Appendix V4-1F

Doris North Project: 2013 Compliance Monitoring Program - Meteorology

TMAC Resources Inc.

DORIS NORTH PROJECT
2013 Compliance Monitoring Program - Meteorology

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DORIS NORTH PROJECT
2013 COMPLIANCE MONITORING PROGRAM - METEOROLOGY

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Prepared for:

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Executive Summary

ERM

Executive Summary

The Doris North Project (the Project) is located within the Hope Bay Belt, an 80 by 20 kilometre property located along 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 on the southern shore of Melville Sound. The nearest communities are Umingmaktok (75 km to the southwest of the property), Cambridge Bay, and Kingaok (Bathurst Inlet; 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 Gold Mine and its permits, licences and authorizations for development received by previous owners. In late 2012, prior to the sale, the Hope Bay Belt Project was placed into care and maintenance, and the project 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, environmental compliance programs and to support exploration activities. The Doris North Project remains in care and maintenance although it will not be seasonally closed for the winter of 2013/2014.

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

Section 4.0, Subsection 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 was already operational in the Doris North area. This station's location was discussed with Environment Canada and has remained constant 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.

This report presents the results from the permanent Doris weather station and the seasonal micro-meteorological weather station for the period of October 1, 2012 to September 30, 2013. The annual average temperature was -11.2ºC, and all temperatures ranged between -42.0ºC and 29.4ºC at the Doris station, for the 2012/13 hydrologic year.

Total annual precipitation during the period (October 2012 to September 2013) was 88.9 mm, with July receiving the highest monthly precipitation of 26.9 mm. Total annual precipitation is an underestimation as the precipitation adapter was frozen for a few months over the winter.

Solar radiation in the Arctic is high during the summer and very low during the winter. The annual average number of bright sunshine hours, where average global solar radiation is greater than 120 W/m^2, was 2,336.

In general, winds in the Doris North region typically blow from the west-northwest quadrant year round although winds are also common from the east and southeast. Average annual wind speeds at Doris station were 5.5 m/s (19.7 km/h), and gusts were recorded up to 28.8 m/s (104.0 km/h).

Total evaporation values in the Doris North Project area from July to October 2013 were estimated to be 138.9 and 128.8 mm, using the Penman Combination and Priestly-Taylor methods, respectively.

Acknowledgements

Acknowledgements

This report was prepared for TMAC Resources Inc. by ERM Rescan. Data collection was conducted by Jem Morrison (B.Sc.). Field assistance was provided by Johnny Qilluniq and Leonard Wingnek. 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 and managed by Marc Wen (M.Sc., R.P.Bio.).

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

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Glossary and Abbreviations

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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
α	Constant value in Priestly-Taylor methodology which replaces the aerodynamic component (for subarctic regions $\alpha = 1.26$)
γ	Psychometric constant in Pa °C
ι_V	Latent heat of vaporization
ρ_w	Water density (at 10 °C = 999.7 kg m^{-3})
Δ	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)
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
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
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
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. Introduction

1.1 PROJECT BACKGROUND

The Doris North Project (the Project) is located within the Hope Bay Belt, an 80 by 20 kilometre 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 on the southern shore of Melville Sound. The nearest communities are Umingmaktok (75 km to the southwest of the property), Cambridge Bay, and Kingaok (Bathurst Inlet; 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 Gold Mine and its permits, licences and authorizations for development received by previous owners. In late 2012, prior to the sale, the Hope Bay Belt Project was placed into care and maintenance, and the project 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, environmental compliance programs and to support exploration activities. The Doris North Project remains in care and maintenance although it will not be seasonally closed for the winter of 2013/2014.

The property is oriented in a north/south direction. The northern portion of the property consists of several watershed systems that drain into Roberts Bay, and a large river (Koignuk River) that drains into Hope Bay. Watersheds in the southern portion of the belt ultimately drain into the upper Koignuk, which drains into Hope Bay.

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

Section 4.0, Subsection 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 was already operational in the Doris North area. This station location was discussed with Environment Canada and has remained constant 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.

Figure 1.1-1

Proximity of Past, Existing, and Exploration Developments to the Hope Bay Project

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In addition to the permanent weather station near Doris Camp, a micro-meteorological station designed to obtain evaporation data has been seasonally installed in Doris Lake starting in the summer of 2009.

1.2 OBJECTIVES

To comply with Section 4.0, Subsection 8 of the Project Certificate, TMAC contracted ERM Consultants Canada Ltd. (ERM Rescan) to undertake the following activities in 2013:

- Operate and maintain a meteorological station at Doris Camp.

In addition to this requirement, ERM Rescan reinstalled and operated a micro-meteorological (evaporation) station in Doris Lake to support project planning.

This report presents the results from the permanent Doris weather station and the seasonal micro-meteorological weather station for the period of October 1, 2012 to September 30, 2013. Section 2 of this report presents the methods, Section 3 presents the results, and Section 4 provides a brief summary.

2. Methods

2. Methods

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

The 2013 meteorology compliance program included the following components:

- Operation and maintenance of the meteorological station at Doris Camp; and
- Reinstallation and operation of a micro-meteorological (evaporation) station in Doris Lake.

One automated meteorological station and one micro-meteorological (evaporation) station were installed and commissioned for the Doris North Project as part of the meteorology compliance program. The locations of these stations are shown in Figure 2-1, and their measurement variables are shown in Table 2-1.

Table 2-1. List of Hope Bay Belt Meteorological Compliance Stations and Measured Variables

	Doris Station[a]	Doris Lake (Micro Met)
Date Established	**March 2004**	**July 2009**
Temperature and Relative Humidity	✓	✓
Wind Speed and Direction	✓	✓
Rainfall via Tipping Bucket Rain Gauge	✓	✓
Winter Precipitation via CS705	✓[b]	n/a
Solar Radiation	✓	✓
Barometric Pressure	✓[c]	n/a
Water Temperature via Thermistors	n/a	✓
Net Radiation	n/a	✓

Notes:
n/a = This type of sensor was not installed at this meteorological station.
[a] The Doris 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.
[b] The winter precipitation adapter was first installed in February 2012.
[c] The barometric pressure sensor was installed in September 2010.

2.1 DORIS CAMP AUTOMATED METEOROLOGICAL STATION

An automated meteorological station consisting of two tripods was installed on February 27, 2004 near Doris camp (Figure 2-1). This meteorological station recorded wind speed and direction, air temperature, relative humidity, precipitation, solar radiation and, since 2010,barometric pressure.

The two-tripod station at Doris was powered by a deep cycle marine battery, but was converted to include solar power when it was replaced by a permanent 10 m tower installed in mid-August 2009. Temperature, relative humidity, wind speed and direction and solar radiation sensors were initially mounted on one of the 3 m tall tripod structures and a tipping bucket rain gauge (TBRG) was mounted on the other. The various sensors were remounted on the 10 m aluminium tower anchored with bed-rock anchors and guy wires on August 13, 2009 (Plate 2.1-1). This configuration is consistent with the Environment Canada - Meteorological Services of Canada (EC-MSC) standard sensor height for data to be used for air dispersion modelling (MSC 2004). Wind speed is measured in m/s and wind direction in degrees from true north and is mounted at the top of the 10 m tower.

Plate 2.1-1. Doris meteorological station after being upgraded to a 10 m tower on August 13, 2009.

The temperature and relative humidity sensors are combined into one unit. Temperature is measured in degrees Celsius and relative humidity in percent. The TBRG monitors precipitation in millimetres. Global solar radiation is monitored at the station with a pyranometer, which gives readings in watts per square metre. A barometric pressure sensor was added to the Doris meteorological station in late September 2010.

In August 2013, high winds caused damage to the TBRG and the alter wind screen. In late September a new platform and TBRG were installed at the Doris meteorological station (Plate 2.1-2). A TBRG installed on the micro-meteorological station (Section 2.2) was used to fill the data precipitation data gap during the period the TBRG at Doris camp meteorological station was damaged. The sensors for the Doris station are connected to a Campbell Scientific CR10X datalogger that controls the operation of the station and stores the data. The datalogger's program dictates how often the sensors will be monitored (set at every 5 seconds) and generates both hourly and daily averages. The 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 the solar power during winter. The station is grounded to prevent lightning damage.

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. A micro-meteorological station was reinstalled in a shallow area of this lake on July 6, 2013 (Plate 2.2-1; Figure 2-1). The station was operated until September 28, 2013. As in previous years, data collected at this station were used to calculate daily evaporation rates using both the Penman Combination and Priestley-Taylor methods (Appendix A).

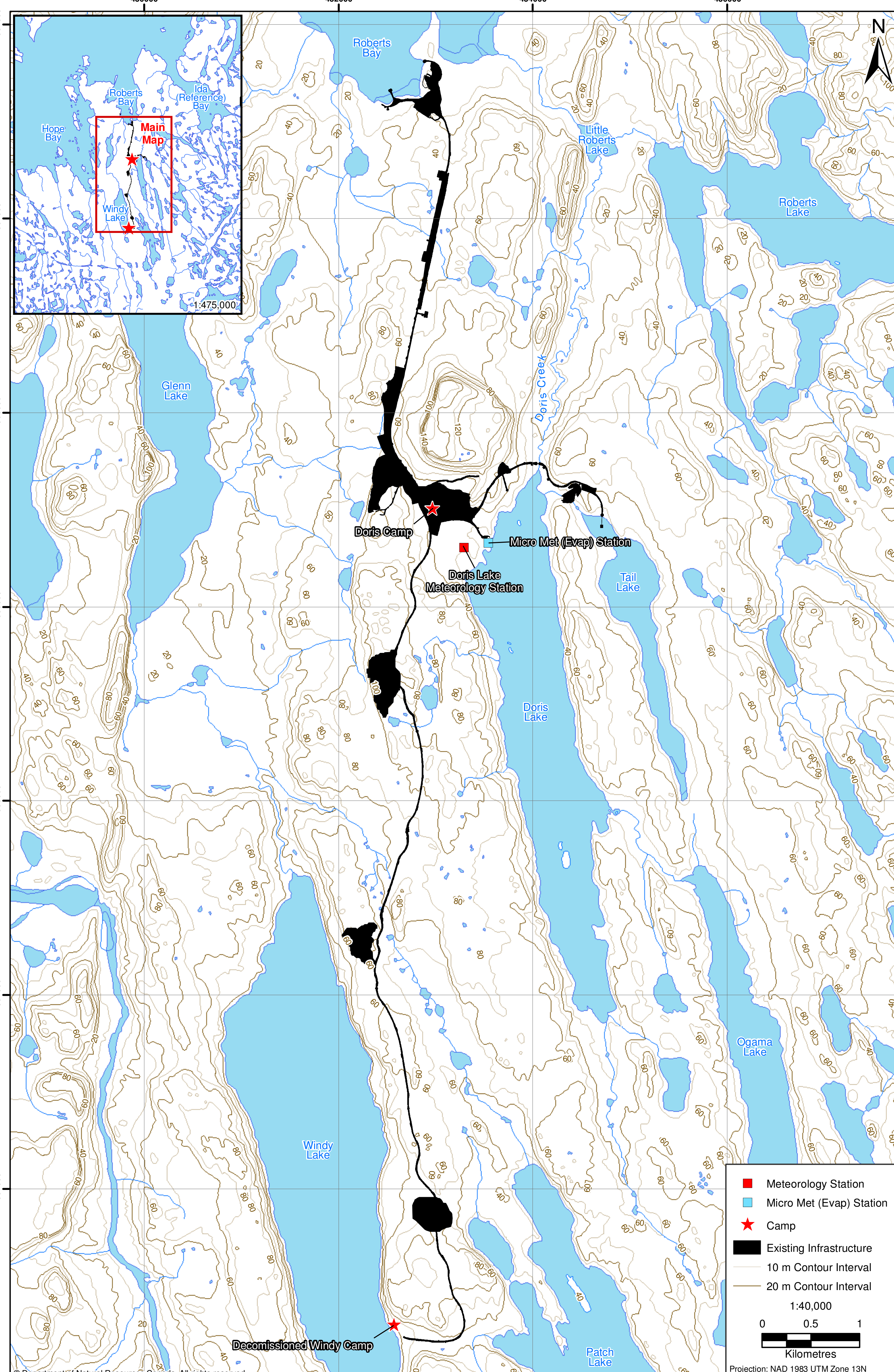

Figure 2-1

Location of Meteorological Stations, Doris North Project

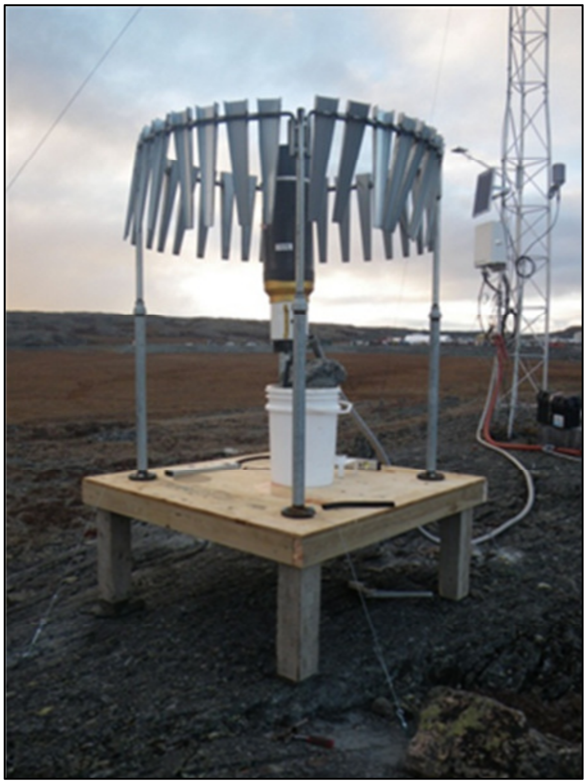

Plate 2.1-2. *The newly installed platform for the alter wind screen and tipping bucket rain gauge. The TBRG has the winter precipitation adapter installed on it, September 29, 2013.*

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

The micro-meteorological station is powered with a sealed rechargeable 8.5 Amp-hour battery that is recharged with a 50 watt solar panel. Operation of the station is controlled by a CR1000-55 datalogger whose program dictates how often the sensors will be monitored (every 5 seconds) and generates and stores hourly and daily averages. Sensors for this station are mounted on a tripod that is partially submerged in the lake. Sensors (units of measure are shown in brackets) include:

- A silicon pyranometer (solar radiation; W/m^2);
- A net radiometer (net radiation; W/m^2);
- Two air temperature (ºC) and relative humidity (%) probes;
- A wind speed (m/s) and direction (degrees from true north) sensor;
- Two water temperature thermistors (ºC); and
- A tipping bucket rain gauge (rain precipitation; mm).

Lake evaporation rates are calculated from mean daily weather data using the Penman Combination (PC) Method from Chow *et al.* (1988). The Penman model is a combined energy-balance/aerodynamic mathematical model defined by the general equation:

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

where Δ is the slope of the temperature-saturated vapour pressure curve in Pa °C; γ 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 – 2370T J kg^{-1} is the latent heat of vaporization.

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

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

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; ρ_w = 999.7 kg m^{-3} is the water density at 10°C; 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 10°C as 0.0241 and 0.615 W/m/°C, 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 by E_R = 0.0353 * R_n.

Two modifications to the above equation are used in order 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's surface is determined by the 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 is calculated as:

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

Where *u2* is wind speed in m s-1 measured at a height of *z2* in cm; Brutsaert (1982) gives the surface water roughness height *z0* as 0.01 cm; the term *eas-ea* is the difference between saturated vapour pressure *eas* and actual vapour pressure *ea* in Pa; and relative humidity (RH) is given as a proportion (0≤*RH*≤1).

The Priestly-Taylor (PT) method is similar to the Penman Combination method and defined by the 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 term 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.

This report uses both of the described methods for calculating evaporation.

3. Results

3. Results

This section summarizes data collected at the Doris meteorological and micro-meteorological stations from October 2012 to September 2013. Table 3-1 summarizes monthly data collected at the Doris stations, and Appendix A summarizes select daily data collected at the Doris stations.

The Doris Camp meteorological station was installed on February 27, 2004 and the Doris Lake micro-meteorological station was first installed in July 2009. Historical data from the Doris North Project area up to May 2002 are included in the *1993 to 2002 Data Compilation Report for Meteorology and Hydrology* (Rescan 2002). Historical meteorological data from May 2002 to September 2009, and 2009 evaporation data are published in the *2009 Meteorology Baseline Report, Hope Bay Belt Project* (Rescan 2009). Historical meteorological and evaporation data from October 2009 to September 2012 is available in the *Doris North Gold Mine Project: 2010 Meteorology Compliance Report, Doris North Gold Mine Project: 2011 Meteorology Compliance Report*, and *Doris North Gold Mine Project: 2012 Meteorology Compliance Report* (Rescan 2010; Rescan 2011; Rescan 2012).

All annual averages and totals were calculated from October 2012 to September 2013 data, so that only twelve months of data were included. Data from October 2012 to September 2013 have been included in this report to provide a continuous record of data following the 2012 meteorology compliance report (Rescan 2012). In addition, this section includes a summary of evaporation rates calculated from data collected (July 10 to September 28, 2013) at the micro-meteorological station.

3.1 AIR TEMPERATURE

Figure 3.1-1 summarizes the mean, mean daily maximum and mean daily minimum monthly air temperatures at the Doris meteorological station for October 2012 to September 2013. Table 3-1 provides a summary of the available meteorological data from the onsite station.

The mean monthly air temperatures for Doris station (30 masl) ranged from -33.3ºC in February 2013 to 9.7ºC in August 2013. The annual average air temperature was -11.2ºC. The mean minimum daily air temperatures for Doris ranged from a low of -36.3ºC (February 2013), to a high of 5.9ºC (July 2013). The mean maximum daily air temperatures ranged from a low of -29.9ºC (February 2013), to a high of and 14.6ºC (June 2013).

The extreme minimum hourly temperature at Doris station was -42.0ºC on February 17, 2013 at 6:00 AM, and the extreme maximum hourly temperature was 29.4ºC on June 29, 2013 at 6:09 PM.

3.2 PRECIPITATION

Total annual precipitation (October 2012 to September 2013) recorded at the Doris station was 88.9 mm[1]. Monthly precipitation values are summarized in Table 3-1 and Figure 3.2-1. A snowfall adapter was installed at the Doris station in September 2012, and precipitation as snowfall was collected from September 8, 2012 to June 3, 2013.

[1] Due to closure of the Doris camp during the winter, it was not possible to complete necessary winter maintenance to the precipitation adapter. The precipitation adapter was frozen from November to March meaning that the total annual precipitation is an underestimate.

Table 3-1. Monthly Meteorological Data from Doris Meteorological Station, October 2012 to September 2013

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[a]	Average Barometric Pressure kPa[b]
Oct-12	-5.2	-7.7	-2.9	87.5	4.6	16.4	21.0	75.7	26.1	45	11.7	101.0
Nov-12	-18.0	-21.2	-15.2	83.5	5.9	21.3	19.6	70.5	4.6	0	0.0	101.6
Dec-12	-28.1	-30.9	-25.4	75.5	4.3	15.5	15.9	57.4	0.4	0	0.0	102.0
Jan-13	-30.8	-33.9	-27.4	73.1	7.4	26.6	20.1	72.3	2.4	0	0.0	100.9
Feb-13	-33.3	-36.3	-29.9	70.2	4.5	16.0	17.2	61.9	24.9	35	0.0	99.2
Mar-13	-25.2	-29.7	-20.7	74.5	5.6	20.2	19.7	70.8	90.7	228	0.0	102.3
Apr-13	-17.6	-21.8	-13.8	78.2	7.8	28.2	20.0	72.1	190.7	354	0.3	102.0
May-13	-6.0	-10.2	-2.5	82.9	5.0	18.0	16.4	59.0	228.9	416	0.3	102.0
Jun-13	8.9	3.3	14.6	69.1	4.8	17.1	17.7	63.8	244.8	430	13.2	101.4
Jul-13	9.5	5.9	13.2	73.1	5.8	20.7	19.1	68.9	209.9	398	26.9	101.2
Aug-13	9.7	5.8	13.7	73.2	5.3	18.9	28.9	104.0	149.3	314	10.5	101.3
Sep-13	1.7	-0.1	3.8	87.9	5.2	18.6	20.6	74.3	52.8	116	26.0	100.6
Average[c]	-11.2	-14.7	-7.7	77.4	5.5	19.8	19.7	70.9	102.1	-	-	101.28
Sum[c]	-	-	-	-	-	-	-	-	-	2336	88.9	-

Notes:

[a] *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.*

[b] *Missing 1.5 days of data in August and 18 days of data in September due to sensor malfunction.*

[c] *This calculation was only performed on data from October 2012 to September 2013.*

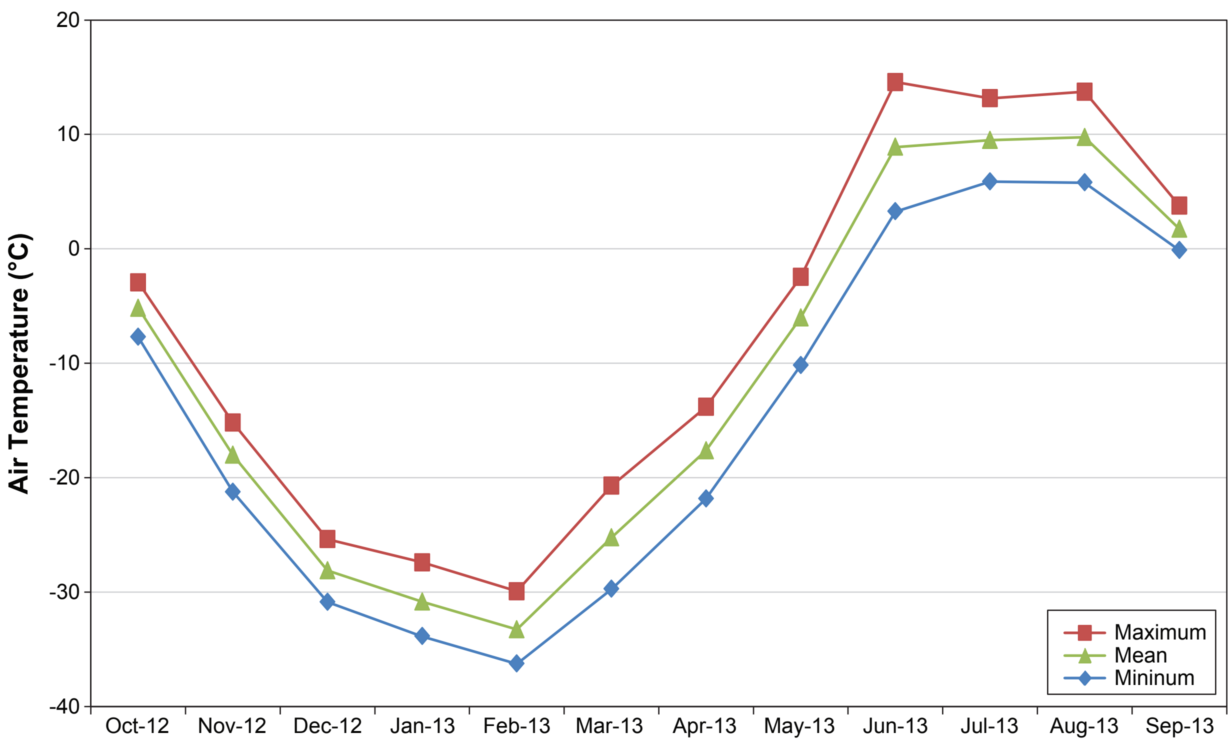

Figure 3.1-1

Doris Station Monthly Average Air Temperatures, October 2012 to September 2013

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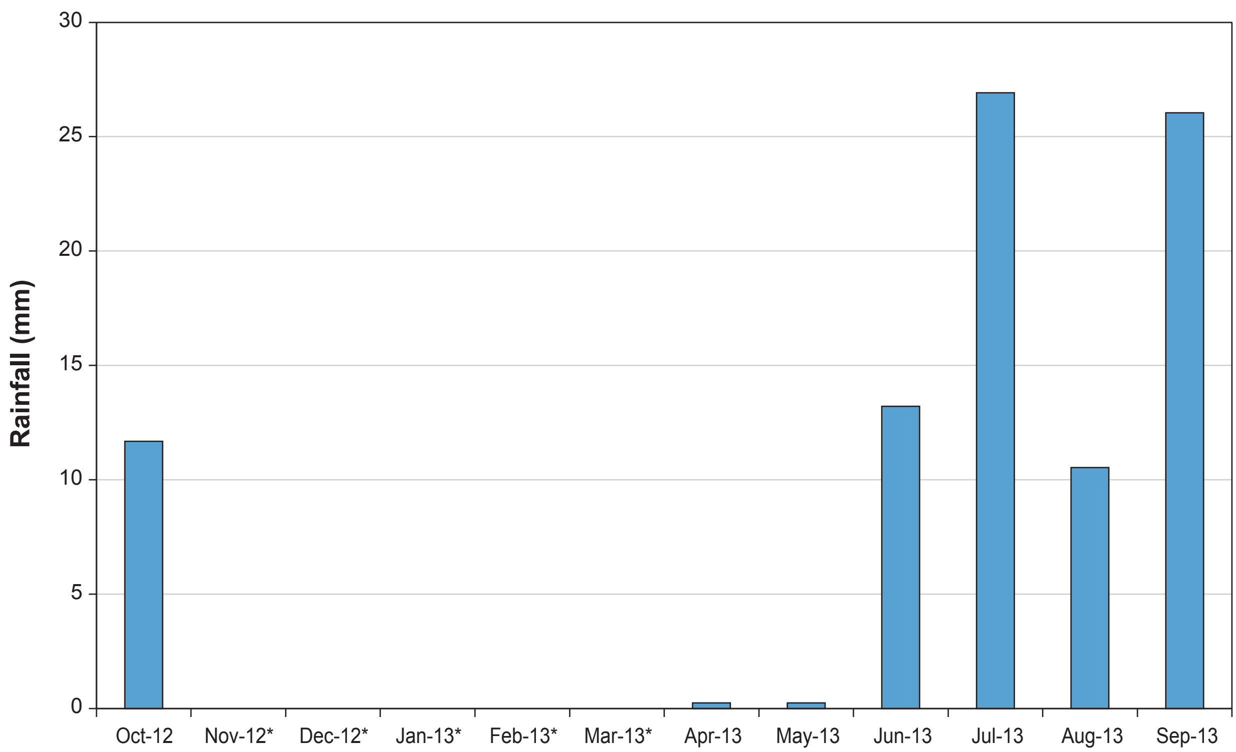

*Note: * Due to closure of the Doris Camp during the winter of 2012/2013, it was not possible to complete necessary winter maintenance on the precipitation adapter.*

Figure 3.2-1

Doris Station Monthly Precipitation, October 2012 to September 2013

July 2013 received the highest amount of precipitation at 26.9 mm. The Doris camp was closed during the winter 2012/2013 and the winter precipitation adapter typically will have its antifreeze solution changed at least once during the winter, but due to the camp closure this maintenance trip was unavailable. The lack of maintenance likely resulted in some underestimation of winter precipitation.

Since August 2012 an Environment Canada (EC) station has been operating Bathurst Inlet, which is approximately 160 km to the southwest of the Doris meteorological station. From November 2012 to May 2013, 120 mm of precipitation fell at the Bathurst Inlet station. Although this information has not been incorporated into the Doris North meteorological dataset, it provides some indication of the regional precipitation for the period of underestimated data at Doris North.

3.3 SOLAR RADIATION

Solar radiation is electromagnetic energy from the sun. Solar energy accounts for 99% of the Earth's energy budget. The solar radiation incident on top of the terrestrial atmosphere is called extraterrestrial solar radiation. Ninety-seven percent of this radiation is confined to the spectral range of 0.29 to 3.0 microns and is referred to as short-wave radiation. A portion of the extraterrestrial solar radiation penetrates through the atmosphere to the earth's surface, while part of it is scattered and/or absorbed in the atmosphere by gases, aerosol particles, cloud droplets, and cloud crystals. Global solar radiation is monitored at the Hope Bay Belt meteorological stations using silicone pyranometers. 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. Local data on solar radiation can be used as a guide for sizing potential solar panel systems.

Table 3-1 provides monthly total bright sunshine hours and average global solar radiation in watts per square metre, and Figure 3.3-1 shows monthly average global solar radiation at Doris station. The highest daily average solar radiation was 339 W/m^2 (June 26, 2013). The highest hourly average solar radiation at Doris station was 730 W/m^2 on July 1, 2013 at 2:00 PM. The Doris North Project area experiences almost 24 hours of sunlight per day between mid-May to the end of July.

The lowest solar radiation values are recorded during winter months when the sun is at its lowest angle and there is a higher frequency for low cloud cover that reflects and absorbs the solar radiation. The minimum average daily solar radiation of 0.2 W/m^2 was recorded at the Doris station on January 2, 2013. The hourly average solar radiation values recorded on that day were all equal to or below 1.5 W/m^2. All of the hourly average solar radiation values recorded during the night time were 0 W/m^2. The Doris North Project area experiences almost 24 hours of darkness per day from late November to early January.

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 2,336 hours of bright sunshine during the annual October 2012 to September 2013 measurement period at the Doris station. There were zero sunlight hours in November, December and January during the reported time period.

3.4 WIND SPEED AND DIRECTION

Figure 3.4-1 shows annual (October 2012 to September 2013), winter (October 2012 to May 2013), and summer (June 2013 to September 2013) wind direction and speed distributions at the Doris station. The predominant wind direction was from the west with a secondary component from the east. Based on annual data, these wind directions were recorded approximately 20% of the time. The average wind speed was 5.5 m/s (19.8 km/h) and the most frequent wind speeds at this station were 3 to 5 m/s (11 to 18 km/h), occurring 22.1% of the time. Strong winds over 11 m/s (39.6 km/h) occurred 7.6% of the time, and calm conditions (i.e., hourly average wind speeds less than 1 m/s (3.6 km/hr)) were experienced 9.4% of the time.

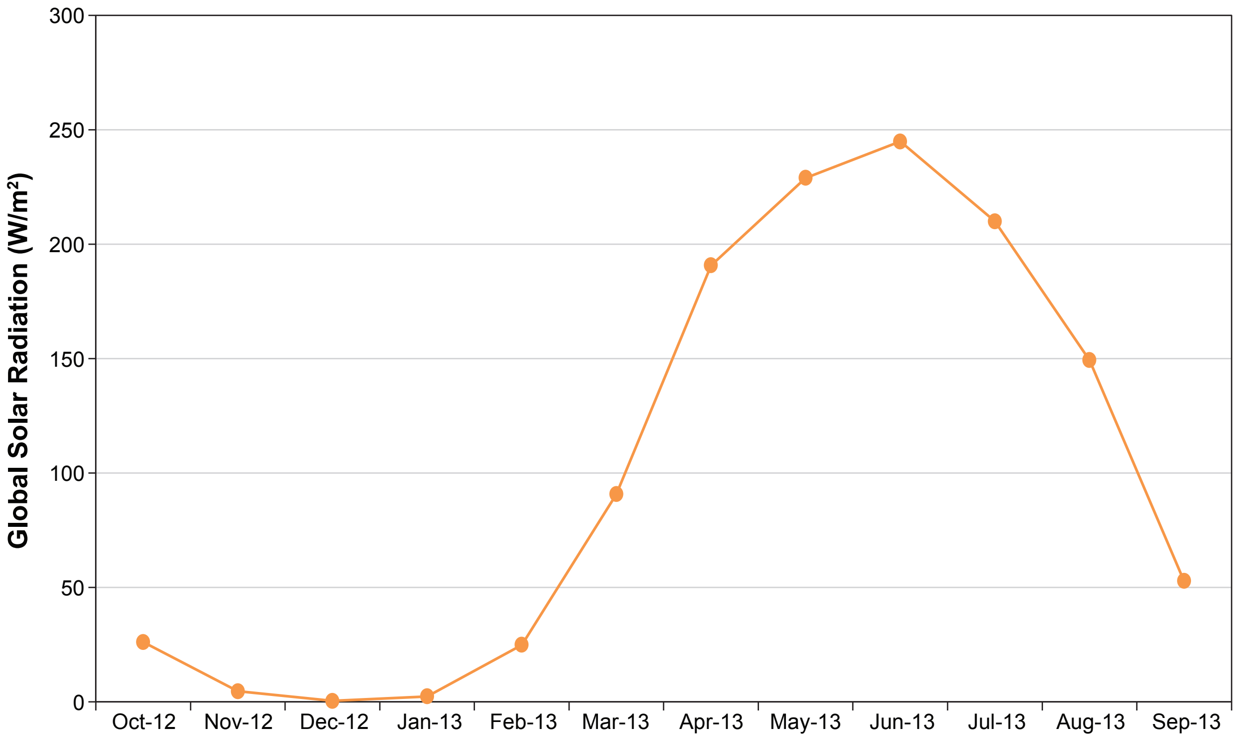

Figure 3.3-1

Doris Station Monthly Average Global Solar Radiation, October 2012 to September 2013

TMAC RESOURCES

Rescan an ERM company

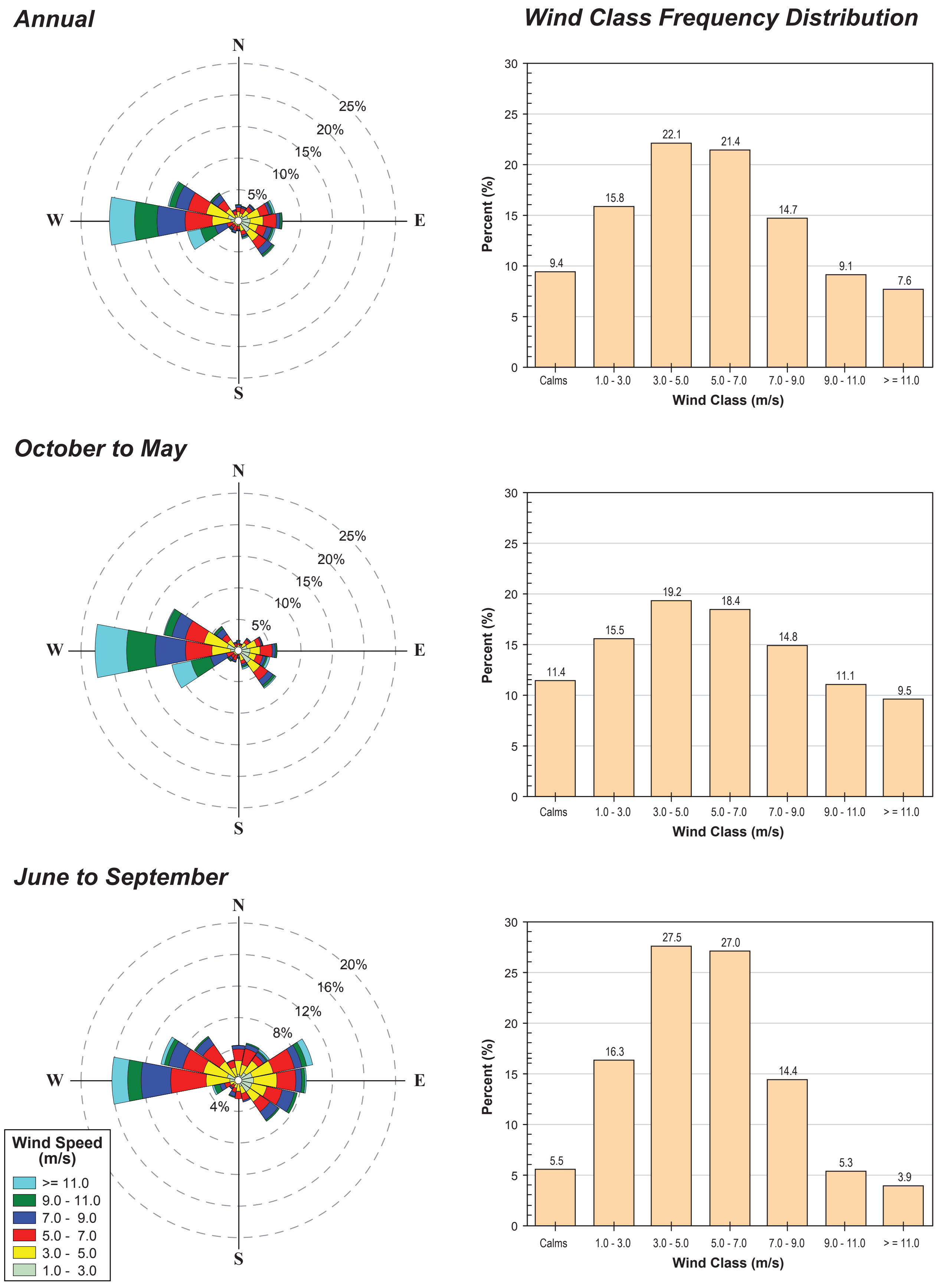

Figure 3.4-1

Doris Station Windroses and Frequency Distributions, October 2012 to September 2013

TMAC RESOURCES

Rescan an ERM company

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 55% of the time. The most common wind speed class during the winter was 3 to 5 m/s (10.8 to 18 km/h) winds occurring 19.2% of the time, with calm and strong winds occurring 11.4% and 9.5% of the time, respectively. During the summer, the most frequent winds came from the west, west-northwest with a secondary component from the east and east-north east. Wind speeds in the middle classes were more frequent than in the winter, with 3 to 5 m/s (10.8 to 18 km/h) winds occurring 27.5% of the time, while calm and strong winds were lower than the winter occurring 5.5% and 3.9% of the time, respectively. The maximum gust speed measured during this reporting period at Doris was 28.9 m/s (104.0 km/h) on August 24, 2013.

3.5 EVAPORATION

Lake evaporation values were calculated using data from the Doris Lake micro-meteorological (evaporation) station by two methods, the Penman Combination and the Priestly-Taylor. In total, 81 days of data were collected (July 10, 2013, to September 28, 2013). On average, the Doris North Project area experiences an open-water season that starts in early to mid-July; however, there are inter annual variations in the length of the open water season.

Total evaporation values in the Doris North Project area from July 10 to September 28, 2013 were estimated to be 139 and 129 mm based on total monthly evaporation values calculated using the Penman Combination and Priestly-Taylor methods, respectively (Table 3.5-1).

Table 3.5-1. Doris North Project - 2013 Monthly Evaporation

	Average Daily Evaporation Rate (mm/day)		Total Monthly Evaporation (mm)	
Month	**Penman Method**	**Priestly-Taylor Method**	**Penman Method**	**Priestly-Taylor Method**
July[a]	2.8	2.9	63.0	64.4
August[b]	2.1	1.9	64.5	57.2
September[c]	0.4	0.3	12.4	7.1
2013 Average	1.8	1.7	-	-
2013 Sum	-	-	138.9	128.7

Note:
[a] *The micro-meteorological station was installed on July 10, 2013. Based on 22 days of collected data.*
[b] *Based on the full month of data.*
[c] *The micro-meteorological station was decommissioned on September 28, 2013. Based on 28 days of data.*

Evaporation measured from this station between July, August and September shows a decreasing trend. This is because solar radiation has the largest influence on evaporation rate, and the water surface receives significantly more solar radiation in July than in August and September (see Figure 3.3-1).

4. Summary

ERM

4. Summary

Meteorological data were collected to comply with the requirements of the Doris North Project Certificate to collect atmospheric data, including air temperature and precipitation. Additional meteorological data are collected as part of this program to support potential future mine development. An automated meteorological station (Doris Camp) and a micro-meteorological (evaporation) station (Doris Lake) monitored over an annual period from October 2012 to September 2013.

The annual average temperature was -11.2ºC, and all temperatures ranged between -42.0ºC and 29.4ºC at the Doris station, for the 2012/13 hydrologic year.

Total annual precipitation during the period was 88.9 mm, with July receiving the highest monthly precipitation of 26.9 mm. Total annual precipitation is an underestimation as the precipitation adapter was frozen for a few months over the winter (November 2012 to March 2013). Estimates of precipitation at the Environment Canada station operating at the Bathurst Inlet suggests that the underestimation is on the order of 120 mm.

Solar radiation in the Arctic is high during the summer and very low during the winter. The annual total number of bright sunshine hours was 2,336, where a bright sunshine hour is defined as an hour with solar radiation is greater than 120 W/m^2.

In general, winds in the Doris North region typically blow from the west-northwest quadrant year round although winds are also common from the east and southeast. Average annual wind speeds at Doris station were 5.5 m/s (19.7 km/h), and gusts were recorded up to 28.9 m/s (104.0 km/h).

Total evaporation values in the Doris North Project area from July to October 2013 were estimated to be 138.9 and 128.7 mm, using the Penman Combination and Priestly-Taylor methods, respectively.

References

ERM

References

Brutsaert, W. 1982. *Evaporation into the Atmosphere*. D. Reidal Publishing, Dordrecht, The Netherlands.

Chow, V. T., Maidment, D. R. & Mays, L. W. 1988. *Applied Hydrology*. McGraw-Hill Book Co., New York, USA.

Meteorological Services of Canada (MSC). 2004. *MSC Guidelines for Co-operative Climatological Autostations, Version 3.0*. Environment Canada, MSC, Surface Weather, Climate & Marine Division, Atmospheric Monitoring Water Survey Branch.

Rescan Environmental Services Ltd. (Rescan). 2012. *Doris North Gold Mine Project: 2012 Meteorology Compliance Report*. Prepared for Hope Bay Mining Ltd.

Rescan Environmental Services Ltd. (Rescan). 2011. *Doris North Gold Mine Project: 2011 Meteorology Compliance Report*. Prepared for Hope Bay Mining Ltd.

Rescan Environmental Services Ltd. (Rescan). 2010. *Doris North Gold Mine Project: 2010 Meteorology Compliance Report*. Prepared for Hope Bay Mining Ltd.

Rescan Environmental Services Ltd. (Rescan). 2009. *2009 Meteorology Baseline Report, Hope Bay Belt Project*. Prepared for Hope Bay Mining Ltd.

Rescan Environmental Services Ltd. (Rescan). 2002. *1993 to 2002 Data Compilation Report for Meteorology and Hydrology*.

Shuttleworth, W. J. 1993. Evaporation. In: *Handbook of Hydrology* (ed. by D. R. Maidment), McGraw-Hill Book Co., New York, USA.

Stewart, R. B. and Rouse, W. R. 1977. Substantiation of the Priestly and Taylor parameter α = 1.26 for potential evaporation in high latitudes. *J. Appl. Met*. 16(6), 649-650.

Yarwood, T. M. & Castle, F. 1970. *Physical and Mathematical Tables*, third edition. Macmillan and Co. Ltd., Basingstoke and London, UK.

Appendix A

Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

ERM

Appendix A. Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

Date	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
1-Oct-12	0.8	3.4	-1.8	37.0	3.0	93.5	0.0	n/a	n/a
2-Oct-12	-1.7	-0.8	-2.5	47.9	5.7	71.4	0.0	n/a	n/a
3-Oct-12	-1.5	0.5	-4.0	30.0	3.0	74.3	0.0	n/a	n/a
4-Oct-12	1.3	5.7	-3.7	43.2	5.3	83.1	0.0	n/a	n/a
5-Oct-12	2.7	5.6	0.5	34.8	5.7	88.2	0.0	n/a	n/a
6-Oct-12	0.1	3.0	-2.2	31.2	2.9	90.9	0.0	n/a	n/a
7-Oct-12	-1.1	0.6	-2.9	40.2	4.3	91.4	0.0	n/a	n/a
8-Oct-12	-1.5	-0.8	-2.7	30.9	3.2	88.9	0.0	n/a	n/a
9-Oct-12	-0.9	1.7	-5.6	31.3	6.9	91.3	0.0	n/a	n/a
10-Oct-12	-4.7	-1.1	-7.6	34.1	7.4	80.1	0.0	n/a	n/a
11-Oct-12	-5.9	-4.8	-7.3	36.4	9.3	73.5	0.0	n/a	n/a
12-Oct-12	-5.2	-3.6	-7.2	38.8	7.2	80.3	0.0	n/a	n/a
13-Oct-12	-5.8	-3.0	-8.2	37.0	3.3	80.6	0.0	n/a	n/a
14-Oct-12	-4.2	-2.5	-6.0	24.1	2.9	86.2	0.0	n/a	n/a
15-Oct-12	-7.4	-4.9	-9.9	28.3	4.5	89.8	0.0	n/a	n/a
16-Oct-12	-5.2	-4.2	-7.0	23.0	4.7	84.7	0.0	n/a	n/a
17-Oct-12	-4.9	-3.1	-7.5	22.8	3.2	92.2	0.0	n/a	n/a
18-Oct-12	-4.6	-2.0	-7.6	26.9	5.8	91.1	0.0	n/a	n/a
19-Oct-12	-6.2	-4.2	-9.3	19.2	5.3	91.9	0.0	n/a	n/a
20-Oct-12	-3.3	-1.7	-4.9	14.4	4.6	97.1	0.0	n/a	n/a
21-Oct-12	-1.5	-0.7	-2.7	22.8	3.3	97.5	0.0	n/a	n/a
22-Oct-12	-2.4	-1.4	-3.6	21.8	5.8	92.5	0.3	n/a	n/a
23-Oct-12	-6.4	-2.8	-9.3	18.2	5.0	93.8	0.0	n/a	n/a
24-Oct-12	-10.0	-8.2	-11.7	15.5	2.1	93.1	0.0	n/a	n/a
25-Oct-12	-9.9	-7.2	-11.3	15.0	0.7	93.3	0.0	n/a	n/a
26-Oct-12	-7.2	-6.1	-10.1	12.0	4.4	88.9	0.0	n/a	n/a
27-Oct-12	-10.1	-8.7	-11.2	15.5	6.5	87.8	0.0	n/a	n/a
28-Oct-12	-8.4	-6.2	-15.3	15.4	3.7	85.3	0.3	n/a	n/a
29-Oct-12	-15.2	-9.1	-20.1	15.0	3.6	85.3	11.2	n/a	n/a
30-Oct-12	-17.5	-13.0	-21.0	15.2	4.1	86.0	0.0	n/a	n/a
31-Oct-12	-12.6	-11.3	-15.5	11.0	4.0	88.4	0.0	n/a	n/a
1-Nov-12	-15.0	-10.0	-21.4	8.9	1.5	86.1	0.0	n/a	n/a
2-Nov-12	-12.5	-10.4	-19.6	8.3	1.6	88.3	0.0	n/a	n/a
3-Nov-12	-12.5	-8.4	-19.2	8.3	7.1	83.9	0.0	n/a	n/a
4-Nov-12	-10.5	-7.0	-16.5	9.0	4.5	90.7	0.0	n/a	n/a
5-Nov-12	-17.1	-15.2	-18.3	8.6	3.0	87.6	0.0	n/a	n/a
6-Nov-12	-15.8	-14.4	-17.0	6.5	3.6	88.5	0.0	n/a	n/a
7-Nov-12	-17.7	-15.9	-21.2	13.8	4.4	85.8	0.0	n/a	n/a
8-Nov-12	-15.4	-9.7	-18.3	13.0	3.6	86.4	0.0	n/a	n/a
9-Nov-12	-10.3	-7.7	-14.6	5.4	6.2	86.9	0.0	n/a	n/a
10-Nov-12	-12.2	-9.2	-14.7	4.6	5.9	82.1	0.0	n/a	n/a
11-Nov-12	-11.0	-6.5	-16.2	4.4	9.0	84.4	0.0	n/a	n/a
12-Nov-12	-18.4	-15.7	-20.2	7.9	8.3	80.0	0.0	n/a	n/a
13-Nov-12	-13.8	-12.2	-15.9	4.4	9.0	82.2	0.0	n/a	n/a
14-Nov-12	-14.9	-12.9	-17.5	4.5	7.6	81.1	0.0	n/a	n/a
15-Nov-12	-17.8	-14.8	-20.4	4.6	8.1	82.6	0.0	n/a	n/a
16-Nov-12	-18.9	-15.3	-22.3	2.5	5.3	84.0	0.0	n/a	n/a
17-Nov-12	-19.4	-17.7	-21.6	4.6	12.2	82.2	0.0	n/a	n/a
18-Nov-12	-17.9	-15.8	-21.0	1.2	3.6	84.9	0.0	n/a	n/a
19-Nov-12	-16.7	-15.0	-18.1	1.6	5.9	86.4	0.0	n/a	n/a
20-Nov-12	-20.3	-16.5	-23.0	2.1	7.4	81.1	0.0	n/a	n/a
21-Nov-12	-22.7	-20.4	-24.4	3.2	4.2	82.0	0.0	n/a	n/a
22-Nov-12	-21.7	-20.0	-23.8	1.5	5.4	83.4	0.0	n/a	n/a
23-Nov-12	-21.9	-18.4	-27.0	1.3	6.4	83.0	0.0	n/a	n/a
24-Nov-12	-23.9	-19.5	-26.7	1.6	6.5	81.0	0.0	n/a	n/a
25-Nov-12	-18.5	-16.7	-20.7	0.7	5.6	84.1	0.0	n/a	n/a
26-Nov-12	-20.3	-17.9	-23.6	1.2	6.8	84.1	0.0	n/a	n/a
27-Nov-12	-23.0	-19.5	-26.8	1.0	7.2	80.5	0.0	n/a	n/a

Appendix A. Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
28-Nov-12	-21.5	-20.2	-23.8	0.6	10.7	80.8	0.0	n/a	n/a
29-Nov-12	-28.1	-23.7	-31.3	1.1	3.5	77.0	0.0	n/a	n/a
30-Nov-12	-30.5	-29.4	-32.4	0.9	3.2	74.4	0.0	n/a	n/a
1-Dec-12	-30.7	-29.1	-34.6	0.7	3.9	74.0	0.0	n/a	n/a
2-Dec-12	-34.7	-33.7	-35.8	0.6	0.6	69.8	0.0	n/a	n/a
3-Dec-12	-31.9	-30.5	-34.5	0.4	0.2	72.6	0.0	n/a	n/a
4-Dec-12	-31.9	-30.7	-33.4	0.3	0.6	72.6	0.0	n/a	n/a
5-Dec-12	-30.5	-26.8	-33.9	0.4	1.5	73.9	0.0	n/a	n/a
6-Dec-12	-25.0	-21.6	-27.0	0.5	8.7	79.7	0.0	n/a	n/a
7-Dec-12	-24.9	-21.0	-28.0	0.5	6.6	79.9	0.0	n/a	n/a
8-Dec-12	-26.7	-24.0	-28.6	0.5	7.3	77.5	0.0	n/a	n/a
9-Dec-12	-27.5	-25.8	-29.0	0.5	10.2	77.0	0.0	n/a	n/a
10-Dec-12	-27.1	-25.8	-28.8	0.4	10.9	77.3	0.0	n/a	n/a
11-Dec-12	-29.2	-27.8	-33.2	0.4	6.3	75.6	0.0	n/a	n/a
12-Dec-12	-29.3	-24.1	-34.1	0.2	3.6	74.9	0.0	n/a	n/a
13-Dec-12	-27.1	-24.2	-28.9	0.7	8.0	74.5	0.0	n/a	n/a
14-Dec-12	-24.2	-20.7	-28.9	0.2	5.1	76.4	0.0	n/a	n/a
15-Dec-12	-23.0	-20.9	-26.2	0.6	4.2	81.1	0.0	n/a	n/a
16-Dec-12	-29.4	-25.6	-32.1	0.3	2.1	75.6	0.0	n/a	n/a
17-Dec-12	-27.3	-20.3	-32.2	0.2	4.5	77.1	0.0	n/a	n/a
18-Dec-12	-21.8	-17.2	-26.1	0.4	5.0	73.8	0.0	n/a	n/a
19-Dec-12	-27.7	-25.0	-29.5	0.3	1.1	73.3	0.0	n/a	n/a
20-Dec-12	-25.4	-23.0	-28.7	0.3	3.2	77.1	0.0	n/a	n/a
21-Dec-12	-24.8	-22.9	-26.9	0.3	6.2	77.5	0.0	n/a	n/a
22-Dec-12	-30.8	-26.9	-32.1	0.4	6.4	73.0	0.0	n/a	n/a
23-Dec-12	-32.2	-31.5	-33.1	0.4	5.3	72.4	0.0	n/a	n/a
24-Dec-12	-31.6	-30.0	-32.9	0.3	3.4	72.8	0.0	n/a	n/a
25-Dec-12	-28.1	-26.5	-31.2	0.3	3.6	76.3	0.0	n/a	n/a
26-Dec-12	-29.8	-26.6	-31.9	0.3	1.4	74.9	0.0	n/a	n/a
27-Dec-12	-28.3	-25.3	-31.8	0.2	1.9	76.2	0.0	n/a	n/a
28-Dec-12	-25.1	-23.2	-27.3	0.3	1.0	76.9	0.0	n/a	n/a
29-Dec-12	-27.8	-24.6	-30.2	0.5	0.2	77.3	0.0	n/a	n/a
30-Dec-12	-25.0	-21.4	-30.0	0.4	7.4	78.0	0.0	n/a	n/a
31-Dec-12	-32.6	-29.7	-36.2	0.4	2.9	72.1	0.0	n/a	n/a
1-Jan-13	-34.3	-32.7	-35.9	0.4	3.1	70.4	0.0	n/a	n/a
2-Jan-13	-29.5	-22.5	-36.1	0.2	4.3	74.0	0.0	n/a	n/a
3-Jan-13	-25.0	-20.8	-30.8	0.8	7.8	78.8	0.0	n/a	n/a
4-Jan-13	-29.7	-21.2	-35.3	0.6	4.7	72.7	0.0	n/a	n/a
5-Jan-13	-27.3	-22.1	-35.5	0.6	6.7	77.3	0.0	n/a	n/a
6-Jan-13	-24.7	-23.0	-26.3	0.7	10.7	78.9	0.0	n/a	n/a
7-Jan-13	-31.6	-22.9	-36.9	0.7	6.4	72.7	0.0	n/a	n/a
8-Jan-13	-35.5	-33.4	-36.9	0.7	9.3	69.0	0.0	n/a	n/a
9-Jan-13	-33.2	-29.7	-36.2	0.8	6.1	71.0	0.0	n/a	n/a
10-Jan-13	-30.9	-24.3	-36.4	0.6	2.4	73.2	0.0	n/a	n/a
11-Jan-13	-27.8	-25.0	-31.4	0.9	6.9	76.8	0.0	n/a	n/a
12-Jan-13	-31.1	-29.1	-32.9	0.9	7.7	73.2	0.0	n/a	n/a
13-Jan-13	-34.5	-31.3	-36.9	1.1	7.2	69.7	0.0	n/a	n/a
14-Jan-13	-36.1	-33.0	-38.7	0.8	4.8	68.2	0.0	n/a	n/a
15-Jan-13	-36.8	-35.3	-38.6	1.3	9.9	67.3	0.0	n/a	n/a
16-Jan-13	-34.2	-32.7	-35.5	1.2	11.3	69.7	0.0	n/a	n/a
17-Jan-13	-33.6	-32.0	-35.0	1.5	10.2	70.1	0.0	n/a	n/a
18-Jan-13	-32.9	-31.9	-33.7	1.6	10.6	70.9	0.0	n/a	n/a
19-Jan-13	-28.9	-24.8	-33.4	1.7	12.1	74.9	0.0	n/a	n/a
20-Jan-13	-27.5	-25.3	-29.4	2.2	12.1	76.8	0.0	n/a	n/a
21-Jan-13	-25.9	-23.9	-27.5	2.3	8.5	78.0	0.0	n/a	n/a
22-Jan-13	-32.2	-25.6	-36.3	2.7	2.0	72.4	0.0	n/a	n/a
23-Jan-13	-32.1	-26.7	-36.0	4.4	2.6	72.0	0.0	n/a	n/a
24-Jan-13	-27.7	-25.0	-31.4	4.0	1.8	75.9	0.0	n/a	n/a

Appendix A. Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

Date	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
25-Jan-13	-28.7	-23.5	-32.1	2.5	5.8	74.3	0.0	n/a	n/a
26-Jan-13	-29.3	-27.0	-30.8	6.1	4.1	74.6	0.0	n/a	n/a
27-Jan-13	-28.7	-26.4	-30.6	4.5	6.3	74.7	0.0	n/a	n/a
28-Jan-13	-31.3	-27.7	-33.1	7.2	9.9	72.1	0.0	n/a	n/a
29-Jan-13	-31.4	-28.9	-33.0	5.1	11.9	71.9	0.0	n/a	n/a
30-Jan-13	-32.0	-31.3	-33.6	8.3	11.0	71.5	0.0	n/a	n/a
31-Jan-13	-31.6	-30.1	-33.6	6.9	10.9	72.0	0.0	n/a	n/a
1-Feb-13	-33.3	-31.8	-34.8	9.3	11.0	70.2	0.0	n/a	n/a
2-Feb-13	-32.1	-30.3	-34.3	8.2	11.3	71.4	0.0	n/a	n/a
3-Feb-13	-32.6	-30.9	-33.9	13.8	9.7	71.1	0.0	n/a	n/a
4-Feb-13	-31.4	-29.1	-33.2	12.9	8.7	72.5	0.0	n/a	n/a
5-Feb-13	-33.2	-30.5	-36.4	10.8	2.8	70.8	0.0	n/a	n/a
6-Feb-13	-33.6	-26.8	-37.1	12.1	0.7	70.4	0.0	n/a	n/a
7-Feb-13	-33.3	-27.3	-35.9	14.8	4.6	70.8	0.0	n/a	n/a
8-Feb-13	-37.2	-33.4	-39.6	15.0	0.5	66.8	0.0	n/a	n/a
9-Feb-13	-34.9	-30.5	-37.7	18.5	0.0	69.0	0.0	n/a	n/a
10-Feb-13	-25.2	-22.7	-31.5	6.5	1.4	79.0	0.0	n/a	n/a
11-Feb-13	-25.5	-21.9	-32.8	11.5	4.9	78.9	0.0	n/a	n/a
12-Feb-13	-33.9	-31.7	-36.7	19.3	3.7	70.2	0.0	n/a	n/a
13-Feb-13	-35.6	-33.6	-38.8	20.2	2.6	68.4	0.0	n/a	n/a
14-Feb-13	-38.4	-34.0	-41.1	21.9	0.2	65.8	0.0	n/a	n/a
15-Feb-13	-38.3	-36.1	-40.9	21.5	0.0	65.2	0.0	n/a	n/a
16-Feb-13	-38.6	-36.6	-40.9	24.7	0.0	64.8	0.0	n/a	n/a
17-Feb-13	-39.6	-33.4	-42.0	24.3	0.0	63.8	0.0	n/a	n/a
18-Feb-13	-38.9	-36.4	-40.3	25.0	0.0	64.5	0.0	n/a	n/a
19-Feb-13	-35.7	-33.2	-39.2	20.2	3.6	67.9	0.0	n/a	n/a
20-Feb-13	-29.1	-26.7	-33.6	31.4	6.8	74.4	0.0	n/a	n/a
21-Feb-13	-29.0	-26.5	-32.3	35.9	4.3	74.9	0.0	n/a	n/a
22-Feb-13	-29.0	-26.6	-31.2	25.0	3.3	74.6	0.0	n/a	n/a
23-Feb-13	-27.8	-25.6	-30.1	26.9	3.3	75.1	0.0	n/a	n/a
24-Feb-13	-29.2	-28.2	-30.7	35.3	2.9	74.1	0.0	n/a	n/a
25-Feb-13	-33.2	-27.5	-36.2	51.9	1.2	68.6	0.0	n/a	n/a
26-Feb-13	-35.2	-27.9	-37.9	53.7	0.3	66.4	0.0	n/a	n/a
27-Feb-13	-36.8	-32.9	-39.4	63.2	1.0	65.9	0.0	n/a	n/a
28-Feb-13	-30.5	-25.6	-36.6	63.3	4.4	69.4	0.0	n/a	n/a
1-Mar-13	-21.7	-13.8	-29.8	35.5	4.5	79.9	0.0	n/a	n/a
2-Mar-13	-21.2	-13.8	-27.8	53.6	6.7	80.7	0.0	n/a	n/a
3-Mar-13	-28.7	-26.3	-30.8	44.8	2.9	73.3	0.0	n/a	n/a
4-Mar-13	-27.8	-25.9	-31.0	40.5	3.7	74.4	0.0	n/a	n/a
5-Mar-13	-30.2	-27.5	-32.7	58.7	6.9	72.6	0.0	n/a	n/a
6-Mar-13	-30.6	-28.5	-33.5	52.2	9.0	72.2	0.0	n/a	n/a
7-Mar-13	-31.9	-30.4	-33.4	70.1	10.9	70.9	0.0	n/a	n/a
8-Mar-13	-33.0	-31.4	-34.9	72.3	11.5	70.2	0.0	n/a	n/a
9-Mar-13	-31.3	-29.1	-33.7	63.4	8.2	72.1	0.0	n/a	n/a
10-Mar-13	-26.7	-21.1	-34.6	48.3	3.7	76.3	0.0	n/a	n/a
11-Mar-13	-28.0	-23.1	-33.3	74.1	8.8	74.9	0.0	n/a	n/a
12-Mar-13	-34.4	-32.6	-36.7	93.6	8.7	68.8	0.0	n/a	n/a
13-Mar-13	-31.0	-26.9	-36.5	67.5	10.0	72.4	0.0	n/a	n/a
14-Mar-13	-30.9	-27.8	-36.2	93.6	4.3	70.6	0.0	n/a	n/a
15-Mar-13	-33.3	-28.6	-37.7	77.2	9.1	69.9	0.0	n/a	n/a
16-Mar-13	-23.2	-20.4	-28.6	60.7	8.1	80.1	0.0	n/a	n/a
17-Mar-13	-24.7	-20.4	-26.8	72.7	7.0	77.2	0.0	n/a	n/a
18-Mar-13	-26.7	-21.5	-33.2	103.2	2.6	72.5	0.0	n/a	n/a
19-Mar-13	-34.2	-30.9	-37.3	115.5	1.5	67.7	0.0	n/a	n/a
20-Mar-13	-31.5	-22.6	-38.6	108.4	2.7	66.8	0.0	n/a	n/a
21-Mar-13	-21.0	-17.2	-24.9	99.0	9.7	77.8	0.0	n/a	n/a
22-Mar-13	-17.2	-14.8	-20.1	104.4	7.2	79.5	0.0	n/a	n/a
23-Mar-13	-18.2	-12.0	-22.3	107.0	2.4	78.2	0.0	n/a	n/a

Appendix A. Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

Date	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
24-Mar-13	-16.3	-10.5	-22.3	101.6	3.8	79.4	0.0	n/a	n/a
25-Mar-13	-16.0	-11.3	-20.1	133.9	2.3	79.1	0.0	n/a	n/a
26-Mar-13	-17.2	-13.1	-21.1	136.8	3.7	81.1	0.0	n/a	n/a
27-Mar-13	-14.4	-10.7	-18.7	138.5	6.4	83.2	0.0	n/a	n/a
28-Mar-13	-16.5	-12.3	-23.0	131.4	4.0	77.9	0.0	n/a	n/a
29-Mar-13	-21.6	-13.0	-26.2	148.5	1.3	72.1	0.0	n/a	n/a
30-Mar-13	-22.5	-12.9	-28.6	149.2	0.4	68.4	0.0	n/a	n/a
31-Mar-13	-19.6	-11.5	-27.3	154.1	1.4	68.9	0.0	n/a	n/a
1-Apr-13	-21.1	-10.2	-27.0	139.9	2.0	74.7	0.0	n/a	n/a
2-Apr-13	-26.4	-23.2	-30.5	159.2	7.6	74.9	0.0	n/a	n/a
3-Apr-13	-24.4	-21.8	-27.7	138.6	7.0	75.4	0.0	n/a	n/a
4-Apr-13	-28.9	-27.0	-31.8	164.0	5.0	71.8	0.0	n/a	n/a
5-Apr-13	-28.0	-23.9	-33.1	140.3	11.2	75.0	0.0	n/a	n/a
6-Apr-13	-21.4	-18.1	-25.6	122.6	14.6	81.5	0.0	n/a	n/a
7-Apr-13	-18.0	-14.9	-20.9	155.1	6.9	76.3	0.0	n/a	n/a
8-Apr-13	-10.8	-2.8	-21.4	180.6	5.0	69.7	0.0	n/a	n/a
9-Apr-13	-5.8	-0.7	-10.9	184.5	7.6	72.4	0.3	n/a	n/a
10-Apr-13	-6.5	-3.9	-8.5	166.3	12.8	88.3	0.0	n/a	n/a
11-Apr-13	-10.1	-4.4	-15.4	180.7	6.9	74.7	0.0	n/a	n/a
12-Apr-13	-13.8	-6.9	-18.8	191.9	1.1	77.8	0.0	n/a	n/a
13-Apr-13	-13.8	-11.2	-19.4	185.1	7.9	74.4	0.0	n/a	n/a
14-Apr-13	-13.1	-10.4	-16.3	197.8	7.8	74.6	0.0	n/a	n/a
15-Apr-13	-18.3	-16.3	-21.6	200.6	11.0	81.5	0.0	n/a	n/a
16-Apr-13	-18.2	-16.6	-20.4	207.3	10.4	78.5	0.0	n/a	n/a
17-Apr-13	-17.3	-13.9	-21.1	181.5	8.8	80.4	0.0	n/a	n/a
18-Apr-13	-17.3	-13.7	-21.0	210.4	11.3	80.5	0.0	n/a	n/a
19-Apr-13	-15.5	-13.7	-17.2	168.6	11.4	84.5	0.0	n/a	n/a
20-Apr-13	-14.0	-11.1	-18.0	159.2	9.5	86.4	0.0	n/a	n/a
21-Apr-13	-12.5	-10.9	-14.8	179.7	11.8	85.9	0.0	n/a	n/a
22-Apr-13	-15.0	-12.3	-20.1	226.7	9.0	81.5	0.0	n/a	n/a
23-Apr-13	-21.0	-18.3	-24.5	237.0	4.3	75.5	0.0	n/a	n/a
24-Apr-13	-18.4	-14.3	-24.2	202.3	2.8	79.4	0.0	n/a	n/a
25-Apr-13	-15.5	-8.3	-22.9	196.5	4.1	82.9	0.0	n/a	n/a
26-Apr-13	-18.2	-12.9	-20.6	237.1	10.8	77.0	0.0	n/a	n/a
27-Apr-13	-20.0	-18.2	-23.5	246.7	8.0	75.2	0.0	n/a	n/a
28-Apr-13	-22.1	-18.8	-25.3	253.4	6.5	76.7	0.0	n/a	n/a
29-Apr-13	-21.2	-17.9	-25.5	251.7	3.8	79.2	0.0	n/a	n/a
30-Apr-13	-21.9	-18.1	-27.1	254.3	8.1	78.1	0.0	n/a	n/a
1-May-13	-17.4	-11.0	-25.8	263.3	1.5	69.6	0.0	n/a	n/a
2-May-13	-16.9	-12.6	-21.7	245.8	3.5	79.1	0.0	n/a	n/a
3-May-13	-17.1	-10.8	-24.5	252.4	2.4	70.1	0.0	n/a	n/a
4-May-13	-16.4	-13.3	-20.0	268.6	4.5	77.1	0.0	n/a	n/a
5-May-13	-19.0	-14.6	-23.9	260.4	2.5	78.8	0.0	n/a	n/a
6-May-13	-16.7	-11.5	-24.2	232.5	3.2	79.2	0.0	n/a	n/a
7-May-13	-17.5	-13.5	-22.0	278.8	9.0	80.4	0.0	n/a	n/a
8-May-13	-15.4	-13.2	-17.6	271.6	4.3	76.1	0.0	n/a	n/a
9-May-13	-10.6	-4.5	-16.9	222.5	5.7	85.3	0.0	n/a	n/a
10-May-13	-12.0	-10.2	-15.8	246.3	5.5	83.8	0.0	n/a	n/a
11-May-13	-10.7	-6.7	-16.0	262.0	3.2	84.3	0.0	n/a	n/a
12-May-13	-4.5	0.0	-8.1	223.1	3.6	81.7	0.3	n/a	n/a
13-May-13	-6.2	-2.6	-11.1	190.0	6.9	88.8	0.0	n/a	n/a
14-May-13	-6.9	-5.1	-10.3	279.4	5.8	85.8	0.0	n/a	n/a
15-May-13	-2.8	1.6	-9.2	239.9	7.6	85.9	0.0	n/a	n/a
16-May-13	-2.2	0.3	-8.4	246.0	7.1	86.5	0.0	n/a	n/a
17-May-13	-1.0	0.1	-2.0	143.7	3.8	92.5	0.0	n/a	n/a
18-May-13	-2.5	0.1	-4.9	178.8	4.1	89.8	0.0	n/a	n/a
19-May-13	-3.0	-0.1	-5.8	274.3	11.4	89.0	0.0	n/a	n/a
20-May-13	-1.7	0.9	-4.4	224.2	10.1	91.0	0.0	n/a	n/a

Appendix A. Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

Date	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
21-May-13	-1.9	2.1	-7.8	312.0	5.1	82.1	0.0	n/a	n/a
22-May-13	0.2	1.6	-1.3	166.0	3.2	86.1	0.0	n/a	n/a
23-May-13	1.9	5.5	-0.5	296.8	4.1	75.8	0.0	n/a	n/a
24-May-13	2.7	6.1	-1.7	296.1	4.3	79.4	0.0	n/a	n/a
25-May-13	1.6	5.5	0.0	112.9	8.1	94.7	0.0	n/a	n/a
26-May-13	-0.6	1.6	-3.5	163.3	6.2	86.5	0.0	n/a	n/a
27-May-13	-1.4	1.5	-5.5	133.5	3.4	90.1	0.0	n/a	n/a
28-May-13	1.9	4.8	-0.8	204.2	4.7	83.9	0.0	n/a	n/a
29-May-13	1.4	3.0	-0.6	127.4	3.7	88.9	0.0	n/a	n/a
30-May-13	1.9	5.8	-1.0	174.2	3.4	80.2	0.0	n/a	n/a
31-May-13	7.5	13.1	-0.4	307.4	2.6	67.8	0.0	n/a	n/a
1-Jun-13	7.1	15.4	1.3	191.4	4.7	74.7	0.0	n/a	n/a
2-Jun-13	1.8	3.9	0.6	174.2	5.2	81.9	0.3	n/a	n/a
3-Jun-13	7.2	13.6	0.5	317.3	7.1	59.1	0.0	n/a	n/a
4-Jun-13	13.4	19.7	4.8	320.5	3.6	58.0	0.0	n/a	n/a
5-Jun-13	15.3	23.6	7.2	268.9	2.8	60.5	0.0	n/a	n/a
6-Jun-13	4.1	12.0	0.8	105.8	7.3	90.7	0.8	n/a	n/a
7-Jun-13	2.1	4.9	0.0	71.8	5.4	90.9	3.0	n/a	n/a
8-Jun-13	-0.1	0.1	-0.5	32.8	1.2	95.5	2.3	n/a	n/a
9-Jun-13	0.0	2.4	-1.3	191.8	1.6	87.7	0.5	n/a	n/a
10-Jun-13	5.0	9.3	-0.5	335.0	3.2	67.6	0.0	n/a	n/a
11-Jun-13	10.6	17.0	2.3	325.6	3.0	50.2	0.0	n/a	n/a
12-Jun-13	10.8	14.7	4.7	261.7	2.9	56.9	0.0	n/a	n/a
13-Jun-13	12.5	19.1	5.9	217.0	2.3	56.7	0.0	n/a	n/a
14-Jun-13	9.6	15.7	4.9	193.8	4.9	71.5	0.0	n/a	n/a
15-Jun-13	10.7	17.5	3.8	312.1	4.3	67.7	0.0	n/a	n/a
16-Jun-13	11.1	15.5	5.5	277.0	4.8	73.2	0.0	n/a	n/a
17-Jun-13	11.7	18.5	6.5	272.2	3.5	71.1	0.0	n/a	n/a
18-Jun-13	3.8	7.6	0.0	175.9	5.4	68.8	0.0	n/a	n/a
19-Jun-13	5.5	10.2	-0.5	263.0	7.2	63.3	0.0	n/a	n/a
20-Jun-13	6.5	11.6	2.6	328.8	9.3	75.5	0.0	n/a	n/a
21-Jun-13	12.2	20.3	5.3	315.2	5.5	61.5	0.0	n/a	n/a
22-Jun-13	10.3	16.8	4.6	327.5	5.5	70.2	0.0	n/a	n/a
23-Jun-13	15.8	25.1	6.0	295.4	3.3	63.2	0.0	n/a	n/a
24-Jun-13	12.7	17.5	7.4	263.9	5.1	71.7	0.0	n/a	n/a
25-Jun-13	5.8	7.9	2.4	134.2	6.3	79.4	0.0	n/a	n/a
26-Jun-13	5.6	10.2	1.1	339.1	2.6	59.4	0.0	n/a	n/a
27-Jun-13	13.6	21.6	2.7	315.8	6.5	50.4	0.0	n/a	n/a
28-Jun-13	10.4	13.9	7.1	197.0	5.8	69.6	0.0	n/a	n/a
29-Jun-13	17.5	29.4	5.9	282.4	5.5	56.7	0.0	n/a	n/a
30-Jun-13	14.1	22.3	6.4	236.8	6.5	70.4	7.1	n/a	n/a
1-Jul-13	6.6	10.8	3.2	252.4	4.3	75.1	0.0	n/a	n/a
2-Jul-13	9.8	16.8	4.9	180.4	8.0	72.5	0.5	n/a	n/a
3-Jul-13	6.2	9.1	2.8	297.5	11.4	68.9	6.9	n/a	n/a
4-Jul-13	7.6	11.5	3.3	333.1	5.3	55.6	0.0	n/a	n/a
5-Jul-13	9.8	13.5	4.5	266.8	5.6	52.8	0.0	n/a	n/a
6-Jul-13	15.2	20.0	7.1	313.0	3.3	46.7	0.0	n/a	n/a
7-Jul-13	12.7	19.2	7.7	234.0	5.2	67.9	0.0	n/a	n/a
8-Jul-13	9.4	13.1	5.2	250.3	5.2	72.3	0.0	n/a	n/a
9-Jul-13	10.2	12.4	6.8	322.1	4.4	64.7	0.0	n/a	n/a
10-Jul-13	8.6	11.8	5.6	286.0	4.2	64.1	0.0	6.43	6.92
11-Jul-13	10.2	13.5	6.4	231.7	3.8	63.5	0.0	3.99	4.20
12-Jul-13	7.6	10.6	5.4	208.6	6.0	72.2	0.0	3.70	3.85
13-Jul-13	4.6	6.8	3.0	96.2	9.3	90.0	1.8	3.36	3.43
14-Jul-13	4.8	6.3	3.8	151.0	8.0	89.4	2.8	0.70	0.62
15-Jul-13	6.3	8.9	4.2	165.4	6.1	88.1	2.5	1.12	1.12
16-Jul-13	5.5	6.5	4.0	70.7	7.3	86.3	2.3	1.81	1.93
17-Jul-13	5.9	8.9	3.6	128.9	7.9	85.4	0.3	0.49	0.15

Appendix A. Doris Meteorological Station and Doris Micro-meteorological Station, Daily Data, October 2012 to September 2013

Date	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
18-Jul-13	10.9	16.2	5.2	279.9	5.9	76.7	0.0	1.75	1.66
19-Jul-13	12.4	17.2	7.4	223.4	4.5	71.2	0.0	4.54	4.98
20-Jul-13	11.3	14.6	9.0	243.3	4.4	69.2	0.0	3.60	3.85
21-Jul-13	9.3	11.6	7.5	198.4	4.3	74.4	0.0	3.74	3.92
22-Jul-13	10.1	14.1	5.6	262.5	4.0	74.0	0.0	3.00	3.14
23-Jul-13	14.3	19.2	7.8	261.9	2.8	57.5	0.0	3.76	4.18
24-Jul-13	15.0	18.7	12.0	132.9	5.0	83.7	2.5	4.34	4.78
25-Jul-13	15.4	21.2	9.3	164.7	4.2	76.7	0.0	2.06	2.24
26-Jul-13	9.2	11.4	7.2	153.7	6.8	80.0	1.0	3.01	3.23
27-Jul-13	11.3	15.8	7.6	196.9	6.2	70.6	0.0	1.91	1.90
28-Jul-13	8.2	11.8	5.3	168.2	4.9	79.1	0.5	3.03	3.03
29-Jul-13	9.7	12.9	6.0	159.2	5.8	70.7	0.0	2.00	1.99
30-Jul-13	8.6	12.0	5.4	92.0	8.2	91.0	4.8	2.69	2.19
31-Jul-13	7.9	11.7	5.5	182.1	5.6	73.6	0.3	1.06	1.11
1-Aug-13	8.6	12.2	5.6	164.0	6.9	79.4	0.3	2.29	2.24
2-Aug-13	8.8	12.0	6.2	209.4	3.0	66.3	0.0	2.09	2.10
3-Aug-13	10.9	16.7	4.5	243.2	4.7	67.1	0.0	2.72	2.79
4-Aug-13	12.5	17.7	6.8	243.2	6.9	58.6	0.0	3.39	3.16
5-Aug-13	12.6	17.6	6.9	260.6	6.3	64.3	0.0	4.16	3.32
6-Aug-13	15.4	22.1	9.3	255.2	6.3	66.8	0.0	3.92	3.37
7-Aug-13	18.1	21.3	13.3	240.0	5.2	57.8	0.0	4.08	3.85
8-Aug-13	12.7	15.3	7.9	143.3	4.2	82.2	0.0	4.51	4.46
9-Aug-13	13.8	21.1	6.9	223.0	4.6	77.2	0.0	2.01	1.98
10-Aug-13	19.2	26.5	10.4	233.1	2.0	56.4	0.0	3.35	3.48
11-Aug-13	18.2	22.5	12.5	196.3	2.8	62.0	0.0	3.82	4.08
12-Aug-13	18.4	23.4	12.0	210.1	4.7	65.3	0.0	3.19	3.28
13-Aug-13	11.8	17.5	9.0	149.2	5.5	73.6	0.0	3.88	3.92
14-Aug-13	15.8	24.5	8.5	189.3	5.6	69.8	0.0	2.25	1.83
15-Aug-13	10.4	13.1	8.7	88.8	6.5	79.2	0.0	3.11	2.78
16-Aug-13	7.5	9.9	5.7	105.0	5.6	78.1	0.0	1.53	1.15
17-Aug-13	9.0	13.4	3.8	113.4	6.1	76.8	0.0	1.20	0.72
18-Aug-13	10.4	12.2	9.2	44.3	3.1	90.0	1.5	1.52	1.02
19-Aug-13	8.4	9.4	5.8	52.0	7.2	89.7	0.0	0.47	0.34
20-Aug-13	7.2	10.3	4.1	150.6	5.0	74.1	0.0	0.64	0.36
21-Aug-13	6.0	7.9	4.0	112.0	4.1	69.6	0.0	1.62	1.51
22-Aug-13	5.0	7.5	2.8	67.1	2.3	82.2	2.3	0.93	0.64
23-Aug-13	3.1	6.1	1.1	112.6	14.0	69.6	2.3	0.11	-0.10
24-Aug-13	1.2	2.1	0.3	48.2	12.7	72.6	0.5	1.48	0.66
25-Aug-13	2.9	4.8	0.8	64.7	8.8	68.9	0.0	0.86	-0.03
26-Aug-13	5.2	10.6	-1.9	168.3	2.5	66.4	0.0	0.75	0.10
27-Aug-13	4.7	6.2	3.3	64.3	4.4	87.4	1.9	1.49	1.38
28-Aug-13	3.7	6.1	1.9	85.6	3.5	84.8	1.4	0.36	0.17
29-Aug-13	4.6	9.1	2.2	175.5	3.1	74.5	0.0	0.35	0.23
30-Aug-13	7.2	14.3	0.8	140.6	1.6	73.0	0.2	1.20	1.24
31-Aug-13	8.7	12.2	7.0	74.2	3.9	85.7	0.2	1.20	1.20
1-Sep-13	4.7	7.0	1.9	47.3	5.4	89.5	5.6	0.78	0.74
2-Sep-13	2.4	4.0	0.5	72.0	12.3	79.9	0.4	0.05	-0.15
3-Sep-13	0.6	2.3	-1.8	79.7	5.6	70.0	3.0	0.72	0.23
4-Sep-13	2.8	6.1	-0.7	56.2	8.0	81.6	1.0	0.74	0.35
5-Sep-13	4.9	6.9	3.5	53.8	1.5	92.7	3.6	0.46	-0.11
6-Sep-13	2.2	4.1	0.7	71.0	4.3	87.3	1.0	0.49	0.54
7-Sep-13	1.7	3.4	0.0	69.3	4.2	83.5	0.0	0.59	0.49
8-Sep-13	1.0	3.0	-0.6	57.2	4.3	76.9	0.0	0.68	0.50
9-Sep-13	1.6	3.5	0.1	77.3	7.4	79.8	0.0	0.62	0.29
10-Sep-13	0.8	3.7	-1.5	119.7	4.7	80.6	0.0	0.83	0.34
11-Sep-13	0.1	2.8	-1.6	95.4	3.5	83.0	0.0	0.81	0.60
12-Sep-13	3.9	7.6	-0.3	41.7	7.2	88.7	0.8	0.61	0.45
13-Sep-13	0.2	3.4	-1.3	42.1	7.0	86.0	0.0	0.51	0.20

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Date	Doris Meteorological Station							Doris 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)	Mean Daily Relative Humidity (%)	Total Daily Precipitation (mm)[1]	Penman method	Priestly-Taylor Method
14-Sep-13	2.6	6.4	-1.2	27.7	3.6	90.0	0.0	0.46	0.19
15-Sep-13	4.1	8.0	2.2	33.8	5.3	94.3	0.5	0.29	0.17
16-Sep-13	0.9	2.9	-1.7	72.0	4.2	88.5	0.5	0.22	0.14
17-Sep-13	-1.8	-0.5	-3.3	91.6	3.9	81.8	0.0	0.35	0.23
18-Sep-13	-0.9	1.5	-2.7	92.3	2.3	81.4	0.0	0.59	0.50
19-Sep-13	0.2	1.6	-1.3	38.8	7.5	82.1	0.0	0.42	0.28
20-Sep-13	0.3	1.3	-0.5	46.7	4.0	95.8	0.0	0.52	0.06
21-Sep-13	2.1	3.1	0.4	14.9	8.1	96.4	3.0	0.30	0.29
22-Sep-13	2.5	3.3	1.9	17.6	7.9	98.2	0.8	0.06	-0.09
23-Sep-13	2.5	3.0	1.9	18.0	6.1	97.2	5.3	0.16	0.10
24-Sep-13	2.4	3.4	1.9	22.5	4.4	97.2	0.0	0.07	-0.01
25-Sep-13	1.8	2.9	0.5	25.5	3.2	96.5	0.0	0.11	0.07
26-Sep-13	2.5	4.2	0.6	36.0	2.2	93.8	0.0	0.15	0.13
27-Sep-13	3.2	5.0	-0.2	35.1	5.6	88.8	0.3	0.34	0.35
28-Sep-13	1.0	3.0	-0.5	41.1	3.6	94.4	0.0	0.44	0.22
29-Sep-13	1.0	2.4	-0.1	28.4	4.1	92.0	0.3	n/a	n/a

[1] Due to closure of the Doris camp during the winter, it was not possible to complete necessary winter maintenance to the precipitation adapter. The precipitation adapter was frozen from November to March meaning that the total annual precipitation is an underestimate.