



Wood Buffalo Environmental Association
Ambient Air Monitoring Station
Site Documentation

Kirby South

LAST UPDATED: 02-28-2022



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WBEA Monitoring Network

Vision

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

Mission

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

Continuous ambient air quality and meteorological data are collected under the Ambient Air Monitoring (AAM) group in WBEA. The WBEA currently operates 29 permanent continuous monitoring stations, each measuring various air quality parameters. The continuously measured air quality parameters include Sulphur Dioxide (SO₂), Hydrogen Sulfide (H₂S), Total Reduced Sulphur (TRS), Ozone (O₃), Total Oxides of Nitrogen (NO_x), Nitric Oxide (NO), Nitrogen Dioxide (NO₂), Ammonia (NH₃), Carbon Monoxide (CO), Carbon Dioxide (CO₂), Particulate Matter less than 2.5µm (PM_{2.5}), Total Hydrocarbon (THC), Total and Non-Methane Hydrocarbon (NMHC). All sites also measure ambient air temperature (AT), wind speed (WS), wind direction (WD), and relative humidity (RH). Selected sites measure barometric pressure (BP), global radiation (GR), precipitation (PC), leaf wetness (LW), vertical wind speed (VWS), vertical temperature gradient (VTG) and visibility (VS). 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 SO₂, H₂S, NO_x, NO, NO₂, THC, WS, WD, AT, RH. 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}, PM₁₀, VOC and PAH. The sampling for time-integrated monitoring has evolved with a better understanding of technology, analytical laboratory methods and sample deployment and collection methods. In 2015, the WBEA moved to duplicate sampling for the PM₁₀ and PM_{2.5} time integrated parameters for 2 reasons; (1) to have duplicate mass measurements for QA purposes, (2) to have separate filters for subsequent metals and ion analysis. Elemental and Organic Carbon (ECOC) sampling began on August 7, 2012 at the Bertha Ganter site. ECOC was added and the Wapasu and Stony Mountain sites on May 1, 2018. All time-integrated samples in the WBEA ambient air monitoring network are collected on the National Air Pollution Surveillance (NAPS) schedule every 6 days for a 24-hour period.

The WBEA also collects precipitation samples for chemistry analysis through the National Atmospheric Deposition Program (NADP) at here site. These samples are collected every Tuesday at 12:00

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



Table 1.0 provides a listing of stations with their names and corresponding WBEA identification number and the air quality parameters measured by continuous methods at each site. Parameters measured include hydrogen sulphide (H₂S), total reduced sulphur (TRS), sulphur dioxide (SO₂), nitrogen dioxide (NO₂), total hydrocarbons (THC), methane (CH₄), non-methane hydrocarbons (NMHC), ammonia (NH₃), carbon monoxide (CO), and carbon dioxide (CO₂). Sites are categorized as industrial or community, based on the setting in which they are located.

| WBEA ID | TYPE | STATION NAME | SO ₂ | NO ₂ | O ₃ | PM _{2.5} | TRS | H ₂ S | THC | NMHC | CO | CO ₂ | NH ₃ |
|---------|-------------------------------|----------------------------|-----------------|-----------------|----------------|-------------------|-----|------------------|-----|------|----|-----------------|-----------------|
| 1 | COMMUNITY | BERTHA GANTER-FORT MCKAY | X | X | X | X | X | X | X | X | X | X | X |
| 2 | COMPLIANCE | MILDRED LAKE | X | | | | | X | X | X | | | |
| 3 | METEOROLOGICAL | LOWER CAMP MET TOWER | | | | | | | | | | | |
| 4 | COMPLIANCE | BUFFALO VIEWPOINT | X | X | X | X | | X | X | X | | | |
| 5 | COMPLIANCE/ METEOROLOGICAL | MANNIX | X | | | | | X | X | X | | | |
| 6 | COMMUNITY | PATRICIA MCINNES | X | X | X | X | X | | X | X | | | X |
| 7 | COMMUNITY | ATHABASCA VALLEY | X | X | X | X | X | | X | X | X | | |
| 8 | COMMUNITY/ COMPLIANCE | FORT CHIPEWYAN | X | X | X | X | | | | | X | X | |
| 9 | ATTRIBUTION | BARGE LANDING | X | X | | X | X | | X | X | | | |
| 11 | COMPLIANCE | LOWER CAMP | X | | | | | X | X | X | | | |
| 13 | COMPLIANCE/ ATTRIBUTION | FORT MCKAY SOUTH | X | X | X | X | X | | X | X | | | |
| 14 | COMPLIANCE/ COMMUNITY | ANZAC | X | X | X | X | X | | X | X | | | |
| 17 | COMPLIANCE | WAPASU | X | X | X | X | | X | X | | | | |
| 18 | BACKGROUND | STONY MOUNTAIN | X | X | X | X | X | | X | X | X | X | |
| 19 | COMPLIANCE | FIREBAG | X | X | | | | X | X | | | | |
| 20 | COMPLIANCE | MACKAY RIVER | X | X | | | | X | X | | | | |
| 21 | COMMUNITY | CONKLIN | X | X | X | X | X | | X | X | | | |
| 22 | COMMUNITY | JANVIER | X | X | X | X | X | | X | X | | | |
| 23 | COMPLIANCE | FORT HILLS | X | X | | X | X | | X | X | | | |
| 25 | EMERGENCY RESPONSE | WASKOW OHCI PIMATISIWIN | X | | | | | X | | | | | |
| 26 | COMPLIANCE | CHRISTINA LAKE | X | X | | | | X | | | | | |
| 27 | COMPLIANCE | JACKFISH 2/3 | X | X | | | | X | | | | | |
| 29 | COMPLIANCE | SURMONT 2 | X | X | | X | | X | X | | | | |
| 30 | COMPLIANCE | ELLS RIVER | X | X | | X | X | | X | X | | | |
| 501 | COMPLIANCE | LEISMER | X | X | | | | X | | | | | |
| 505 | COMPLIANCE | SAWBONES BAY | X | X | | | | X | | | | | |
| 506 | COMPLIANCE | JACKFISH 1 | X | X | | | | X | | | | | |
| 507 | COMPLIANCE | KIRBY SOUTH | X | X | | | | X | X | | | | |
| 508 | COMPLIANCE | KIRBY NORTH | X | X | | | | X | X | | | | |

Table 1.0 - Pollutant Parameters monitored in the WBEA network



Table 1.1 provides a listing of stations and meteorological parameters measured by continuous methods. Parameters measured include ambient temperature, relative humidity, wind speed, wind direction, vertical wind speed, solar radiation, precipitation, and leaf wetness

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

Table 1.1 – Meteorological Parameters monitored in the WBEA network

Table 1.2 provides a listing of stations and air quality parameters measured by time integrated methods. Parameters measured include volatile organic compounds (VOC), particulate matter less than 2.5 µm aerodynamic diameter (PM_{2.5}) and associated metals and ions, particulate matter less than 10 µm aerodynamic diameter (PM₁₀) and associated metals and ions, polycyclic aromatic hydrocarbons (PAH), and precipitation samples.

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

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



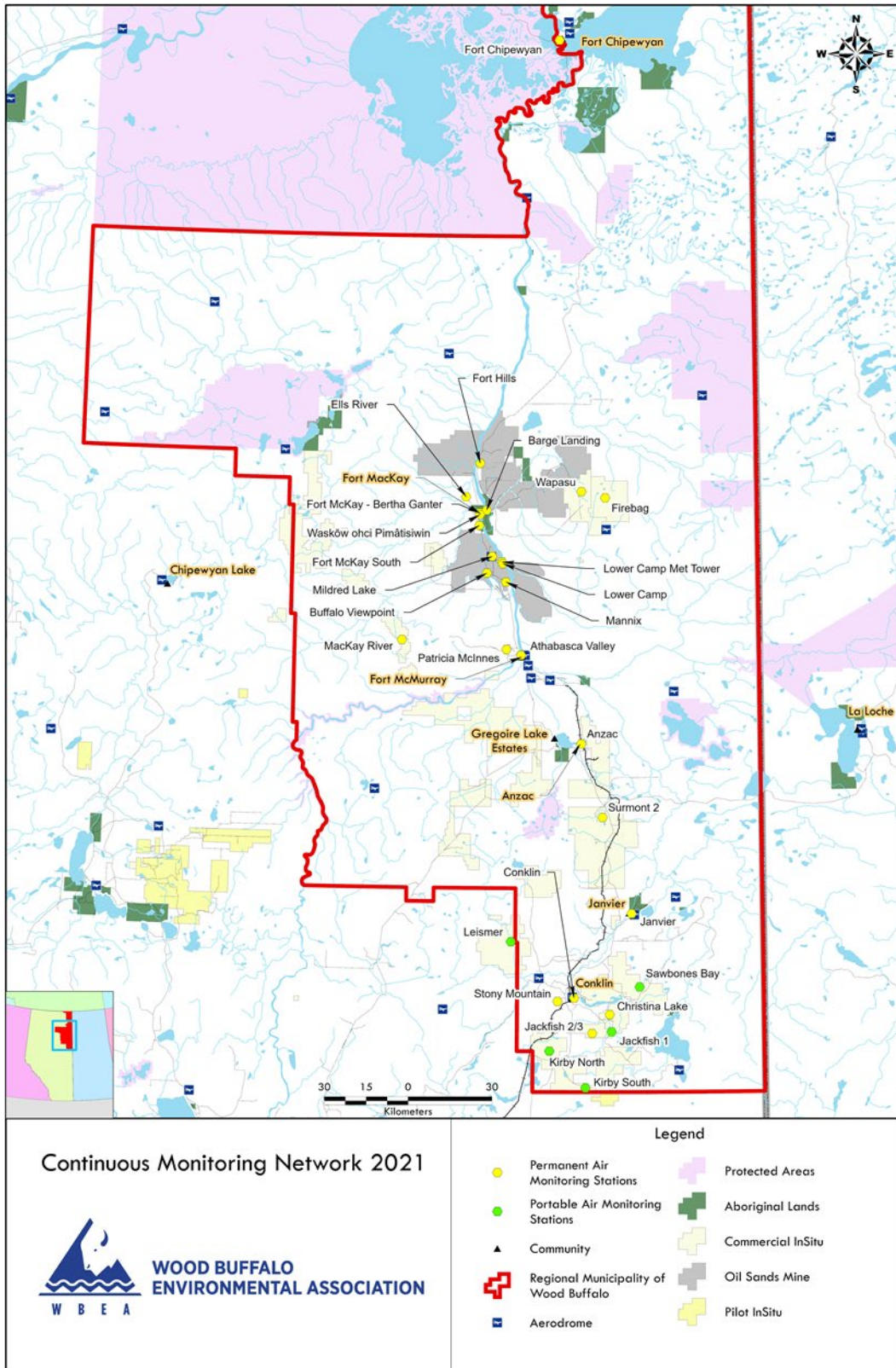


Figure 1.0 – WBEA Network Monitoring Sites



General Site Information

Station

| | |
|--------------------------|--------------|
| Station ID | AMS 507 |
| Station name | Kirby South |
| Date station established | July 1, 2021 |

Location

| | |
|------------------------|----------------------------------------|
| Station street address | G-Pad |
| Legal land description | 15-21-73-7-W4 |
| Airshed Zone | Wood Buffalo Environmental Association |
| Latitude | 55.3437334 |
| Longitude | -111.0139229 |
| UTM East | 499117.19 |
| UTM North | 6133043.08 |
| Nearest community | Conklin |
| Community population | 229 |
| Census Year | 2018 |

Owner/Operator/Approval Holder

| | |
|-----------------------------|------------------------------------------------------------|
| Operating Agency | Wood Buffalo Environmental Association |
| Address of Operating Agency | Unit 3, 805 Memorial Drive, Fort McMurray, Alberta T9K 0K4 |
| Name of Approval Holder | Canadian Natural Resources Ltd. |
| Approval number | 20809-02-00 |
| Contact Name | Shawn Milligan |
| Address | 2100, 855 – 2 st SW. Calgary, AB T2P 4J8 |
| Phone number | 403-896-3109 |
| Email address | shawn.milligan@cnrl.com |

Site Description

| | | |
|----------------------------------------|--------------------|----------------|
| Land use by sector | 0 – 90 degrees | SAGD Operation |
| | 91 – 180 degrees | SAGD Operation |
| | 181 – 270 degrees | SAGD Operation |
| | 271 – 360 degrees | SAGD Operation |
| Site elevation (above sea level) | 730m | |
| Angle of elevation to nearby buildings | Greatest angle | N/A |
| | Building direction | None |
| Airflow restrictions | North | None |
| | East | None |
| | South | None |



| | | |
|-------------------------------|-------------------------|--------------|
| | West | None |
| Distance to nearest trees (m) | North | 250 |
| | East | 100 |
| | West | None |
| | South | 100 |
| Sample manifold | Type | All glass |
| | Inlet height above roof | 1 metre |
| Meteorological Sensors | Type | Cup and vane |
| | Height above ground | 10 metres |
| | Distance from station | 0 metre |

Site Influences

Localized Sources (within 20 metres of station)

| Type | Distance (m) | Description |
|----------------|--------------|--------------|
| SAGD Operation | 25 | SAGD Oil Pad |
| | | |
| | | |
| | | |

Roadway Influences

| Type | Traffic Volume | Distance (m) | Description |
|--------------|----------------|--------------|----------------------------------|
| Site Roadway | Low | 200m | Roadway used by the site workers |
| | | | |
| | | | |
| | | | |

Major Point Sources

| Facility Name | Source Type | Production Capacity | Distance from site (km) | Compass direction from site |
|---------------|-------------|---------------------|-------------------------|-----------------------------|
| Kirby South | SAGD Plant | | 0.5 | SW |
| | | | | |
| | | | | |
| | | | | |



Station Equipment

Equipment Owner: CNRL

Analytical Equipment

| Parameter | Make | Model | Serial Number | Date Installed |
|------------------|-------------------|-------|---------------|-------------------|
| SO ₂ | Thermo Scientific | 43iQ | 1182340007 | July 1, 2021 |
| H ₂ S | Teledyne/API | T101 | 158 | July 1, 2021 |
| NO ₂ | Teledyne/API | T200 | 4259 | July 1, 2021 |
| THC | Thermo Scientific | 51i | 1182340005 | September 2, 2021 |
| | | | | |
| | | | | |
| | | | | |

Meteorological Equipment

| Parameter | Make | Model | Serial Number | WMO Site Class | Date Installed |
|-----------|---------|--------|---------------|----------------|----------------|
| AT/RH | Vaisala | HMP155 | F5010010 | 4 | July 1, 2021 |
| WS | Met One | 010C-1 | X16479 | 3 | July 1, 2021 |
| WD | Met One | 020C-1 | X16495 | 3 | July 1, 2021 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Support Equipment

| Name | Description | Make | Model | Serial Number |
|-------------------------|------------------------------------------------------|---------------------|----------------|---------------|
| Datalogger | Datalogger | Campbell Scientific | CR3000 | 2372 |
| Zero air generator | Zero Air Generator | Teledyne/API | 701H | 4428 |
| HVAC | Heating and air conditioning system. Wall mount unit | BARD | 1 ton | |
| Shelter / Building | Air monitoring portable | ITB | 8 x 16 trailer | 17451-1 |
| Gas Dilution Calibrator | Mass flow controlled gas dilution | Teledyne/API | T700 | 3804 |
| | | | | |





Figure 2.0 – Area Topographic map showing AMS 507





Figure 3.0 – Aerial photo showing AMS 507



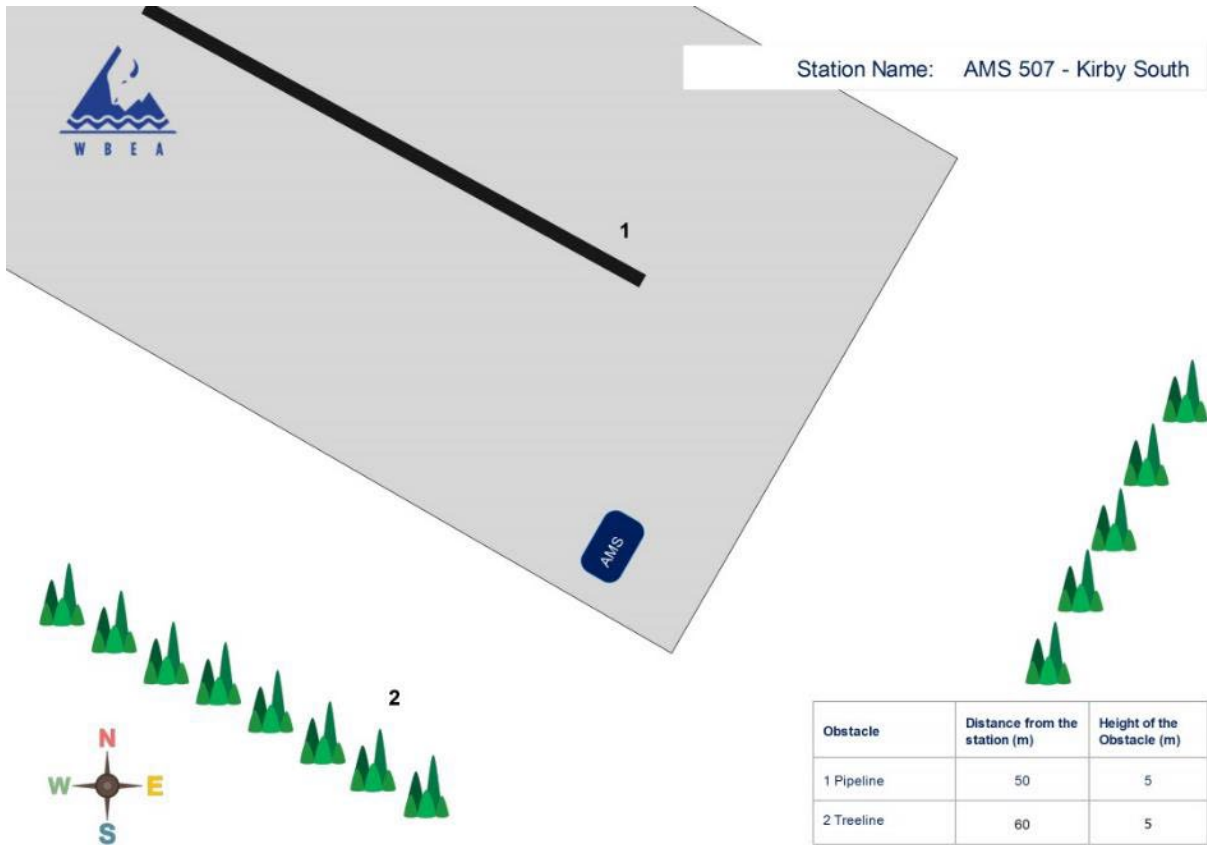


Figure 4.0 – Plan view sketch for AMS 507 site

Site photos

The following photos show the environment surrounding the monitoring station.



Figure 5.0 – Environment looking North





Figure 5.1 – Environment looking East



Figure 5.2 – Environment looking South





Figure 5.3 – Environment 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 the front and the back of instrument rack

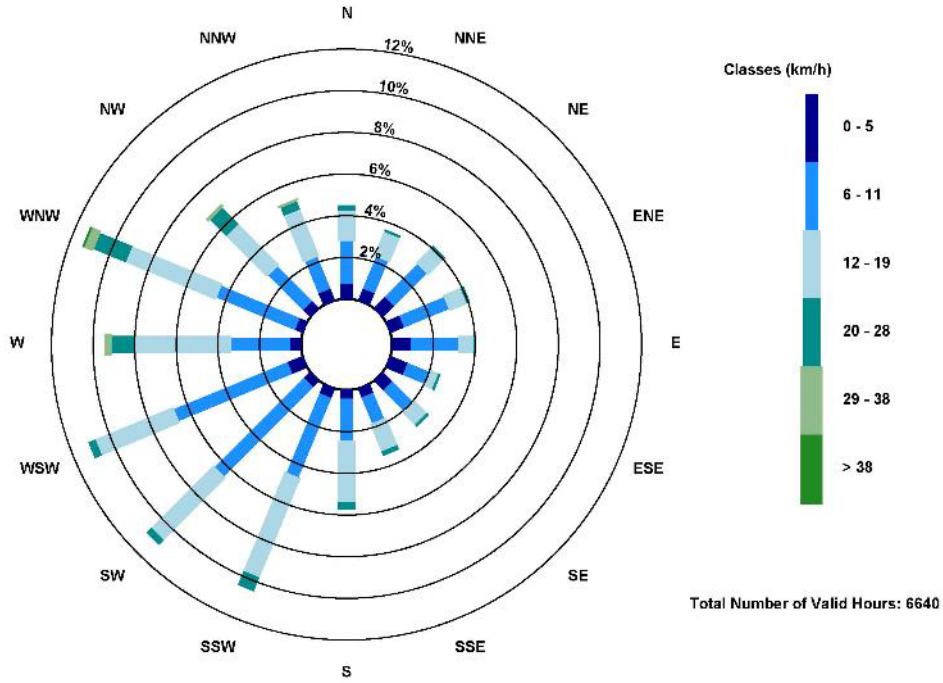


Figure 7.0 – Windrose (Five Year)

