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Wood Buffalo Environmental Association

ANNUAL REPORT – VOLUME 3

SITE DOCUMENTATION

March 2019

Operations, Data Collection,
QA/QC, Data Validation and Reporting by:
Wood Buffalo Environmental Association

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Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Fort McKay – Bertha Ganter

LAST UPDATED: 01-30-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

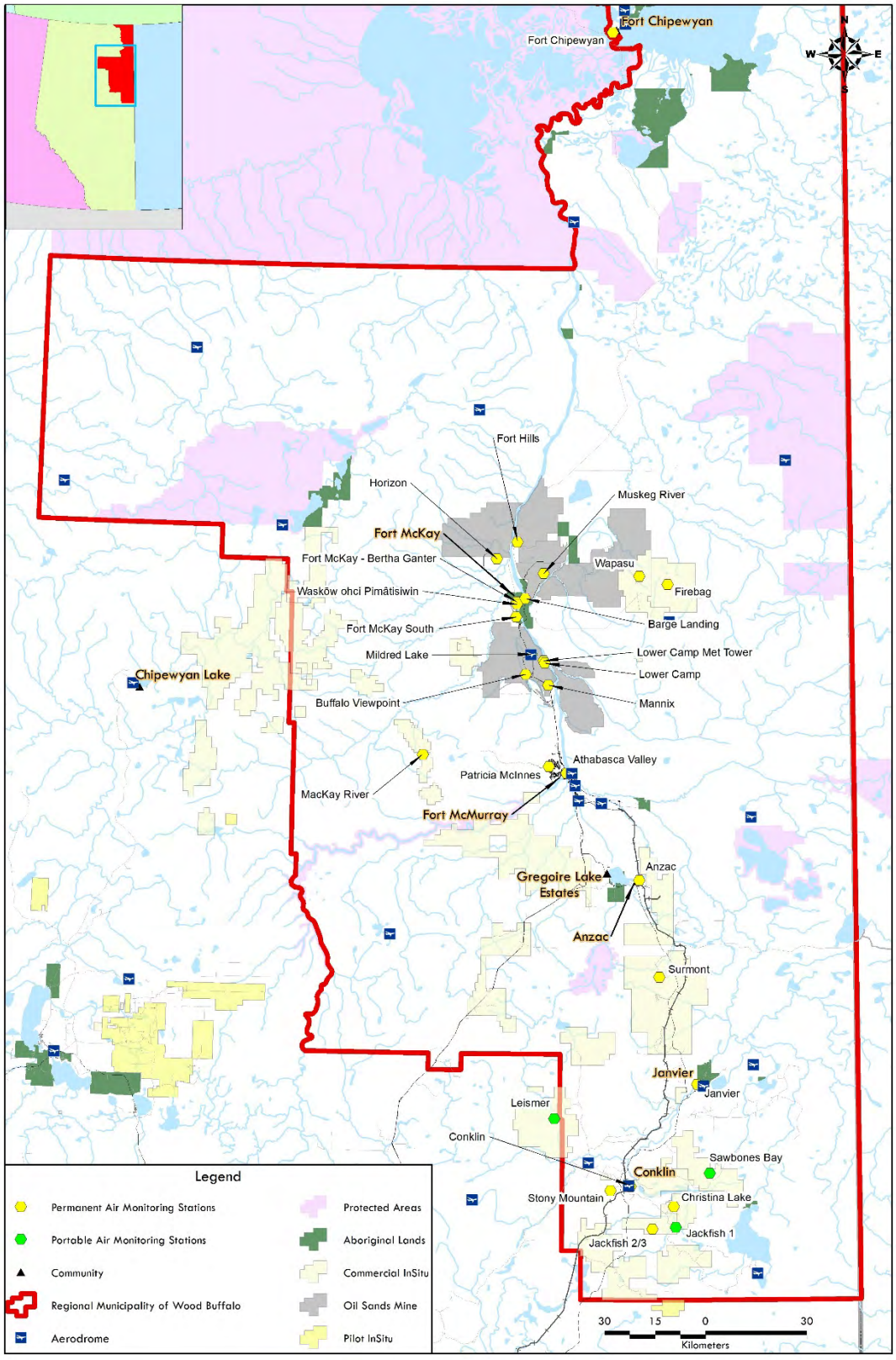


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 01
Station name	Fort McKay – Bertha Ganter
Date station established	October 1997

Location

Station street address	NA
Legal land description	13-25-094-11 W4
Latitude	57°11'21.94"N
Longitude	111°38'26.10"W
UTM East	461284
UTM North	6338654
Nearest community	Fort Mckay
Community population	750

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	NA
Approval number	NA
Contact Name	NA
Address	NA
Phone number	NA
Email address	NA

Site Description

Land use by sector	0 – 90 degrees	Forest and Residential
	91 – 180 degrees	Residential and Water services
	181 – 270 degrees	Forest and Residential
	271 – 360 degrees	Forest and Residential
Site elevation (above sea level)	270	
Angle of elevation to nearby buildings	Greatest angle	0 degree
	Building direction	None
Airflow restrictions	North	None
	East	Trees
	South	None
	West	Trees
Sample manifold	Type	All glass
	Inlet height above roof	1 meter
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	Attached to north side of the station

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Snow dump	20	Occasionally heavy truck and graders parked in the area.

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Gravel road	Low	50	Access road
Gravel road	Medium	200	Access road – Range road 110A

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
CNRL Albian Sands	Oil sands mining	340,000 bpd	10	NE
Syncrude Canada Ltd.	Oil sands mining	350,000 bpd	10	SE

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Scientific	43i	1501301448	June 17, 2015
Total Reduced Sulfur	WBEA	Thermo Scientific	43i-TLE	1218153461	2012
TRS converter	WBEA	CD Nova	CDN-101	470	2012
Oxides of Nitrogen	WBEA	Thermo Scientific	42i	1218153357	2012
Non-Methane Hydrocarbon	WBEA	Thermo Scientific	55i	1152430012	November 25, 2015
Ammonia	WBEA	Teledyne API	T201	475	June 13, 2018
Ammonia converter	WBEA	Teledyne API	M501	484	June 13, 2018
Ozone	WBEA	Teledyne API	T400	1107	January 24, 2017
Aethalometer 33	WBEA	Magee	AE-33	E33-S03-00299	October 26, 2018
Particulate Monitor	WBEA	Teledyne API	T640	306	May 07, 2018
Temperature/RH	WBEA	Vaisala	HMP 155	NA	2015
Wind speed	WBEA	Met One	010C-1	P10041	2015
Wind direction	WBEA	Met One			2015
Precipitation Gauge	WBEA	OTT	Pluvio 2	363524	September 24, 2015
Solar Radiation	WBEA	Eppley Radiometer	8-48	34276	2010
Hi-VOL PUF	WBEA	Tisch	TE-1000	1001060	2018
Partisol 2.5A	WBEA	Thermo Scientific	Partisol – 2000i	200012 0456 1405	2018
Partisol 10A	WBEA	Thermo Scientific	Partisol – 2000i	200012 0457 1405	2018
Partisol 2.5B	WBEA	Thermo Scientific	Partisol – 2000i	200012 04871408	2018
Partisol 10B	WBEA	Thermo Scientific	Partisol – 2000i	200012 04841408	2018
Partisol EC/OC	WBEA	Thermo Scientific	Partisol – 2000i	2000I2 022 1205	2018
Precip Sampler	WBEA	N-CON	ADS 00-120	60192	2018
Precip Sampler	WBEA	TPC	TPC-3000	164	2018
VOC	WBEA	Tisch	TE123	1028	2018
Hi-Vol PUF	ECCC	Tisch	TE-1000	004	2018
SASS	ECCC	MET One	SuperSASS	P15905	2018
Dichot A	ECCC	Thermo Scientific	2000i-D	2000iD-2-01101102	2018
Dichot B	ECCC	Thermo Scientific	2000i-D	2000iD-01161103	2018
VOC	ECCC	Xontech	911/912	6283	2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9036
Zero air generator	Zero Air Generator	Teledyne/API	T701	262
HVAC	Heating and air conditioning system. Wall mount unit	BARD	2 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	NA
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700P	2464
Datalogger	Logger for camera and AE33	Campbell Scientific	CR1000	23051
Datalogger	Logger for Pluvio and N-Con sampler	Campbell Scientific	CR6	1249
Hydrogen generator	Hydrogen generator for NMHC	AMA	HG 300	171067041

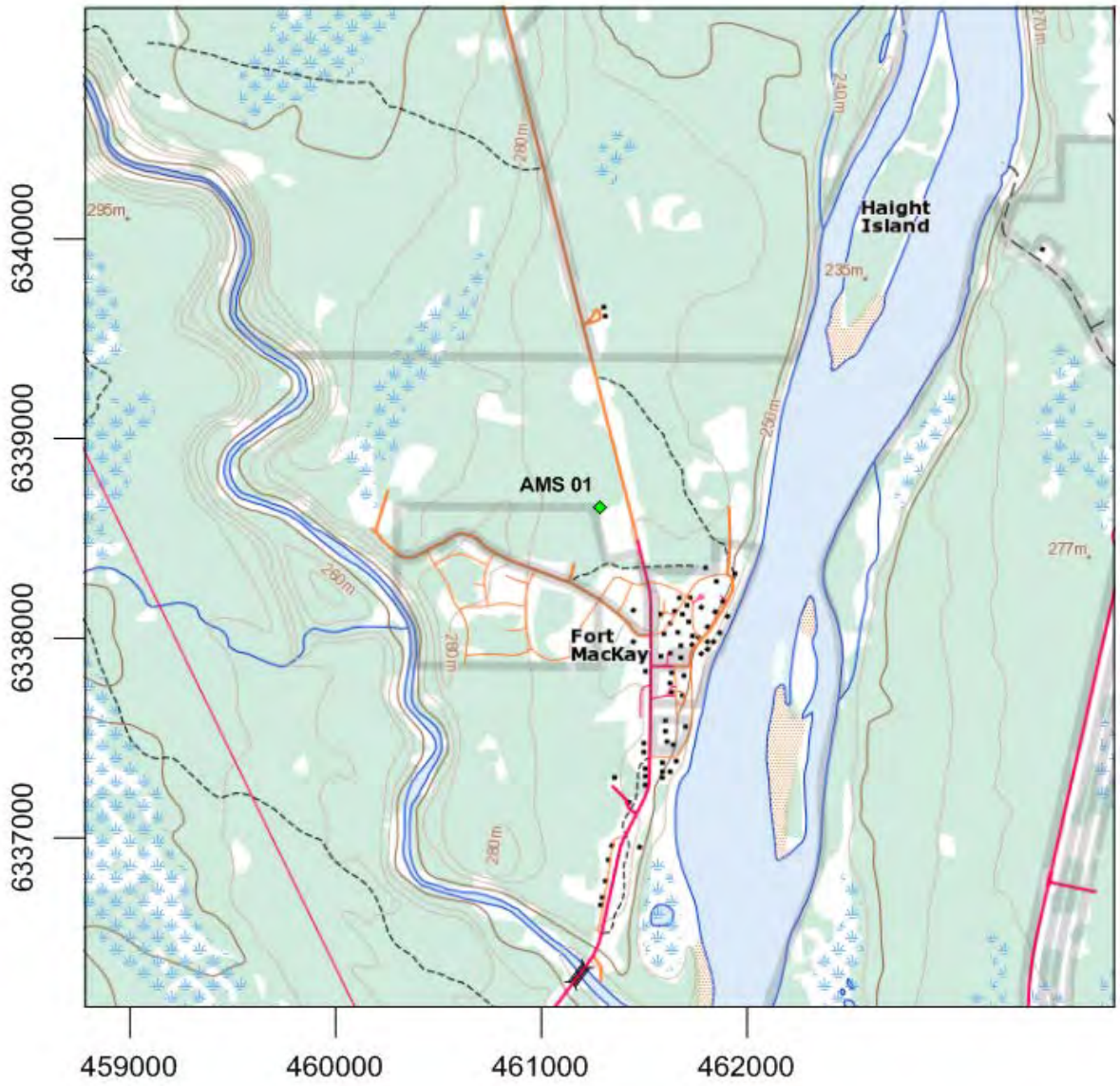
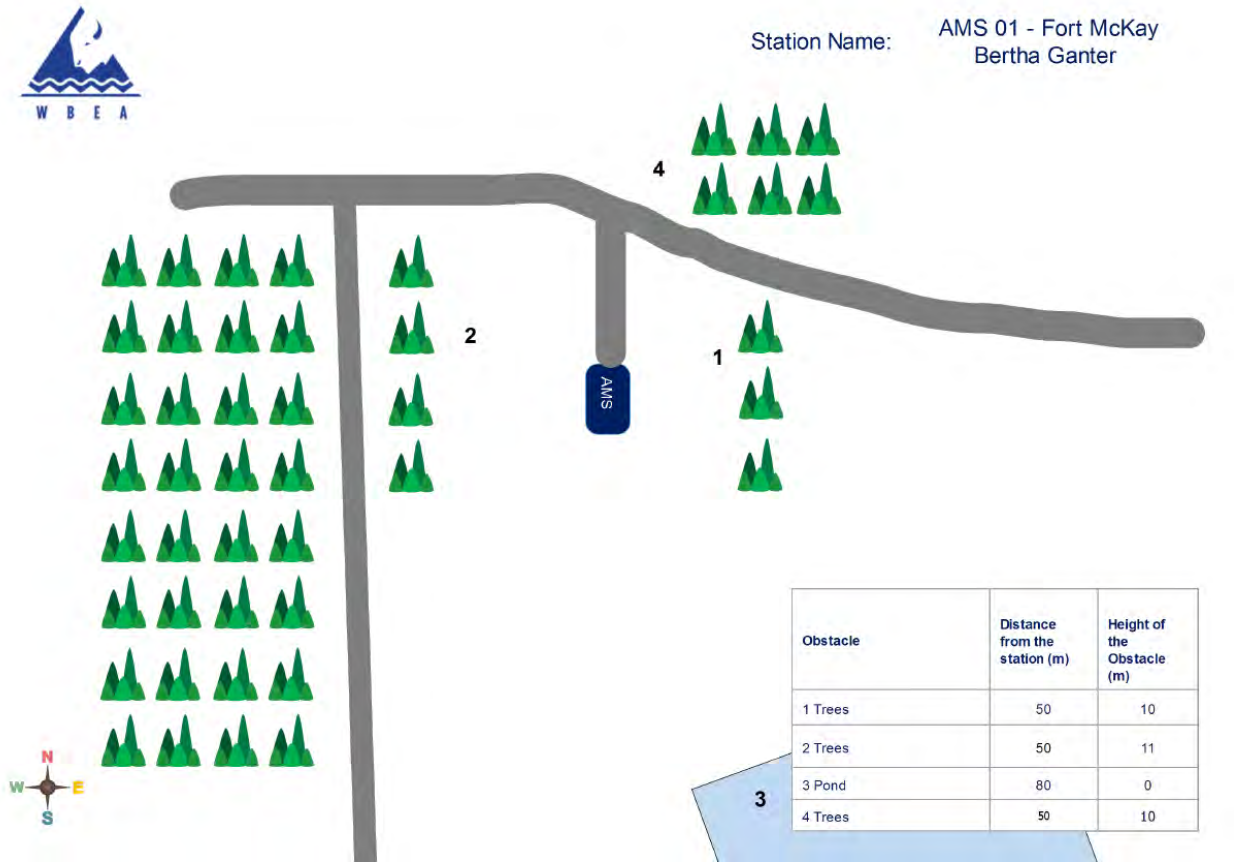


Figure 2.0 – Area Topographic map showing AMS 01



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	50	10
2 Trees	50	11
3 Pond	80	0
4 Trees	50	10

Figure 3.0 – Plan view sketch for AMS 01 site



Figure 4.0 – Aerial photo showing AMS 01

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

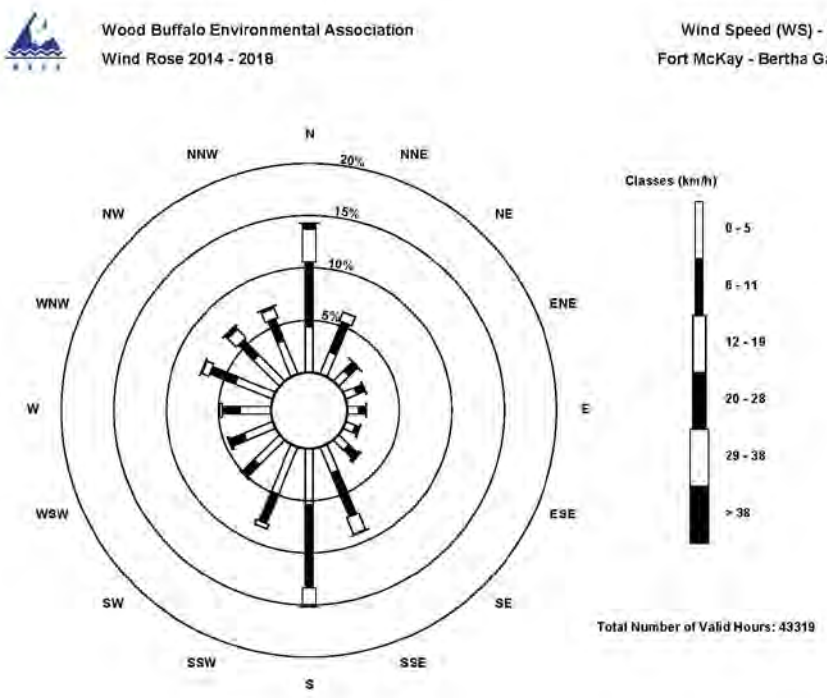


Figure 7.0 – Windrose (2014-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Mildred Lake

LAST UPDATED: 02-15-2019

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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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

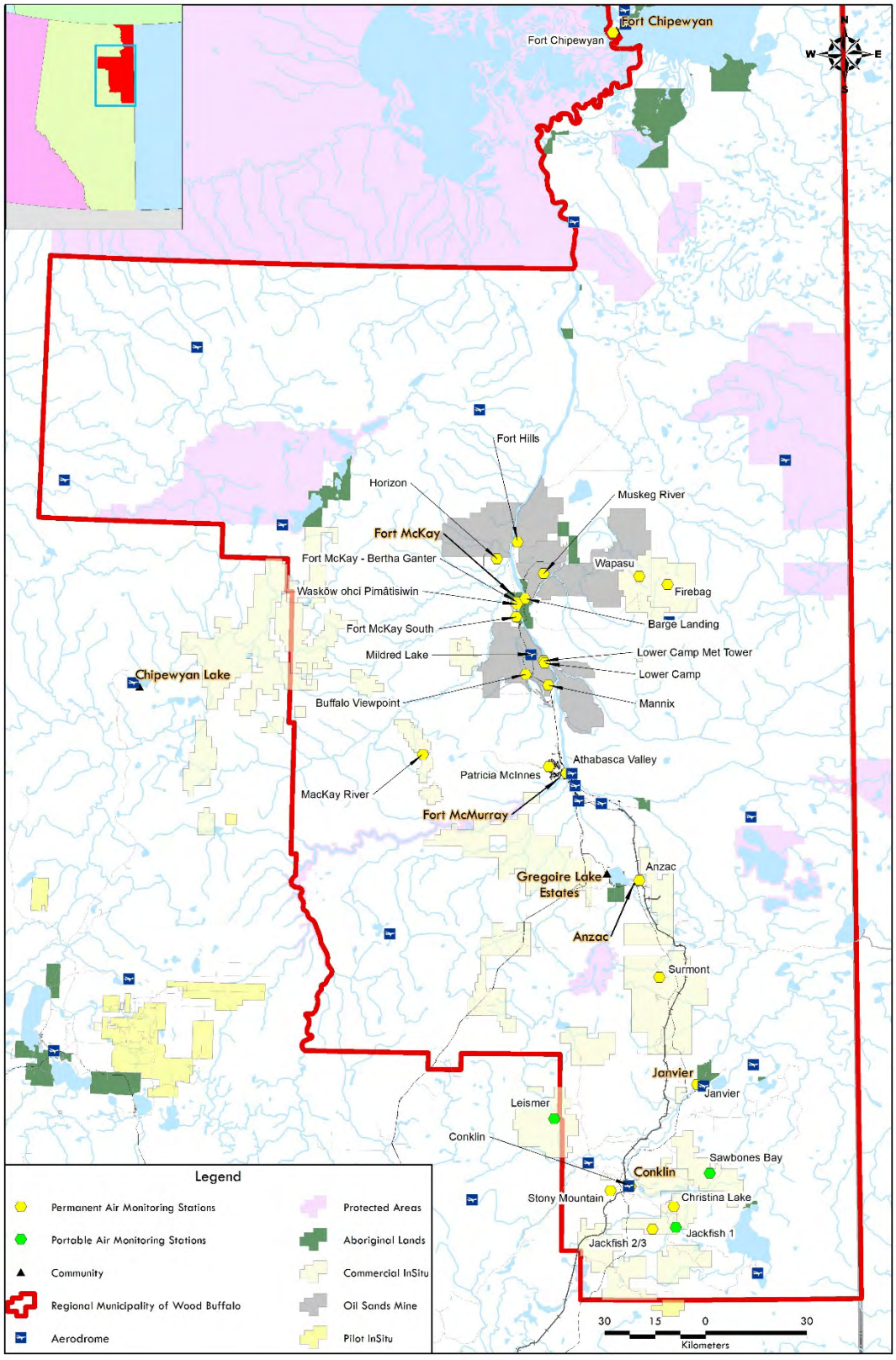


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 02
Station name	Mildred Lake
Date station established	June 1st, 1979

Location

Station street address	Located at the south end of the Syncrude airstrip, 400m west of HWY 63
Legal land description	8-08-093-10 W4
Latitude	57° 3’0.02” North
Longitude	111°33’50.93” West
UTM East	465775
UTM North	6338654
Nearest community	Fort Mackay
Community population	742 (2016)

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Syncrude Canada Limited
Approval number	026-02-00
Contact Name	Brooke Bennett
Address	Bag 4009, MD 4160, Fort McMurray, Alberta, T9H 3L1
Phone number	780-790-5692
Email address	Bennett.brooke@syncrude.com

Site Description

Land use by sector	0 – 90 degrees	Waiting trailers, Paved parking area, open field
	91 – 180 degrees	Air strip gate and access road
	181 – 270 degrees	Wooded area
	271 – 360 degrees	Waiting trailers, Syncrude Air Strip
Site elevation (above sea level)	314 m	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	North
Airflow restrictions	North	Yes
	East	No
	South	No
	West	No
Sample manifold	Type	All glass

	Inlet height above roof	1 metre
Meteorological Sensors	Type	Cup and vane
	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Waiting trailers	15m	Waiting area for flights
Airstrip	20m	Syncrude airstrip used by small, single engine planes

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Access Road	Low	50	Paved secondary road for industrial access frequented by pick up trucks, heavy equipment, and tractor trailers.
Highway 63	Medium	300	Provincial highway frequented by tractor trailers, heavy equipment and light vehicles.

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Syncrude	Oil Sands Plant	350,000	5	West
Suncor	Oil Sands Plant	194,000	20	South East

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	4007	January 2015
Hydrogen Sulfide	WBEA	Thermo	450i	621	N/A
Total Hydrocarbon	WBEA	Thermo	51i	10244	October 2017
Temperature/RH	WBEA	Vaisala	HMP155	G4340061	N/A
Wind speed	WBEA	Met One	010C-1	E5130	N/A
Wind direction	WBEA	Met One	020C-1	B1462	N/A

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	10252
Zero air generator	Zero Air Generator	Teledyne/API	701	12619
Mitsubishi Electric Mr Slim	Heating and air conditioning system. Wall mount unit	R410A	MUY-GE15NA	30025603T
Shelter / Building	Air monitoring portable	CNB	8 x 16 trailer	SBB81408
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	10054

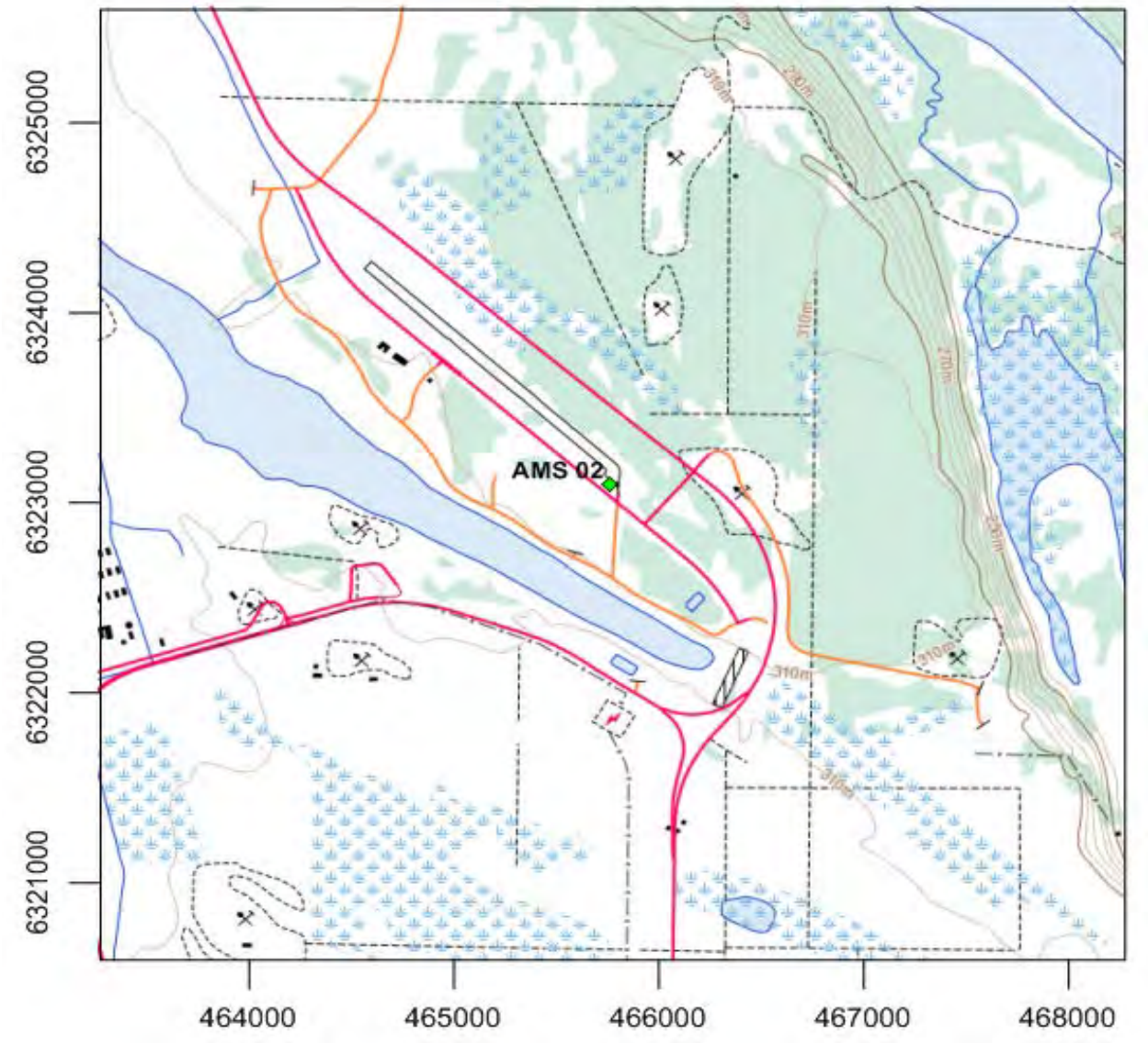
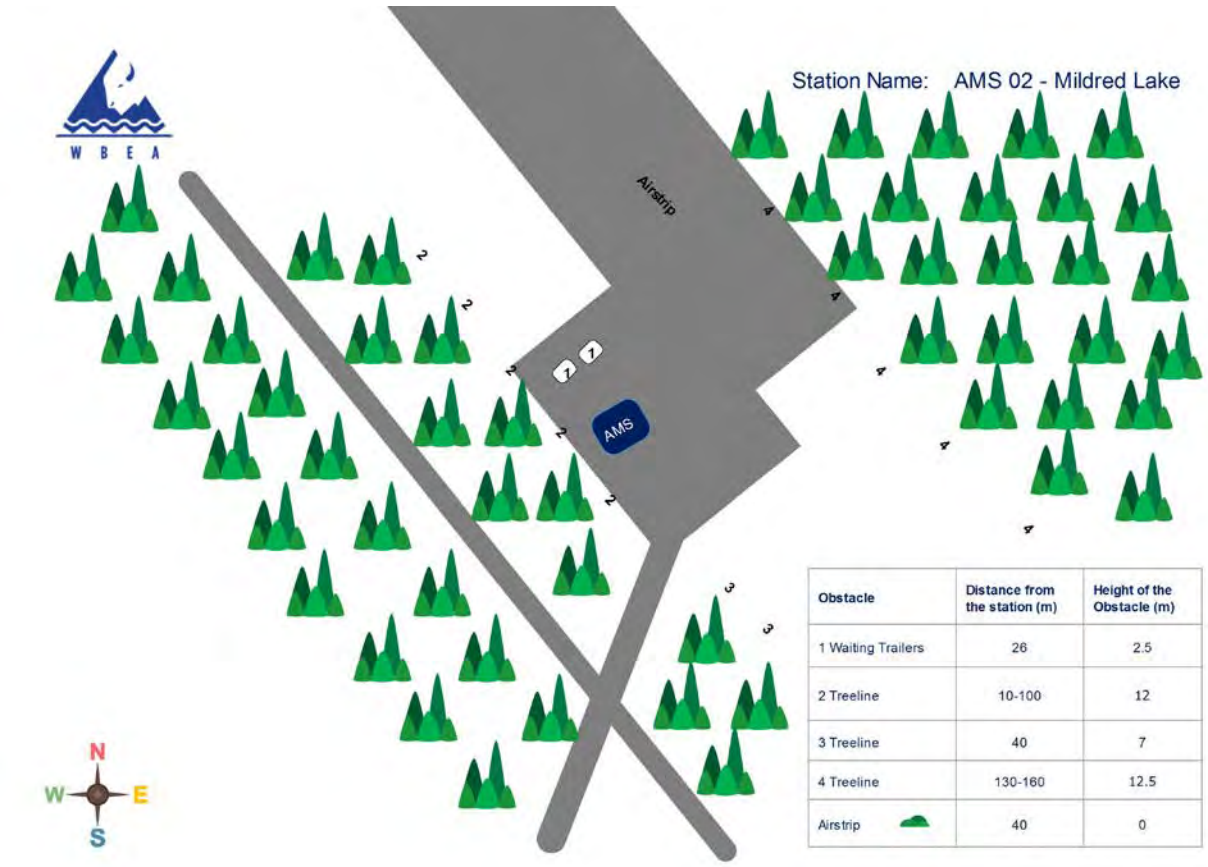


Figure 2.0 – Area Topographic map showing AMS 02 – Mildred Lake



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Waiting Trailers	26	2.5
2 Treeline	10-100	12
3 Treeline	40	7
4 Treeline	130-160	12.5
Airstrip	40	0

Figure 3.0 – Plan view sketch for AMS 02 – Mildred Lake



Figure 4.0 – Aerial photo showing AMS 02 – Mildred Lake

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

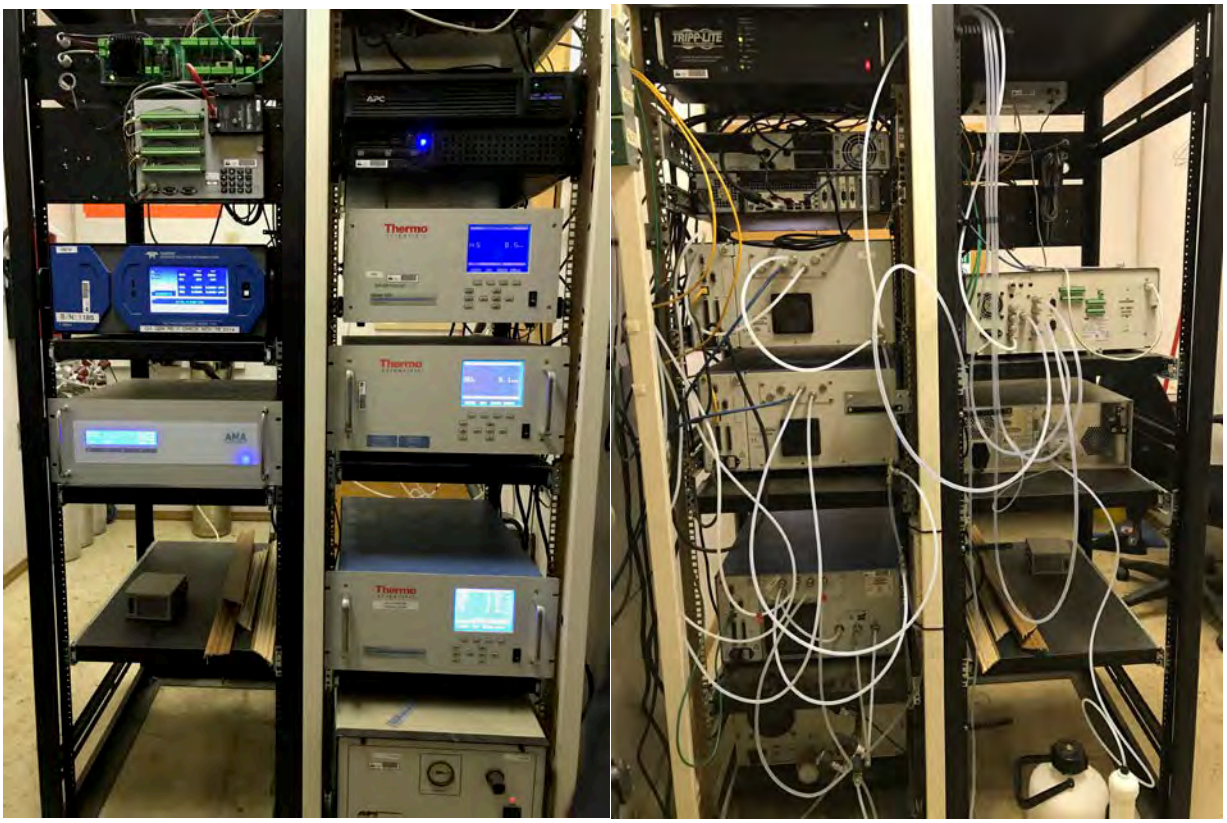


Figure 6.2 –Photo of front and back of instrument rack

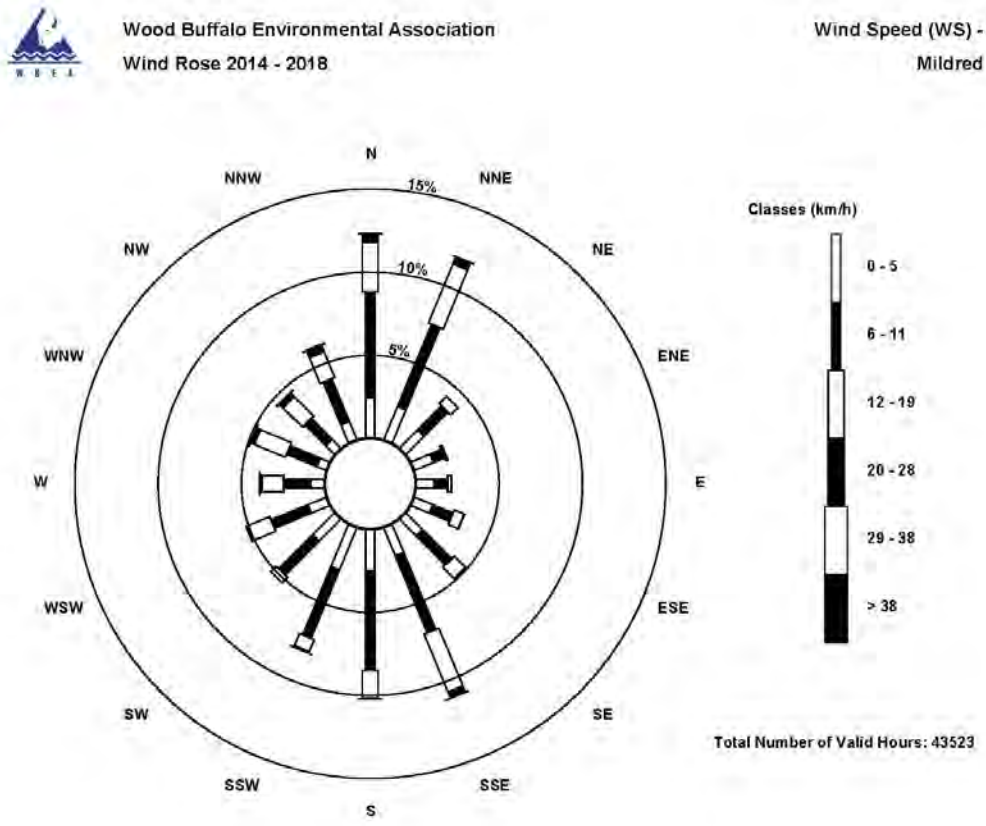


Figure 7.0 – Windrose (2014 – 2018)

Wood Buffalo Environmental Association
Ambient Air Monitoring Station
Site Documentation

AMS 04 – Buffalo View Point

LAST UPDATED: 02-15-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

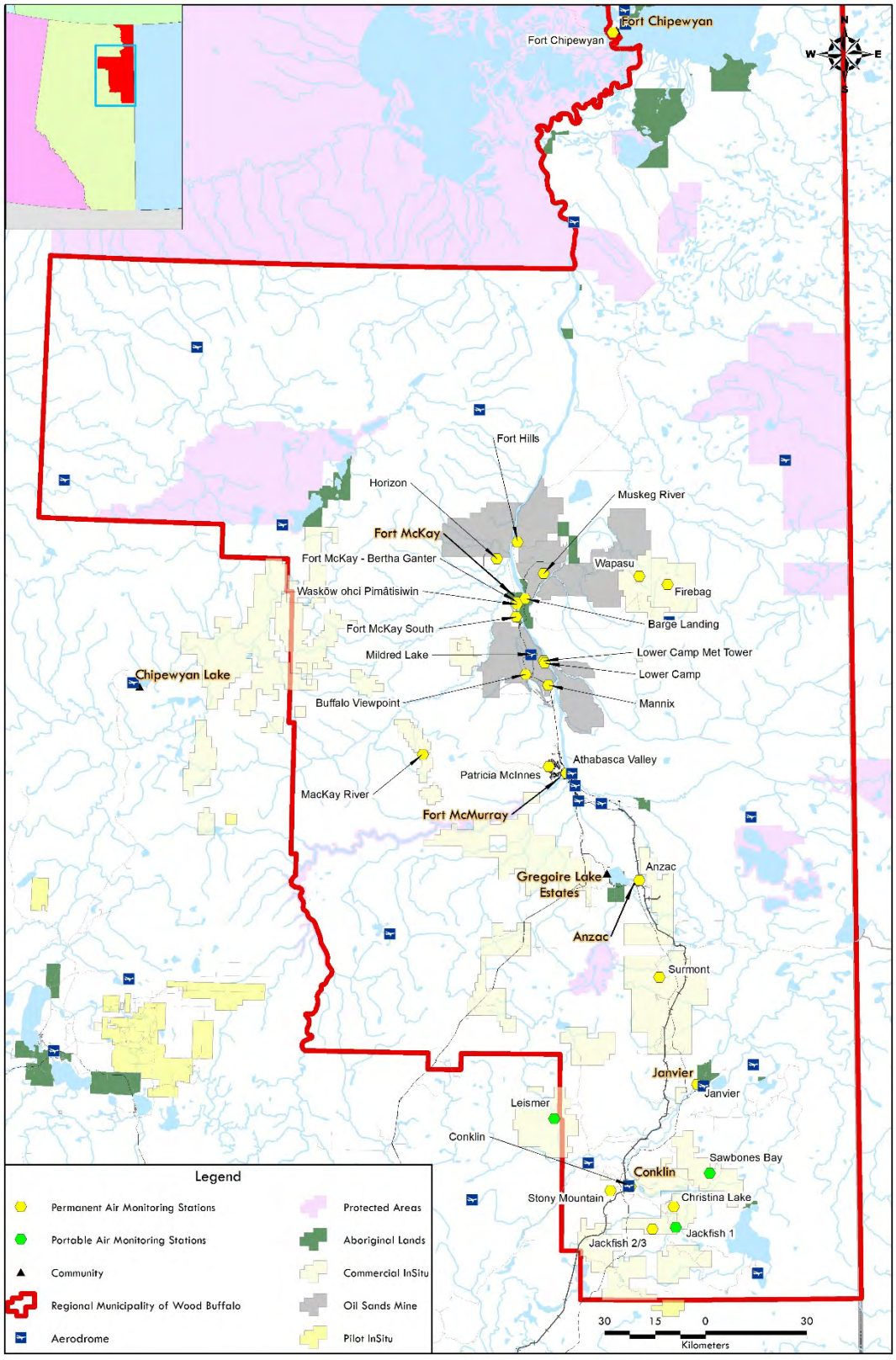


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 04
Station name	Buffalo View Point
Date station established	1979

Location

Station street address	NA
Legal land description	9-19-092-10 W4
Latitude	56°59’46.17”N
Longitude	111°35’38.22”W
UTM East	461284
UTM North	6338654
Nearest community	Fort McKay
Community population	742

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Syncrude Canada Ltd
Approval number	026-02-00
Contact Name	Brooke Bennett
Address	NA
Phone number	780-881-3304
Email address	bennett.brooke@syncrude.com

Site Description

Land use by sector	0 – 90 degrees	Oil Sands Plant
	91 – 180 degrees	Forest
	181 – 270 degrees	Forest
	271 – 360 degrees	Oil Sands Plant
Site elevation (above sea level)	315m	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10m
	Distance from station	Attached to North end of Monitoring Shelter

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Dirt	Very Low	2 North	Access road to AMS 4
Dirt	Medium	147 North	Road used to access North American/Syncrude Area
HighWay	High	758 East	Paved Highway mostly used by public

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Syncrude	Oilsands Plant	350,000	5.12	North
Suncor	Oilsands Plant	194,000	7.8	SouthEast
Syncrude	Buffalo Farm		0.32	NorthWest
Syncrude	Tailings Pond		0.8	North East

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	1327300932	May 2017
Hydrogen Sulfide	WBEA	Thermo	450i	1336160094	May 2017
Oxides of Nitrogen	WBEA	Teledyne/API	T200	1035	May 2017
Ozone	WBEA	Teledyne/API	T400	2961	May 2017
PM2.5	WBEA	Thermo	5030	E-803	May 2017
Methane non Methane	WBEA	Thermo	55i	1180320039	Jan 2019
Temperature/RH	WBEA	Vaisala	HMP155	G4330041	May 2017
Wind speed	WBEA	Met One	010C-1	E5131	May 2017
Wind direction	WBEA	Met One	020C-1	P10612	May 2017
Visibility	WBEA	Viasala	PWD22	H5030007	May 2017
Hi Vol Puf	ECCC	Tisch	TE-1004BL	3821	May 2017
Dichot	ECCC	Thermo	Partisol-2000iD	200ID2 01301103	May 2017
Dichot	ECCC	Thermo	Partisol-2000iD	200ID2 01271103	May 2017
SASS	ECCC	Met One Instruments	SASS	T16914	May 2017
VOC	ECCC	XONtech	911/912	6280	May 2017

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2635
Zero air generator	Zero Air Generator	Teledyne/API	701H	362
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	330N122967779-01
Shelter / Building	Air monitoring portable	National	8 x 16 trailer	NA
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	3060
Hydrogen generator	Hydrogen Generator	AMA	HG300	171067037

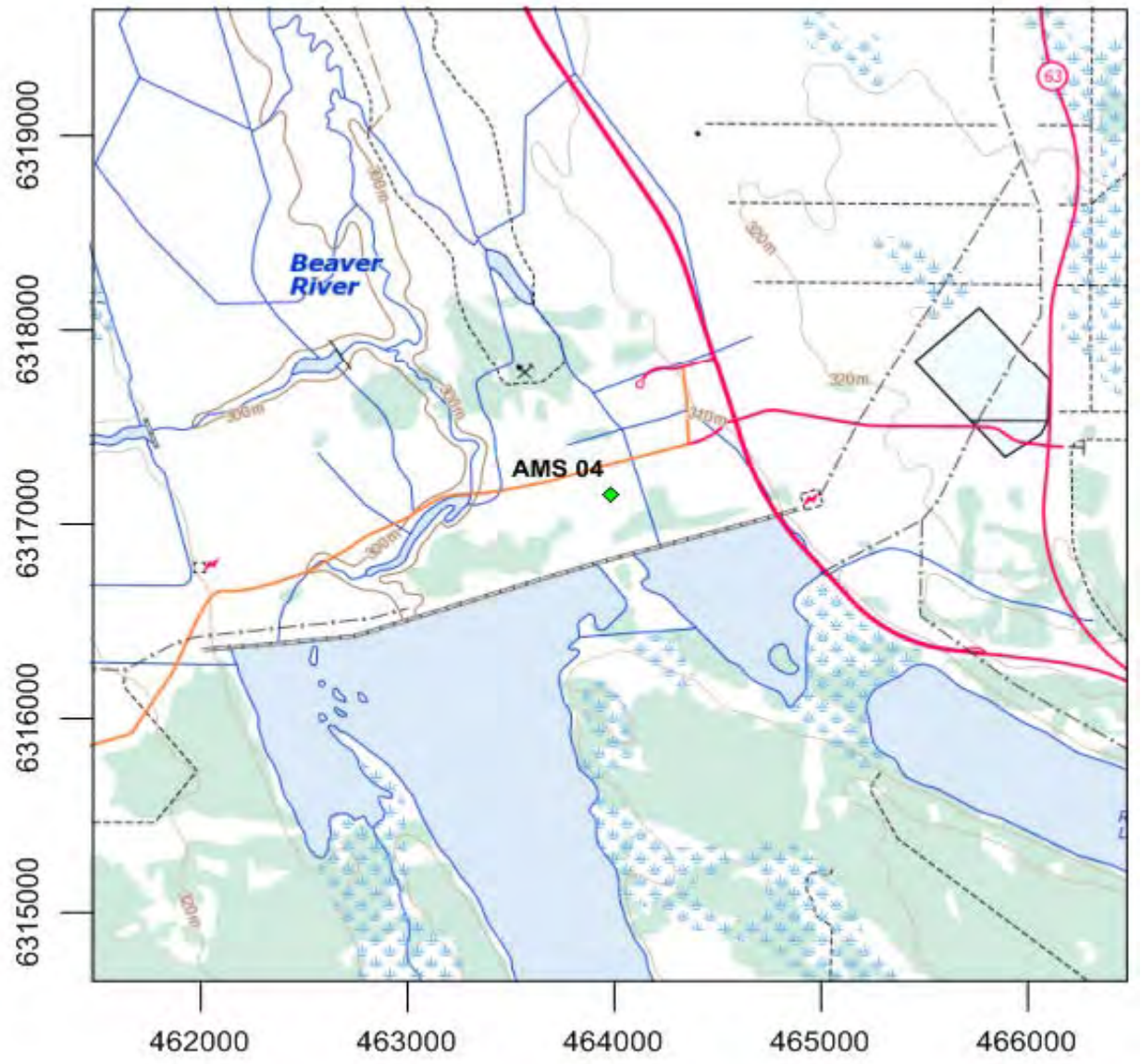
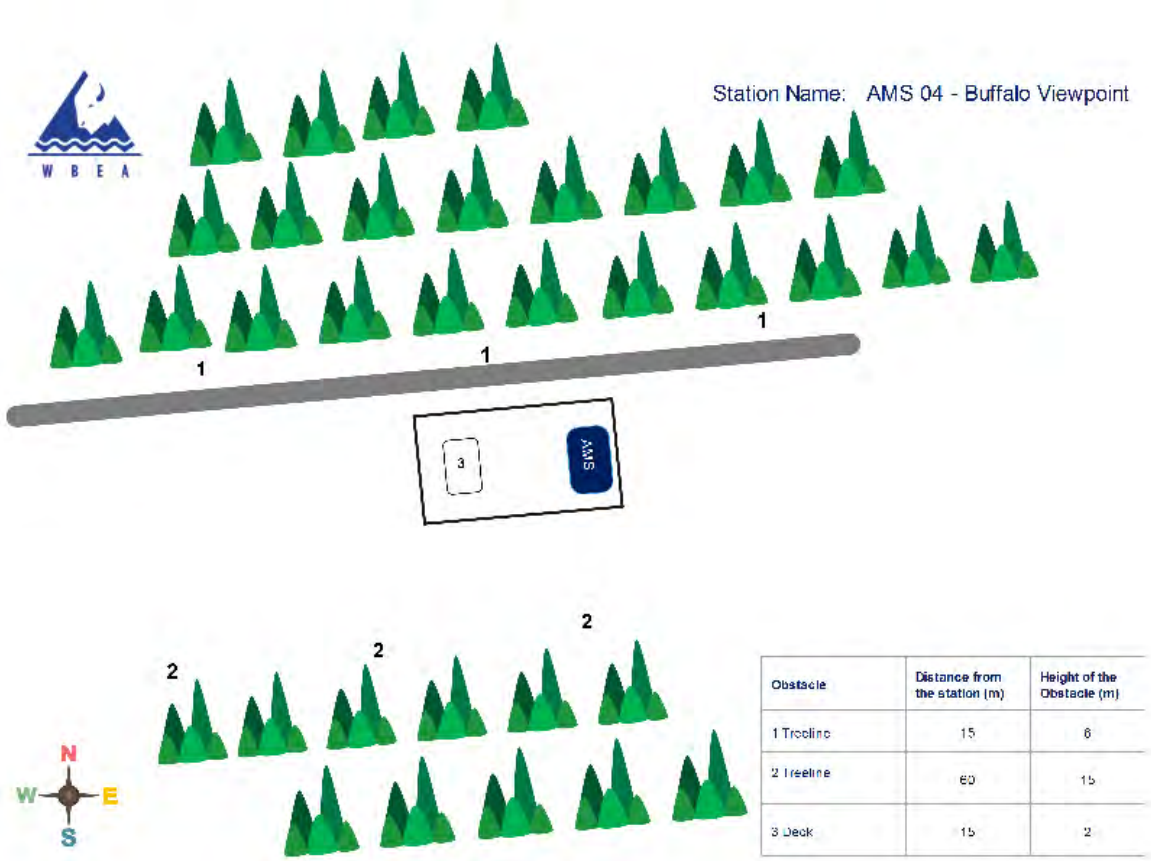


Figure 2.0 – Area Topographic map showing AMS 04



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Treeline	15	6
2 Treeline	60	15
3 Deck	15	2

Figure 3.0 – Plan view sketch for AMS 04 site



Figure 4.0 – Aerial photo showing AMS 04

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.

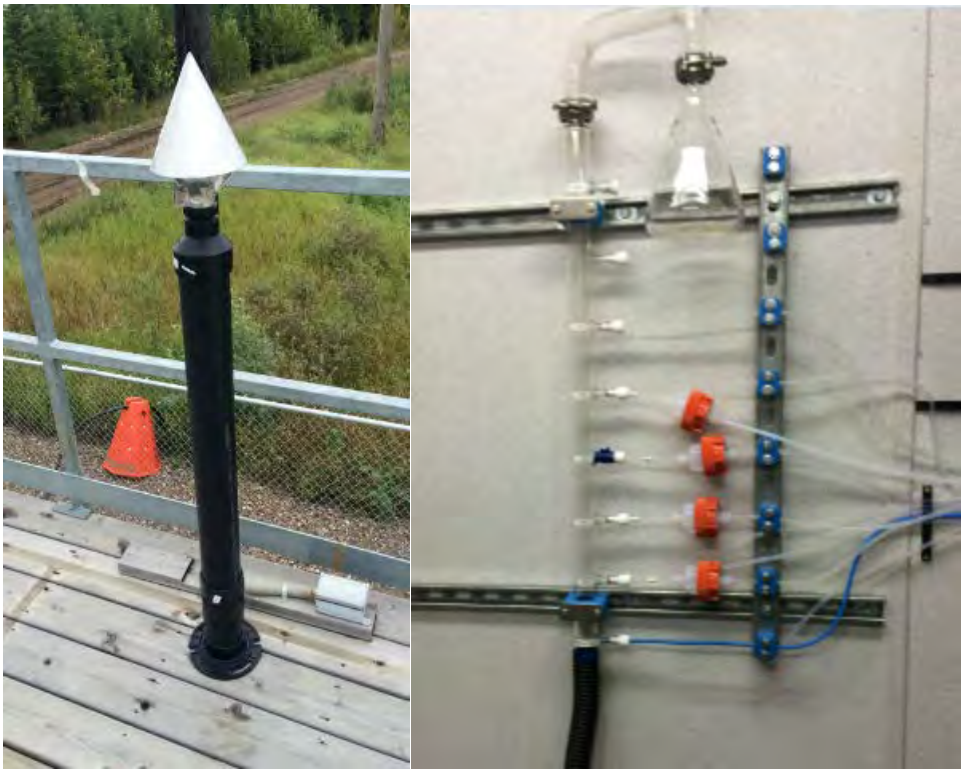


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



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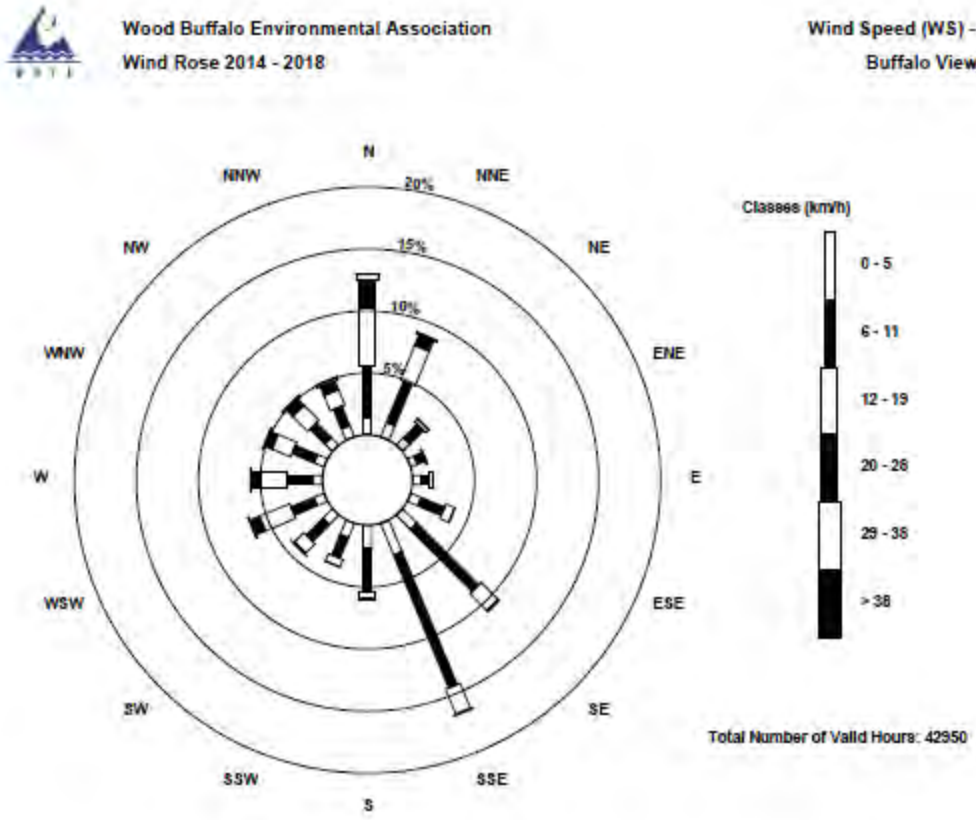


Figure 7.0 – Windrose (5 Year)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Mannix

LAST UPDATED: 02-15-2019

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WBEA Monitoring Network

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1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

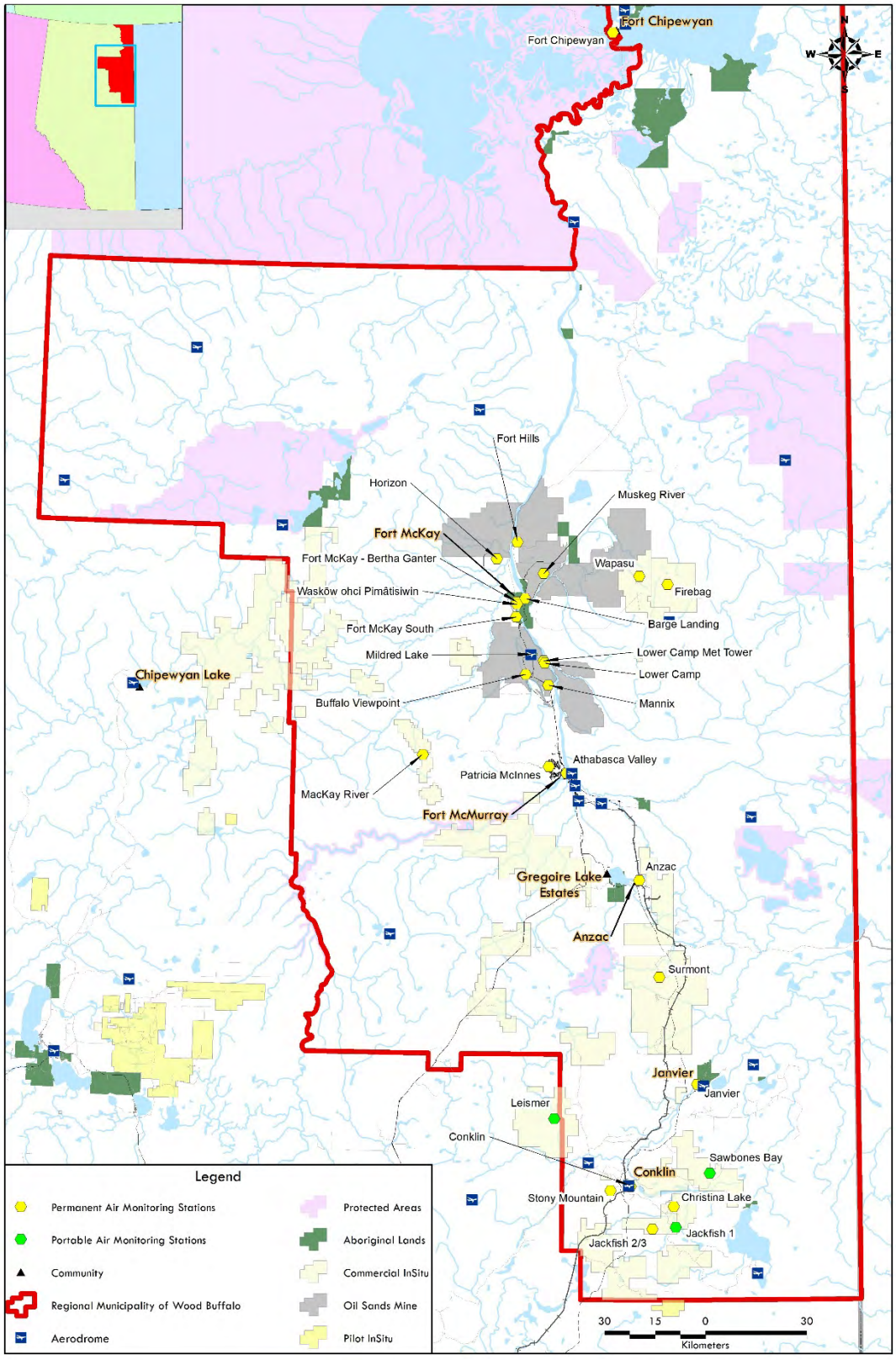


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 05
Station name	Mannix
Date station established	1975

Location

Station street address	Located south of Suncor Range road 101 off of Suncor Base Plant road.
Legal land description	9-11-092-10 W4
Latitude	56°58’4.67” North
Longitude	111°28’55.56”
UTM East	470688
UTM North	6313923
Nearest community	Fort McMurray
Community population	66,000

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Suncor Energy Inc.
Approval number	92-00-00
Contact Name	Sheri LePoudre
Address	P.O. Box 4001 Fort McMurray, Alberta, T9H 3E3
Phone number	403-296-8271
Email address	slepoudre@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 (above sea level)	332 m	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	N/A
Airflow restrictions	North	No
	East	No
	South	No
	West	No

Sample manifold	Type	All glass
	Inlet height above roof	1 metre
Meteorological Sensors	Type	Ultrasonic Anemometer
	Height above ground	20, 45, 75, 90 m
	Distance from station	22.5 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
N/A	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
NA	Storage tank complex	NA	0.2	East

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	1008841399	N/A
Hydrogen Sulfide	WBEA	Thermo	450i	0815129108	N/A
Total Hydrocarbons	WBEA	Thermo	51i	1180540021	May 2018
Temperature/RH	WBEA	Vaisala	HMP155	N2910512	N/A
Temperature/RH	WBEA	Vaisala	HMP155	J5140014	N/A
Temperature/RH	WBEA	Vaisala	HMP155	G4340038	N/A
Temperature/RH	WBEA	Vaisala	HMP155	J3310032	N/A
Temperature/RH	WBEA	Vaisala	HMP155	N3840524	N/A
Anenometer 20m	WBEA	Young USA	81000	N/A	September 2018
Anenometer 45m	WBEA	Young USA	81000	N/A	September 2018
Anenometer 75m	WBEA	Young USA	81000	N/A	September 2018
Anenometer 90m	WBEA	Young USA	81000	N/A	September 2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2580
Zero air generator	Zero Air Generator	Teledyne/API	701	146
HVAC	Heating and air conditioning system. Wall mount unit	BARD	W12A2-A05EPXXXJ	330C132993376-01
Shelter / Building	Air monitoring portable	Monitoring Shelter	8 x 16 wood	SAA81407
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	997

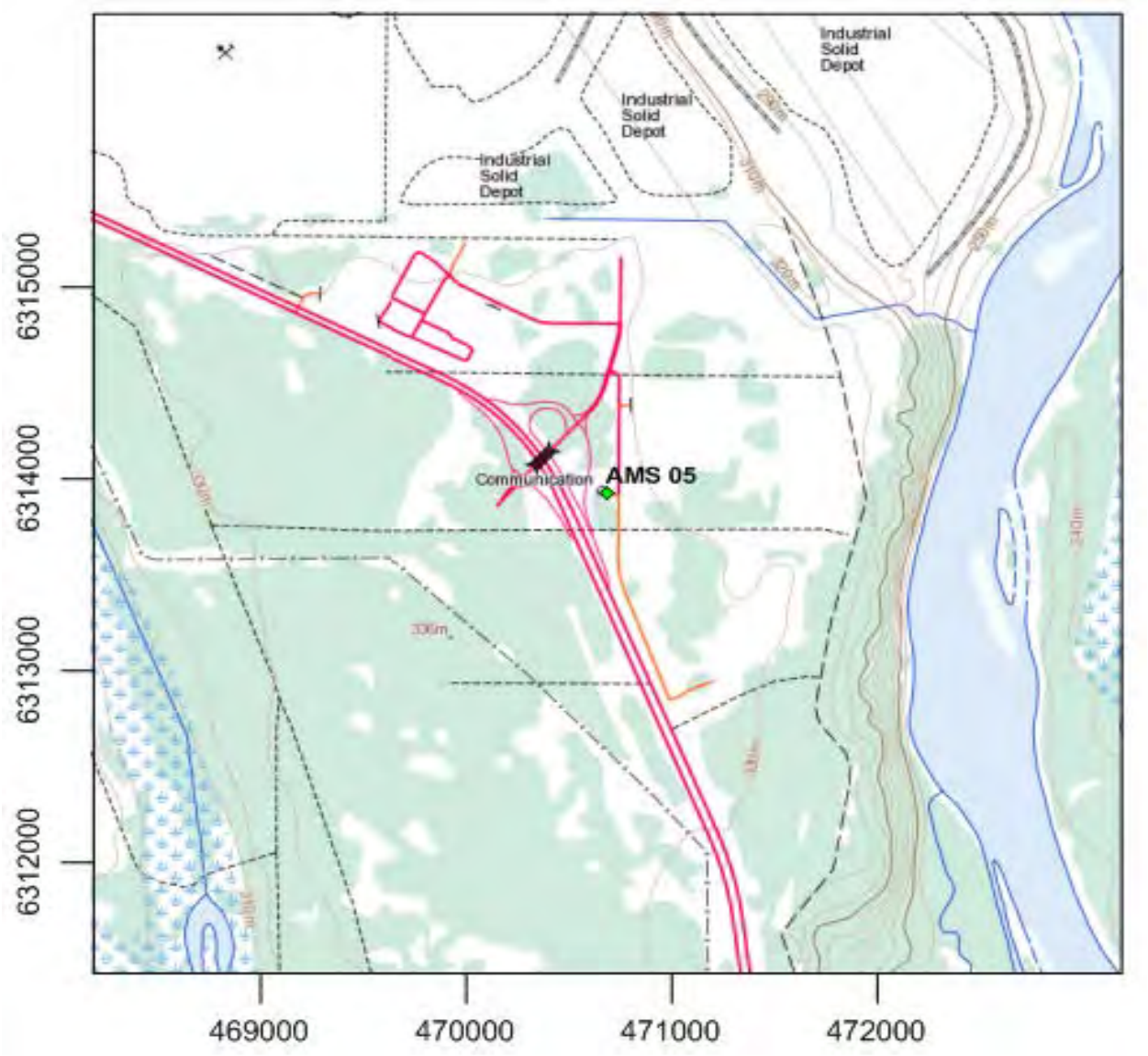
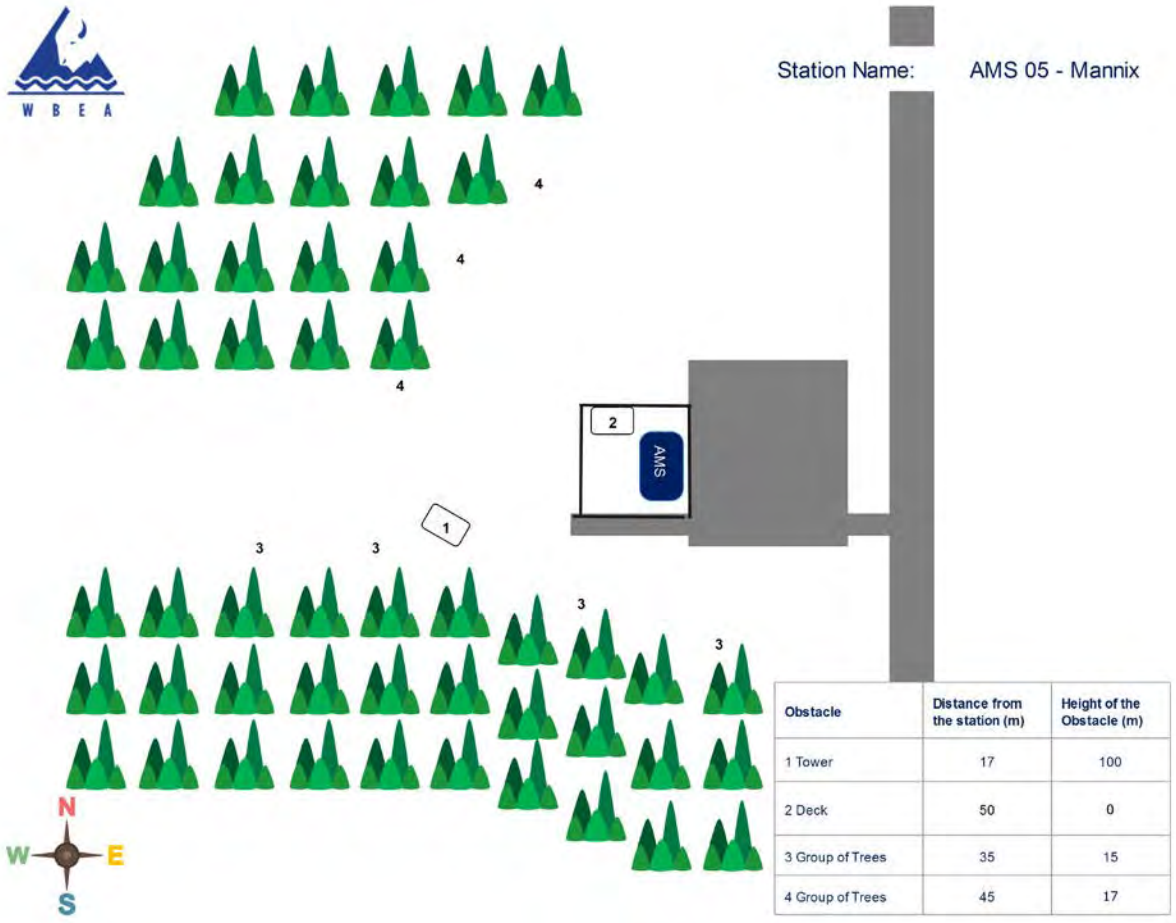


Figure 2.0 – Area Topographic map showing AMS 05 – Mannix



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Tower	17	100
2 Deck	50	0
3 Group of Trees	35	15
4 Group of Trees	45	17

Figure 3.0 – Plan view sketch for AMS 05 – Mannix site



Figure 4.0 – Aerial photo showing AMS 05 - Mannix

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.

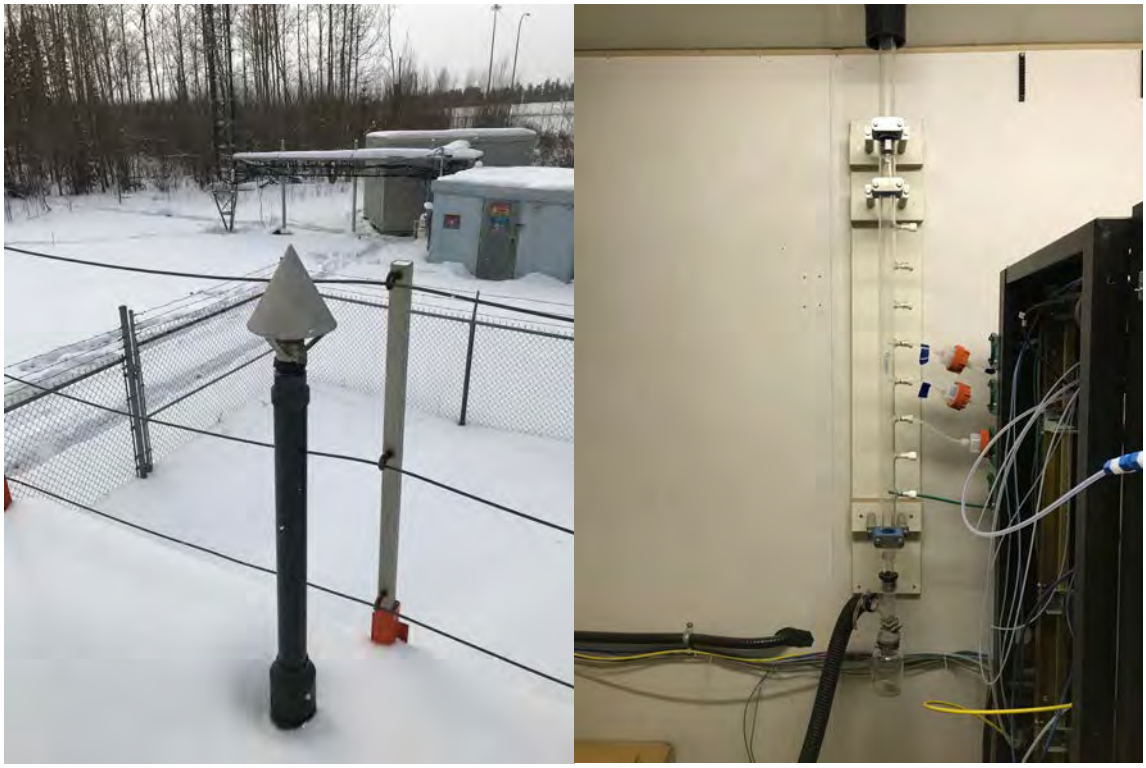


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

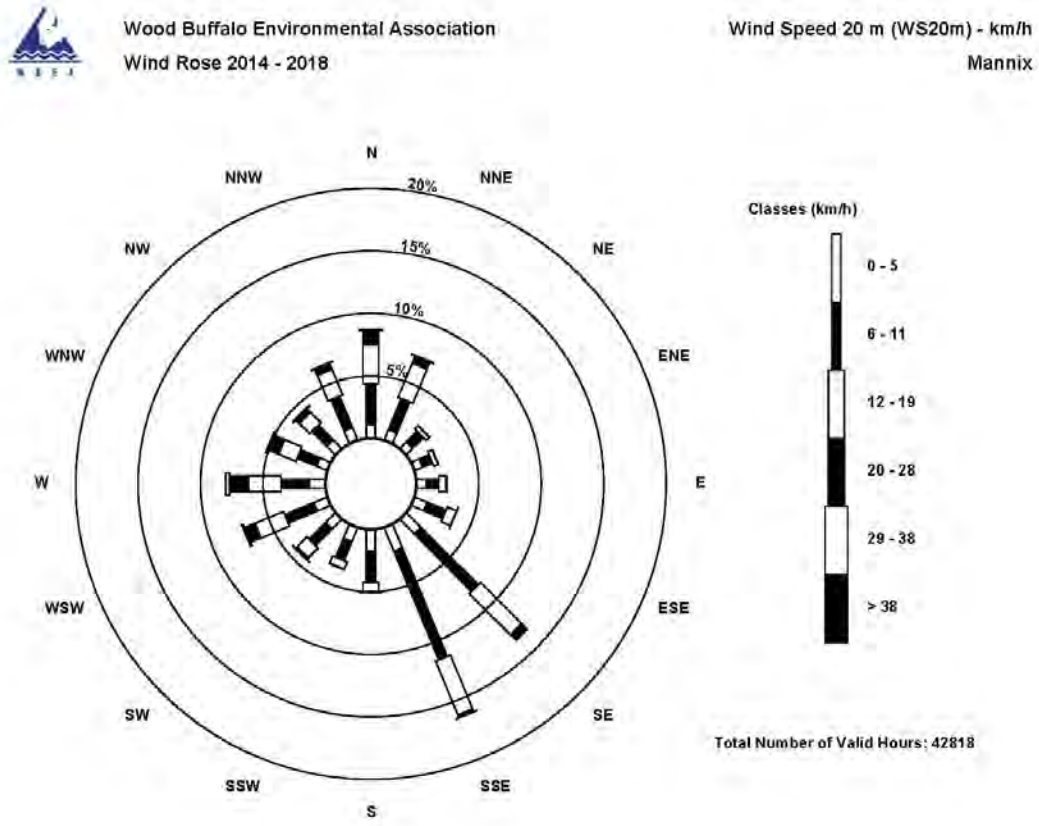


Figure 7.0 – Windrose (2014 - 2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

AMS 06- Patricia McInnes

LAST UPDATED: 02-19-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

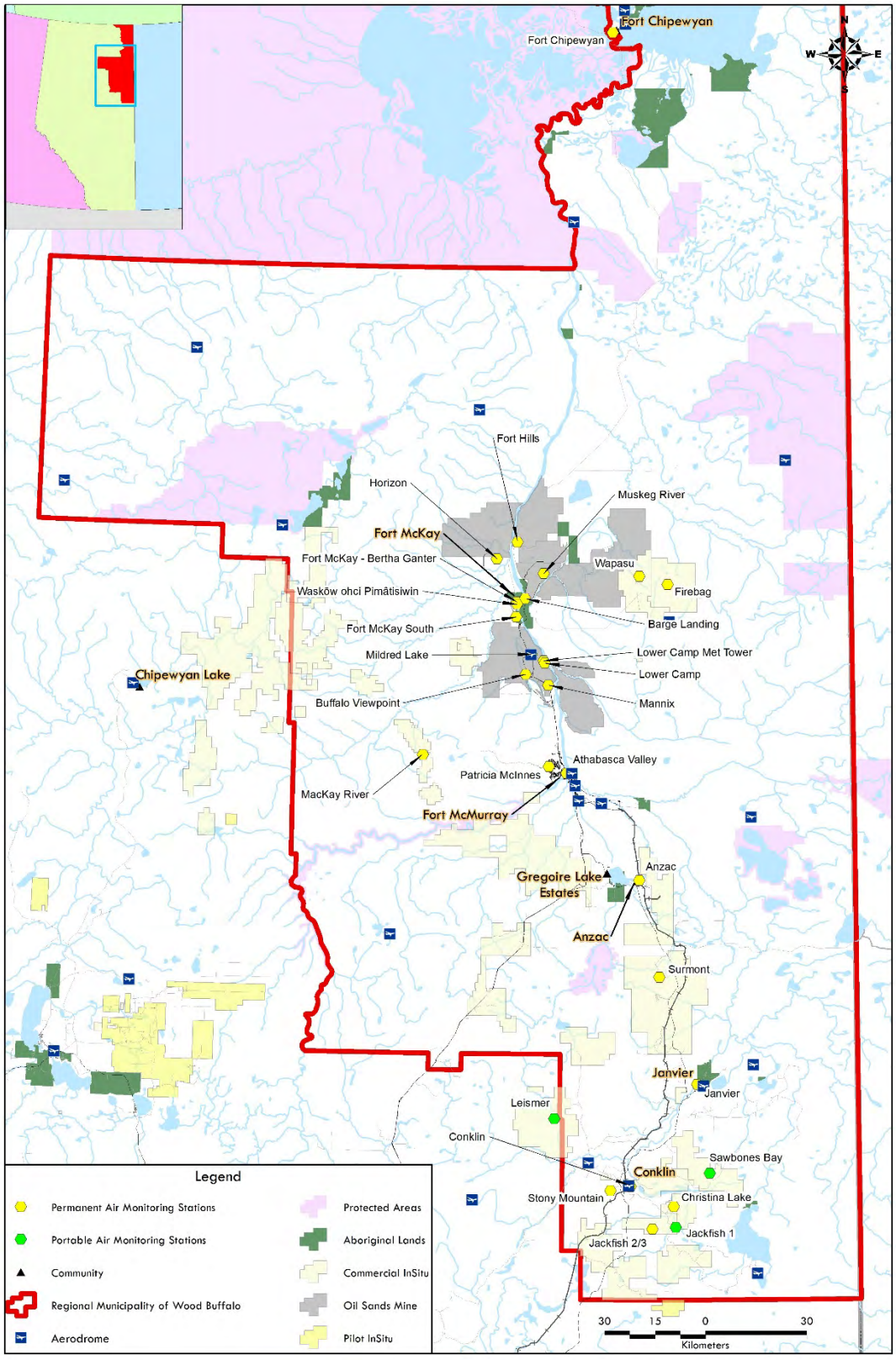


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 06
Station name	Patricia McInnes
Date station established	1998

Location

Station street address	Carteret Street, Fort McMurray
Legal land description	10-26-089-10 W4
Latitude	56°45’4.96” North
Longitude	111°28’36.10” West
UTM East	470849
UTM North	6289812
Nearest community	Located in Fort McMurray
Community population	67,000

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	N/A
Approval number	N/A
Contact Name	Wood Buffalo Environmental Association
Address	Unit 3 – 805 Memorial Drive, Fort McMurray, AB
Phone number	780-799-4420
Email address	info@wbea.org

Site Description

Land use by sector	0 – 90 degrees	Residential
	91 – 180 degrees	Residential
	181 – 270 degrees	Sports Grounds
	271 – 360 degrees	Sports Grounds
Site elevation (above sea level)	362 m	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	1 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Recreational Complex	About 20-50 meters, North to North West of Station	Maintenance of sports fields and recreational complex, possible PM and NOx sources.
Residential Subdivision	S and SW of station about 100m	Wood burning in household stoves and backyard firepits.

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Residential Road	Medium	30	Paved road

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Fort McMurray Water Treatment Plant	Water treatment plan.	NA	4	
Eveready	Ashphalt Production	NA	4	
Suncor/ Syncrude	Oil Sands Production	NA	15	

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	1008841397	NA
TRS	WBEA	Teledyne/API	43i-TLE	1218153358	NA
CH4/NMHC	WBEA	Thermo	55i	1180320038	NA
Oxides of Nitrogen	WBEA	Thermo	42i	1172750022	NA
NH3	WBEA	API	T 201	215	NA
O3	WBEA	Thermo	49i	1300156234	NA
PM 2.5	WBEA	SHARP	5030	E-1475	NA
Temperature/RH	WBEA	Vaisala	HMP155	J5140017	NA
Wind speed	WBEA	Met One	010C-1	E5132	NA
Wind direction	WBEA	Met One	020C-1	E4854	NA
PM 2.5 A	WBEA	Partisol	2000i	20001202151205	NA
PM 2.5 B	WBEA	Partisol	2000i	20001203881308	NA
PM 10 A	WBEA	Partisol	2000i	2001204831408	NA
PM 10 B	WBEA	Partisol	2000i	200IW205251411	NA
PAH	WBEA	Tisch	TE-1004BL	1001059	NA
VOC	WBEA	Tisch	TE-123	1021	NA
Precipitation	WBEA	MIC	AUC	733	NA
Particulate Matter	Health Canada	Omni	400	2044	NA

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	10957
Zero air generator	Zero Air Generator	Teledyne/API	701	26
HVAC	Heating and air conditioning system. Wall mount unit	BARD	2 ton	314H183561152-02
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	09 14786
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2447
Thermal Oxidxer	H2S Converter	CDN	101	521

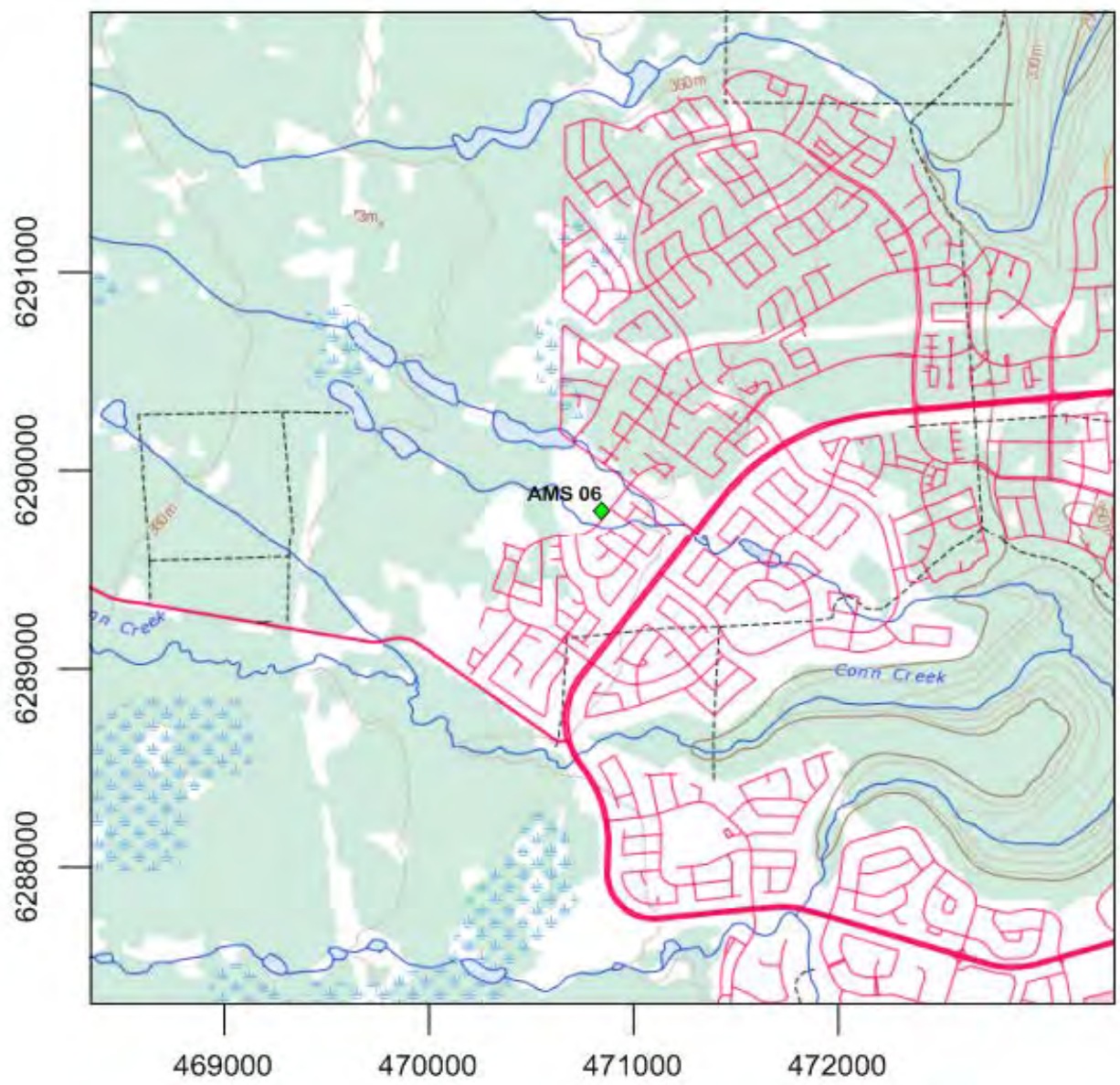
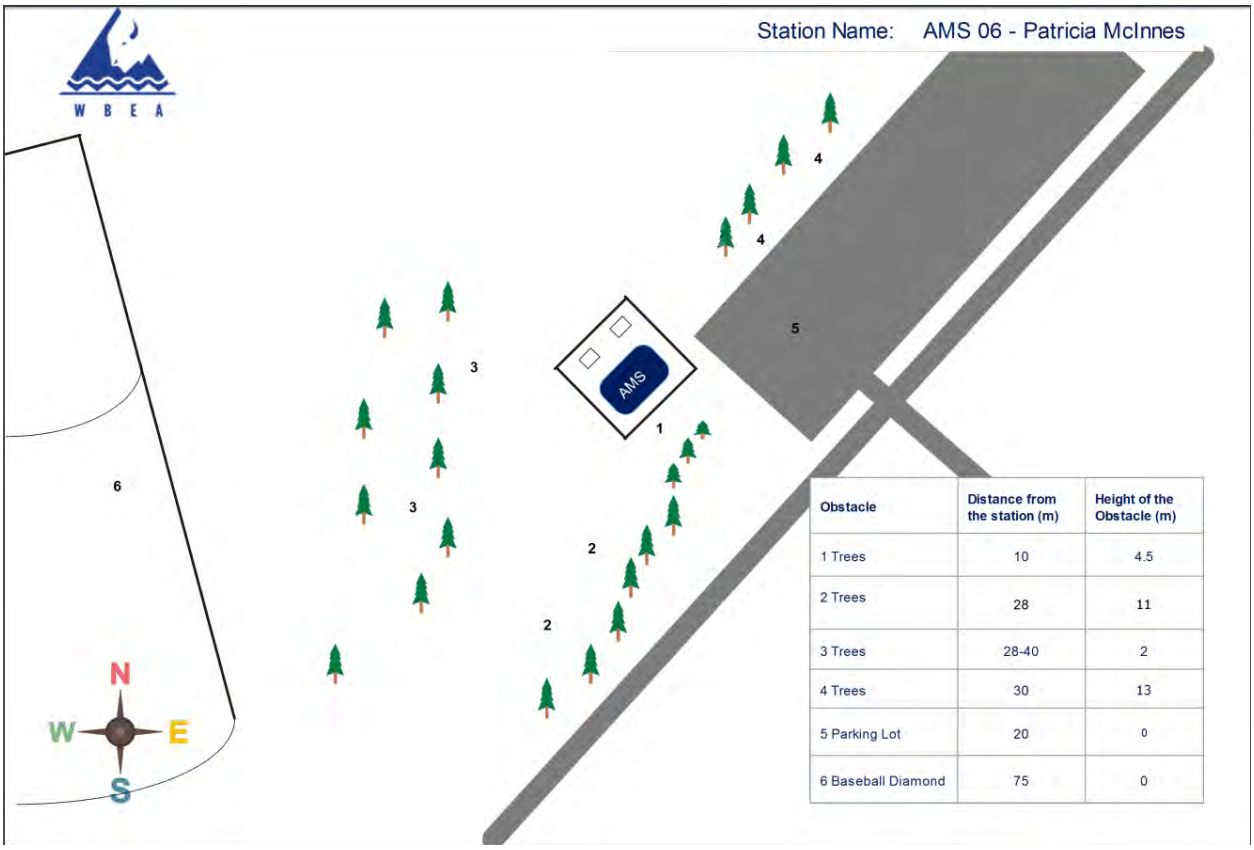


Figure 2.0 – Area Topographic map showing AMS 06 – Patricia McInnes



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	10	4.5
2 Trees	28	11
3 Trees	28-40	2
4 Trees	30	13
5 Parking Lot	20	0
6 Baseball Diamond	75	0

Figure 3.0 – Plan view sketch for AMS 06 – Patricia McInnes



Figure 4.0 – Aerial photo showing AMS 06 – Patricia McInnes

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

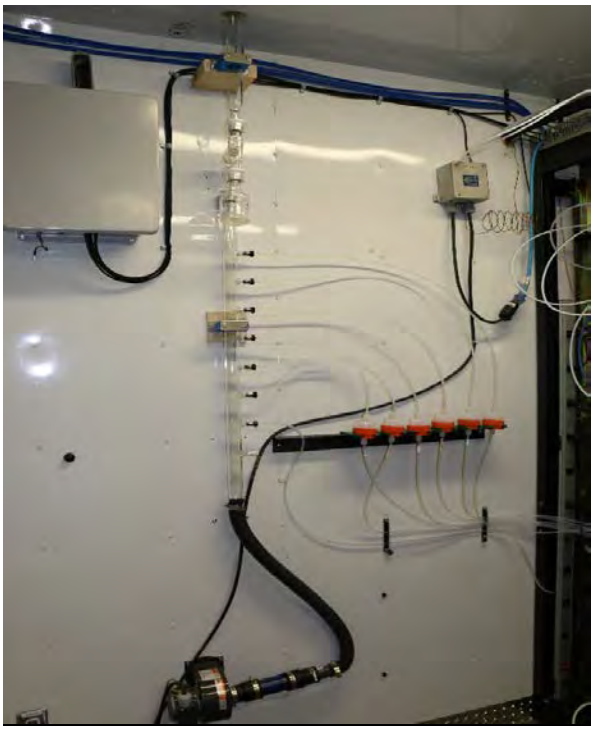


Figure 6.1 – Curb shot of the monitoring station

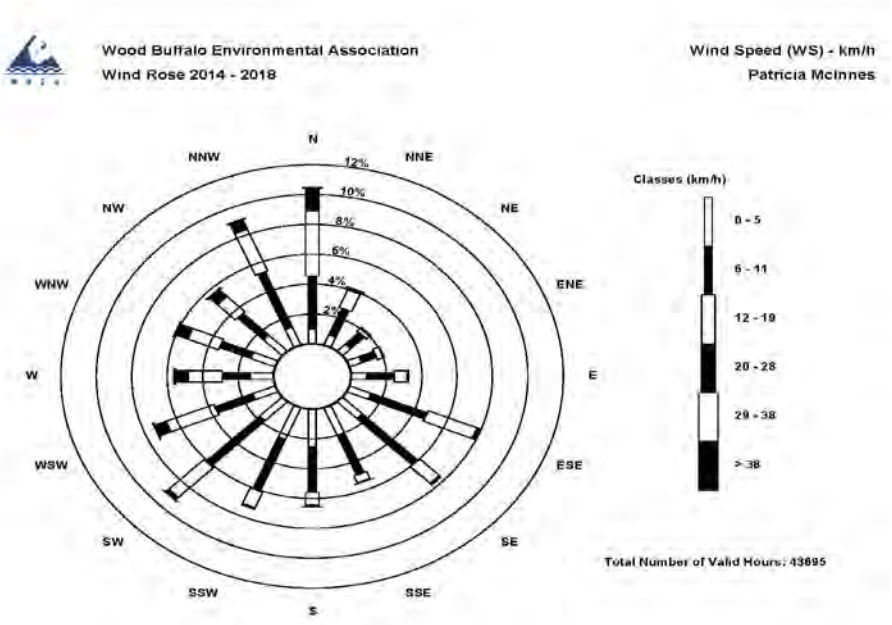


Figure 6.2 –Photo of front and back of instrument rack





Figure 7.0 – Windrose (specify time period)



Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Athabasca Valley

LAST UPDATED: 02-15-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

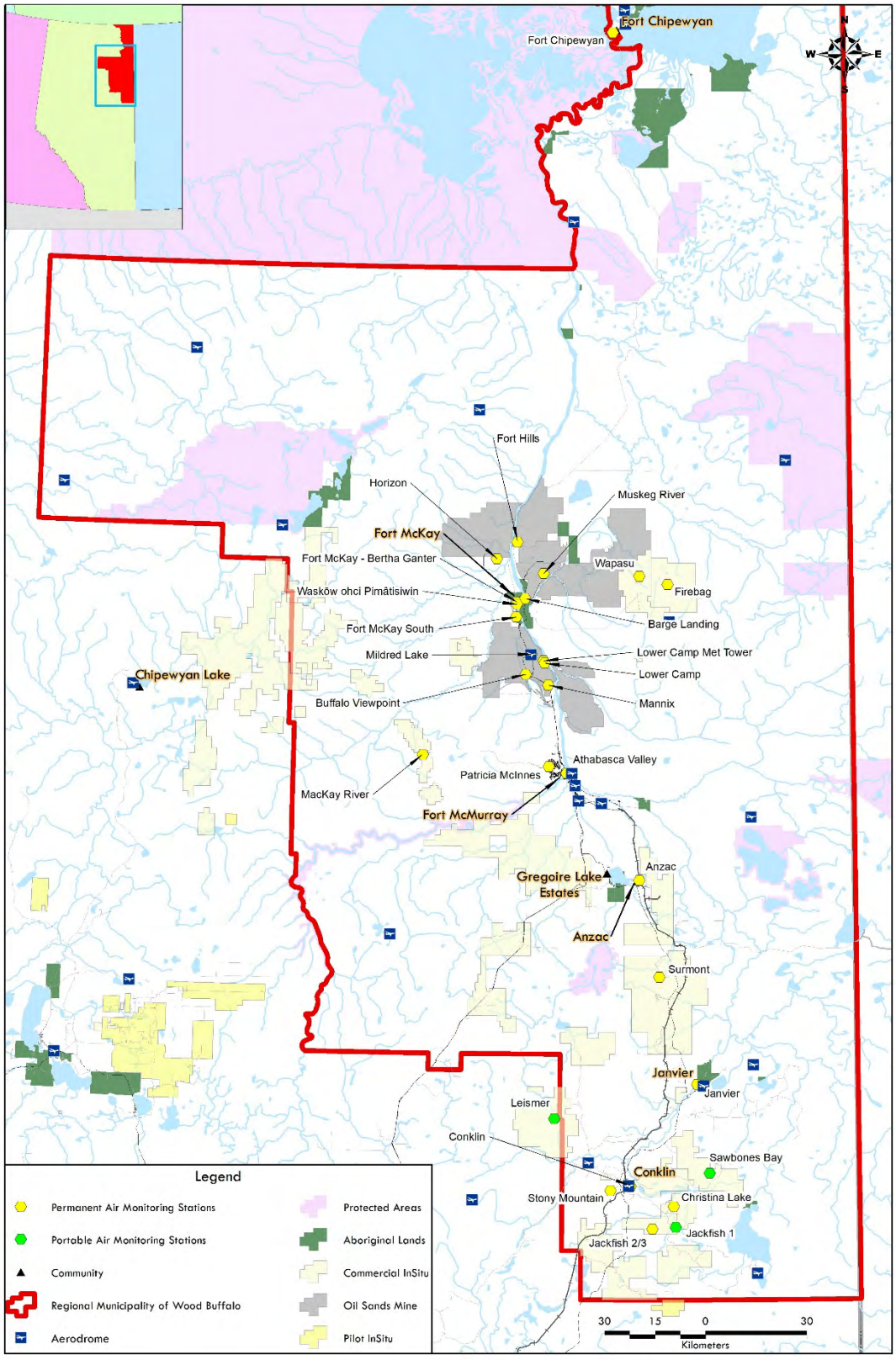


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 07
Station name	Athabasca Valley
Date station established	1977

Location

Station street address	Located on C.A. Knight Way, Near the Athabasca river and McDonald Island
Legal land description	9-20-089-09 W4
Latitude	56°44’00.21”N
Longitude	111°23’25.80”W
UTM East	476108
UTM North	6287777
Nearest community	Fort McMurray
Community population	66,573

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	None
Approval number	None
Contact Name	None
Address	None
Phone number	None
Email address	None

Site Description

Land use by sector	0 – 90 degrees	Residential
	91 – 180 degrees	Residential
	181 – 270 degrees	Residential
	271 – 360 degrees	River
Site elevation (above sea level)	250	
Angle of elevation to nearby Sculpture	Greatest angle	3°
	Sculpture direction	N
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre

Meteorological Sensors	Type	Cup and vane
	Height above ground	10m
	Distance from station	Attached to North End of monitoring Station

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Asphalt road	High	15	Access road to McDonald Island Park
Highway	High	309	Road to go across the city
Asphalt	High	328	Road goes to city

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Fort McMurray Water treatment Plant	Water treatment Plant		1.22	SW
McDonald Island	Sports Complex		0.265	NE
Eveready	Asphalt Plant		3.71	NW
Fort McMurray Waste Water Treatment Plant	Waste Water Treatment Plant		3.84	NW
Diversified	Main Bus Depo		4.48	NW
Suncor	Oil Sands Plant	194,000	26.81	N
Suncor	Tailings Pond		15.81	N
LaFarge	Concrete Plant		3.06	NW
Inland	Concrete Plant		3.32	NW
Burnco	Concrete Plant		4.24	NW

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	Alberta Environment	Thermo	43i-LTE	1507864683	May 2018
TRS	Alberta Environment	Thermo	43i-LTE	1170050152	May 2018
Converter for TRS	Alberta Environment	CD Nova	CDN-101	551	May 2018
Oxides of Nitrogen	Alberta Environment	Thermo	42i	1160120024	Feb 2018
Oxides of Nitrogen	WBEA	Thermo	42Y	1160350002	March 2018
Oxides of Nitrogen	WBEA	API	T200	721	March 2018
Oxides of Nitrogen	WBEA	API	T500U	81	March 2018
Carbon Monoxide	Alberta Environment	Thermo	48i	1408761381	2016
Continuous PM2.5	Alberta Environment	Thermo	5030	E-515/3256	2016
Ozone	WBEA	API	T400	3873	Sept 2018
Methane Non methane	WBEA	Thermo	55i	1426262594	Feb 2018
VOC	WBEA	Tisch	TE123	1029	2016
Hi-Vol Puf	WBEA	Tisch	TE-1004BL	1326	2016
PM2.5	WBEA	Thermo	Partisol 2000i	200012 0433 1312	2016
PM2.5	WBEA	Thermo	Partisol 2000i	200012 0355 1305	2016
PM10	WBEA	Thermo	Partisol 2000i	200012 0561 1305	2016
PM10	WBEA	Thermo	Partisol 2000i	200012 0382 1308	2016
Opera Sampler	Health Canada	OMNI	400	2126	2017
Pressure Sensor	WBEA	Young	61302V-10	BPA4395	2016
Temperature/RH	WBEA	Vaisala	HMP155	G4340069	2016
Wind speed	WBEA	Met One	010C-1	P10039	Aug 2018
Wind direction	WBEA	Met One	020C-1	NA	Aug 2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	8205
Datalogger	Datalogger	Campbee Scientifific	CR1000X	1394
Zero air generator	Zero Air Generator	Teledyne/API	701H	586
Zero Air Generator	Zero Air Generator	Teledyne/API	701H	198
HVAC	Heating and air conditioning system. Wall mount unit	BARD	2 ton	314K182321-02

Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	NA
Hydrogen Generator	Hydrogen Generator	AMA	HG300	171067038
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	3813
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2445

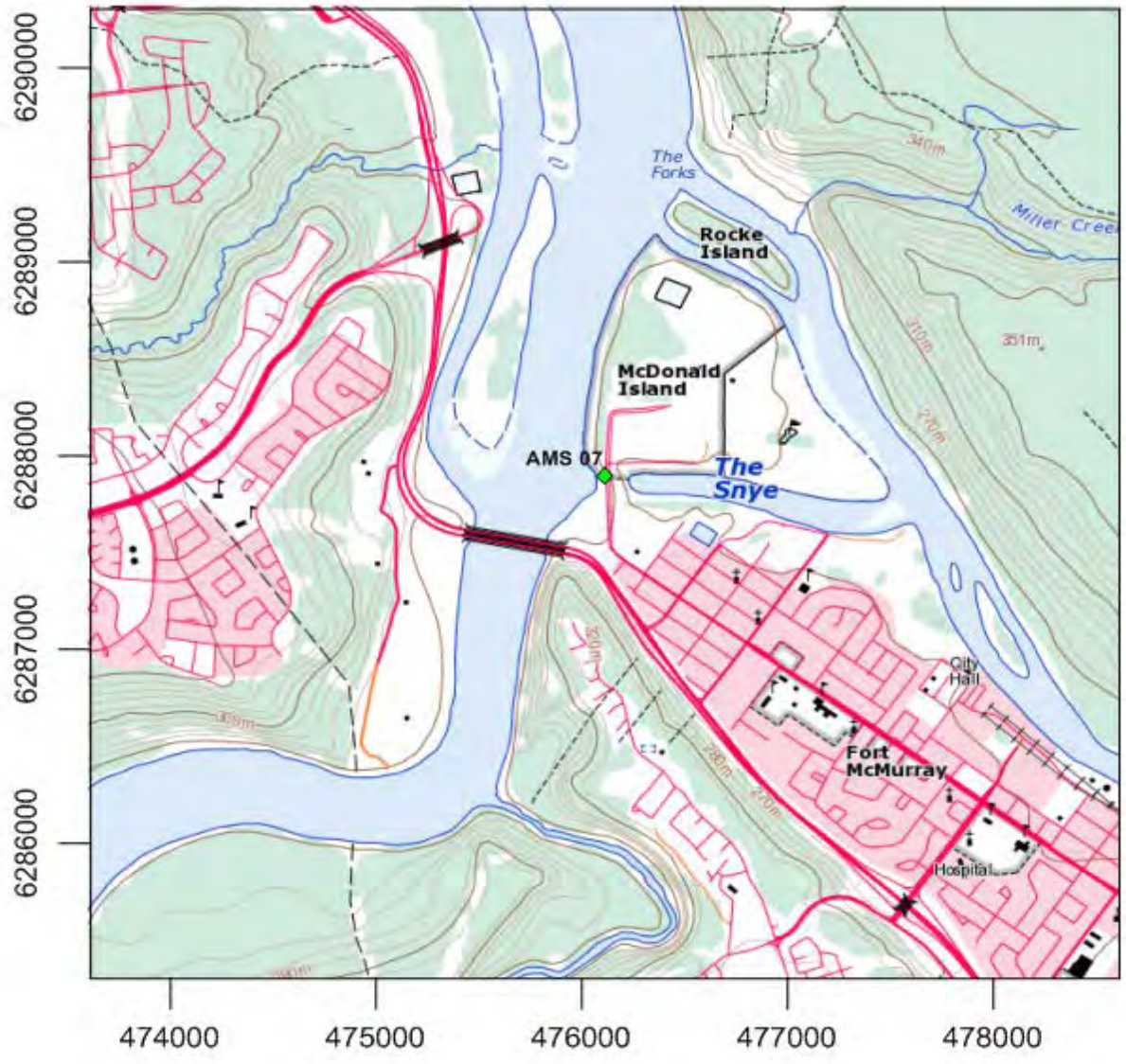


Figure 2.0 – Area Topographic map showing AMS 07

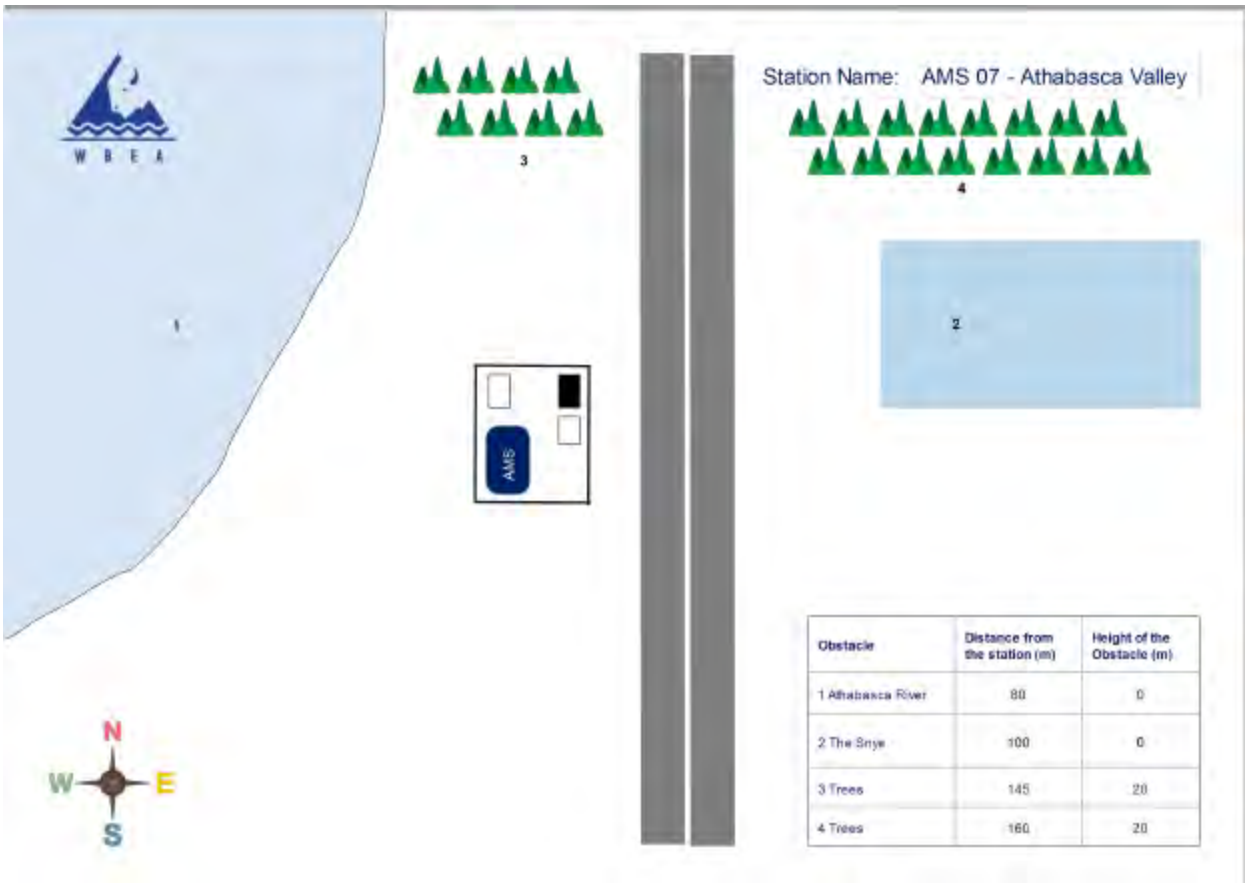


Figure 3.0 – Plan view sketch for AMS 07 site



Figure 4.0 – Aerial photo showing AMS 07

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.

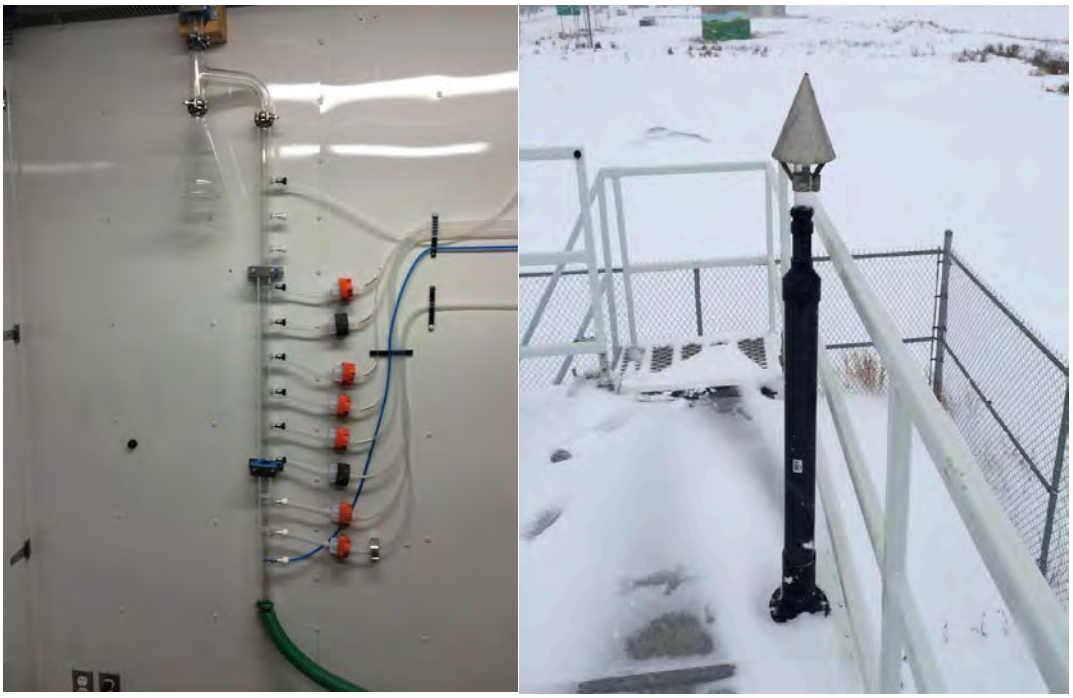


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

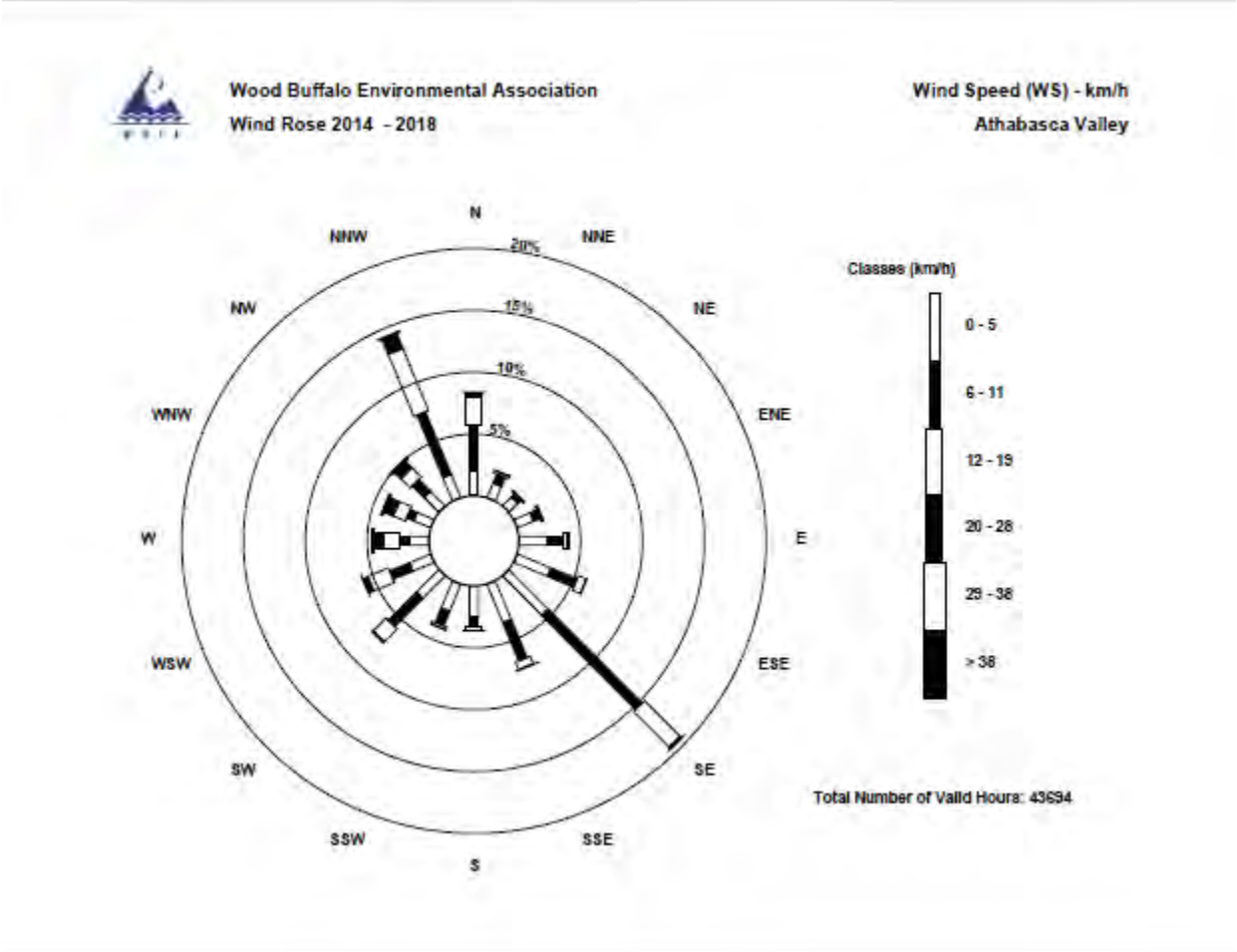


Figure 7.0 – Windrose (5 Year)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

AMS 08 – Fort Chipewyan

LAST UPDATED: 02-19-2019

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WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

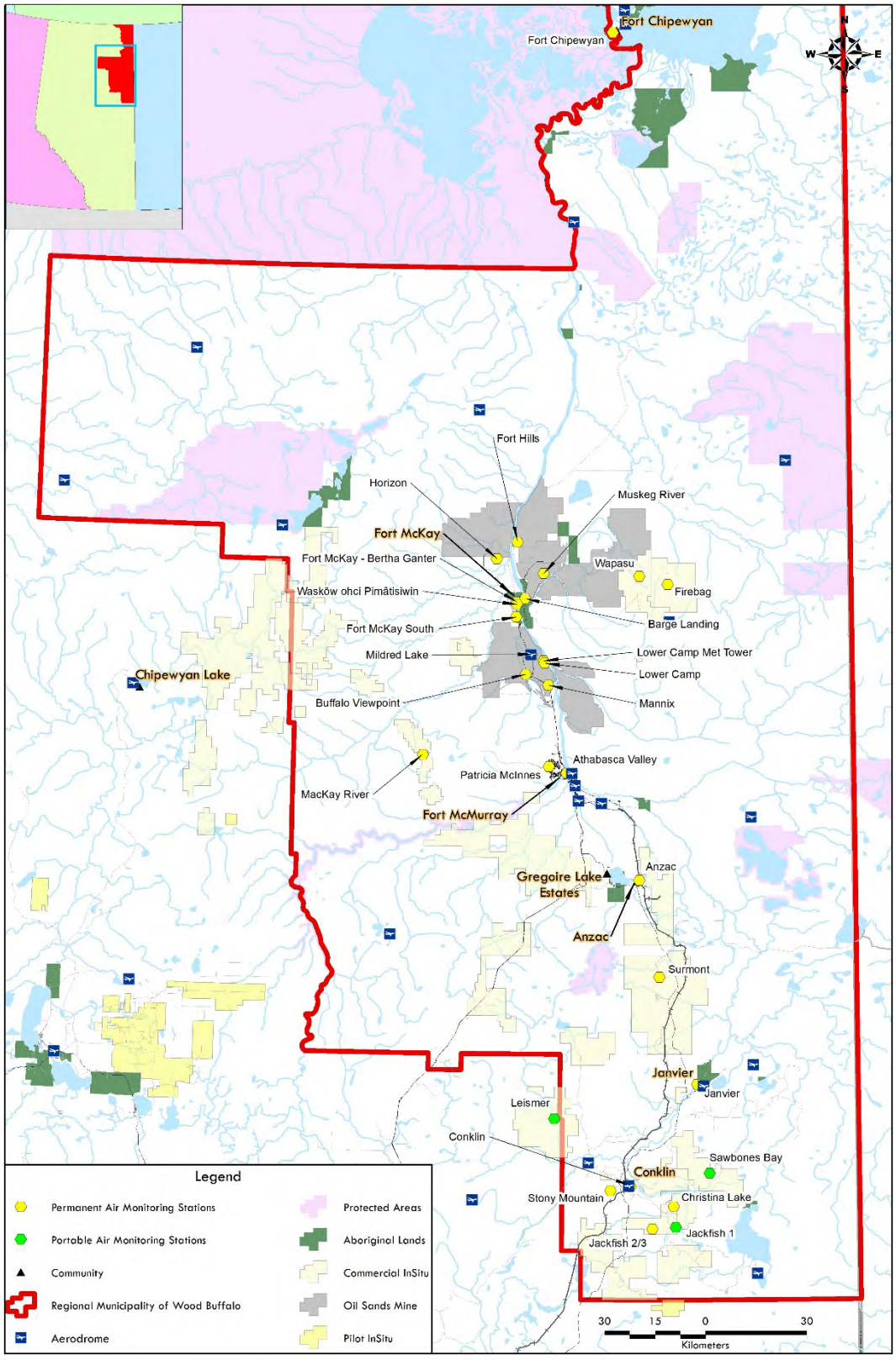


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 08
Station name	Fort Chipewyan
Date station established	1998

Location

Station street address	Fort Chipewyan
Legal land description	6-07-112-07 W4
Latitude	58°42’33.25” North
Longitude	111°10’29.98” West
UTM East	489862
UTM North	6507689
Nearest community	Located in Fort Chipewyan
Community population	852

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Syncrude
Approval number	026-02-00
Contact Name	Wood Buffalo Environmental Association
Address	Unit 3 – 805 Memorial Drive, Fort McMurray, AB
Phone number	780-799-4420
Email address	info@wbea.org

Site Description

Land use by sector	0 – 90 degrees	Residential
	91 – 180 degrees	Residential, Lake
	181 – 270 degrees	Residential, Lake
	271 – 360 degrees	Residential
Site elevation (above sea level)	221 m	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
House	About 20 meters, South	Local residential house. Wood burning

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Driveway	Low	10	Dirt road, residential use
Local roads	Low	100	Paved road, very low volume

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Suncor/ Syncrude	Oil Sands Production	NA	160	South

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i-TLE	1136451241	NA
CO	WBEA	API	T300	3505	Feb '19
CO2	WBEA	API	T360	283	Feb '19
Oxides of Nitrogen	WBEA	API	T200u	172	NA
O3	WBEA	API	T400	1020	NA
PM 2.5	WBEA	API	T 640	216	NA
Temperature/RH	WBEA	Vaisala	HMP155	K2510021	NA
Wind speed	WBEA	Met One	010C-1	G3212	NA
Wind direction	WBEA	Met One	020C-1	NA	NA
Leaf Wetness	WBEA	NA	NA	NA	NA
Solar Radiation	WBEA	NA	8-48	38243	NA

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	11039
Zero air generator	Zero Air Generator	Teledyne/API	701	4698
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	314B132990230-02
Shelter / Building	Air monitoring portable	ITB	10 x 20 trailer	13 15920
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2656

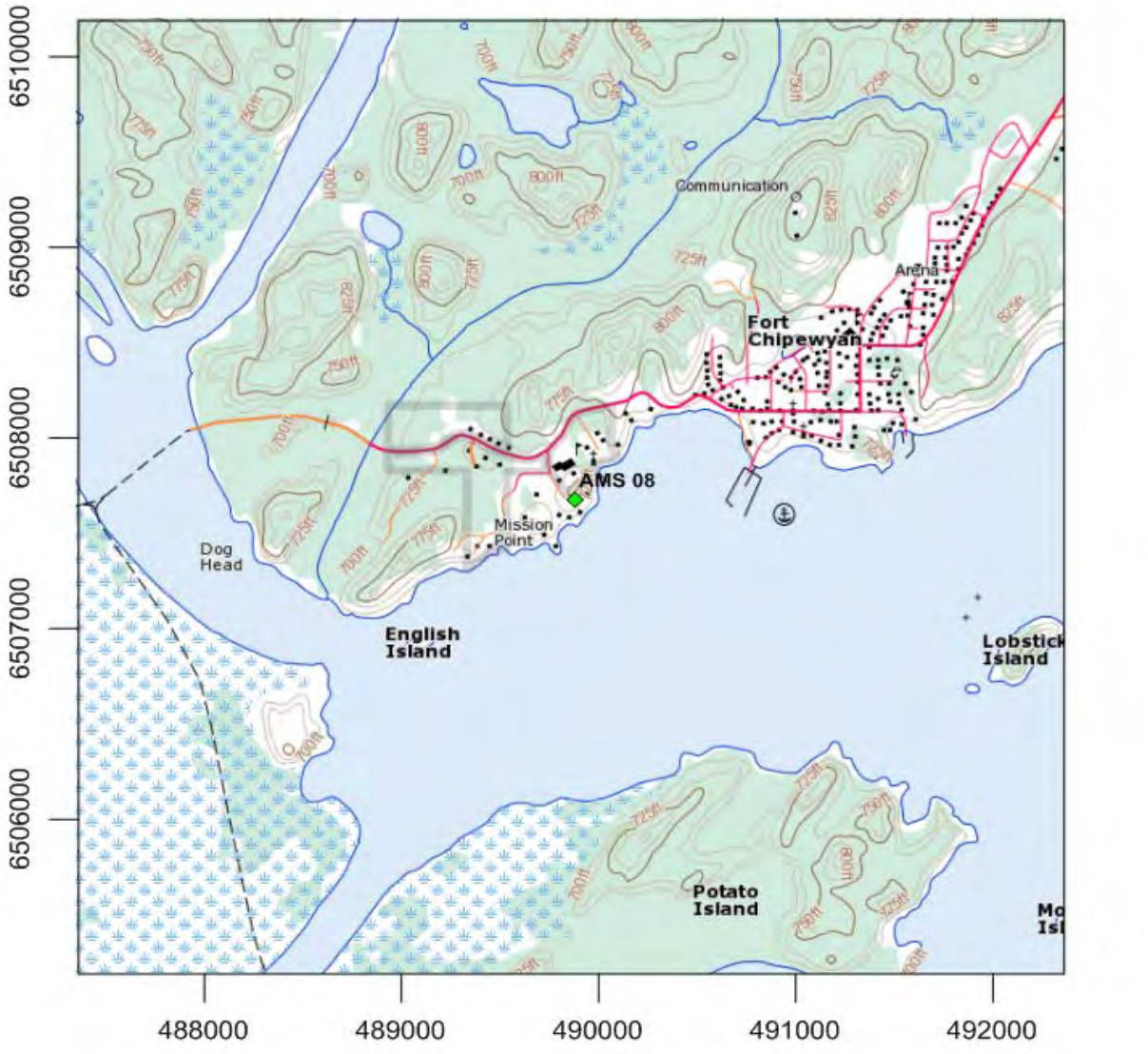
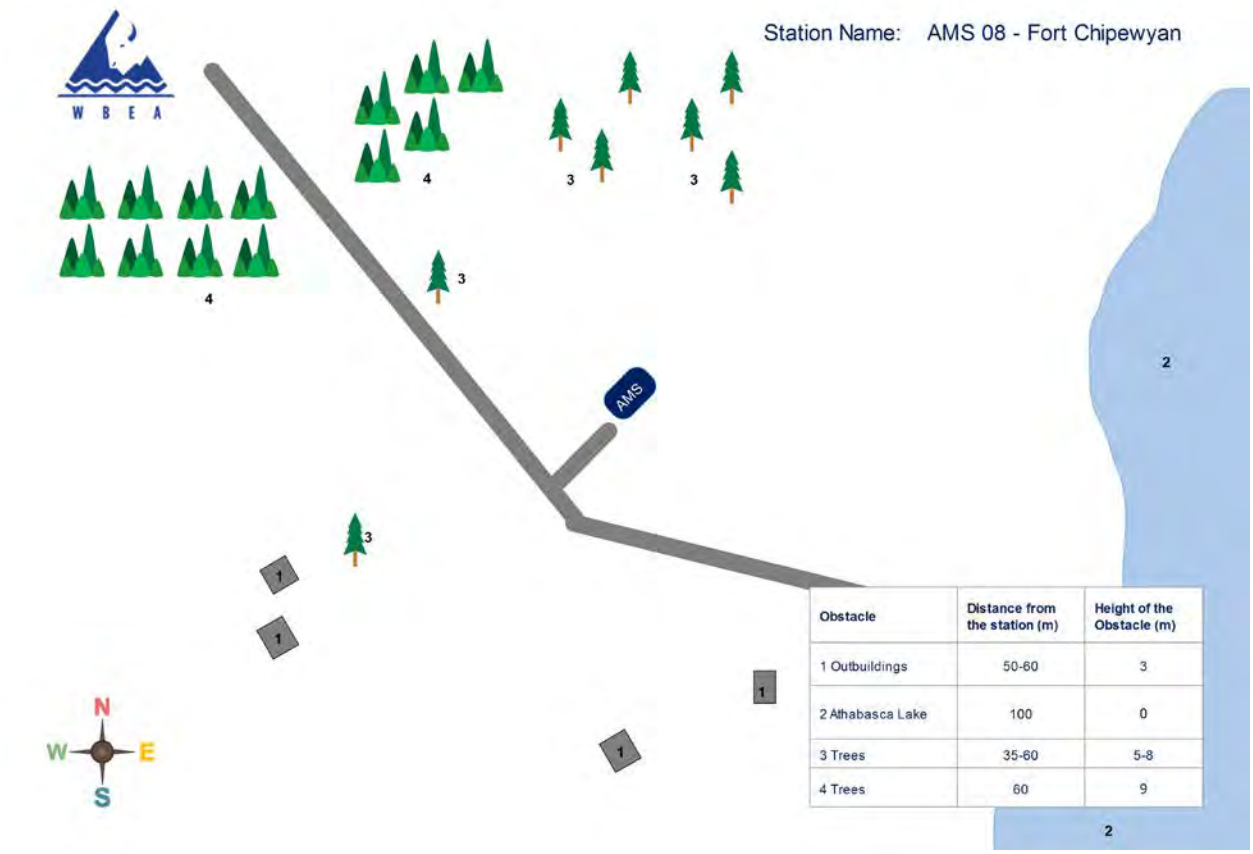


Figure 2.0 – Area Topographic map showing AMS 08 – Fort Chipewyan



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Outbuildings	50-60	3
2 Athabasca Lake	100	0
3 Trees	35-60	5-8
4 Trees	60	9

Figure 3.0 – Plan view sketch for AMS 08 – Fort Chipewyan



Figure 4.0 – Aerial photo showing AMS 08 – Fort Chipewyan

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.

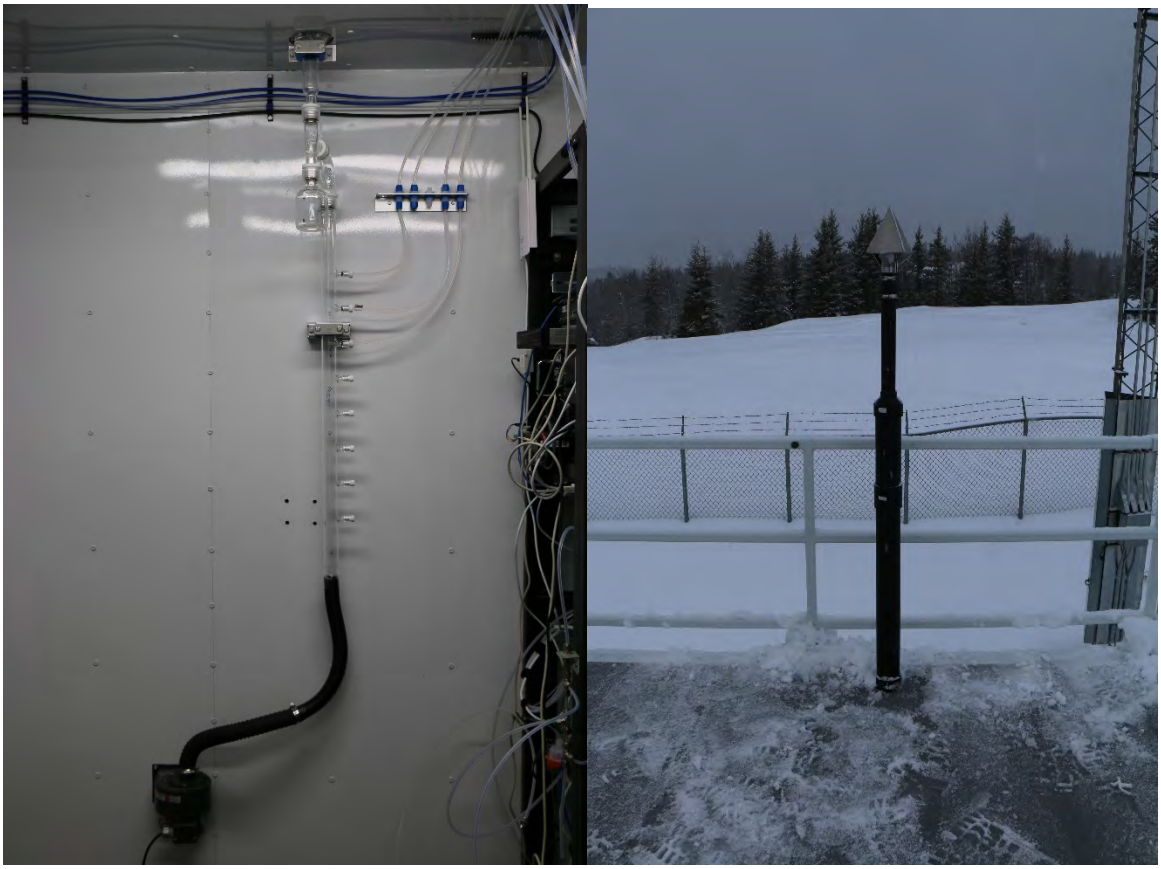


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station

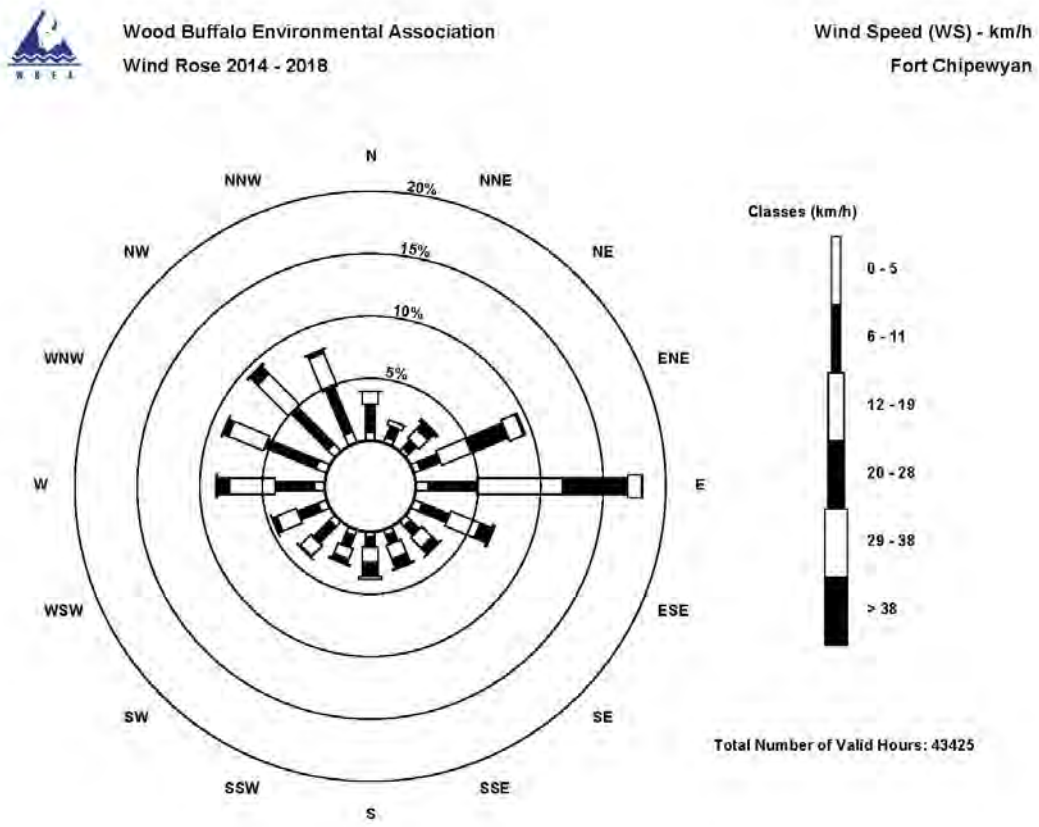
Figure 6.2 –Photo of front and back of instrument rack







Figure 7.0 – Windrose 2014-2018



Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Barge Landing

LAST UPDATED: 02-15-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

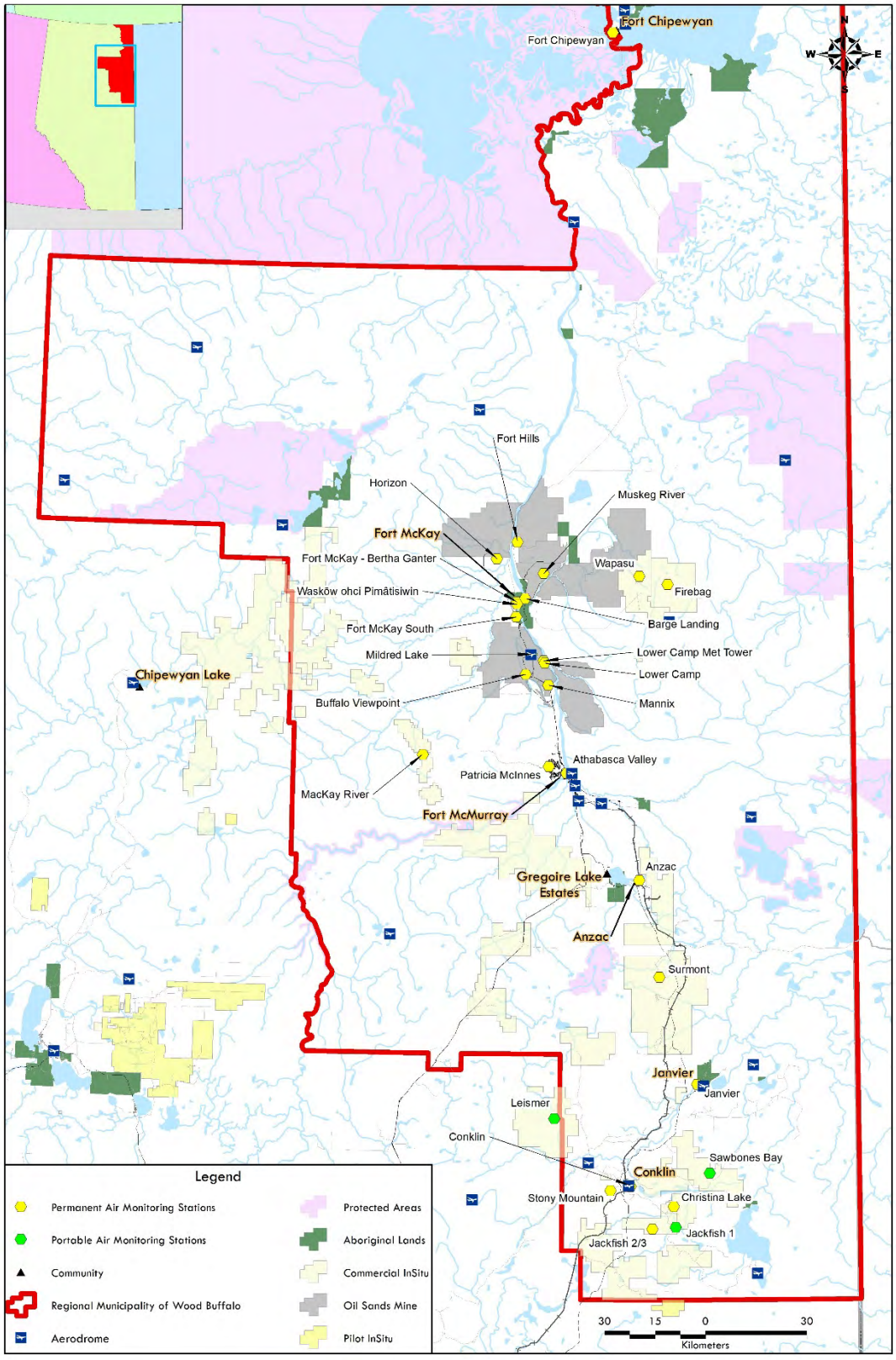


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 09
Station name	Barge Landing
Date station established	2000

Location

Station street address	Located off Barge Landing road, approximately 300 M east of the Barge Landing Lodge.
Legal land description	7-31-094-10 W4
Latitude	57°11'53.47" North
Longitude	111°35'58.35" West
UTM East	463773
UTM North	6339607
Nearest community	Fort Mackay
Community population	742 (2016)

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Shell Canada Limited
Approval number	20809-02-00
Contact Name	Tina Ding
Address	Albian Sands, P.O. Box 5670
Phone number	780-713-4454
Email address	Tina.ding@cnrl.com

Site Description

Land use by sector	0 – 90 degrees	Wooded area
	91 – 180 degrees	Wooded area
	181 – 270 degrees	Wooded area
	271 – 360 degrees	Wooded area
Site elevation (above sea level)	282 m	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	N/A
Airflow restrictions	North	Trees
	East	Trees
	South	Trees
	West	Trees
Sample manifold	Type	All glass
	Inlet height above roof	1 metre

Meteorological Sensors	Type	Cup and vane
	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
N/A	N/A	N/A

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Barge Landing road	Very low	70	Well maintained dirt access road frequented by pickup trucks and heavy equipment
Highway 63	Medium	400	Provincial highway frequented by tractor trailers and pickup trucks.

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Shell Albian	Oil Sands Plant	340,000	10	North East
CNRL Horizon	Oil Sands Plant	100,000	20	North West

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	4007	November 2018
Total Reduced Sulfides	WBEA	Thermo	43i-TLE	621	N/A
Oxides of Nitrogen	WBEA	Thermo	42i	4460	November 2018
Total Hydrocarbons	WBEA	Thermo	51i	1327059296	N/A
Particulate Matter	WBEA	Teledyne/API	T640	321	December 2018
Temperature/RH	WBEA	Vaisala	HMP155	N/A	N/A
Barometric Pressure	WBEA	RM Young USA	61302V-10	BPA4394	November 2018
Wind speed	WBEA	Met One	010C-1	B4128	N/A
Wind direction	WBEA	Met One	020C-1	E4852	N/A
VOC Sampler	WBEA	Tisch	TE-123	1027	N/A

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	5564
Zero air generator	Zero Air Generator	Teledyne/API	701	10204
Hydrogen generator	Hydrogen gas generator	AMA	HG 300	171067036
Thermal Oxidizer	Thermal Oxidizer	Thermo	CDN-101	519
Mitsubishi Electric Mr Slim	Heating and air conditioning system. Wall mount unit	R410A	MUY-GE15NA	3002509T
Shelter / Building	Air monitoring portable	Monitoring Shelter	10 x 20	2N9MMFY3615
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	3055

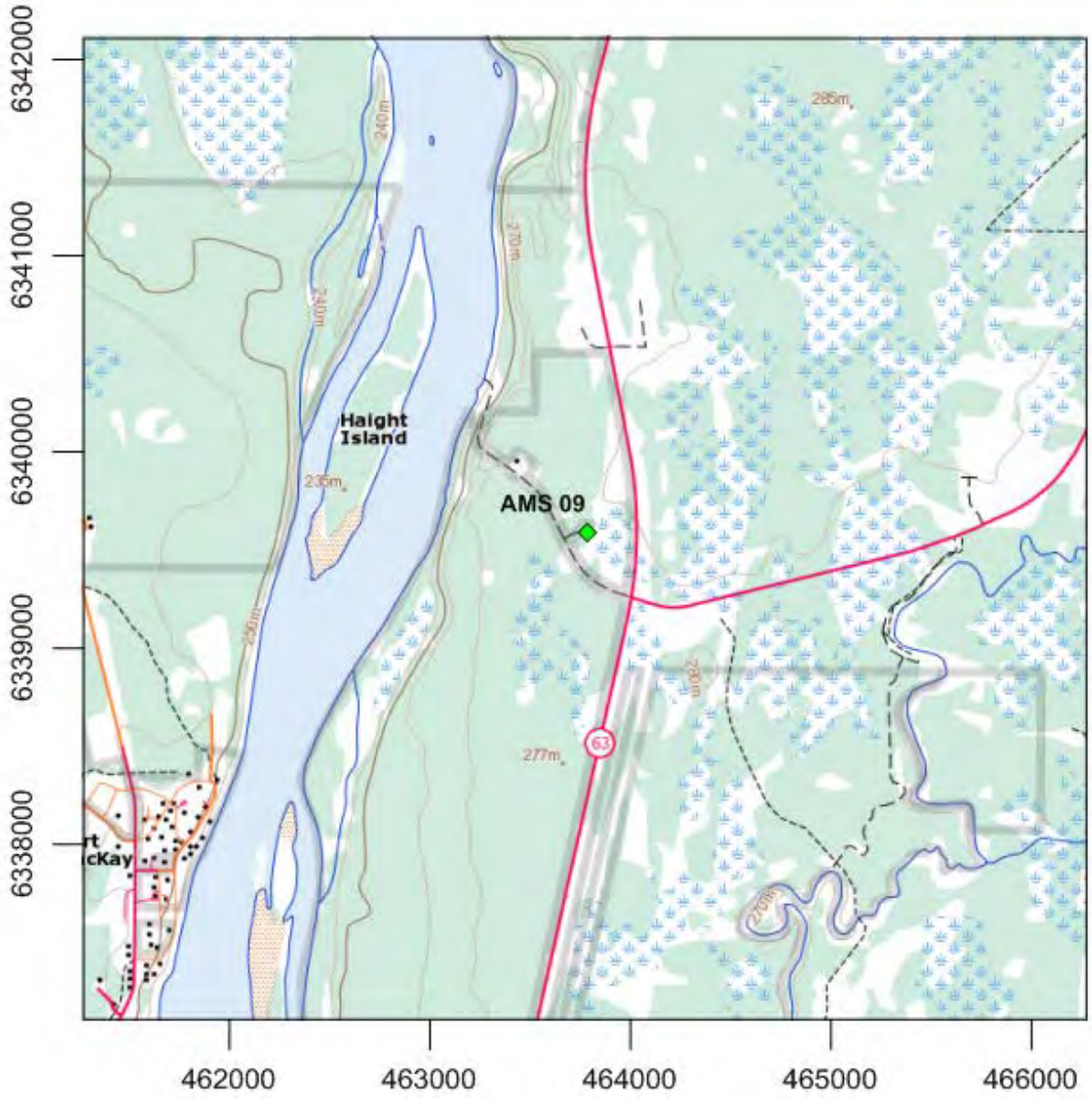


Figure 2.0 – Area Topographic map showing AMS 09 – Barge Landing Station

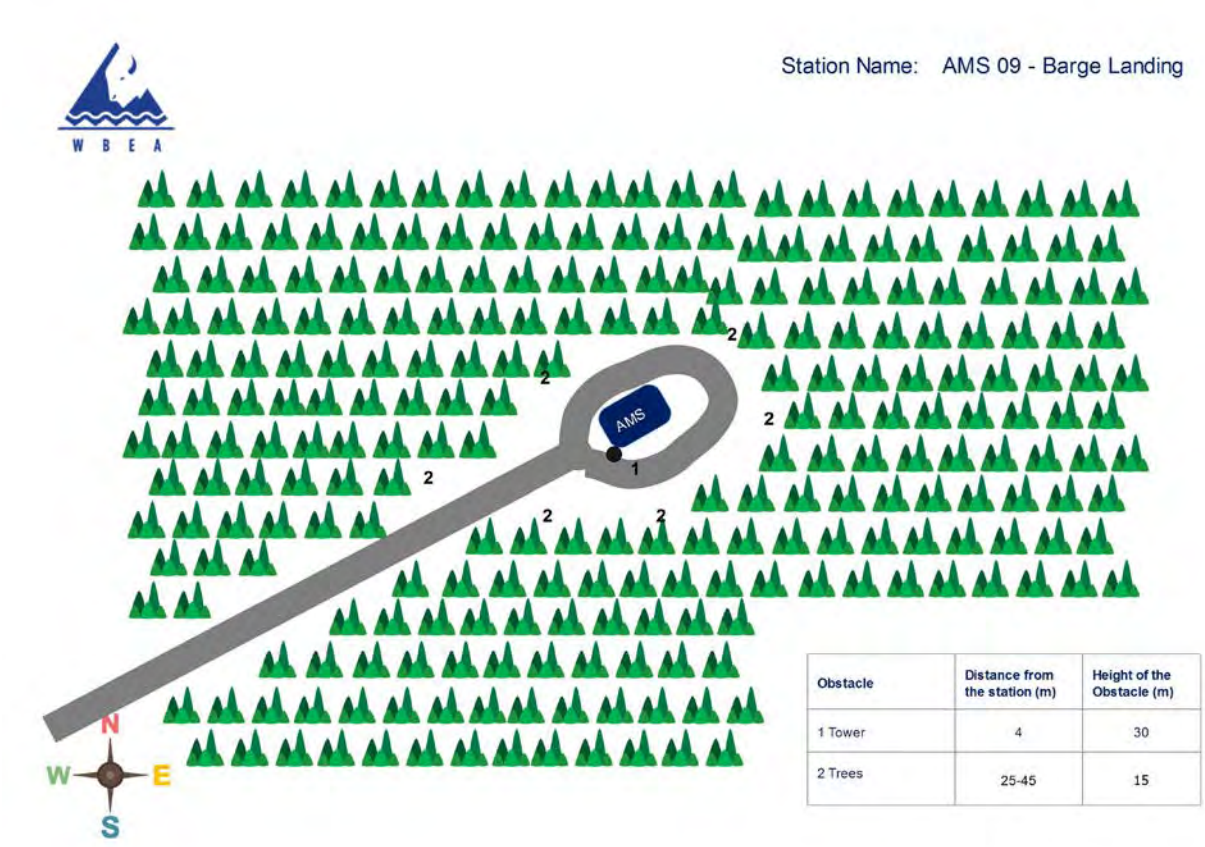


Figure 3.0 – Plan view sketch for AMS 09 – Barge Landing Station



Figure 4.0 – Aerial photo showing AMS 09 – Barge Landing Station

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.

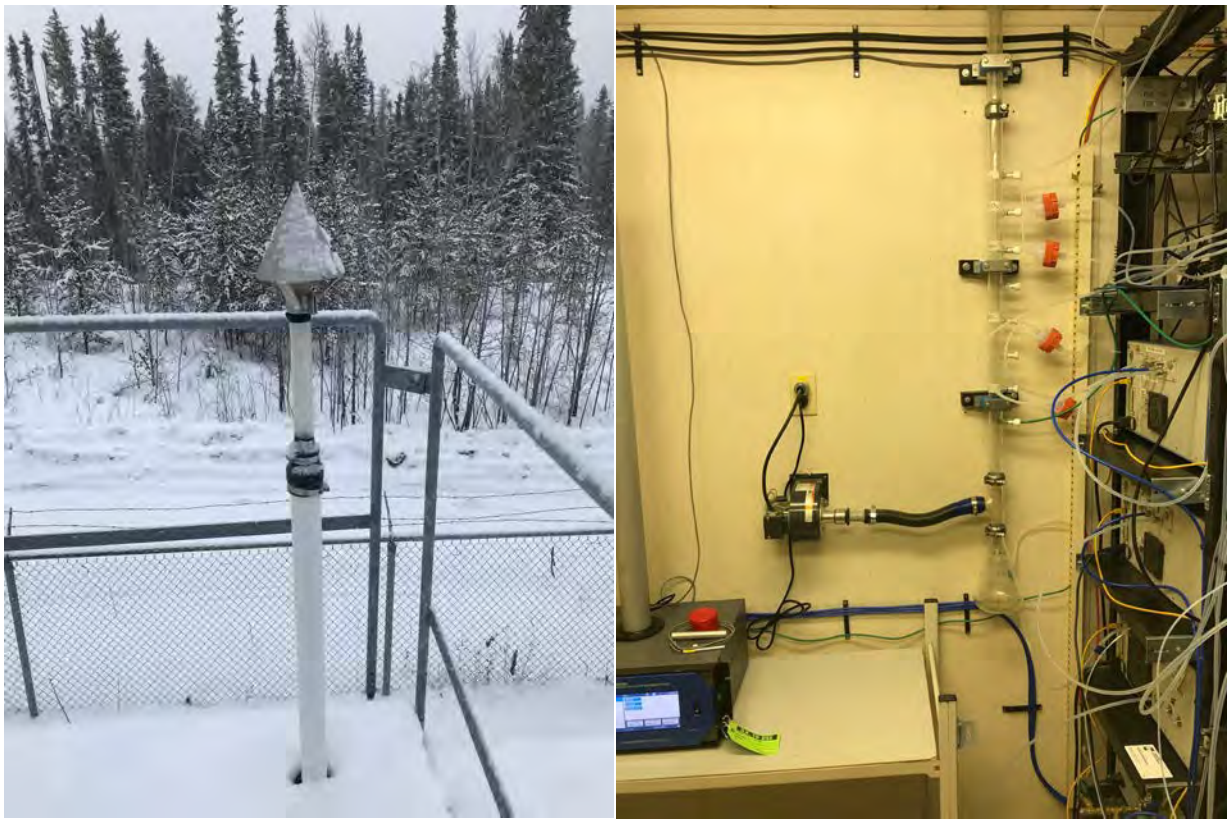


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

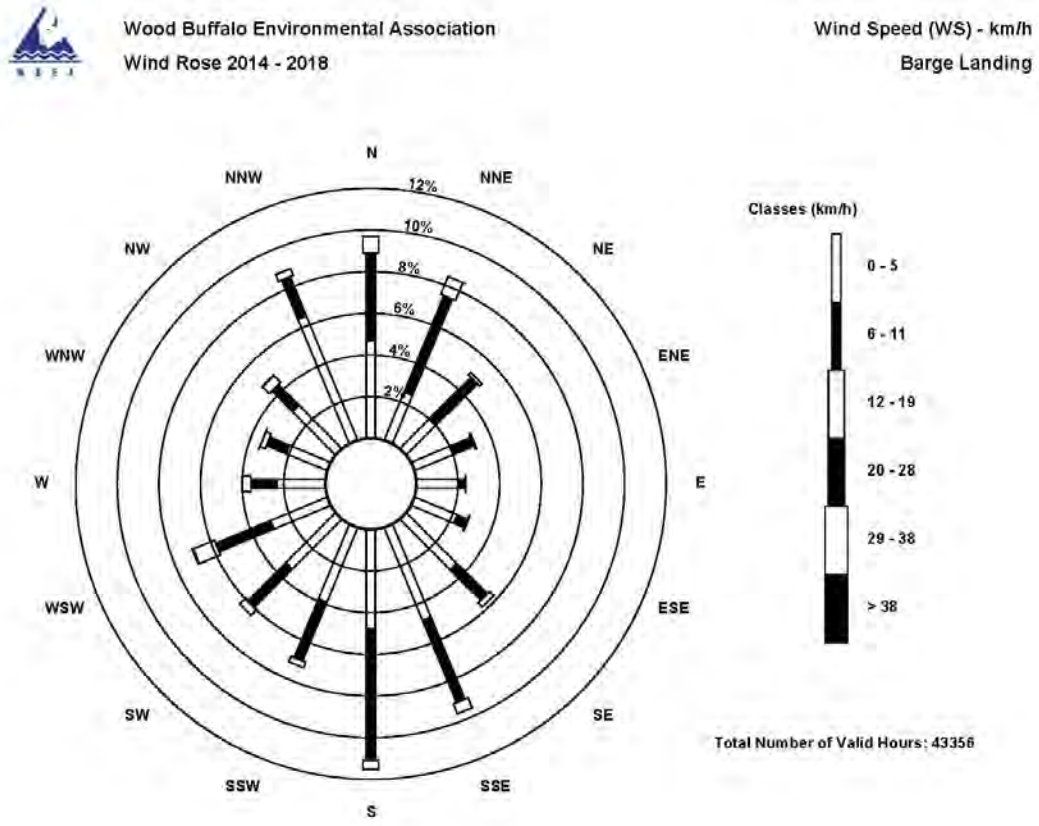


Figure 7.0 – Windrose (2014 - 2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Lower Camp

LAST UPDATED: 02-04-2019

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WBEA Monitoring Network

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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 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), and carbon monoxide (CO). Sites are categorized as industrial or community, based on the setting in which they are located.

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/METEOROLOGICAL	MANNIX	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						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

* Also functions as an enhanced deposition station.

Table 2 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.

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

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	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

* Also functions as an enhanced deposition station.
y Monitoring data used for research and development purposes only.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC) and reduced sulphur compounds (RSC), 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), dichotomous samples, speciated denuder sampler (SASS), and precipitation samples.

Table 3: Summary of parameters measured using integrated methods at WBEA sites

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

* Also functions as an enhanced deposition station.

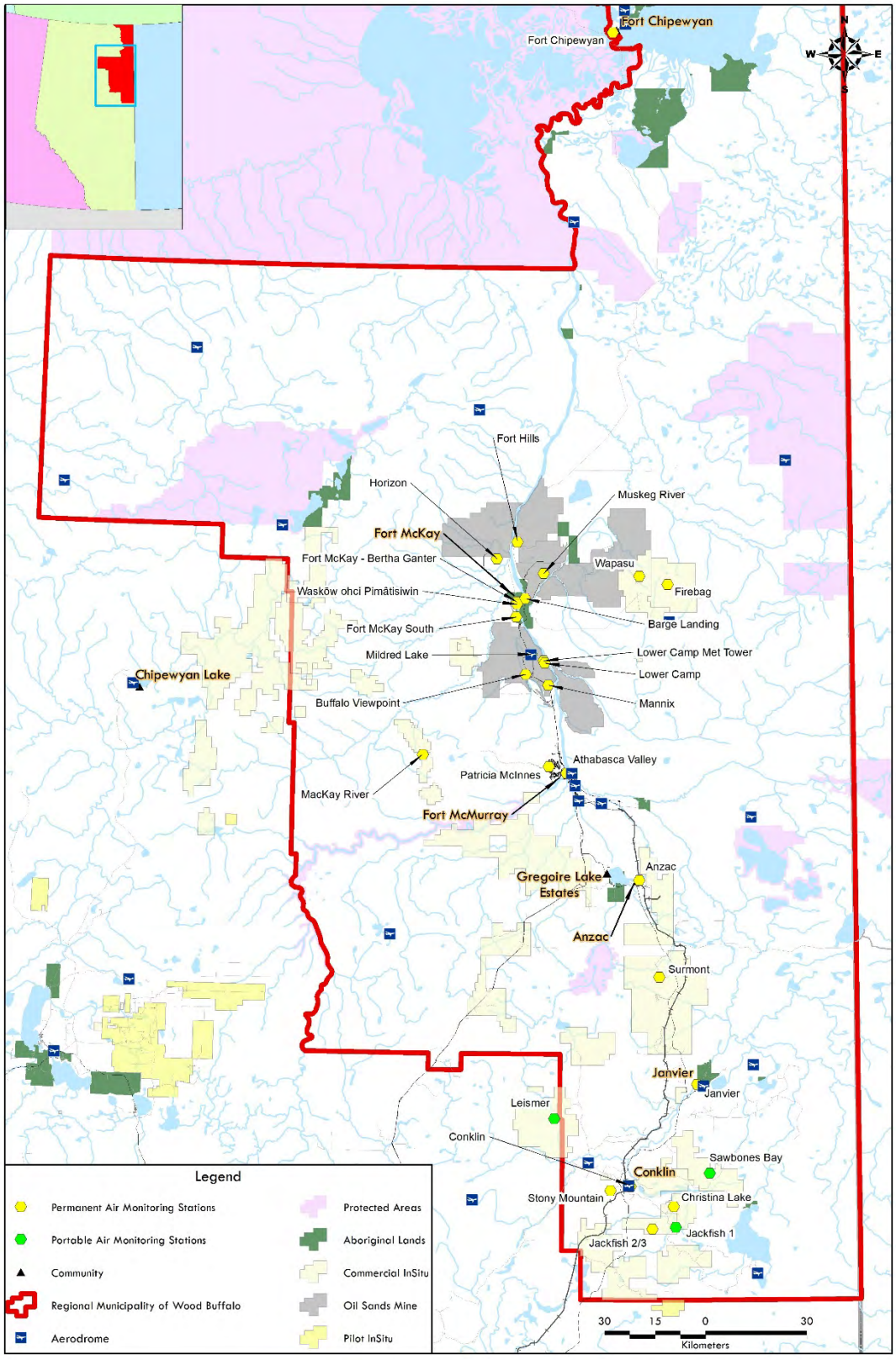


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 11
Station name	Lower Camp
Date station established	1975

Location

Station street address	Located by the Athabasca River Valley at about 115 meters south of the Syncrude pump house
Legal land description	11-35-092-10 W4
Latitude	57.026792
Longitude	-111.500819
UTM East	469598.29
UTM North	6320474.30
Nearest community	Fort McMurray
Community population	66,573

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Sunshine Oilsands Ltd.
Approval number	305529-00-00
Contact Name	Brooke Bennett
Address	PO Bag 4009, MD X203 Fort McMurray, AB T9H 3L1
Phone number	(780) 790-5692
Email address	Bennett.brooke@syncrude.com

Site Description

Land use by sector	0 – 90 degrees	Syncrude open mining operations
	91 – 180 degrees	Athabasca River
	181 – 270 degrees	Athabasca River
	271 – 360 degrees	Syncrude open mining operations
Site elevation (above sea level)	235m	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	N/A
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	10
	Distance from station	7

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Laydown	79.21m W	Equipment Laydown
Water Pond	136.8m NW	Reservoir
Athabasca River	33.8m E	River
Pumping Station	114m N	Syncrude Water Pump Station
Deck	4m E	Has Precipitation, PM2.5, and PUF samplers on it

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Gravel road	Low	20	Road access to lay down and pumping station

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Suncor Energy	Oil refinery		1	South
Syncrude	Oil refinery/open mining		3	West
Suncor Energy	Open mining operations		4	East

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	10197	2015
Hydrogen Sulfide	WBEA	Thermo	450i	12837	2018
Total Hydrocarbon	WBEA	Thermo	51i	1327059297	2018
Temperature/RH	WBEA	Vaisala	HMP155	K2510020	2016
Wind speed	WBEA	Met One	010C-1	N11710	2017
Wind direction	WBEA	Met One	020C-1	P19941	2017

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2403
Zero air generator	Zero Air Generator	Teledyne/API	701	3411
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	1410661328
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	1222

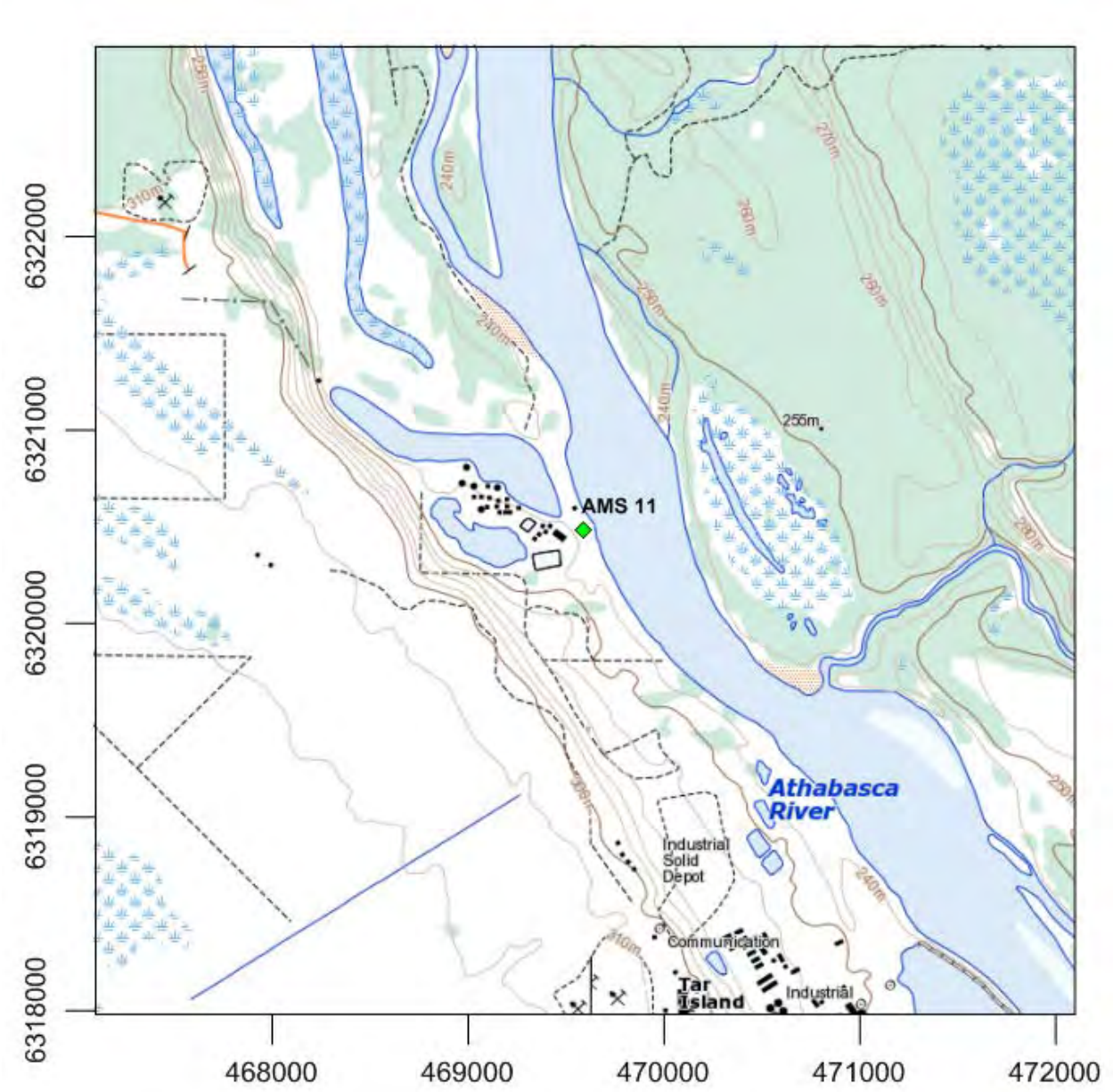


Figure 2.0 – Area Topographic map showing AMS 11



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Athabasca River	40	0
2 Trees	42	12
3 Shrubs/Trees	12	6

Figure 3.0 – Plan view sketch for AMS 11 site



Figure 4.0 – Aerial photo showing AMS 11

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 6.1.2 – Sampling Deck which contains EC PM2.5 & High Volume PAH Sampler



Figure 6.2 –Photo of front and back of instrument rack

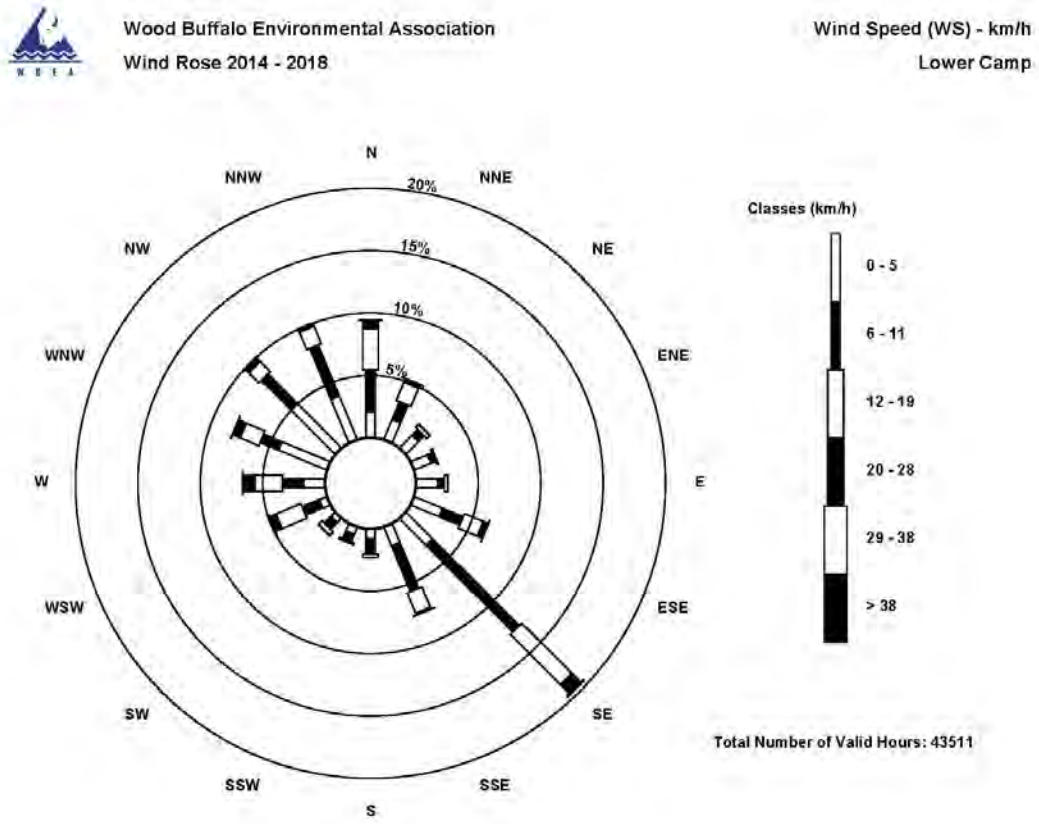


Figure 7.0 – Windrose (2014-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Fort McKay South

LAST UPDATED: 01-29-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

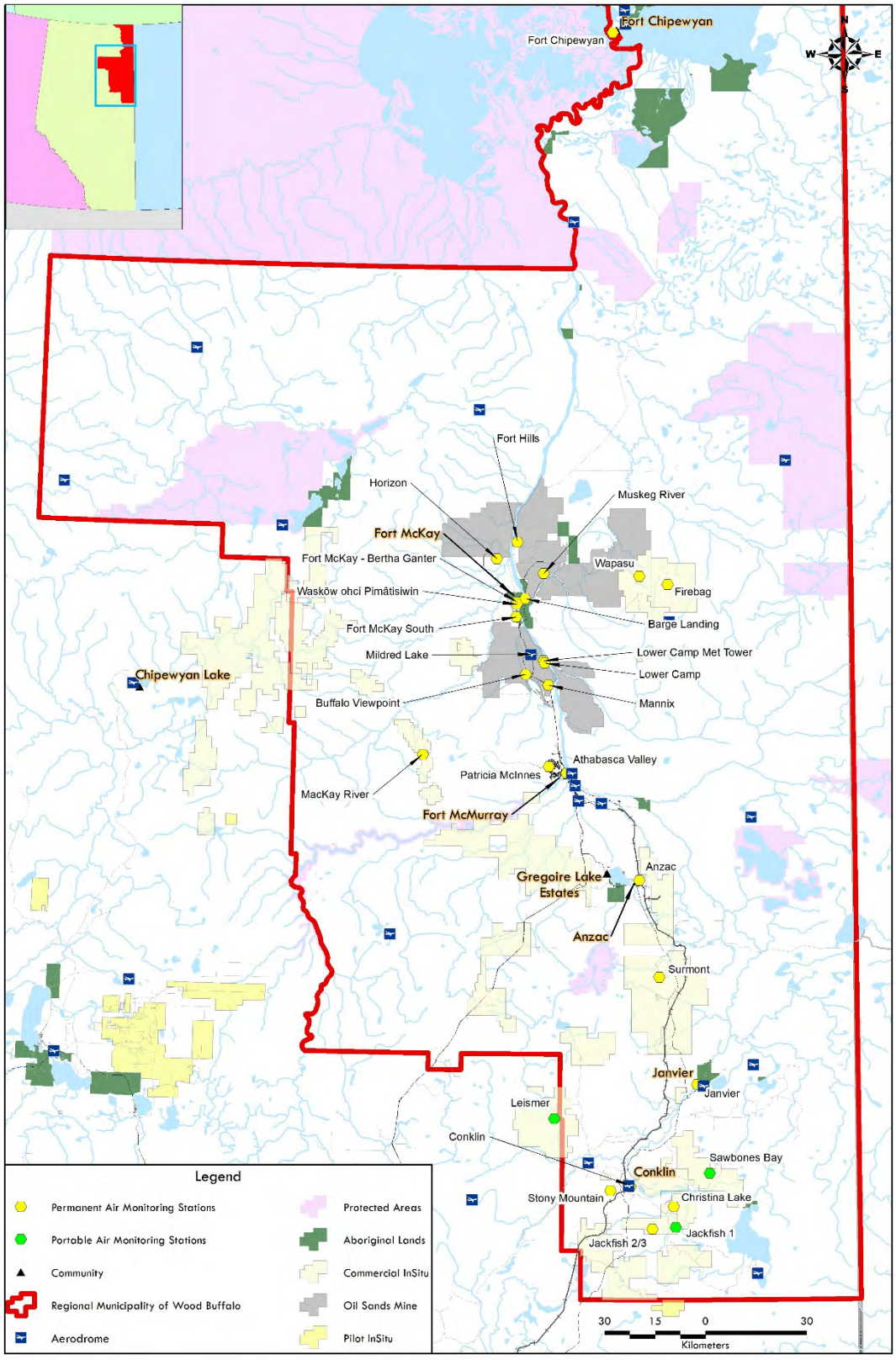


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 13
Station name	Fort McKay South
Date station established	2002

Location

Station street address	None
Legal land description	4-13-094-11 W4
Latitude	57°8’57.03”N
Longitude	111°38’32.44”W
UTM East	461136
UTM North	6334175
Nearest community	Fort McKay
Community population	742

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Syncrude Canada Ltd
Approval number	026-02-00
Contact Name	Brooke Bennett
Address	NA
Phone number	780-881-3304
Email address	Bennett.brooke@syncrude.com

Site Description

Land use by sector	0 – 90 degrees	Forest
	91 – 180 degrees	Forest
	181 – 270 degrees	Forest
	271 – 360 degrees	Forest
Site elevation (above sea level)	268	
Angle of elevation to nearby buildings	Greatest angle	None
	Building direction	None
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10m
	Distance from station	Attached to North side of Monitoring Station

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Asphalt	High	326	Main Road to Fort McKay and CNRL Horizon
Dirt	Low	99	Road to AMS 13
Dirt	Very Low	10	Access Road to AMS 13

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
CNRL Horizon	OilSands Plant	250,000	21.9	N
Syncrude	Tailings pond	350,000	6.2	SW
Syncrude	OilSands Plant		12.3	S
Fort McKay Enterprises Ltd.	Laydown Yard		1	SE
Bouchier Group	LayDown Yard		1	SE
BME Ltd.	Laydown Yard		1	SE
Wood Buffalo Water Treatment Plant	Water Treatment Plant		4.9	N
CNRL Albian	Tailings pond		9.2	NE
CNRL Albian	Oilsands Plant	255,000	14.1	NE

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Teledyne/API	T100	599	2016
Total Reduced Sulfur	WBEA	Thermo	43i-LTE	1218153359	2016
Total Reduced Sulfur Converter	WBEA	Thermo	CDN-101	456	2016
Oxides of Nitrogen	WBEA	Thermo	42i	1410661329	2016
Hydrocarbon	WBEA	Thermo	51i	1505164380	2016
Ozone	WBEA	Teledyne/API	T400	825	2016
Temperature/RH	WBEA	Vaisala	HMP155	G4340047	2016
Continuous PM2.5	WBEA	Thermo	5030	E-773	2016
Continuous PM2.5	WBEA	Teledyne/API	T640	319	2018
PM10	WBEA	Thermo	Partisol-2000i	200012 0386 1408	2016
PM10	WBEA	Thermo	Partisol-2000i	200012 0492 1408	2016
VOC	WBEA	Tisch	TE123	1023	2016
Wind speed	WBEA	Met One	010C-1	U11127	2018
Wind direction	WBEA	Met One	020C-1	N13744	2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	11038
Zero air generator	Zero Air Generator	Teledyne/API	701	5613
HVAC	Heating and air conditioning system. Wall mount unit	Intertherm	E2EB-010HB	E2E011101302
Shelter / Building	Air monitoring portable	C&B	8 x 16 trailer	5201657
Hydrogen Generator	Hydrogen Generator	AMA	HG300	171067044
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2448

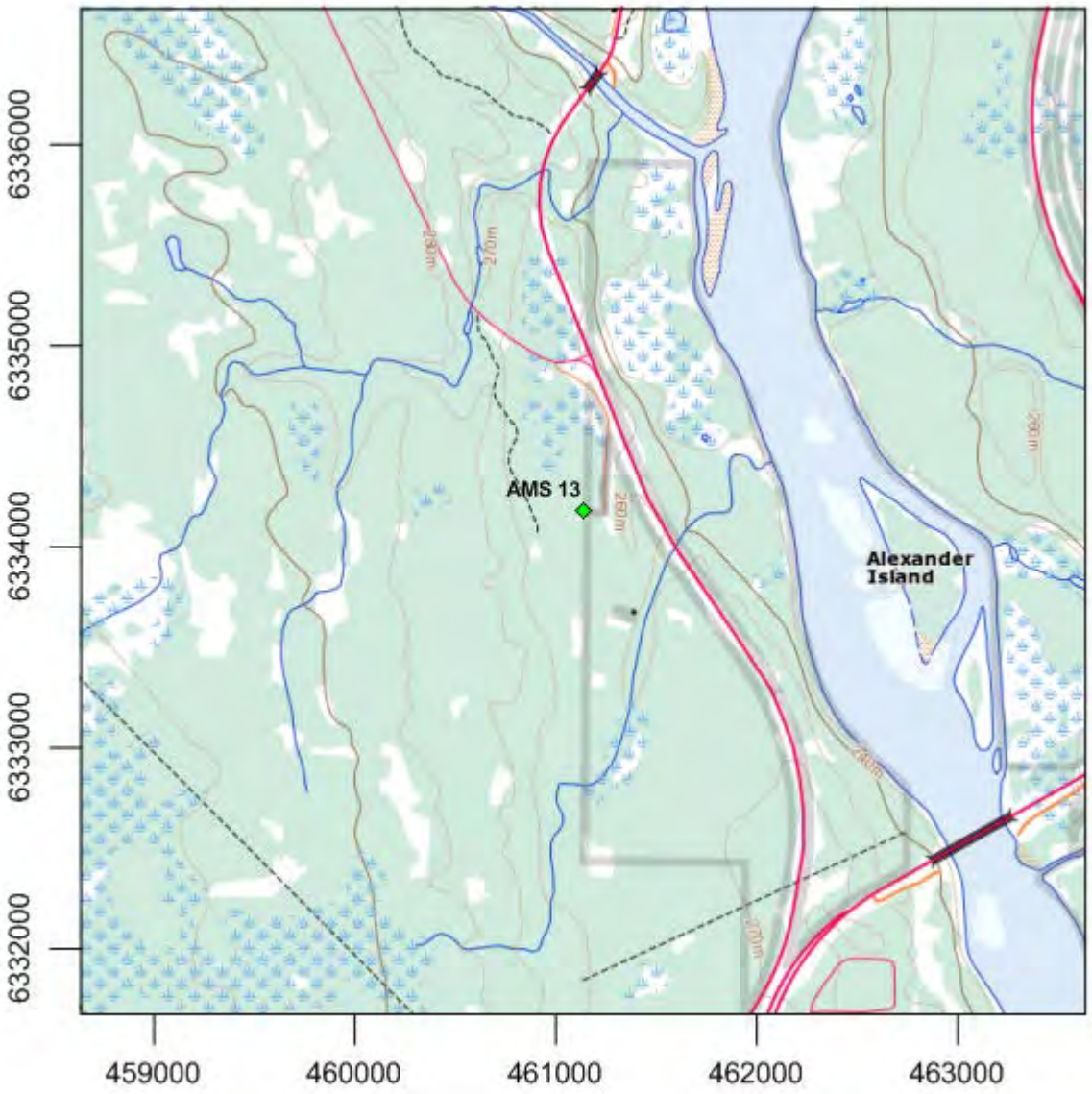
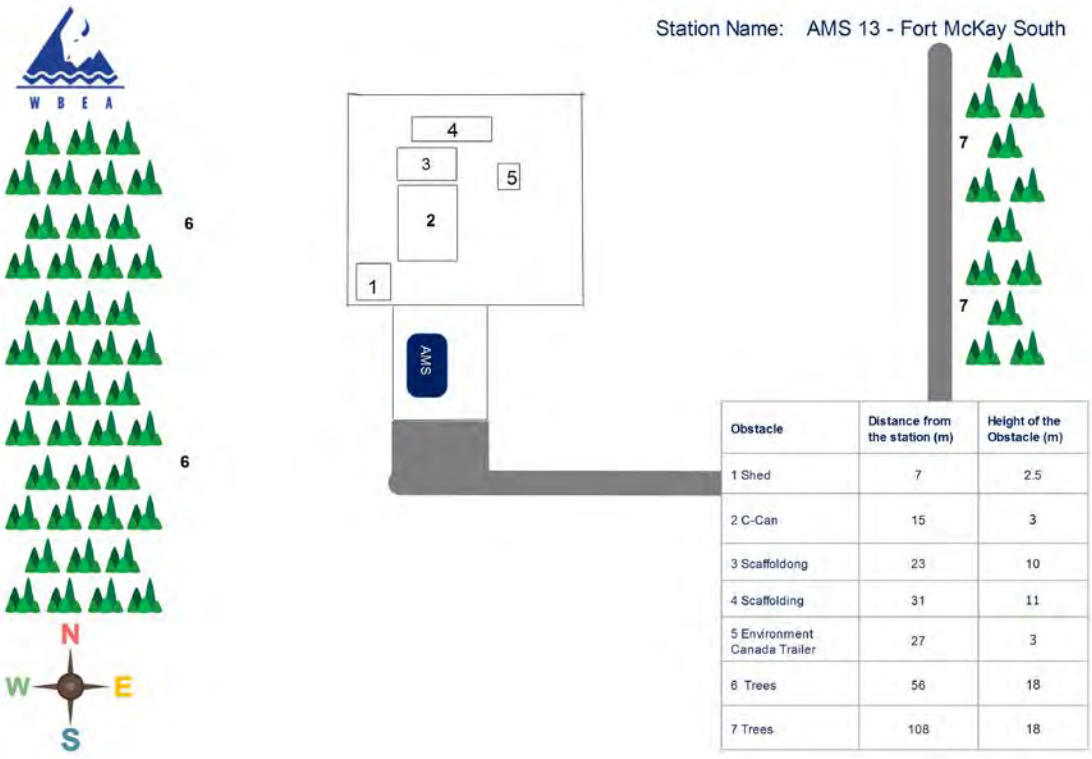


Figure 2.0 – Area Topographic map showing AMS 13



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Shed	7	2.5
2 C-Can	15	3
3 Scaffoldong	23	10
4 Scaffolding	31	11
5 Environment Canada Trailer	27	3
6 Trees	56	18
7 Trees	108	18

Figure 3.0 – Plan view sketch for AMS 13 site



Figure 4.0 – Aerial photo showing AMS 13

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.

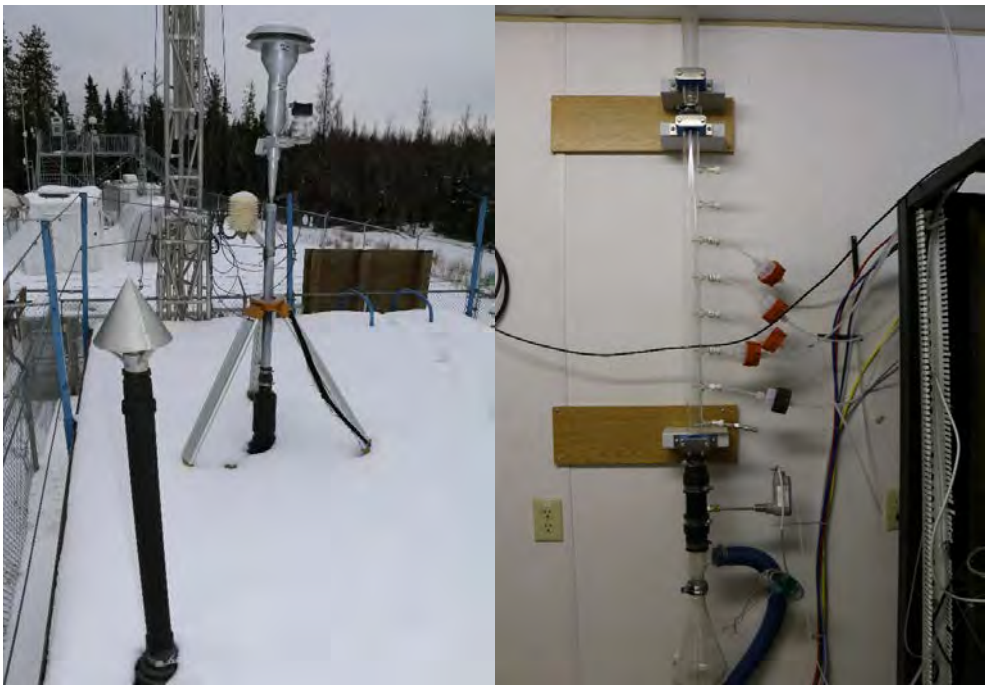


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

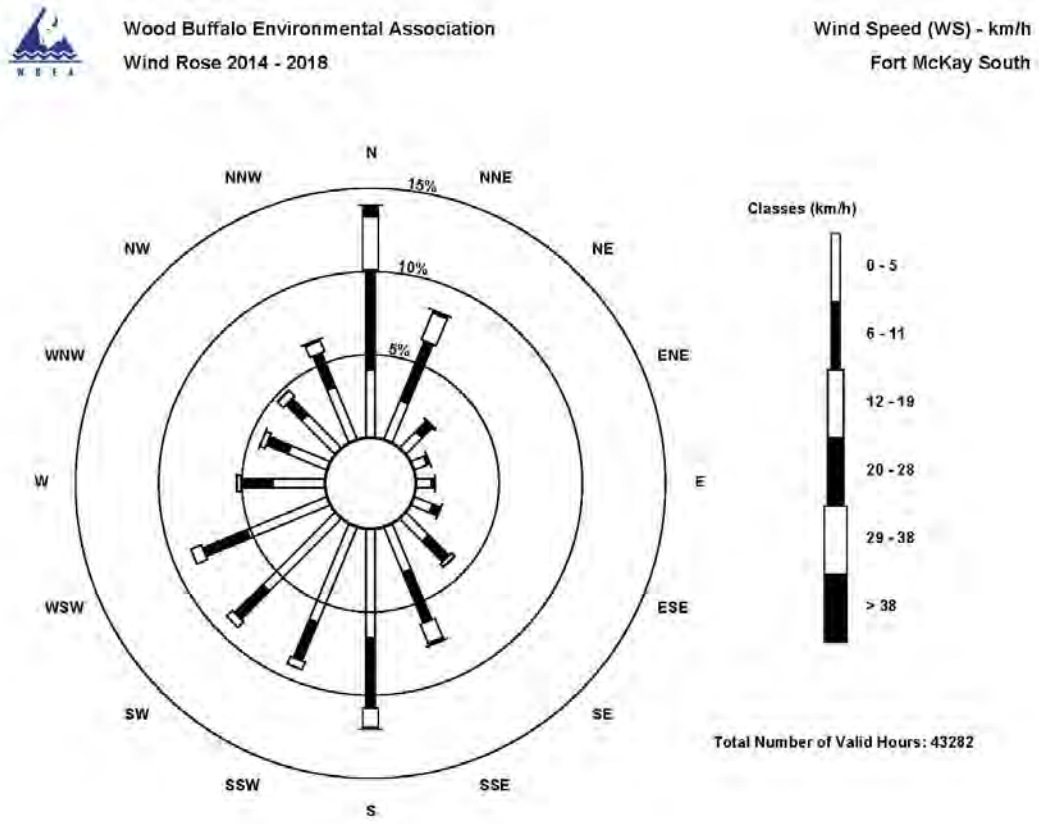


Figure 7.0 – Windrose (specify time period)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Anzac

LAST UPDATED: 03-06-2019

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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 25 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, $PM_{2.5}$, 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, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

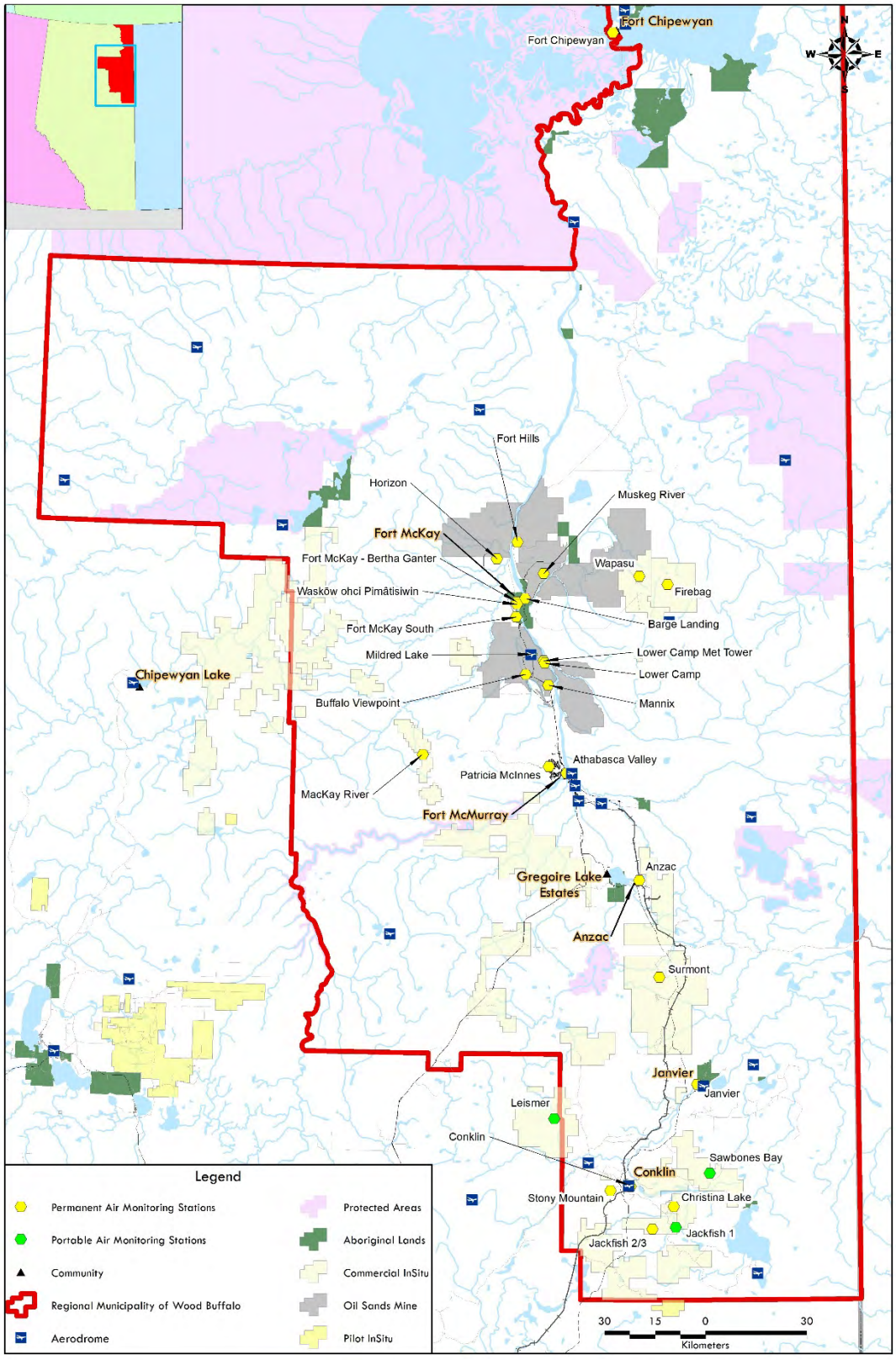


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 14
Station name	Anzac
Date station established	January 1, 2006.

Location

Station street address	Stony Mountain Road
Legal land description	16-09-086-07 W4
Latitude	56.448908
Longitude	-111.037975
UTM East	497659
UTM North	6256044
Nearest community	Anzac
Community population	548

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Nexen Energy ULC
Approval number	137467-01-00; 236394-00-00
Contact Name	Clementina Okoforo
Address	NA
Phone number	780-742-6873
Email address	NA

Site Description

Land use by sector	0 – 90 degrees	Trees
	91 – 180 degrees	Trees
	181 – 270 degrees	House
	271 – 360 degrees	Trailer
Site elevation (above sea level)	497 m	
Angle of elevation to nearby buildings	Greatest angle	18
	Building direction	West
Airflow restrictions	North	None
	East	None
	South	None
	West	House
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	20 m
	Distance from station	0

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Trailer	17 m	Telus trailer and tower
House	18	House W of station

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Pavement	low	62mS	Main road of Anzac
Access road	Low	16mE	Access road to station
Railway	low	70 m	Railway track E of station

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Nexen Long lake	SAGD	70,000 bbl/day	4.38	SW

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Instruments	43i	1152430005	2016-08-02
Total reduced Sulphur	WBEA	Thermo Instruments	43i-TLE	1300156232	2013-05-21
Oxides of Nitrogen	WBEA	Thermo Instruments	42i	1426262592	2015-01-08
Temperature/RH	WBEA	Vaisala	HMP155	G4330054	
Wind speed	WBEA	Met One	010C-1	D6359	2016-02-22
Wind direction	WBEA	Met One	020C-1	Z1048	2016-02-22
Methane Non Methane	WBEA	Thermo Instruments	55i-LT	1317958219	2016-04-21
Ozone	WBEA	Thermo Instruments	49i	1426262595	2015-01-09
PM <2.5 um in diameter	WBEA	Thermo Instruments	5030	E-1093	2014-07-04
Leaf wetness sensor	WBEA	Decagon Devices	LWS	10023	2018-10-01
Precip tipping bucket	WBEA	Met One	8" Heated Rain Gauge 0.01"	N1505A	2016-11-17
Partisol sampler	WBEA	Thermo Instruments	2000i	20001204821408	2014-09-11
Partisol sampler	WBEA	Thermo Instruments	2000i	20001204581405	2014-06-23
Partisol sampler	WBEA	Thermo Instruments	2000i	20001203871308	2017-02-10
Partisol sampler	WBEA	Thermo Instruments	2000i	2000IW205911510	2015-12-11
Polycyclic aromatic hydrocarbons	WBEA	Tisch	TE-PUF+BL	1001055	2016-11-15
Volatile organic compounds	WBEA	Tisch	TE-123	1024	2016-11-15
OPERA	Health Canada	OMNI 400	OMNI 400	2190	2016-07-26

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2582
Zero air generator	Zero Air Generator	Teledyne/API	701	4764
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	10 x 20 shelter	2N9MF53785
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2659

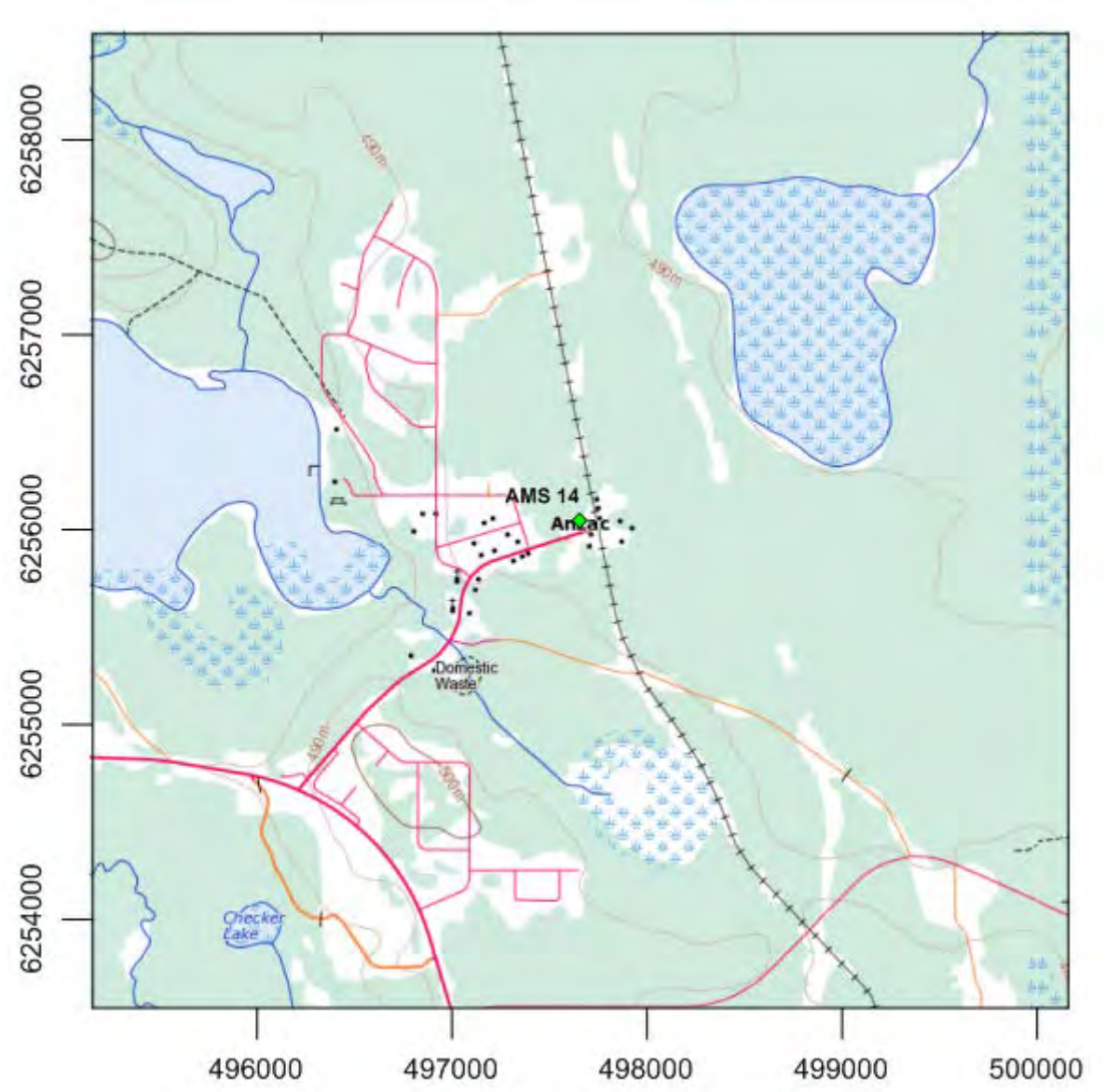
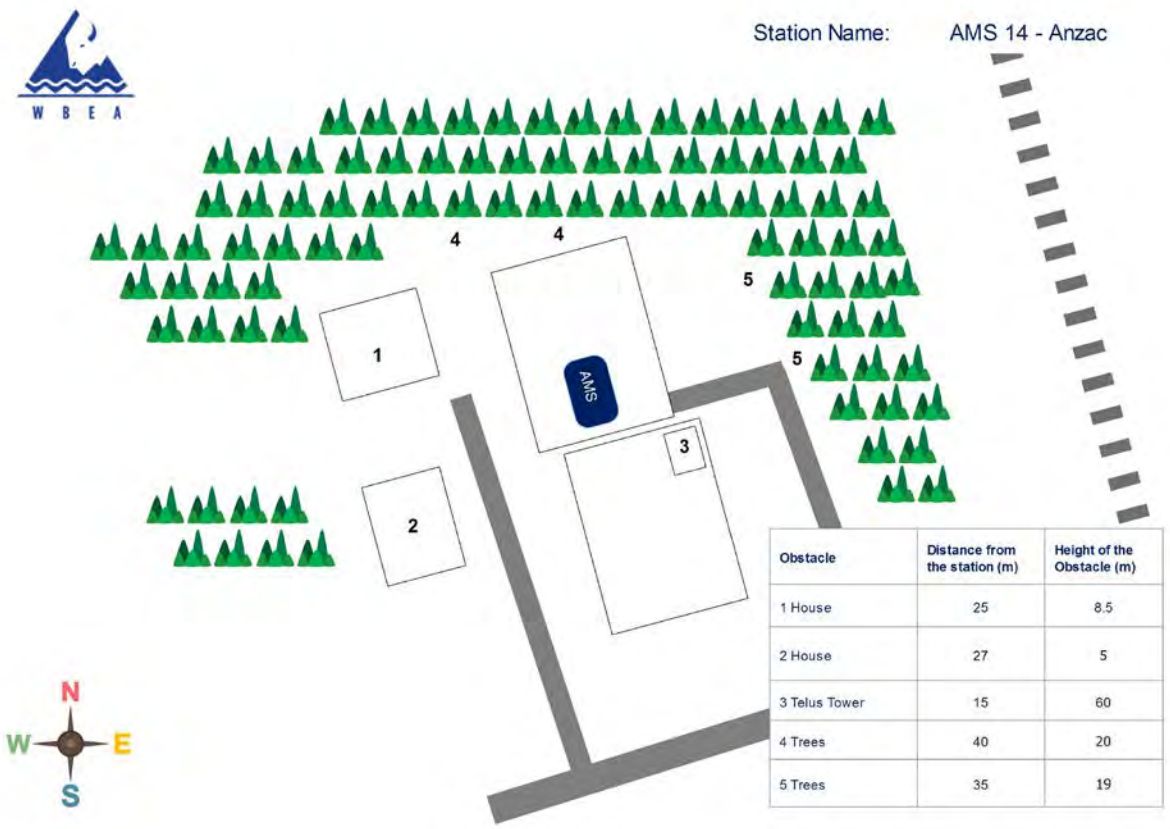


Figure 2.0 – Area Topographic map showing AMS 14



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 House	25	8.5
2 House	27	5
3 Telus Tower	15	60
4 Trees	40	20
5 Trees	35	19

Figure 3.0 – Plan view sketch for AMS 14 site



Figure 4.0 – Aerial photo showing AMS 14

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

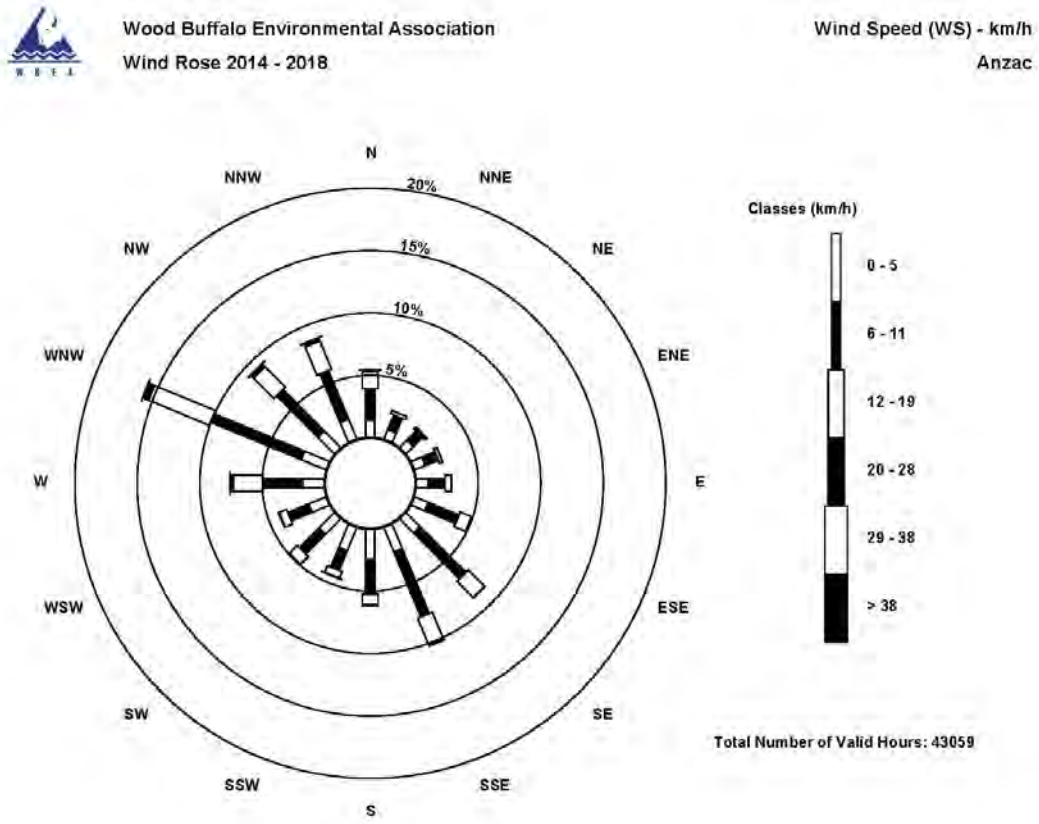


Figure 7.0 – Windrose (2014-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Horizon

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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 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), and carbon monoxide (CO). Sites are categorized as industrial or community, based on the setting in which they are located.

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_x$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

* Also functions as an enhanced deposition station.

Table 2 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.

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

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	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

* Also functions as an enhanced deposition station.
y Monitoring data used for research and development purposes only.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC) and reduced sulphur compounds (RSC), 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), dichotomous samples, speciated denuder sampler (SASS), and precipitation samples.

Table 3: Summary of parameters measured using integrated methods at WBEA sites

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

* Also functions as an enhanced deposition station.

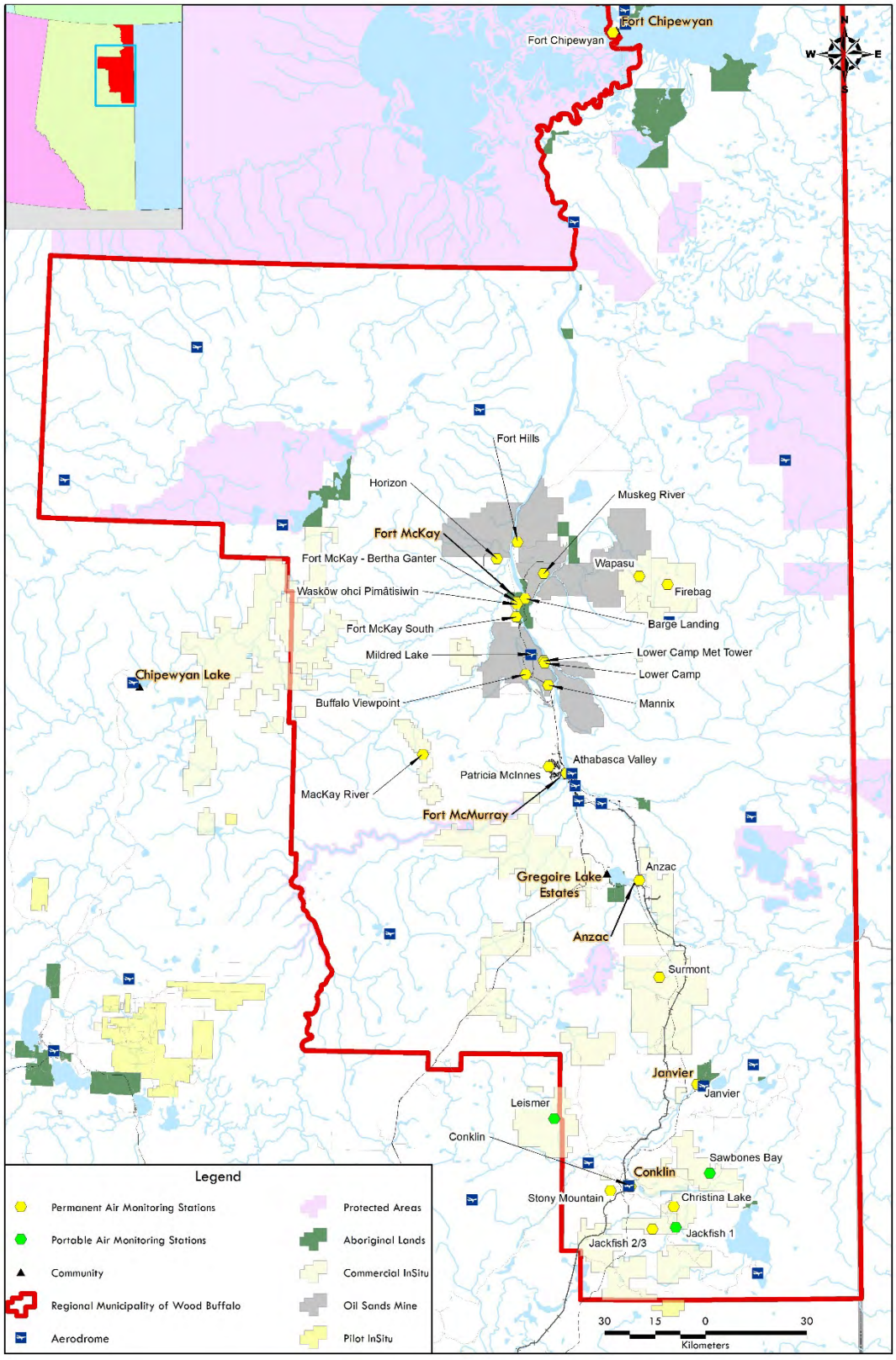


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 15
Station name	Horizon
Date station established	2007

Location

Station street address	Located at about 300 m northwest of the Total Joslyn camp.
Legal land description	12-04-096-11 W4
Latitude	57.303689
Longitude	-111.739489
UTM East	455445
UTM North	6351434
Nearest community	Fort Mackay
Community population	742

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Canadian Natural Resources Ltd.
Approval number	149968-01-00
Contact Name	Tina Ding
Address	2100, 855 – 2 Street SW Calgary, AB T2P 4J8
Phone number	(780) 714-4436
Email address	Tina.ding@cnrl.com

Site Description

Land use by sector	0 – 90 degrees	Forest
	91 – 180 degrees	Forest
	181 – 270 degrees	Forest
	271 – 360 degrees	Forest
Site elevation (above sea level)	302	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	N/A
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10
	Distance from station	7

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Camp	300	Total Joslyn workers camp

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Dirt road	Very low	3	

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
CNRL Horizon Oil Sands	Oil plant		2km	North
CNRL Horizon	Open mining		15km	East

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Scientific	43i	710321322	2018
Hydrogen Sulfide	WBEA	Thermo Scientific	43-TLE	1410661331	2018
Oxides of Nitrogen	WBEA	Thermo Scientific	42i	0710321429	2018
Temperature/RH	WBEA	Vaisala	HMP155	F5010003	2018
Wind speed	WBEA	Met One	010C-1	J4337	2018
Wind direction	WBEA	Met One	020C-1	J2732	2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	11040
Zero air generator	Zero Air Generator	Teledyne/API	701	1004
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	2N9MF73895
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	1223

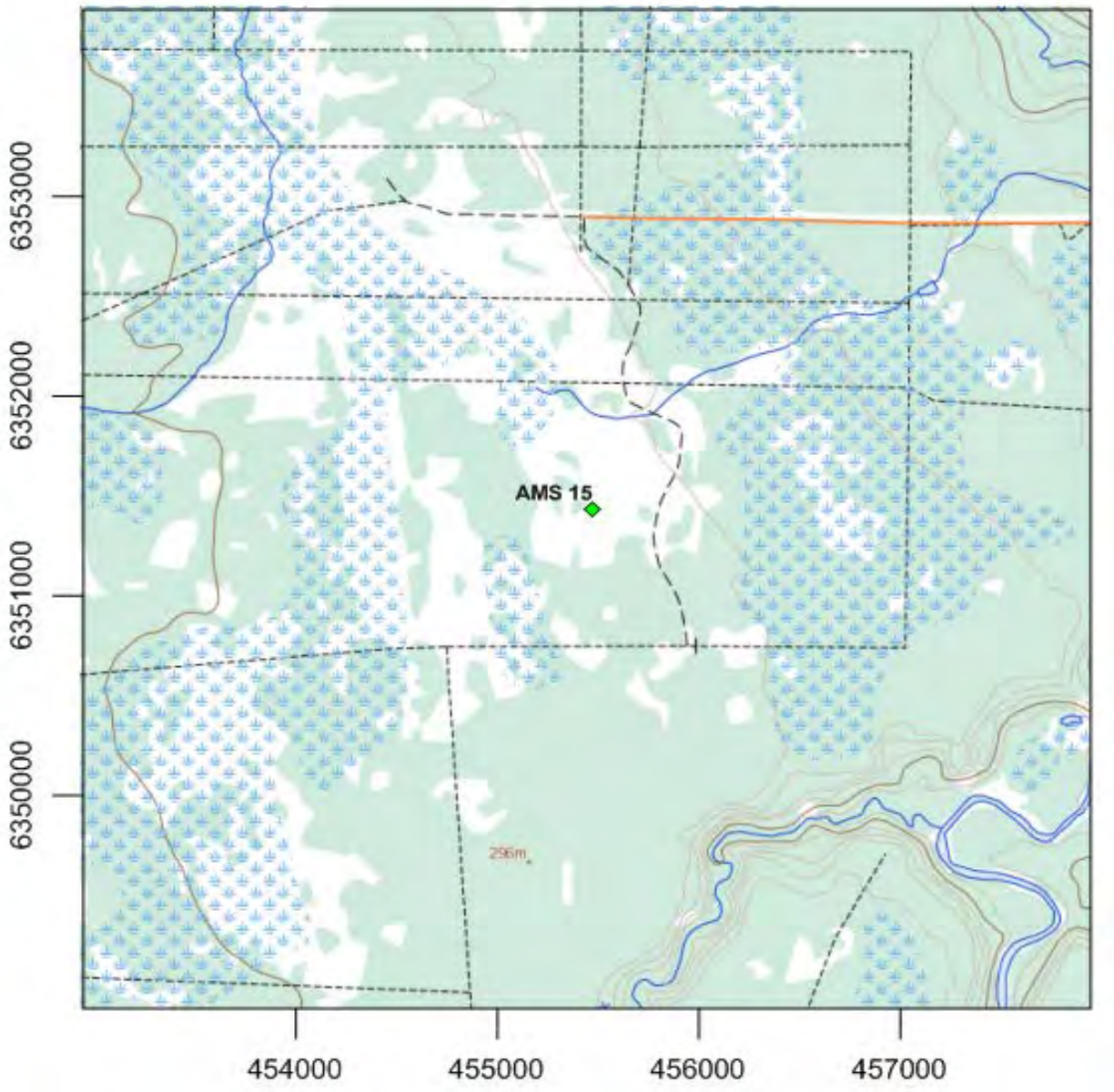
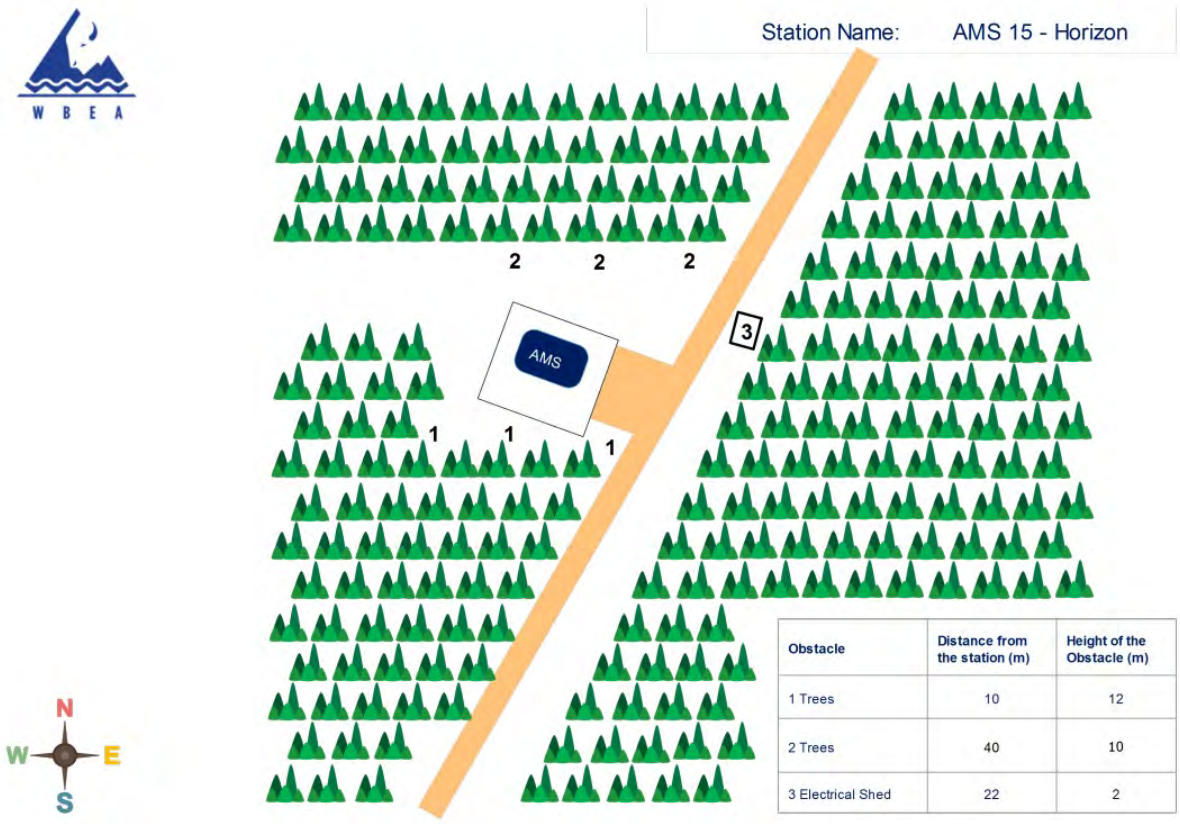


Figure 2.0 – Area Topographic map showing AMS 15



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	10	12
2 Trees	40	10
3 Electrical Shed	22	2

Figure 3.0 – Plan view sketch for AMS 15 site



Figure 4.0 – Aerial photo showing AMS 15

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.

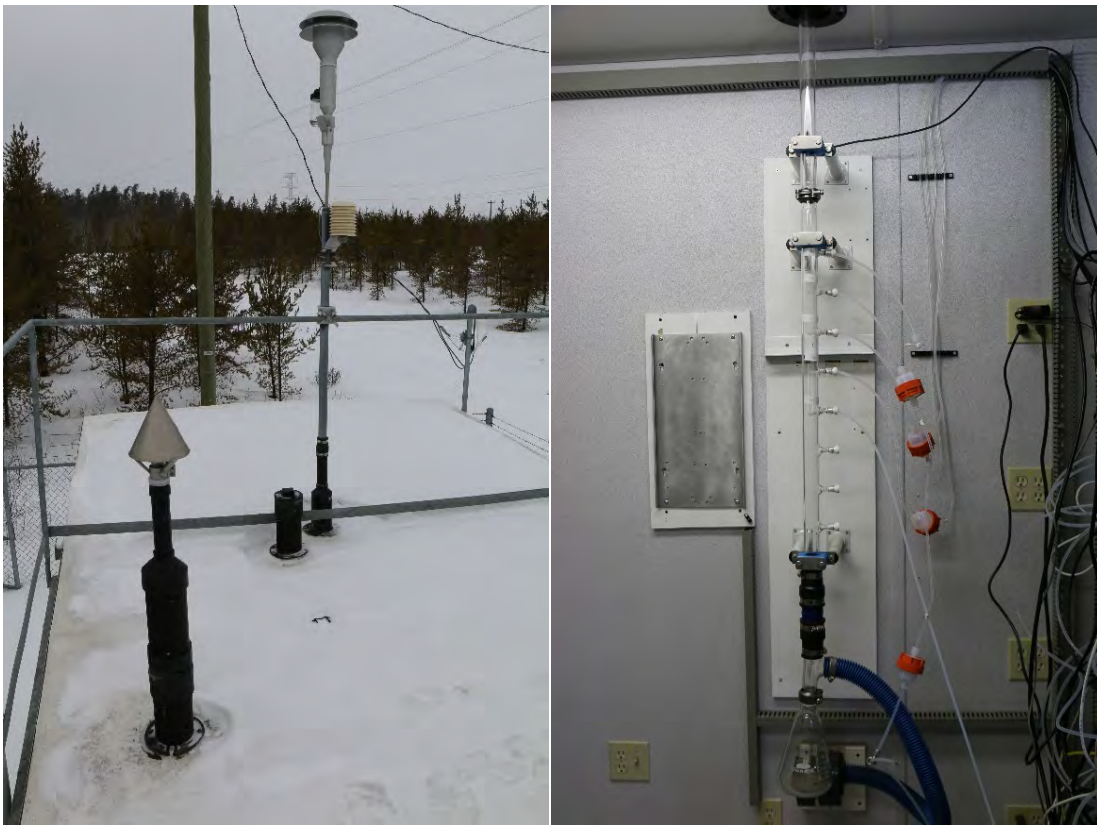


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

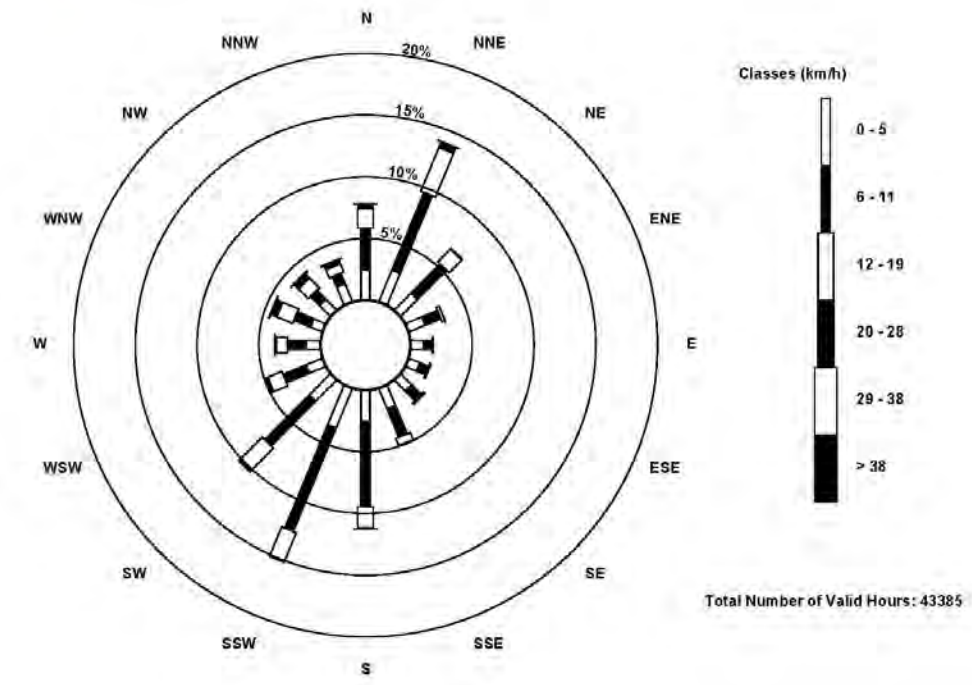


Figure 7.0 – Windrose (2014-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Muskeg River

LAST UPDATED: 02-28-2019

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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 25 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, $PM_{2.5}$, 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.

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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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

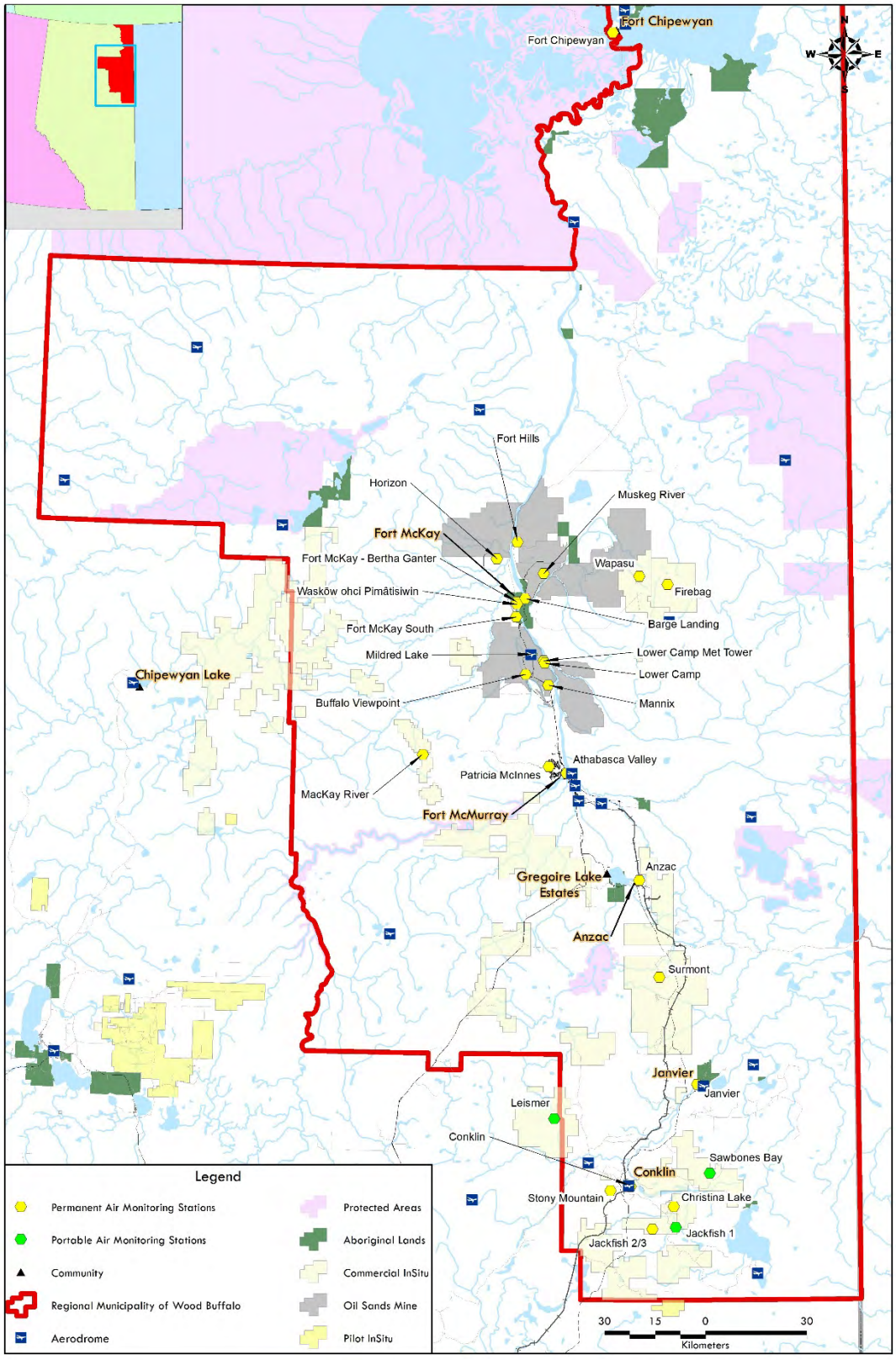


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 16
Station name	Muskeg River
Date station established	February 10, 2009

Location

Station street address	Located approximately 250m south of Shell MRM plant site
Legal land description	15-14-095-10 W4
Latitude	57.249092
Longitude	-111.508653
UTM East	469307
UTM North	6345229
Nearest community	Barge Landing Camp
Community population	unknown

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Canadian Natural Upgrading Limited
Approval number	20809-02-00
Contact Name	Tina Ding
Address	N/A
Phone number	(780) 714-4436
Email address	XueFeng.Ding@cnrl.com

Site Description

Land use by sector	0 – 90 degrees	Water pond, Muskeg River plant
	91 – 180 degrees	Forest
	181 – 270 degrees	Forest
	271 – 360 degrees	Muskeg River plant
Site elevation (above sea level)	285 m	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	none
Airflow restrictions	North	trees
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 metres
	Distance from station	2 metres

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Oilsands operation	300 m	MRM's extraction and tailings operations.

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Gravel road	low	30 m	Gravel access road to site
Asphalt road	medium	300 m	Access road to the MRM operations

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Muskeg River Operations	Oilsands mine and plant	150,000 barrels per day	300 m	North

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	CNRL	Thermo Scientific	43i	1118148498	2012
Oxides of Nitrogen	CNRL	Thermo Scientific	42i	1426262593	2012
Total Hydrocarbons	CNRL	Thermo Scientific	51i	1327059296	2012
PM 2.5	CNRL	Thermo Scientific	5030	E-798	2015
Wind speed	CNRL	Met One	010C-1	B2027	2012
Wind direction	CNRL	Met One	020C-1	N12035	2012
Temperature/RH	CNRL	Vaisala	HMP155	G4340064	2012
PM10 sampler	CNRL	Thermo Scientific	2000i	2000i204511014	2015
PM10 sampler	CNRL	Thermo Scientific	2000i	2000i203701306	2015

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	3492
Zero air generator	Zero Air Generator	Teledyne/API	701	197
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	493
Shelter / Building	Monitoring shelter	National Trailer	10 x 20 skid	2N9MFY3614

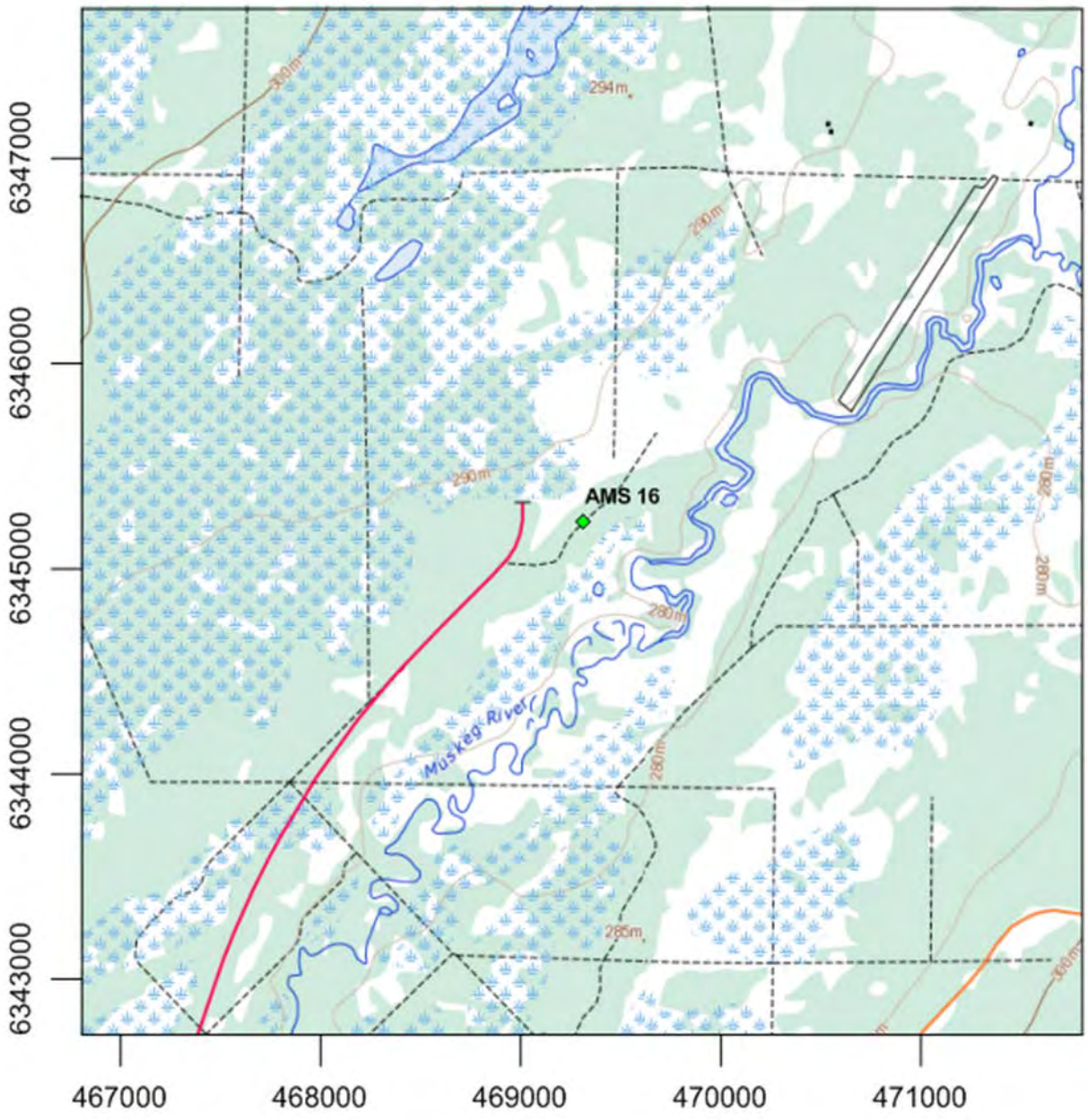
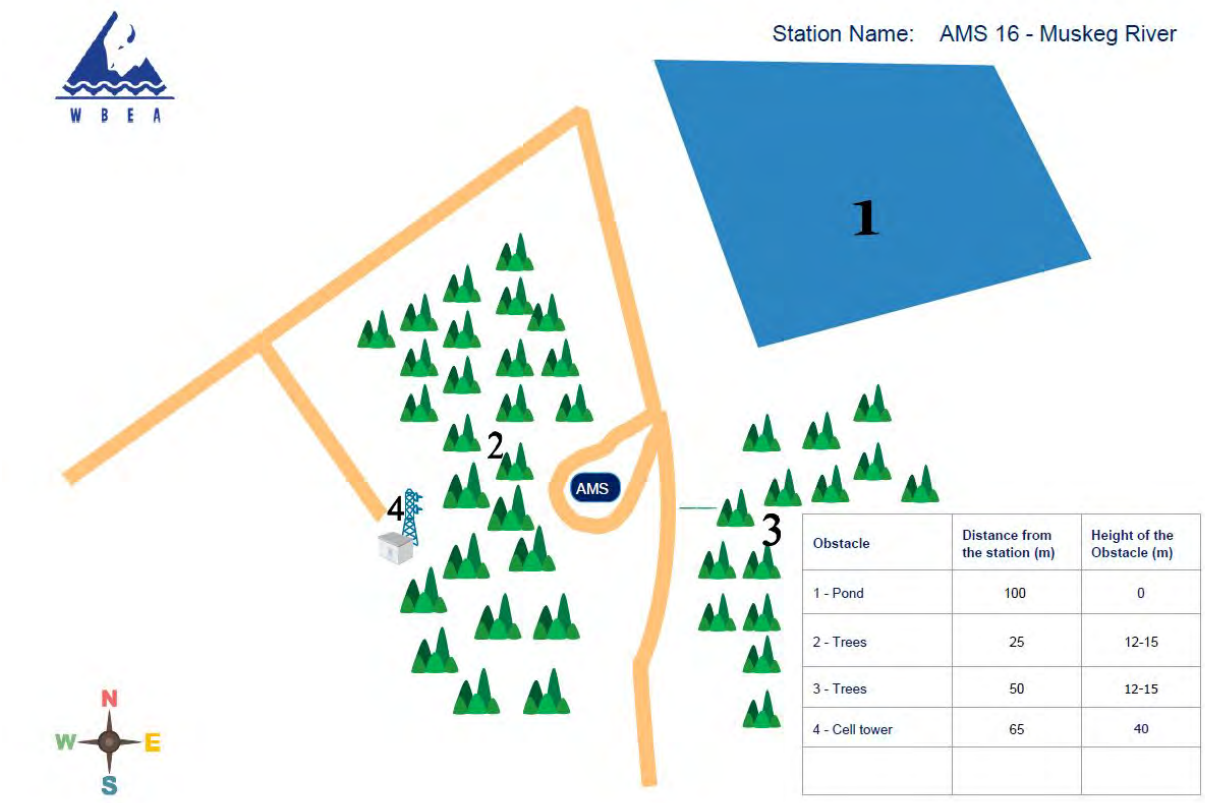


Figure 2.0 – Area Topographic map showing AMS 16



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 - Pond	100	0
2 - Trees	25	12-15
3 - Trees	50	12-15
4 - Cell tower	65	40

Figure 3.0 – Plan view sketch for AMS 16 site



Figure 4.0 – Aerial photo showing AMS 16

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



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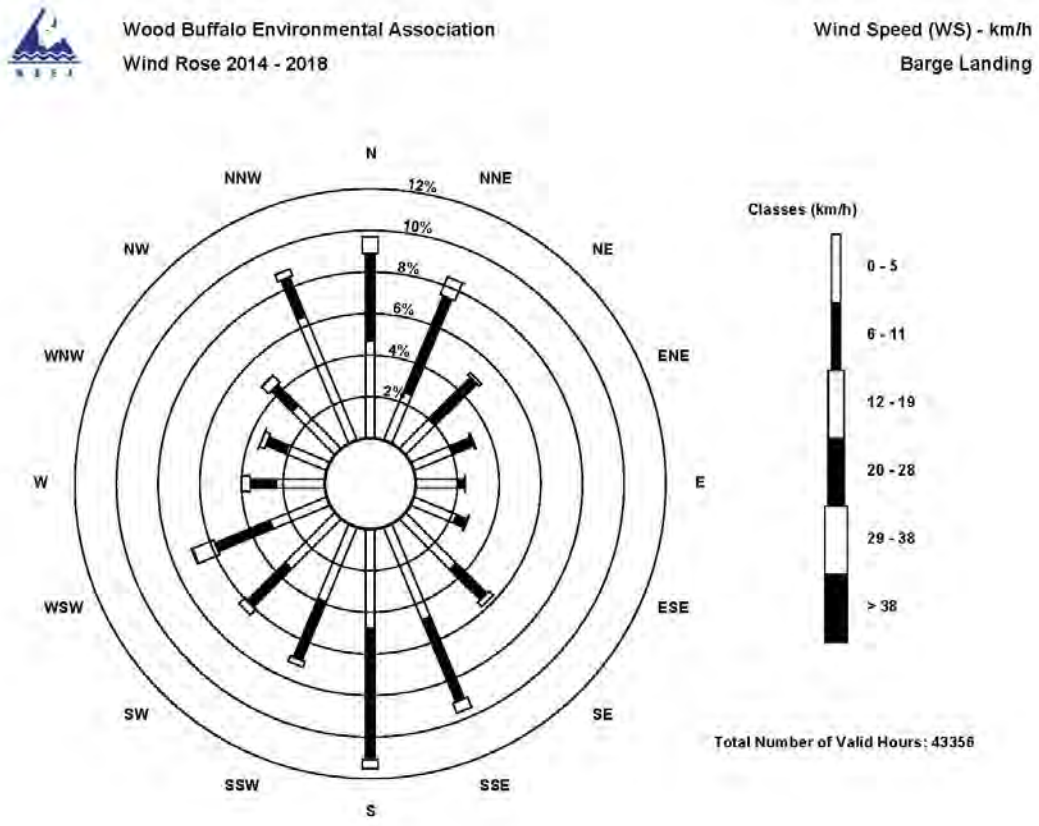


Figure 7.0 – Windrose – from Barge Landing site nearby

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Wapasu

LAST UPDATED: 02-15-2019

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1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

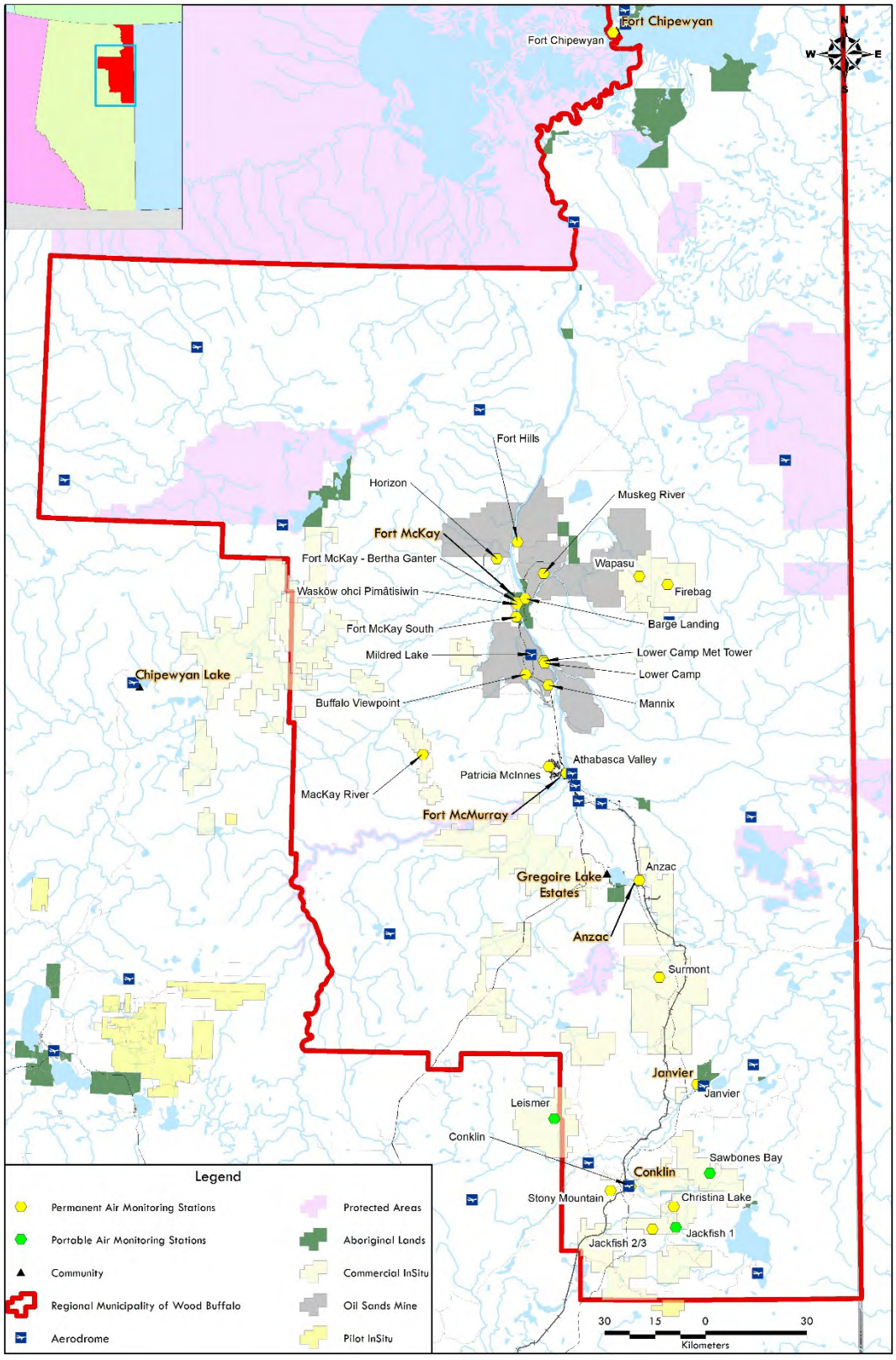


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 17
Station name	Wapasu
Date station established	November 2013

Location

Station street address	Located on the north of the Wapasu Camp.
Legal land description	9-22-095-07 W4
Latitude	57°15’33.11” North
Longitude	111°2’18.90” West
UTM East	497672
UTM North	6346240
Nearest community	Fort Mackay
Community population	742 (2016)

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Husky Oil Operations Limited
Approval number	206355-01-00
Contact Name	
Address	N/A
Phone number	
Email address	

Site Description

Land use by sector	0 – 90 degrees	Decommissioned well pad
	91 – 180 degrees	Wooded area
	181 – 270 degrees	Wooded area
	271 – 360 degrees	Site access road
Site elevation (above sea level)	491 m	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	N/A
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
N/A	N/A	N/A

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Access road	Low	5	Gravel access road used by pickup trucks.
Canterra Main Road	High	1500	Heavily trafficked gravel road frequented by heavy equipment, tractor trailers, and pickup trucks.

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Suncor Firebag	Oilsands Operation	157,500	10	SE
Husky Sunrise	Oilsands Operation	346,000	0	N/A

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	1218153459	N/A
Hydrogen Sulfide	WBEA	Thermo	450i	1218153583	N/A
Oxides of Nitrogen	WBEA	Teledyne/API	T200	833	N/A
Total Hydrocarbons	WBEA	Thermo	51i	1218153352	N/A
Ozone	WBEA	Teledyne/API	T400	2962	December 2017
Particulate Matter	WBEA	SHARP	5030	CM-2390	July 2016
Temperature/RH	WBEA	Vaisala	HMP155	G0840090	N/A
Wind speed	WBEA	Met One	010C-1	N14664	May 2018
Wind direction	WBEA	Met One	020C-1	P19942	May 2018
Hi-VOL PUF	WBEA	Tisch	TE-1000	3816	N/A
Dichot	WBEA	Partisol	2000i-D	200ID 01251103	N/A
Partisol EC/OC	WBEA	Partisol	2000i	2000I204511404	N/A

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	884
Zero air generator	Zero Air Generator	Teledyne/API	701H	359
HVAC	Heating and air conditioning system. Wall mount unit	BARD	W24A1-A05XPXXXJ	314M122956387-02
Shelter / Building	Air monitoring portable	ITB	10 x 20 trailer	ITB12-15686
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	3252

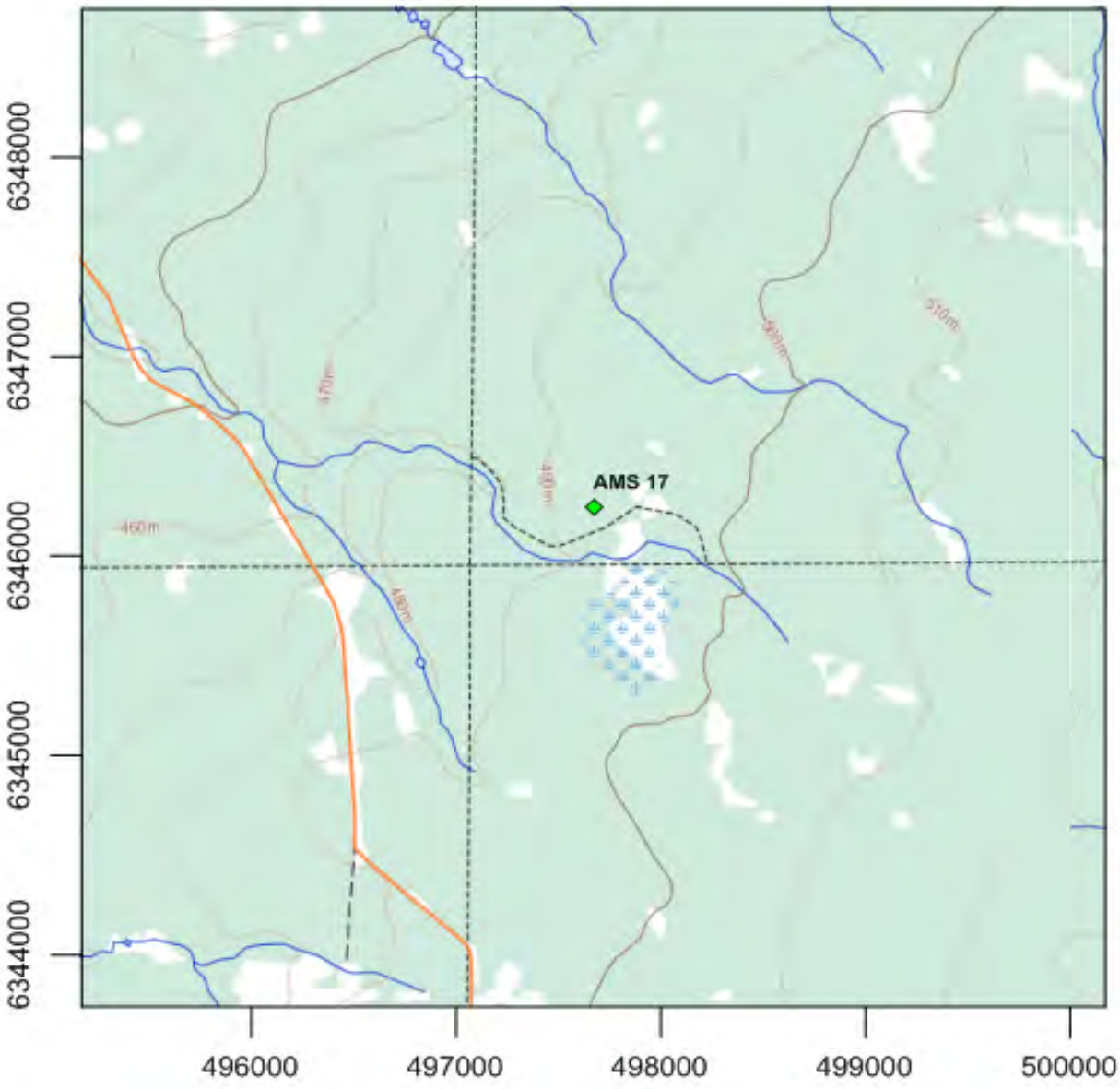
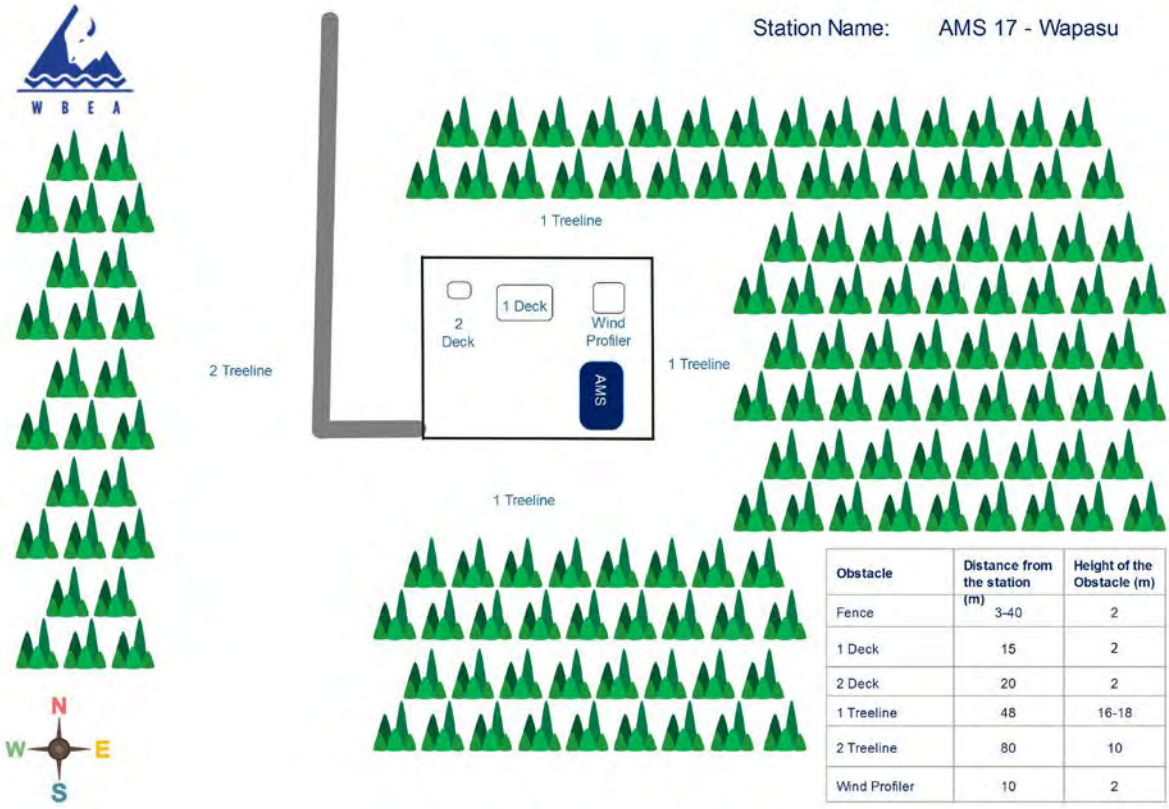


Figure 2.0 – Area Topographic map showing AMS 17 – Wapasu Station



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
Fence	3-40	2
1 Deck	15	2
2 Deck	20	2
1 Treeline	48	16-18
2 Treeline	80	10
Wind Profiler	10	2

Figure 3.0 – Plan view sketch for AMS 17 – Wapasu Station

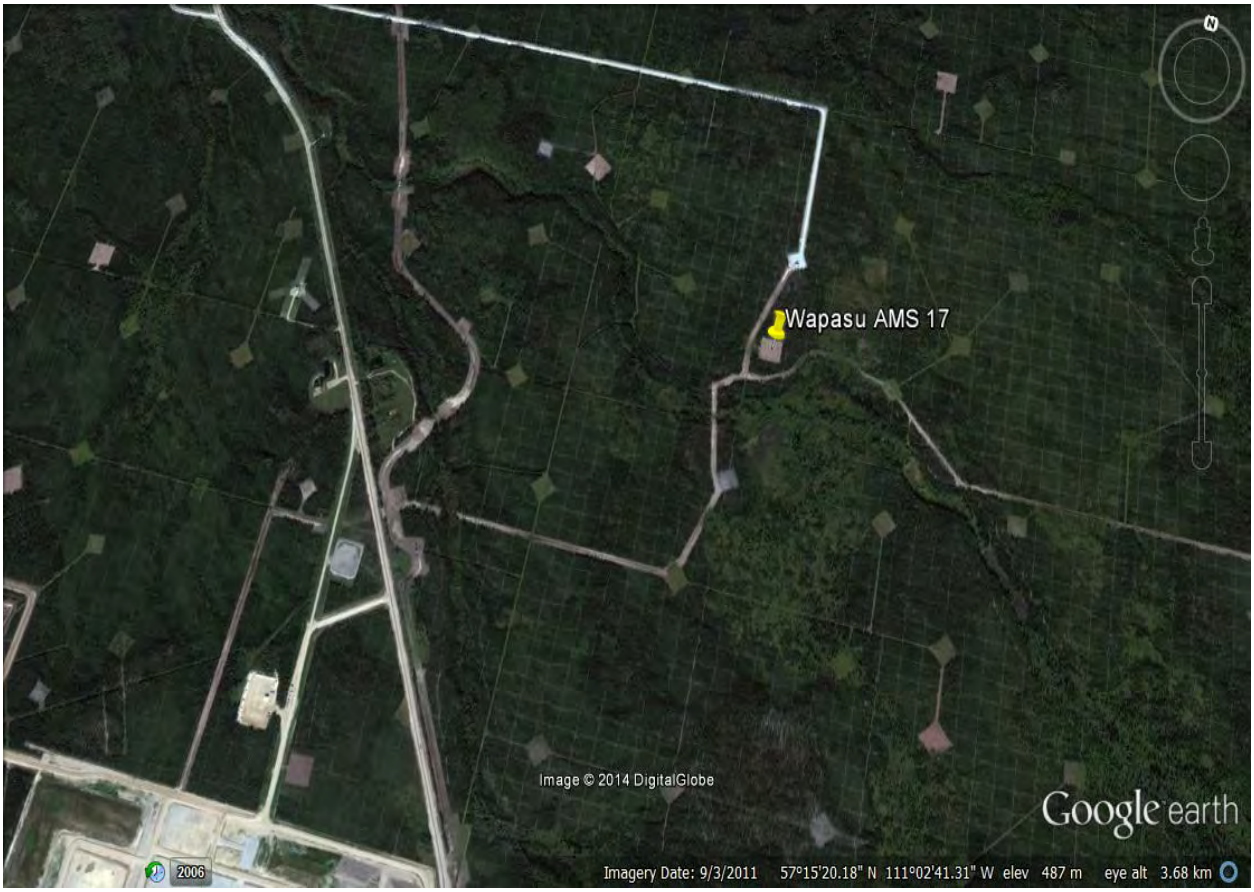


Figure 4.0 – Aerial photo showing AMS 17 – Wapasu Station

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.

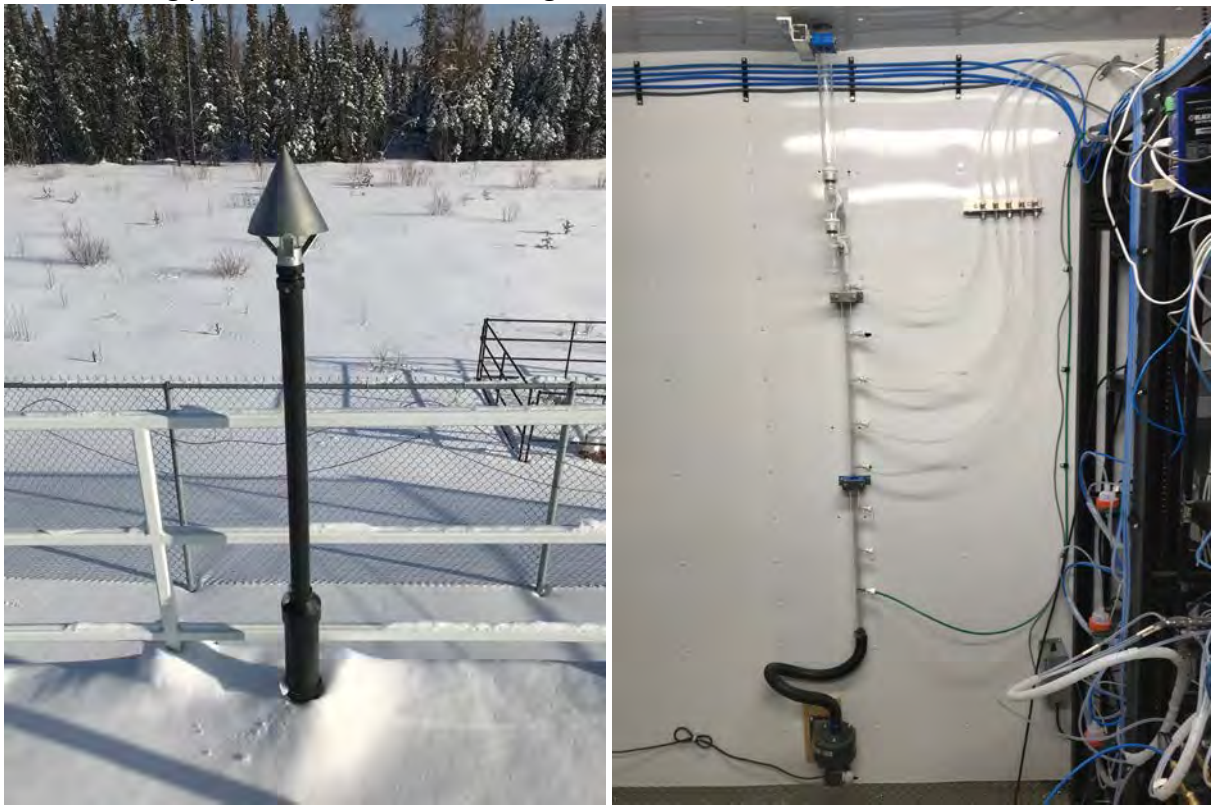


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

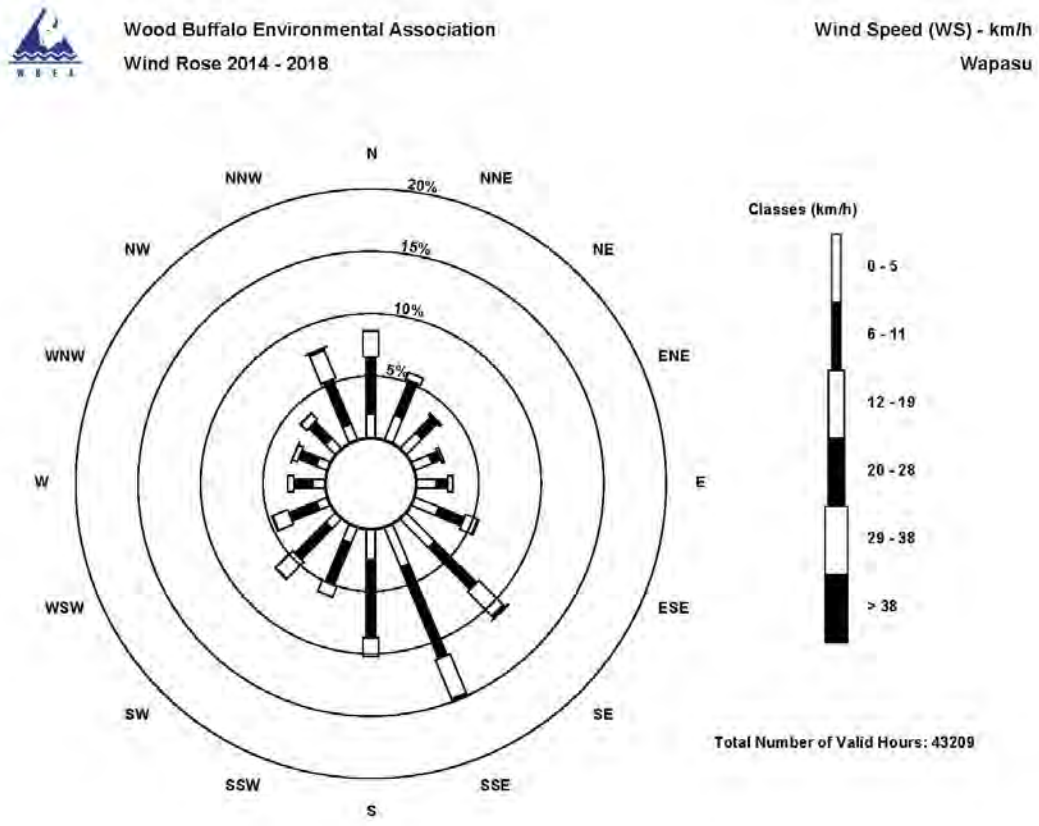


Figure 7.0 – Windrose (2014 - 2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Stony Mountain

LAST UPDATED: 03-06-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

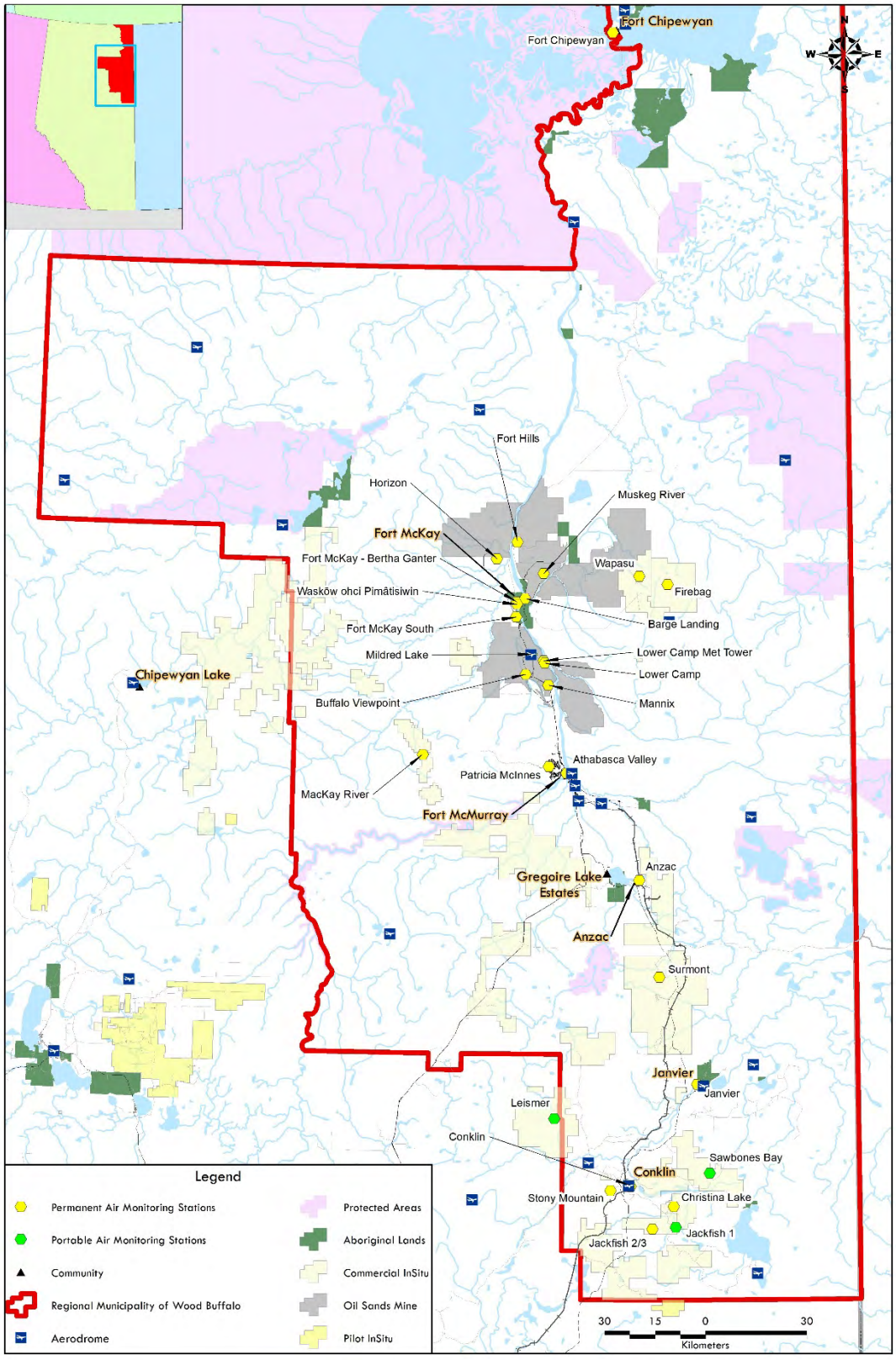


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 18
Station name	Stony Mountain
Date station established	June 2015

Location

Station street address	NA
Legal land description	1-33-076-08 W4
Latitude	55.621408
Longitude	-111.172686
UTM East	489125
UTM North	6163958
Nearest community	Conklin
Community population	185

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	NA
Approval number	NA
Contact Name	NA
Address	NA
Phone number	NA
Email address	NA

Site Description

Land use by sector	0 – 90 degrees	Trees
	91 – 180 degrees	Trees
	181 – 270 degrees	Trees
	271 – 360 degrees	Fire tower, trees
Site elevation (above sea level)		
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Fire watch tower	100 m Nw of station	Fire lookout tower, operated by ESRD.
Communication tower	30 m E of station	Fire lookout tower, operated by ESRD.c

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Access road	low	10 m	Dirt/sand road

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Cenovus	SAGD	376,000 barrels per day (bbls/d)	12.26 km	SE
Devon Jackfish	SAGD	105,000 bbl/day	15 km	SE

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Instruments	43i	1501301453	2015
Total reduced Sulphur	WBEA	Thermo Instruments	43i-TLE	1336160090	2015
Oxides of Nitrogen	WBEA	Thermo Instruments	42i	1336160088	2015
Temperature/RH	WBEA	Vaisala	HMP155	N2910512	2016
Wind speed	WBEA	Met One	010C-1	U11125	2015
Wind direction	WBEA	Met One	020C-1	R14654	2015
Ozone	WBEA	Thermo Instruments	49i	1501663733	2015
PM 2.5	WBEA	Thermo Instruments	SHARP 5030	E-1107	2015
Precipitation	WBEA	OTT	Pluvio	363526	2016
Leaf Wetness	WBEA	Decagon Devices	LWS-L		2016
Global Radiation	WBEA	Pacwill Environmental	8-48 Solar Rad	38008	2015
Dichot A	ECCC	Thermo Instruments	Partisol – 2000i-D	200ID201181103	2016
Dichot B	ECCC	Thermo Instruments	Partisol – 2000i-D	200ID201341103	2016
SASS	ECCC	Met One Instruments	SuperSASS	R20401	2016
Hi-VOL PUF	ECCC	Tisch	TE-1000	1416242	2016
Partisol EC/OC	WBEA	Thermo Instruments	2000i	2000IW206911702	2016

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	66062
Zero air generator	Zero Air Generator	Teledyne/API	701	360
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB-14-16019
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700P	3811
Themal oxidizer	TRS converter	CD Nova	CDN- 101	522

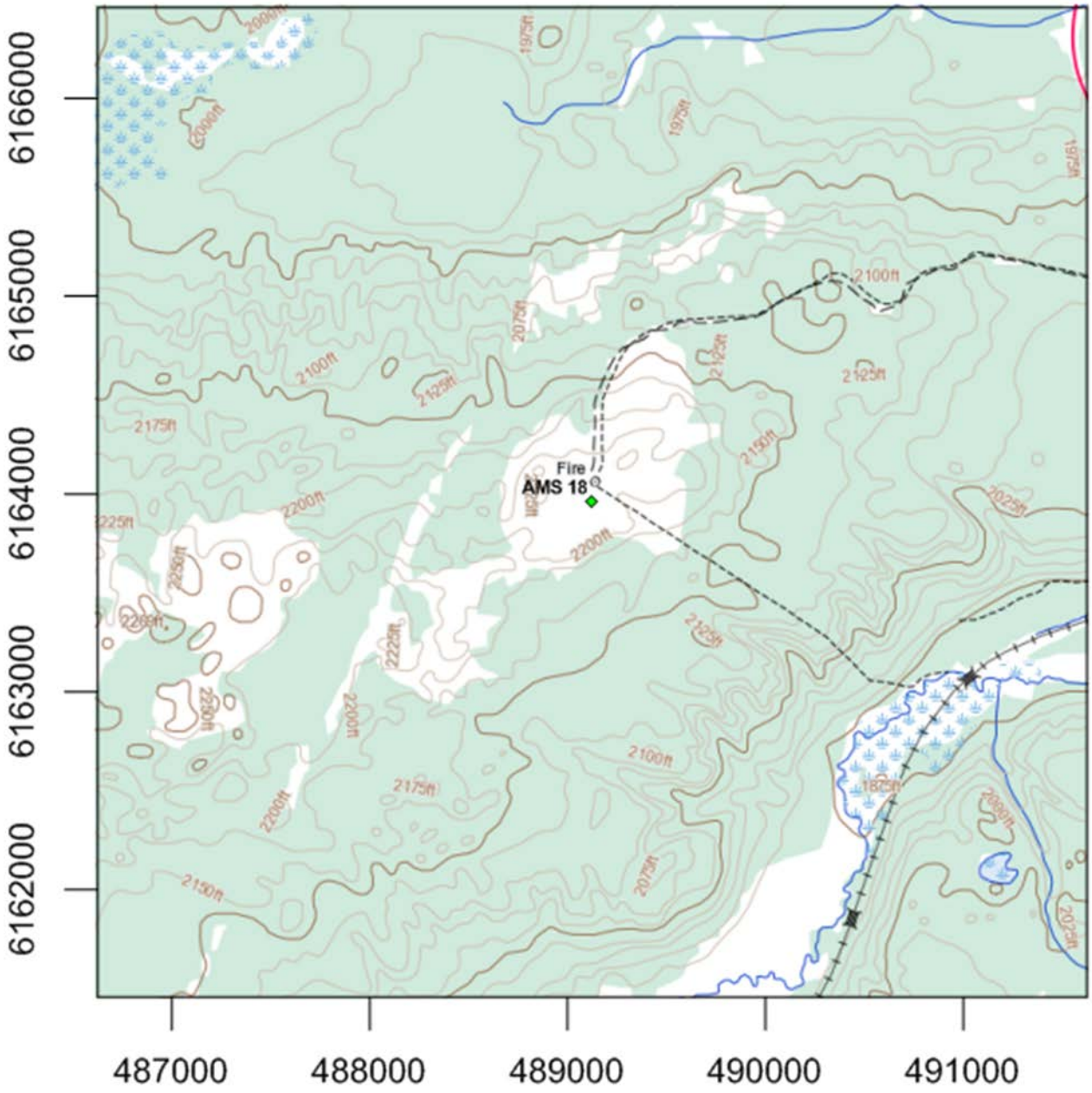
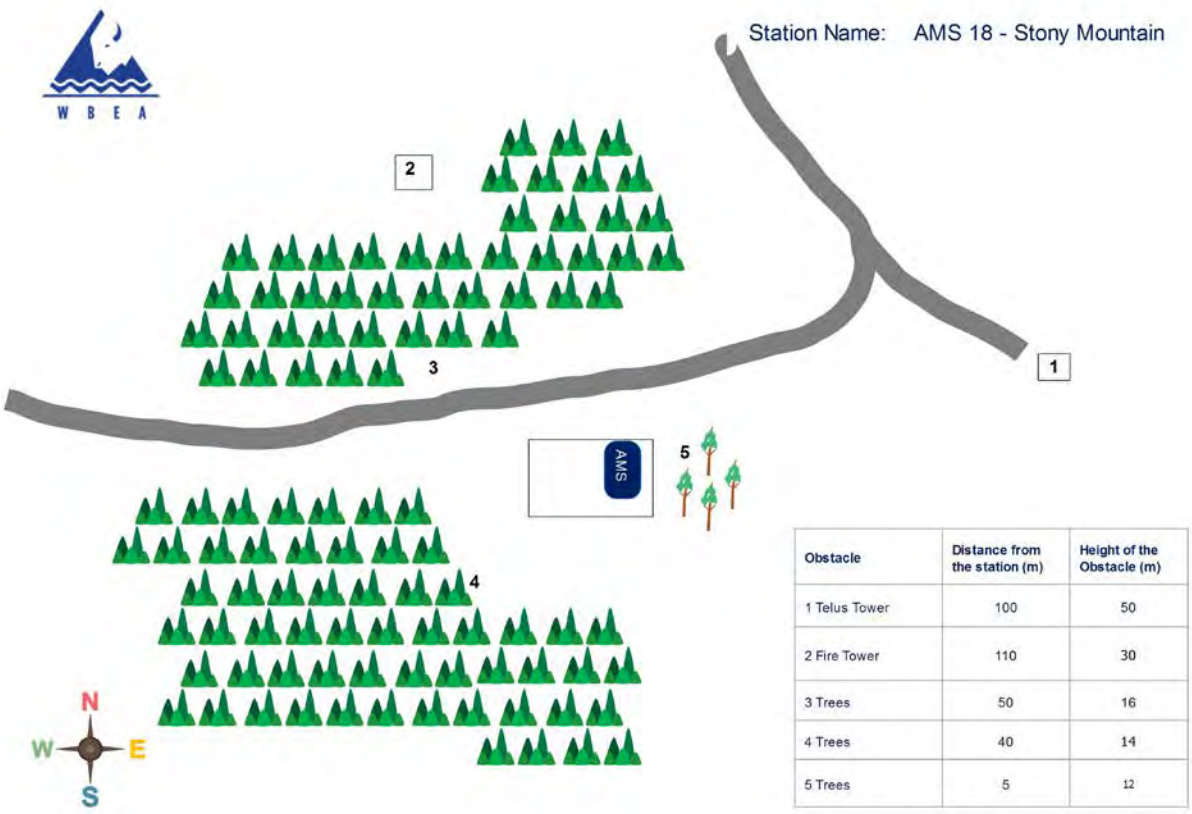


Figure 2.0 – Area Topographic map showing AMS 18



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Telus Tower	100	50
2 Fire Tower	110	30
3 Trees	50	16
4 Trees	40	14
5 Trees	5	12

Figure 3.0 – Plan view sketch for AMS 18 site

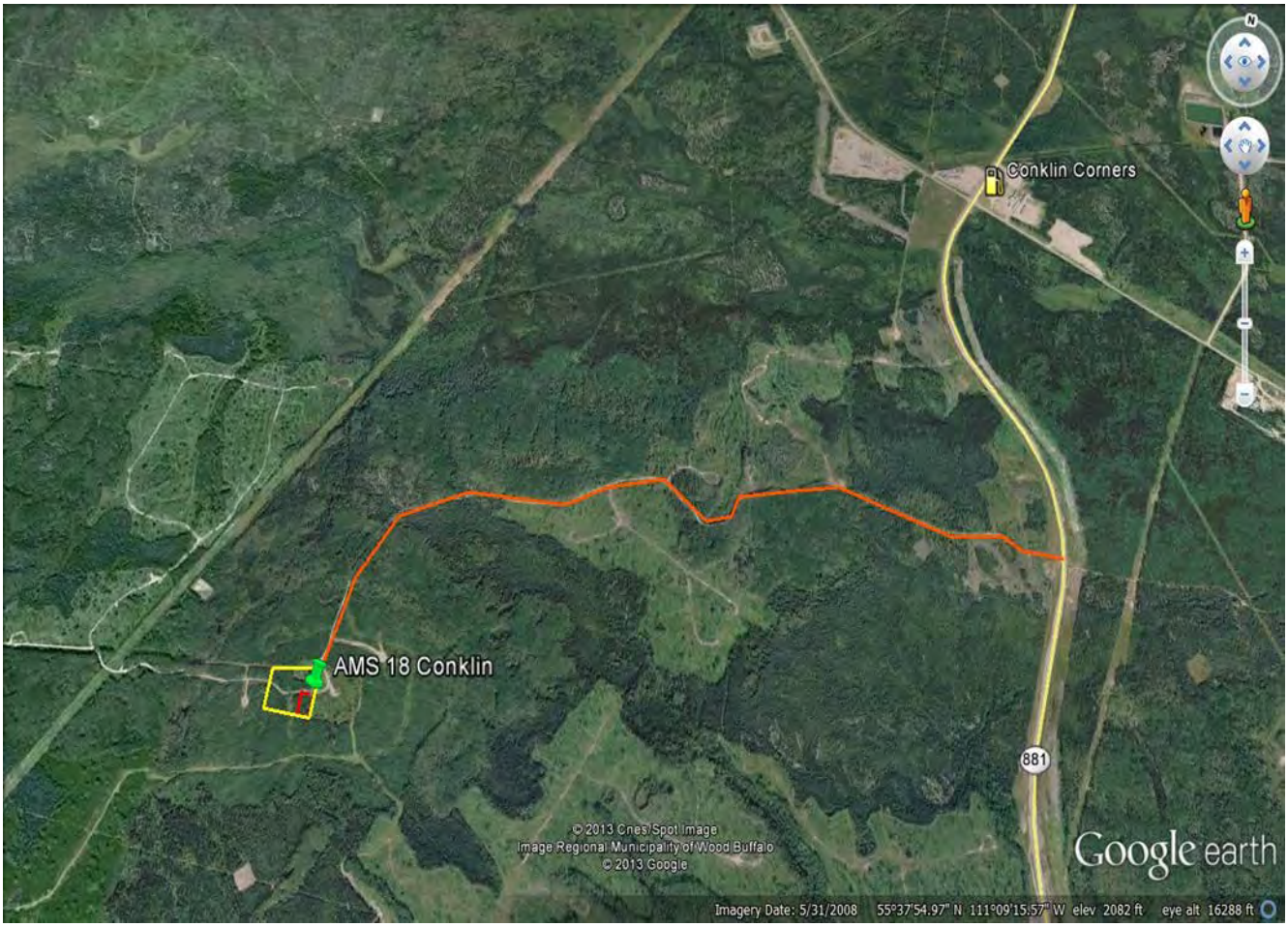


Figure 4.0 – Aerial photo showing AMS 18

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 –Photos of Instrument racks and sampling equipment

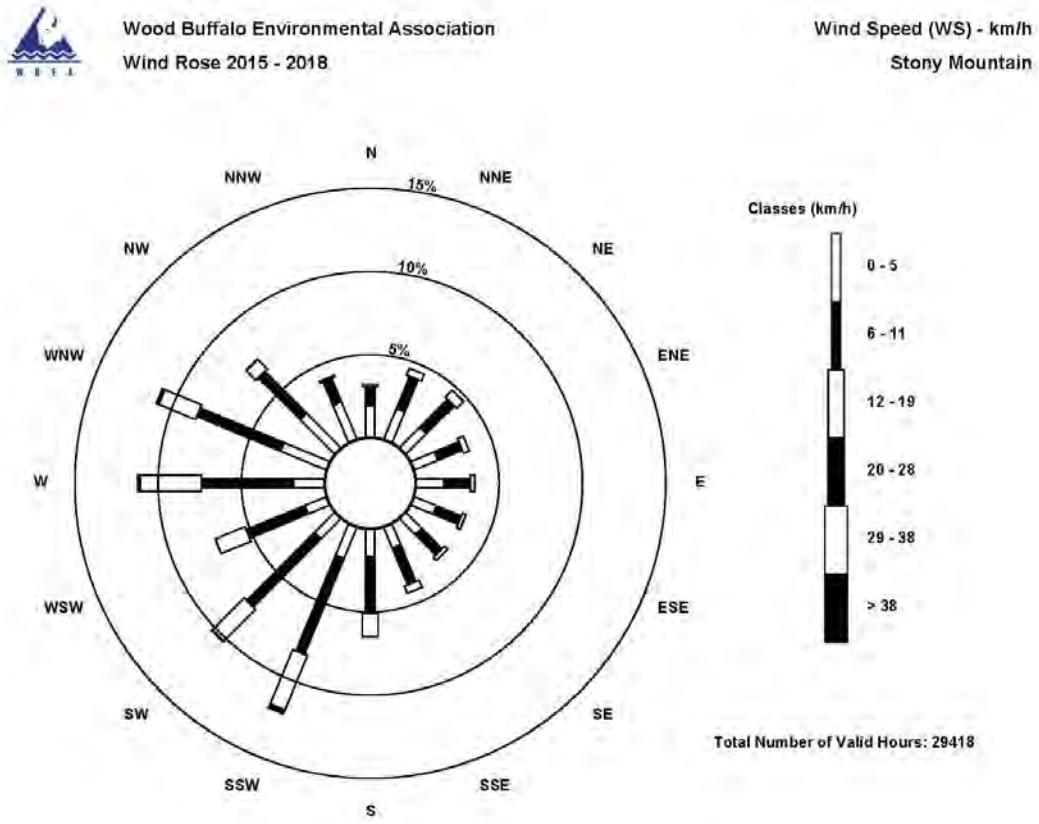


Figure 7.0 – Windrose (2015-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

AMS 19- Firebag

LAST UPDATED: 03-06-2019

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WBEA Monitoring Network

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Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 25 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, $PM_{2.5}$, 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.

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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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

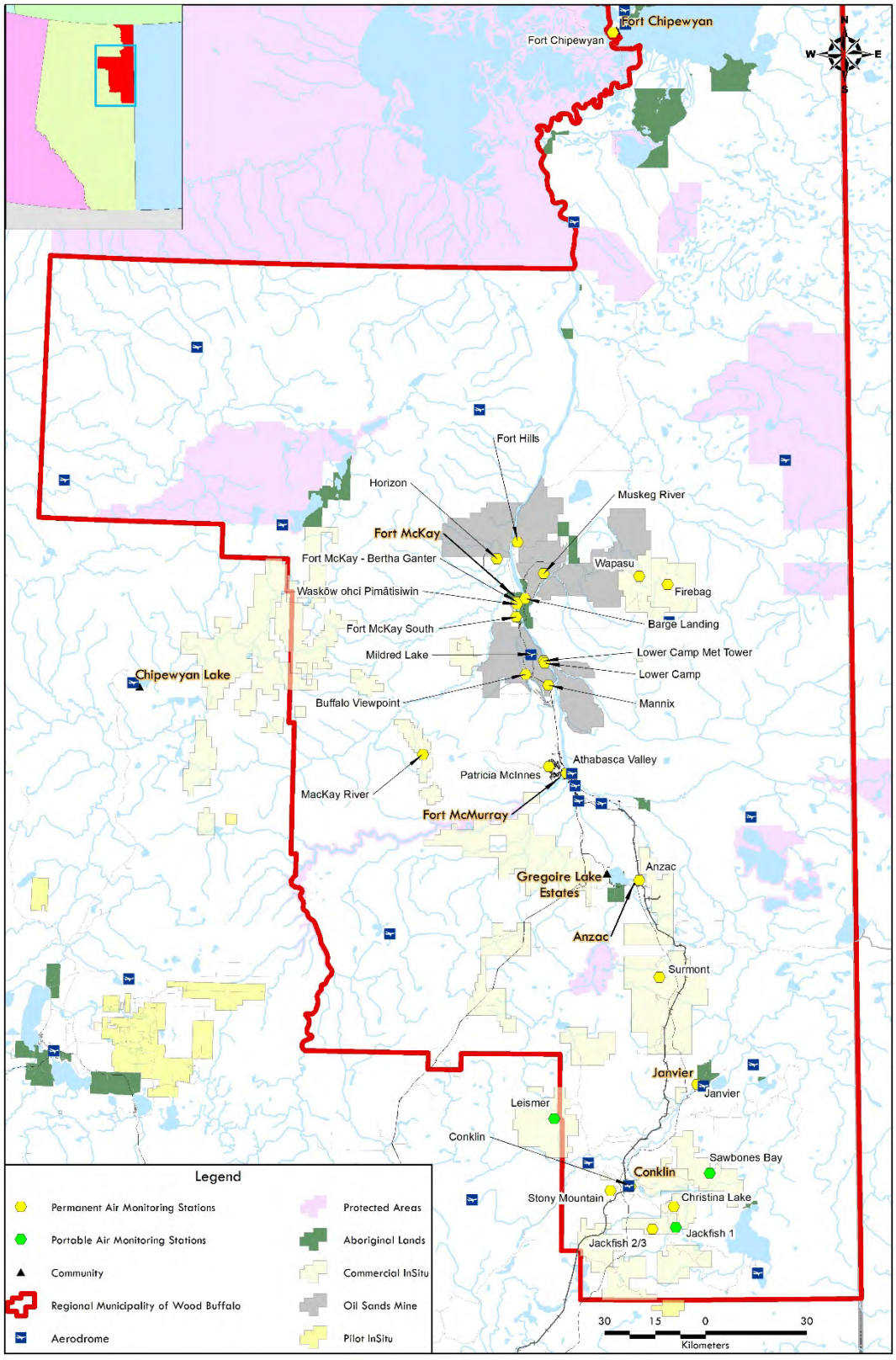


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 19
Station name	Firebag
Date station established	July, 2014

Location

Station street address	Firebag Camp
Legal land description	5-15-095-06 W4
Latitude	57° 14’ 22.31”
Longitude	110 °53’ 52.78”
UTM East	506157
UTM North	6344054
Nearest community	Fort Mackay
Community population	742

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Suncor
Approval number	80105-01-00
Contact Name	AJ Janis
Address	Suncor Energy, Fort McMurray
Phone number	780-788-1865
Email address	ajanis@suncor.com

Site Description

Land use by sector	0 – 90 degrees	Oil sands development
	91 – 180 degrees	Oil sands development
	181 – 270 degrees	Oil sands development
	271 – 360 degrees	Oil sands development
Site elevation (above sea level)		
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Suncor Firebag	0	Oil sands development
Firebag Camp	20	Camp housing, cafeteria, heating system

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Local Camp roads	Low	20	Camp traffic

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Suncor Firebag	Oilsands	NA	0	NA
Husky	Oilsands	NA	10	WNW

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	1410661308	
H2S	WBEA	Thermo	450i	0815129098	
THC	WBEA	Thermo	51i	1336160089	
Oxides of Nitrogen	WBEA	Thermo	42i	1410661309	
Temperature/RH	WBEA	Vaisala	HMP155	2910508	
Wind speed	WBEA	Met One	010C-1	P22394	
Wind direction	WBEA	Met One	020C-1	U11347	

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	6466
Zero air generator	Zero Air Generator	Teledyne/API	701	201
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	330B143093513-01
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB 14 16269
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	996
Hydrogen Generator	Hydrogen Generator	AMA	HG 300	171067043

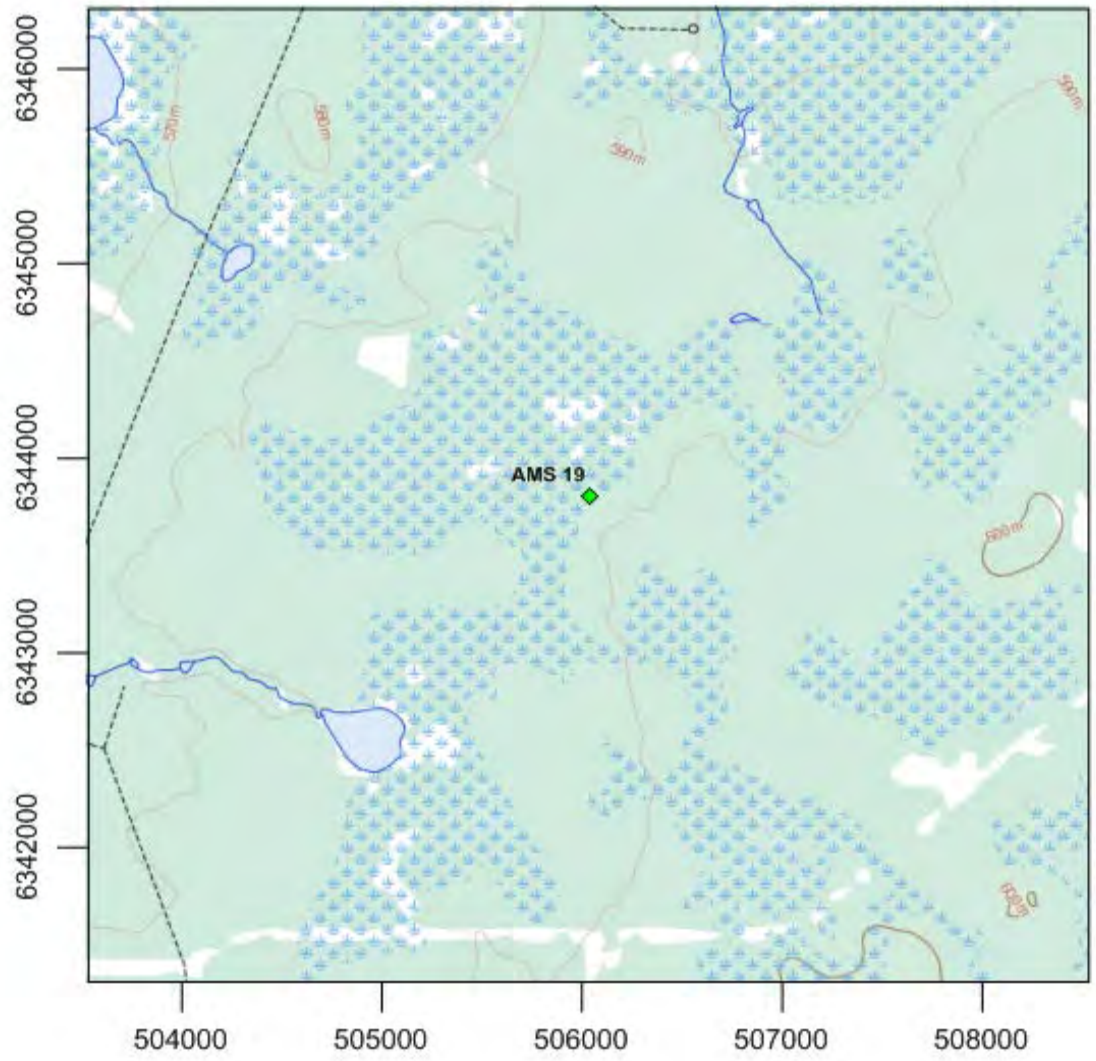
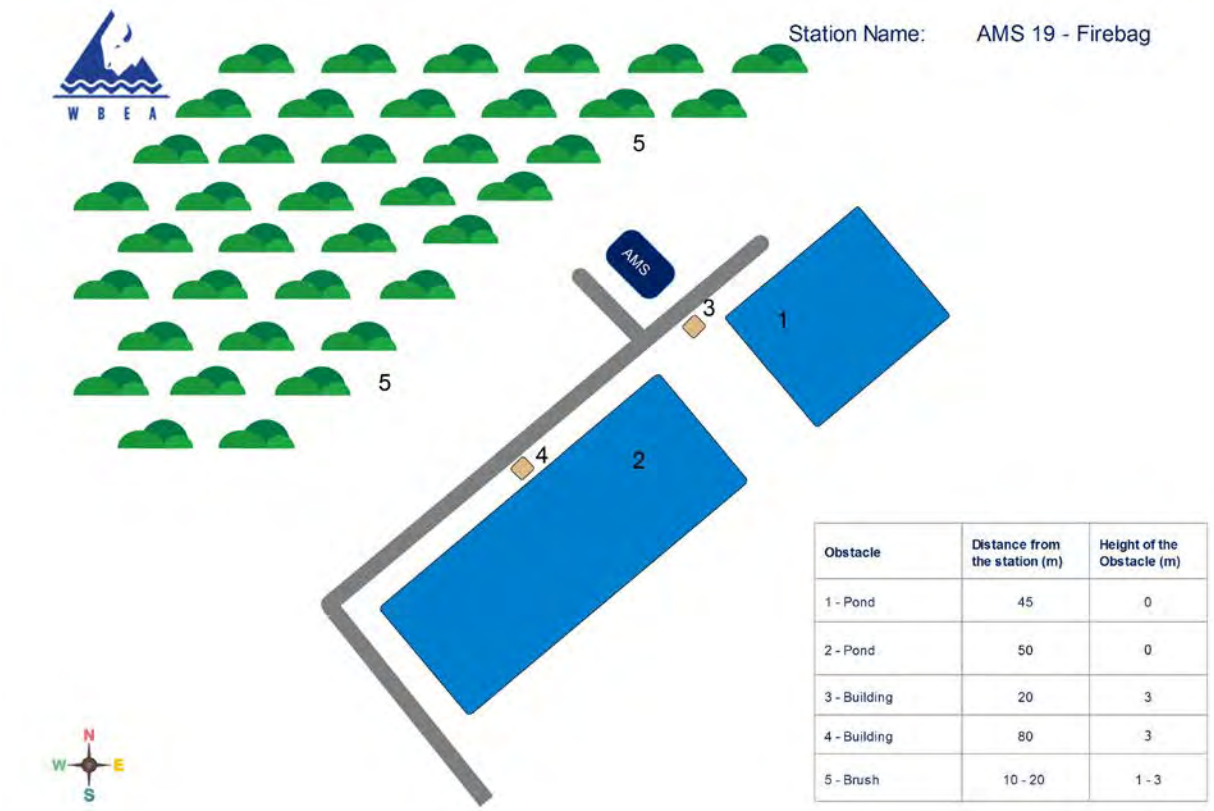


Figure 2.0 – Area Topographic map showing AMS 19 – Firebag



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 - Pond	45	0
2 - Pond	50	0
3 - Building	20	3
4 - Building	80	3
5 - Brush	10 - 20	1 - 3

Figure 3.0 – Plan view sketch for AMS 19 – Firebag



Figure 4.0 – Aerial photo showing AMS 19 - Firebag

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

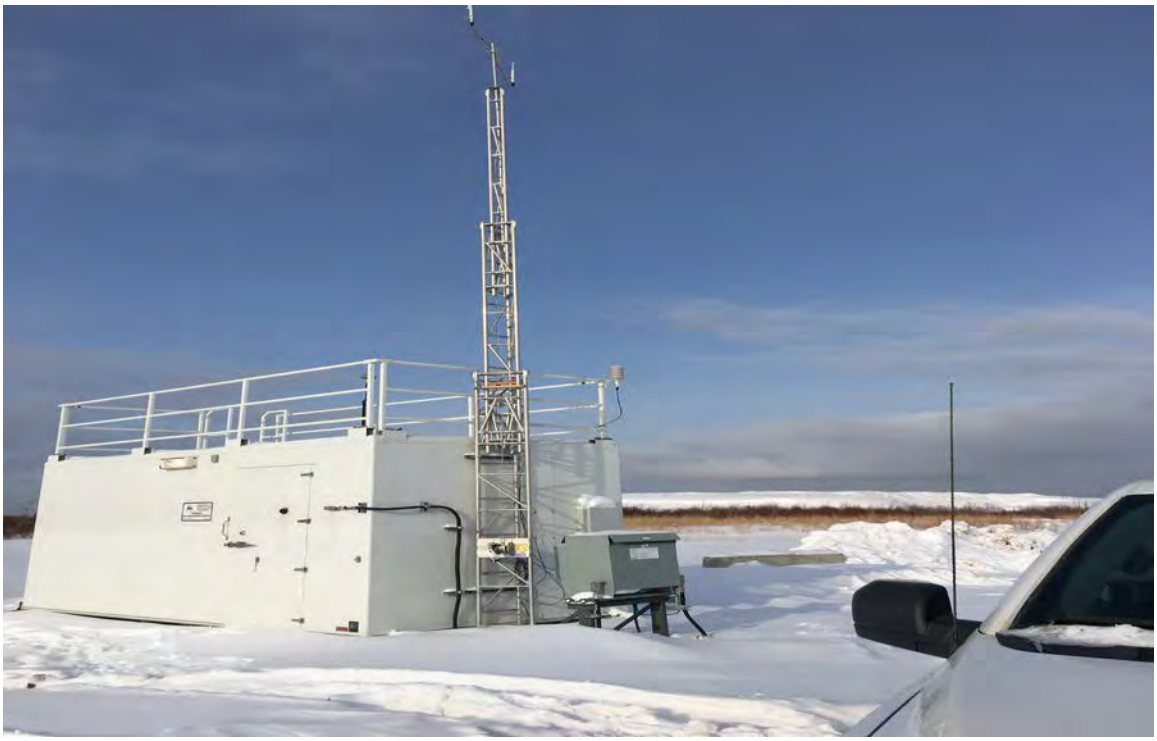


Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.

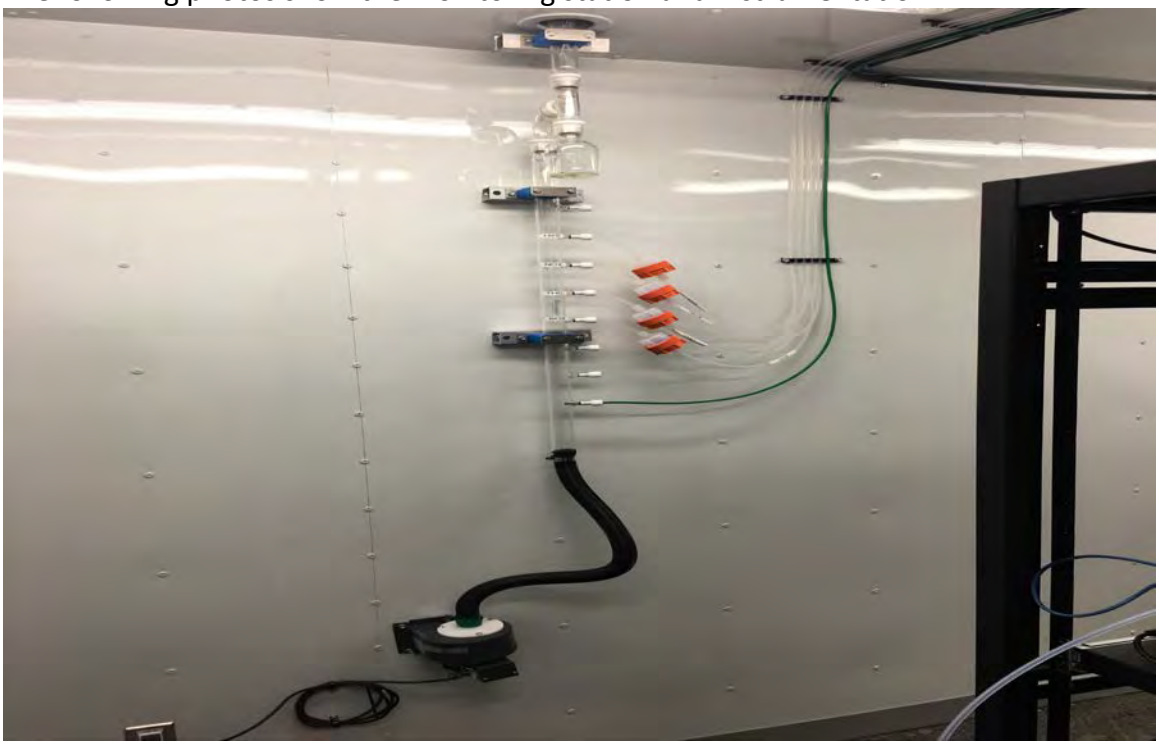


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

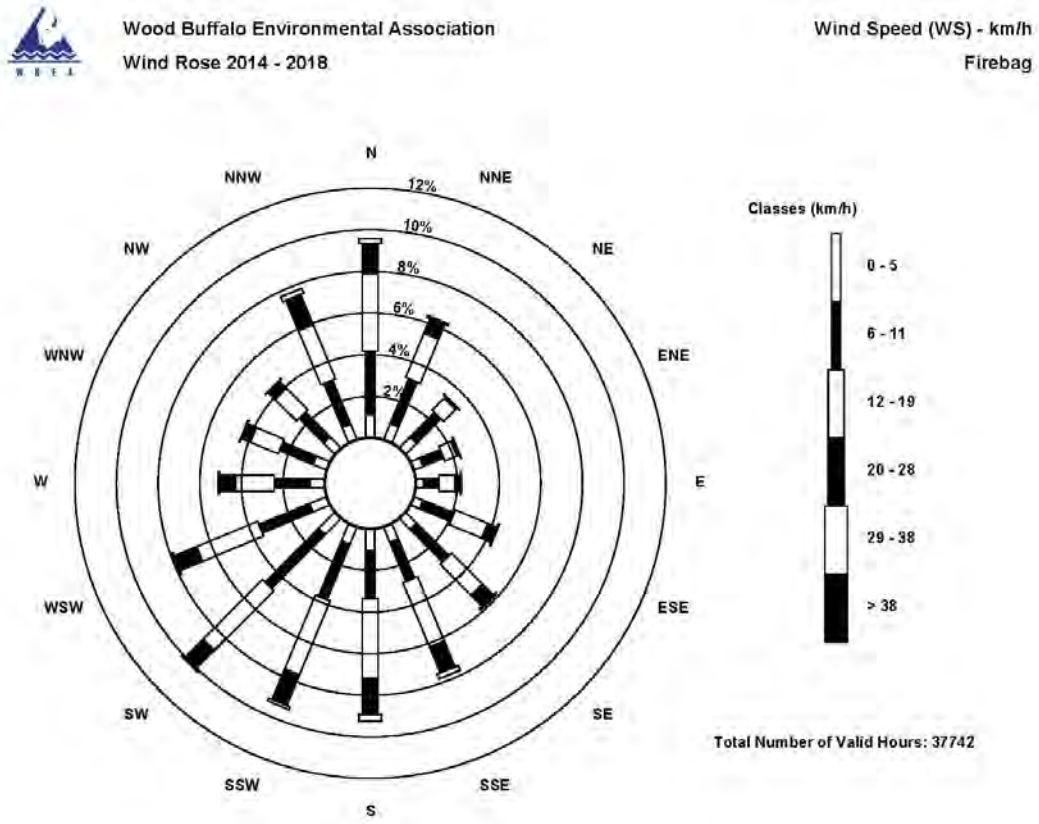


Figure 7.0 – Windrose 2014-2018

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Mackay River

LAST UPDATED: 03-06-2019

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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 25 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, $PM_{2.5}$, 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.

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WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

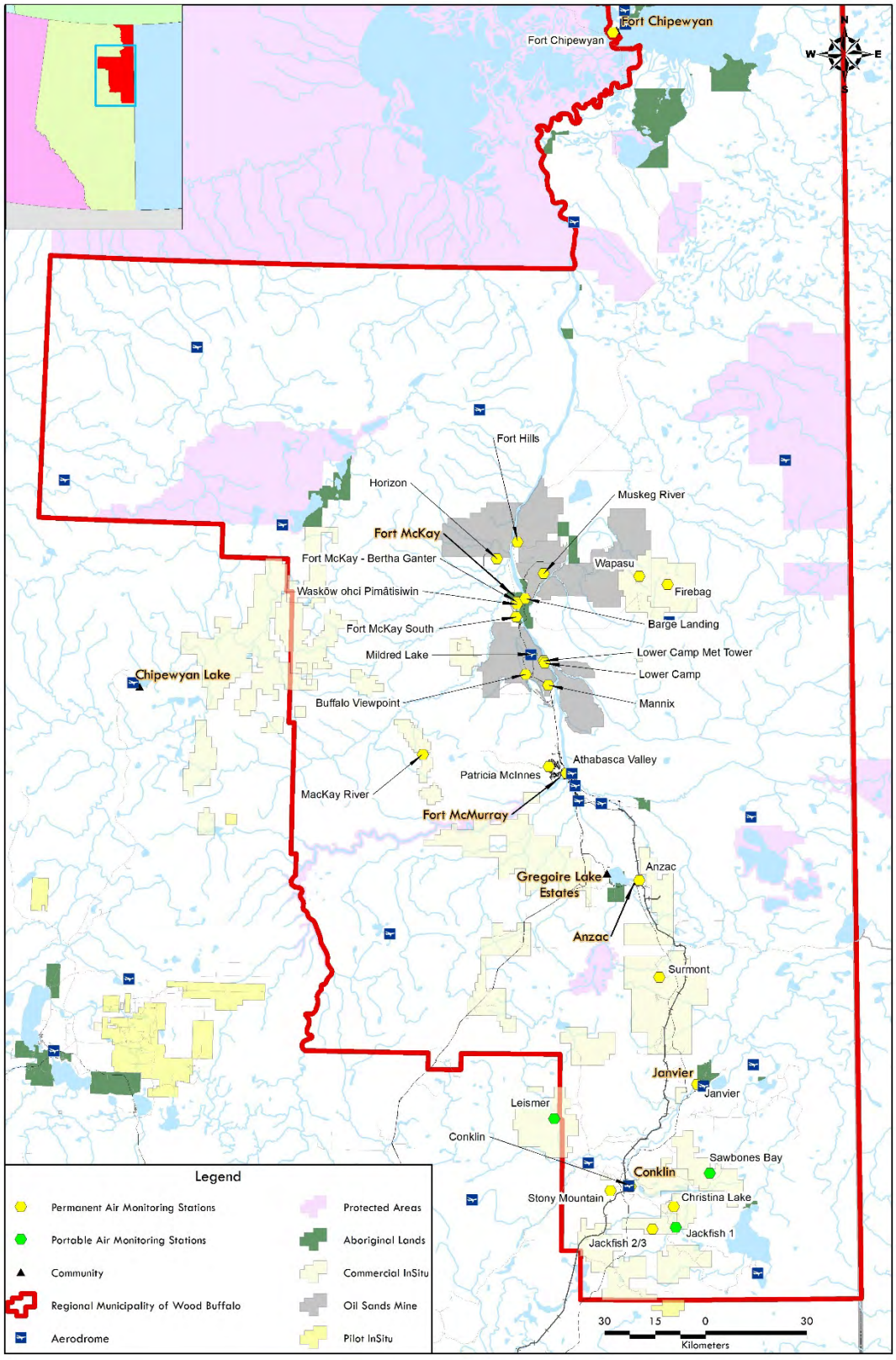


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 20
Station name	Mackay River
Date station established	January 07, 2016

Location

Station street address	NA
Legal land description	10-01-090-14 W4
Latitude	56°46'45.49"N
Longitude	112° 5'19.48"W
UTM East	433447
UTM North	6293395
Nearest community	Fort McMurray
Community population	112000

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	PetroChina Canada Ltd.
Approval number	254465-00-00
Contact Name	Matt Going
Address	NA
Phone number	780-446-0779
Email address	environment@petrochinacanada.com

Site Description

Land use by sector	0 – 90 degrees	Forest and SAGD project
	91 – 180 degrees	Forest and SAGD project
	181 – 270 degrees	Forest
	271 – 360 degrees	Forest
Site elevation (above sea level)	498	
Angle of elevation to nearby buildings	Greatest angle	0 degree
	Building direction	None
Airflow restrictions	North	None
	East	None
	South	None
	West	Yes
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	Attached to north end of the station

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Gravel road	Low	30	Access road

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Petrochina Canada Ltd.	Oil and Gas industry	35000 b/ day	5	North

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Scientific	43i	JC1501301450	January 07, 2016
Hydrogen Sulfide	WBEA	Teledyne/API	T101	196	January 07, 2016
Oxides of Nitrogen	WBEA	Thermo Scientific	42i	1505164379	January 07, 2016
Total Hydrocarbons	WBEA	Thermo Scientific	51i	1501663727	January 07, 2016
Temperature/RH	WBEA	Vaisala	HMP155	F5010002	September 26, 2018
Wind speed	WBEA	Met One	010C-1	A3111	January 07, 2016
Wind direction	WBEA	Met One	020C-1	N9937	January 07, 2016

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9627
Zero air generator	Zero Air Generator	Teledyne/API	701	4766
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB-15-16552
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	1220
Hydrogen generator	H2 for THC analyzer	AMA	HG 300	171067042

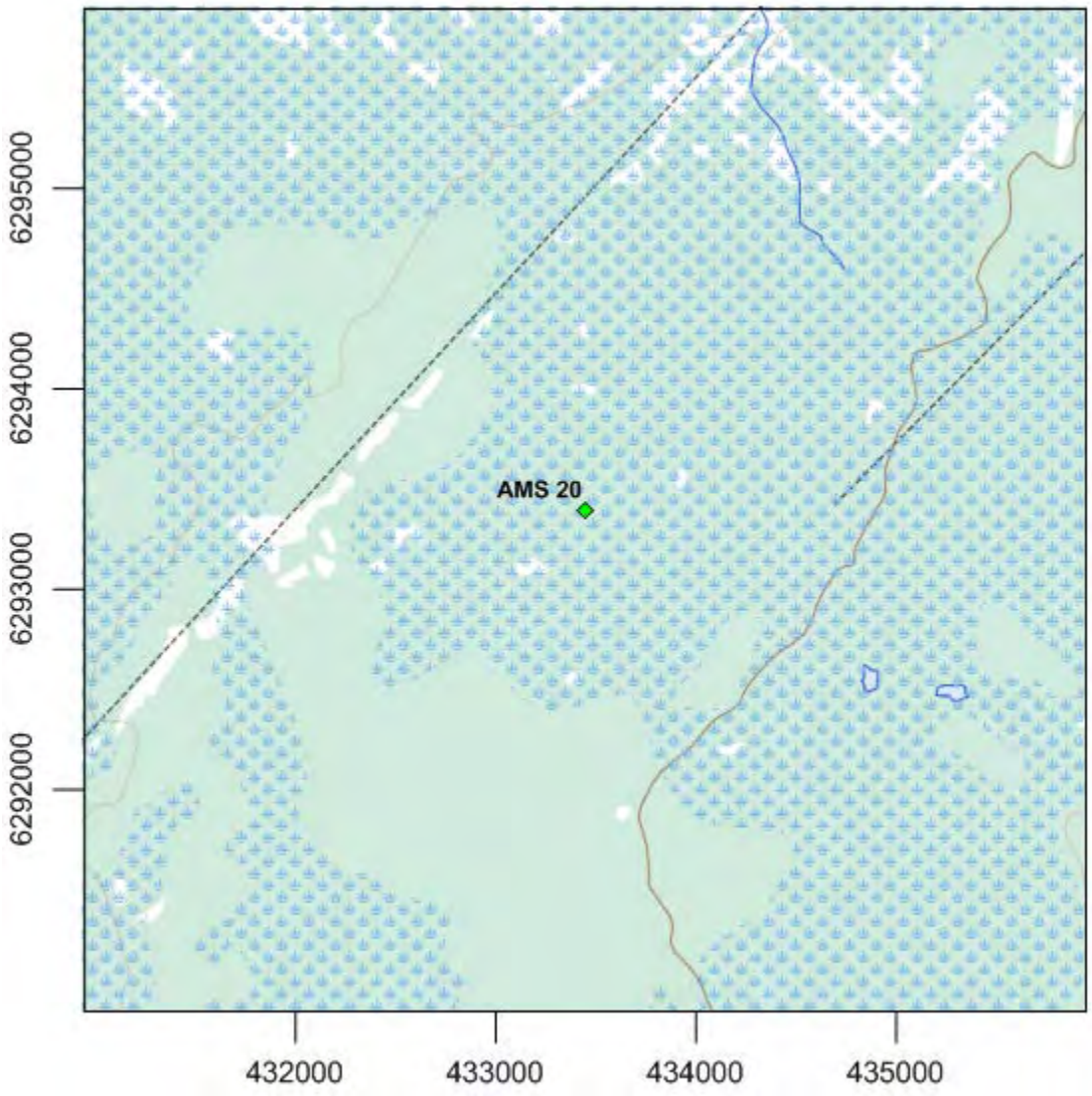
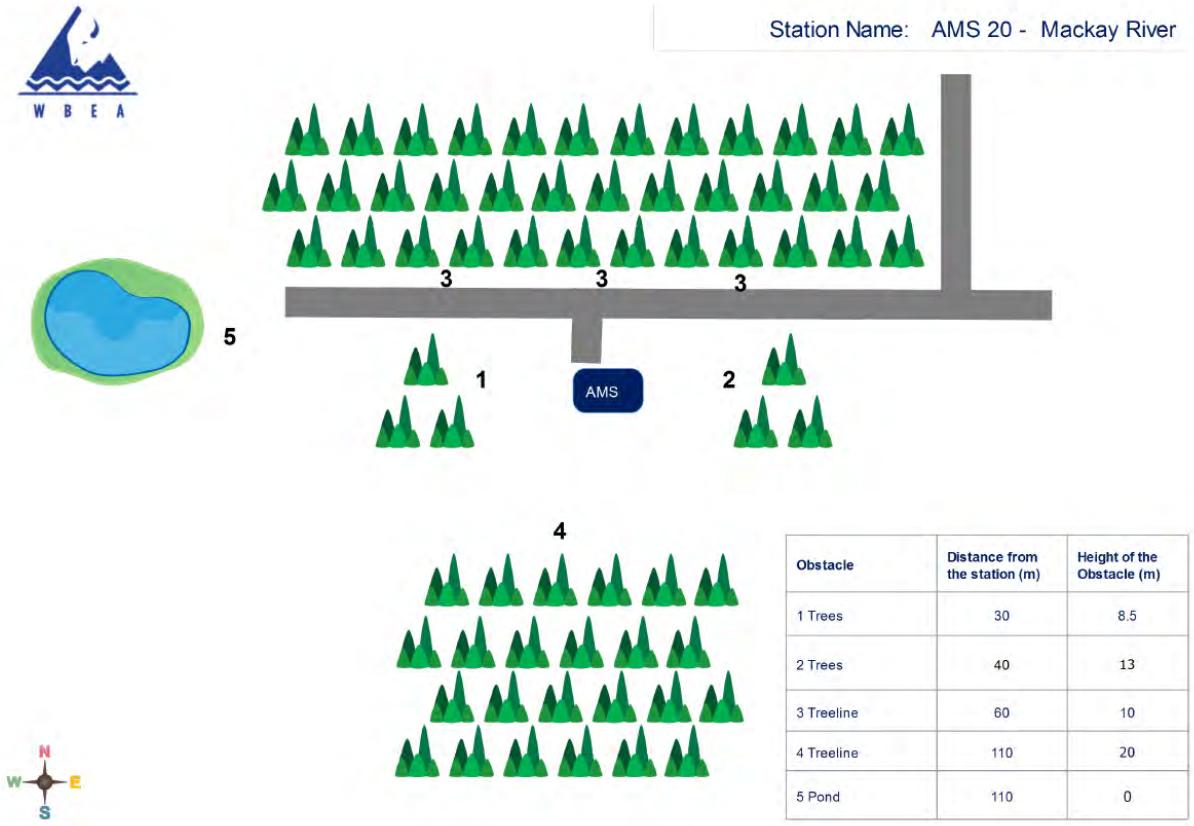


Figure 2.0 – Area Topographic map showing AMS 20



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	30	8.5
2 Trees	40	13
3 Treeline	60	10
4 Treeline	110	20
5 Pond	110	0

Figure 3.0 – Plan view sketch for AMS 20 site



Figure 4.0 – Aerial photo showing AMS 20

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.

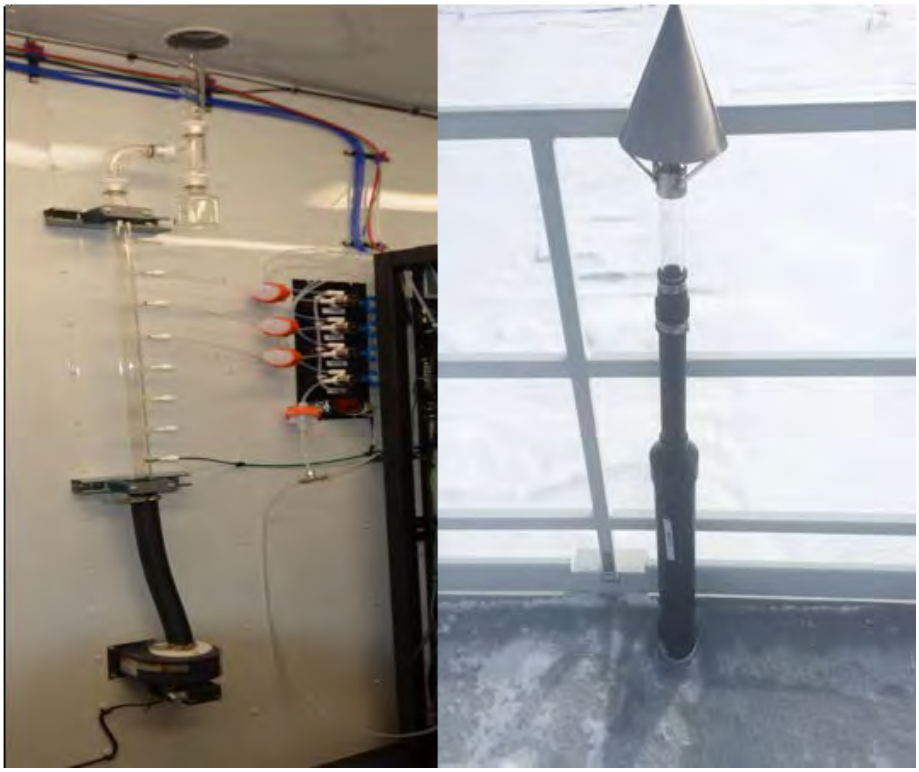


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

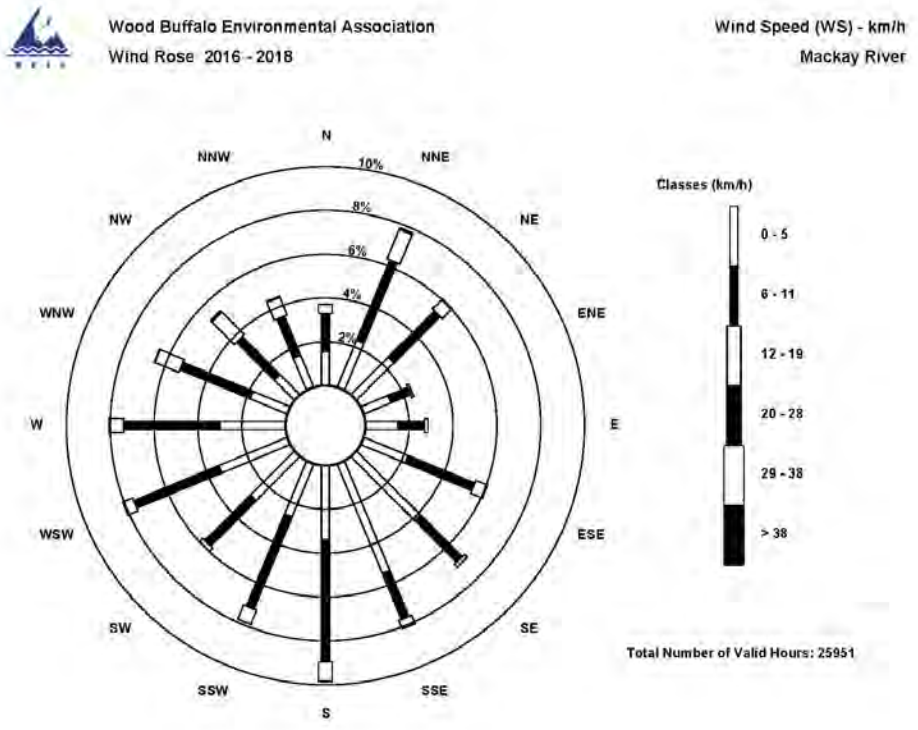


Figure 7.0 – Windrose (2016-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Conklin

LAST UPDATED: 03-06-2019

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WBEA Monitoring Network

Vision

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

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

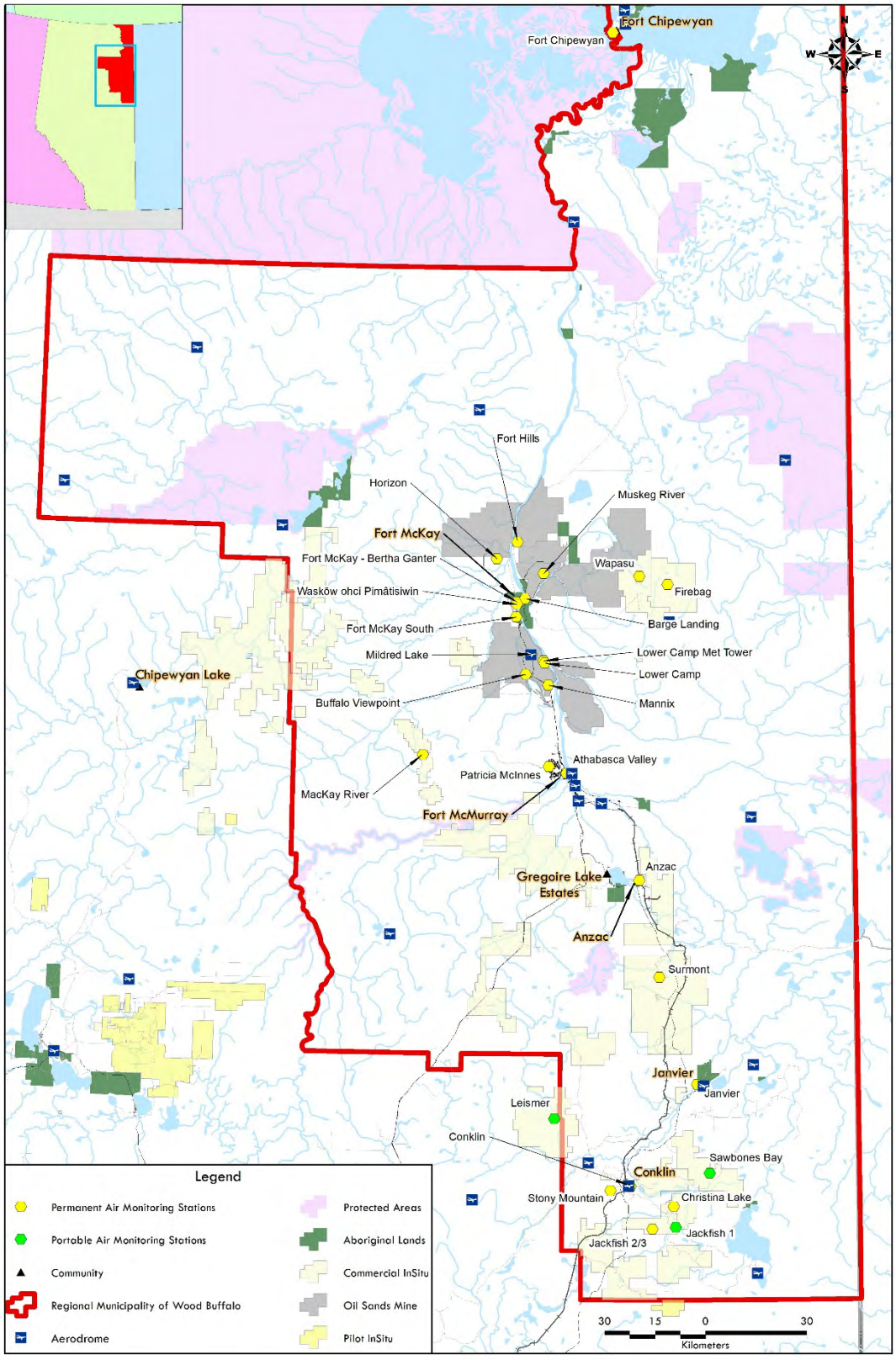


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 21
Station name	Conklin
Date station established	April 01, 2016

Location

Station street address	Father Mercredis Trail
Legal land description	15-31-076-07 W4
Latitude	55°37'56.39"N
Longitude	111° 4'43.84"W
UTM East	495034
UTM North	6165163
Nearest community	Conklin
Community population	190

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	NA
Approval number	NA
Contact Name	NA
Address	NA
Phone number	NA
Email address	NA

Site Description

Land use by sector	0 – 90 degrees	Forest and Residential
	91 – 180 degrees	Forest and Residential
	181 – 270 degrees	Forest and Residential
	271 – 360 degrees	Forest and Residential
Site elevation (above sea level)	562	
Angle of elevation to nearby buildings	Greatest angle	0 degree
	Building direction	South – CRDAC office
Airflow restrictions	North	Trees
	East	None
	South	None
	West	Conklin Rec center, about 2 km west
Sample manifold	Type	All glass
	Inlet height above roof	1 meter
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	Attached to north site of the station

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Wetlands	20	Peat bog / Marshes – Variety of reeds and grasses.
Admin building	20	Conklin Resource Development Advisory Committee Office

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Gravel	Medium	50	Father Mercredis Trail – Access Road
Paved	Medium	200	Northland Drive

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Meg Energy	Oil and Gas	210,000 bpd	25	NE
Cenovus Energy	Oil and Gas	50, 000 bpd	14	SE

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Scientific	43i	1428701363	March 20, 2016
Total Reduce Sulfur	WBEA	Thermo Scientific	43i-TLE	1236656116	June 16, 2016
TRS converter	WBEA	CD Nova	CDN-101	NA	March 20, 2016
Ozone	WBEA	Thermo Scientific	49i	1501663734	March 20, 2016
Oxides of Nitrogen	WBEA	Thermo Scientific	42i	1501663731	March 20, 2016
Non-Methane Hydrocarbon	WBEA	Thermo Scientific	55i	1152430011	March 20, 2016
Particulate matter 2.5	WBEA	Thermo Scientific	5030	CM0404	March 20, 2016
Temperature/RH	WBEA	Vaisala	HMP155	K2870011 2014	March 20, 2016
Wind speed	WBEA	Met One	010C-1	A1406	March 20, 2016
Wind direction	WBEA	Met One	020C-1	P22886	March 20, 2016

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9628
Zero air generator	Zero Air Generator	Teledyne/API	701	263
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB-14-16423
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2658
Hydrogen generator	Hydrogen generator for THC analyzer	AMA	HG 300	16HMD0141

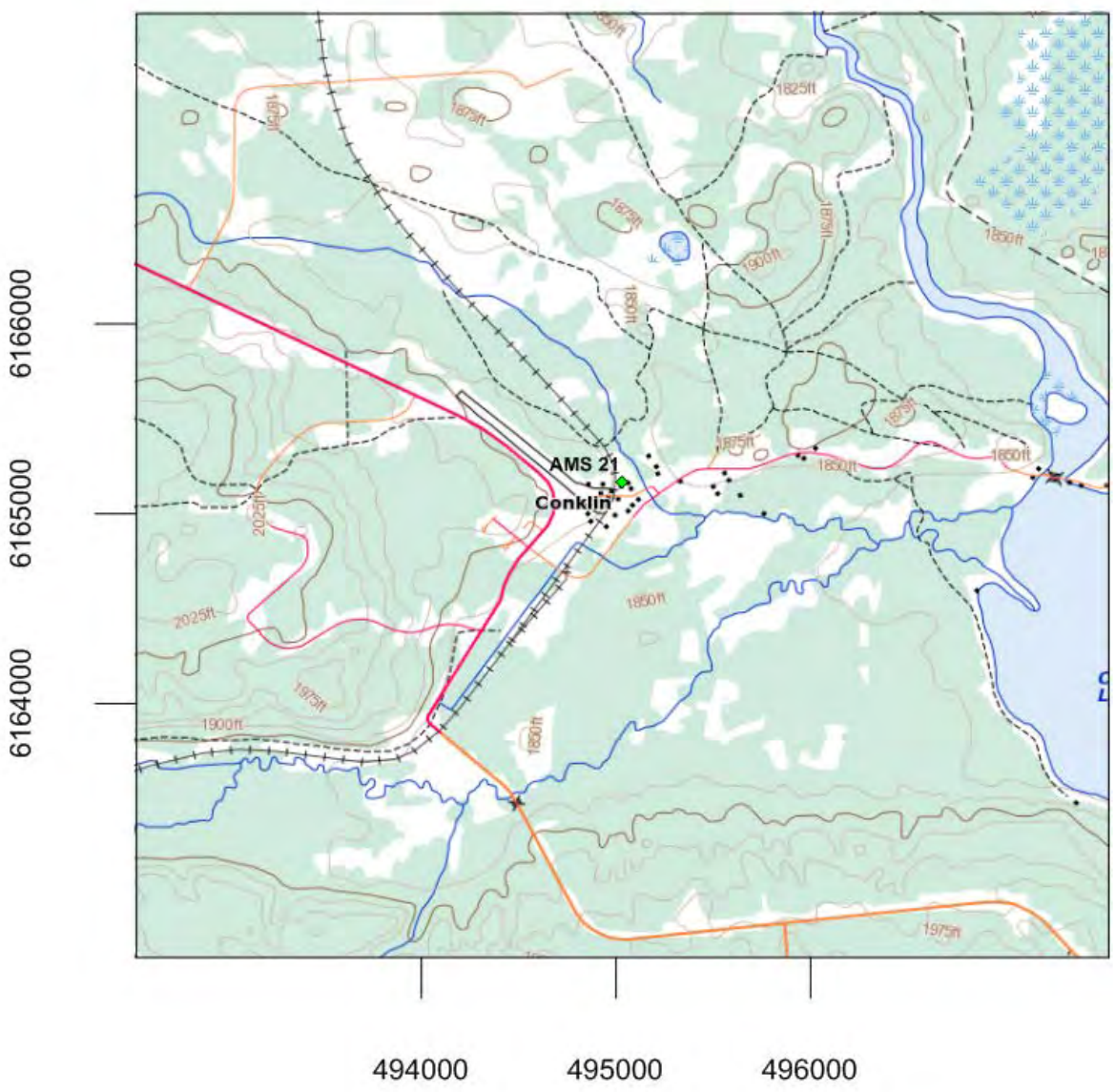
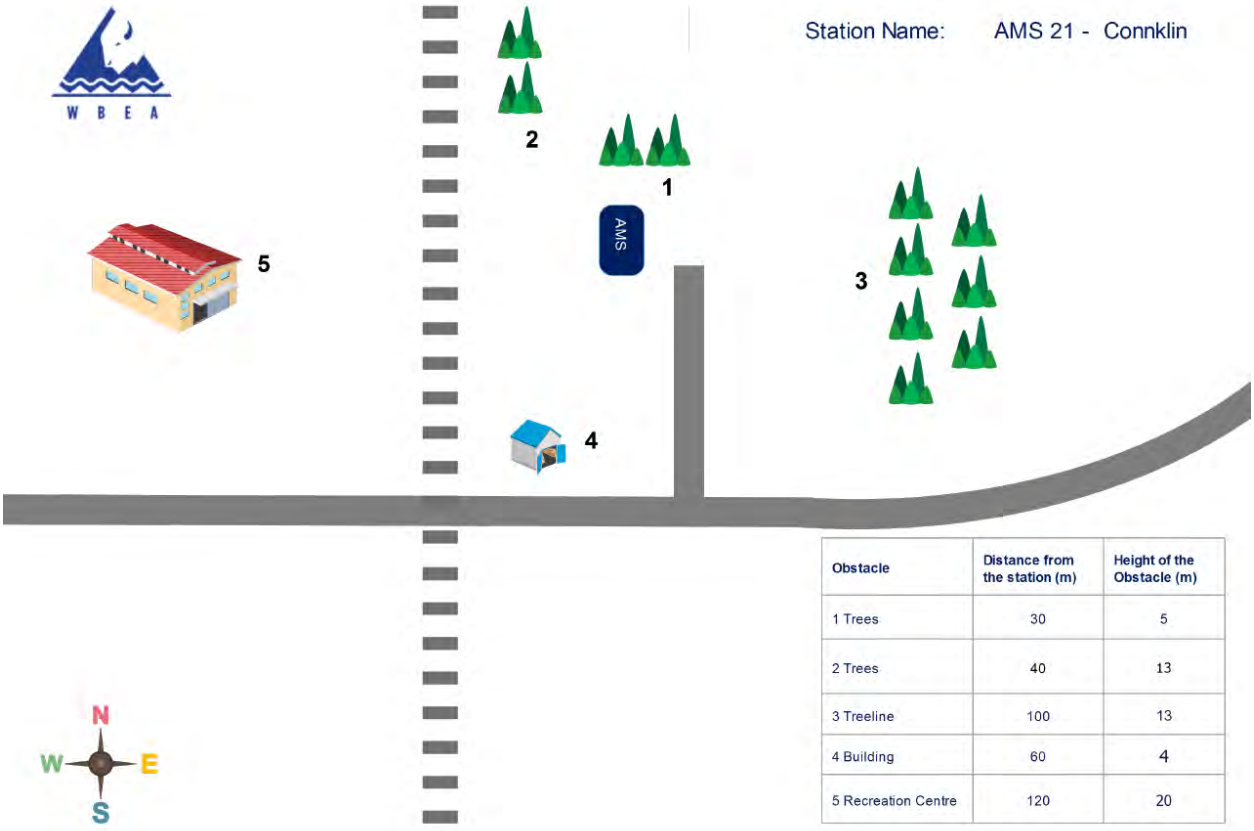


Figure 2.0 – Area Topographic map showing AMS 21



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	30	5
2 Trees	40	13
3 Treeline	100	13
4 Building	60	4
5 Recreation Centre	120	20

Figure 3.0 – Plan view sketch for AMS 21 site



Figure 4.0 – Aerial photo showing AMS 21

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

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The following photos show the monitoring station and instrumentation.



Figure 6.0 – Photo showing the inlet and sample manifold



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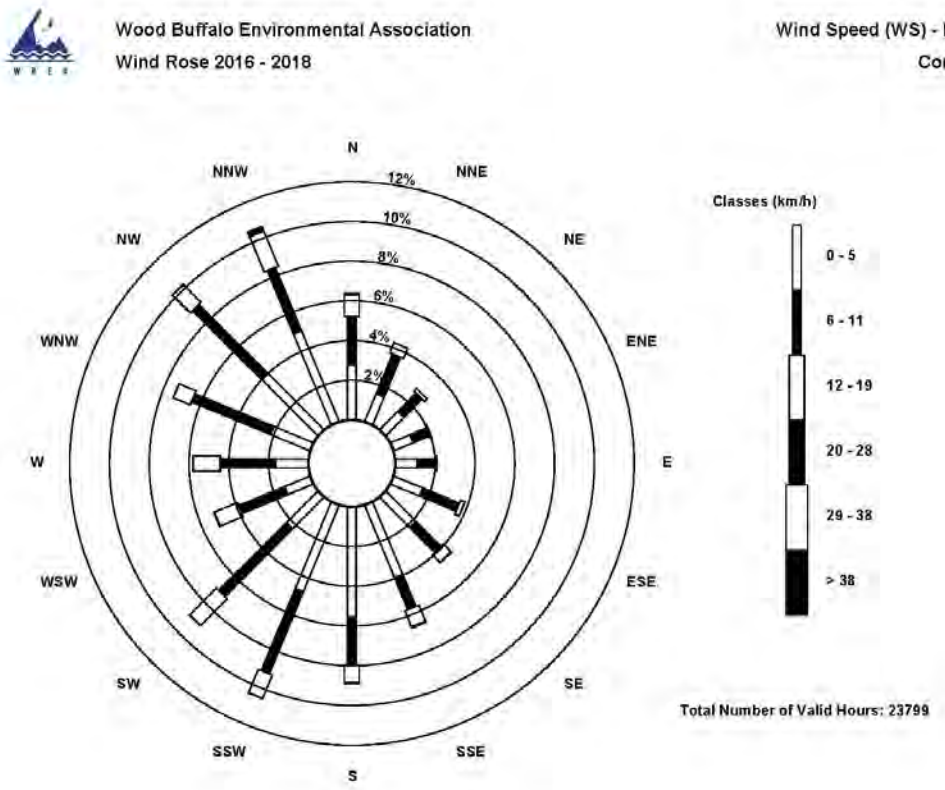


Figure 7.0 – Windrose (2016-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Janvier

LAST UPDATED: 03-06-2019

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WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

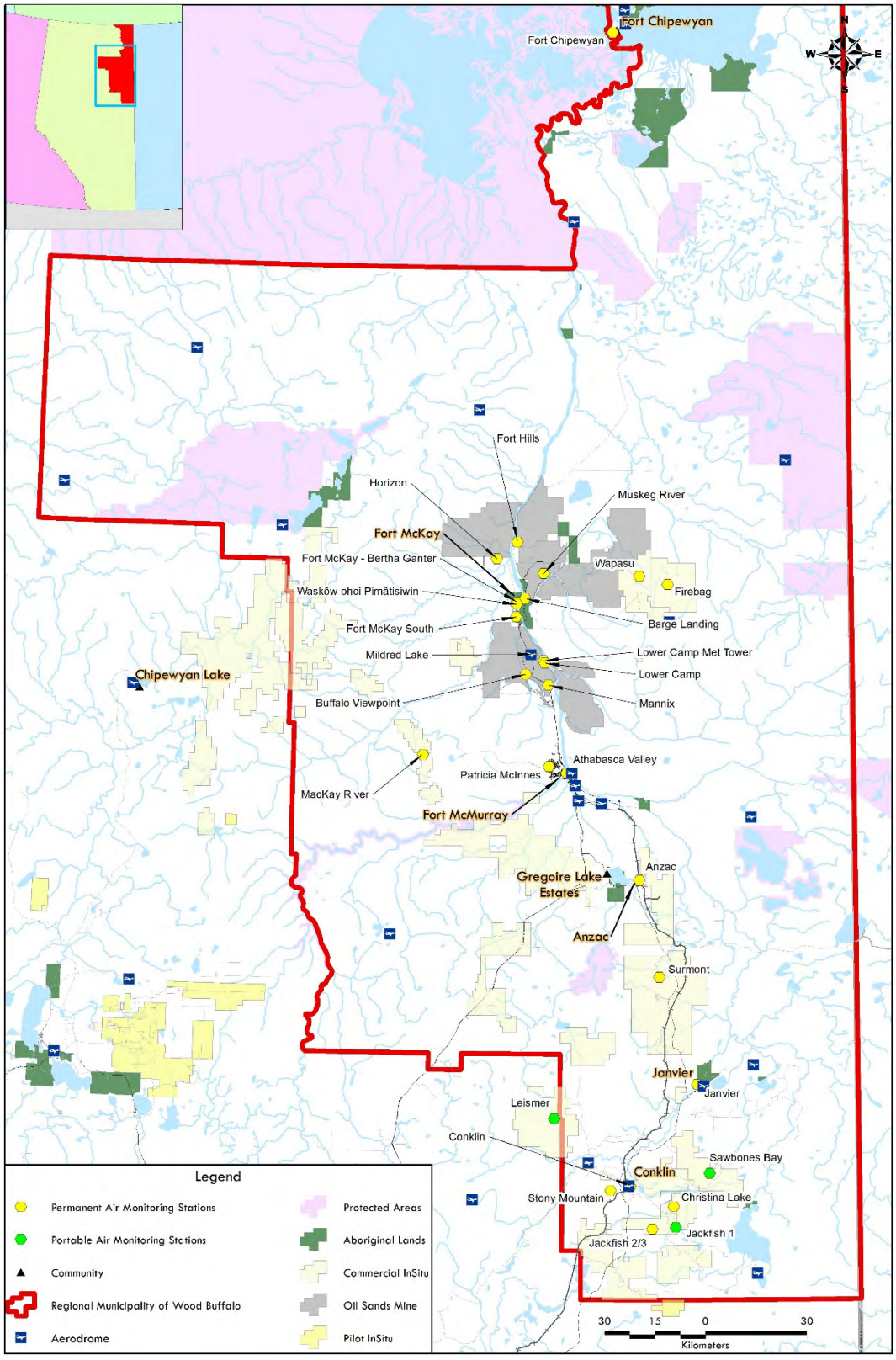


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 22
Station name	Janvier
Date station established	October 2016

Location

Station street address	Block 4; Lot 135 - Adjacent to Nokohoo Road between Teed Ave and Lapouse Ave.
Legal land description	6-05-80-05-W4
Latitude	55.903242
Longitude	-110.749744
UTM East	515647
UTM North	6195323
Nearest community	Janvier
Community population	104

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	NA
Approval number	NA
Contact Name	NA
Address	NA
Phone number	NA
Email address	NA

Site Description

Land use by sector	0 – 90 degrees	Trees
	91 – 180 degrees	Main road
	181 – 270 degrees	Main road
	271 – 360 degrees	Trees and House
Site elevation (above sea level)	471	
Angle of elevation to nearby buildings	Greatest angle	10°
	Building direction	SE
Airflow restrictions	North	None
	East	None
	South	None
	West	Trees (45 m from station, 17 m high)
Sample manifold	Type	All glass
	Inlet height above roof	1 metre

Meteorological Sensors	Type	Cup and vane
	Height above ground	10 m
	Distance from station	0

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Vehicles	25 m East	Main road
Residence	20 m West	Housing area

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Main access road	low	25 m	Paved

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
ConocoPhillips	SAGD	140 MBOED	33.38	NW
Tervita	Landfill	Unknown	11 kms	NW

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Instruments	43i	1152430006	2016
Total reduced Sulphur	WBEA	Thermo Instruments	43iTLE	1152430006	2018
Oxides of Nitrogen	WBEA	Teledyne/API	T200	722	2017
Temperature/RH	WBEA	Vaisala	HMP155	G4330042	2018-12-27
Wind speed	WBEA	Met One	010C-1	U11126	2016
Wind direction	WBEA	Met One	020C-1	U11346	2016
Ozone	AEP	Thermo Instruments	49i	1227254861	2016
Volatile organic compounds	WBEA	Tisch	TE-123	1019	2018
PM 2.5	WBEA	Teledyne/ API	T640	325	2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2586
Zero air generator	Zero Air Generator	Teledyne/API	701	12345
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	314P143189505-02
Shelter / Building	Air monitoring portable	ITB	10x20	ITB-15-16494
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	2657



Figure 2.0 – Area Topographic map showing AMS 22



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Tree	34	9
2 Tree	45	17
3 Group of trees	77	15

Figure 3.0 – Plan view sketch for AMS 22 site



Figure 4.0 – Aerial photo showing AMS 22

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

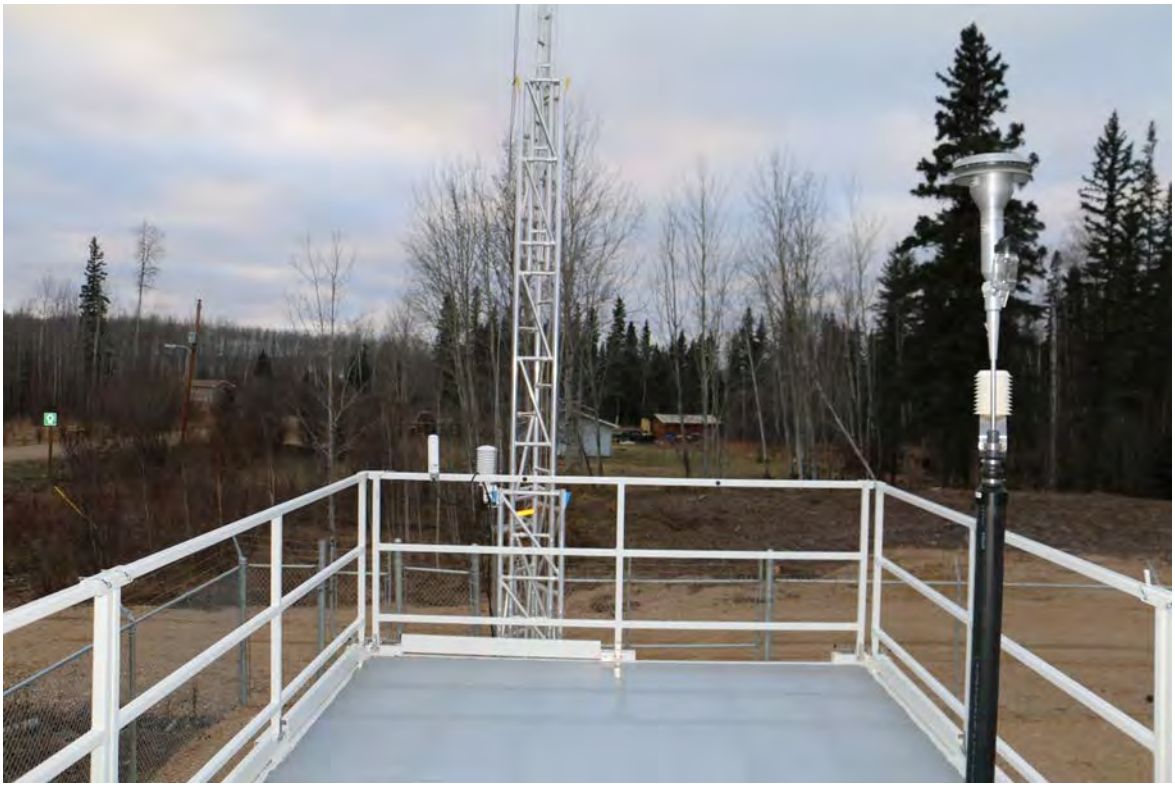


Figure 5.3 – Environ Looking West



Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.

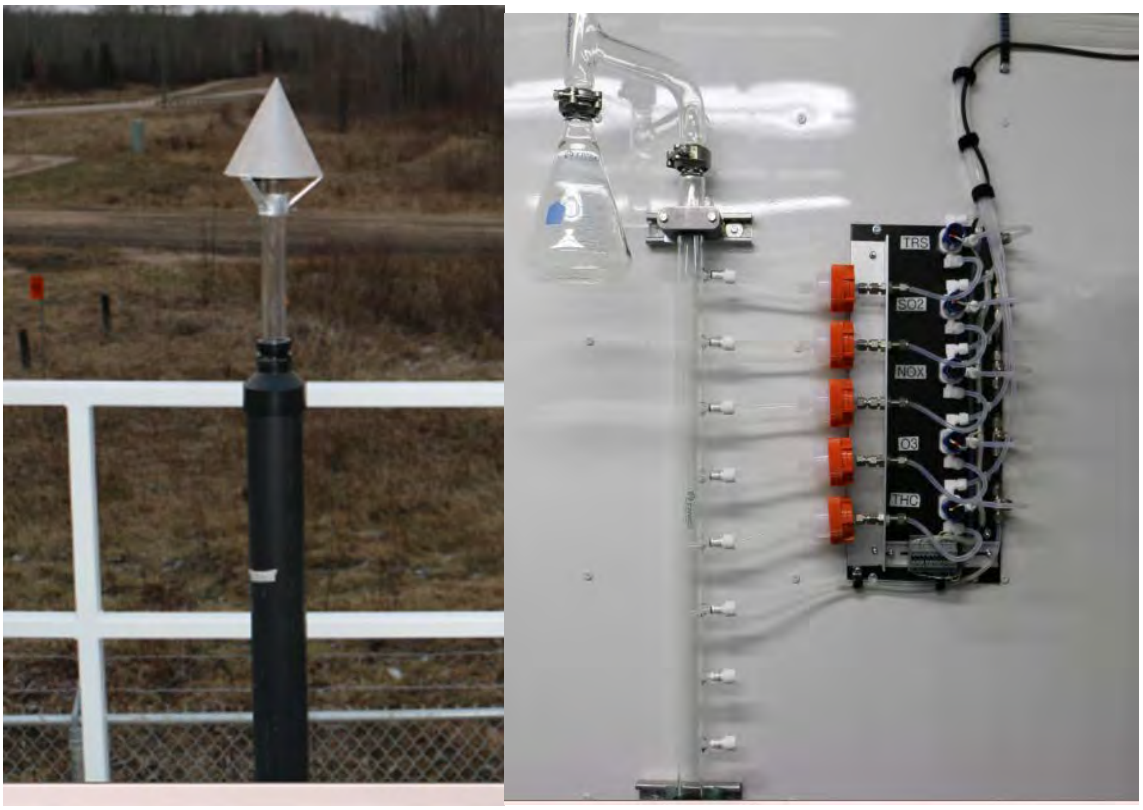


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

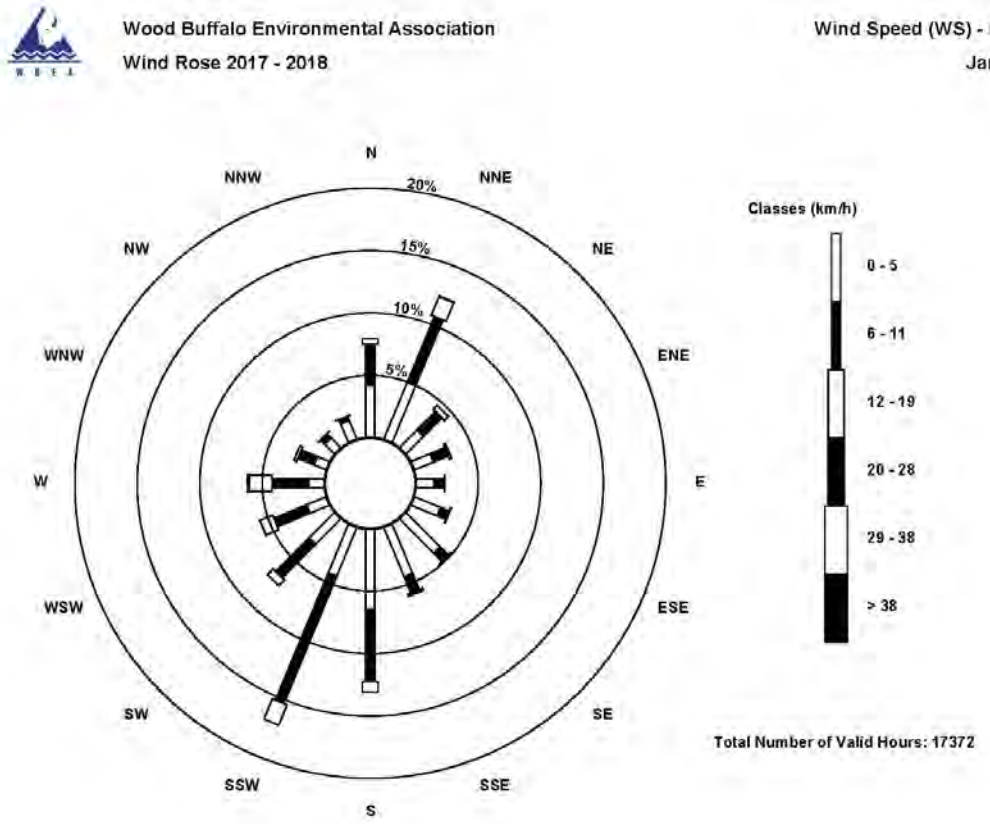


Figure 7.0 – Windrose (2017-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Fort Hills

LAST UPDATED: 02-15-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

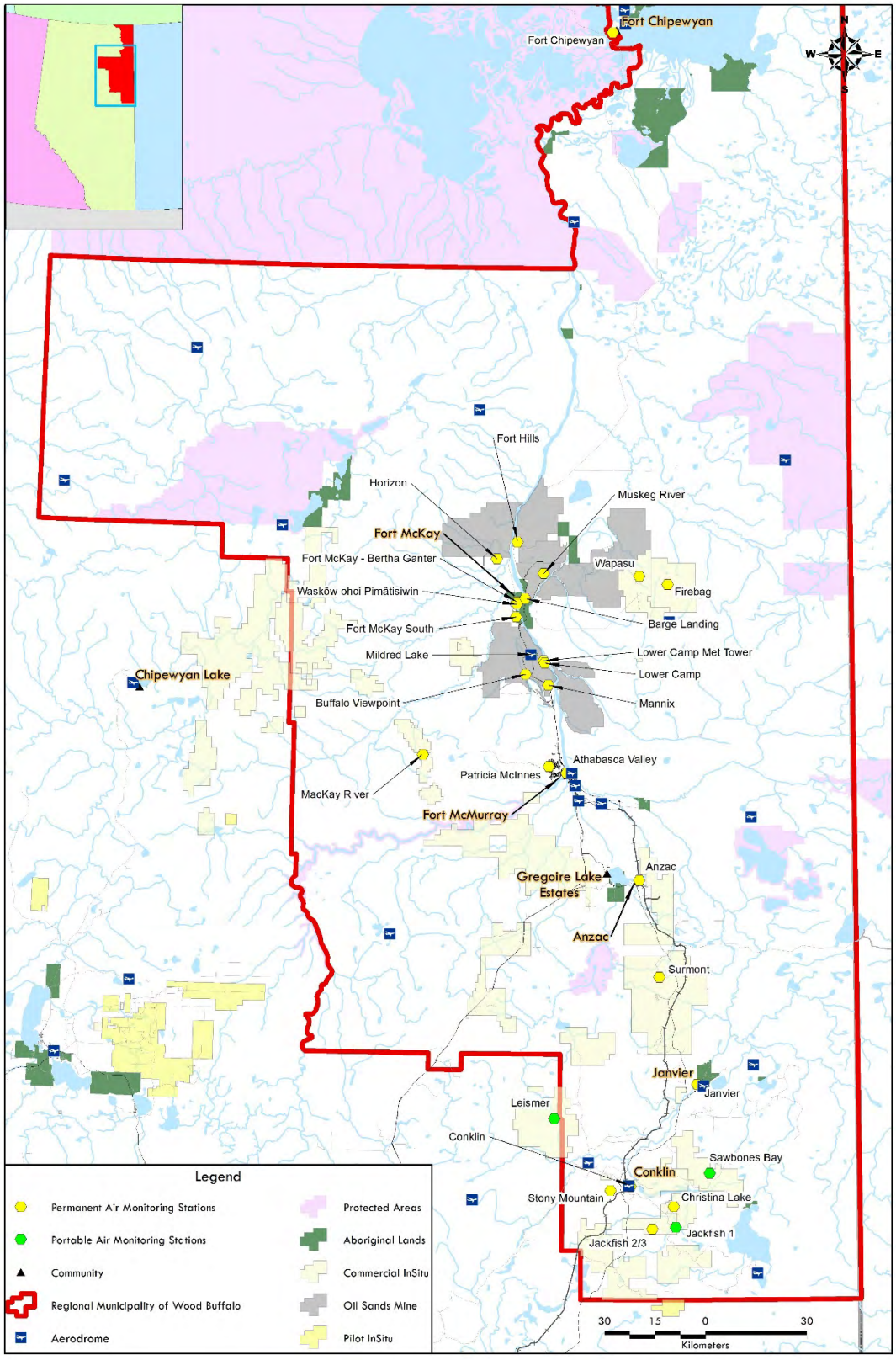


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 23
Station name	Fort Hills
Date station established	March 2017

Location

Station street address	Located North of the South-West Raw Water Pond.
Legal land description	15-24-096-11 W4
Latitude	57°20’56.04” North
Longitude	111°38’22.89” West
UTM East	461505
UTM North	6356406
Nearest community	Fort Mackay
Community population	742 (2016)

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Fort Hills Energy Corporation
Approval number	151469-01-00
Contact Name	Sheri LePoudre
Address	P.O. Box 4001 Fort McMurray, Alberta, T9H 3E3
Phone number	403-296-8271
Email address	slepoudre@suncor.com

Site Description

Land use by sector	0 – 90 degrees	Water treatment building
	91 – 180 degrees	Raw Water Pond
	181 – 270 degrees	Raw Water Pond
	271 – 360 degrees	Access road, drilling lay down yard
Site elevation (above sea level)	283 m	
Angle of elevation to nearby buildings	Greatest angle	20°
	Building direction	West
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Raw water pond	20 m	Storage pond for raw process water

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Gravel Road	Low	100	Mine access road used by pickup trucks and heavy equipment.

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Fort Hills	Oil Sands Plant	194,000	0	N/A
CNRL Horizon	Oil Sands Plant	100,000	10	South West
Shell Albian	Oil Sands Plant	340,000	15	South

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	Fort Hills Energy	Thermo	43i	1160290012	March 2017
Hydrogen Sulfide	Fort Hills Energy	Thermo	43i-TLE	1150840012	March 2017
Oxides of Nitrogen	Fort Hills Energy	Thermo	42i	1152430007	March 2017
Total Hydrocarbons	Fort Hills Energy	Thermo	51i	1218153580	March 2017
Particulate Matter	Fort Hills Energy	SHARP	5030	E-802	March 2017
Temperature/RH	Fort Hills Energy	Vaisala	HMP155	K2860019	March 2017
Wind speed	Fort Hills Energy	Met One	010C-1	P22395	March 2017
Wind direction	Fort Hills Energy	Met One	020C-1	P10613	March 2017

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	7882
Zero air generator	Zero Air Generator	Teledyne/API	701	4522
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	330K102733451-01
Shelter / Building	Air monitoring portable	ITB	8 x 14 trailer	2C9UAB2G9B1044004
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	451
Hydrogen Generator	Hydrogen Generator	Parker Balston	H2PD-150NA	F2SL7LQ1

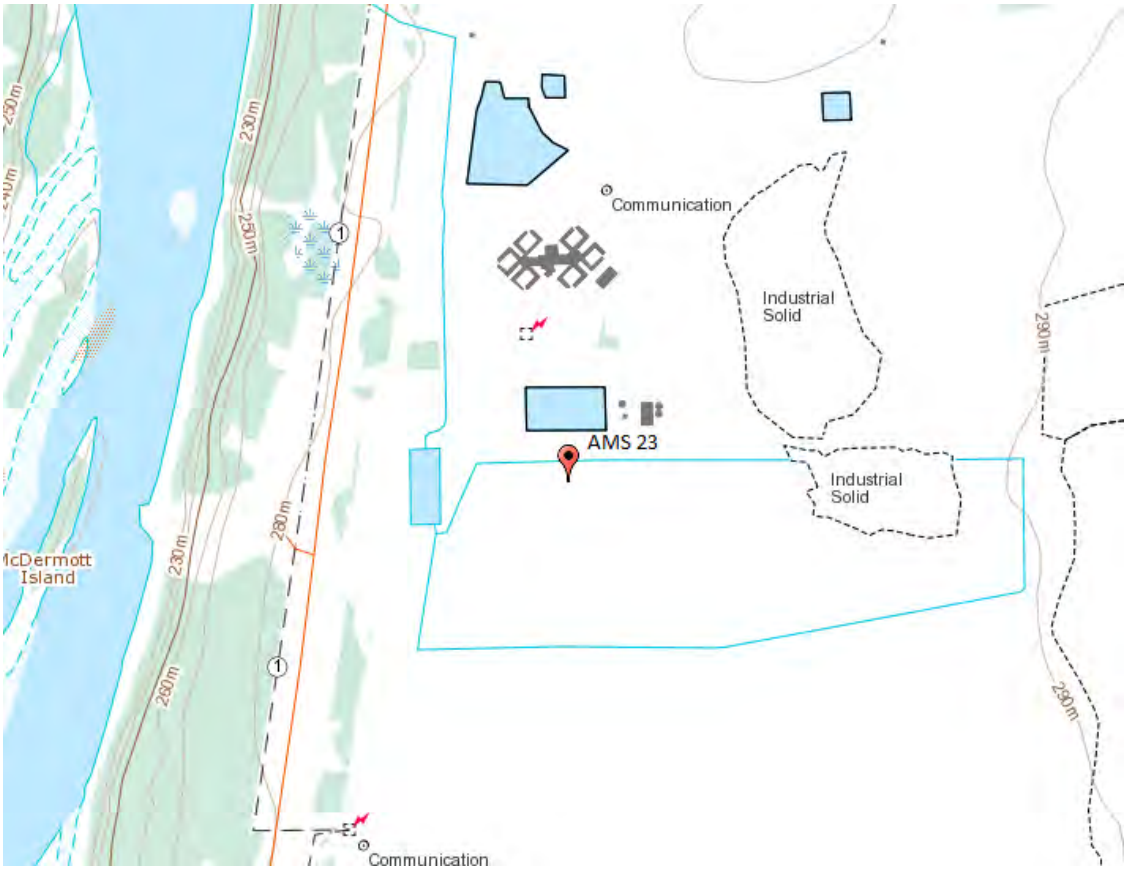
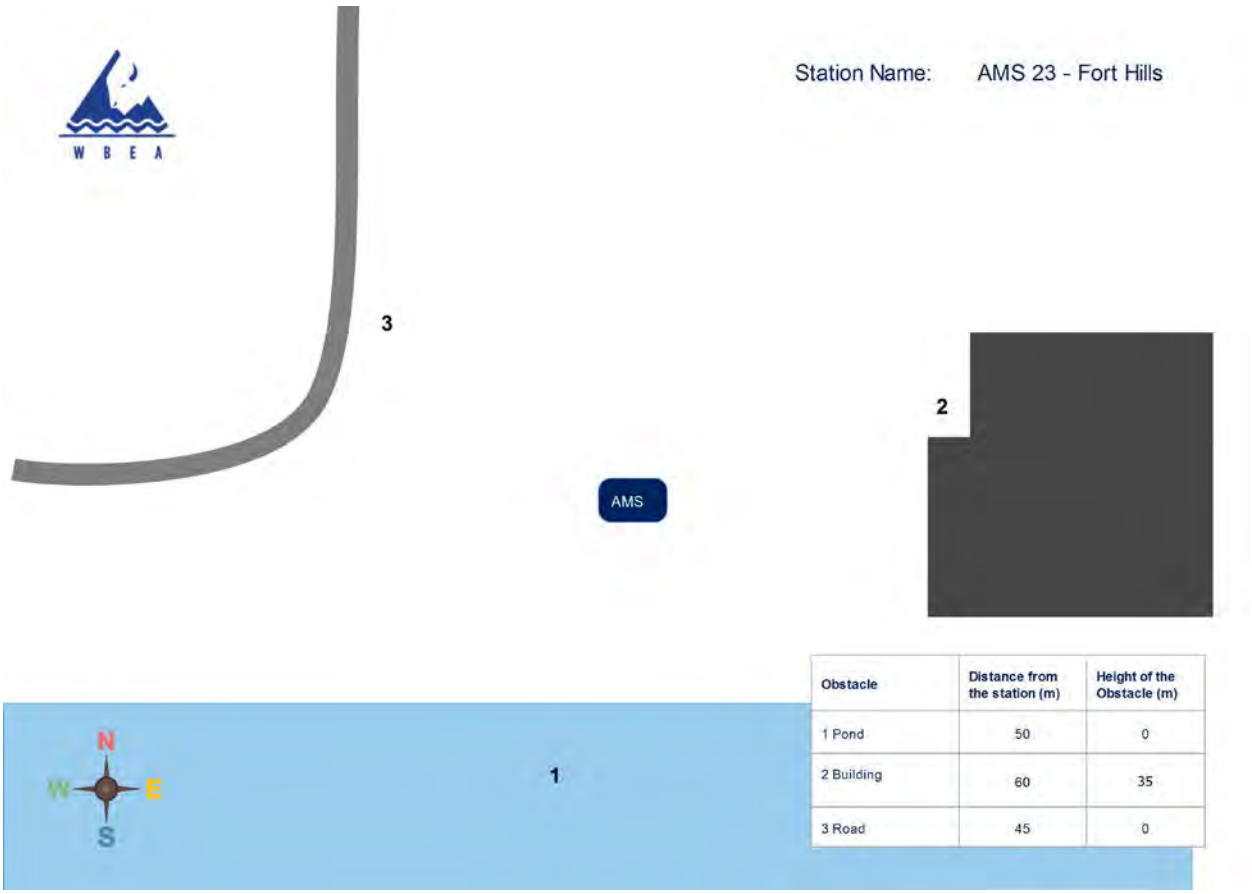


Figure 2.0 – Area Topographic map showing AMS 23 – Fort Hills Station



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Pond	50	0
2 Building	60	35
3 Road	45	0

Figure 3.0 – Plan view sketch for AMS 23 – Fort Hills Station



Figure 4.0 – Aerial photo showing AMS 23 – Fort Hills Station

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

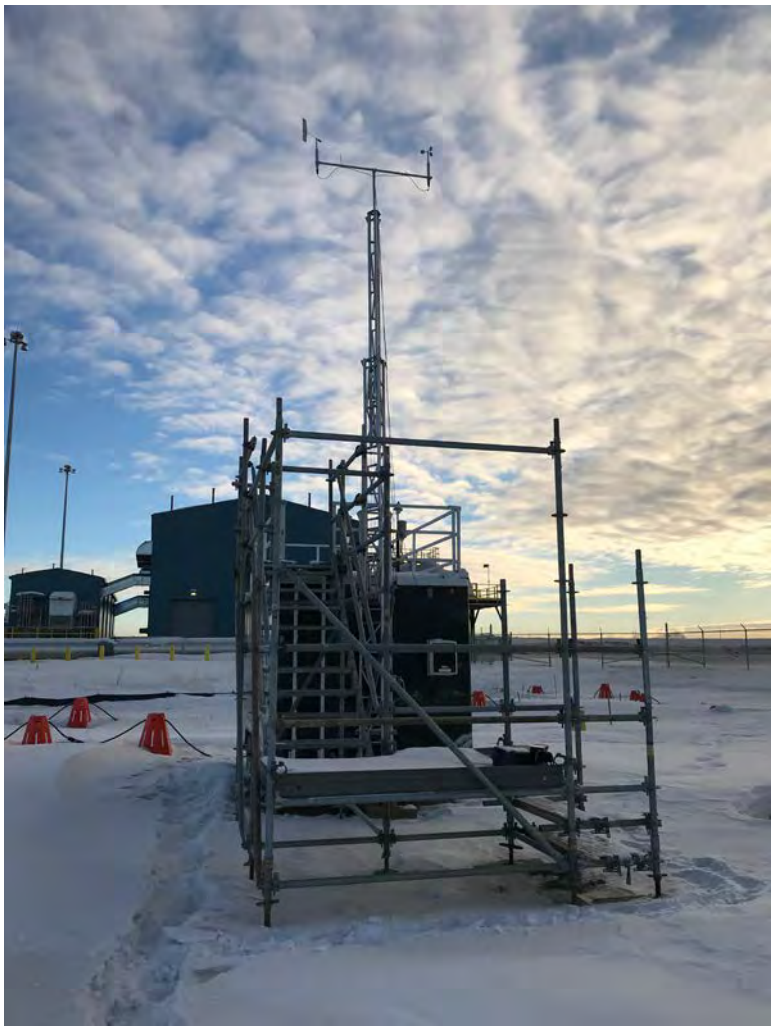


Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.

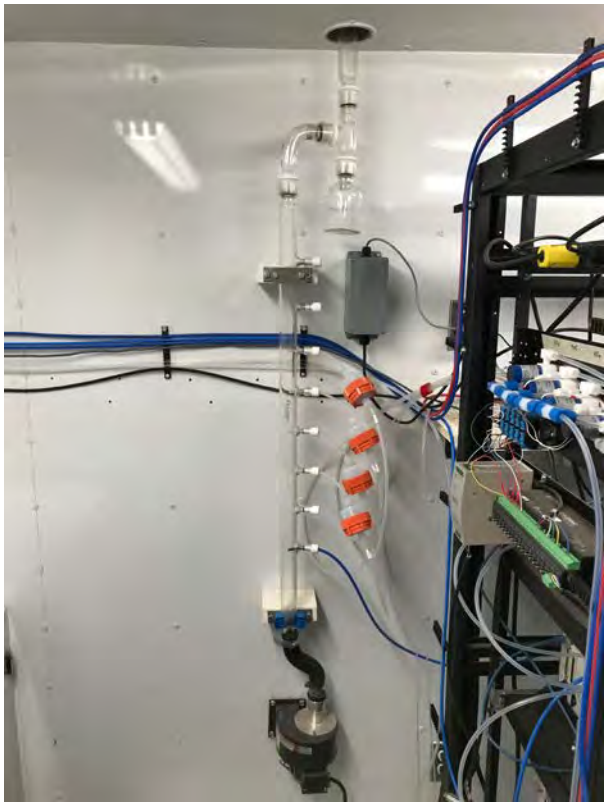


Figure 6.0 – Photo showing the inlet and sample manifold



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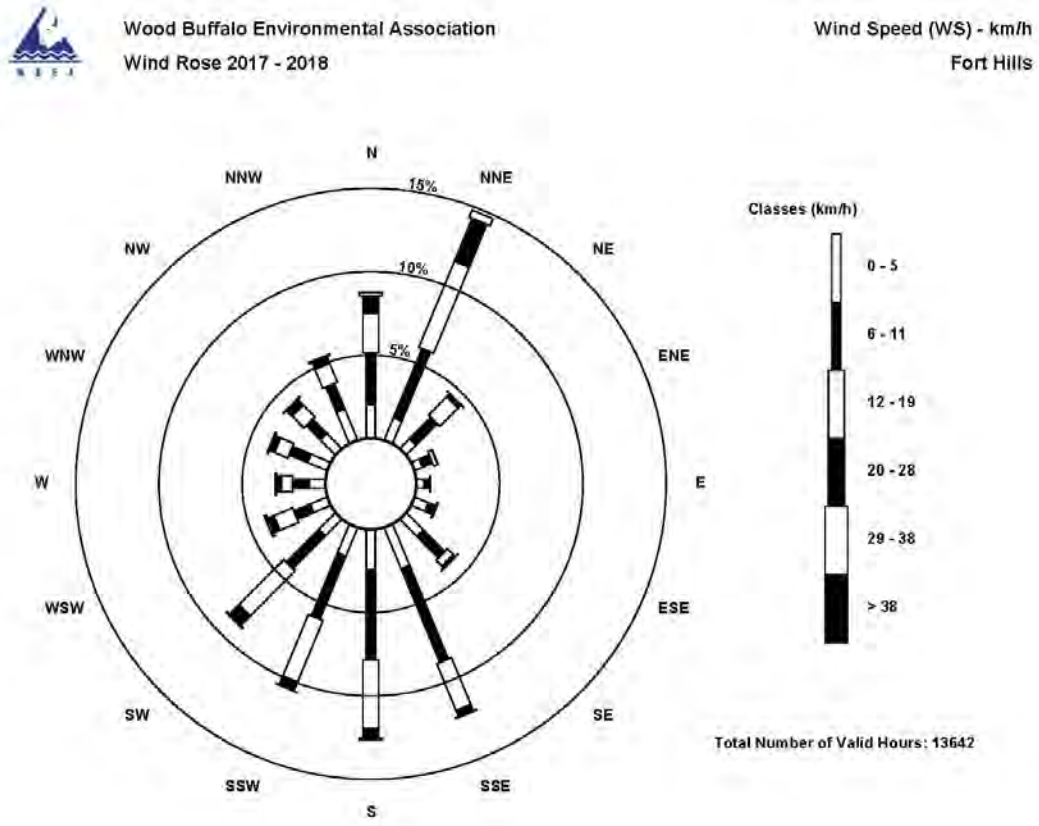


Figure 7.0 – Windrose (2017 - 2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Surmont

LAST UPDATED: 03-06-2019

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WBEA Monitoring Network

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1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

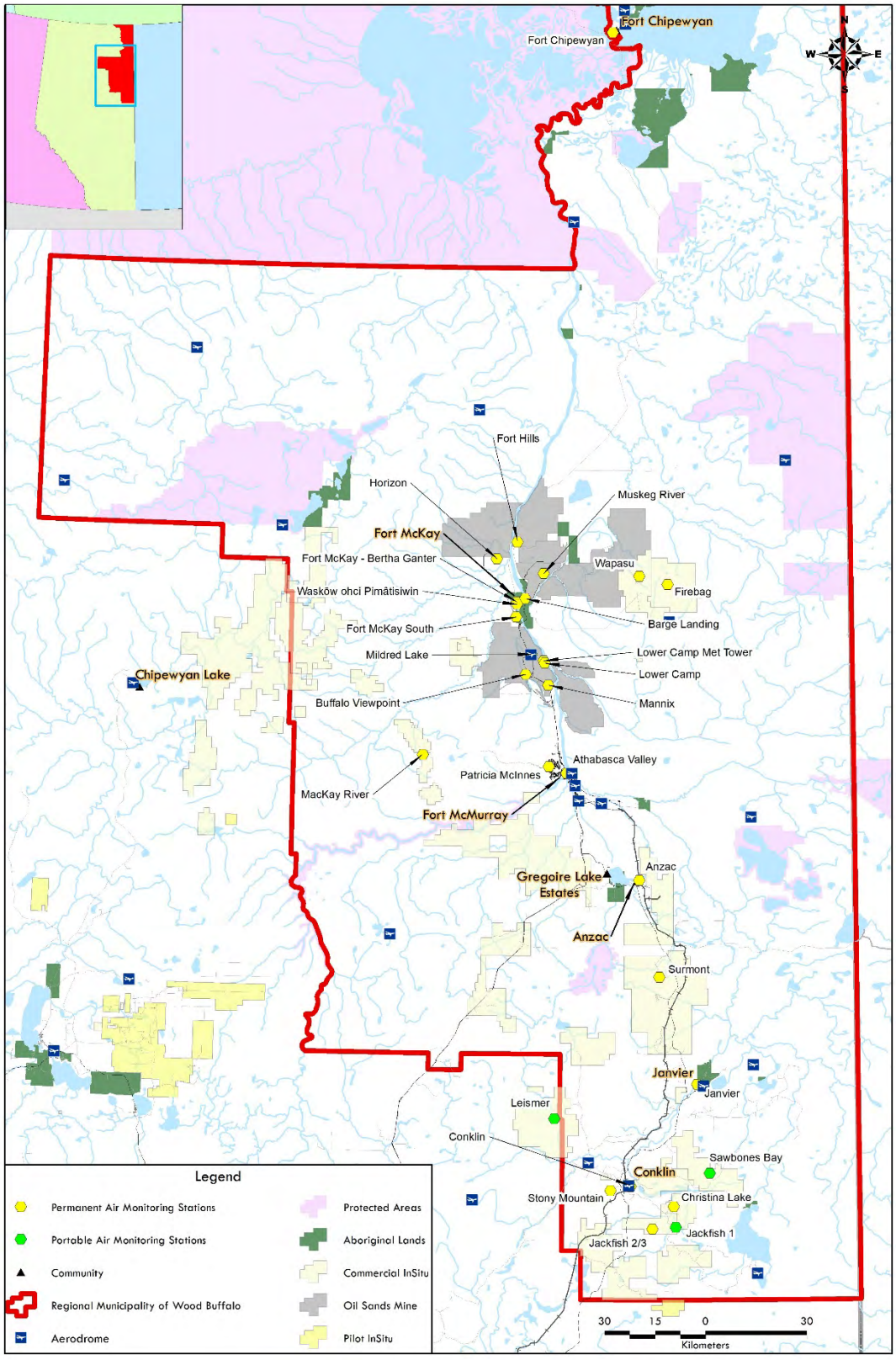


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 24
Station name	Surmont
Date station established	2017-09-08

Location

Station street address	NA
Legal land description	7-7-83-6 W4
Latitude	56°10'40.75"N
Longitude	110°56'8.18"W
UTM East	503997
UTM North	6225891
Nearest community	Anzac
Community population	548

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	ConocoPhillips Canada Resources Corp.
Approval number	48263-01-00
Contact Name	Brooke Hartwick
Address	NA
Phone number	403-233-3947
Email address	Brooke.Hartwick@conocophillips.com

Site Description

Land use by sector	0 – 90 degrees	Equipment hanger
	91 – 180 degrees	Laydown yard
	181 – 270 degrees	Laydown yard
	271 – 360 degrees	Laydown yard
Site elevation (above sea level)	504	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass

	Inlet height above roof	1 metre
Meteorological Sensors	Type	Cup and vane
	Height above ground	10 m
	Distance from station	0

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Vehicles	20 m NW	Moving vehicles around station

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Dirt/gravel road	Medium-high	20	Used by site personnel for accessing various sections around plant.

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
ConocoPhillips	SAGD	140 MBOED	0.36 km	NW

Analytical Equipment

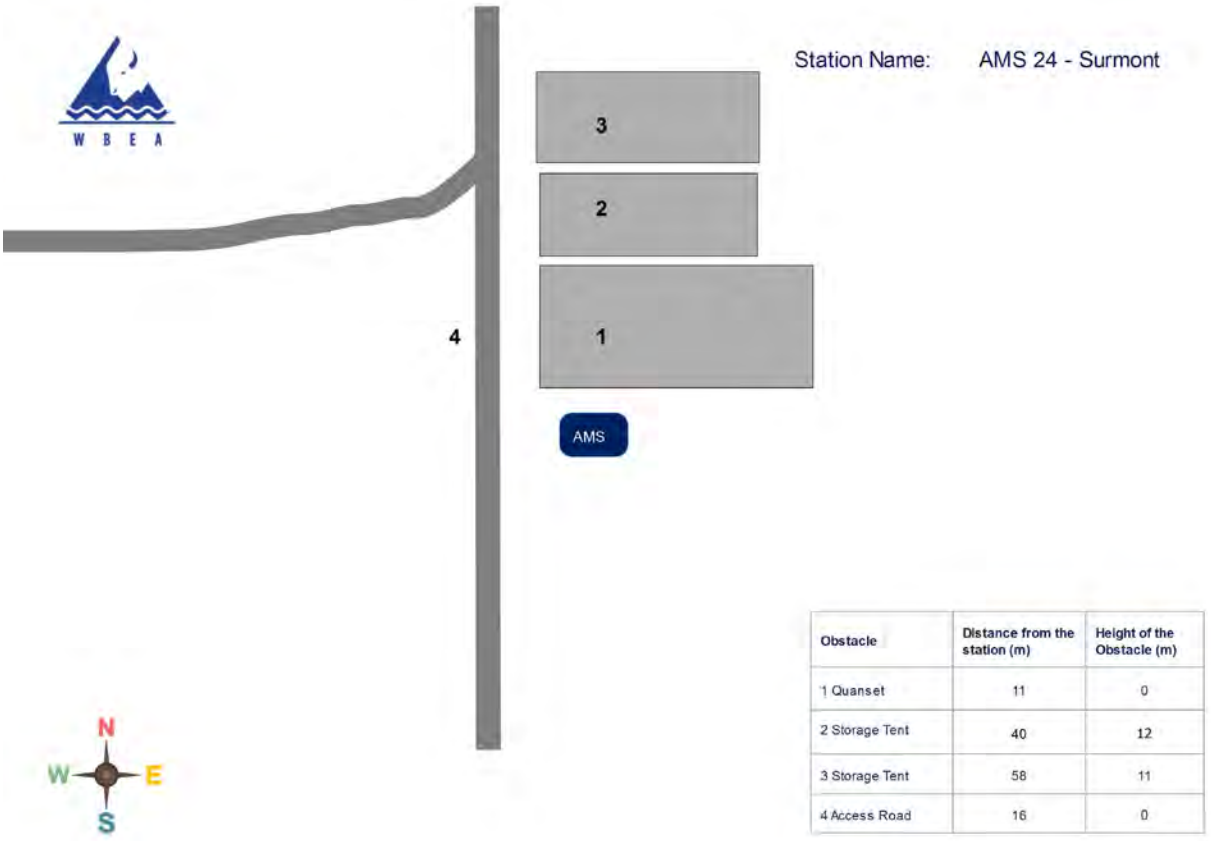
Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	ConocoPhillips	Thermo Instruments	43i	1170050150	2017-09-08
Hydrogen Sulfide	ConocoPhillips	Thermo Instruments	450i	621	2017-09-08
Oxides of Nitrogen	ConocoPhillips	Thermo Instruments	42i	4460	2017-09-08
Temperature/RH	ConocoPhillips	Vaisala	HMP155	N2910512	2017-09-08
Wind speed	ConocoPhillips	Met One	010C-1	X16480	2017-09-08
Wind direction	ConocoPhillips	Met One	020C-1	X16496	2017-09-08
FID Total Hydrocarbon	ConocoPhillips	Thermo Instruments	51i	0913935796	2017-09-08
PM 2.5	ConocoPhillips	Teledyne API	T640	253	2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9037
Zero air generator	Zero Air Generator	Teledyne/API	701	268
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB-17-17154
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	12345



Figure 2.0 – Area Topographic map showing AMS 24



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Quanset	11	0
2 Storage Tent	40	12
3 Storage Tent	58	11
4 Access Road	16	0

Figure 3.0 – Plan view sketch for AMS 24 site



Figure 4.0 – Aerial photo showing AMS 24

Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North

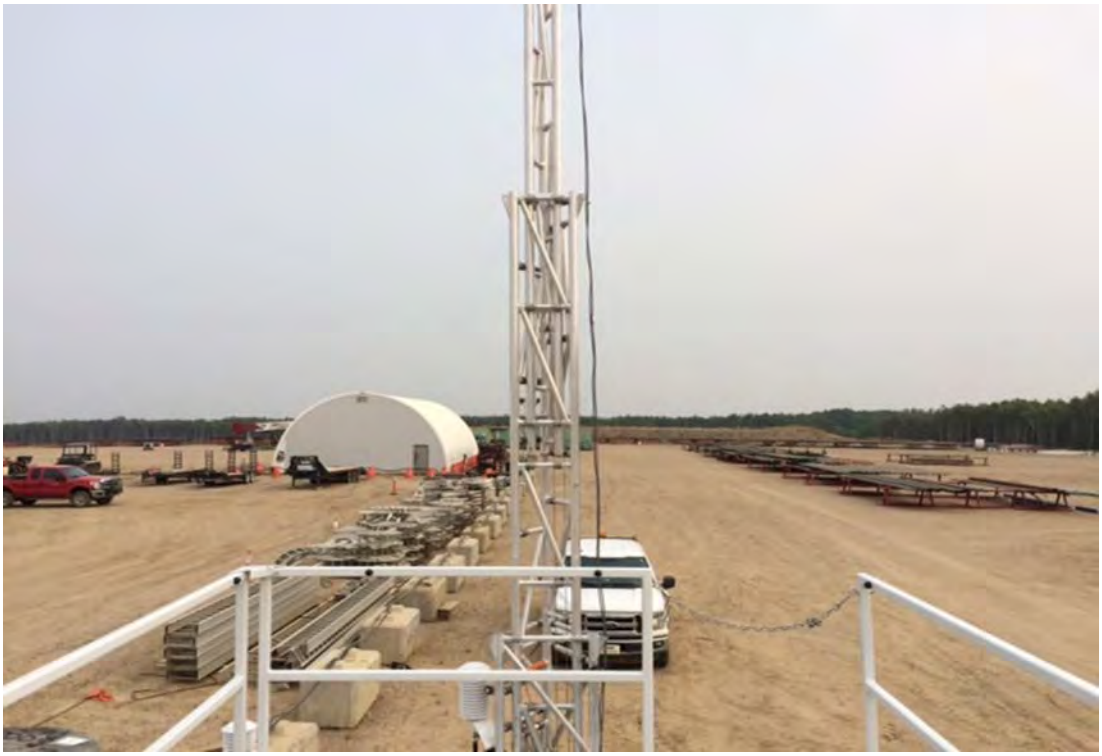


Figure 5.1 – Environ Looking East



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

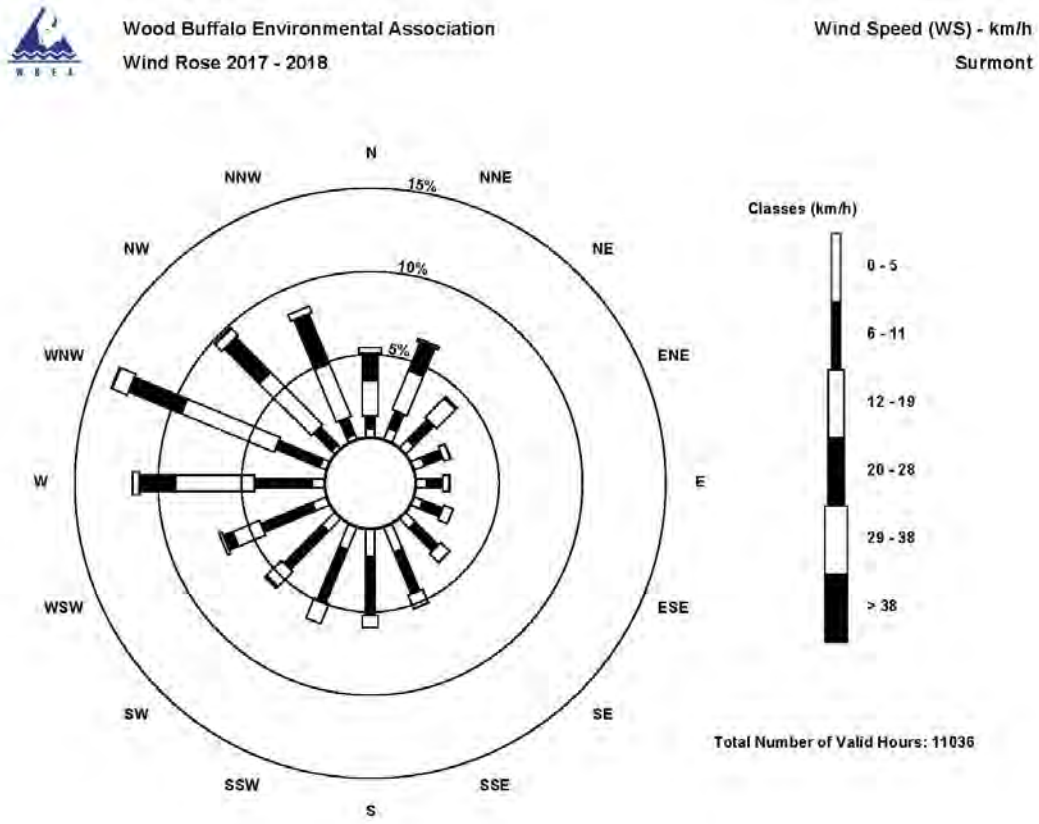


Figure 7.0 – Windrose (2017-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Waskōw ohci Pimâtisiwin

LAST UPDATED: 02-14-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING	X	X		X	X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

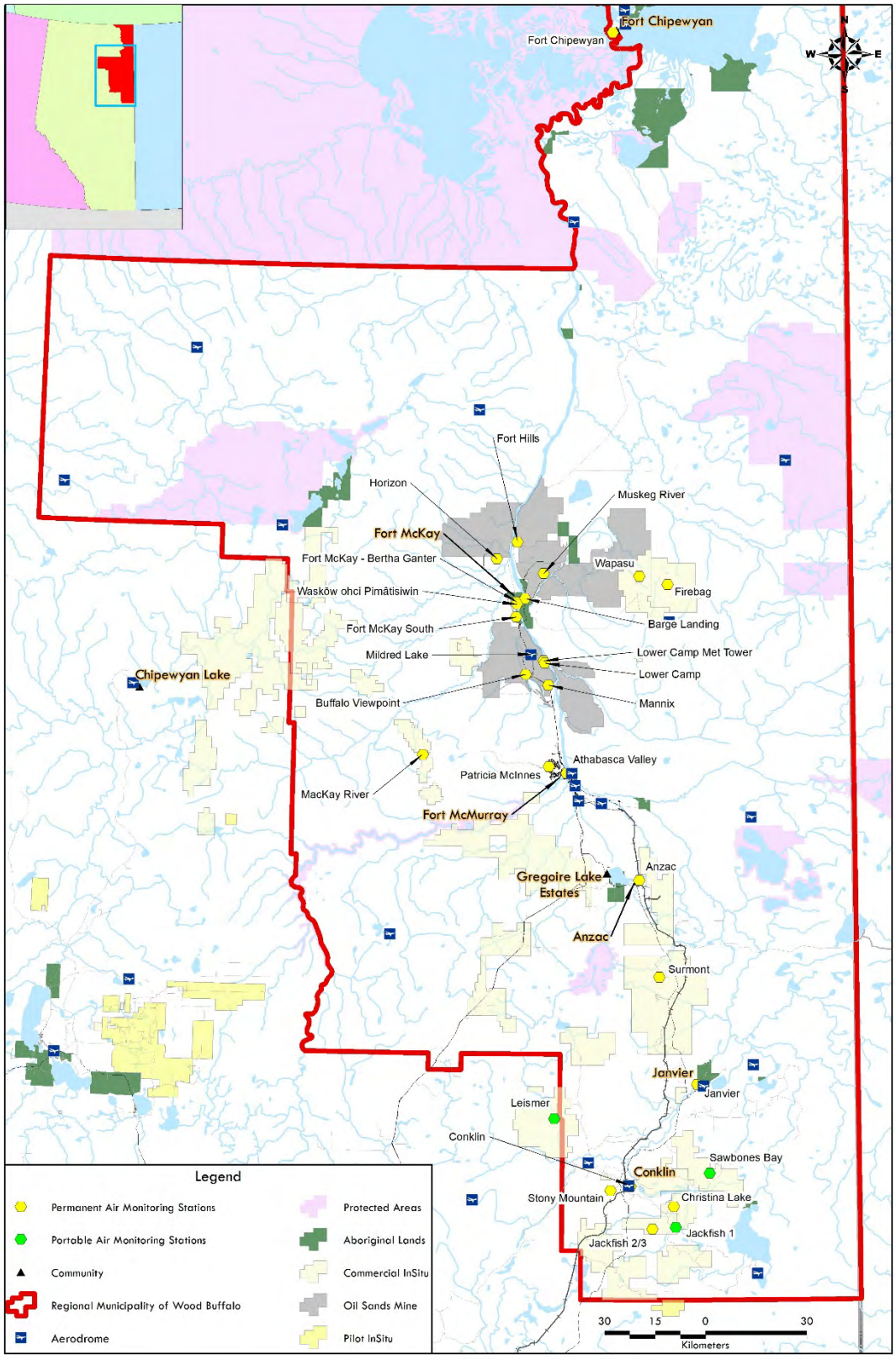


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 25
Station name	Waskōw ohci Pimâtisiwin
Date station established	July 2017

Location

Station street address	Oski-Otin Air Monitoring Site on Target Road
Legal land description	5-25-94-11 W4
Latitude	57°11’0.75” North
Longitude	111°38’21.82” West
UTM East	461347
UTM North	6338012
Nearest community	Fort Mackay
Community population	742 (2016)

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	N/A
Approval number	N/A
Contact Name	
Address	
Phone number	
Email address	

Site Description

Land use by sector	0 – 90 degrees	Wooded area
	91 – 180 degrees	Wooded area
	181 – 270 degrees	Oski-otin Air monitoring compound
	271 – 360 degrees	Oski-otin Air monitoring compound, gravel access road
Site elevation (above sea level)	266 m	
Angle of elevation to nearby buildings	Greatest angle	N/A
	Building direction	N/A
Airflow restrictions	North	No
	East	No
	South	No
	West	No
Sample manifold	Type	All glass
	Inlet height above roof	1 metre

Meteorological Sensors	Type	Cup and vane
	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Trailer	5 meters N/W	Air monitoring trailer

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Main roadway	Low	30	Main roadway used by residential vehicles

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Shell Albian	Oil Sands Plant	340,000	10	North East
Syncrude	Oil Sands Plant	350,000	15	South
CNRL Horizon	Oil Sands Plant	100,000	20	North West

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo	43i	1160290014	September 2017
Hydrogen Sulfide	WBEA	Thermo	450i	0922436967	September 2017
Temperature/RH	WBEA	Vaisala	HMP155	K2870024	July 2017
Wind speed	WBEA	Met One	010C-1	W15276	July 2017
Wind direction	WBEA	Met One	020C-1	U11345	July 2017

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	2632
Zero air generator	Zero Air Generator	Teledyne/API	701	261
HVAC	Heating and air conditioning system. Wall mount unit	BARD	W24A2-A05WPXXXJ	314D153220503-02
Shelter / Building	Air monitoring portable	ITB	10 x 20 trailer	ITB-15-16517
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	747

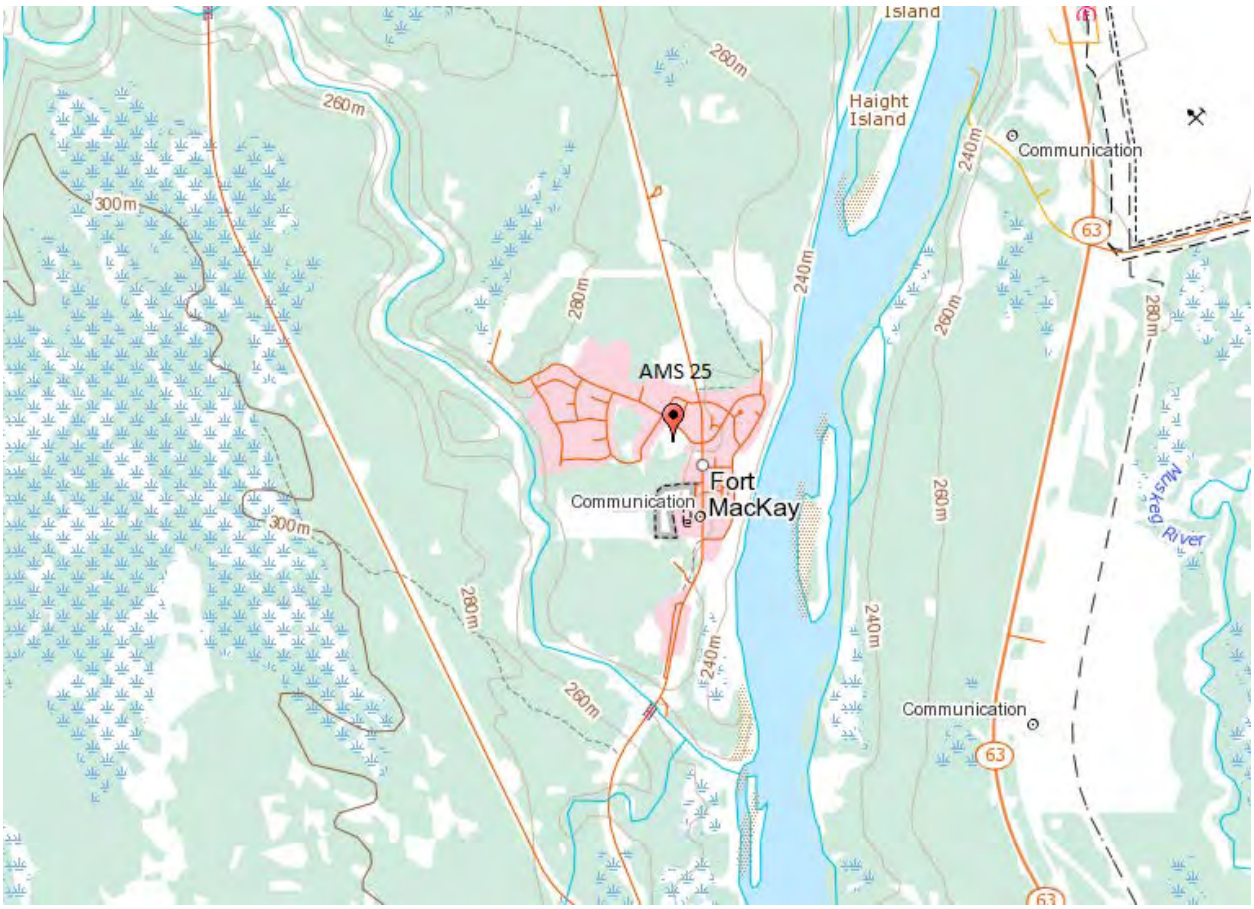
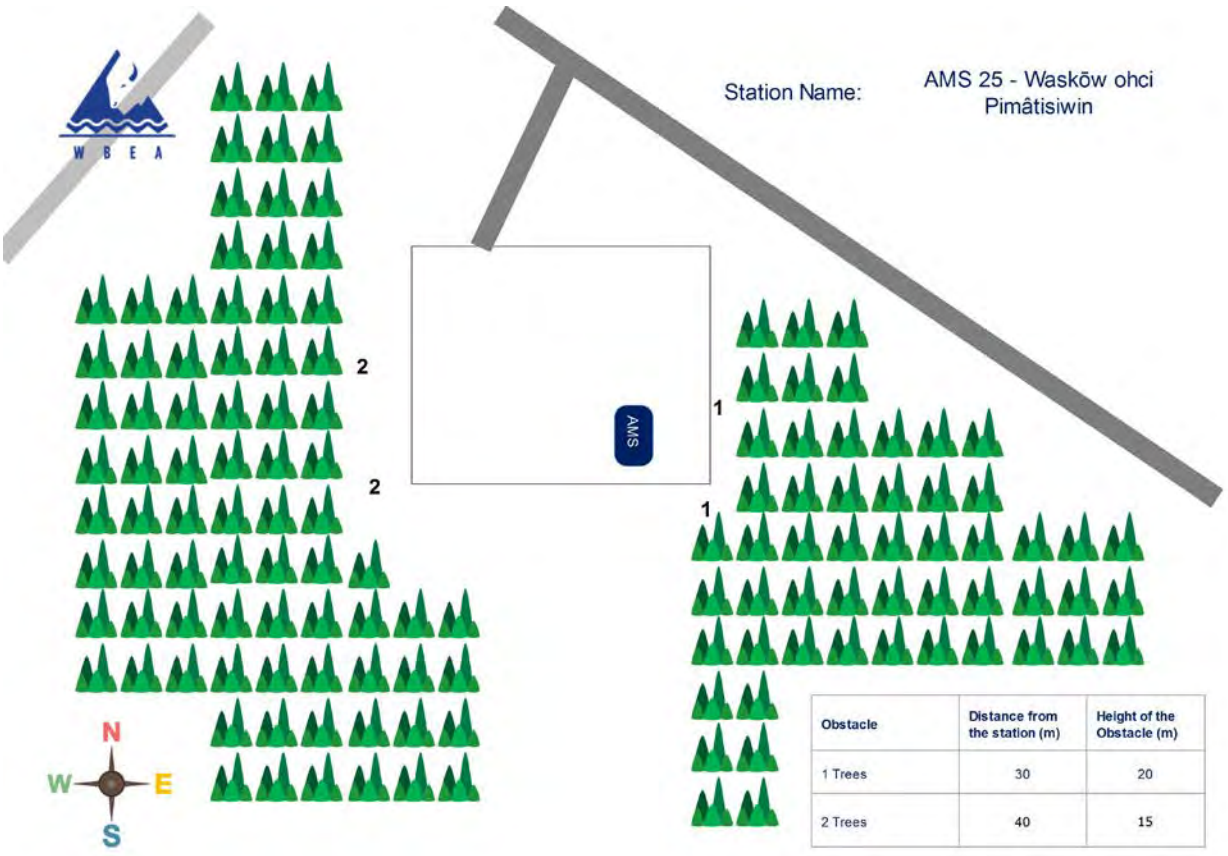


Figure 2.0 – Area Topographic map showing AMS 25 – Waskōw ohci Pimâtisiwin Community Station



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Trees	30	20
2 Trees	40	15

Figure 3.0 – Plan view sketch for AMS 25 – Waskōw ohci Pimâtisiwin Community Station

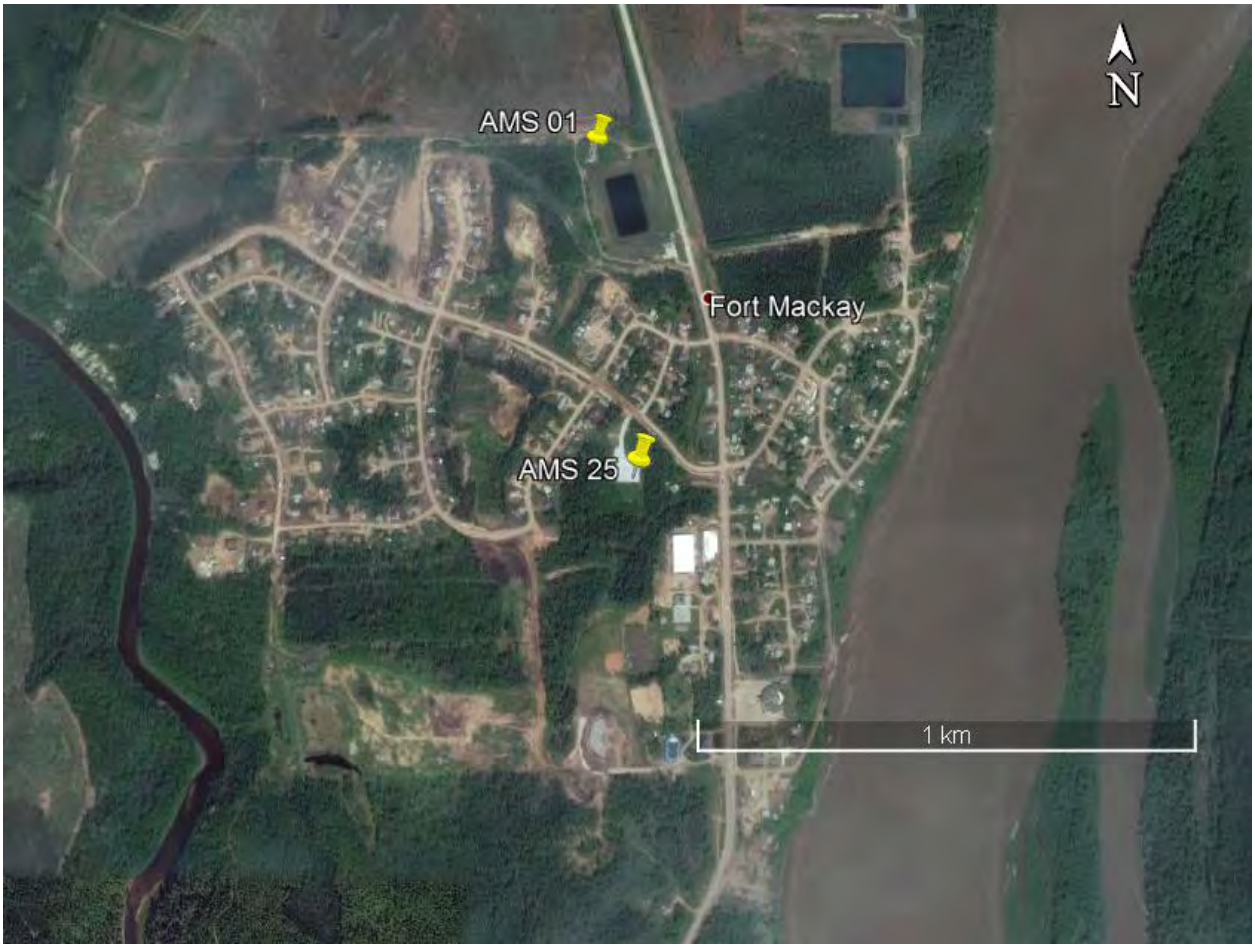


Figure 4.0 – Aerial photo showing AMS 25 – Waskōw ohci Pimâtisiwin Community Station

Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East

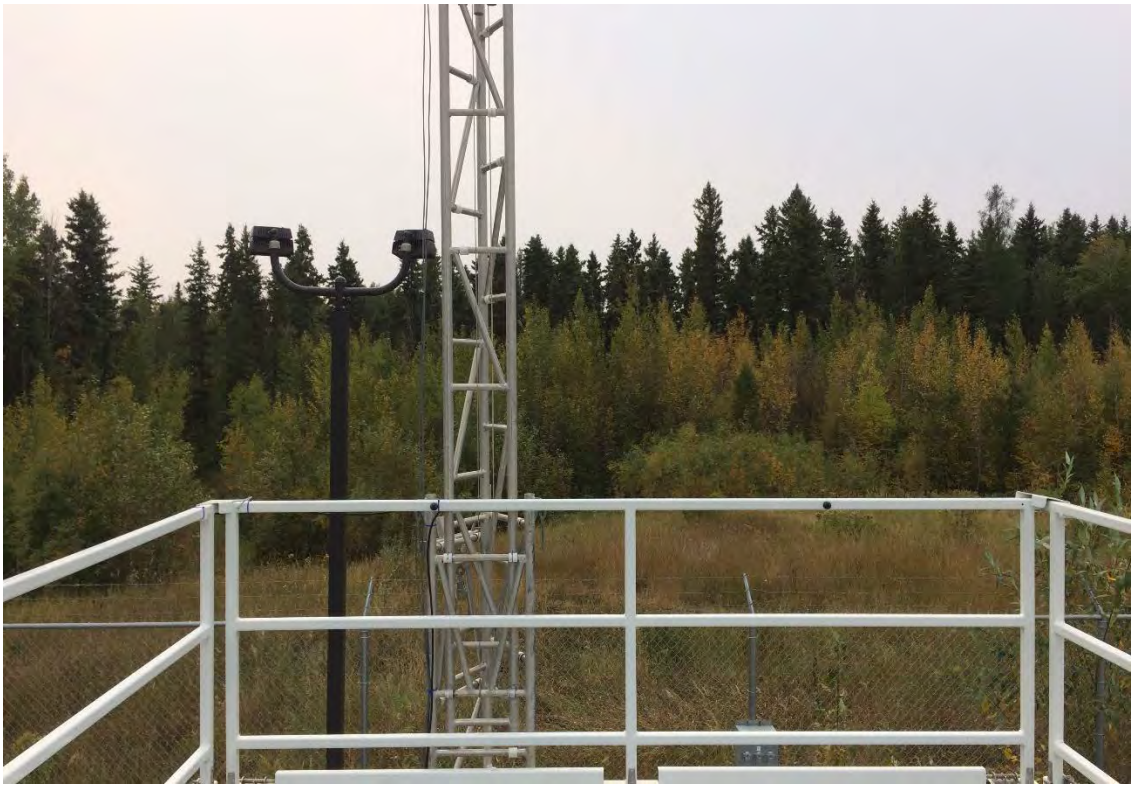


Figure 5.2 – Environ looking South



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

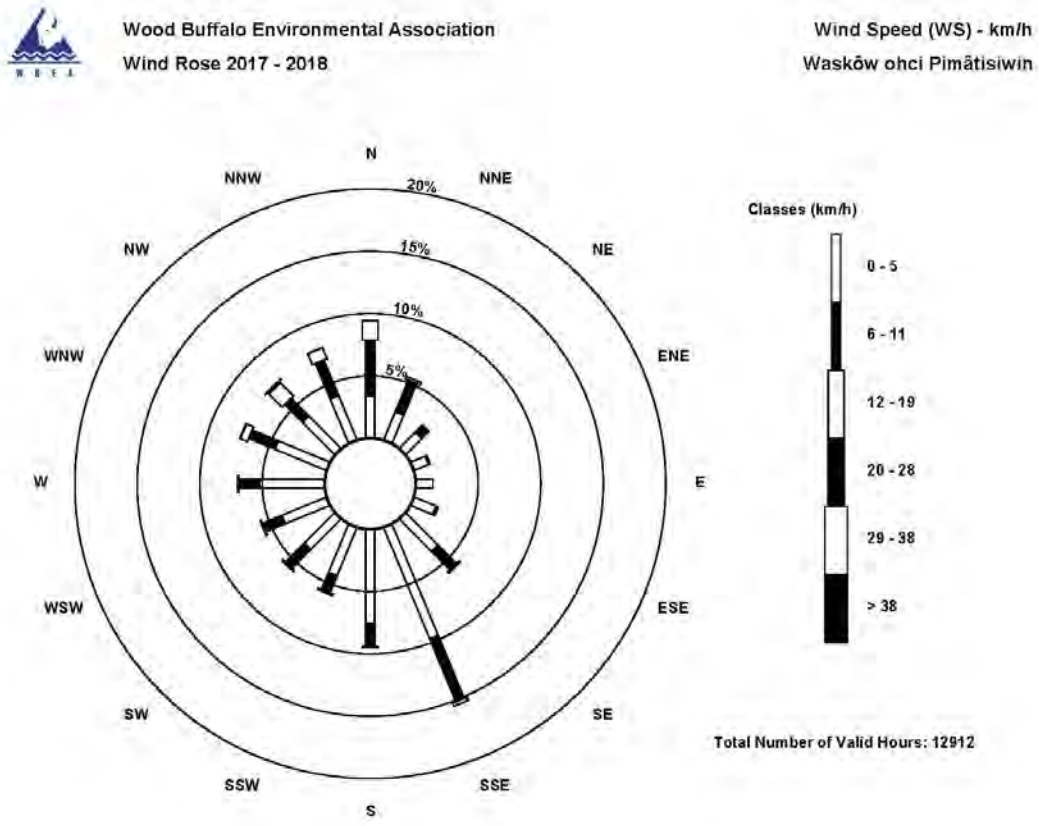


Figure 7.0 – Windrose (2017 - 2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Christina Lake

LAST UPDATED: 01-31-2019

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WBEA Monitoring Network

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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 25 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, $PM_{2.5}$, 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 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), and carbon monoxide (CO). Sites are categorized as industrial or community, based on the setting in which they are located.

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_x$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

* Also functions as an enhanced deposition station.

Table 2 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.

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

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	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

* Also functions as an enhanced deposition station.
y Monitoring data used for research and development purposes only.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC) and reduced sulphur compounds (RSC), 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), dichotomous samples, speciated denuder sampler (SASS), and precipitation samples.

Table 3: Summary of parameters measured using integrated methods at WBEA sites

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

* Also functions as an enhanced deposition station.

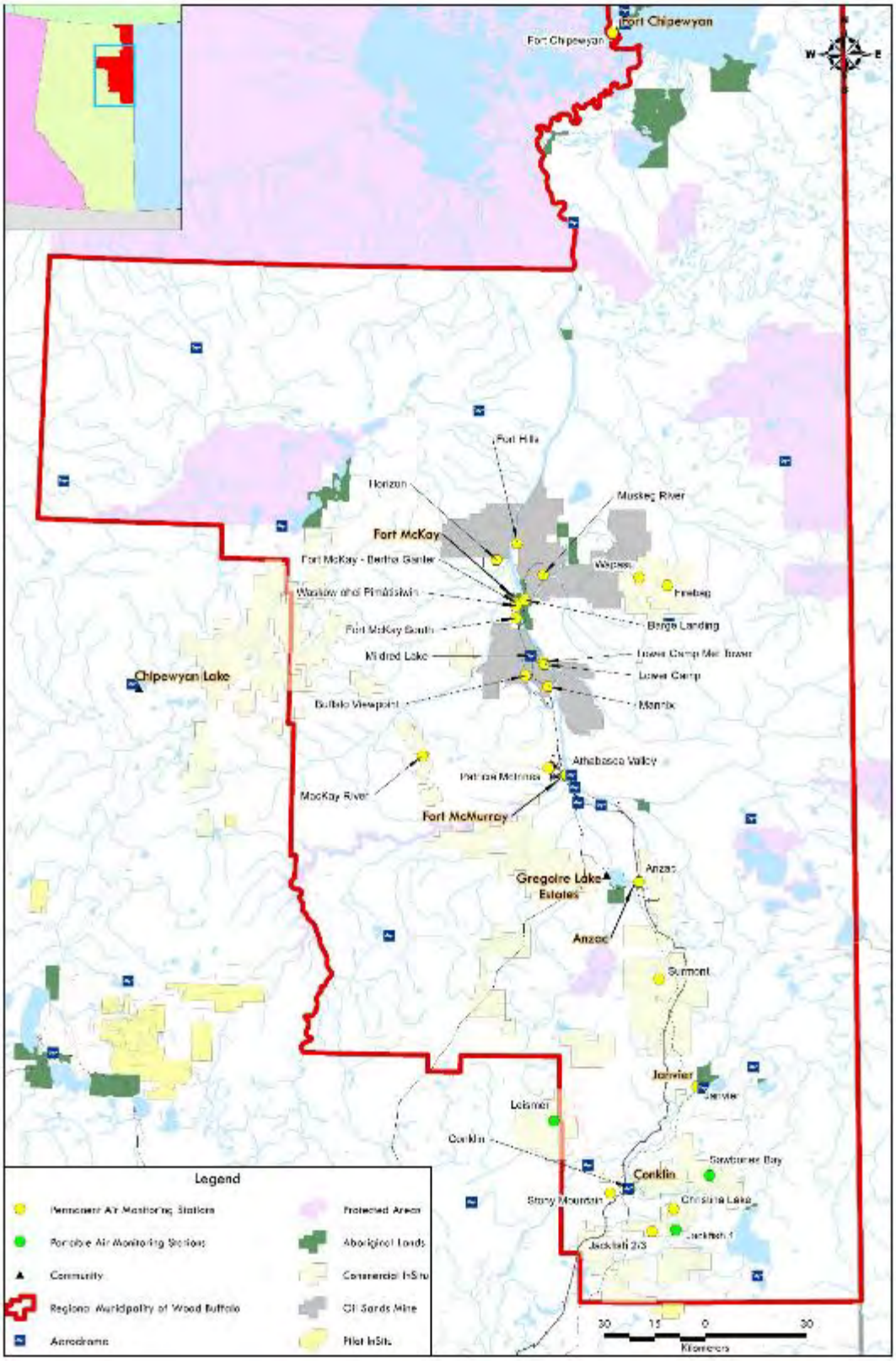


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 26
Station name	Christina Lake
Date station established	May 30, 2018

Location

Station street address	Located close to a non-operational well-pad 3-16 at Cenovus SAGD site
Legal land description	3-16-76-6 W4
Latitude	55.579149
Longitude	-110.876018
UTM East	507816.30
UTM North	6159248.60
Nearest community	Conklin
Community population	185

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Cenovus Energy Inc.
Approval number	48522-01-00
Contact Name	Rene Morales
Address	500 Centre Street SE Calgary, AB T2P 0M5
Phone number	(403) 874-0107
Email address	Rene.morales@cenovus.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)	576m	
Angle of elevation to nearby building	Greatest angle	N/A
	Building direction	N/A
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	10
	Distance from station	7

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
Well-pad	100	Non-operational well pad. Capped.

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Dirt/gravel	Medium	20	Used by site workers

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (m)	Compass direction from site
Cenovus Christina Lake	SAGD Facility		300	N

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	Cenovus	Thermo Instruments	43I	1173410001	May 30, 2018
Hydrogen Sulfide	Cenovus	Thermo Instruments	450I	1180030032	May 30, 2018
Oxides of Nitrogen	Cenovus	Thermo Instruments	42I	117348006	May 30, 2018
Temperature/RH	Cenovus	Vaisala	HMP155	G4330034 2011	May 30, 2018
Wind speed	Cenovus	Met One	010C-1	W23536	May 30, 2018
Wind direction	Cenovus	Met One	020C-1	W23733	May 30, 2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	7881
Zero air generator	Zero Air Generator	Teledyne/API	701	953
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	3654

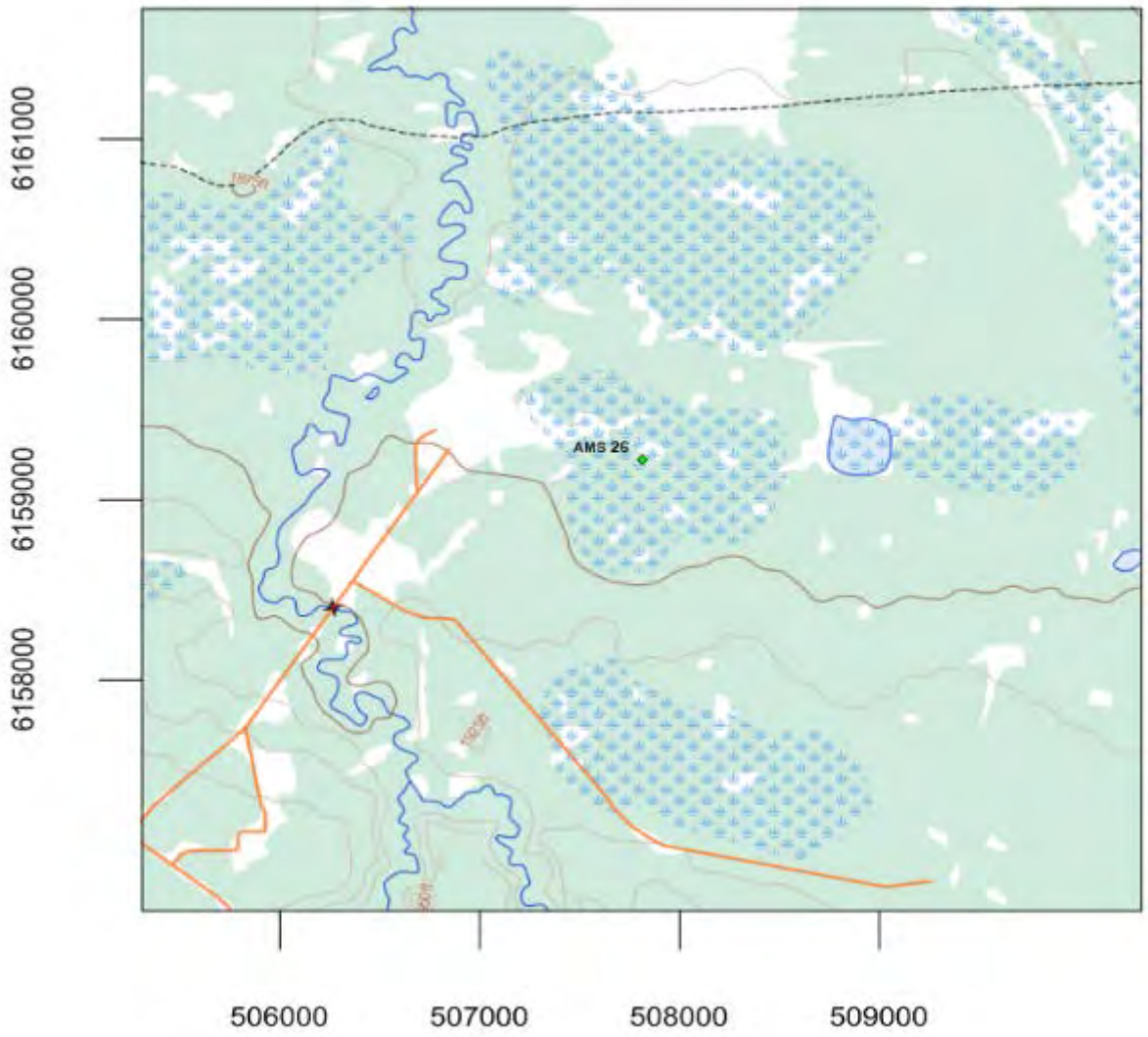


Figure 2.0 – Area Topographic map showing AMS 26

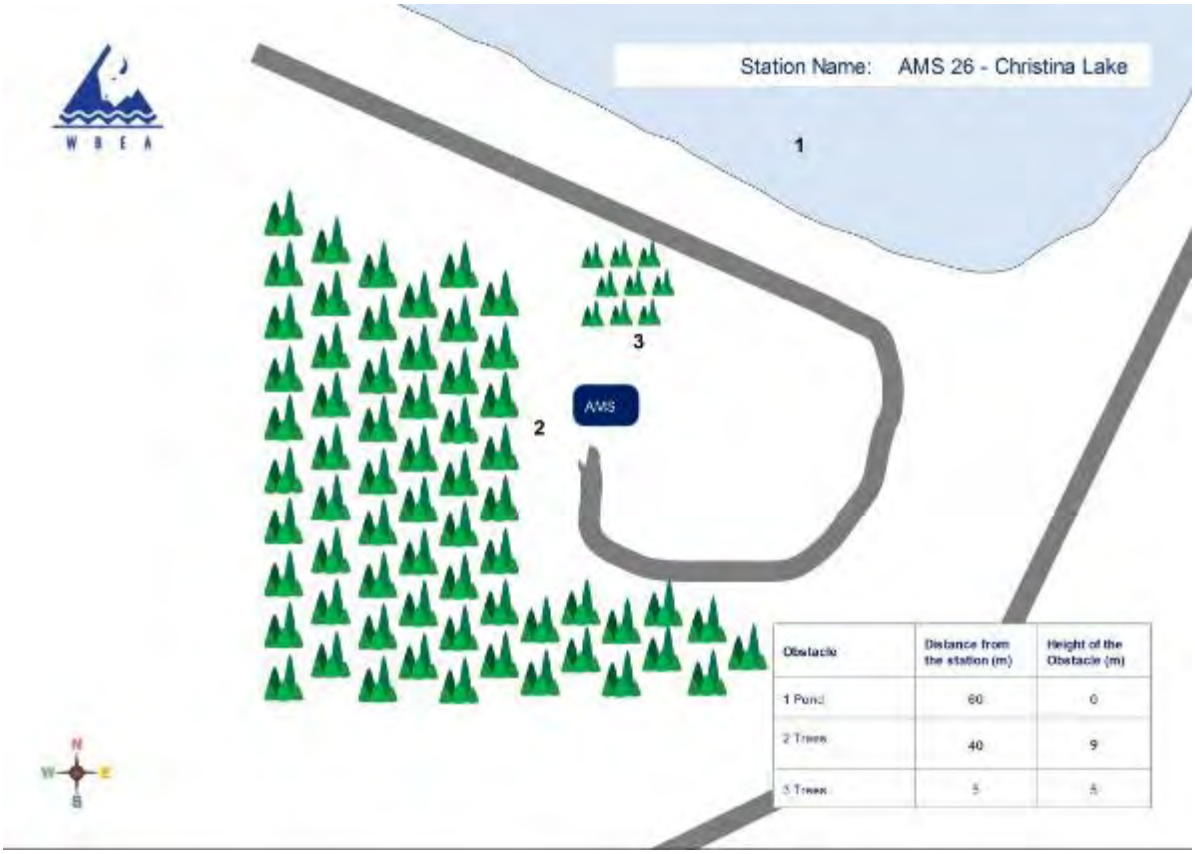


Figure 3.0 – Plan view sketch for AMS 26 site



Figure 4.0 – Aerial photo showing AMS 26

Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East

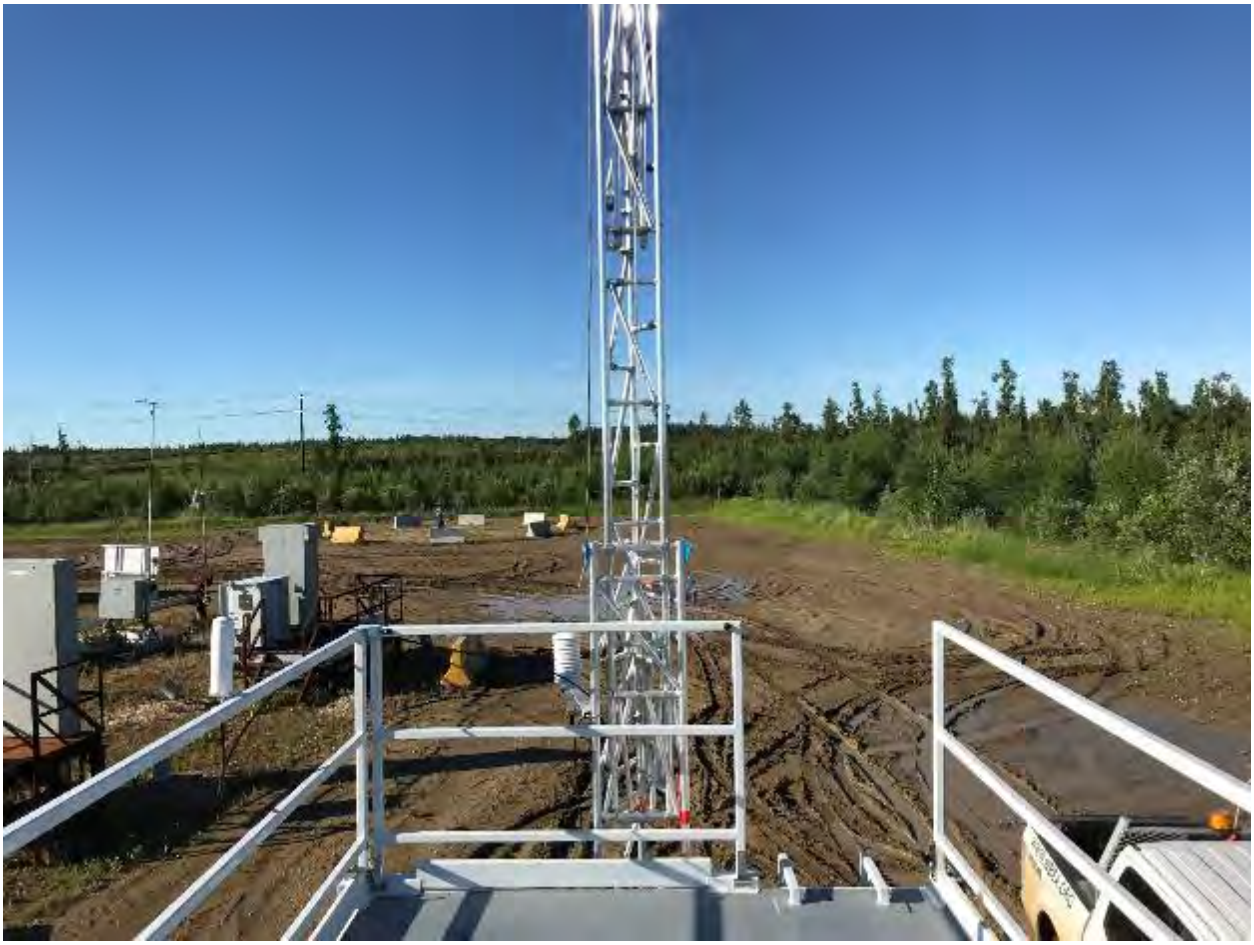


Figure 5.2 – Environ looking South



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

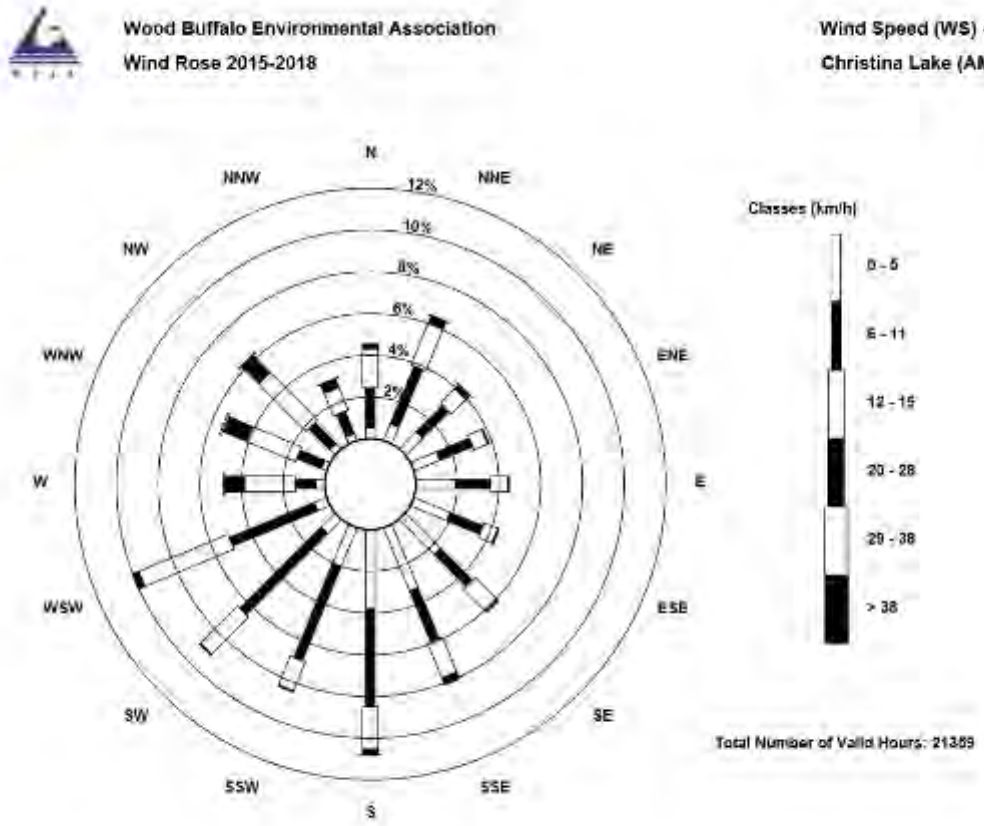


Figure 7.0 – Windrose (2015-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Jackfish 2/3

LAST UPDATED: 03-04-2019

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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 25 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, $PM_{2.5}$, 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 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), and carbon monoxide (CO). Sites are categorized as industrial or community, based on the setting in which they are located.

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_x$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

* Also functions as an enhanced deposition station.

Table 2 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.

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

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	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

* Also functions as an enhanced deposition station.
y Monitoring data used for research and development purposes only.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC) and reduced sulphur compounds (RSC), 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), dichotomous samples, speciated denuder sampler (SASS), and precipitation samples.

Table 3: Summary of parameters measured using integrated methods at WBEA sites

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

* Also functions as an enhanced deposition station.

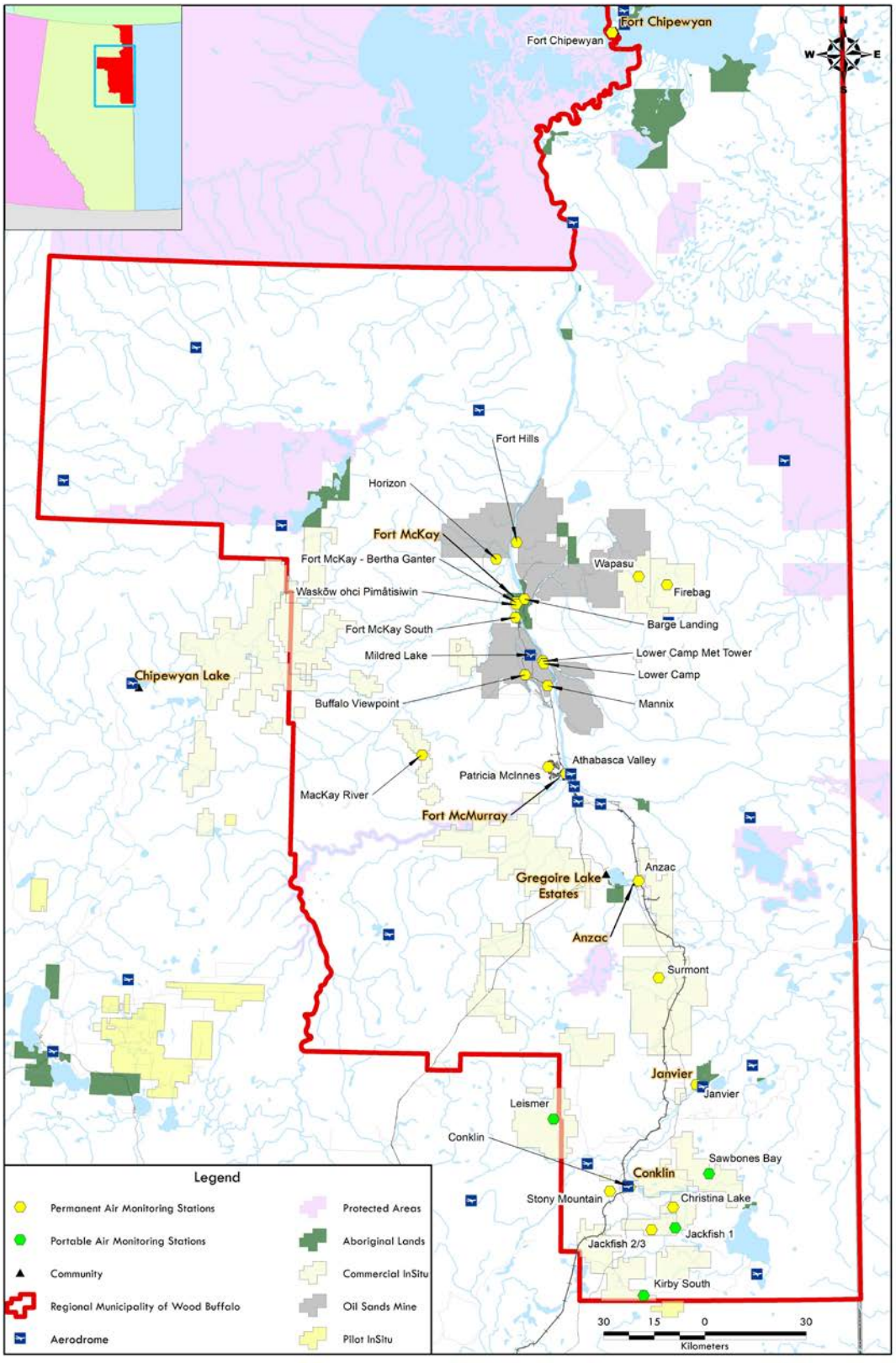


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

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

Location

Station street address	Located SE of Devon Jackfish Lodge, left side of the road right after Devon 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	Devon Canada Corporation
Approval number	224816-00-00
Contact Name	Garett White
Address	333 West Sherida Avenue Oklahoma City, Oklahoma 73102-5015
Phone number	(780) 799-1889
Email address	Garett.white@dvn.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

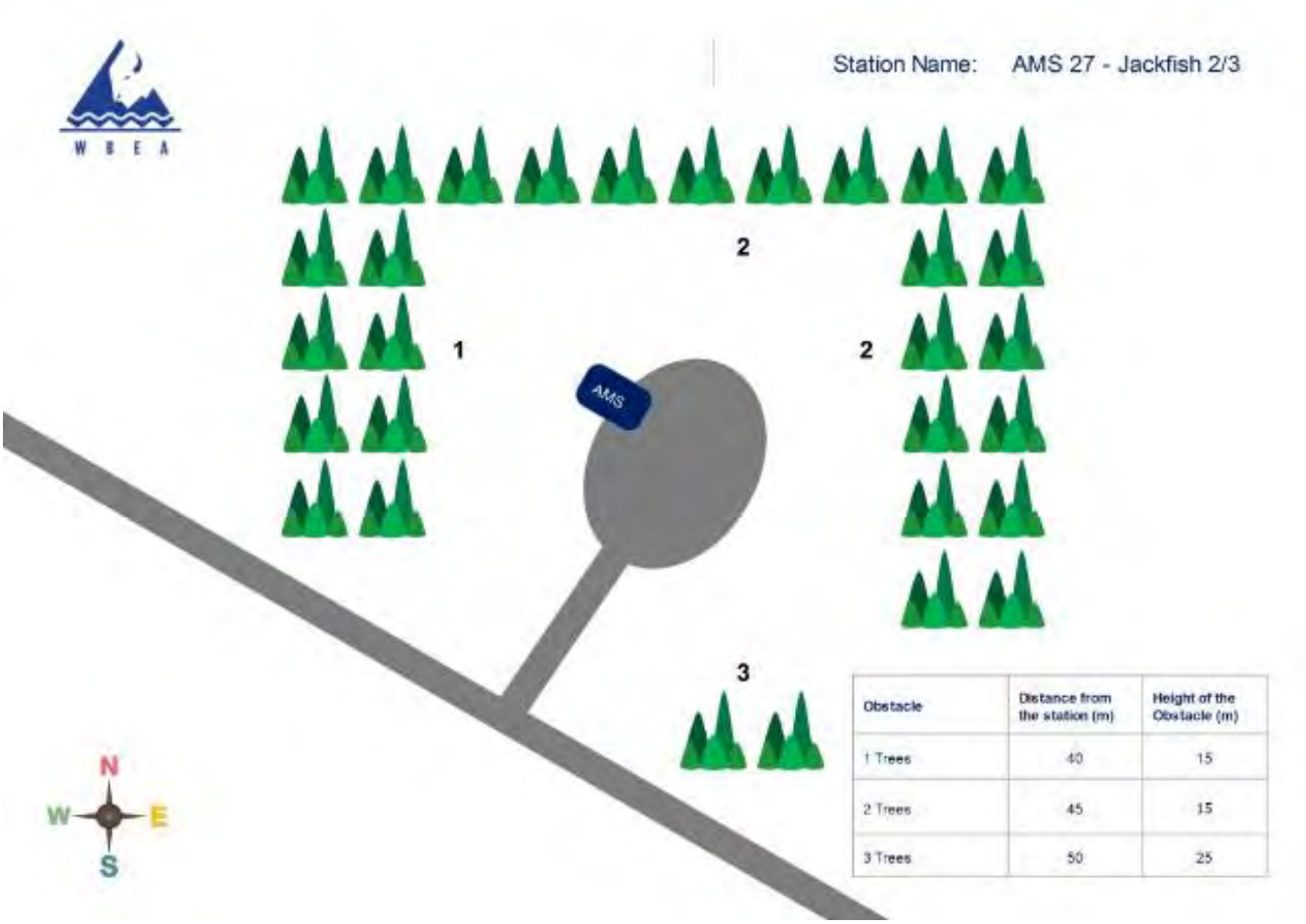
Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Teledyne/API	T100	4007	Sep 15, 2018
Hydrogen Sulfide	WBEA	Teledyne/API	T101	621	Sep 15, 2018
Oxides of Nitrogen	WBEA	Teledyne/API	T200	4460	Sep 15, 2018
Temperature/RH	WBEA	Vaisala	HMP155	N2910512	Sep 15, 2018
Wind speed	WBEA	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	12345
Zero air generator	Zero Air Generator	Teledyne/API	701	4764
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

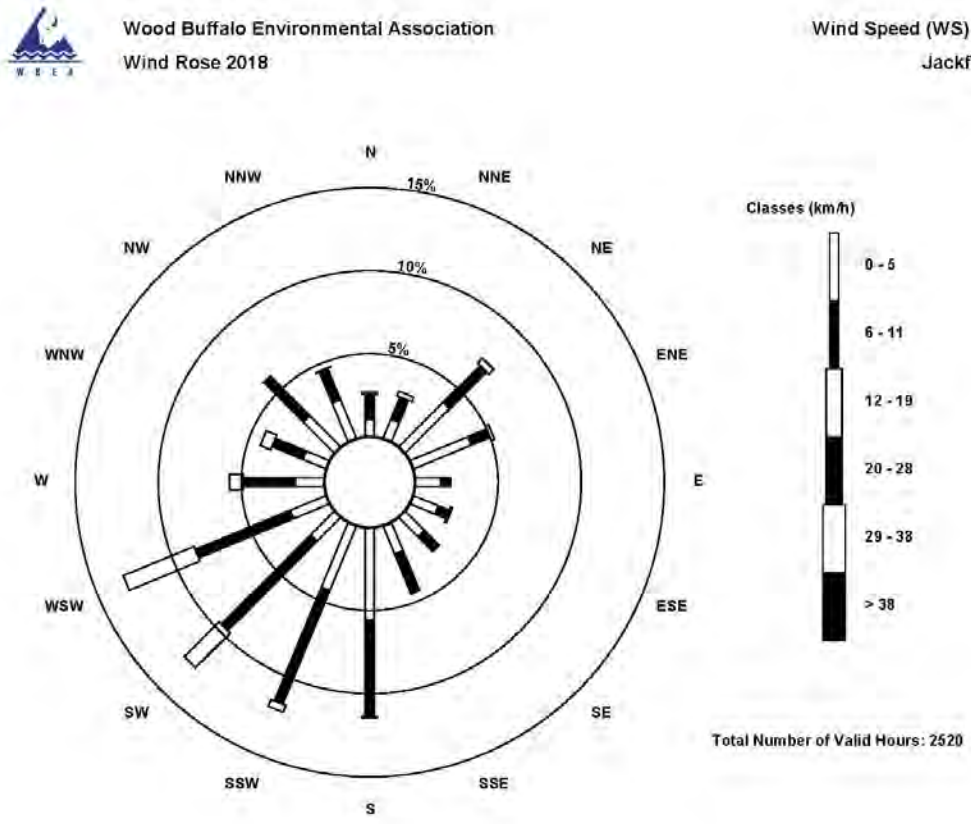


Figure 7.0 – Windrose (2018)

WBEA Network and Site Documentation

AMBIENT MONITORING STATION SITE DOCUMENTATION

AMS 26 – CHRISTINA LAKE

(Portable Monitoring Station –AMS 26)

2018

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WBEA Network and Site Documentation

Network Background

The WBEA vision is to operate a state of the art monitoring system that meets the needs of residents and stakeholders in the Wood Buffalo Region. WBEA's mission is to monitor air quality and air quality related environmental indicators, to generate accurate and transparent information which enables stakeholders to make informed decisions.

Continuous ambient air quality and meteorological data are collected through a program administered by the WBEA's Ambient Air Technical Committee (AATC). The WBEA currently operates 20 continuous monitoring stations, each measuring from 5 to 15 continuous and intermittent air quality parameters. The continuously measured air quality parameters include SO2, H2S, TRS, O3, NOX, NO, NO2, NH3, CO, PM2.5, THC, NMHC, and CH4. All sites also measure temperature, wind speed, wind direction, ambient temperature 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.

The WBEA also maintains and operates several portable monitoring stations, equipped to measure SO2, H2S, O3, NOX, NO, NO2, NH3, PM2.5, THC, wind speed, wind direction, temperature and GPS location. The unit is available to WBEA member companies for private, facility-associated monitoring, or can be deployed for public monitoring in areas of special need or interest.

Since 1998 WBEA has maintained semi-continuous (intermittent) sampling for PM2.5, PM10, VOC and PAH. The sampling for intermittent monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. Intermittent samples in the WBEA ambient air monitoring network are taken every 6 days for a 24-hour period. The sampling schedule and procedures are consistent with Environment Canada's National Air Pollution Surveillance (NAPS) program. Since the planning process of the Joint Oilsands Monitoring Plan, additional sampling has been added at selected sites and has been included in the list in table 1.0. Some of the additional monitoring includes speciated ionic analysis and dichotomous sampling for coarse and fine particulate on a three day sampling schedule.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
16	COMPLIANCE	MUSKEG RIVER	X	X		X			X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	X	X		X		X	X			
25	EMERGENCY RESPONSE	WASKOW OHCI PIMATISIWIN	X					X				
26	COMPLIANCE	CHRISTINA LAKE	X	X				X				
501	COMPLIANCE	LEISMER	X	X				X				
505	COMPLIANCE	SAWBONES BAY	X	X				X				

Table 1.0 - Ambient Air monitoring Parameters in the WBEA Network

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	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
16	COMPLIANCE	MUSKEG RIVER	X	X	X	X	X				
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	X	X		X	X				
25	EMERGENCY RESPONSE	WASKOW OHCI PIMATISIWIN	X	X		X	X				
26	COMPLIANCE	CHRISTINA LAKE	X	X		X	X				
501	COMPLIANCE	LEISMER	X	X		X	X				
505	COMPLIANCE	SAWBONES BAY	X	X		X	X				

Table 1.1 - Ambient Air monitoring Parameters in the WBEA Network

All the stations listed in table 1 and 1.1 are located throughout the Wood Buffalo Region. The map below shows the location of each station.

WBEA Network and Site Documentation

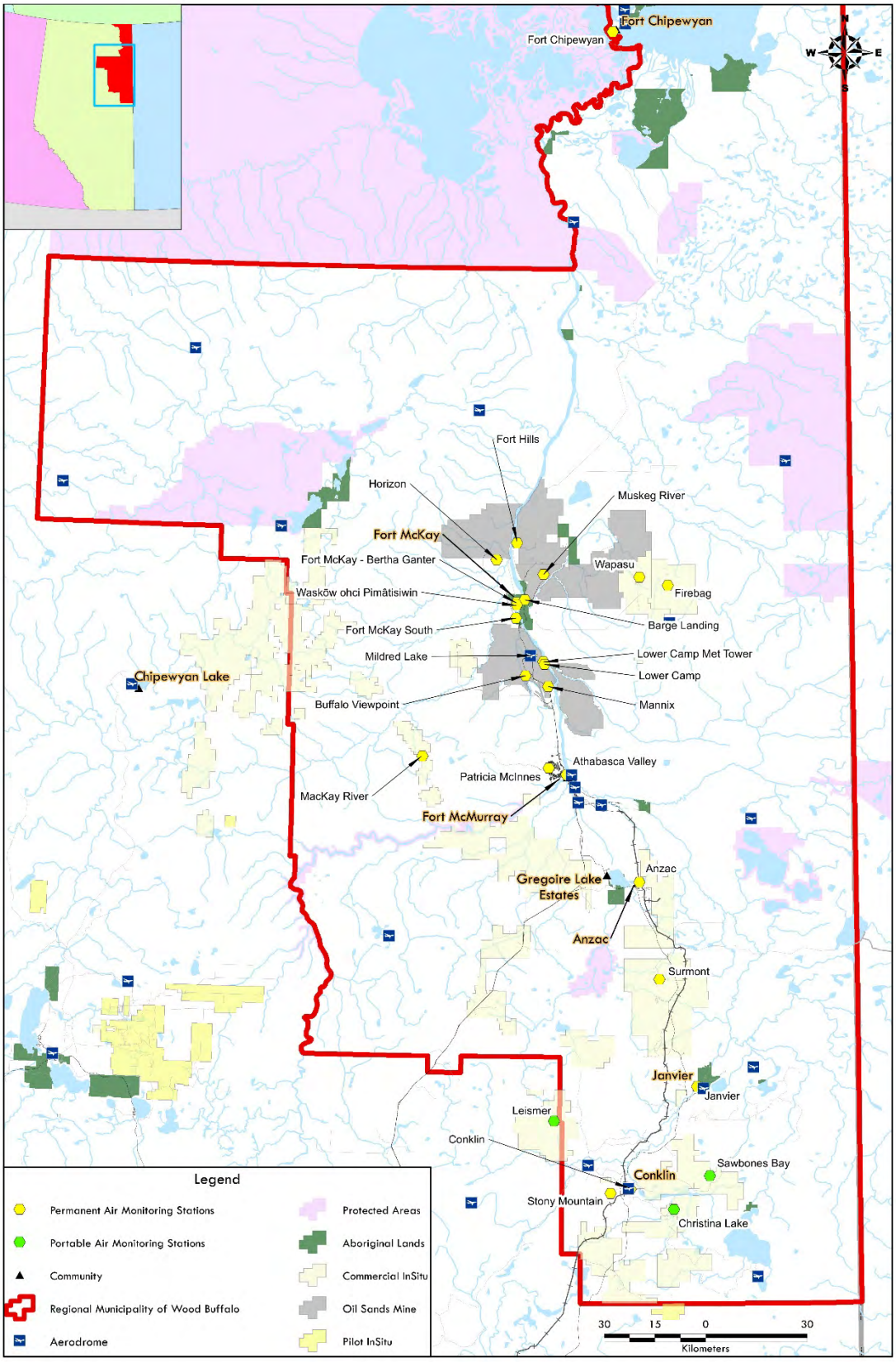


Figure 1.0 – WBEA Monitoring Network Sites

AMS 26 – Christina Lake Station Details

General Site Information

The Christina Lake Portable AMS is currently deployed at the Cenovus Christina Lake location. The Christina Lake station contains analyzers and sensors that continuously measure SO_2, H_2S, NOx, Wind speed, Wind direction, External temperature, and Relative humidity.

Item	Description			
Station ID	AMS 26			
Station Name	Christina Lake			
General description	Located close to a non-operational well-pad 316 at Cenovus SAGD site.			
Community	NA			
Station Coordinates	55° 34' 44.00"	North	110° 52' 34.00"	West
Station elevation	576			Meters
Station Address	NA			
Station Type	Portable-Compliance			
Initial Commission Date	NA			
Area Land Use	Industrial – SAGD			
Angle of elevation to nearby buildings	0 degrees			
Average building height in area	0 meters			
Airflow Restrictions (yes/no)	North South	no No	East West	No No
Nearest Tree	Distance	100 meters	Height	15 meters
Sample Manifold Type	Glass			
Meteorological Tower Information	Height Type Position	10 meters Aluma crank-up tower Attached to North end of monitoring shelter		
Station Install Date	May 30, 2018			
Station Origin	NA			
Site Preparation	Level gravel pad			

Table 2.0 – General Site Information

Localized Sources

Type	Distance	Description
Well-pad.	100 m west	Non-operational well pad. Capped.

Name	Type	Traffic Volume	Distance (m)	Description
Roadway	Dirt/gravel road	Medium	20	Used by workers to access many areas of the plant.

Table 3.0 – Local Source Information

Area Topographic Map

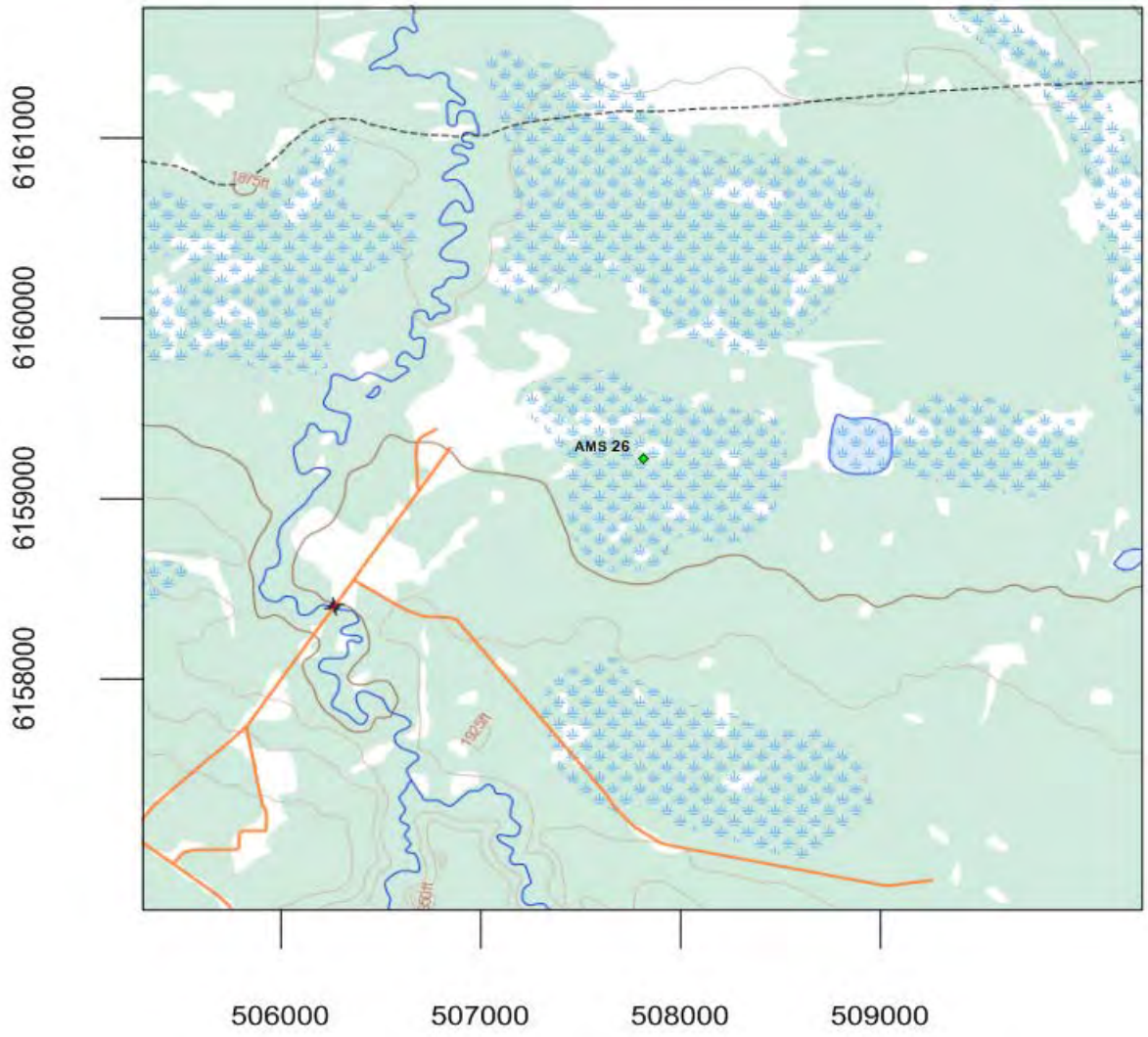


Figure 2.0 – Area Topographic map showing AMS 26 – Christina Lake Station

Aerial Photo



Figure 3.0 – Aerial photo showing AMS 26 – Christina Lake Station

Site photos

The following show photos of the station surroundings as well as the exterior and interior of the station itself.



Figure 4.0 – Exterior of monitoring station



Figure 4.1 – Monitoring compound looking south



Figure 4.2 – Environ looking north



Figure 4.3 – Environ looking east

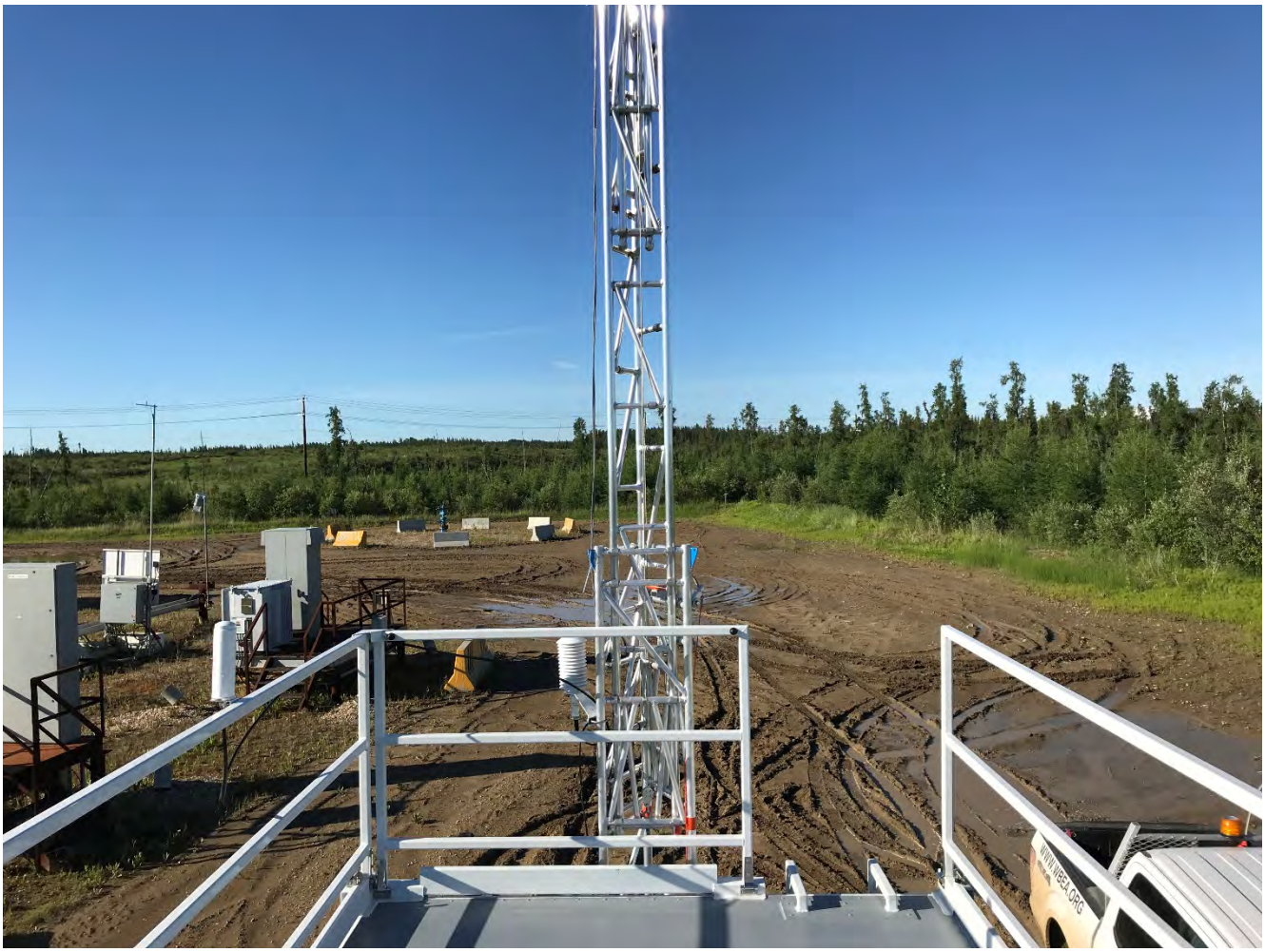


Figure 4.4 – Environ looking south

WBEA Network and Site Documentation



Figure 4.5 –Environ looking west

WBEA Network and Site Documentation



Figure 4.6 – Outdoor Sample Inlet and Indoor manifold setup



Figure 4.7 – Instrument rack

Equipment Inventory

Parameter Measured		Make	Model	Serial Number	Range	Detection Principle	Sampling Height (m)	
							Ground	Shelter
SO2	Sulfur Dioxide	Thermo Instruments	43i	1173410001	0-1000ppb	Pulsed Fluorescence	4	1
H2S	Hydrogen Sulfide	Thermo Instruments	450i	1180030032	0-100ppb	Pulsed Fluorescence	4	1
H2S converter		Thermo Instruments	340	328702539	NA		4	1
NOx	NO/NO2/NOx	Thermo Instruments	42i	117348006	0-1000ppb	Chemiluminesense	4	1
AT/RH	Ambient temp and relative humidity.	Vaisala	HMP155	G4330034 2011	Temp: -80 - +60 C RH: 0-100%	Thermometer. Measurement is based on measuring voltage across a capacitive film polymer sensor.	4	
WS	Wind speed	Met One	010C-1	W23536	0-80kph	Chopped optical	10	
WD	Wind direction	Met One	020C-1	W23733	0-360 degrees	Resistive (potentiometer)	10	

Table 4.0 - Analytical Equipment in AMS 26

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	NA
ZAG	Zero Air Generator	Teledyne API	M701	953
HVAC	Heating and air conditioning system. Wall mount unit	BARD	NA	NA
Shelter / Building	Air monitoring portable	ITB	NA	NA
Gas Dilution Calibrator	Uses Mass Flow Controllers to dilute and deliver calibration gasses at concentrations required for multipoint instrument calibrations, troubleshooting and daily reference points.	Teledyne API	T700	3654

Table 5.0 - Support Equipment in AMS 26

WBEA Network and Site Documentation

Wind Rose

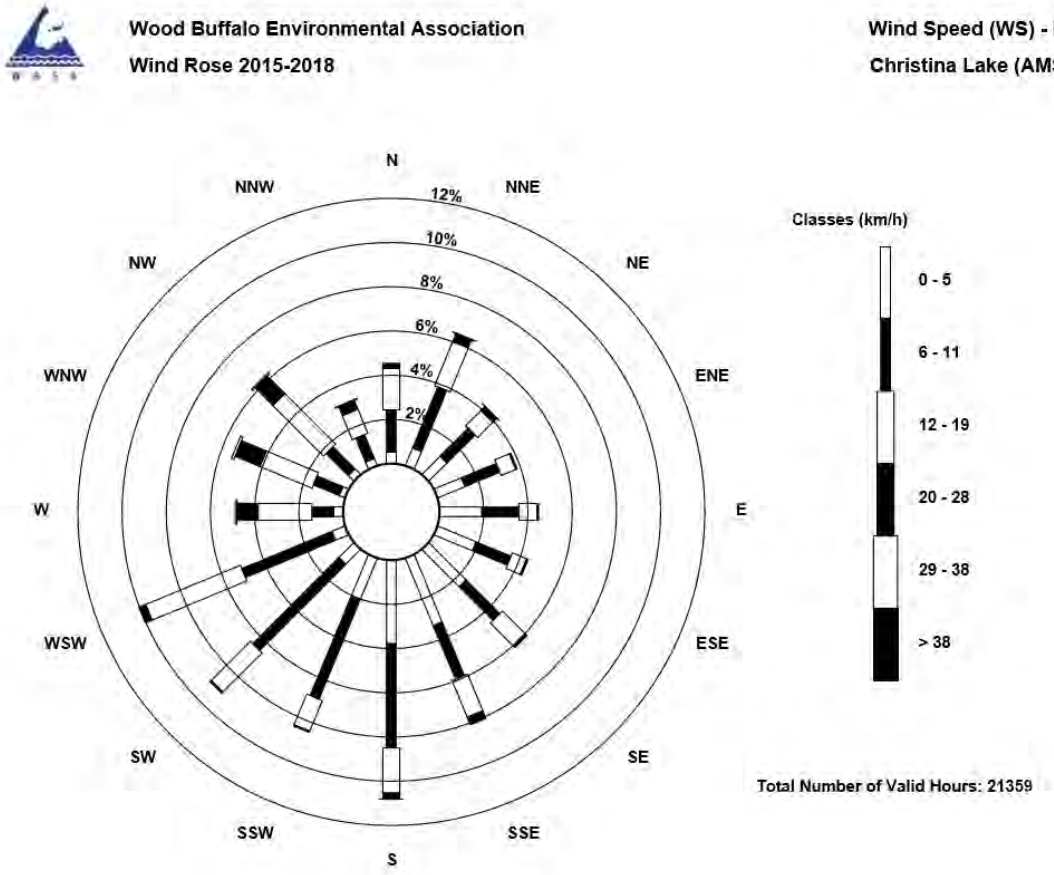
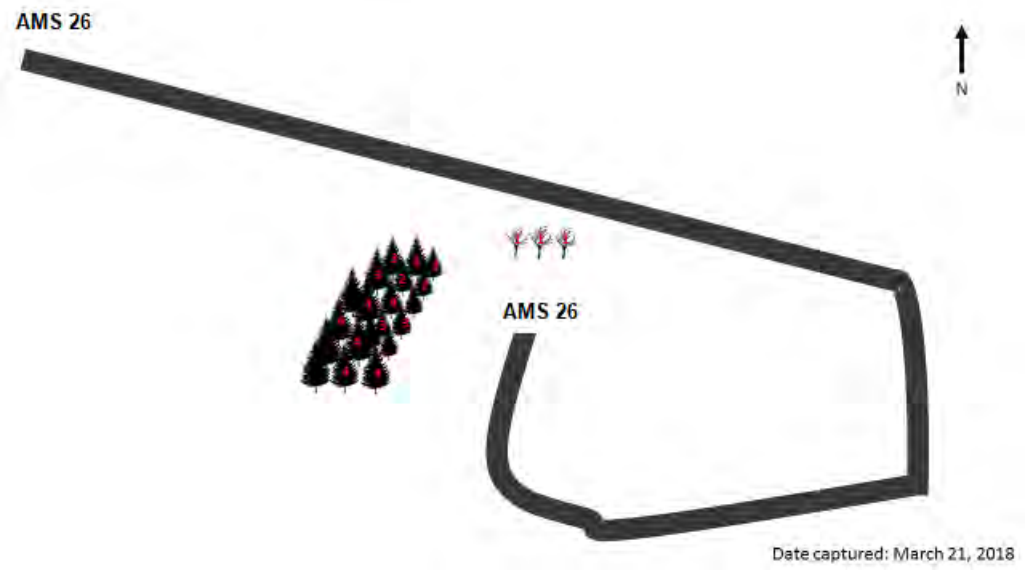


Figure 5.0 – AMS 26 Wind Rose

WBEA Network and Site Documentation



Figure 6.0 – Plan view image showing a 500m radius around Niska – Cenovus Christina Lake station



Obstacle #	Description	Direction from Station	Distance from Station (metres)	Height of Obstacle (metres)
1	Trees	N	5	5
2	Trees	W	40	7
3	Trees	W	45	9
4	Trees	W	50	8

Figure 6.1 – Plan view sketch

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Leismer

LAST UPDATED: 03-04-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

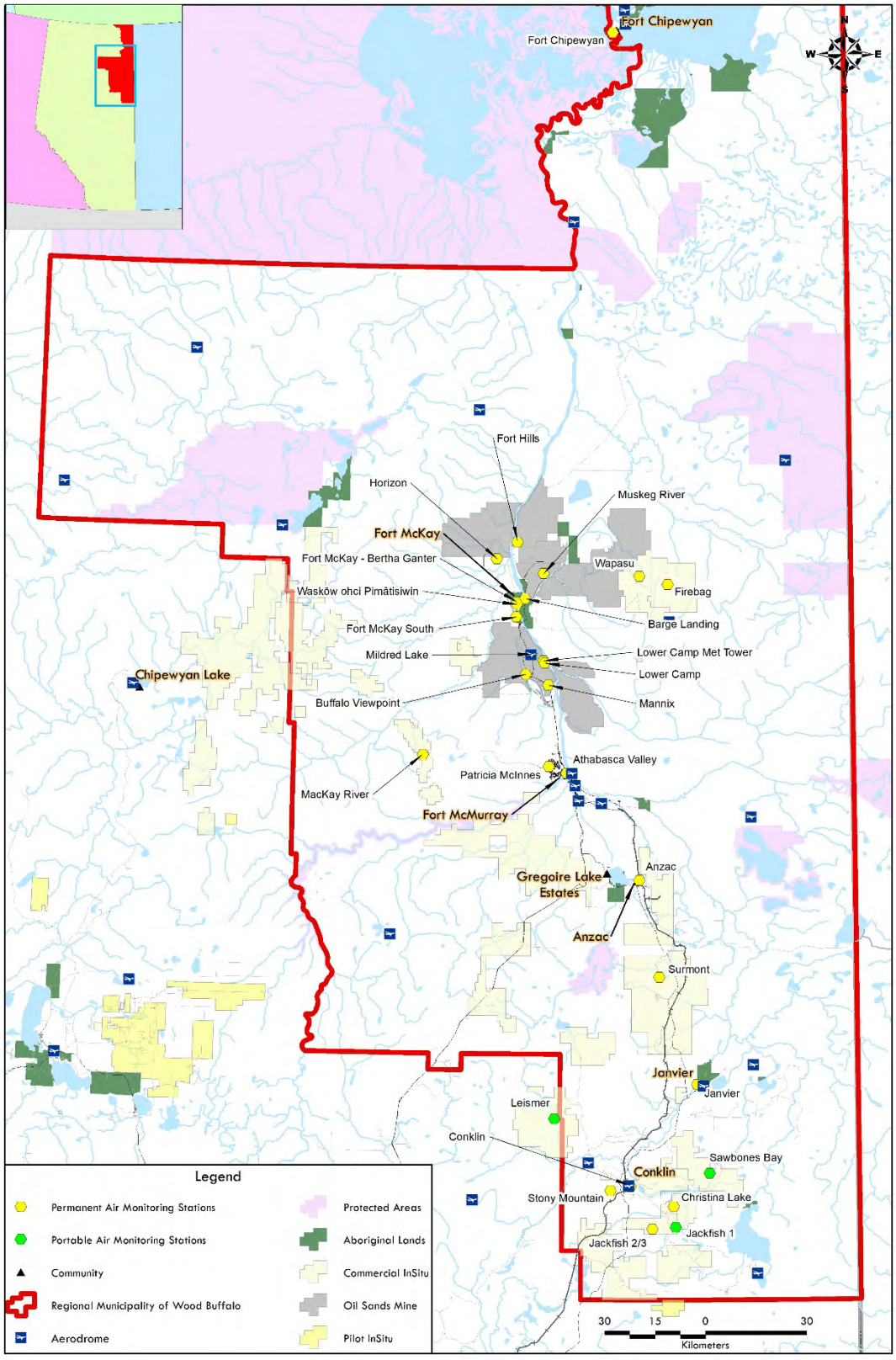


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 501
Station name	Leismer
Date station established	May 2013

Location

Station street address	NA
Legal land description	4-01-079-10 W4
Latitude	55.81294255
Longitude	-111.44054535
UTM East	472392
UTM North	6185349
Nearest community	Conklin
Community population	185

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Athabasca Oil Corporation
Approval number	289664-00-00; 241311-00-00
Contact Name	Dawn Fark
Address	NA
Phone number	403-817-9169
Email address	dfark@atha.com

Site Description

Land use by sector	0 – 90 degrees	Gate/ Main road
	91 – 180 degrees	Road/ Trees
	181 – 270 degrees	Trees
	271 – 360 degrees	Trees/laydown yard
Site elevation (above sea level)		
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	NA
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
SAGD operations	100 m	Athabasca Oil SAGD operations

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
Roadway	Medium	15 m	Main road access into SAGD plant

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
Atha Oil corp.	SAGD	37,500 – 40,000 boe/d	100 m	West

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Instruments	43i	1160290011	2018
Hydrogen Sulfide	WBEA	Teledyne/API	T101	197	2018
Oxides of Nitrogen	WBEA	Thermo Instruments	42i	1218153356	2018
Temperature/RH	WBEA	Vaisala	HMP155	N2910504	2018
Wind speed	WBEA	Met One	010C-1	Y4520	2018
Wind direction	WBEA	Met One	020C-1	G3858	2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9035
Zero air generator	Zero Air Generator	Teledyne/API	701	196
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB1315940
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	622

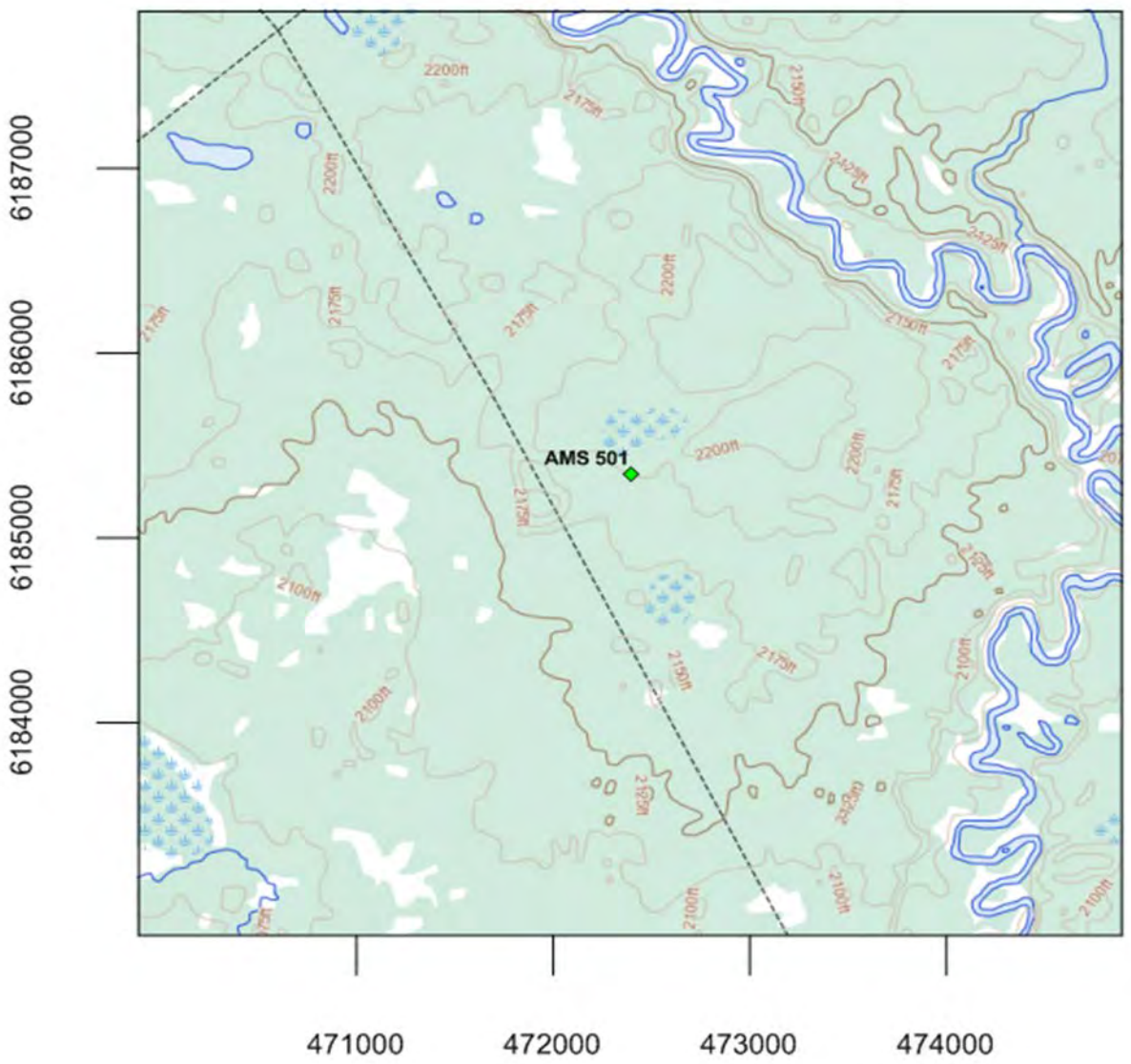
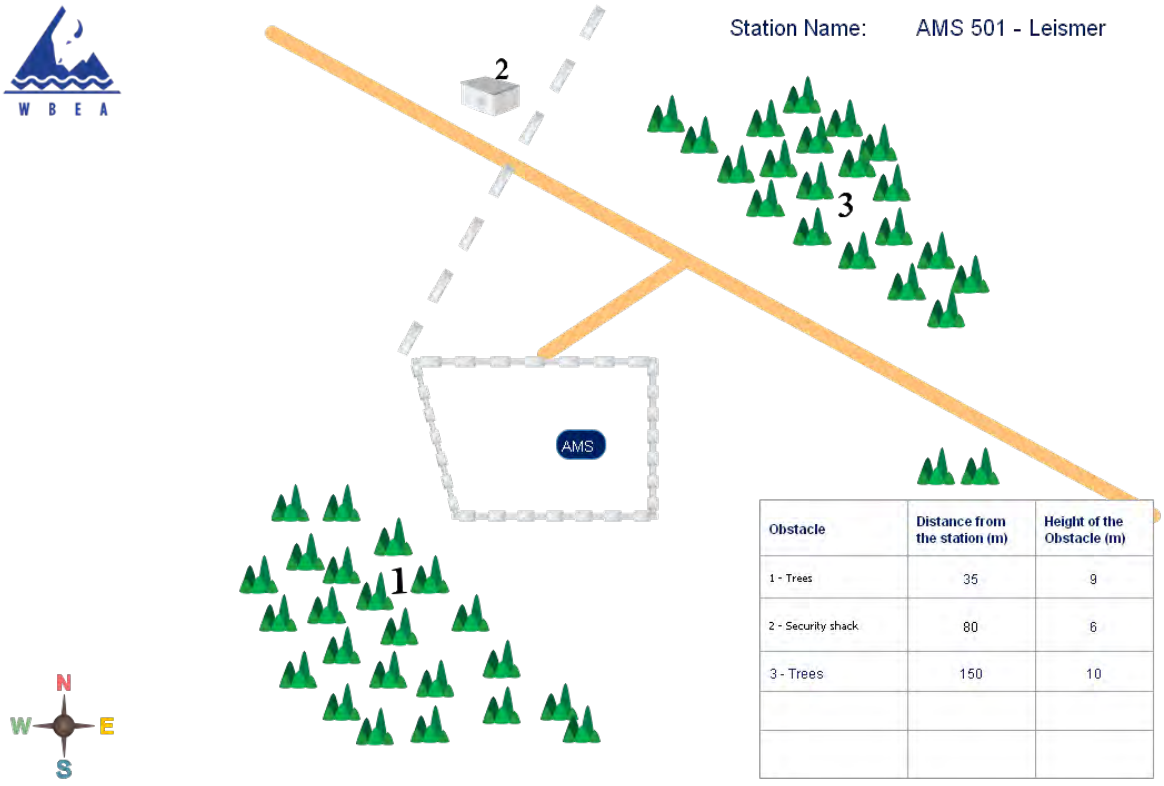


Figure 2.0 – Area Topographic map showing AMS 501



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 - Trees	35	9
2 - Security shack	80	6
3 - Trees	150	10

Figure 3.0 – Plan view sketch for AMS 501 site



Figure 4.0 – Aerial photo showing AMS 501

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

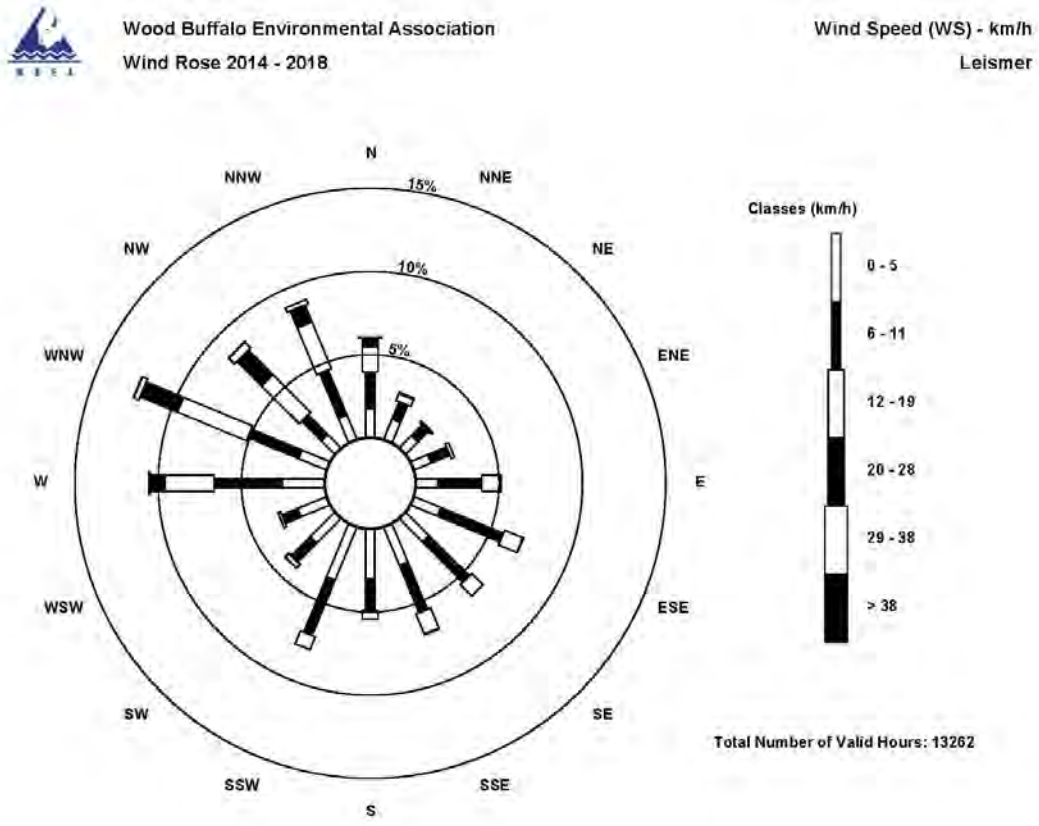


Figure 7.0 – Windrose (2014-2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Sawbones Bay

LAST UPDATED: 03-05-2019

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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 25 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, $PM_{2.5}$, 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.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_X$	O_3	$PM_{2.5}$	TRS	H_2S	THC	CH_4/ NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X	X	X						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

Table 1.0 - Pollutant Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	Temperature	RH	BP	Wind Speed	Wind Direction	Vertical Wind Speed	Solar Rad	Precip	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	COMPLIANCE/ COMMUNITY	FORT CHIPEWYAN	X	X		X	X		X	X	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

Table 1.1 – Meteorological Parameters monitored in the WBEA network

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

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

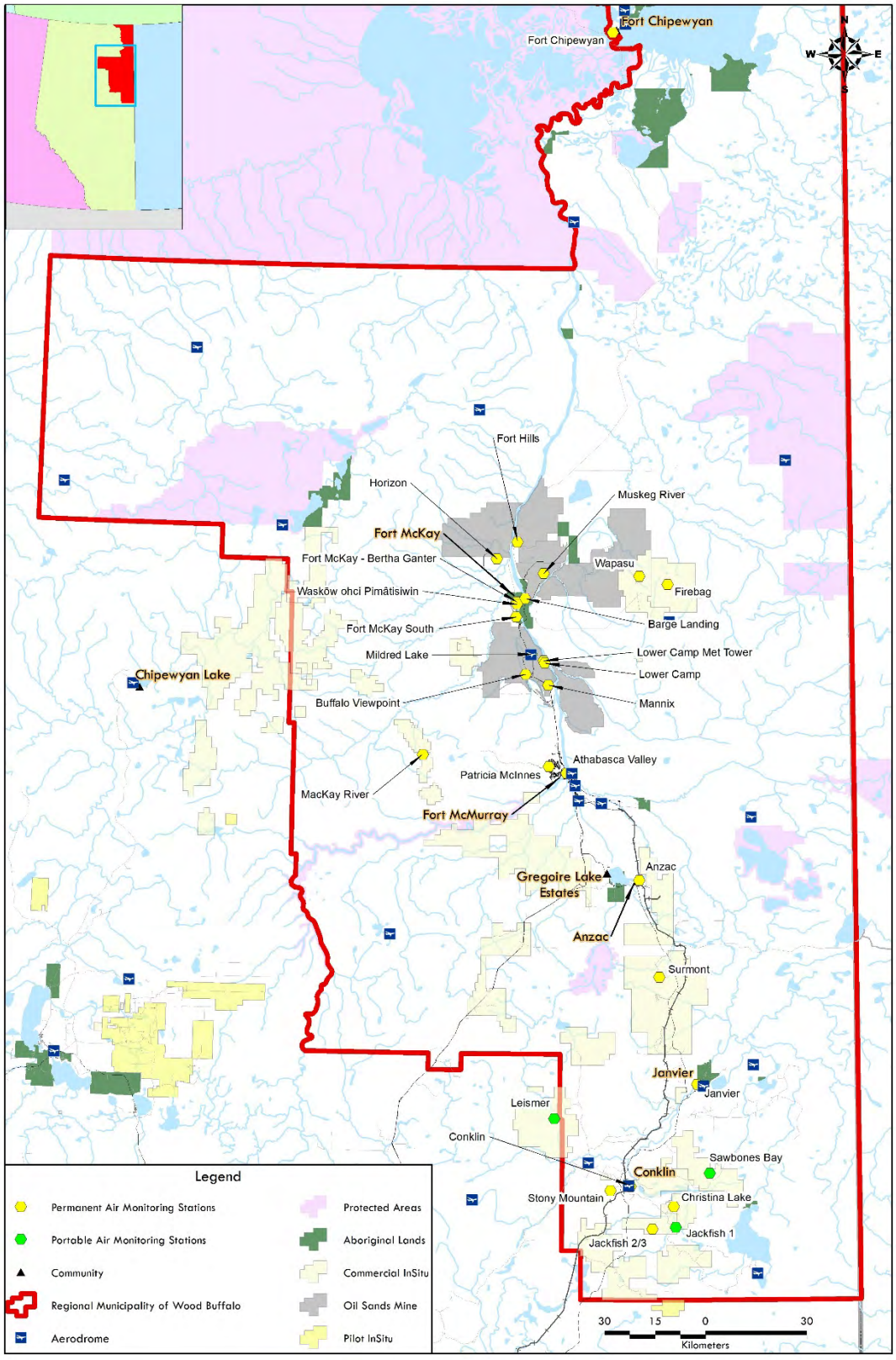


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 505
Station name	Sawbones Bay
Date station established	July 1, 2017

Location

Station street address	Station located in laydown yard at Christina Lake facility
Legal land description	1-16-77-5 W4
Latitude	55.667847
Longitude	-110.705711
UTM East	518511
UTM North	6169152
Nearest community	Conklin
Community population	185

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	MEG Energy Corp.
Approval number	00216466-01-00
Contact Name	Bryan Wilson
Address	NA
Phone number	403-629-0853
Email address	Bryan.wilson@megenergy.com

Site Description

Land use by sector	0 – 90 degrees	Forest
	91 – 180 degrees	Forest
	181 – 270 degrees	SAGD operations
	271 – 360 degrees	Forest
Site elevation (above sea level)	471	
Angle of elevation to nearby buildings	Greatest angle	0
	Building direction	None
Airflow restrictions	North	None
	East	None
	South	None
	West	None
Sample manifold	Type	All glass
	Inlet height above roof	1 metre
	Type	Cup and vane

Meteorological Sensors	Height above ground	10 m
	Distance from station	0 m

Site Influences

Localized Sources (within 20 metres of station)

Type	Distance (m)	Description
SAGD Operations	2 Km W	MEG Energy operations
Laydown yard	500 m S	Heavy equipment

Roadway Influences

Type	Traffic Volume	Distance (m)	Description
roadway	low	100	Gravel access road
roadway	low	500	Gravel access road

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (km)	Compass direction from site
MEG Christina Lake	SAGD operations	100,000 barrels per day	2 Km	West

Analytical Equipment

Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Scientific	43i	710321323	July 2017
Hydrogen Sulfide	WBEA	Thermo Scientific	450i	922436966	July 2017
Oxides of Nitrogen	WBEA	Thermo Scientific	42i	1152430008	July 2017
Total Hydrocarbons	WBEA	Thermo Scientific	51i	1327059297	July 2017
Temperature/RH	WBEA	Vaisala	HMP155	NA	July 2017
Wind speed	WBEA	Met One	010C-1	P10040	July 2017
Wind direction	WBEA	Met One	020C-1	R14655	July 2017

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	6894
Zero air generator	Zero Air Generator	Teledyne/API	701	4428
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	621
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	NA
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB1315941

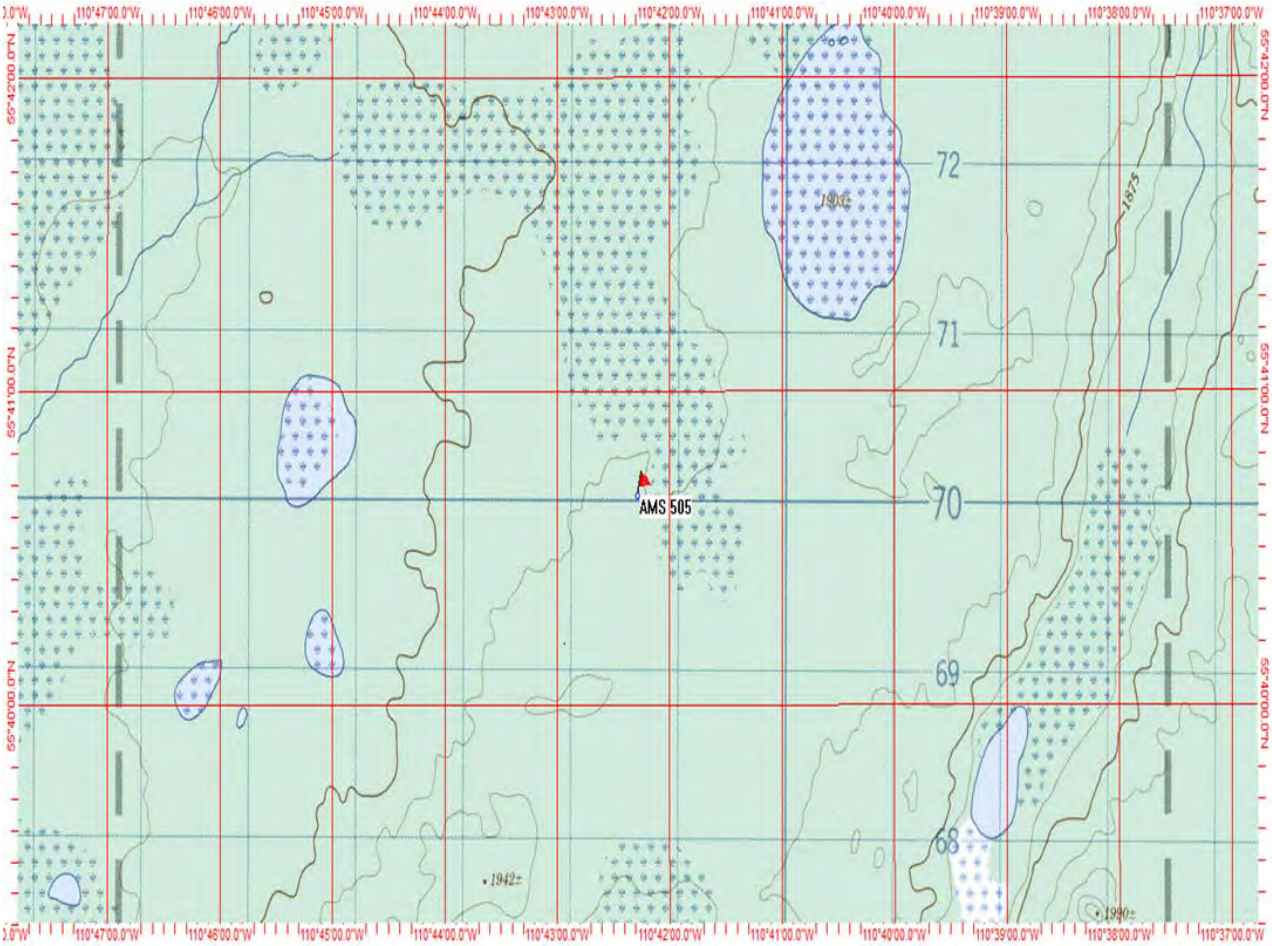
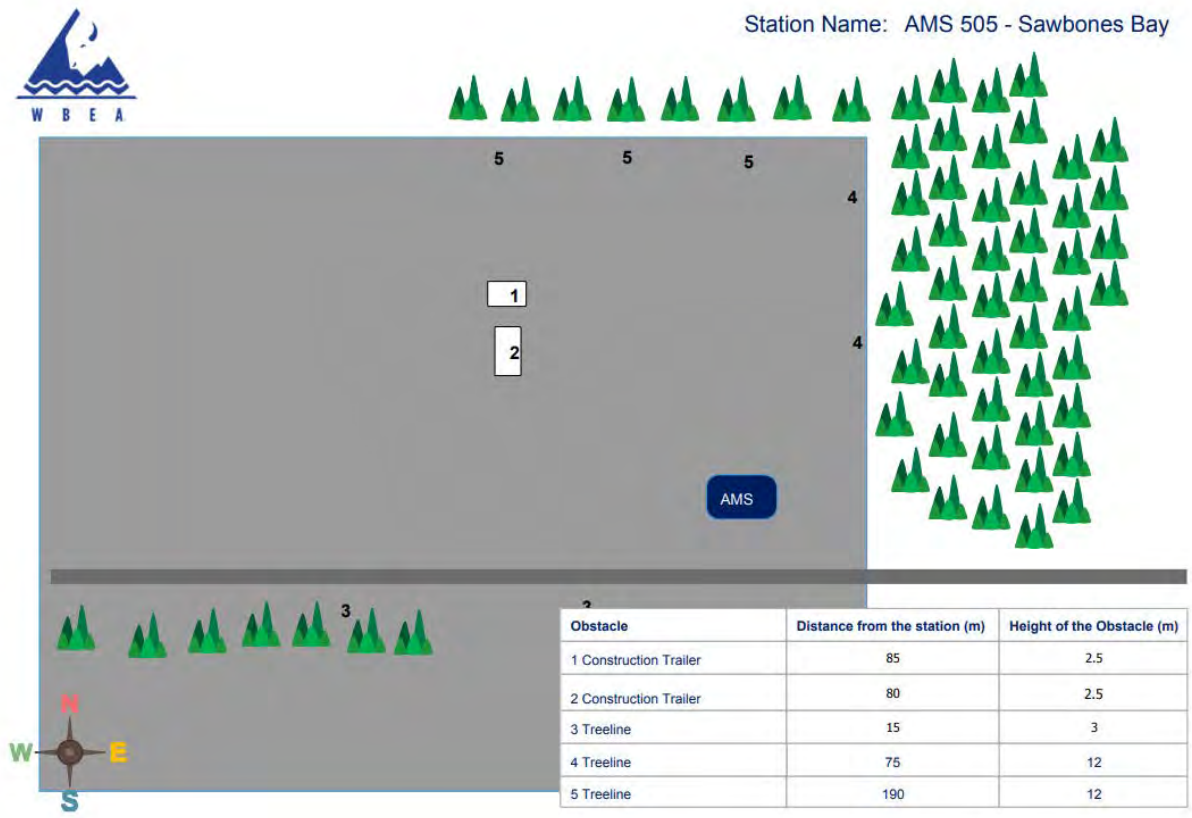


Figure 2.0 – Area Topographic map showing AMS 505



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Construction Trailer	85	2.5
2 Construction Trailer	80	2.5
3 Treeline	15	3
4 Treeline	75	12
5 Treeline	190	12

Figure 3.0 – Plan view sketch for AMS 505 site



Figure 4.0 – Aerial photo showing AMS 505

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

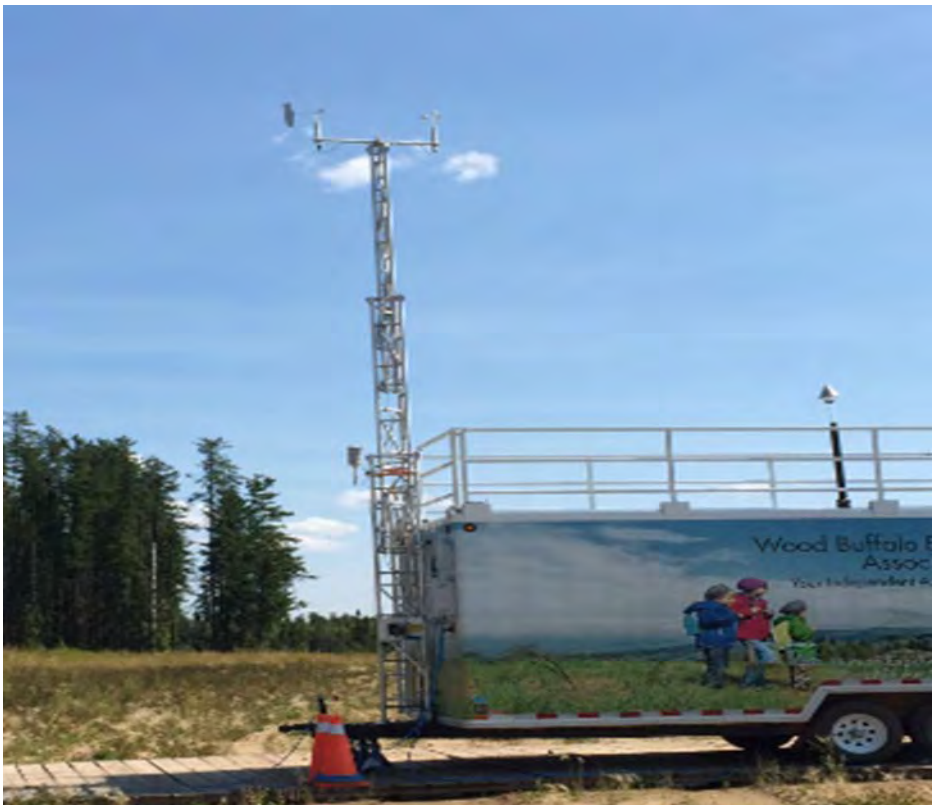


Figure 5.4 – Meteorological Tower

Station Photos

The following photos show the monitoring station and instrumentation.

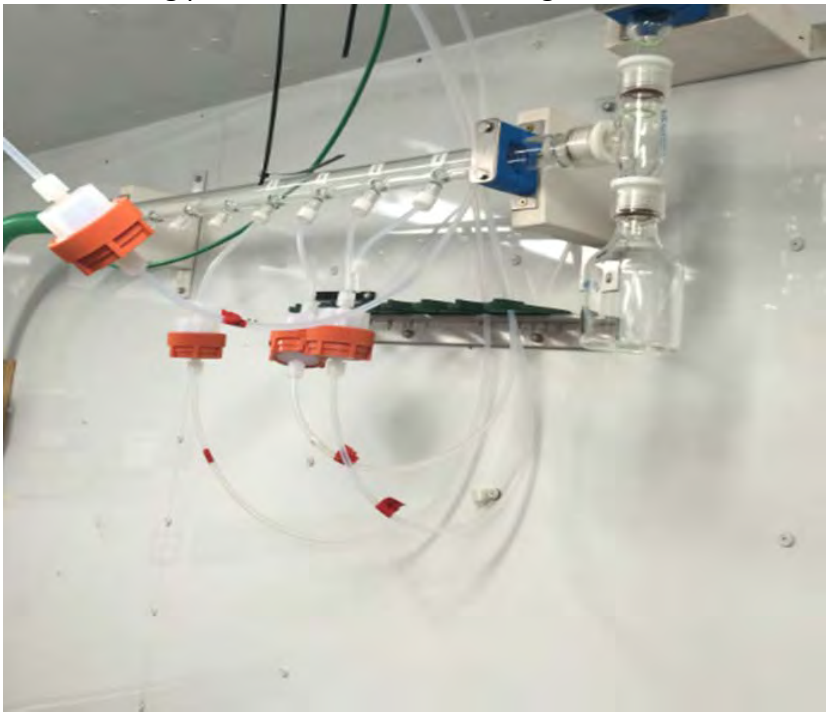


Figure 6.0 – Photo showing the inlet and sample manifold



Figure 6.1 – Curb shot of the monitoring station



Figure 6.2 –Photo of front and back of instrument rack

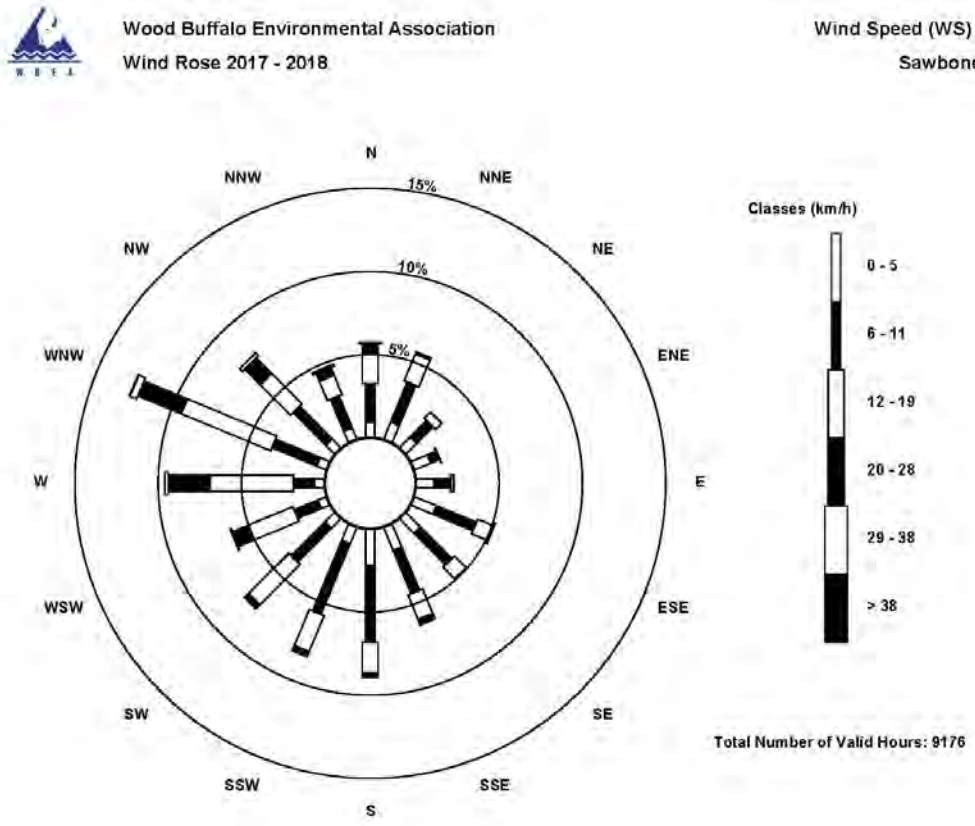


Figure 7.0 – Windrose (2018)

Wood Buffalo Environmental Association

Ambient Air Monitoring Station Site Documentation

Jackfish 1

LAST UPDATED: 03-04-2019

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WBEA Monitoring Network

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Table 1 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), and carbon monoxide (CO). Sites are categorized as industrial or community, based on the setting in which they are located.

Table 1: Summary of stations and parameters measured continuously at WBEA sites.

WBEA ID	TYPE	STATION NAME	SO_2	$NO/NO_2/NO_x$	O_3	$PM_{2.5}$	TRS	H_2S	THC	Methane NMHC	CO	NH_3
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X		X	X		X
2	COMPLIANCE	MILDRED LAKE	X					X	X			
3	METEOROLOGICAL	LOWER CAMP MET TOWER										
4	COMPLIANCE	BUFFALO VIEWPOINT*	X	X	X	X		X	X			
5	COMPLIANCE/ METEOROLOGICAL	MANNIX	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						
9	ATTRIBUTION	BARGE LANDING					X		X			
11	COMPLIANCE	LOWER CAMP	X					X	X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH	X	X	X	X	X		X			
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X	X	X	X		X	X		
15	COMPLIANCE	HORIZON	X	X		X	X		X			
17	COMPLIANCE	WAPASU*	X	X	X	X		X	X			
18	ENHANCED DEPOSITION/ 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			
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			
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X				X				

* Also functions as an enhanced deposition station.

Table 2 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.

Table 2: Summary of stations and meteorological parameters measured continuously at WBEA sites.

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	X
9	ATTRIBUTION	BARGE LANDING	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	X
15	COMPLIANCE	HORIZON	X	X		X	X		X	X	
17	COMPLIANCE	WAPASU*	X	X		X	X			X	
18	ENHANCED DEPOSITION/ 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				
24	COMPLIANCE	SURMONT	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				
506	COMPLIANCE	JACKFISH 1	X	X		X	X				

* Also functions as an enhanced deposition station.
y Monitoring data used for research and development purposes only.

Table 3 provides a listing of stations and air quality parameters measured by integrated methods. Parameters measured include volatile organic compounds (VOC) and reduced sulphur compounds (RSC), 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), dichotomous samples, speciated denuder sampler (SASS), and precipitation samples.

Table 3: Summary of parameters measured using integrated methods at WBEA sites

WBEA ID	TYPE	STATION NAME	VOC	$PM_{2.5}$ Mass, Metals and Ions	$PM_{2.5}$ ECOC	PM_{10} Mass, Metals and Ions	PAH	DICHOT	SASS	PRECIP
1	COMMUNITY	BERTHA GANTER-FORT MCKAY*	X	X	X	X	X	X	X	X
4	COMPLIANCE	BUFFALO VIEWPOINT*	X				X	X	X	
6	COMMUNITY	PATRICIA MCINNES	X	X		X	X			X
7	COMMUNITY	ATHABASCA VALLEY	X	X		X	X			
9	ATTRIBUTION	BARGE LANDING	X							
11	COMPLIANCE	LOWER CAMP*		X			X			
13	COMPLIANCE/ ATTRIBUTION	FORT MCKAY SOUTH*	X			X				X
14	COMPLIANCE/ COMMUNITY	ANZAC	X	X		X	X			
15	COMPLIANCE	HORIZON	X			X				
17	COMPLIANCE	WAPASU*					X	X		
18	ENHANCED DEPOSITION/ BACKGROUND	STONY MOUNTAIN*	X				X	X	X	
22	COMMUNITY	JANVIER	X							

* Also functions as an enhanced deposition station.

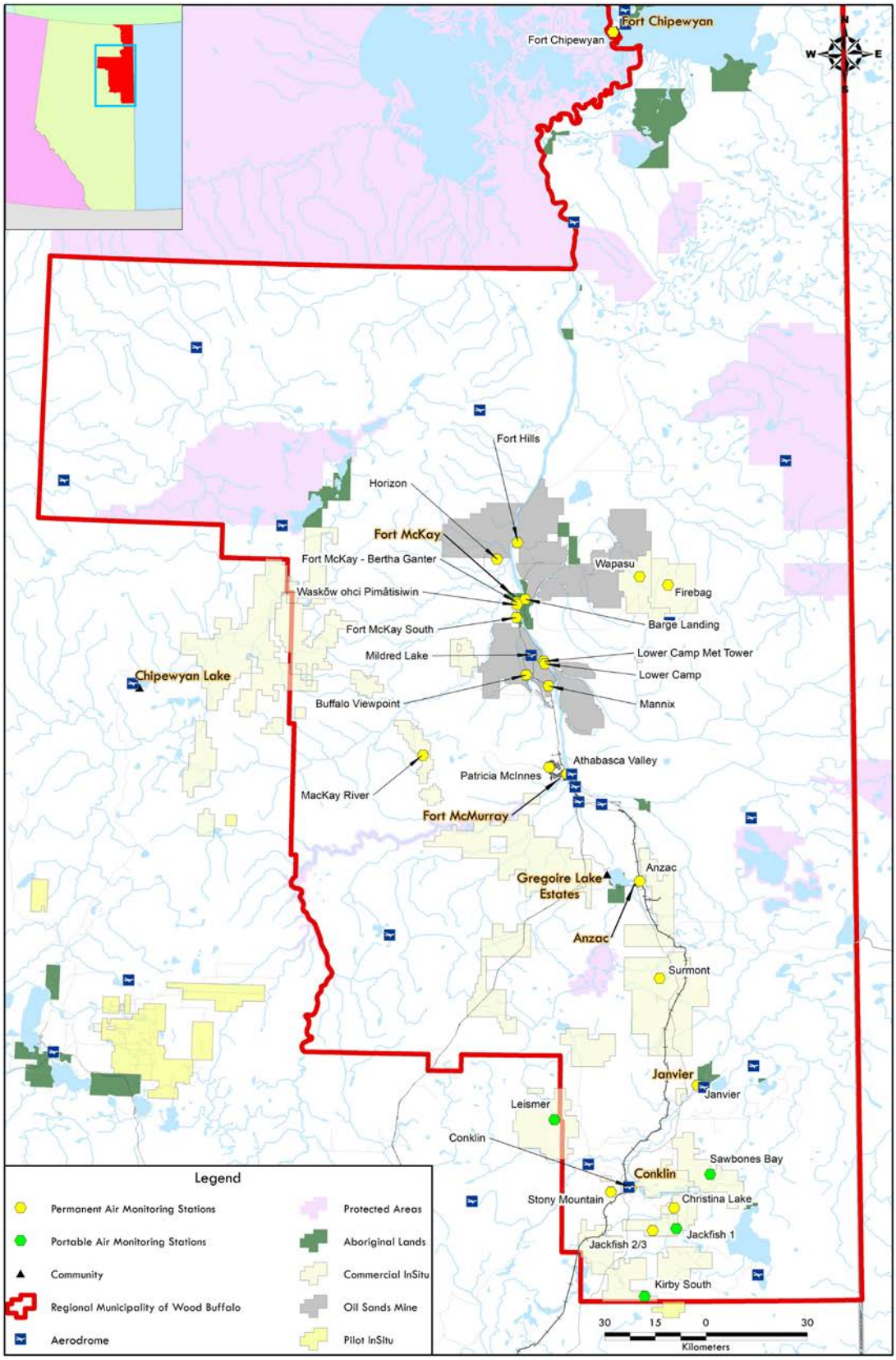


Figure 1.0 – WBEA Network Monitoring Sites

General Site Information

Station

Station ID	AMS 506
Station name	Jackfish 1
Date station established	Aug 16, 2018

Location

Station street address	Located SE of Jackfish construction camp
Legal land description	8-28-75-6-W4
Latitude	55.523816
Longitude	-110.865345
UTM East	508501.10
UTM North	6153091.90
Nearest community	Conklin
Community population	185

Owner/Operator/Approval Holder

Operating Agency	Wood Buffalo Environmental Association
Name of Approval Holder	Devon Canada Corporation
Approval number	224816-00-00
Contact Name	Garett White
Address	333 West Sheridan Avenue Oklahoma City, Oklahoma 73102-5015
Phone number	(780) 799-1889
Email address	Garett.white@dvn.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)	620m	
Angle of elevation to nearby buildings	Greatest angle	28 degrees
	Trees direction	West
Airflow restrictions	North	No
	East	No
	South	Trees
	West	Trees
Sample manifold	Type	All glass
	Inlet height above roof	1 meter
	Type	Cup and vane

Meteorological Sensors	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	Low	20	Used by site workers

Major Point Sources

Facility Name	Source Type	Production Capacity	Distance from site (m)	Compass direction from site
Devon Energy	SAGD Plant		400	N

Analytical Equipment

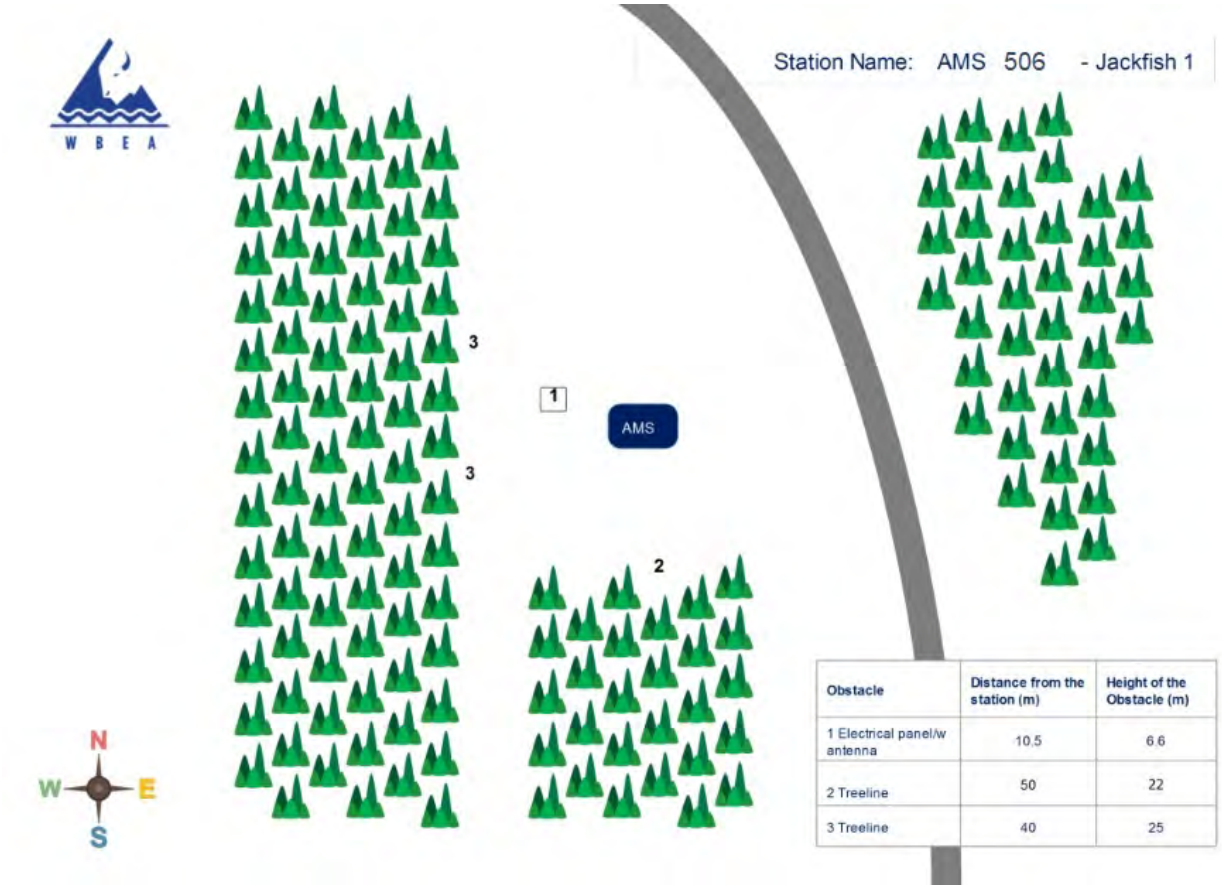
Parameter	Owner	Make	Model	Serial Number	Date Installed
Sulfur Dioxide	WBEA	Thermo Instruments	43i	1160290011	08/17/2018
Hydrogen Sulfide	WBEA	API	T101	197	08/17/2018
Oxides of Nitrogen	WBEA	Thermo Instruments	42i	1218153356	08/17/2018
Temperature/RH	WBEA	Vaisala	HMP155	J3310031	08/17/2018
Wind speed	WBEA	Met One	010C-1	Y4520	08/17/2018
Wind direction	WBEA	Met One	020C-1	G3858	08/17/2018

Support Equipment

Name	Description	Make	Model	Serial Number
Datalogger	Datalogger	Campbell Scientific	CR3000	9035
Zero air generator	Zero Air Generator	Teledyne/API	701	196
HVAC	Heating and air conditioning system. Wall mount unit	BARD	1 ton	
Shelter / Building	Air monitoring portable	ITB	8 x 16 trailer	ITB1315940
Gas Dilution Calibrator	Mass flow controlled gas dilution	Teledyne/API	T700	622



Figure 2.0 – Area Topographic map showing AMS 506



Obstacle	Distance from the station (m)	Height of the Obstacle (m)
1 Electrical panel/w antenna	10.5	6.6
2 Treeline	50	22
3 Treeline	40	25

Figure 3.0 – Plan view sketch for AMS 506 site



Figure 4.0 – Aerial photo showing AMS 506

Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environ Looking North



Figure 5.1 – Environ Looking East

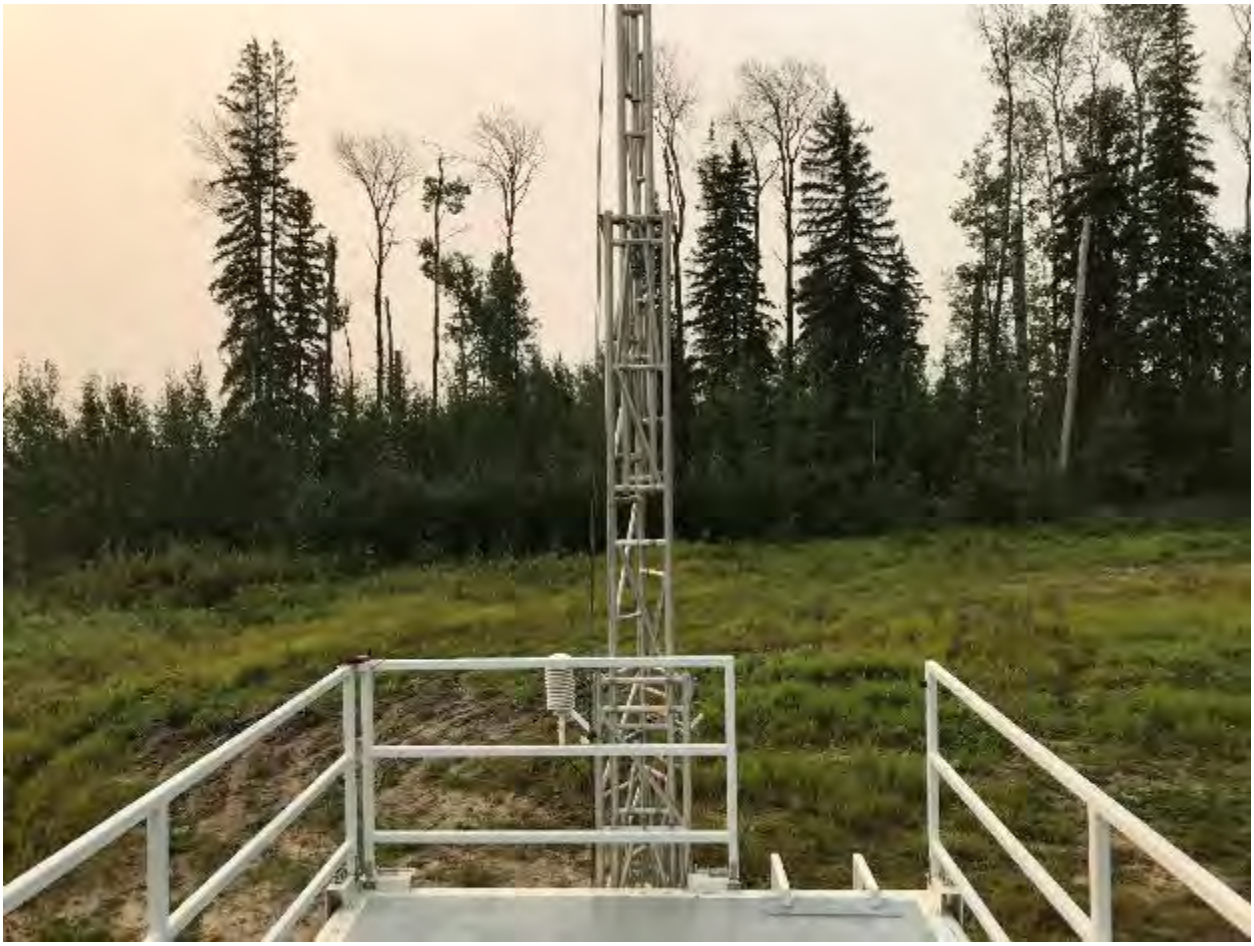


Figure 5.2 – Environ looking South



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

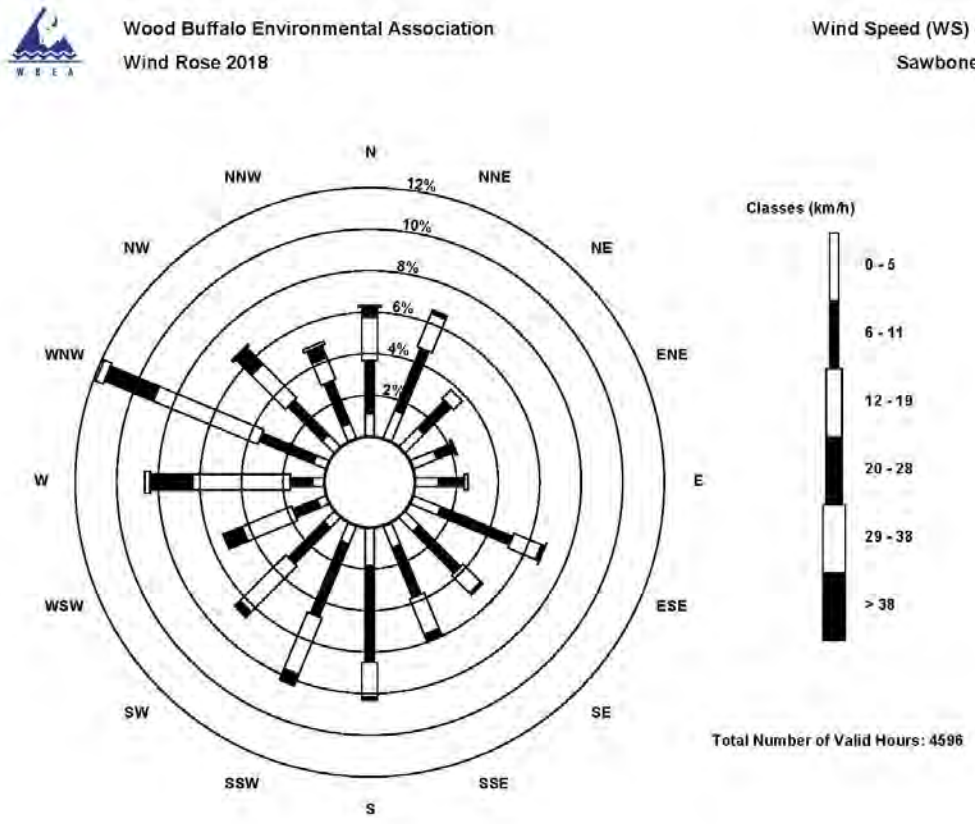


Figure 7.0 – Windrose (2018)



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