# Appendix V4-1G

Doris North Project: 2014 Meteorology Compliance Monitoring Program

*Prepared for:*

TMAC RESOURCES

DORIS NORTH PROJECT

# 2014 Meteorology Compliance Monitoring Program

December 2014

*The world's leading sustainability consultancy*

ERM

**TMAC Resources Inc.**

# DORIS NORTH PROJECT

# 2014 Meteorology Compliance Monitoring Program

**December 2014**

Project #0246616-0002

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**ERM Rescan**
5120 49th Street, Suite 201
Yellowknife, NT
Canada X1A 1P8
T: (867) 920-2090
F: (867) 920-2015

# EXECUTIVE SUMMARY

The Doris North Project (the Project) is located on the Hope Bay Belt, an 80 by 20 km property on the south shore of Melville Sound in Nunavut. The property consists of a greenstone belt (the Hope Bay Belt) that contains three main gold deposits. The Doris and Madrid deposits are located in the northern portion of the belt, and the Boston deposit is at the southern end. The Project is located approximately 125 km southwest of Cambridge Bay (Iqaluktuttiaq) on the southern shore of Melville Sound. The nearest communities are Umingmaktok (75 km to the southwest of the property), Cambridge Bay, and Bathurst Inlet (Kingaok; 160 km to the southwest of the property).

TMAC Resources Inc. (TMAC) acquired the Hope Bay Belt Project from Newmont Corporation in March 2013. The acquisition included exploration and mineral rights over the Hope Bay Belt, including the Doris North Project and its permits, licences and authorizations for development received by previous owners. In late 2012, prior to the sale, the Project was placed into care and maintenance, and was seasonally closed during the winter of 2012/2013. TMAC re-opened the Doris North Camp in March of 2013 for the purposes of conducting site water management and environmental compliance programs and to support exploration activities that have continued through 2014. The Project remains in care and maintenance at this time.

The Doris North Project Certificate (Nunavut Impact Review Board (NIRB) No. 003, issued September 15, 2006; NIRB 2006) contains the following compliance requirements for meteorological monitoring:

- Section 4.0, Item 8. MHBL will fund and install a weather station at the mine site to collect atmospheric data, including air temperature and precipitation. The design and location of this station shall be developed in consultation with Environment Canada officials.
  - Commentary: Prior to closure and reclamation, NIRB expects MHBL to undertake consultation with appropriate agencies including INAC and EC, to discuss the possibility of the continued operation of the station, including transfer of ownership, for the collection of regional meteorological data.

At the time of project approval (2006), a permanent meteorological station (the Doris North meteorological station) was already operational in the Project area. The station's location was discussed with Environment Canada and has remained in place since 2006. Changes to the station include re-mounting sensors onto a 10 m tower in August 2009, the installation of a barometer in September 2010, and the installation of newly calibrated meteorological sensors and a CR800 data logger in October 2014.

In addition to the permanent weather station near Doris Camp, a micro-meteorology station designed to obtain evaporation data has been seasonally installed, during the late spring to early fall, in Doris Lake since 2009. The station is operated until the end of the open-water season each year and the data collected from the station is used to calculate daily evaporation rates using the Penman Combination and Preistley-Taylor methods.

This report presents the results of the 2014 Doris North Meteorology Compliance Monitoring Program and covers data collected at the Doris North meteorological and micro-meteorological stations from October 1, 2013 to September 30, 2014. During this time, the annual average temperature was -11.3ºC, with temperatures ranging from -43.0ºC to 27.0 ºC. Total annual precipitation was 104.9 mm, with the greatest monthly precipitation occurring in July (41.7 mm). However, total annual precipitation was likely underestimated because the antifreeze solution used in the winter precipitation adapter was frozen from December 2013 to May 2014 due to extreme low temperatures. The total annual number of bright sunshine hours, where average global solar radiation is greater than 120 $W/m^2$, was 2,351. Winds in the Project area typically blew from the west-northwest quadrant year round, with winds from the east and southeast also common especially during the summer. Average annual wind speed at the Doris North meteorological station was 5.8 m/s (20.9 km/h), and gusts of up to 22.0 m/s (79.3 km/h) were recorded. Total evaporation was estimated as 95.7 and 88.8 mm using the Penman Combination and Priestly-Taylor methods, respectively, from July to September 2014.

# ACKNOWLEDGEMENTS

This report was prepared for TMAC Resources Inc. by ERM Rescan. Data collection was conducted by Jem Morrison (B.Sc.) and the on-site ESR team. The report was prepared and written by Jem Morrison and technically reviewed by Derek Shaw (M.A.Sc., P.Eng.). The compliance program was coordinated by Cassie Chow (B. Eng., E.I.T) and managed by April Hayward (Ph.D.). Marc Wen (M.Sc., R.P. Bio.) was the Partner in Charge.

Field-related logistics support was provided by TMAC, Great Slave Helicopters, Braden Burry Expediting, and Nuna Logistics.

DORIS NORTH PROJECT

# 2014 Meteorology Compliance Monitoring Program

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# GLOSSARY AND ABBREVIATIONS

Terminology used in this document is defined where it is first used. The following list will assist readers who may choose to review only portions of the document.

| | |
|---|---|
| **°C** | Degrees Celsius °C |
| **$\alpha$** | Constant value in Priestly-Taylor methodology that replaces the aerodynamic component (for subarctic regions $\alpha$ = 1.26) |
| **$\gamma$** | Psychometric constant in Pa °C |
| **$\iota_V$** | Latent heat of vaporization |
| **$\rho_w$** | Water density (at 10 °C = 999.7 kg $m^{-3}$) |
| $\Delta$ | The slope of the temperature-saturated vapour pressure curve in Pa °C |
| **AES** | Atmospheric Environment Services |
| **$C_P$** | Specific heat capacity ($C_P$ of air = 1006 J $kg^{-1}$ °C) |
| **the Doris North meteorological station** | A permanent meteorological station designed to collect temperature, relative humidity, precipitation, solar radiation, barometric pressure, and wind data, installed near Doris North Camp and operational since 2006. |
| **the Doris North micro-meteorological station** | A meteorological station designed to obtain evaporation data, installed seasonally at Doris Lake since 2009. |
| **E(PC)** | Evaporation calculated using the Penman Combination methodology in mm |
| **E(PT)** | Evaporation calculated using the Priestly-Taylor methodology in mm |
| **$E_A$** | Aerodynamic component in mm/day |
| **$e_a$** | Actual vapour pressure in Pa |
| **$e_{as}$** | Saturated vapour pressure in Pa |
| **EC** | Environment Canada |
| **EC-MSC** | Environment Canada – Meteorological Services of Canada |
| **$E_R$** | Energy balance component in mm/day |
| **ERM Rescan** | ERM Consultants Canada Ltd. |
| **G** | Water heat flux |

| | |
|---|---|
| **H** | Sensible heat flux |
| **INAC** | Indian and Northern Affairs Canada |
| **J** | Joules |
| **$K_a$** | Thermal conductivity of air (at 10°C = 0.0241 W/m/ °C) |
| **kg** | Kilograms |
| **kPa** | Kilo Pascals |
| **$k_w$** | Thermal conductivity of water (at 10°C = 0.615 W/m/ °C) |
| **m** | Metres |
| **m/s** | Metres per second |
| **$m^3$** | Cubic metres |
| **masl** | Metres above sea level |
| **MHBL** | Miramar Hope Bay Limited |
| **mm** | Millimetres |
| **MSC** | Meteorological Services of Canada |
| **NIRB** | Nunavut Impact Review Board |
| **$P_A$** | Air pressure (Standard $P_A$ at sea level at 20°C = $101.3*10^3$ Pa) |
| **Pa** | Pascals |
| **PC** | Penman Combination |
| **the Program** | the 2014 Doris North Meteorology Compliance Monitoring Program |
| **the Project** | The Doris North Project |
| **PT** | Priestly-Taylor |
| **RH** | Relative humidity in % |
| **$R_n$** | Net solar radiation measured over water in W $m^{-2}$ |
| **T** | Air temperature in °C |
| **TBRG** | Tipping bucket rain gauge |
| **TMAC** | TMAC Resources Inc. |
| **$T_w$** | Water temperature in °C |

| | |
|---|---|
| ***u*** | Wind speed in m $s^{-1}$ |
| **$W/m^2$** | Watts per square metre |
| **Wind Gust** | A high wind speed that typically lasts for 3 to 5 seconds. |
| **WMO** | World Meteorological Organization |
| ***z*** | Height in m above the ground |
| **$z_W$** | Depth in m from the water surface |

# 1. INTRODUCTION

## 1.1 PROJECT BACKGROUND

The Doris North Project (the Project) is located on the Hope Bay Belt (the Belt), an 80 by 20 km property located along the south shore of Melville Sound in Nunavut (Figure 1.1-1). The property consists of a greenstone belt (the Hope Bay Belt) that contains three main gold deposits. The Doris and Madrid deposits are located in the northern portion of the belt, and the Boston deposit is at the southern end. The Project is located approximately 125 km southwest of Cambridge Bay (Iqaluktuttiaq) on the southern shore of Melville Sound. The nearest communities are Umingmaktok (75 km to the southwest of the property), Cambridge Bay, and Bathurst Inlet (Kingaok; 160 km to the southwest of the property).

TMAC Resources Inc. (TMAC) acquired the Hope Bay Belt property from Newmont Corporation in March 2013. The acquisition included exploration and mineral rights over the Hope Bay Belt, including the Doris North Project and its permits, licences and authorizations for development received by previous owners. In late 2012, prior to the sale, the Project was placed into care and maintenance, and was seasonally closed during the winter of 2012/2013. TMAC re-opened the Doris North Camp in March of 2013 for the purposes of conducting site water management and environmental compliance programs and to support exploration activities which have continued through 2014. The Project remains in care and maintenance at this time.

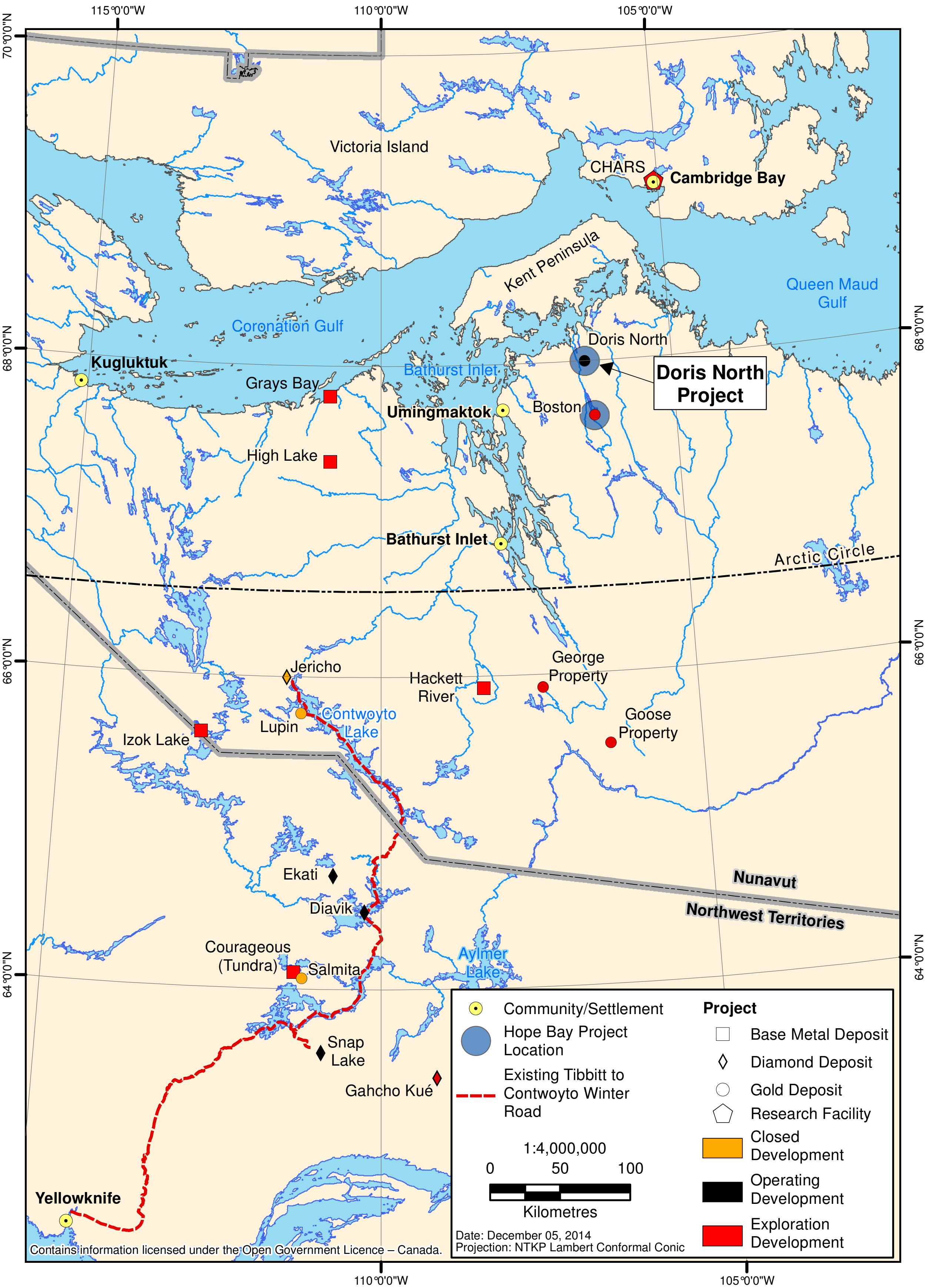
## 1.2 METEOROLOGY COMPLIANCE MONITORING REQUIREMENTS

The Doris North Project Certificate (Nunavut Impact Review Board (NIRB) No. 003, issued September 15, 2006; NIRB 2006) contains the following compliance requirements for meteorological monitoring:

- Section 4.0, Item 8. MHBL will fund and install a weather station at the mine site to collect atmospheric data, including air temperature and precipitation. The design and location of this station shall be developed in consultation with Environment Canada officials.
  - Commentary: Prior to closure and reclamation, NIRB expects MHBL to undertake consultation with appropriate agencies including INAC and EC, to discuss the possibility of the continued operation of the station, including transfer of ownership, for the collection of regional meteorological data.

At the time of project approval (2006), a meteorological station (the Doris North meteorological station) was already operational in the Project area. The station location was discussed with Environment Canada and has not changed since 2006. Changes to the station include re-mounting sensors onto a 10 m tower in August 2009, and the installation of a barometer in September 2010. In October 2014, newly calibrated sensors were installed on the station, along with a newly calibrated CR800 datalogger that was formerly on the Roberts Bay wind meteorological station.

## Figure 1.1-1
## Proximity of the Hope Bay Belt to Historic, Operating, and Exploration Developments



In addition to the Doris North meteorological station, a micro-meteorological station designed to obtain evaporation data has been seasonally installed in Doris Lake (the Doris North micro-meteorological station) since the summer of 2009.

## 1.3 Meteorology Compliance Monitoring Program Objectives

The objective of the 2014 Doris North Meteorology Compliance Monitoring Program (the Program) was to ensure compliance with Section 4.0, Item 8 of the Project Certificate and to support project planning. To this end, TMAC contracted ERM Consultants Canada Ltd. (ERM Rescan) to operate and maintain the Doris North meteorological station and to reinstall and operate the Doris North micro-meteorological station at Doris Lake. In addition to the temperature and precipitation data required under Section 4.0, Item 8 of the Project certificate, these stations collect wind speed and direction, relative humidity, global solar radiation, barometric pressure, and evaporation data to support project planning.

On-site meteorological data are used for a variety of purposes. Wind speed and direction data are usually required to select sites for permanent camp and mineral processing facilities in order to accommodate predominant wind patterns and mitigate fugitive dust emissions. Wind, air temperature, precipitation, solar radiation and barometric pressure data are used for air dispersion modelling that is often conducted to determine potential air quality effects. Solar radiation and precipitation data are required for the design of water impoundments and water balance calculations. Precipitation data is also be important for documenting the meteorological conditions that are associated with potential flooding and landslide conditions. Precipitation and evaporation data are useful for understanding hydrological patterns and for engineering, with particular applications in the design and operation of reservoirs and drainage systems.

This report presents results from the Doris North meteorological and micro-meteorological stations for the period October 1, 2013 to September 30, 2014. Methods are presented in Section 2; results are presented in Section 3. A brief summary of the results of 2014 Program is provided in Section 4.

# 2. METHODS

Meteorological monitoring has been conducted in the Project area since 1993. The bulk of the meteorological data have been collected from automated stations, which allow for a nearly continuous data record.

For the 2014 Program, meteorological data were collected using an automated meteorological station and a micro-meteorological station (Figure 2-1). The Doris North meteorological station has recorded air temperature, relative humidity, wind speed and direction, precipitation, and solar radiation since 2004 (Table 2-1). Barometric pressure has been recorded since 2010 (Table 2-1). A winter precipitation adapter was installed in February 2012 (Table 2-1). The Doris North micro-meteorological station is designed to obtain evaporation data from Doris Lake and has recorded temperature, relative humidity, wind speed and direction, precipitation, solar radiation, water temperature and net radiation seasonally since 2009 (Table 2-1).

**Table 2-1. Variables Measured at the Doris North Meteorological and Micro-meteorological Stations[a]**

| Variable Measured (units) | Doris North Meteorological Station[b] | Micro-meteorological Station[c] |
|---|---|---|
| Temperature and Relative Humidity (°C) | ✓ | ✓ |
| Wind Speed and Direction (m/s and degrees) | ✓ | ✓ |
| Rainfall via Tipping Bucket Rain Gauge (mm) | ✓ | ✓ |
| Winter Precipitation via CS705 (mm) | ✓[d] | n/a |
| Solar Radiation (W/m$^2$) | ✓ | ✓ |
| Barometric Pressure (kPa) | ✓[e] | n/a |
| Water Temperature via Thermistors (°C) | n/a | ✓ |
| Net Radiation (W/m$^2$) | n/a | ✓ |

*Notes:*
[a] *n/a = This type of sensor was not installed at this meteorological station.*
[b] *The Doris North meteorological station consisted of two tripods from February 27, 2004 to August 13, 2009 after which its sensors were reinstalled on a EC-MSC recommended 10 m tower.*
[c] *The micro-meteorological station has been installed seasonally since 2009.*
[d] *The winter precipitation adapter was first installed in February 2012.*
[e] *The barometric pressure sensor was installed in September 2010.*

## 2.1 DORIS NORTH METEOROLOGICAL STATION

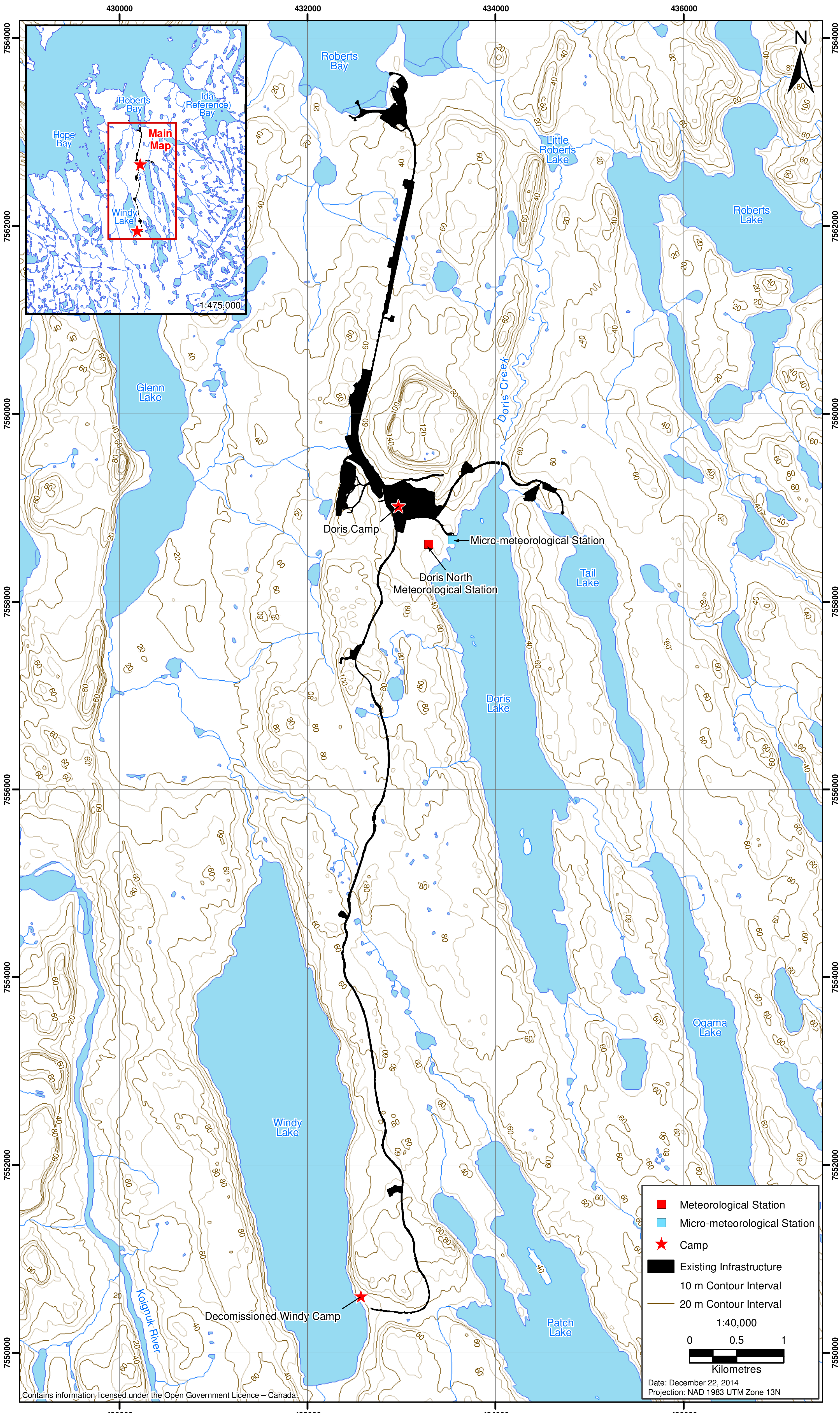
A temporary automated meteorological station was installed on February 27, 2004 near Doris camp (Figure 2-1). The original station configuration consisted of two 3 m tall tripods, with temperature, relative humidity, wind speed and direction and solar radiation sensors mounted on one of the tripods and a tipping bucket rain gauge (TBRG) mounted on the other. The station was powered by a deep cycle marine battery.

All of the sensors were remounted on a permanent, 10 m aluminium tower on August 13th, 2009 (Plate 2.1-1). The permanent tower was installed using bedrock anchors and guy wires and was grounded to prevent lightning damage. The permanent station is powered with a sealed battery that is recharged with a 30 watt solar panel. An external deep cycle marine 105 Amp-hour battery is used to supplement solar power during winter.

*Plate 2.1-1. Doris North meteorological station, October 5, 2014.*

The configuration of the permanent tower is consistent with the Environment Canada - Meteorological Services of Canada (EC-MSC) standard sensor height for air dispersion modelling data (MSC 2004).

**Figure 2-1**
**Location of Meteorological Stations, Doris North Project**



The wind sensor (RM Young Model 05130-10) was mounted at the top of the 10 m tower and measured wind speed in m/s and wind direction in degrees from true north. This is standard for the collection of wind speed and wind direction data when the data will be used for air dispersion modelling, and conforms to recommendations by the United States Environmental Protection Agency (US EPA 2000).

The temperature and relative humidity sensors were combined into one unit (Campbell Scientific Model HMP45C). The combination sensors were mounted on each tower, approximately one third of the way up the tower, and were protected from thermal radiation by a multi-plate solar radiation shield. Air temperature was measured in degrees Celsius (ºC) and relative humidity in percent saturation (%).

Precipitation was monitored in millimetres using the TBRG (Texas Electronics Model TE525). A snowfall adapter (Campbell Scientific Model CS705) was installed on the TBRG in September 2013, with precipitation as snowfall data collected from September 29, 2013 to June 5, 2014.

Global solar radiation is the total incoming direct and diffuse short-wave solar radiation received from the whole dome of the sky on a horizontal surface. Global solar radiation was monitored using a Kipp & Zonen SP LITE pyranometer, and is reported in units of watts per square metre ($W/m^2$).

Barometric pressure is the force per unit area exerted on a given horizontal surface by the weight of the atmosphere above. Barometric pressure data are used primarily in weather analyses, but other climatological applications include trajectory and storm track studies, air quality modelling, health studies, and verification and evaluation of climatic models. To compare pressure conditions from one location to another pressure is corrected to sea level. Barometric pressure was monitored using a RM Young model 61302V barometric pressure sensor. The readings were corrected to sea level automatically by the station's datalogger using an offset based on the elevation of the station (890 masl). Standard atmospheric pressure at sea level is 101.325 kPa; pressure conditions greater than this are considered high pressure and less than this are considered low pressure.

A datalogger, also housed on the station, controls the station operation and stores the data. The datalogger's program dictates how often the sensors will be monitored (set at 5 second intervals) and generates and stores hourly and daily averages.

In August 2013, high winds caused damage to the TBRG and the alter wind screen. An alter wind screen minimizes the effect of strong winds on precipitation measurements. In late September 2013, a new platform and TBRG were installed at the Doris North meteorological station (Plate 2.1-2). Data from the TBRG installed on the micro-meteorological station (Section 2.2) was used to fill the precipitation data gap during the period the Doris North meteorological station TBRG was damaged.

In October 2014, all sensors on the Doris North meteorological station were replaced (excluding the barometer) with the same model of newly calibrated or new sensors. The previously installed Campbell Scientific CR10X datalogger was replaced with a newly calibrated CR800 datalogger, which was formerly installed on the Roberts Bay wind station.

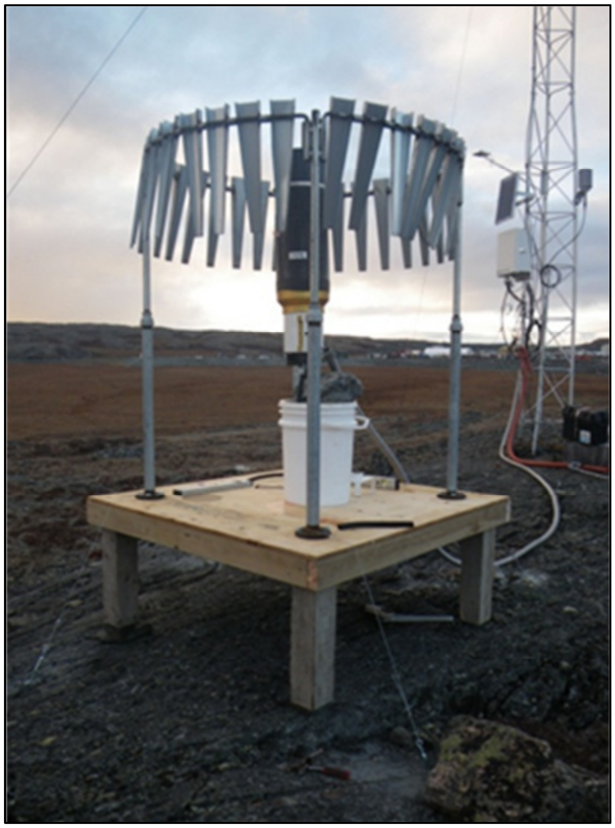


*Plate 2.1-2. The newly installed platform for the alter wind screen and tipping bucket rain gauge, September 29, 2013. The TBRG includes a winter precipitation adapter.*

## 2.2 DORIS LAKE MICRO-METEOROLOGICAL (EVAPORATION) STATION

In 2009, the meteorological program was expanded to include measurements of open-water evaporation at Doris Lake. The Doris Lake micro-meteorological station is installed seasonally, through the open water season, each year. In 2014, the micro-meteorological station was installed in a shallow area of Doris Lake from July 15 to October 3 (Figure 2-1; Plate 2.2-1).

Temperature, relative humidity, wind speed and direction, precipitation, and solar radiation were measured using the same models of sensors used at the Doris North meteorological station. Additional parameters measured at the micro-meteorological station include water temperature (model 107B) and net radiation sensor, model NR Lite. The sensors are mounted on a tripod that is partially submerged in the lake. The micro-meteorological station is powered with a sealed, rechargeable 8.5 Amp-hour battery that is recharged with a 50 watt solar panel. Station operation is controlled by a CR1000-55 datalogger, which also stores the data. The datalogger’s program dictates how often the sensors will be monitored (every 5 seconds) and generates and stores hourly and daily averages.

*Plate 2.2-1. The Doris Lake micro-meteorological (evaporation) station in July 2013.*

Mean daily weather data collected at the Doris North micro-meteorology station were used to calculate daily lake evaporation rates using both the Penman Combination. Daily lake evaporation rates were calculated from mean daily weather data using the Penman Combination (PC) Method (Chow *et al*. 1988) and the Priestley-Taylor method (Appendix A).

The Penman model is a combined energy-balance/ aerodynamic mathematical model defined by the following general equation:

$$[1]\ E(PC) = \frac{\Delta}{\Delta+\gamma} E_R + + \frac{\gamma}{\Delta+\gamma} E_A \ \ with\ \ \Delta = \frac{4098 e_{as}}{(237.3+T)^2} \ \ and\ \ \gamma = \frac{C_P P_A}{0.622 l_v}$$

where $\Delta$ is the slope of the temperature-saturated vapour pressure curve in Pa °C; $\gamma$ is the psychometric constant in Pa °C; $e_{as}$ is the saturated vapour pressure at air temperature $T$ in °C; $C_P$ = 1006 J $kg^{-1}$ °C is the specified heat of air; $P_A$ = 101.3 * $10^3$ Pa is air pressure at 20°C; and $l_v$ = 2.501 x $10^6$ – 2370*T* J $kg^{-1}$ is the latent heat of vaporization.

The energy-balance component $E_R$ in mm/day is determined by the equation:

$$[2]\ E_R = \frac{R_n - H - G}{l_v \rho_w} * 8.64 * 10^7,\ with\ H = -k_a\left(\frac{T_2 - T_1}{z_2}\right)\ and\ G = -k_w\left(\frac{T_{w2} - T_{w1}}{z_w}\right)$$

where $R_n$ is the net solar radiation measured over water in W m$^{-2}$; $H$ and $G$ are the sensible heat flux and water heat flux; $\rho_w$ = 999.7 kg m$^{-3}$ is the water density at 10ºC; $T_2 - T_1$ and $T_{w2} - T_{w1}$ are the change in mean daily air and water temperatures from the previous day, as measured at height $z_2$ and depth $z_w$ in metres from the water surface. Yarwood & Castle (1970) give the thermal conductivities of air $k_a$ and water $k_w$ at 10ºC as 0.0241 and 0.615 W/m/ºC, respectively. The energy-balance equation can be simplified to a constant if it is assumed that the sensible heat flux $H$ and water heat flux $G$ are negligible, such that Chow *et al.* (1988) calculate the energy-balance component as $E_R = 0.0353 * R_n$.

Two modifications to the above equation were used to calculate the instantaneous evaporation rate. Rather than using the difference in mean daily air and water temperatures from the previous day, the instantaneous heat flux from above and below the water surface were determined by the following equations:

$$H = -k_a\left(\frac{T_2 - T_1}{z_2 - z_1}\right) \text{ and } G = -k_w\left(\frac{T_{w2} - T_{w1}}{z_{w2} - z_{w1}}\right)$$

where $T_2 - T_1$ is the change in air temperature over height $z_2 - z_1$ and $T_{w2} - T_{w1}$ is the change in water temperature over depth $z_{w2} - z_{w1}$.

The aerodynamic component $E_A$ in mm/day was calculated as follows:

$$[3]\ E_A = \frac{0.1062u_2}{[\ln(z_2/z_0)]^2} * (e_{as} - e_a) \text{ with } e_a = -RH * e_{as} \text{ and } e_{as} = 611\exp\left(\frac{17.27 * T}{237.3 + T}\right)$$

where $u_2$ is wind speed in m s$^{-1}$ measured at a height of $z_2$ in cm; the surface water roughness height, $z_0$, is 0.01 cm (Brutsaert 1982); the term $e_{as}$-$e_a$ is the difference between saturated vapour pressure, $e_{as}$, and actual vapour pressure, $e_a$, in Pa; and relative humidity (RH) is given as a proportion ($0 \le RH \le 1$).

The Priestly-Taylor (PT) method is similar to the Penman Combination method and defined by the following general equation:

$$[4]\ E(PT) = \alpha \frac{\Delta}{\Delta + \gamma} E_R$$

where the weighted aerodynamic component $E_A$ is replaced by a constant α, and where the sensible heat flux, $H$, is omitted from the energy flux term, $E_R$, after Shuttleworth (1993). Stewart & Rouse (1977) substantiate the constant α = 1.26 for subarctic regions.

# 3. RESULTS

Results of the 2014 Program are presented below. Following the 2011, 2012 and 2013 Doris North Meteorology Compliance Monitoring Program reports, data collected from October 2013 to September 2014 were included in this report to provide a continuous record of data (Rescan 2011; Rescan 2012; ERM Rescan 2014).

Meteorological data is summarised by month in Table 3-1. Annual totals and averages were calculated using data collected over the October 2013 to September 2014 sampling period. Summaries of mean daily, maximum and minimum air temperatures, mean daily solar radiation, mean daily wind speed, mean daily relative humidity, total daily precipitation and the Penman and Priestly-Taylor methods of calculated evaporation are included in Appendix A.

Historical meteorological and evaporation data from the Doris North Project area are available as follows:

- Meteorological data collected prior to May 2002 are available in the *1993 to 2002 Data Compilation Report for Meteorology and Hydrology* (Rescan 2002);
- Meteorological data collected from May 2002 to September 2009 and evaporation data collected in 2009 are available in the *2009 Meteorology Baseline Report, Hope Bay Belt Project* (Rescan 2009); and
- Data from October 2009 to September 2012 are available in the *Doris North Gold Mine Project: 2010 Meteorology Compliance Report, Doris North Gold Mine Project: 2011 Meteorology Compliance Report, Doris North Gold Mine Project: 2012 Meteorology Compliance Report and Doris North Gold Mine Project: 2013 Meteorology Compliance Report* (Rescan 2010; Rescan 2011; Rescan 2012; ERM Rescan 2014).

## 3.1 AIR TEMPERATURE

Over the October 2013 to September 2014 period, the annual average air temperature at the Doris North meteorological station was -11.3ºC. Mean monthly air temperature ranged from -29.7 ºC in January 2014 to 10.8ºC in July 2014 (Figure 3.1-1; Table 3-1). Mean minimum daily air temperatures ranged from a low of -32.6ºC in January 2014, to a high of 6.9ºC in July 2014 (Figure 3.1-1; Table 3-1). The mean maximum daily air temperatures ranged from -26.8ºC in January 2014 to 14.9ºC in July 2014 (Figure 3.1-1; Table 3-1).

The extreme minimum hourly temperature at the Doris North meteorology station was -43.0ºC on January 19, 2014 at 9:45 AM. The extreme maximum hourly temperature was 27.0ºC on July 24, 2014 at 2:13 PM.

The annual climate trends and variables bulletin, released by Environment Canada, for the Arctic Tundra, indicated that the winter of 2013/2014 was average: it was the 27th warmest winter in a record of 67 years (EC 2014a).

**Table 3-1. Monthly Meteorological Data from Doris Meteorological Station, October 2013 to September 2014[a]**

| Month | Average Air Temperature °C | Average Daily Minimum Air Temperature °C | Average Daily Maximum Air Temperature °C | Average Relative Humidity % | Average Hourly Wind Speed m/s | Average Hourly Wind Speed km/h | Maximum Wind Gust Speed m/s | Maximum Wind Gust Speed km/h | Average Solar Radiation W/m$^2$ | Total Bright Sunshine (>120 W/m$^2$) Hours | Total Precipitation mm[b] | Average Barometric Pressure kPa[e] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oct-13 | -4.1 | -6.4 | -2.3 | 90.4 | 6.4 | 23.1 | 19.2 | 69.2 | 25.3 | 34 | 9.4 | n/a |
| Nov-13 | -20.8 | -23.9 | -17.6 | 81.6 | 4.3 | 15.4 | 18.8 | 67.5 | 5.7 | 0 | 5.8[c] | n/a |
| Dec-13 | -26.6 | -29.9 | -23.7 | 76.6 | 7.3 | 26.3 | 19.0 | 68.3 | 0.4 | 0 | n/a | n/a |
| Jan-14 | -29.7 | -32.6 | -26.8 | 73.9 | 5.9 | 21.1 | 18.0 | 64.7 | 2.3 | 0 | n/a | n/a |
| Feb-14 | -28.3 | -31.6 | -25.1 | 75.1 | 7.8 | 28.0 | 19.6 | 70.7 | 24.9 | 43 | n/a | n/a |
| Mar-14 | -25.7 | -29.3 | -22.2 | 73.7 | 7.1 | 25.7 | 22.0 | 79.3 | 91.1 | 240 | n/a | n/a |
| Apr-14 | -18.7 | -23.5 | -13.6 | 78.0 | 5.3 | 19.2 | 17.4 | 62.7 | 184.5 | 346 | n/a | 102.1 |
| May-14 | -5.3 | -9.6 | -1.2 | 83.8 | 5.2 | 18.8 | 20.3 | 73.1 | 231.6 | 418 | 2.3[d] | 101.8 |
| Jun-14 | 4.4 | 0.3 | 8.5 | 74.2 | 5.1 | 18.2 | 16.5 | 59.5 | 256.0 | 442 | 11.4 | 101.3 |
| Jul-14 | 10.8 | 6.9 | 14.9 | 76.1 | 4.6 | 16.5 | 19.0 | 68.4 | 184.3 | 351 | 41.7 | 100.9 |
| Aug-14 | 7.7 | 4.4 | 10.9 | 76.4 | 4.6 | 16.7 | 16.3 | 58.5 | 152.5 | 337 | 12.4 | 101.0 |
| Sep-14 | 0.5 | -1.6 | 2.5 | 83.0 | 6.4 | 23.2 | 20.5 | 73.9 | 60.2 | 140 | 30.0 | 100.9 |
| *Average* | -11.3 | -14.7 | -8.0 | 78.6 | 5.8 | 21.0 | 18.9 | 68.0 | 101.6 | - | - | 101.34 |
| *Sum* | - | - | - | - | - | - | - | - | - | 2351 | 104.9[b] | - |

*Notes:*

[a] *n/a - Represents missing data*

[b] *Extreme cold temperatures during the winter reduce the effectiveness of the winter precipitation adapter, resulting in underestimations of precipitation. Precipitation events likely occurred in November through March that were not captured by the TBRG.*

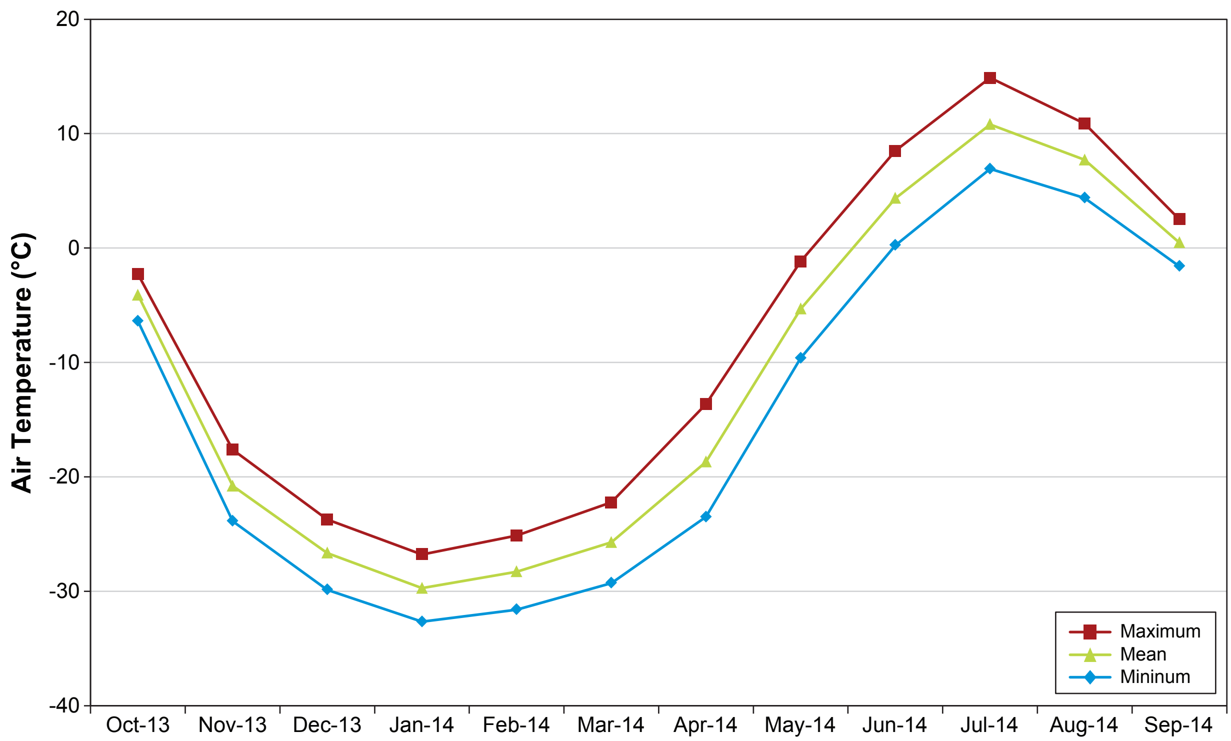
[c] *November 11th was the last day of recorded precipitation.*

[d] *Data up to May 23rd were excluded due to freezing issues with the TBRG.*

[e] *Sensor malfunction during the winter 2013.*

**Figure 3.1-1**

**Monthly Average Air Temperatures, Doris North Meteorological Station, October 2013 to September 2014**



The summer of 2014 was also average: it was the 23rd warmest year on record (out of 67; EC 2014a). On site, 2014 average temperatures were similar to those observed in 2013, though annual average temperatures have cooled since 2010 (Rescan 2011; Rescan 2012; ERM Rescan 2014). However, 2010 and 2011 were the 1st and 6th warmest years on record, respectively (EC 2014a).

## 3.2 PRECIPITATION

Total annual precipitation recorded at the Doris North meteorological station over the October 2013 to September 2014 period was 104.9 mm. However, the extreme cold temperatures experienced at the Doris North project, combined with a lack of personnel on site, resulted in the antifreeze solution used in the winter precipitation adapter becoming extremely viscous, hampering the ability of the winter precipitation adapter to collect precipitation data as snow in the most extreme months. Thus, total annual precipitation was underestimated in 2014. A maintenance schedule and procedure has been communicated to, and implemented by, TMAC personnel who will be on-site during the 2014/2015 winter period. This procedure, combined with a change in fluid type in the winter precipitation adapter, will improve the effectiveness of winter precipitation data collection.

The greatest monthly precipitation was observed in July (41.7 mm; Figure 3.2-1; Table 3-1). The lowest reliable estimate of monthly precipitation was observed in October (Figure 3.2-1, Table 3-1). However, the lowest monthly precipitation likely occurred during the winter while the precipitation adapter was frozen; data from the nearest Environment Canada (EC) stations (i.e., Cambridge Bay Airport and Bathurst Inlet) showed the smallest quantities of precipitation during this period (Table 3.2-1; EC 2014).

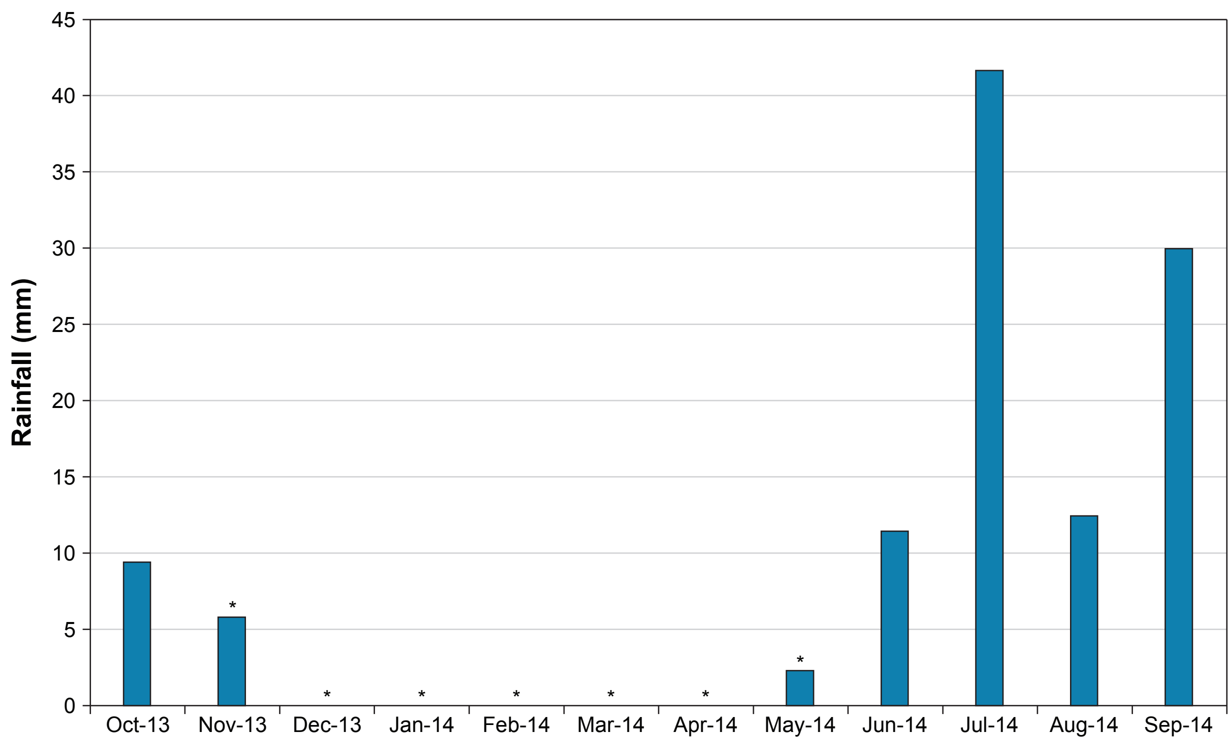
**Table 3.2-1. Doris North and Regional Meteorological Station Precipitation, October 2013 to September 2014[a]**

| | Total Precipitation (mm) | | |
|---|---|---|---|
| Date | Doris North Meteorology Station[b] | Bathurst Inlet | Cambridge Bay Airport |
| Oct-13 | 9.4 | 3.8 | 8.4 |
| Nov-13 | 5.8[c] | 1.8 | 4.8 |
| Dec-13 | n/a | 2.0 | 2.0 |
| Jan-14 | n/a | 0.9[e] | 4.2 |
| Feb-14 | n/a | n/a | 0.8 |
| Mar-14 | n/a | 9.1 | 2.0 |
| Apr-14 | n/a | 9.6 | 1.0 |
| May-14 | 2.3[d] | 21.9 | 14.2 |
| Jun-14 | 11.4 | 18.0 | 12.0 |
| Jul-14 | 41.6 | 21.7 | 85.6 |
| Aug-14 | 12.4 | 31.7 | 15.8 |
| Sep-14 | 29.9 | 48.8 | 26.2 |
| *Sum* | 104.9 | 168.4 | 177.0 |

*Notes:*
*[a]n/a - Represents missing data*
*[b] Extreme cold temperatures during the winter reduce the effectiveness of the winter precipitation adapter, resulting in underestimations of precipitation. Precipitation events likely occurred in November through March that were not captured by the TBRG.*
*[c] November 11th was the last day of recorded precipitation.*
*[d] Data up to May 23rd were excluded due to freezing issues with the TBRG.*
*[e] Data from January 12 to January 31 were missing.*

**Figure 3.2-1**

**Monthly Precipitation, Doris North Meteorological Station, October 2013 to September 2014**




*Note: * Due to extreme cold temperatures, the precipitation adapter was frozen from November 12th to May 23rd. Precipitation was underestimated during this period.*

Environment Canada data suggests that the winter of 2013/2014 was average: it was the 39th driest winter of 67 winters on record (EC 2014a). The spring and summer of 2014 were also average: they were the 28th and 21st wettest on record, respectively (EC 2014a). Most precipitation falls during the summer months in the Project area. The wettest month recorded since compliance reporting began in 2011 was July 2014 (41.7mm; Table 3-1).

## 3.3 Solar Radiation

The Project area experiences almost 24 hours of sunlight per day between mid-May and the end of July and almost 24 hours of darkness per day from late November to early January (Table 3-1; Figure 3.3-1). The lowest solar radiation values (0 W/m$^2$) were recorded during winter months when the sun was at its lowest angle and there was a higher frequency for low cloud cover that reflects and absorbs solar radiation (Table 3-1; Figure 3.3-1). The months of May, June and July received the highest amounts of solar radiation during the year. Solar radiation in July 2014 was less than other years due to extended periods of cloud cover in the Project area (Figure 3.3-1).

The greatest daily average solar radiation was 345 W/m$^2$ on June 22, 2014 (Appendix A). The greatest hourly average solar radiation at Doris North meteorological station was 732 W/m$^2$ on June 1, 2014 at 1:00 PM. The minimum average daily solar radiation of 0.2 W/m$^2$ was recorded at the Doris North meteorological station on January 2, 2014. The hourly average solar radiation values recorded on that day were all equal to or less than 1.5 W/m$^2$. All of the hourly average solar radiation values recorded during the night time were 0 W/m$^2$.

A bright sunshine hour is defined by the World Meteorological Organization (WMO) as an hour when the average global solar radiation is greater than 120 W/m$^2$. There were 2,351 hours of bright sunshine during the October 2013 to September 2014 period. There were zero sunlight hours in November and December 2013 and January 2014.

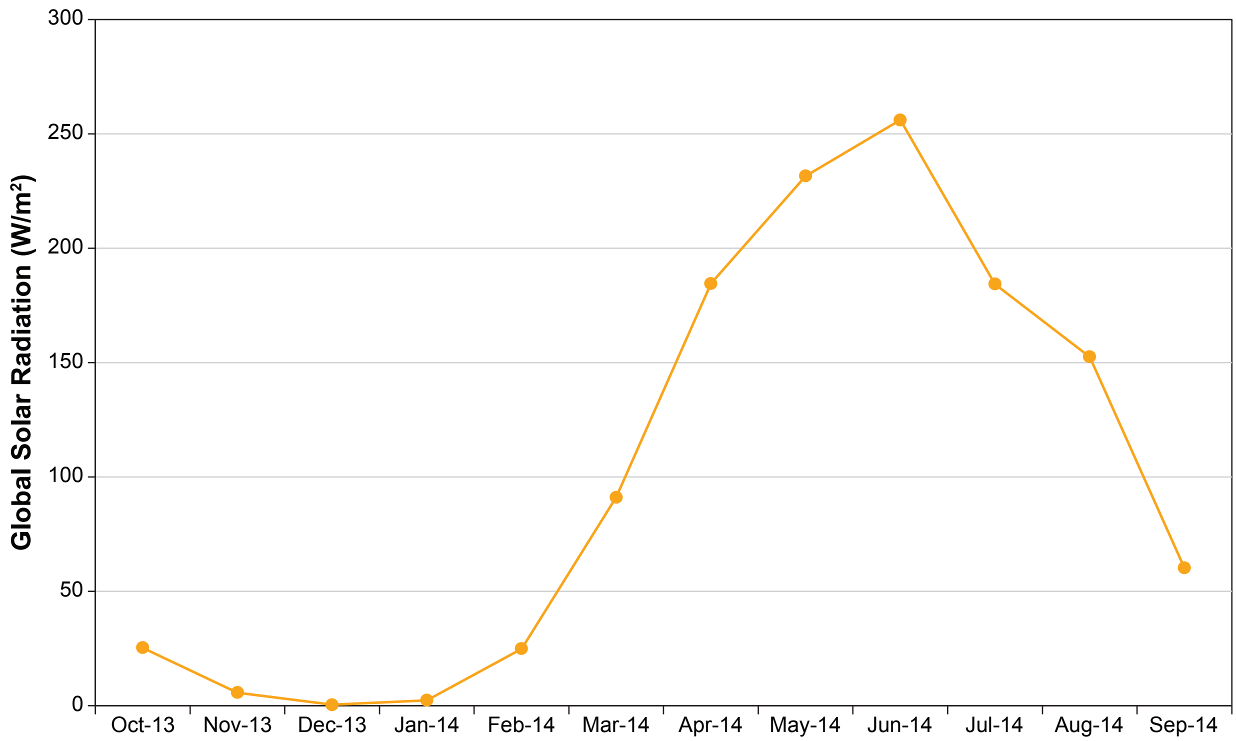
## 3.4 Wind Speed and Direction

The predominant wind direction at the Doris North meteorological station was from the west, with a secondary component from the east (Figure 3.4-1). Based on annual data, these wind directions were recorded approximately 35% of the time (Figure 3.4-1). The average wind speed was 5.8 m/s (21.0 km/h) and the most frequent wind speeds were 5 to 7 m/s (18 to 25 km/h), which occurred 20.8% of the time (Figure 3.4-1; Table 3-1). Strong winds over 11 m/s (39.6 km/h) occurred 8.2% of the time, and calm conditions (i.e., hourly average wind speeds less than 1 m/s (3.6 km/hr)) were experienced 6.9% of the time (Figure 3.4-1).

During the winter, winds were primarily from the south-west through to the north-west with a secondary component from the east and east-southeast occurring approximately 30% of the time (Figure 3.4-1). The most common wind speed classes during the winter were 5 to 7 m/s (18 to 25.2 km/h) and 7 to 9 m/s (25.2 to 32.4 km/h), which occurred 18.6% and 18.4% respectively (Figure 3.4-1). Calm and strong winds occurred 8.5% and 10.7% of the time, respectively (Figure 3.4-1).

**Figure 3.3-1**

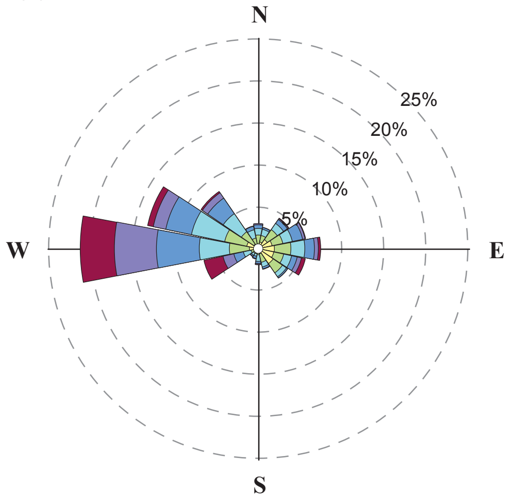
**Monthly Average Global Solar Radiation, Doris North Meteorological Station, October 2013 to September 2014**

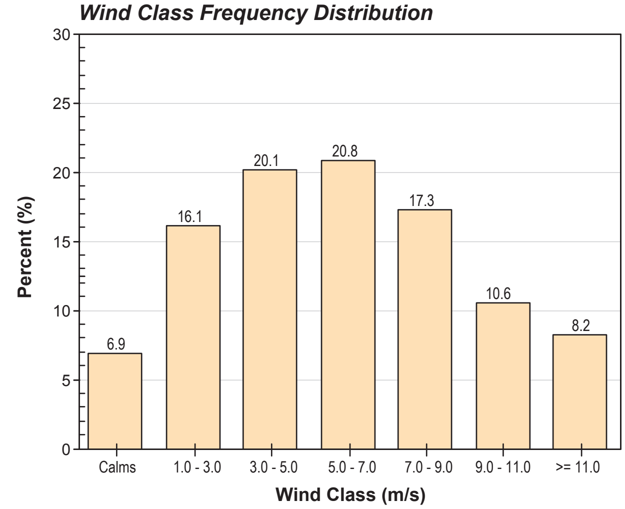


# Figure 3.4-1

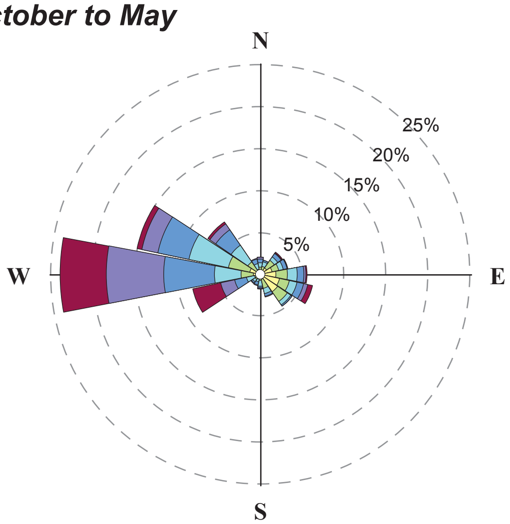
## Windroses and Frequency Distributions, Doris North Meteorological Station, October 2013 to September 2014

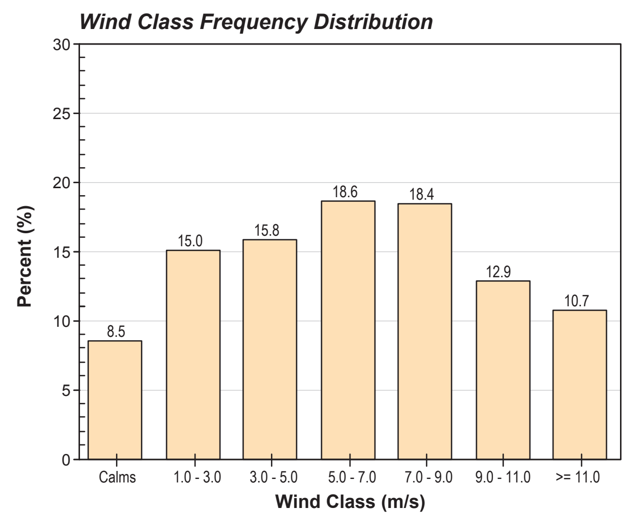
### *Annual*



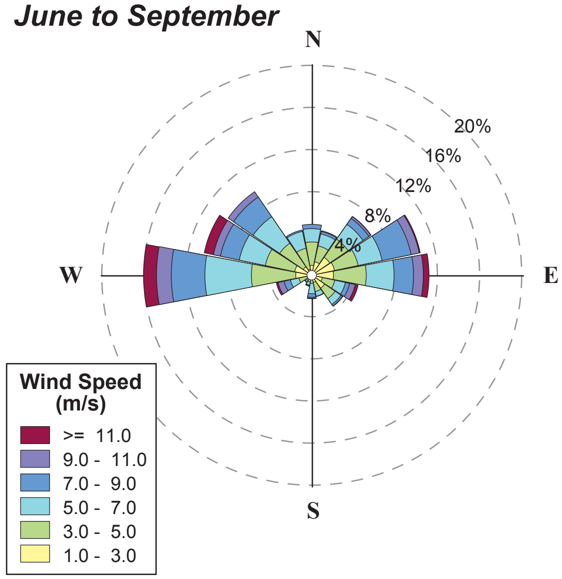



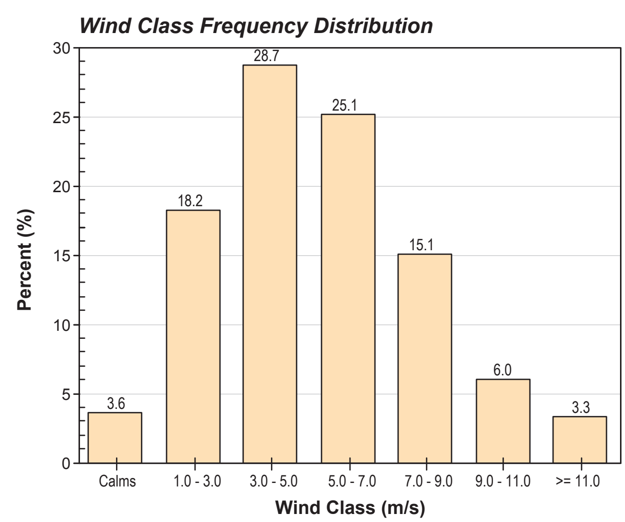

### *October to May*




### *June to September*



During the summer, the most frequent winds came from the west and west-northwest with a strong secondary component from the east and east-north east (Figure 3.4-1). Wind speeds in the middle classes were more frequent than in the winter, with speeds of 3 to 5 m/s (10.8 to 18 km/h) occurring 28.7% of the time. Calm and strong winds were also less frequent in the summer than in the winter, occurring 3.6% and 3.3% of the time, respectively. The maximum gust speed measured during this reporting period at Doris North was 22.0 m/s (79.3 km/h) on March 7, 2014 (Table 3-1). The maximum wind gust recorded since compliance reporting began in 2011, was 28.9 m/s (104.0 km/h) in August 2013 (ERM Rescan 2014). The average hourly wind speed since 2010 has ranged from 5.3 m/s (19.1 km/h) in 2011/2012 to 5.8 m/s (21.1 km/h) during both the 2013/2014 and 2010/2011 reporting period (Rescan 2011).

## 3.5 EVAPORATION

In total, 80 days of evaporation data were collected at the Doris North micro-meteorological station, from July 15, 2014 to September 30, 2014. Total monthly evaporation values in the Project area were calculated as 95.7 and 88.8 mm using the Penman Combination and Priestly-Taylor methods, respectively (Table 3.5-1).

**Table 3.5-1. Average Daily Evaporation and Total Monthly Evaporation, Doris Lake Micro-meteorological Station, July 15 to September 30, 2014**

| | Average Daily Evaporation Rate (mm/day) | | Total Monthly Evaporation (mm) | |
|---|---|---|---|---|
| Month | Penman Method | Priestly-Taylor Method | Penman Method | Priestly-Taylor Method |
| July[a] | 2.10 | 2.22 | 35.7 | 37.8 |
| August | 1.63 | 1.56 | 50.6 | 48.4 |
| September | 0.32 | 0.09 | 9.5 | 2.6 |
| *2014 Average* | 1.35 | 1.29 | - | - |
| *2014 Sum* | - | - | 95.7 | 88.8 |

*Note:*
[a] *The micro-meteorological station was installed on July 15, 2013. July estimate is based on 17 days of data collection.*

Daily evaporation rates decreased from July to September (Table 3.5-1). Evaporation is strongly related to net radiation (Oke 1995) and is expected to be greatest during summer months, as was the case during 2014 (Figure 3.5-1). This is because solar net radiation has the largest influence on evaporation rate, and the water surface receives significantly more solar radiation in July than in August and September.

The 2014, total monthly evaporation rates were lower than in previous reporting periods (Rescan 2011, Rescan 2012, ERM Rescan 2014). The July 2014 period was the main causal factor for these low averages in 2014. This can be directly related to the net radiation ($W/m^2$) that the station received during this period. The net radiation in July 2014 was significantly lower than past years and signifies that July was a particularly cloud-covered month. This can also be seen in the solar radiation data presented in Figure 3.3-1.

## 3.6 BAROMETRIC PRESSURE AND RELATIVE HUMIDITY

The mean monthly barometric pressure (adjusted to sea level) recorded at the Doris North meteorological station for the 2013/2014 reporting period was 101.34 (Table 3-1). Mean daily barometric pressure remained between 98 and 103 kPa throughout the reporting period (Appendix A). Crossed wires caused the data gap from October 2013 to March 2014. Annual average relative humidity was 78.6%, with mean monthly averages ranging from a high of 90.4% in October 2013 to a low of 73.7% in March 2014 (Table 3-1).

# 4. SUMMARY

Meteorological data were collected at the Doris North meteorological and micro-meteorological stations from October 2013 to September 2014 to comply with the requirements of the Doris North Gold Mine Project Certificate and to support project planning. The annual average temperature was -11.3ºC, with temperatures ranging from -43.0ºC to 27.0ºC during the monitoring period. Temperatures in the Arctic Tundra were average compared to 66 years of recorded data during the winter of 2013/2014 (EC 2014a). On site, temperatures were slightly lower than in the past four years of monitoring, but 2010 and 2011 were two of the hottest years on record (EC 2014a).

Total annual precipitation recorded during the period was 104.9 mm. However, the extreme cold temperatures experienced at the Doris North project caused the antifreeze solution used in the winter precipitation adapter to become extremely viscous, hampering the ability of winter precipitation adapter to collect precipitation data as snow in the most extreme months. Thus, total annual precipitation was underestimated over the reporting period. The greatest amount of monthly precipitation was observed in July (41.7 mm). Environment Canada ranked the winter 2013/2014 as the 39th driest winter of 67 years on record (EC 2014a). The spring and summer of 2014 were ranked the 28th and 21st wettest on record, respectively (EC 2014a). Most precipitation fell during the summer months at the Project. July 2014 was the wettest month recorded since compliance reporting began in 2011 (41.7 mm; Table 3-1).

Solar radiation in the Arctic is greatest during the summer and very low during the winter. The total annual number of bright sunshine hours, where average global solar radiation was greater than 120 W/m$^2$, was 2,351. July 2014 experienced heavier cloud cover than average.

Winds in the Project area typically blew from the west-northwest year round, although winds from the east and southeast were also common, especially in summer. Average annual wind speeds at the Doris North meteorological station were 5.8 m/s (20.9 km/h), and gusts were recorded up to 16.2 m/s (58.3 km/h).

Total evaporation values in the Project area were estimated as 95.7 and 88.8 mm using the Penman Combination and Priestly-Taylor methods, respectively. These values were generally lower than average on site and can be attributed to the extended periods of cloud cover during July 2014.

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# *Appendix A*

*Daily Data, Doris North Meteorological Station and Micro-meteorological Station, October 2013 to September 2014*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| Date | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation (W/m²) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 1-Oct-13 | -0.4 | 0.9 | -2.1 | 54.0 | 10.5 | 101.5 | 92.0 | 0.0 | n/a | n/a |
| 2-Oct-13 | -1.1 | 0.5 | -2.5 | 40.4 | 16.2 | 102.3 | 93.4 | 0.0 | n/a | n/a |
| 3-Oct-13 | -1.7 | -1.1 | -2.1 | 33.2 | 22.2 | 102.6 | 81.0 | 0.0 | n/a | n/a |
| 4-Oct-13 | 0.8 | 2.3 | -2.2 | 23.6 | 22.0 | 101.5 | 91.5 | 0.5 | n/a | n/a |
| 5-Oct-13 | 1.5 | 3.2 | 0.3 | 21.0 | 13.7 | 100.3 | 93.9 | 0.0 | n/a | n/a |
| 6-Oct-13 | 0.3 | 0.7 | -0.1 | 34.6 | 13.0 | 100.5 | 96.6 | 0.8 | n/a | n/a |
| 7-Oct-13 | 0.2 | 0.7 | -0.3 | 32.8 | 24.4 | 100.8 | 96.5 | 1.3 | n/a | n/a |
| 8-Oct-13 | -1.8 | -0.1 | -3.6 | 25.7 | 28.5 | 101.4 | 93.5 | 0.8 | n/a | n/a |
| 9-Oct-13 | -0.6 | 1.2 | -3.2 | 43.7 | 23.8 | 100.5 | 92.2 | 0.0 | n/a | n/a |
| 10-Oct-13 | 1.2 | 2.4 | 0.2 | 20.7 | 34.0 | n/a | 95.1 | 0.3 | n/a | n/a |
| 11-Oct-13 | 1.3 | 2.4 | -1.3 | 23.3 | 17.3 | n/a | 94.6 | 0.0 | n/a | n/a |
| 12-Oct-13 | -2.9 | -1.3 | -4.0 | 22.7 | 31.1 | n/a | 84.8 | 0.0 | n/a | n/a |
| 13-Oct-13 | -3.5 | -2.5 | -4.6 | 21.5 | 20.4 | n/a | 85.7 | 0.0 | n/a | n/a |
| 14-Oct-13 | -4.1 | -2.7 | -5.3 | 27.1 | 14.6 | n/a | 93.5 | 0.0 | n/a | n/a |
| 15-Oct-13 | -4.0 | -3.2 | -5.0 | 15.8 | 23.7 | n/a | 92.8 | 0.3 | n/a | n/a |
| 16-Oct-13 | -3.9 | 0.8 | -7.9 | 21.5 | 17.1 | n/a | 93.5 | 5.6 | n/a | n/a |
| 17-Oct-13 | -7.5 | -4.8 | -11.3 | 22.6 | 22.0 | n/a | 90.8 | 0.0 | n/a | n/a |
| 18-Oct-13 | -5.4 | -4.4 | -6.3 | 20.5 | 18.0 | n/a | 93.0 | 0.0 | n/a | n/a |
| 19-Oct-13 | -4.8 | -2.8 | -7.8 | 41.1 | 5.1 | n/a | 96.0 | 0.0 | n/a | n/a |
| 20-Oct-13 | -6.5 | -2.7 | -9.6 | 52.0 | M | n/a | 89.4 | 0.0 | n/a | n/a |
| 21-Oct-13 | -5.1 | -2.6 | -7.0 | 34.8 | 25.6 | n/a | 89.7 | 0.0 | n/a | n/a |
| 22-Oct-13 | -5.8 | -4.2 | -9.2 | 19.1 | 11.8 | n/a | 92.0 | 0.0 | n/a | n/a |
| 23-Oct-13 | -1.8 | -0.1 | -6.5 | 14.7 | 20.3 | n/a | 93.7 | 0.0 | n/a | n/a |
| 24-Oct-13 | -3.1 | -1.6 | -6.8 | 11.8 | 23.3 | n/a | 86.0 | 0.0 | n/a | n/a |
| 25-Oct-13 | -6.3 | -2.5 | -10.9 | 14.6 | 31.4 | n/a | 83.3 | 0.0 | n/a | n/a |
| 26-Oct-13 | -11.8 | -9.4 | -13.3 | 19.9 | 27.1 | n/a | 85.5 | 0.0 | n/a | n/a |
| 27-Oct-13 | -8.5 | -6.5 | -13.0 | 18.3 | 33.6 | n/a | 77.8 | 0.0 | n/a | n/a |
| 28-Oct-13 | -12.2 | -10.7 | -13.8 | 16.6 | 13.7 | n/a | 87.8 | 0.0 | n/a | n/a |
| 29-Oct-13 | -9.8 | -7.1 | -12.9 | 10.5 | 38.3 | n/a | 89.8 | 0.0 | n/a | n/a |
| 30-Oct-13 | -10.4 | -8.6 | -12.8 | 16.3 | 47.2 | n/a | 88.5 | 0.0 | n/a | n/a |
| 31-Oct-13 | -9.5 | -6.7 | -12.9 | 9.0 | 36.2 | n/a | 88.3 | 0.0 | n/a | n/a |
| 1-Nov-13 | -6.4 | -5.2 | -7.0 | 9.7 | 16.9 | n/a | 93.0 | 0.0 | n/a | n/a |
| 2-Nov-13 | -7.8 | -4.9 | -10.5 | 12.3 | 27.6 | n/a | 89.2 | 0.0 | n/a | n/a |
| 3-Nov-13 | -11.6 | -9.6 | -16.2 | 8.4 | 11.5 | n/a | 91.0 | 0.0 | n/a | n/a |
| 4-Nov-13 | -12.9 | -7.4 | -17.1 | 11.7 | 8.8 | n/a | 89.8 | 0.5 | n/a | n/a |
| 5-Nov-13 | -13.5 | -7.2 | -18.9 | 19.5 | 9.8 | n/a | 85.3 | 0.0 | n/a | n/a |
| 6-Nov-13 | -19.6 | -16.5 | -23.0 | 18.6 | 7.7 | n/a | 82.2 | 0.3 | n/a | n/a |
| 7-Nov-13 | -17.4 | -12.1 | -23.4 | 7.1 | 11.5 | n/a | 85.5 | 0.5 | n/a | n/a |
| 8-Nov-13 | -21.4 | -19.1 | -24.5 | 7.8 | 8.0 | n/a | 83.9 | 0.0 | n/a | n/a |
| 9-Nov-13 | -22.6 | -20.1 | -25.4 | 9.4 | 11.4 | n/a | 82.4 | 0.0 | n/a | n/a |
| 10-Nov-13 | -17.2 | -8.9 | -22.3 | 12.6 | 23.8 | n/a | 82.0 | 0.0 | n/a | n/a |
| 11-Nov-13 | -3.8 | -1.7 | -8.9 | 3.3 | 36.9 | n/a | 90.6 | 4.6 | n/a | n/a |
| 12-Nov-13 | -7.6 | -4.8 | -12.4 | 6.9 | 28.7 | n/a | 88.1 | n/a | n/a | n/a |
| 13-Nov-13 | -17.4 | -11.1 | -22.2 | 7.8 | 19.7 | n/a | 83.3 | n/a | n/a | n/a |
| 14-Nov-13 | -16.4 | -13.4 | -21.0 | 3.1 | 11.9 | n/a | 86.5 | n/a | n/a | n/a |
| 15-Nov-13 | -22.9 | -14.7 | -27.1 | 4.0 | 24.6 | n/a | 80.4 | n/a | n/a | n/a |
| 16-Nov-13 | -25.9 | -24.3 | -27.1 | 4.1 | 32.3 | n/a | 75.0 | n/a | n/a | n/a |
| 17-Nov-13 | -25.4 | -23.8 | -26.5 | 4.8 | 36.7 | n/a | 76.5 | n/a | n/a | n/a |
| 18-Nov-13 | -25.2 | -22.6 | -27.1 | 4.2 | 22.7 | n/a | 78.4 | n/a | n/a | n/a |
| 19-Nov-13 | -29.5 | -21.9 | -31.4 | 3.0 | 2.6 | n/a | 75.8 | n/a | n/a | n/a |
| 20-Nov-13 | -24.6 | -21.9 | -27.0 | 1.5 | 13.2 | n/a | 78.7 | n/a | n/a | n/a |
| 21-Nov-13 | -22.2 | -20.8 | -25.7 | 2.5 | 21.7 | n/a | 80.8 | n/a | n/a | n/a |
| 22-Nov-13 | -21.9 | -20.4 | -24.9 | 1.6 | 28.3 | n/a | 82.9 | n/a | n/a | n/a |

*Note:*

[1] *Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation ($W/m^2$) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 23-Nov-13 | -26.9 | -24.3 | -28.3 | 0.8 | 7.6 | n/a | 78.2 | n/a | n/a | n/a |
| 24-Nov-13 | -28.3 | -26.2 | -30.6 | 1.6 | 15.7 | n/a | 75.5 | n/a | n/a | n/a |
| 25-Nov-13 | -31.4 | -30.5 | -32.3 | 1.3 | 3.0 | n/a | 74.1 | n/a | n/a | n/a |
| 26-Nov-13 | -28.0 | -25.0 | -31.6 | 0.8 | 3.9 | n/a | 77.0 | n/a | n/a | n/a |
| 27-Nov-13 | -29.1 | -25.1 | -31.5 | 1.0 | 2.0 | n/a | 76.1 | n/a | n/a | n/a |
| 28-Nov-13 | -29.1 | -28.0 | -31.0 | 0.9 | 3.2 | n/a | 75.8 | n/a | n/a | n/a |
| 29-Nov-13 | -29.1 | -28.0 | -30.0 | 0.6 | 6.3 | n/a | 75.9 | n/a | n/a | n/a |
| 30-Nov-13 | -29.7 | -29.0 | -30.8 | 0.4 | 1.5 | n/a | 75.1 | n/a | n/a | n/a |
| 1-Dec-13 | -26.7 | -22.2 | -30.2 | 0.5 | 1.1 | n/a | 78.2 | n/a | n/a | n/a |
| 2-Dec-13 | -15.9 | -10.3 | -29.3 | 0.2 | 31.7 | n/a | 86.4 | n/a | n/a | n/a |
| 3-Dec-13 | -20.6 | -12.6 | -23.6 | 0.6 | 29.1 | n/a | 79.7 | n/a | n/a | n/a |
| 4-Dec-13 | -23.6 | -22.2 | -24.5 | 0.7 | 26.0 | n/a | 80.8 | n/a | n/a | n/a |
| 5-Dec-13 | -23.5 | -20.9 | -27.2 | 0.7 | 19.2 | n/a | 81.6 | n/a | n/a | n/a |
| 6-Dec-13 | -16.4 | -13.4 | -23.5 | 0.5 | 30.1 | n/a | 84.9 | n/a | n/a | n/a |
| 7-Dec-13 | -22.5 | -19.6 | -25.5 | 0.4 | 35.0 | n/a | 80.1 | n/a | n/a | n/a |
| 8-Dec-13 | -27.3 | -25.5 | -28.7 | 0.4 | 16.0 | n/a | 77.4 | n/a | n/a | n/a |
| 9-Dec-13 | -27.5 | -24.4 | -29.3 | 0.5 | 26.3 | n/a | 77.1 | n/a | n/a | n/a |
| 10-Dec-13 | -25.3 | -22.0 | -27.8 | 0.3 | 25.1 | n/a | 78.0 | n/a | n/a | n/a |
| 11-Dec-13 | -31.3 | -27.4 | -33.6 | 0.4 | 19.3 | n/a | 72.8 | n/a | n/a | n/a |
| 12-Dec-13 | -31.9 | -30.6 | -33.2 | 0.4 | 30.2 | n/a | 72.3 | n/a | n/a | n/a |
| 13-Dec-13 | -28.8 | -27.4 | -30.7 | 0.4 | 45.8 | n/a | 74.3 | n/a | n/a | n/a |
| 14-Dec-13 | -28.4 | -26.9 | -32.3 | 0.5 | 30.1 | n/a | 68.5 | n/a | n/a | n/a |
| 15-Dec-13 | -32.5 | -31.1 | -33.7 | 0.2 | 15.2 | n/a | 69.3 | n/a | n/a | n/a |
| 16-Dec-13 | -30.0 | -27.9 | -33.0 | 0.4 | 23.5 | n/a | 73.9 | n/a | n/a | n/a |
| 17-Dec-13 | -26.8 | -23.9 | -29.3 | 0.2 | 28.8 | n/a | 76.2 | n/a | n/a | n/a |
| 18-Dec-13 | -25.6 | -23.3 | -29.5 | 0.2 | 22.7 | n/a | 77.6 | n/a | n/a | n/a |
| 19-Dec-13 | -31.8 | -29.5 | -33.5 | 0.3 | 29.7 | n/a | 73.0 | n/a | n/a | n/a |
| 20-Dec-13 | -26.6 | -23.9 | -31.1 | 0.2 | 22.9 | n/a | 74.6 | n/a | n/a | n/a |
| 21-Dec-13 | -25.1 | -19.1 | -29.1 | 0.3 | 23.1 | n/a | 79.8 | n/a | n/a | n/a |
| 22-Dec-13 | -19.9 | -18.3 | -21.7 | 0.4 | 28.9 | n/a | 80.2 | n/a | n/a | n/a |
| 23-Dec-13 | -25.7 | -19.8 | -30.3 | 0.3 | 19.8 | n/a | 77.2 | n/a | n/a | n/a |
| 24-Dec-13 | -26.4 | -22.1 | -29.8 | 0.3 | 33.3 | n/a | 77.4 | n/a | n/a | n/a |
| 25-Dec-13 | -24.4 | -22.1 | -28.1 | 0.3 | 32.7 | n/a | 78.8 | n/a | n/a | n/a |
| 26-Dec-13 | -29.2 | -25.8 | -34.3 | 0.3 | 29.4 | n/a | 74.9 | n/a | n/a | n/a |
| 27-Dec-13 | -31.0 | -28.9 | -34.3 | 0.3 | 37.6 | n/a | 73.3 | n/a | n/a | n/a |
| 28-Dec-13 | -30.2 | -28.1 | -32.7 | 0.3 | 31.6 | n/a | 73.3 | n/a | n/a | n/a |
| 29-Dec-13 | -30.9 | -29.3 | -32.9 | 0.4 | 25.9 | n/a | 73.2 | n/a | n/a | n/a |
| 30-Dec-13 | -30.0 | -27.9 | -31.6 | 0.3 | 22.6 | n/a | 74.5 | n/a | n/a | n/a |
| 31-Dec-13 | -29.9 | -28.9 | -31.4 | 0.4 | 23.4 | n/a | 74.6 | n/a | n/a | n/a |
| 1-Jan-14 | -28.4 | -26.4 | -30.3 | 0.4 | 24.6 | n/a | 75.1 | n/a | n/a | n/a |
| 2-Jan-14 | -29.9 | -26.5 | -33.0 | 0.3 | 6.0 | n/a | 74.9 | n/a | n/a | n/a |
| 3-Jan-14 | -29.1 | -27.0 | -30.0 | 0.3 | 22.2 | n/a | 73.5 | n/a | n/a | n/a |
| 4-Jan-14 | -34.0 | -29.8 | -35.4 | 0.8 | 26.6 | n/a | 68.9 | n/a | n/a | n/a |
| 5-Jan-14 | -32.0 | -29.5 | -34.1 | 0.6 | 39.6 | n/a | 71.5 | n/a | n/a | n/a |
| 6-Jan-14 | -29.8 | -28.1 | -31.5 | 0.6 | 28.8 | n/a | 74.2 | n/a | n/a | n/a |
| 7-Jan-14 | -30.1 | -27.8 | -32.8 | 0.8 | 24.2 | n/a | 74.5 | n/a | n/a | n/a |
| 8-Jan-14 | -25.5 | -22.3 | -30.3 | 0.6 | 5.0 | n/a | 79.1 | n/a | n/a | n/a |
| 9-Jan-14 | -26.5 | -23.7 | -30.9 | 0.7 | 23.6 | n/a | 78.1 | n/a | n/a | n/a |
| 10-Jan-14 | -26.0 | -23.2 | -29.3 | 0.5 | 17.5 | n/a | 77.8 | n/a | n/a | n/a |
| 11-Jan-14 | -31.6 | -25.3 | -34.3 | 1.0 | 26.0 | n/a | 72.1 | n/a | n/a | n/a |
| 12-Jan-14 | -29.7 | -27.0 | -32.2 | 1.8 | 27.4 | n/a | 69.4 | n/a | n/a | n/a |
| 13-Jan-14 | -29.6 | -26.8 | -32.3 | 0.7 | 10.3 | n/a | 74.4 | n/a | n/a | n/a |
| 14-Jan-14 | -32.9 | -28.1 | -35.2 | 1.9 | 21.0 | | 70.1 | n/a | n/a | n/a |

*Note:*

[1] *Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation ($W/m^2$) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 15-Jan-14 | -23.9 | -20.9 | -28.2 | 0.6 | 16.7 | n/a | 79.1 | n/a | n/a | n/a |
| 16-Jan-14 | -29.4 | -26.6 | -32.1 | 1.7 | 31.8 | n/a | 74.2 | n/a | n/a | n/a |
| 17-Jan-14 | -33.3 | -31.3 | -36.2 | 1.5 | 20.4 | n/a | 71.5 | n/a | n/a | n/a |
| 18-Jan-14 | -39.0 | -36.0 | -40.8 | 2.2 | 17.6 | n/a | 65.5 | n/a | n/a | n/a |
| 19-Jan-14 | -41.5 | -39.1 | -43.1 | 2.6 | 3.3 | n/a | 62.8 | n/a | n/a | n/a |
| 20-Jan-14 | -38.8 | -37.6 | -40.0 | 3.5 | 6.5 | n/a | 65.3 | n/a | n/a | n/a |
| 21-Jan-14 | -32.8 | -28.1 | -39.6 | 2.0 | 8.7 | n/a | 71.5 | n/a | n/a | n/a |
| 22-Jan-14 | -25.0 | -21.1 | -28.6 | 1.9 | 9.5 | n/a | 77.5 | n/a | n/a | n/a |
| 23-Jan-14 | -26.6 | -21.3 | -32.5 | 2.9 | 26.6 | n/a | 76.7 | n/a | n/a | n/a |
| 24-Jan-14 | -31.3 | -29.9 | -33.0 | 3.7 | 35.6 | n/a | 72.7 | n/a | n/a | n/a |
| 25-Jan-14 | -33.0 | -30.5 | -36.1 | 3.8 | 30.3 | n/a | 70.7 | n/a | n/a | n/a |
| 26-Jan-14 | -31.0 | -29.2 | -33.2 | 6.4 | 24.3 | n/a | 72.9 | n/a | n/a | n/a |
| 27-Jan-14 | -30.0 | -26.9 | -33.4 | 8.0 | 8.0 | n/a | 74.1 | n/a | n/a | n/a |
| 28-Jan-14 | -24.1 | -21.4 | -28.9 | 3.4 | 24.7 | n/a | 80.2 | n/a | n/a | n/a |
| 29-Jan-14 | -20.5 | -19.3 | -23.2 | 5.1 | 37.8 | n/a | 83.4 | n/a | n/a | n/a |
| 30-Jan-14 | -19.0 | -17.1 | -22.1 | 6.8 | 27.1 | n/a | 84.0 | n/a | n/a | n/a |
| 31-Jan-14 | -26.7 | -22.1 | -29.6 | 5.8 | 21.0 | n/a | 76.4 | n/a | n/a | n/a |
| 1-Feb-14 | -21.8 | -17.4 | -25.8 | 5.1 | 29.2 | n/a | 82.1 | n/a | n/a | n/a |
| 2-Feb-14 | -24.8 | -17.3 | -29.3 | 8.4 | 22.2 | n/a | 78.6 | n/a | n/a | n/a |
| 3-Feb-14 | -17.0 | -14.5 | -22.1 | 6.9 | 27.4 | n/a | 86.5 | n/a | n/a | n/a |
| 4-Feb-14 | -15.6 | -13.2 | -18.9 | 13.2 | 31.5 | n/a | 88.1 | n/a | n/a | n/a |
| 5-Feb-14 | -16.4 | -12.6 | -19.9 | 7.6 | 40.3 | n/a | 81.2 | n/a | n/a | n/a |
| 6-Feb-14 | -20.8 | -18.7 | -26.8 | 8.4 | 26.7 | n/a | 81.9 | n/a | n/a | n/a |
| 7-Feb-14 | -25.9 | -23.4 | -28.2 | 17.8 | 27.9 | n/a | 76.1 | n/a | n/a | n/a |
| 8-Feb-14 | -22.9 | -20.6 | -25.8 | 10.7 | 50.7 | n/a | 80.1 | n/a | n/a | n/a |
| 9-Feb-14 | -25.4 | -23.8 | -26.8 | 10.4 | 35.6 | n/a | 77.2 | n/a | n/a | n/a |
| 10-Feb-14 | -31.1 | -25.7 | -34.6 | 20.0 | 24.0 | n/a | 73.2 | n/a | n/a | n/a |
| 11-Feb-14 | -25.4 | -22.2 | -31.6 | 13.6 | 37.3 | n/a | 78.7 | n/a | n/a | n/a |
| 12-Feb-14 | -25.5 | -22.8 | -29.1 | 20.4 | 26.8 | n/a | 79.1 | n/a | n/a | n/a |
| 13-Feb-14 | -29.9 | -26.6 | -33.6 | 21.7 | 6.9 | n/a | 74.9 | n/a | n/a | n/a |
| 14-Feb-14 | -32.8 | -30.7 | -35.9 | 16.2 | 5.0 | n/a | 71.6 | n/a | n/a | n/a |
| 15-Feb-14 | -30.4 | -24.4 | -36.1 | 14.7 | 22.1 | n/a | 73.8 | n/a | n/a | n/a |
| 16-Feb-14 | -32.0 | -25.4 | -36.5 | 30.2 | 23.8 | n/a | 71.7 | n/a | n/a | n/a |
| 17-Feb-14 | -34.2 | -31.0 | -37.0 | 23.1 | 11.5 | n/a | 69.8 | n/a | n/a | n/a |
| 18-Feb-14 | -30.8 | -26.8 | -34.1 | 29.1 | 12.2 | n/a | 72.6 | n/a | n/a | n/a |
| 19-Feb-14 | -32.6 | -30.1 | -34.2 | 24.4 | 10.1 | n/a | 71.7 | n/a | n/a | n/a |
| 20-Feb-14 | -33.0 | -31.7 | -34.6 | 35.2 | 38.6 | n/a | 71.0 | n/a | n/a | n/a |
| 21-Feb-14 | -31.8 | -30.9 | -32.6 | 39.1 | 32.7 | n/a | 71.9 | n/a | n/a | n/a |
| 22-Feb-14 | -31.7 | -30.6 | -33.0 | 36.6 | 40.9 | n/a | 71.8 | n/a | n/a | n/a |
| 23-Feb-14 | -27.7 | -24.1 | -31.8 | 36.8 | 41.5 | n/a | 75.4 | n/a | n/a | n/a |
| 24-Feb-14 | -30.8 | -28.1 | -32.9 | 41.7 | 42.6 | n/a | 72.6 | n/a | n/a | n/a |
| 25-Feb-14 | -33.5 | -28.8 | -37.9 | 36.8 | 30.4 | n/a | 70.0 | n/a | n/a | n/a |
| 26-Feb-14 | -37.5 | -36.1 | -39.1 | 56.0 | 32.6 | n/a | 65.9 | n/a | n/a | n/a |
| 27-Feb-14 | -36.5 | -33.2 | -39.7 | 50.1 | 27.5 | n/a | 66.8 | n/a | n/a | n/a |
| 28-Feb-14 | -34.4 | -32.6 | -36.7 | 62.2 | 27.8 | n/a | 68.6 | n/a | n/a | n/a |
| 1-Mar-14 | -29.5 | -25.2 | -33.4 | 41.8 | 39.2 | n/a | 74.2 | n/a | n/a | n/a |
| 2-Mar-14 | -26.6 | -24.0 | -30.1 | 64.0 | 42.5 | n/a | 72.7 | n/a | n/a | n/a |
| 3-Mar-14 | -21.4 | -14.9 | -29.0 | 52.0 | 23.3 | n/a | 59.1 | n/a | n/a | n/a |
| 4-Mar-14 | -19.0 | -17.8 | -21.9 | 41.4 | 37.9 | n/a | 83.2 | n/a | n/a | n/a |
| 5-Mar-14 | -25.2 | -19.9 | -28.0 | 64.9 | 32.1 | n/a | 77.0 | n/a | n/a | n/a |
| 6-Mar-14 | -24.9 | -23.6 | -26.3 | 49.5 | 50.1 | n/a | 77.5 | n/a | n/a | n/a |
| 7-Mar-14 | -24.0 | -21.3 | -27.5 | 56.5 | 45.7 | n/a | 79.2 | n/a | n/a | n/a |
| 8-Mar-14 | -26.2 | -24.6 | -29.8 | 64.2 | 32.2 | n/a | 76.8 | n/a | n/a | n/a |

*Note:*

[1] *Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| Date | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation ($W/m^2$) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 9-Mar-14 | -35.5 | -29.7 | -37.9 | 75.3 | 13.8 | n/a | 67.5 | n/a | n/a | n/a |
| 10-Mar-14 | -32.9 | -29.5 | -36.8 | 82.3 | 37.3 | n/a | 67.4 | n/a | n/a | n/a |
| 11-Mar-14 | -28.2 | -26.0 | -31.0 | 84.7 | 31.1 | n/a | 62.1 | n/a | n/a | n/a |
| 12-Mar-14 | -31.2 | -28.0 | -34.9 | 93.0 | 5.3 | n/a | 67.2 | n/a | n/a | n/a |
| 13-Mar-14 | -31.0 | -26.2 | -34.2 | 97.7 | 4.3 | n/a | 67.3 | n/a | n/a | n/a |
| 14-Mar-14 | -28.4 | -22.3 | -33.2 | 102.1 | 9.6 | n/a | 67.8 | n/a | n/a | n/a |
| 15-Mar-14 | -23.9 | -19.2 | -26.5 | 103.8 | 10.1 | n/a | 67.8 | n/a | n/a | n/a |
| 16-Mar-14 | -20.8 | -17.7 | -26.9 | 68.1 | 19.1 | n/a | 80.0 | n/a | n/a | n/a |
| 17-Mar-14 | -19.6 | -17.3 | -22.9 | 75.7 | 14.5 | n/a | 80.3 | n/a | n/a | n/a |
| 18-Mar-14 | -22.6 | -19.6 | -25.3 | 80.0 | 15.5 | n/a | 79.2 | n/a | n/a | n/a |
| 19-Mar-14 | -26.7 | -25.3 | -28.3 | 100.2 | 25.4 | n/a | 73.6 | n/a | n/a | n/a |
| 20-Mar-14 | -24.4 | -21.8 | -26.3 | 107.1 | 28.0 | n/a | 75.5 | n/a | n/a | n/a |
| 21-Mar-14 | -22.3 | -18.6 | -26.0 | 106.4 | 43.7 | n/a | 79.0 | n/a | n/a | n/a |
| 22-Mar-14 | -18.6 | -15.3 | -27.1 | 100.3 | 33.9 | n/a | 82.4 | n/a | n/a | n/a |
| 23-Mar-14 | -25.4 | -21.4 | -30.5 | 94.3 | 39.0 | n/a | 76.2 | n/a | n/a | n/a |
| 24-Mar-14 | -23.5 | -20.8 | -26.6 | 106.2 | 32.6 | n/a | 78.6 | n/a | n/a | n/a |
| 25-Mar-14 | -23.0 | -21.0 | -25.1 | 108.2 | 26.7 | n/a | 77.1 | n/a | n/a | n/a |
| 26-Mar-14 | -24.7 | -22.0 | -26.9 | 126.0 | 25.4 | n/a | 74.8 | n/a | n/a | n/a |
| 27-Mar-14 | -24.6 | -20.4 | -28.3 | 112.9 | 17.6 | n/a | 76.3 | n/a | n/a | n/a |
| 28-Mar-14 | -29.1 | -25.8 | -32.0 | 137.6 | 19.3 | n/a | 71.8 | n/a | n/a | n/a |
| 29-Mar-14 | -28.9 | -25.1 | -32.2 | 138.5 | 18.4 | n/a | 71.9 | n/a | n/a | n/a |
| 30-Mar-14 | -27.3 | -22.4 | -30.9 | 137.1 | 17.0 | n/a | 71.0 | n/a | n/a | n/a |
| 31-Mar-14 | -27.4 | -22.0 | -31.9 | 151.1 | 5.5 | n/a | 71.5 | n/a | n/a | n/a |
| 1-Apr-14 | -28.8 | -24.7 | -34.6 | 129.3 | 34.7 | n/a | 73.9 | n/a | n/a | n/a |
| 2-Apr-14 | -23.4 | -21.2 | -25.2 | 108.9 | 38.6 | n/a | 78.6 | n/a | n/a | n/a |
| 3-Apr-14 | -24.5 | -21.0 | -28.1 | 144.0 | 32.9 | n/a | 76.8 | n/a | n/a | n/a |
| 4-Apr-14 | -25.2 | -19.5 | -30.1 | 163.1 | 12.4 | n/a | 74.8 | n/a | n/a | n/a |
| 5-Apr-14 | -28.9 | -26.0 | -32.3 | 167.6 | 16.7 | n/a | 72.7 | n/a | n/a | n/a |
| 6-Apr-14 | -27.7 | -23.2 | -31.1 | 161.0 | 33.0 | n/a | 74.8 | n/a | n/a | n/a |
| 7-Apr-14 | -26.1 | -18.1 | -30.4 | 158.3 | 16.0 | n/a | 75.7 | n/a | n/a | n/a |
| 8-Apr-14 | -25.3 | -20.8 | -30.2 | 156.4 | 15.7 | n/a | 76.3 | n/a | n/a | n/a |
| 9-Apr-14 | -28.0 | -26.1 | -30.3 | 177.1 | 16.5 | n/a | 71.7 | n/a | n/a | n/a |
| 10-Apr-14 | -27.5 | -24.1 | -30.8 | 185.8 | 34.9 | n/a | 74.3 | n/a | n/a | n/a |
| 11-Apr-14 | -25.1 | -21.7 | -28.0 | 181.1 | 34.8 | n/a | 77.0 | n/a | n/a | n/a |
| 12-Apr-14 | -24.9 | -22.6 | -28.1 | 190.4 | 26.4 | n/a | 73.1 | n/a | n/a | n/a |
| 13-Apr-14 | -22.7 | -18.0 | -27.0 | 190.5 | 25.0 | n/a | 75.9 | n/a | n/a | n/a |
| 14-Apr-14 | -21.0 | -12.8 | -27.8 | 200.0 | 2.8 | n/a | 71.2 | n/a | n/a | n/a |
| 15-Apr-14 | -17.1 | -5.0 | -25.8 | 195.3 | 2.9 | n/a | 69.0 | n/a | n/a | n/a |
| 16-Apr-14 | -10.8 | -6.8 | -18.2 | 191.9 | 26.1 | n/a | 67.9 | n/a | n/a | n/a |
| 17-Apr-14 | -16.5 | -10.4 | -23.7 | 210.8 | 11.8 | n/a | 78.9 | n/a | n/a | n/a |
| 18-Apr-14 | -4.9 | 0.1 | -11.7 | 214.8 | 20.1 | n/a | 70.5 | n/a | n/a | n/a |
| 19-Apr-14 | -4.1 | 4.9 | -10.2 | 196.8 | 6.6 | 101.1 | 76.9 | n/a | n/a | n/a |
| 20-Apr-14 | -11.8 | -10.2 | -14.4 | 151.8 | 11.5 | 101.5 | 86.4 | n/a | n/a | n/a |
| 21-Apr-14 | -15.7 | -12.4 | -22.3 | 206.9 | 9.8 | 102.1 | 80.1 | n/a | n/a | n/a |
| 22-Apr-14 | -18.5 | -15.0 | -22.7 | 213.4 | 18.6 | 102.6 | 82.2 | n/a | n/a | n/a |
| 23-Apr-14 | -15.5 | -12.4 | -19.4 | 219.4 | 34.0 | 102.7 | 85.1 | n/a | n/a | n/a |
| 24-Apr-14 | -12.8 | -4.5 | -18.1 | 200.4 | 6.3 | 103.0 | 83.4 | n/a | n/a | n/a |
| 25-Apr-14 | -15.6 | -11.2 | -21.4 | 211.2 | 10.6 | 102.9 | 84.8 | n/a | n/a | n/a |
| 26-Apr-14 | -19.3 | -14.5 | -24.3 | 219.4 | 12.6 | 102.0 | 80.6 | n/a | n/a | n/a |
| 27-Apr-14 | -14.5 | -4.6 | -22.8 | 203.6 | 18.6 | 100.9 | 83.4 | n/a | n/a | n/a |
| 28-Apr-14 | -4.2 | 3.9 | -10.2 | 214.7 | 17.8 | 101.0 | 86.4 | n/a | n/a | n/a |
| 29-Apr-14 | -9.9 | -4.1 | -14.9 | 169.5 | 16.5 | 102.3 | 84.9 | n/a | n/a | n/a |
| 30-Apr-14 | -9.4 | -7.2 | -10.8 | 202.0 | 14.1 | 102.2 | 92.6 | n/a | n/a | n/a |

*Note:*

[1] *Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation ($W/m^2$) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 1-May-14 | -13.8 | -10.7 | -17.5 | 208.2 | 35.3 | 102.3 | 82.8 | n/a | n/a | n/a |
| 2-May-14 | -16.9 | -13.0 | -22.5 | 246.6 | 22.7 | 102.8 | 78.2 | n/a | n/a | n/a |
| 3-May-14 | -16.8 | -13.8 | -20.9 | 258.5 | 12.6 | 103.1 | 79.4 | n/a | n/a | n/a |
| 4-May-14 | -17.6 | -9.1 | -24.6 | 238.5 | 2.9 | 103.0 | 78.5 | n/a | n/a | n/a |
| 5-May-14 | -15.6 | -7.2 | -22.1 | 262.1 | 3.7 | 102.8 | 78.9 | n/a | n/a | n/a |
| 6-May-14 | -13.2 | -5.2 | -22.3 | 268.8 | 8.0 | 102.5 | 76.9 | n/a | n/a | n/a |
| 7-May-14 | -7.8 | -1.0 | -15.9 | 272.7 | 13.5 | 102.2 | 75.3 | n/a | n/a | n/a |
| 8-May-14 | -7.0 | -2.4 | -13.2 | 278.6 | 17.3 | 102.0 | 81.3 | n/a | n/a | n/a |
| 9-May-14 | -4.1 | 2.3 | -10.8 | 244.7 | 9.0 | 102.0 | 84.8 | n/a | n/a | n/a |
| 10-May-14 | -0.9 | 0.7 | -3.0 | 189.7 | 10.9 | 102.2 | 85.0 | n/a | n/a | n/a |
| 11-May-14 | -3.7 | -0.5 | -6.5 | 171.6 | 24.1 | 102.4 | 88.9 | n/a | n/a | n/a |
| 12-May-14 | -8.1 | -6.5 | -10.7 | 244.3 | 25.7 | 102.6 | 82.2 | n/a | n/a | n/a |
| 13-May-14 | -7.1 | -0.9 | -13.3 | 285.9 | 11.3 | 102.5 | 84.6 | n/a | n/a | n/a |
| 14-May-14 | -1.2 | 6.0 | -9.0 | 258.2 | 17.8 | 101.4 | 85.1 | n/a | n/a | n/a |
| 15-May-14 | -2.4 | -0.4 | -6.5 | 195.6 | 38.8 | 101.5 | 88.3 | n/a | n/a | n/a |
| 16-May-14 | -3.9 | -2.2 | -6.2 | 233.0 | 27.3 | 101.3 | 84.5 | n/a | n/a | n/a |
| 17-May-14 | -3.7 | 0.4 | -6.1 | 256.9 | 19.8 | 101.7 | 78.9 | n/a | n/a | n/a |
| 18-May-14 | 1.1 | 4.0 | -0.3 | 177.1 | 11.5 | 100.8 | 93.5 | n/a | n/a | n/a |
| 19-May-14 | -3.7 | 0.5 | -7.3 | 197.6 | 19.4 | n/a | 87.0 | n/a | n/a | n/a |
| 20-May-14 | -7.6 | -5.9 | -9.2 | 270.0 | 13.4 | n/a | 82.5 | n/a | n/a | n/a |
| 21-May-14 | -7.5 | -5.4 | -9.7 | 213.7 | 18.6 | n/a | 92.1 | n/a | n/a | n/a |
| 22-May-14 | -5.8 | -4.0 | -7.1 | 239.3 | 21.3 | n/a | 89.7 | n/a | n/a | n/a |
| 23-May-14 | -3.3 | 1.3 | -7.9 | 206.8 | 16.9 | 101.0 | 90.5 | n/a | n/a | n/a |
| 24-May-14 | 0.7 | 2.3 | -1.3 | 87.9 | 19.7 | 100.5 | 93.8 | 0.5 | n/a | n/a |
| 25-May-14 | -3.6 | 0.5 | -6.9 | 303.7 | 38.3 | 99.4 | 88.8 | 1.8 | n/a | n/a |
| 26-May-14 | 0.6 | 5.3 | -3.1 | 203.4 | 28.0 | 101.2 | 84.8 | 0.0 | n/a | n/a |
| 27-May-14 | -0.4 | 3.3 | -5.3 | 296.8 | 11.9 | 102.1 | 82.0 | 0.0 | n/a | n/a |
| 28-May-14 | 7.5 | 12.0 | 0.4 | 294.3 | 17.0 | 101.7 | 67.4 | 0.0 | n/a | n/a |
| 29-May-14 | 5.9 | 13.7 | 0.8 | 222.8 | 18.9 | 101.2 | 77.7 | 0.0 | n/a | n/a |
| 30-May-14 | -0.5 | 1.4 | -3.7 | 98.4 | 24.3 | 101.3 | 93.0 | 0.0 | n/a | n/a |
| 31-May-14 | -3.9 | -1.8 | -6.3 | 253.1 | 20.9 | 101.5 | 79.3 | 0.0 | n/a | n/a |
| 1-Jun-14 | -5.7 | -2.4 | -7.9 | 267.4 | 18.1 | 101.5 | 75.6 | 0.0 | n/a | n/a |
| 2-Jun-14 | -5.4 | -4.0 | -7.2 | 172.7 | 25.2 | 101.5 | 74.8 | 0.0 | n/a | n/a |
| 3-Jun-14 | -3.9 | -2.6 | -5.8 | 155.4 | 38.8 | 101.4 | 89.0 | 0.8 | n/a | n/a |
| 4-Jun-14 | -2.4 | -1.4 | -3.4 | 178.7 | 23.8 | 101.9 | 89.0 | 0.8 | n/a | n/a |
| 5-Jun-14 | -2.5 | -1.3 | -3.4 | 203.7 | 19.4 | 102.0 | 89.3 | 0.0 | n/a | n/a |
| 6-Jun-14 | -1.7 | 1.1 | -3.8 | 336.4 | 15.4 | 101.9 | 79.9 | 0.0 | n/a | n/a |
| 7-Jun-14 | 1.4 | 5.0 | -5.1 | 342.0 | 7.6 | 101.8 | 70.3 | 0.0 | n/a | n/a |
| 8-Jun-14 | 1.6 | 5.5 | -3.0 | 343.0 | 11.1 | 101.4 | 70.9 | 0.0 | n/a | n/a |
| 9-Jun-14 | 2.8 | 9.7 | -2.8 | 333.3 | 21.7 | 101.0 | 76.6 | 0.0 | n/a | n/a |
| 10-Jun-14 | 0.2 | 3.3 | -2.9 | 286.2 | 23.8 | 101.3 | 83.3 | 0.0 | n/a | n/a |
| 11-Jun-14 | 1.7 | 5.9 | -2.5 | 335.9 | 14.3 | 102.0 | 73.6 | 0.0 | n/a | n/a |
| 12-Jun-14 | 6.0 | 12.8 | -0.1 | 163.5 | 11.7 | 101.7 | 75.4 | 0.0 | n/a | n/a |
| 13-Jun-14 | 2.2 | 4.7 | 0.8 | 80.6 | 22.9 | 100.9 | 92.1 | 1.8 | n/a | n/a |
| 14-Jun-14 | 3.1 | 6.1 | 0.6 | 309.9 | 27.2 | 100.6 | 77.3 | 0.0 | n/a | n/a |
| 15-Jun-14 | 2.8 | 6.7 | -0.4 | 316.8 | 20.1 | 101.2 | 82.2 | 0.0 | n/a | n/a |
| 16-Jun-14 | 6.2 | 12.7 | -0.9 | 295.4 | 15.4 | 101.7 | 70.6 | 0.0 | n/a | n/a |
| 17-Jun-14 | 11.1 | 18.2 | 5.6 | 286.7 | 15.6 | 101.1 | 75.7 | 1.0 | n/a | n/a |
| 18-Jun-14 | 11.2 | 22.6 | 5.0 | 191.0 | 10.7 | 100.2 | 77.4 | 1.3 | n/a | n/a |
| 19-Jun-14 | 5.7 | 8.5 | 2.7 | 257.4 | 25.6 | 100.6 | 84.9 | 0.0 | n/a | n/a |
| 20-Jun-14 | 4.3 | 7.3 | 2.6 | 179.2 | 16.3 | 101.5 | 88.2 | 0.0 | n/a | n/a |
| 21-Jun-14 | 6.1 | 9.6 | 1.6 | 344.4 | 16.3 | 102.3 | 66.5 | 0.0 | n/a | n/a |
| 22-Jun-14 | 8.6 | 13.2 | 2.0 | 345.9 | 7.1 | 102.5 | 52.2 | 0.0 | n/a | n/a |

*Note:*

[1] *Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation (W/m$^2$) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 23-Jun-14 | 13.4 | 20.0 | 3.3 | 284.7 | 12.6 | 101.7 | 46.4 | 0.0 | n/a | n/a |
| 24-Jun-14 | 14.1 | 20.3 | 8.0 | 302.5 | 12.8 | 100.8 | 53.4 | 0.0 | n/a | n/a |
| 25-Jun-14 | 13.5 | 19.7 | 8.3 | 320.2 | 18.9 | 100.1 | 64.1 | 0.0 | n/a | n/a |
| 26-Jun-14 | 7.8 | 10.8 | 3.8 | 244.6 | 19.5 | 100.3 | 70.3 | 0.0 | n/a | n/a |
| 27-Jun-14 | 4.3 | 7.2 | 2.3 | 85.0 | 28.2 | 100.4 | 78.5 | 1.8 | n/a | n/a |
| 28-Jun-14 | 2.6 | 3.3 | 1.7 | 72.1 | 27.8 | 100.7 | 91.0 | 4.1 | n/a | n/a |
| 29-Jun-14 | 9.1 | 14.1 | 2.8 | 342.0 | 11.6 | 101.4 | 59.4 | 0.0 | n/a | n/a |
| 30-Jun-14 | 13.3 | 18.2 | 5.8 | 304.3 | 6.4 | 101.6 | 48.3 | 0.0 | n/a | n/a |
| 1-Jul-14 | 13.5 | 17.3 | 8.0 | 303.5 | 12.2 | 101.5 | 59.3 | 0.0 | n/a | n/a |
| 2-Jul-14 | 15.5 | 20.8 | 8.4 | 316.0 | 8.3 | 101.4 | 54.2 | 0.0 | n/a | n/a |
| 3-Jul-14 | 6.1 | 12.0 | 3.4 | 246.7 | 21.3 | 101.4 | 83.4 | 0.0 | n/a | n/a |
| 4-Jul-14 | 5.4 | 11.7 | -0.2 | 278.5 | 18.8 | 101.4 | 75.1 | 0.0 | n/a | n/a |
| 5-Jul-14 | 5.6 | 12.5 | 2.8 | 99.6 | 17.8 | 100.7 | 84.9 | 1.5 | n/a | n/a |
| 6-Jul-14 | 4.4 | 6.0 | 3.0 | 118.0 | 22.7 | 100.9 | 92.4 | 0.0 | n/a | n/a |
| 7-Jul-14 | 6.1 | 9.5 | 3.3 | 191.7 | 15.6 | 101.2 | 81.3 | 0.0 | n/a | n/a |
| 8-Jul-14 | 8.9 | 12.1 | 6.6 | 294.8 | 14.6 | 101.1 | 71.2 | 0.0 | n/a | n/a |
| 9-Jul-14 | 8.9 | 12.4 | 3.0 | 309.7 | 8.1 | 101.0 | 66.8 | 0.0 | n/a | n/a |
| 10-Jul-14 | 9.4 | 12.7 | 4.6 | 279.2 | 7.8 | 100.9 | 63.8 | 0.0 | n/a | n/a |
| 11-Jul-14 | 9.5 | 12.8 | 6.1 | 241.9 | 15.3 | 101.4 | 68.9 | 0.0 | n/a | n/a |
| 12-Jul-14 | 11.9 | 15.5 | 8.0 | 308.5 | 12.6 | 102.0 | 57.8 | 0.0 | n/a | n/a |
| 13-Jul-14 | 15.9 | 22.0 | 7.6 | 192.7 | 26.3 | 101.6 | 55.6 | 0.0 | n/a | n/a |
| 14-Jul-14 | 16.6 | 22.8 | 10.5 | 243.0 | 16.7 | 100.9 | 63.5 | 0.0 | n/a | n/a |
| 15-Jul-14 | 16.9 | 21.1 | 13.0 | 285.1 | 14.0 | 100.6 | 63.6 | 1.0 | 5.26 | 5.73 |
| 16-Jul-14 | 11.9 | 16.0 | 7.8 | 69.5 | 11.7 | 99.9 | 84.3 | 10.2 | 0.92 | 0.90 |
| 17-Jul-14 | 6.3 | 7.8 | 4.8 | 66.9 | 29.8 | 99.1 | 89.0 | 4.8 | 0.67 | 0.48 |
| 18-Jul-14 | 5.5 | 8.4 | 4.0 | 37.3 | 39.0 | 99.2 | 87.2 | 11.4 | 0.54 | 0.10 |
| 19-Jul-14 | 6.5 | 8.8 | 4.6 | 87.7 | 24.3 | 99.7 | 79.9 | 0.0 | 1.39 | 1.22 |
| 20-Jul-14 | 8.5 | 12.0 | 5.1 | 243.4 | 13.7 | 100.2 | 76.0 | 0.0 | 3.73 | 4.26 |
| 21-Jul-14 | 12.2 | 16.5 | 7.9 | 281.0 | 8.4 | 100.7 | 66.4 | 0.0 | 4.33 | 4.98 |
| 22-Jul-14 | 12.1 | 17.7 | 7.0 | 217.8 | 15.9 | 101.1 | 77.2 | 0.0 | 3.27 | 3.60 |
| 23-Jul-14 | 18.1 | 25.5 | 11.0 | 240.1 | 8.1 | 100.9 | 61.2 | 0.0 | 4.53 | 5.15 |
| 24-Jul-14 | 19.7 | 27.0 | 13.7 | 128.5 | 16.2 | 100.3 | 67.2 | 0.0 | 2.39 | 2.40 |
| 25-Jul-14 | 15.6 | 19.5 | 11.8 | 87.8 | 8.7 | 100.6 | 86.1 | 1.8 | 0.94 | 1.00 |
| 26-Jul-14 | 11.7 | 13.0 | 9.9 | 65.3 | 17.9 | 101.4 | 94.6 | 0.0 | 1.12 | 1.17 |
| 27-Jul-14 | 10.7 | 13.4 | 8.4 | 113.2 | 13.6 | 101.5 | 87.6 | 0.0 | 1.76 | 1.89 |
| 28-Jul-14 | 11.1 | 12.4 | 9.3 | 41.7 | 8.2 | 101.6 | 94.8 | 1.3 | 0.50 | 0.53 |
| 29-Jul-14 | 10.2 | 11.8 | 8.4 | 98.3 | 17.5 | 101.4 | 92.3 | 0.0 | 1.21 | 1.35 |
| 30-Jul-14 | 12.7 | 20.5 | 8.0 | 66.6 | 17.3 | 101.1 | 89.3 | 2.0 | 1.00 | 0.95 |
| 31-Jul-14 | 7.5 | 9.4 | 5.1 | 157.5 | 31.8 | 100.2 | 84.9 | 7.6 | 2.10 | 2.12 |
| 1-Aug-14 | 6.8 | 9.2 | 3.6 | 163.2 | 19.5 | 101.1 | 74.2 | 0.0 | 1.57 | 1.43 |
| 2-Aug-14 | 7.4 | 10.5 | 2.3 | 227.2 | 8.7 | 100.8 | 71.9 | 0.0 | 2.27 | 2.53 |
| 3-Aug-14 | 8.7 | 10.8 | 5.7 | 108.9 | 22.8 | 100.8 | 82.5 | 6.6 | 1.03 | 0.85 |
| 4-Aug-14 | 8.5 | 13.1 | 4.0 | 209.0 | 22.1 | 101.1 | 78.1 | 0.0 | 2.51 | 2.54 |
| 5-Aug-14 | 7.7 | 10.0 | 6.1 | 147.7 | 14.4 | 101.1 | 75.0 | 0.0 | 1.71 | 1.74 |
| 6-Aug-14 | 6.7 | 8.0 | 4.2 | 190.0 | 18.2 | 101.2 | 73.3 | 0.0 | 2.07 | 2.18 |
| 7-Aug-14 | 6.7 | 8.5 | 4.1 | 145.0 | 13.6 | 101.3 | 72.1 | 0.0 | 1.35 | 1.29 |
| 8-Aug-14 | 7.6 | 10.5 | 3.8 | 203.4 | 21.2 | 101.6 | 71.8 | 0.0 | 2.58 | 2.64 |
| 9-Aug-14 | 9.4 | 13.5 | 3.3 | 154.3 | 12.1 | 101.3 | 69.3 | 0.0 | 1.75 | 1.74 |
| 10-Aug-14 | 9.1 | 12.4 | 4.6 | 140.6 | 15.7 | 101.1 | 72.9 | 0.0 | 1.72 | 1.67 |
| 11-Aug-14 | 7.5 | 10.4 | 5.1 | 220.8 | 27.8 | 101.2 | 84.0 | 0.0 | 2.24 | 2.33 |
| 12-Aug-14 | 9.6 | 13.2 | 6.2 | 220.7 | 19.7 | 100.9 | 76.9 | 0.0 | 2.56 | 2.68 |
| 13-Aug-14 | 9.0 | 13.4 | 4.9 | 208.0 | 17.2 | 100.4 | 79.7 | 0.0 | 2.25 | 2.30 |
| 14-Aug-14 | 5.7 | 9.0 | 3.8 | 132.9 | 15.9 | 101.0 | 74.7 | 0.0 | 1.77 | 1.66 |

*Note:*

*[1] Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*

**Appendix A. Doris North Meteorological Station and Micro-meteorological Station, Daily Data, October 2013 to September 2014**

| | Doris North Meteorological Station | | | | | | | | Micro-meteorological Station, Calculated Daily Evaporation (mm) | |
|---|---|---|---|---|---|---|---|---|---|---|
| Date | Mean Daily Air Temperature (°C) | Daily Maximum Air Temperature (°C) | Daily Minimum Air Temperature (°C) | Mean Daily Solar Radiation (W/m²) | Mean Daily Wind Speed (m/s) | Barometric Pressure (kPa) | Mean Daily Relative Humidity (%) | Total Daily Precipitation (mm)[1] | Penman Method | Priestly-Taylor Method |
| 15-Aug-14 | 7.6 | 11.2 | 4.3 | 168.8 | 7.9 | 101.3 | 70.7 | 0.0 | 1.98 | 2.07 |
| 16-Aug-14 | 7.4 | 10.4 | 4.3 | 140.2 | 20.2 | 101.0 | 73.8 | 0.0 | 2.13 | 1.78 |
| 17-Aug-14 | 3.9 | 5.6 | 2.4 | 79.9 | 28.1 | 100.8 | 80.6 | 0.0 | 0.93 | 0.50 |
| 18-Aug-14 | 5.0 | 7.5 | 2.6 | 171.9 | 14.0 | 101.0 | 81.0 | 0.5 | 1.40 | 1.44 |
| 19-Aug-14 | 6.7 | 8.4 | 4.2 | 81.7 | 15.6 | 100.7 | 73.9 | 0.0 | 0.89 | 0.72 |
| 20-Aug-14 | 6.4 | 8.2 | 3.8 | 113.9 | 11.7 | 101.3 | 73.9 | 0.0 | 1.29 | 1.17 |
| 21-Aug-14 | 7.1 | 10.0 | 3.7 | 191.2 | 20.1 | 102.2 | 73.4 | 0.0 | 1.86 | 1.78 |
| 22-Aug-14 | 8.6 | 13.7 | 4.3 | 176.0 | 11.8 | 102.5 | 63.1 | 0.0 | 1.57 | 1.50 |
| 23-Aug-14 | 11.5 | 18.1 | 4.1 | 170.9 | 12.4 | 102.0 | 64.2 | 0.0 | 2.15 | 1.98 |
| 24-Aug-14 | 10.5 | 13.9 | 6.7 | 161.2 | 11.0 | 101.4 | 80.6 | 0.0 | 1.52 | 1.61 |
| 25-Aug-14 | 9.7 | 13.2 | 6.2 | 48.7 | 13.5 | 100.6 | 88.7 | 0.3 | 0.13 | 0.00 |
| 26-Aug-14 | 9.6 | 12.4 | 8.1 | 38.8 | 13.9 | 99.7 | 92.2 | 4.3 | 0.34 | 0.28 |
| 27-Aug-14 | 6.0 | 8.7 | 3.9 | 45.1 | 19.1 | 99.7 | 86.9 | 0.8 | 0.20 | 0.00 |
| 28-Aug-14 | 6.4 | 9.9 | 3.5 | 173.9 | 23.2 | 100.6 | 77.9 | 0.0 | 2.04 | 1.88 |
| 29-Aug-14 | 6.0 | 7.8 | 4.6 | 149.4 | 13.9 | 100.6 | 81.0 | 0.0 | 1.51 | 1.52 |
| 30-Aug-14 | 7.7 | 12.5 | 4.8 | 173.7 | 14.6 | 100.5 | 75.3 | 0.0 | 1.70 | 1.49 |
| 31-Aug-14 | 8.6 | 13.4 | 2.7 | 169.3 | 17.4 | 100.5 | 73.4 | 0.0 | 1.52 | 1.13 |
| 1-Sep-14 | 8.5 | 13.4 | 3.5 | 84.5 | 17.0 | 100.4 | 81.9 | 1.0 | 0.67 | 0.34 |
| 2-Sep-14 | 8.0 | 9.0 | 7.3 | 24.4 | 8.6 | 100.4 | 93.9 | 6.4 | 0.00 | 0.00 |
| 3-Sep-14 | 9.5 | 15.2 | 6.5 | 97.6 | 16.8 | 100.3 | 83.2 | 0.5 | 0.86 | 0.68 |
| 4-Sep-14 | 2.8 | 6.5 | 0.8 | 40.2 | 15.4 | 100.6 | 86.3 | 10.7 | 0.00 | 0.00 |
| 5-Sep-14 | 4.1 | 6.5 | 2.2 | 95.9 | 40.1 | 100.4 | 77.0 | 1.0 | 0.65 | 0.03 |
| 6-Sep-14 | 2.2 | 3.9 | 0.6 | 95.5 | 17.4 | 99.9 | 91.2 | 6.9 | 0.10 | 0.00 |
| 7-Sep-14 | 1.5 | 2.8 | 0.2 | 59.9 | 23.0 | 100.9 | 82.9 | 1.3 | 0.30 | 0.01 |
| 8-Sep-14 | 2.0 | 4.9 | 0.5 | 62.9 | 18.7 | 101.5 | 87.8 | 0.0 | 0.06 | 0.00 |
| 9-Sep-14 | 3.0 | 5.4 | 1.0 | 107.5 | 29.5 | 101.8 | 85.3 | 0.0 | 0.69 | 0.50 |
| 10-Sep-14 | 3.1 | 5.7 | 0.3 | 66.6 | 23.2 | 101.5 | 77.3 | 0.0 | 0.55 | 0.18 |
| 11-Sep-14 | 0.0 | 0.7 | -1.1 | 33.2 | 9.3 | 101.7 | 75.5 | 0.0 | 0.13 | 0.00 |
| 12-Sep-14 | 1.1 | 3.3 | -1.2 | 54.8 | 32.7 | 101.5 | 79.8 | 0.3 | 0.50 | 0.18 |
| 13-Sep-14 | 0.8 | 2.3 | -0.8 | 37.3 | 24.5 | 100.7 | 83.5 | 0.5 | 0.00 | 0.00 |
| 14-Sep-14 | -1.5 | 0.5 | -2.9 | 82.4 | 28.7 | 101.3 | 69.3 | 0.0 | 0.70 | 0.15 |
| 15-Sep-14 | -1.8 | -0.6 | -3.1 | 43.4 | 25.6 | 101.8 | 72.5 | 0.0 | 0.38 | 0.00 |
| 16-Sep-14 | -1.7 | 0.1 | -3.3 | 62.2 | 16.0 | 101.9 | 73.8 | 0.0 | 0.31 | 0.01 |
| 17-Sep-14 | -0.5 | 2.8 | -3.6 | 63.9 | 27.1 | 100.7 | 83.7 | 0.0 | 0.44 | 0.02 |
| 18-Sep-14 | 0.3 | 1.6 | -0.9 | 37.0 | 27.5 | 100.1 | 90.9 | 0.0 | 0.43 | 0.19 |
| 19-Sep-14 | -0.5 | 0.8 | -1.3 | 46.4 | 24.3 | 100.3 | 86.1 | 0.0 | 0.41 | 0.09 |
| 20-Sep-14 | -2.4 | -1.2 | -5.2 | 77.0 | 18.7 | 100.7 | 84.7 | 0.0 | 0.23 | 0.00 |
| 21-Sep-14 | -3.1 | 0.6 | -6.2 | 113.7 | 7.1 | 101.0 | 84.4 | 0.0 | 0.00 | 0.00 |
| 22-Sep-14 | -2.8 | 0.1 | -6.3 | 63.1 | 30.4 | 100.6 | 88.3 | 0.0 | 0.23 | 0.00 |
| 23-Sep-14 | 0.7 | 1.7 | -1.0 | 35.9 | 20.3 | 99.1 | 97.1 | 1.3 | 0.18 | 0.15 |
| 24-Sep-14 | -1.9 | -0.4 | -3.4 | 47.9 | 17.2 | 98.3 | 85.2 | 0.0 | 0.03 | 0.00 |
| 25-Sep-14 | 0.8 | 2.2 | -3.8 | 67.2 | 26.1 | 100.5 | 85.8 | 0.0 | 0.18 | 0.00 |
| 26-Sep-14 | 0.9 | 2.0 | -1.0 | 50.3 | 34.6 | 101.4 | 79.6 | 0.3 | 0.41 | 0.00 |
| 27-Sep-14 | -3.6 | -1.0 | -6.0 | 39.5 | 22.2 | 102.1 | 78.8 | 0.0 | 0.12 | 0.00 |
| 28-Sep-14 | -5.5 | -4.6 | -6.3 | 30.3 | 21.6 | 102.1 | 82.2 | 0.0 | 0.21 | 0.00 |
| 29-Sep-14 | -4.8 | -3.9 | -5.6 | 19.5 | 31.5 | 102.0 | 80.9 | 0.0 | 0.31 | 0.00 |
| 30-Sep-14 | -5.6 | -4.6 | -7.3 | 67.3 | 40.5 | 101.7 | 80.6 | 0.0 | 0.43 | 0.00 |

*Note:*

*[1] Extreme cold temperatures during the winter, reduce the effectiveness of the winter precipitation adapter. Precipitation events likely occurred in November through March, but were not recorded. Precipitation data is missing from November 12, 2013 to May 23, 2014.*