APPENDIX 7

Environmental Baseline Report: Climate

EAGLE GOLD PROJECT

Environmental Baseline Report: Climate

FINAL REPORT

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EXECUTIVE SUMMARY

This report presents results of the baseline climate assessment completed in 2009 by Stantec for the Eagle Gold Project proposed by Victoria Gold Corporation. The baseline assessment includes climate data collected and analyzed from two climate stations that were established in the study area from 1993 – 1996 and from a climate station established at the project site from August 2007 – October 2009. This baseline climate assessment has been completed to support engineering and design elements for project facilities, and to provide data inputs to the mine site water balance, a water management plan, for the assessment of potential environmental effects in support of a Project Proposal.

A field program was conducted from 2007 to 2009 to address: 1) a data gap analysis of historic data obtained primarily during the period from 1993 through 1996, and 2) current regulatory requirements for an environmental assessment in the Yukon. This report summarizes background information, methods, and results for the climate baseline report. Review and analysis of previous assessments of the baseline climate information in the region and at the site are included in this report and attempts to update that information have been made where possible.

Climate monitoring was conducted at Potato Hills (located in the upper Dublin Gulch watershed) within the project site from August 2007 to October 2009. Climate monitoring also took place near the project site camp to characterize the valley conditions. Regional climate data were collected from up to nine stations throughout the Yukon Territory.

Summary climate data from 2007 to 2009 were compared to historic regional climate data as well as historic on-site data, to provide information on temporal climatic variability and to develop estimated long-term climate values for the project site. The mean annual temperature at the site is approximately -3°C, with an annual range of 63.5°C for the period of record. Regionally, the maximum temperature range was 98°C at Mayo, YT. The estimated mean annual precipitation in the study area ranges from 389 mm to 528 mm. This range in annual estimated precipitation reflects the elevation changes at the site.

Data summaries and estimates for annual rainfall, snowfall, storm events, evaporation, and wind trends are also included in this report. The monitoring program reported here provides a baseline dataset useful for assessment of potential development of water resources at the project site, and also for the assessment of potential project effects on air quality.

ABBREVIATIONS AND ACRONYMS

EFD .... extreme-value frequency distribution

ENSO .... El Nino Southern Oscillation

ET .... evapotranspiration

masl .... meters above sea level

NFD .... normal-value frequency distributions

HKP .... Hallam Knight Piésold

IDF .... Intensity-Duration-Frequency

JWA .... Jacques Whitford AXYS

SoG .... snow on ground

SWE .... Snow Water Equivalent

WNW .... west northwest

YT .... Yukon Territory

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1 INTRODUCTION

This report presents results of the baseline climate assessment completed by Stantec between 2007 and 2009 for the Eagle Gold Project proposed by Victoria Gold Corporation. The Eagle Gold Project is a proposed open pit gold mine within the Dublin Gulch watershed located 85 km northeast of the Village of Mayo, Yukon Territory.

Stantec was contracted by the Stratagold Corporation to begin environmental baseline studies in 2007. In 2009, Stratagold Corporation was acquired by Victoria Gold Corporation. During this time, the project was renamed from Dublin Gulch to Eagle Gold and the local study area was updated to reflect any changes to the geographic extent of the proposed Eagle Gold Project.

This report presents background information, methods, results and data analysis. Upon review of historic Climate data previously compiled for the Dublin Gulch project, Stantec completed the following studies to complete the baseline climate assessment:

1) renew climate data collection for the two climate stations that were established in the study area from 1993 – 1995
2) update and re-analyze the long-term regional database to improve climate parameter estimates for the study area

These studies were completed to support engineering and design elements for project facilities, and to provide important data inputs to the mine site water balance, a water management plan, and for assessment of potential Project effects on air quality.

Regional climatic data were analyzed to characterize the long-term climatic trends in the area, which were then used to develop long-term estimates for the study area. Historical climate data collection programs are briefly summarized here to provide further context for climate data collected since 2007 in the study area.

2 BACKGROUND

2.1 Study Area Boundaries

The regional study area lies within the Mayo Lake-Ross River Eco-region in central Yukon. The regional area encompasses the Stewart, McMillan, and Pelly plateaus and is a division of the Yukon plateau physiographic region (Figure 2-1) (Yukon Environment 2008). Most of the terrain in the region lies between 500 and 1,700 meters above sea level (m asl). The St. Elias mountain range to the west is the dominant physical feature in the region affecting climate. Moist Pacific maritime air masses are often blocked by the St. Elias range, which tend to reduce air temperatures and precipitation, particularly during the fall and winter. Local topographic enhancement of winter temperature inversions within the Yukon plateaus also tends to keep surface temperatures cool (Burn 1994). As such, the Dublin Gulch area is characterized by a "continental" type climate with moderate annual precipitation and a large temperature range. Summers are short and can be hot, while winters are long and cold with moderate snowfall. Rainstorm events can occur frequently during the summer and may contribute between 30 to 40% of the annual precipitation. Higher elevations are snow-free by mid-June. Frost action may occur at any time during the summer or fall.

2.2 Review of Existing Information

2.2.1 Historical Regional and Study Area Climate Data Sources

Regional climatic data are available from several stations in the area which provide a long-term database. The station locations are listed with the parameters monitored or analyzed in Table 2-1, Appendix A. These stations were operated and reported on by the Atmospheric Environment Service of Environment Canada. Datasets are available at: http://www.climate.weatheroffice.ec.gc.ca/climateData/canada_e.html .

Climatic information has been collected within the study area periodically since 1979 including: the winter of 1979 – 1980 and fall and winter of 1984 by Canada Tungsten; and intermittently from 1993 – 1996 by New Millennium Mining Ltd. The New Millennium project data summary was completed by Hallam Knight Piésold (HKP) in March 1996 and an addendum was completed by Clearwater Consultants in December 1996. For the most part, comparisons and analysis of historical data have focused on the Clearwater report assuming the intent of the Addendum was to update and improve on the earlier HKP report.

3 FIELD METHODS

Climate data collection was renewed in the study area beginning in August 2007. A climate station was installed at Potato Hills (1,420 m asl) in August 2007, while a second station was installed near the camp (823 m asl) in August 2009. The second station was installed based on the findings of a snow survey undertaken in April 2009 at the Potato Hills station and at the Camp station location (JWSAL, 2009) The snow survey demonstrated large differences in snow accumulation between the two sites. Therefore two stations were necessary to characterize climatic conditions in the upper and lower elevations of the study area which exhibit significant variability due to elevation and physiography (Figure 3-1). These sites were the same locations used during the 1993 – 1995 period. The Potato Hills station is located in the southeast part of the Dublin Gulch drainage basin along the drainage divide, while the Camp climate station is located in the lower Dublin Gulch valley near the existing camp (Figure 3-1). Climate data through hydrological year 2008 was previously summarized and reported on in the December 2008 *Climate and Hydrology Environmental Baseline Report*, prepared by JWSAL (2008).

The Potato Hills station is an ONSET Hobo operating system and was installed on August 14 2007. Parameters monitored include: air temperature, rainfall (tipping bucket), wind speed and direction, barometric pressure, relative humidity, and solar radiation. Sampling intervals varied between 15 minutes from Aug 14 2007 to Aug 13 2008; 60-minute intervals from Aug 13 2008 to June 8 2009; and 15-minute intervals from June 8 2009 to October 31 2009.

The Camp station is a Campbell Scientific operating system and was installed on August 21 2009. Parameters measured include: air temperature, rainfall (tipping bucket), wind speed, and direction, barometric pressure, and relative humidity, all at 15-minute intervals. Data for this report were collected to October 31 2009.

Snowpack surveys were conducted in April 2009. Field methods have been previously described by JWSAL (2009). Briefly, a snow survey along two snow courses was completed near the end of April 2009. The snow courses were situated near the Potato Hills station and the Camp station. Snow cores were sampled for snow depth, snow density, and snow water equivalent (SWE). The sampling procedures followed accepted survey techniques employed by Environment Yukon and the Ministry of Environment of British Columbia (MOE, 1981). A snow course is a snow sampling transect through an area of homogeneous land cover and of about the same elevation. The sampling procedure included measuring ten snow depths and acquiring ten snow cores with a calibrated snow sampling tube. The tube and snow core were weighed to determine the weight of the snow. The SWE of each core was derived using a calibrated scale. Snow density was calculated from the snow depth and SWE since no snow pits were dug during the survey.

4 FIELD RESULTS

This section summarizes the field data from the study area including the recent climate monitoring (2007 to 2009) and the historical data (1993 to 1996). These datasets provide important climatic data for water resource and air quality assessments. This information is presented to provide context for the regional data analysis and study area estimates that are described in Section 5.

4.1 Temperature

4.1.1 2007 – 2009 Temperature Data

Temperature data from the study area from 2007 to 2009 are provided in Table 4-1, Appendix A. The mean annual temperature for 2008 (the only full year of data) was -4.2°C. The mean July temperature at the Potato Hills station was 10.4°C and the mean January temperature at the Potato Hills station was -18.5°C

The maximum recorded temperature at the Potato Hills station from 2007 to 2009 was 26.9°C on July 30, 2009 and the minimum temperature recorded was -36.5°C (January 8 2009) (Table 4-1). The annual range is 63.4°C. Comparison between the two stations indicates that, in general, the Potato Hills station is cooler than the Camp station as a result of temperature lapse rates. However, night time temperature inversions occur at the study area. Based on the latest data available inversions were recorded during late September and mid-October in 2009 (Figure 4-1).

4.1.2 Historical Field Data

Mean monthly temperatures from 1993 to 1996 are also provided in Table 4-2, Appendix A. Review of the available historical data indicates the mean annual temperature at the study area was -3°C. In general, 1993 and 1994 were cooler in the winter and slightly warmer in the summer compared to the 2007 to 2009 trends, and spring and fall temperatures tended to be similar between the two periods on record (Tables 4-1, 4-2; and Figure 4-2).

4.2 Precipitation

4.2.1 Study Area Precipitation

Recent precipitation data are summarized for the Potato Hills station and the Camp station in Table 4-3, Appendix A. Historical monthly precipitation data were reported from the Camp station location only and are summarized in Table 4-4, Appendix A.

The Camp station received less rainfall compared to the Potato Hills station when the daily mean temperature at the Potato Hills station remained above freezing. This difference in rainfall likely reflects an orographic effect at the study area (assuming spatial differences in rainfall accumulation are negligible). The monthly difference in rainfall between the sites for August 2009 was 14.7 mm (adjusted to the period where both stations operated) and in September the difference was 9.6 mm. In October 2009, the Camp station recorded 6.6 mm more rainfall than the Potato Hills station. The estimated orographic effect for August was 2.46 mm/100 m elevation rise, and the estimated orographic effect for September was 1.61 mm/100 m. However these trends reflect differences in the state of the precipitation at each site as a result of ambient temperature. Therefore, for the total period where both stations operated and prior to freezing temperatures (e.g., August 21 – September 13, 2009), the rainfall difference between the stations was 11.7 mm. The orographic effect during this period was 1.96 mm/100 m elevation gain, which is a reasonable estimate for the study area based on the period of available data. This estimate does not include summer months in the analysis when the orographic rate may be steeper. A historical estimate of the orographic effect at the study area, based on regional data at Mayo and Elsa, was 2.86 mm/100 m elevation gain (Clearwater 1996).

4.2.2 Snow Surveys

4.2.2.1 2009 Snow Data

Snow surveys at the study area were conducted near the Potato Hills and Camp locations near the end of April 2009, and the results are summarized in Table 4-5, Appendix A.

At that time, snow pack depths, densities and snow water equivalents were significantly greater at the Potato Hills location than the lower Camp location. Snow depth was 1.8 times greater (126 to 69 cm) while snow density was 2.1 times greater. (0.33 to 0.16). Pomeroy and Gray (1995) found that snow pack density tends to increase with the depth of the snow pack and at areas with greater wind exposure, while protected areas, such as in valley bottoms where tree canopy may be greater and wind exposure is lower, tend to have lower snow density. These factors likely explain the differences in snow depth and density at the two locations. As a result of the higher density and deeper snow pack, SWE at the Potato Hills location was 3.7 times greater (410 to 110 mm) than at the Camp location.

Snow survey results for the study area are compared to snow survey data collected in spring 2009 (March, April, and May) from two other nearby stations in Calumet and Mayo. The data indicate that Potato Hills had higher snow depths, densities, and SWE than both Calumet and Mayo, while there was less overall SWE at the Camp location. The data also indicate that April values at Calumet and Mayo for snow depth and SWE were greater than the March and May values, suggesting that the maximum recorded depths and SWE were also recorded for the study area in April 2009.

4.2.2.2 Historical Snow Data

Snow surveys were conducted near the Camp and Potato Hills locations in spring 1996; the results from HKP (1996) are summarized in Table 4-6, Appendix A. Two locations were surveyed: Dublin #1 located in the lower valley near the camp, and Dublin #3 located in the upper watershed near the Potato Hills climate station. As with the April 2009 results, the 1996 data indicate that snow depths and SWE were substantially greater at Dublin #3 than at Dublin #1 (1.7, 1.5 and 5.0 times greater in March, April, and May, respectively), while the densities did not vary at 0.22/0.23. HKP (1996) attributed the greater snow at Dublin #3 to orographic effects. The highest snow water equivalent (216 mm at Dublin #3) occurred in May 1996, while the lower station (Dublin #1) peaked earlier at the start of April at 120 mm. HKP (1996) also noted that following regional trends, the snowpack had decreased substantially by the end of April 1996 at the Dublin #1 station.

4.3 Wind

Monthly wind speed summaries were derived from both stations in the study area. Tri-annual wind roses were produced to portray wind vector trends in time. Wind data were recorded as a wind direction and wind speed as well as a gust speed. Wind direction and wind speed are recorded as the mean values for the recording interval (e.g., 15 minutes). Gust speeds are maximum instantaneous values for the recording interval.

4.3.1 2007 – 2009 Wind Data

The dominant wind direction at the Potato Hills station from 2007 to 2009 was west-northwest (Figure 4-3). Wind vector plots for 2007, 2008, and 2009 are shown in Figures 4-4 to 4-6. There is some slight variation amongst the years; however in general the dominant wind direction is from the west-northwest (WNW).

The dominant wind direction at the Camp station for 2009 was from the north and wind speed was notably lower than at Potato Hills (Figure 4-7). For comparison, Figure 4-8 shows a wind plot for the Potato Hills station for the same period of record that the Camp station operated. During this time, the dominant wind vector at Potato Hills was WNW and the wind speeds were higher than the Camp station. The disparity between the stations reflects the local physiography of the study area. The

Camp station is relatively protected in the Haggart Creek valley, and winds appear to be funneled down the valley axis, while the Potato Hills station is open to the prevailing winds.

Monthly mean wind speeds and mean gust speeds are provided in Table 4-7, Appendix A. The mean monthly wind speeds were greatest in the late winter and early spring and lowest during the late summer and early fall months after which wind speeds tend to increase again. These trends were also noted in the historical wind analysis (Clearwater 1996) summarized below.

Gust speeds indicate the maximum wind speed measured during the data interval. Monthly gust speed trends are summarized into monthly averages for the Potato Hills station (Table 4-7). Gust speeds show similar monthly trends as the mean wind speeds described above.

4.3.2 Historical Wind Data

The 1993-1996 wind data from the Camp station indicates that the predominant wind direction was from the north and northeast (HKP 1996). The predominant wind direction in 1993 and 1996 was north (33.4% and 51.1%, respectively) while the predominant wind direction in 1994 and 1995 was northeast (26.0% and 27.3%, respectively). The annual percent distributions for 1993 to 1995 are shown in Table 4-8, Appendix A. The historical data is only available from the Camp station; however the 2009 Camp station data shows similar wind trends as the historical wind data.

The dominant wind speed interval at the Camp station was 0 – 5 km/h in 1993 and 1994 (57% in 1993, and 54% in 1994) and 5 – 10 km/h in 1995 (36%) (HKP 1996). The monthly maximum wind speed at the study area was 43.4 km/h from 1993 to 1995. The annual mean maximum wind speed was approximately 33 km/h (HKP, 1996).

4.4 Other Parameters

Relative humidity and solar radiation were not reported in the available historical documents for the study area. Results for the 2007 – 2009 period are reported below.

4.4.1 Relative Humidity

Mean monthly summaries for relative humidity at Potato Hills are provided in Table 4-9, Appendix A. In general, the winter months tended to have higher relative humidity compared to summer conditions. The maximum mean monthly relative humidity was 91% in October 2008, while the minimum was 37.4% in May 2009. The October 2007 to September 2008 mean of 77.4% was somewhat higher than the October 2008 to September 2009 mean of 71.1%, perhaps reflecting the overall lower temperatures and higher precipitation values during the October 2007 to September 2008 period (Table 4-3).

4.4.2 Solar Radiation

Mean monthly summaries for solar radiation at Potato Hills are provided in Table 4-9. These values were derived from daily totals and averaged for each month. Solar radiation tends to be highest during the summer (June or July) (a mean monthly maximum of 244.1 Watts/m^2 per day occurred in

July 2009) and diminishes during the winter season, with mean monthly minimums (2.1 and 3.5 Watts/m^2 per day) occurring in December (2007 and 2008, respectively). The maximum solar radiation recorded event was 1161.9 W/m^2/15min interval (77.4 W/m^2/minute) (July 10, 2008).

5 DATA ANALYSIS

The available data record from the study area is not sufficient to address all engineering and environmental assessment aspects related to the project. For this reason, long-term regional data were used in combination with both the historical and recent study area data to help develop more reliable "long-term" estimates of specific climatic parameters and/or conditions of interest for water resource assessments in the study area. This section describes the regional climate conditions and presents on-site estimates for various climate parameters. Annual summaries of climatic conditions at the regional stations and estimated annual totals for the two study area climate stations are provided in Table 5-1, Appendix A. Data are provided for annual temperature, precipitation, rain, snowfall (including estimated snow water equivalent), evaporation, and evapotranspiration. Maximum and minimum totals generally represent either the highest and lowest accumulations on record, or estimates developed from the highest and lowest values on record.

5.1 Temperature

Regional temperature data were summarized for the five stations listed in Table 2-1. Annual and monthly means and station maximum and minimum recorded temperatures were derived for the regional data and for the Potato Hills station. The annual temperature range was also computed for each regional station.

For the period of record at Mayo, daily temperatures have ranged from 36.1°C to -62.2°C for a total range of 98.3°C. Figure 5-1 shows the Mayo and Keno Hill mean monthly temperature records and the seven-year running average at Mayo. The period of the running average was selected based on average El Nino Southern Oscillation (ENSO) event periodicity. However, it is not apparent from the data series that ENSO events have had a substantial impact on temperatures in the region. Over the period of record, the mean temperature at Mayo has fluctuated approximately 4°C (Figure 5-1). Further, the data do not suggest any long-term warming or cooling trend over the period of record.

The other regional stations tend to have smaller temperature ranges compared to Mayo. For example, the mean annual temperature range at Keno Hill station is 71.6°C. This same trend has been noted at the study area (Figure 5-2). The reason for the lower temperature range is attributed to the higher elevations at the study area which tend to limit maximum daytime summer temperatures and night-time inversions that occur at higher elevations in the winter, which keep higher elevations warmer than valley locations. These trends and the similar physiography suggest the study area and Keno Hill have similar climatic regimes.

The mean January temperature for the regional stations is -22.1°C and the mean July temperature for the regional stations is 13.3°C, indicative of the cold winters and moderate summers in the region.

Mean monthly temperature summaries for the regional stations are provided in Table 5-2, Appendix A. Spring thaws begin in April when daily maximum temperatures exceed 0°C, although daily mean temperatures may not rise above freezing until May. Temperatures begin to recede from summer highs during September. However, daily minimums may drop below freezing at night during August.

Study area temperature data demonstrate the distinct seasonality typical of the area. Comparing the study area temperature data to the regional data indicates that the study area temperature follows the same temporal trends as the regional long-term temperature trends (Figures 5-2 and 5-3). During the 1993 – 1996 period, mean monthly temperatures from the Potato Hills station were similar to the Mayo trends for that period but were slightly cooler in the winter and warmer in the summer compared to the long-term Mayo record (Figure 5-3). The mean monthly temperatures during the 2007 – 2009 period at Mayo were similar to the long-term Mayo temperature trends, except for December 2008 which was cooler than the long-term trend. Temperatures at the study area from 2007 to 2009 had a smaller annual range due to warmer winters and cooler summer temperatures compared to the Mayo records (Figure 5-2).

5.2 Precipitation

Estimates of the long-term precipitation data for the study area relied on the regional climate stations listed in Table 2-1. The longest data record was from Mayo, which has served as the primary dataset for analysis of precipitation in previous assessments of the study area (e.g., HKP 1996) and at other operations in the region (e.g., Bellekeno, Brewery Creek).

Among the nine stations considered, the Keno Hill site is most similar to the study area based on physiography and geographic location. However, the Keno Hill data record is only eight years in length and does not overlap with the study area data. Because of this short data record at the nearest climate station, the annual precipitation distributions at Mayo and Keno Hill were analyzed where the datasets overlapped (1974 – 1981) as well as the Mayo and study area datasets (1993 – 1995; 2007 – 2009) to assess the station-specific precipitation conditions relative to the long-term average conditions.

Available study area precipitation data from 1993 – 1996 and 2007 – 2009 consisted of only 24 months (full or partial months) of data that coincided with the Mayo climate record. This was a result of periodic data collection historically, the lack of monthly snow data from the study area, and temporary station malfunctions where the data for some parameters were not recorded.

Analysis of the annual precipitation distributions at Keno Hill, Mayo, and the study area (Potato Hills) demonstrated that both Keno Hill and Potato Hills received approximately 1.3 times more monthly precipitation relative to Mayo. This primarily reflects the orographic effect common to mountainous regions and suggests that Potato Hills and Keno Hill have similar precipitation regimes. The analysis also established that the mean annual precipitation during the period 1974 – 1981 was within 10% of the long-term median precipitation at Mayo (1925 – 2009). Based on this finding, the Keno Hill dataset is not indicative of a particularly dry or wet period of time in the region. Therefore, the Keno Hill dataset was also used in developing estimates for the study area.

Finally, the Keno Hill annual rainfall and snowfall distributions were compared to the other regional stations to assess if the Keno Hill station had monthly distributions that were similar to the study area given the station's similar physiography to Dublin Gulch. This analysis demonstrated that the Keno Hill station had a relatively distinctive annual distribution compared to the other four stations and is likely most similar to the distribution at the study area (Figure 5-4). For example, spring and fall rainfall at Keno Hill tended to be lower than the regional stations while snowfall during these periods was greater than the regional stations. Further, the magnitudes and distributions of monthly precipitation for Keno Hill were similar to the study area. Based on these findings, the Keno Hill precipitation distribution was used as a proxy distribution for the study area.

Mean annual precipitation data for the regional stations were derived from the available precipitation record at each regional station by summing each year's precipitation amounts and deriving the mean annual precipitation from those totals. Annual and monthly precipitation estimates for the study area were derived based on linear regressions of precipitation, rainfall and snowfall (dependent variable) and elevation (independent variable) compiled from each regional station. These equations are provided with each table. Since individual regression equations were derived for each parameter, the annual totals for rainfall and snowfall cannot be summed to calculate the annual precipitation totals. The monthly precipitation estimates for the study area were based on the annual precipitation estimate and then distributed amongst the months based on the historical monthly precipitation distribution at Keno Hill. Uncertainty estimates were developed based on comparisons between actual measured data and predicted data.

5.2.1 Regional Data

Regional monthly precipitation totals are compiled for each station in Table 5-3, Appendix A. Mean monthly totals are also provided in Figure 5-5 and the mean annual precipitation totals are included in Table 5-1. Regional monthly totals for rain are listed in Table 5-4, Appendix A.

Maximum monthly accumulations in the region have been recorded as high as 150 mm at Klondike. Annual trends indicate that rainfall begins at the lower elevations in late April or May, while the majority of rain falls in June, July, and August and tends to diminish in September (Table 5-4 and Figure 5-6). At higher elevations, there tends to be greater rainfall during the summer months (Figure 5-6), and proportionately more snowfall in the spring and fall when the higher elevations experience colder temperatures compared to valley sites (Figure 5-7). Therefore, lower elevations may receive a larger proportion of rainfall in the spring and fall when temperatures at higher elevations remain predominantly below freezing (Figures 5-6 and 5-7).

5.2.2 Study Area Data

Analysis of the available precipitation data from the study area indicates that monthly precipitation had a wide range compared to the monthly precipitation at Mayo over the same period. The mean monthly precipitation totals from Potato Hills exceeded Mayo's monthly precipitation totals by 1.26 times. Similarly, monthly precipitation totals at Keno Hill exceeded monthly precipitation at Mayo by

1.31 times on average. There are no coincident data records between the study area and Keno Hill available at this time.

The monthly rainfall data from Mayo, Keno Hill, and the Potato Hills station, where the records coincide, are provided in Table 5-5, Appendix A. The 'total rain' values are the total annual measured rainfalls, the 'partials' are the total rainfall for months where the datasets coincide. The monthly precipitation ratios represent the ratio between the Potato Hills or Keno Hill precipitation data and the Mayo data. The mean ratios are the average ratio of the 'partials' data. The monthly precipitation of the study area ranges from 17% to 217% of the median monthly precipitation at Mayo. This large range indicates the monthly estimates derived for the study area based on the Mayo dataset will have a high degree of uncertainty for event years but may be suitable for long-term water balance estimates.

Annual precipitation at the study area was previously estimated to be 386 mm (at 790 m asl), and 564 mm (at 1,350 m asl) (Clearwater 1996). These values were derived using an estimated orographic effect of 7%/100 m based on analysis of regional data (Clearwater 1996). In comparison, using a regression equation fitted to regional data, the estimated mean annual precipitation at Potato Hills is 528 mm (±37 mm – based on regression coefficient) and at Camp is 389 mm (±27 mm – based on regression coefficient). Estimated maximum and minimum annual precipitation accumulations provide context of the expected long-term range in annual precipitation (Table 5-6, Appendix A). The estimated monthly precipitation accumulations for the study area are provided in Table 5-7, Appendix A and Figure 5-8. The estimated mean annual rainfall accumulations for the Potato Hills and Camp station locations are 266 mm and 224 mm respectively.

5.2.3 Intensity-Duration-Frequency (IDF) Curves

IDF curves were compiled from Environment Canada for the six stations (Dawson, Mayo, Pelly Ranch, Teslin, Watson Lake and Whitehorse) from 1960 to 2000 where these data were available. Tables 5-8 to 5-13, Appendix A, present compilations of rainfall depths for various storm events up to the 100-year event for the six stations. To develop the IDF curves the stations require data records of greater than 10 years where rainfall was measured with a tipping bucket rain gauge at five-minute intervals. The mean data record is 27.5 years.

IDF curves are also available for Mayo and Dawson from 1979 to 2009 and from 1976 to 2007, respectively. At these two stations, the maximum annual 24-hour storm event intensities were compared to the existing curve for each location from 2000 to 2009 at Mayo and from 2000 to 2007 at Dawson. This analysis demonstrated that for either site there were no storm events greater than the 100-year event and maximum intensities for the 24-hour duration storm events did not exceed the 75-year event.

At Mayo from 2000 to 2009, of the annual maximum precipitation events, one storm event equaled the 75-year storm event intensity, one storm equaled the 5-year event, and all other storm events equaled or were less than the 2-year event intensity. At Dawson from 2000 to 2007, of the annual maximum precipitation events, two storms equaled the 5-year event intensity and all others equaled or were less than the 2-year event intensity. Since there were no outliers, the existing curves (i.e., derived from data up to 2000) were considered representative for rainfall event conditions at these locations.

5.2.3.1 Event Accumulations

Analysis of the study area data has shown that rainfall data falls within 10 % of the estimated median rainfall for the region and that no rain events from 2007 – 2009 exceeded the 24-hour 100-year storm event intensities or accumulations of the Mayo record. The maximum 24-hour accumulation for the Data from the Potato Hills station data was 35.4 mm on Sept 16, 2007 (approximately the 5-year event for Potato Hills based on regression analysis). The extreme recorded 24-hour rainfall for Mayo is 31.8 mm (August 27, 1931) and the predicted 24-hour 100-year accumulation on record for Mayo is 35 mm.

5.2.3.2 Estimated Event Accumulations

Regression analysis of the 100-year storm accumulation yielded a 24-hour 100-year rainfall accumulation of 81 mm at the Potato Hills station. However the r^2 of that regression equation was relatively low at 0.33, indicating that this regression-based estimate has a high level of uncertainty.

Previous analysis of precipitation event data from the study area (HKP 1996) estimated precipitation increases at a rate of 3%/100 m. This rate was based on linear estimates of precipitation accumulation versus elevation using the Mayo and Keno Hill estimated data (HKP 1996). Following this method, the study area 24-hour 100-year storm accumulation would be 44.5 mm based on a 24-hour event intensity of 35 mm (estimated for Mayo based on IDF curves) and elevation difference of 916 m (Mayo to Potato Hills station).

An updated estimate of the orographic rate was derived from the Mayo rainfall data compared to the estimated Potato Hills rainfall data. Based on an annual rainfall difference of 75 mm between Mayo and Potato Hills, the estimated orographic rate is 4.2 mm/100 m for the study area. With this orographic rate and based on the estimated 24-hour 100-year event accumulation of 35 mm at Mayo, the estimated 24-hour 100-year rainfall event accumulations are 48.5 mm and 39.7 mm for the Potato Hills and Camp station locations, respectively.

Following the same methods and using the 24-hour 50-year event accumulation of 32.2 mm at Mayo, the estimated 24-hour 50-year event accumulations are 45.7 mm and 36.9 mm for the Potato Hills station and Camp station, respectively. The 24-hour 10-year event accumulations are 39.1 mm and 30.3 mm for the Potato Hills and Camp station locations, respectively.

5.2.4 Wet and Dry Year Estimates

Normal-value frequency distributions (NFD) of the annual precipitation series at the five regional sites (Mayo, Dawson, Klondike, Elsa and Keno Hill – Table 2-1) up through 2008 were used to derive “wet” and ”dry” year precipitation totals for those sites. “Wet” years are defined as those years where annual rainfall exceeds 90% of the existing NFD distribution (i.e., 10% probability of exceedance), while ”dry” years are defined as those years where annual rainfall does not exceed 10% of the existing distribution (i.e., 90% probability of exceedance). These “wet” and ”dry” year estimates for each of the regional sites were plotted against elevation to derive a linear regression to estimate “wet” and ”dry” year scenarios for the study area.

Historical estimates of “wet” and ”dry” year precipitation were derived using an extreme-value frequency distribution (EFD) (i.e., log-Pearson Type III) for Mayo data to 1995 and applying an orographic factor for the study area locations (Clearwater 1996). Analysis of recent precipitation data at Mayo and Dawson (2000 – 2008) showed that the extreme rainfall events of record were not exceeded during that period. Therefore, the extreme value distribution analysis completed by Clearwater (1996) was not repeated for this report.

Historical EFD estimates of ”dry” year precipitation for the study area were 452 mm (at 1,350 m asl) and 308 mm (at 790 m asl), for the 90 % exceedance probability[1] (Table 5-14, Appendix A). The “wet” year precipitation estimates for the study area were 724 mm (at 1,350 m asl) and 493 mm (at 790 m asl) for the 10% exceedance probability (HKP 1996).

In comparison, “wet” and ”dry” year NFD precipitation estimates using data up through 2008 were 427 mm and 626 mm, and 239 mm and 287 mm, respectively for Camp and Potato Hills, respectively.

The historical EFD “wet” year estimates at the Potato Hills and Camp station locations exceed the recent NFD estimates by 15% and 4%, respectively, and the historical EFD ”dry” year estimates exceed the recent NFD estimates by 57% and 29% respectively.

5.3 Snow

5.3.1 Snowfall

Snowfall estimates for the study area were derived from a regression equation calculated from mean annual snowfall values versus elevation at the five regional climate stations listed in Table 2-1. SWE estimates were derived from estimated snowfall accumulations and converted to SWE assuming a snow density of 10% following Environment Canada protocol (G. Bramwell, pers. comm., 2009). Snowpacks measured during snow surveys typically have higher snow densities as a result of snow metamorphosis, whereas the 10% snow density assumption is a mean value applicable to fresh snow.

5.3.1.1 Regional Analysis

Regional monthly snowfall data are listed in Table 5-15, Appendix A and mean monthly snow water equivalents are provided in Table 5-16, Appendix A. Mean snowfalls indicate the mean monthly snowfall accumulation over the period of record. Maximum and minimum monthly snowfall records indicate the monthly maximum and minimum snowfall accumulations on record for each station. As expected, higher elevations tend to receive higher snowfall accumulations (Figure 5-7). Annually, the largest accumulations occur during the period of November to January. Monthly summaries of Snow on Ground (SoG) were derived from Environment Canada stations where data were available (e.g.,

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[1] Historical Dry Year estimates were equated with the 95% exceedance probability, however to compare the datasets, the 90% exceedance level has been estimated from the HKP 1996 reports

Mayo, Dawson, and Klondike) (Table 5-17, Appendix A). Maximum SoG values are the maximum recorded value in the respective datasets, while mean SoG values represent the average monthly value over the data record.

5.3.1.2 Study Area Analysis

Based on regional analysis and assuming a constant regional orographic rate, the historical estimated long-term mean maximum snow pack (in mm of water equivalent) for the study area ranged from 124 mm at 790 m asl to 239 mm at 1,390 m asl (HKP, 1996). Annual maximum snowpack depths were estimated to occur on or about May 1. Annual sublimation losses were estimated to be 25 mm at the study area; however the standard deviation on that estimate was 100% (HKP 1996).

Based on regression analysis of regional snowfall data, the updated estimate of mean annual snowfall accumulation is 269 cm at Potato Hills and 190 cm at the Camp station (Table 5-18, Appendix A). Monthly estimates for the maximum, minimum, and mean conditions are also provided in Table 5-18. In general, the estimated study area snowfall data follow regional trends. The annual distribution of snowfall at Keno Hill is used as a proxy for snowfall at the study area. Estimated mean monthly snow water equivalents are 269 mm and 190 mm at the Potato Hills and Camp stations, respectively (Table 5-19, Appendix A).

5.3.2 Snow Survey

Snow surveys were conducted at the study area on April 21, 2009 and historical survey data exists from 1995 and 1996. These data were compared to Yukon regional survey data to assess the variability of the recorded accumulation relative to the region. The surveys were compared to snow data from Mayo and Calumet. The Calumet station is the closest snow monitoring station to the study area and at an elevation of 1,300 m asl is of similar elevation to the Potato Hills station.

5.3.2.1 Regional Analysis

In general, snow densities tend to increase over the winter as a result of snow metamorphosis in the snow pack, resulting in densities of approximately 0.20 to 0.35 in late winter. Fresh snow density is often in the order of 0.08 to 0.10. There is a lack of sublimation data in the region. Estimated sublimation losses based on monthly snowpack depths at Mayo and Calumet are approximately 15% of the cumulative winter snowfall (HKP 1996).

Historical regional snow survey summaries for Calumet and Mayo are given in Table 5-20, Appendix A. These data demonstrate that at higher elevations (e.g., Calumet), snow densities tend to increase until spring melt (May). This increase in density tends to offset sublimation losses during late winter and total SWE peaks by May 1. At lower elevations (e.g., Mayo), although there is a similar increase in snow density during the winter season, maximum snow depths and water equivalents tend to occur earlier (early April) and losses begin in April, resulting in lower snowpacks and water equivalents at the start of May (Tables 5-20 and 4-6).

In the winter of 1995 – 1996, regional snow survey data indicated snow packs were approximately 50 – 100% of long-term mean values at Mayo (HKP 1996). In 2009, regional snow survey data indicated snow packs were approximately 150% of the long-term mean conditions and seasonal temperatures were slightly below the long-term mean temperature for the winter season in this region of the Yukon (JWSAL 2009).

5.3.2.2 Study Area Analysis

Mean snow depths in April 2009 were 69 cm near the location of the Camp station and 126 cm near the location of the Potato Hills station (Table 4-5). Mean snow depths in late April 1996 were 19 cm near the Camp station location and 93 cm near the Potato Hills station location (Table 4-6). These values are mean depths based on 10 samples taken along each snow course.

Snow depth, density and water equivalent at Potato Hills were at or above the historical maximum recorded snow data at Calumet in April 2009 and 1996. Snow depth and water equivalent at Potato Hills were 137% of the historical average snow depth and equaled the maximum snow depth ever recorded at Calumet in 2009. At the end of April 1996, snow depth and SWE at Potato Hills were 110% and 109% of the historical averages at Calumet, respectively.

5.3.3 Snowmelt

Monthly snowmelt values were derived using an empirical, regression-based model (Gray and Prowse 1993) and snowfall accumulation estimates as described above. The model is regionalized to the “Western Canada Mountains” and requires daily minimum, maximum and mean temperatures to generate daily estimated snowmelt. However, “temperature-indexed” type models can only provide an estimate of potential snowmelt. In general “energy-balance” models are considered more accurate models, but only estimate potential melt. A lack of required data precluded the use of an energy-balance model for the study area.

To improve the snowmelt estimate, the study area monthly snowfall estimates were used in conjunction with the apparent annual distribution and timing of snowmelt (generated by the Gray and Prowse model) to derive snowfall-based melt estimates. The estimated snowfall monthly distribution was based on the Keno Hill annual distribution as the Keno Hill site has similar physiography to the study area.

Regionally, snow melt may begin in April and continue to June (Yukon Environment 2009). Depending on the snow pack and temperatures, snowmelt may be relatively fast (i.e., less than two weeks) in the region (HKP 1996). Historical estimates of snowmelt were based on the hydrologic year cumulative snow pack up to April, minus estimated sublimation losses (i.e., 15% of cumulative snow pack), plus May runoff volumes (including rainfall runoff) and May evaporation loss estimates.

The updated estimates were derived using similar methods, although the cumulative snow pack was estimated including May snow accumulations. Secondly, the May rainfall runoff was not included in the snowmelt estimate. Sublimation losses were estimated at 40 mm based on a cumulative snow pack of 264 mm (hydrologic year). Therefore, the mean snowmelt estimates for the study area are 123 mm in May and 101 mm in June.

5.4 Evaporation

Due to the lack of available evaporation data near the study area, historical evaporation estimates relied on an orographic factor applied to Mayo station data to derive evaporation estimates for the study area. The Mayo evaporation data set consisted of six months in the period 1985 to 1987. Regional data from Pelly Ranch and Whitehorse were used to estimate the long-term Mayo data (Clearwater 1996). A second set of analyses used similar methods to derive evaporation estimates. However there were small differences in the methods used to derive the orographic factors used in the second analysis (HKP 1996).

Daily evaporation estimates for the study area for the period 2007 – 2009 were estimated using the Hamon evaporation model (Hamon 1961). The model requires daily mean temperature, and estimates of solar radiation to derive daily evaporation rates. Monthly evapotranspiration (ET) data were estimated using a Thornthwaite-type water balance model. Input to the model included precipitation and temperature data, an estimate of solar radiation (adjusted monthly). Soil moisture is held constant. ET is derived following the methods of Alley (1984) where water input (the sum of snowmelt and rain) is compared to potential evapotranspiration, which is based on the temperature-based methods of Hamon (1961).

5.4.1 Historical Data

Historical estimates of evaporation at the study area have ranged from 263 mm to 400 mm at the Potato Hills station and from 353 mm to 480 mm near the Camp station depending on the orographic factor used in the analysis (e.g., HKP, 1996; Clearwater, 1996). Evaporation was reported from June to September, with maximum monthly evaporation rates in June (122 mm) (HKP, 1996). However, it was expected that evaporation would also occur in May, based on the observation that climatic conditions in May were similar to September’s climate conditions (HKP, 1996), but no estimates were provided for lack of data. The Clearwater report does not provide monthly evaporation estimates.

5.4.2 Study Area Estimates

Estimated annual evapotranspiration rates at the study area were 266 mm for the Camp station and 272 near the Potato Hills station location based on the Thornthwaite model (Table 5-21, Appendix A). Evapotranspiration begins in May, peaks in June and continues until September.

2008 was the only available year with a complete dataset (Table 5-22, Appendix A). Based on that data, the estimated evaporation rate was 274 mm at Potato Hills.

6 CLOSURE

Stantec has prepared this report for the sole benefit of Victoria Gold for the purpose of documenting baseline conditions in anticipation of an environmental assessment under the Yukon Territory *Environmental and Socio-Economic Assessment Act*. The report may not be relied upon by any other person or entity, other than for its intended purposes, without the express written consent of

Stantec and Victoria Gold. Any use of this report by a third party, or any reliance on decisions made based upon it, are the responsibility of such third parties.

The information provided in this report was compiled from existing documents and data provided by Victoria Gold, and by field data compiled by Stantec (formerly Jacques Whitford AXYS Ltd.). This report represents the best professional judgment of our personnel available at the time of its preparation. Stantec reserves the right to modify the contents of this report, in whole or in part, to reflect any new information that becomes available. If any conditions become apparent that differ significantly from our understanding of conditions as presented in this report, we request that we be notified immediately to reassess the conclusions provided herein.

7 REFERENCES

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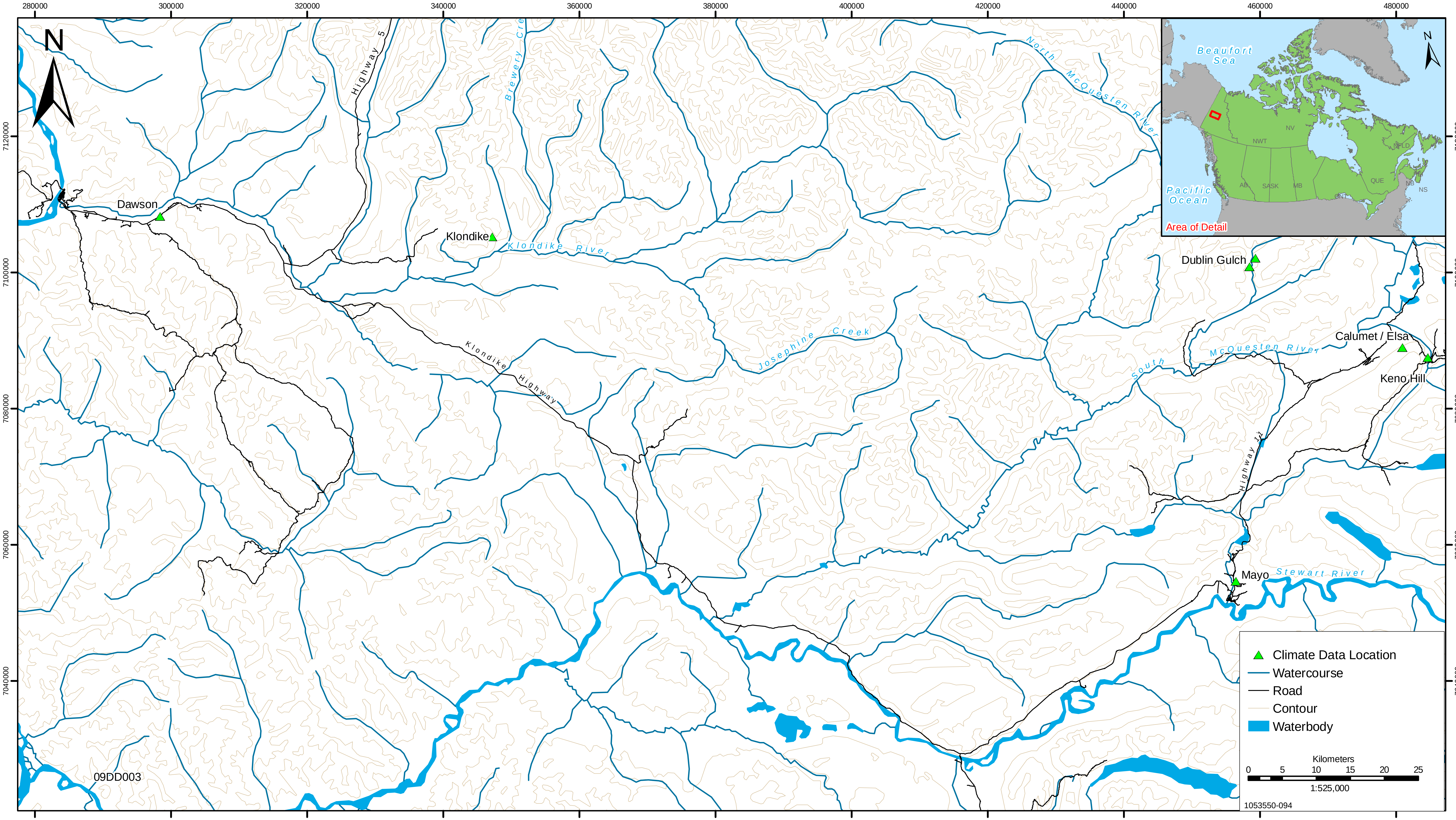
8 FIGURES

Please see the following pages.



Data Sources; Government of Canada, Victoria Gold Corp.

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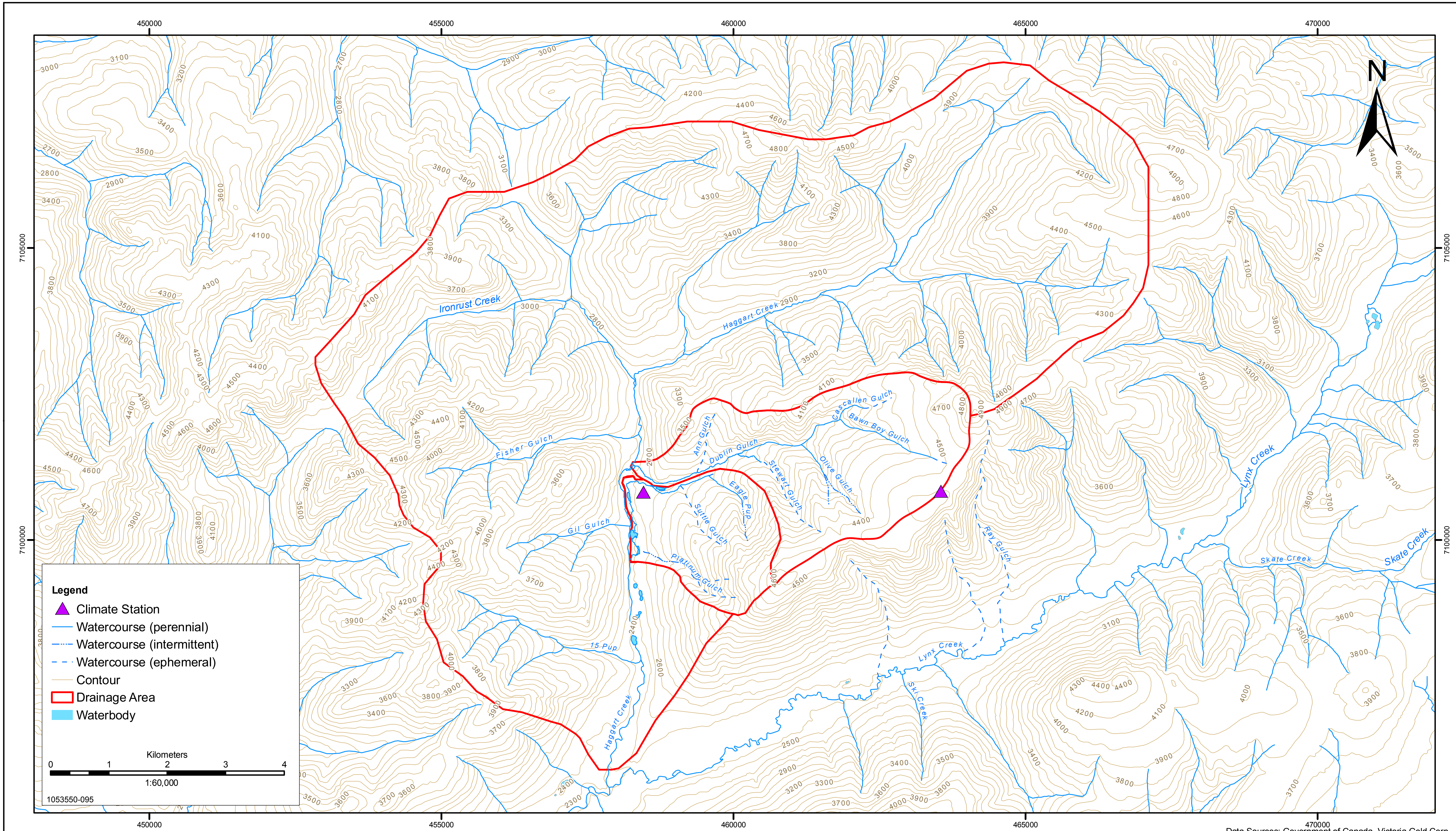
Victoria Gold Corp

REGIONAL STUDY AREA

DUBLIN GULCH PROPERTY
YUKON TERRITORY

PROJECTION	DRAWN BY
UTM - ZONE 8	RS
DATUM	CHECKED BY
NAD 83	
DATE	FIGURE NO.
04-Jan-2009	2-1



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CLIMATE STATION LOCATIONS

EAGLE GOLD PROPERTY
YUKON TERRITORY

PROJECTION	DRAWN BY
UTM - ZONE 8	RS
DATUM	CHECKED BY
NAD 83	
DATE	FIGURE NO.
23-Dec-2009	3-1

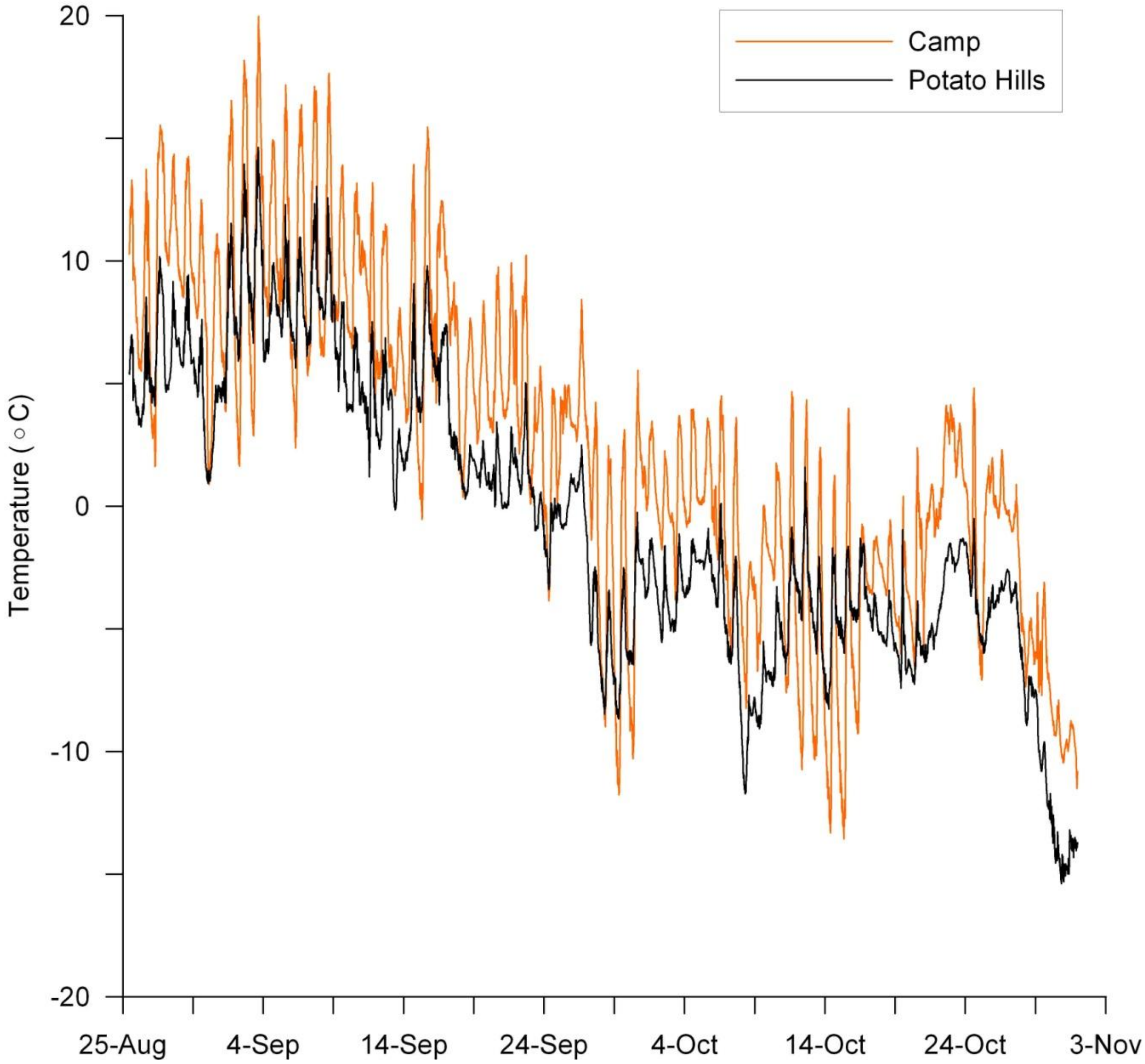

Figure 4-1: Potato Hills and Camp Station Temperatures, August 25 – October 31, 2009

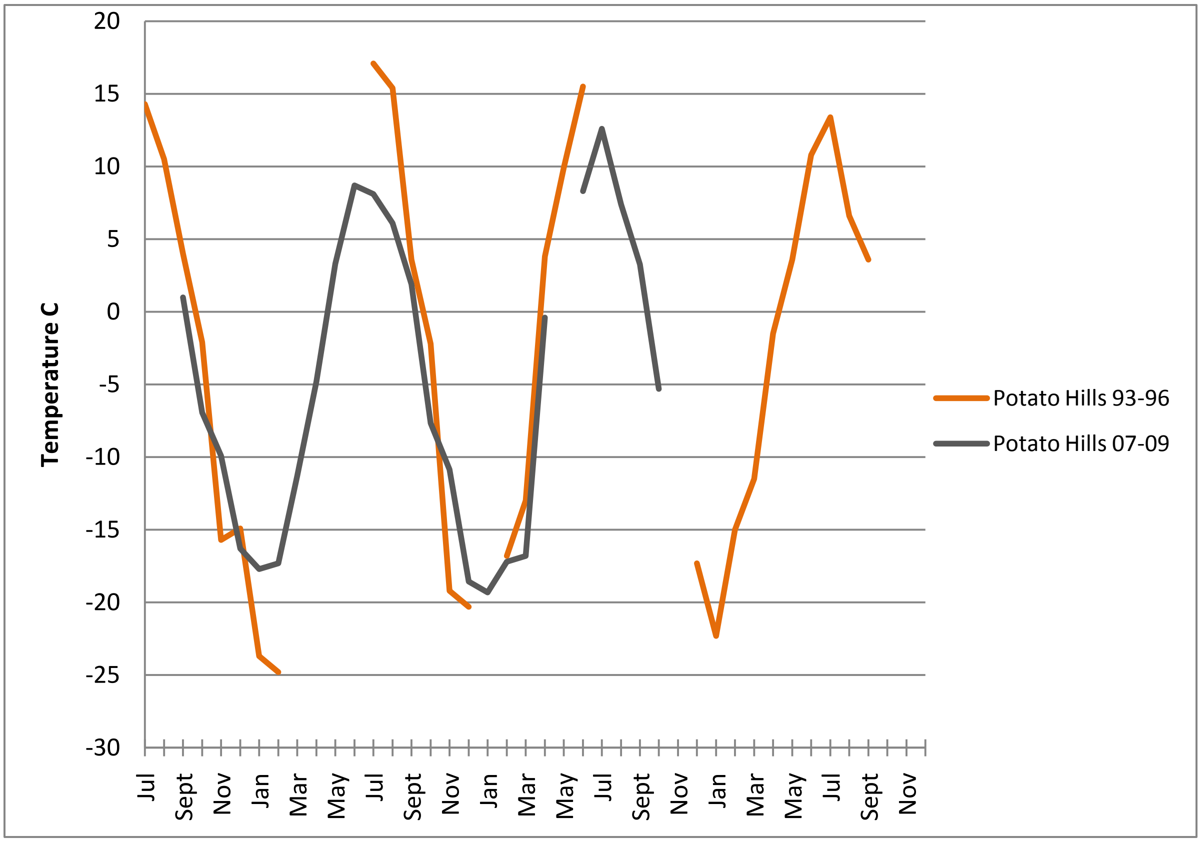

Figure 4-2: Mean Monthly Temperature at Potato Hills, 1993 – 1996 and 2007 – 2009

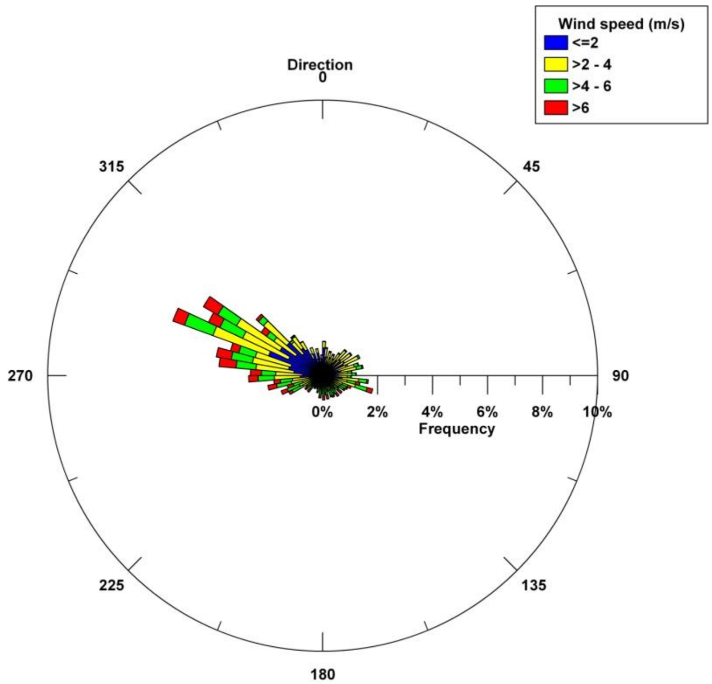

Figure 4-3: Cumulative Wind Rose Plot for Potato Hills Station, 2007 – 2009. Wind speed in m/s

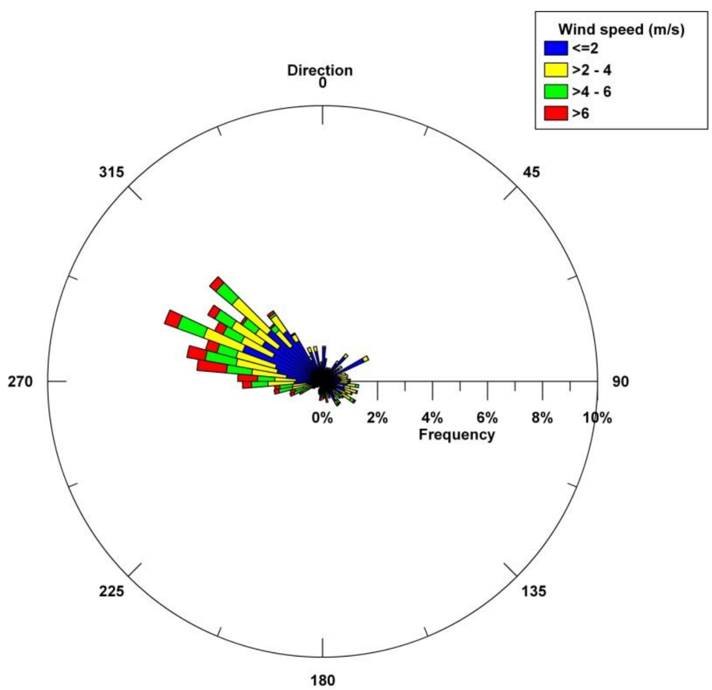

Figure 4-4: Wind Rose Plot for Potato Hills Station, 2007. Wind speed is in m/s

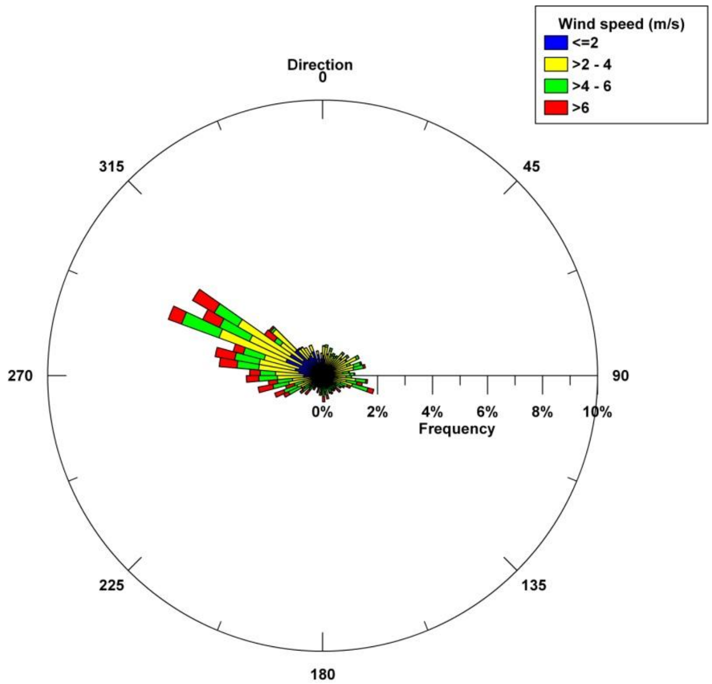

Figure 4-5: Wind Rose Plot for Potato Hills Station, 2008. Wind speed is in m/s

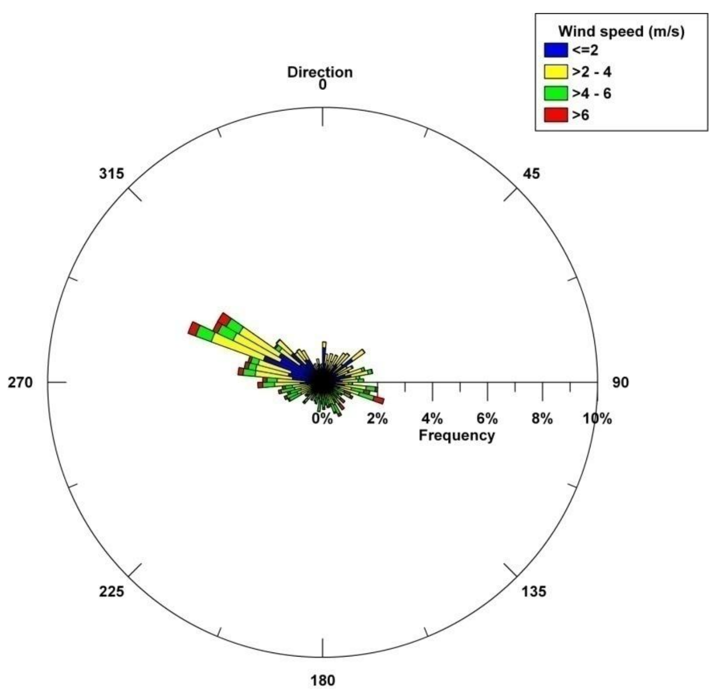

Figure 4-6: Wind Rose Plot for Potato Hills Station, 2009. Wind speed is in m/s

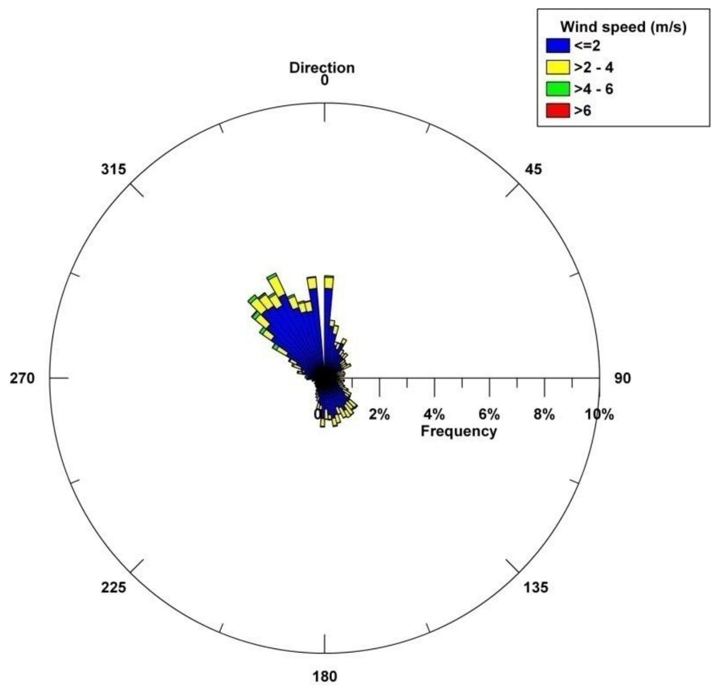

Figure 4-7: Wind Rose Plot for the Camp Station, Aug 21 to Oct 31, 2009. Wind speed is in m/s

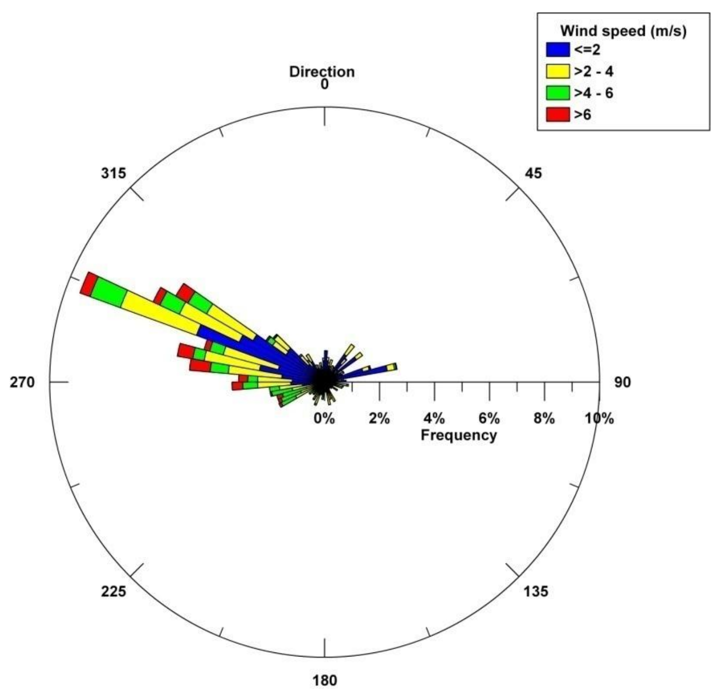

Figure 4-8: Wind Rose Plot for Potato Hills Station, August 21 – October 31, 2009

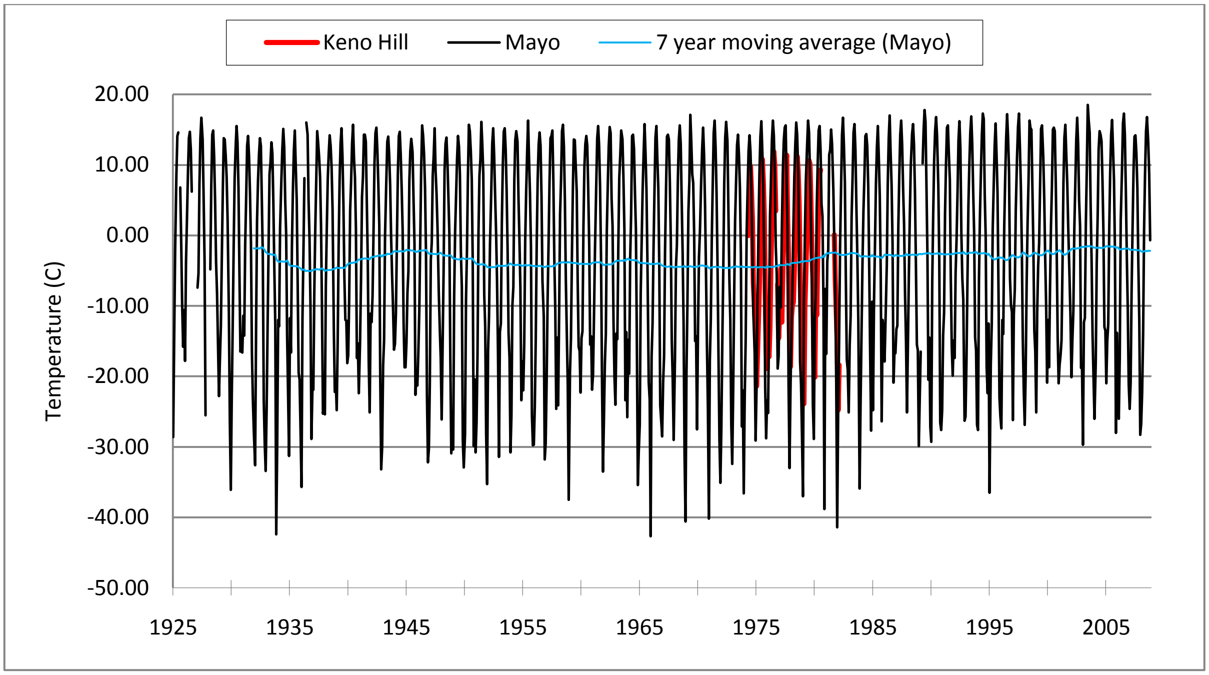

Figure 5-1: Temperature Trends at Regional Climate Stations

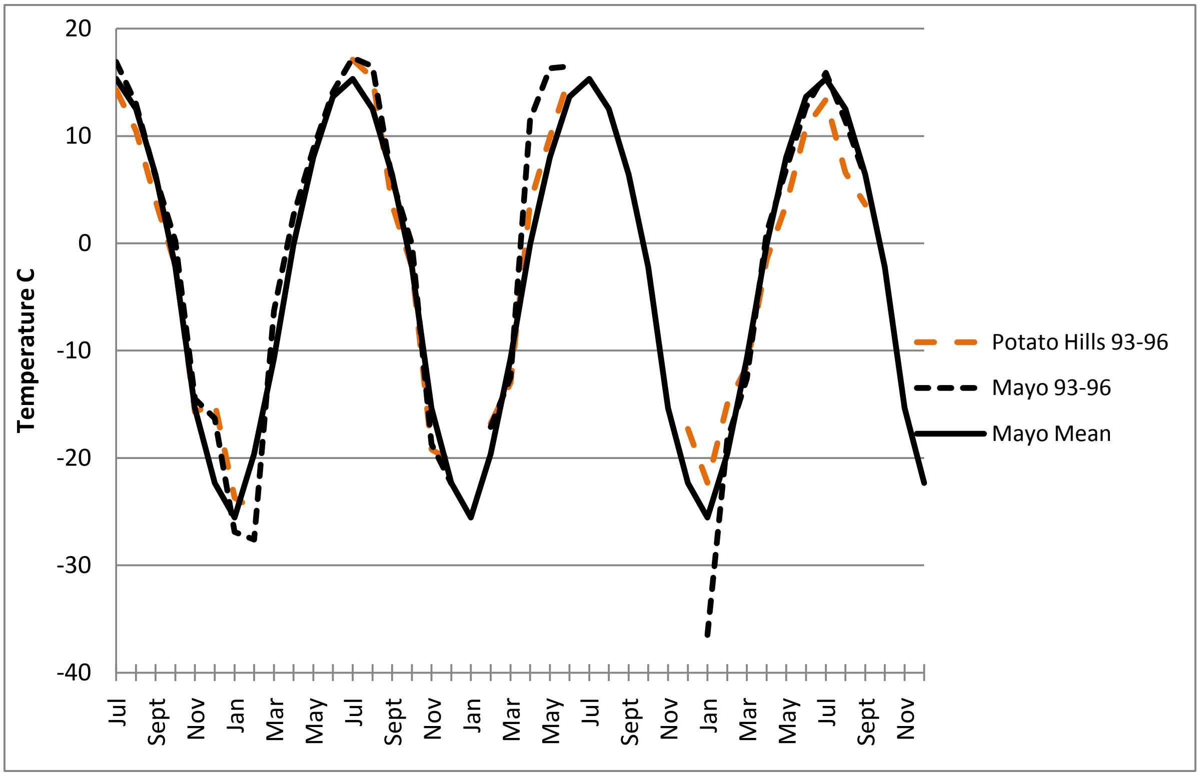

Figure 5-2: Mean Monthly Temperature at Mayo and Potato Hills, 1993 – 1996

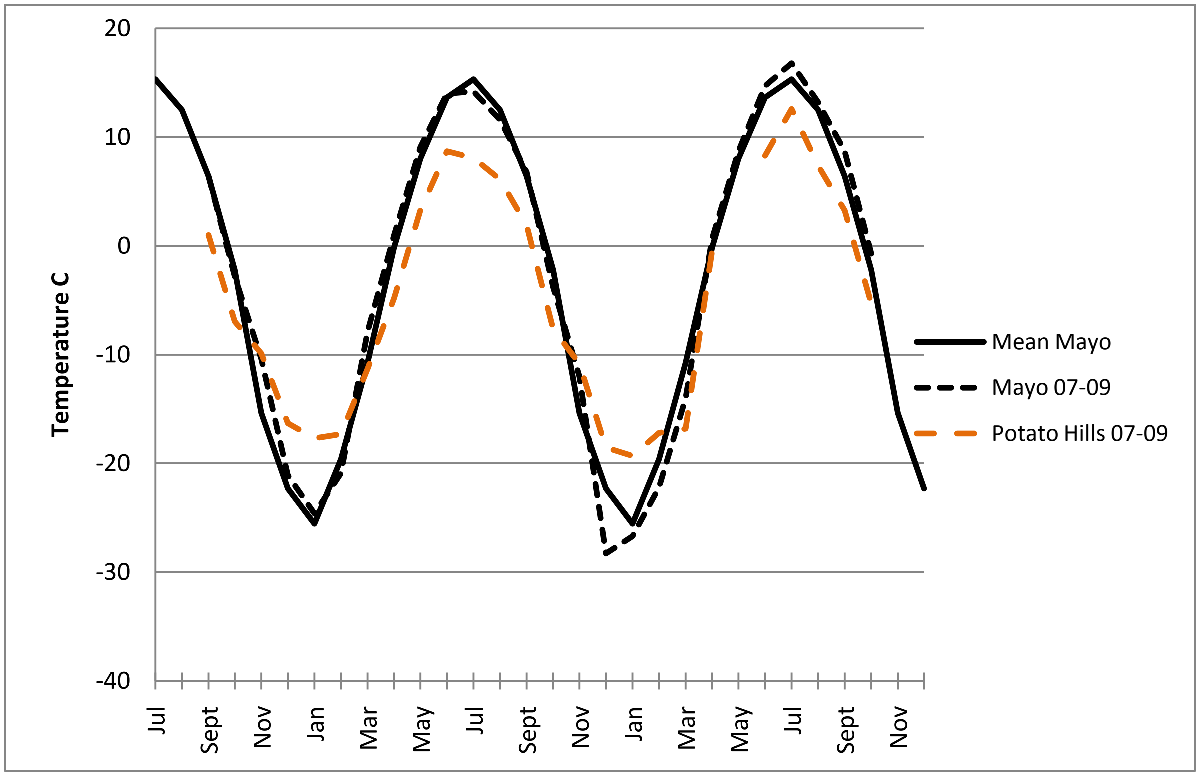

Figure 5-3: Mean Monthly Temperature at Mayo and Potato Hills, 2007 – 2009

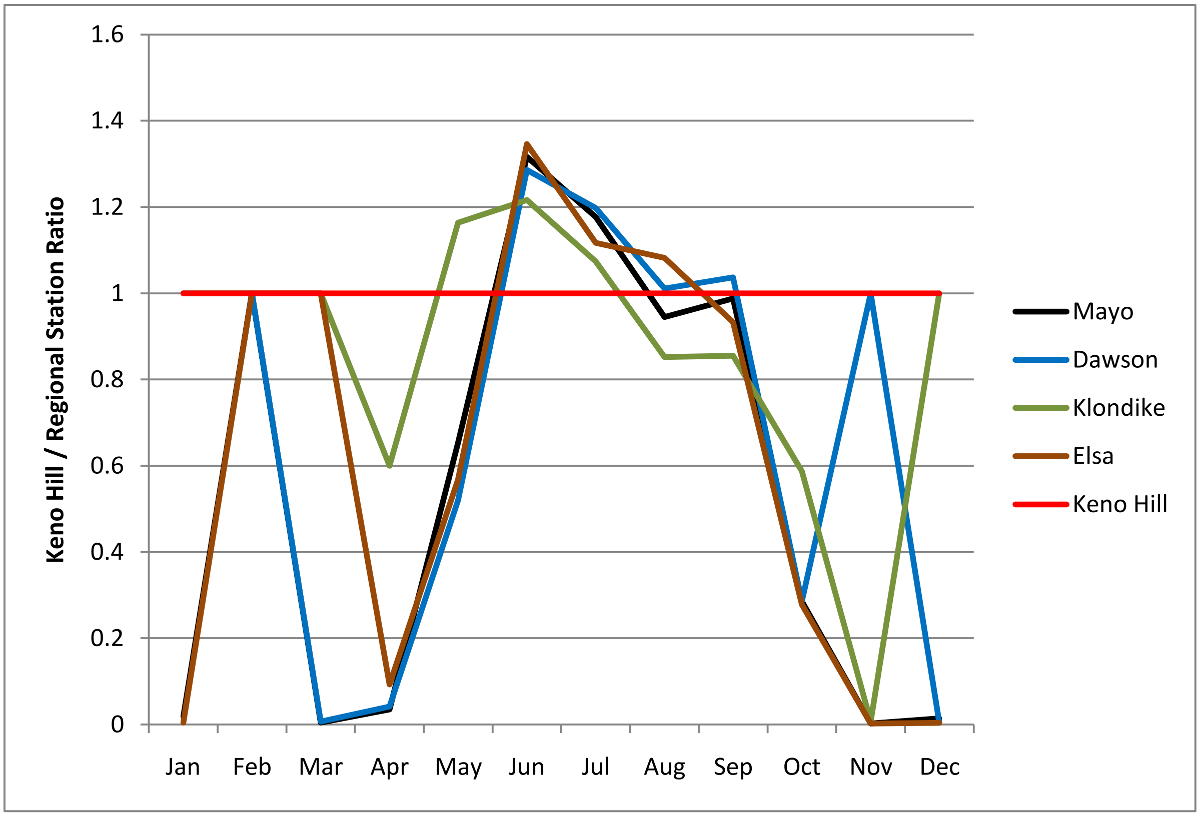

Figure 5-4: Annual Rainfall Ratios – Keno Hill: Regional Stations

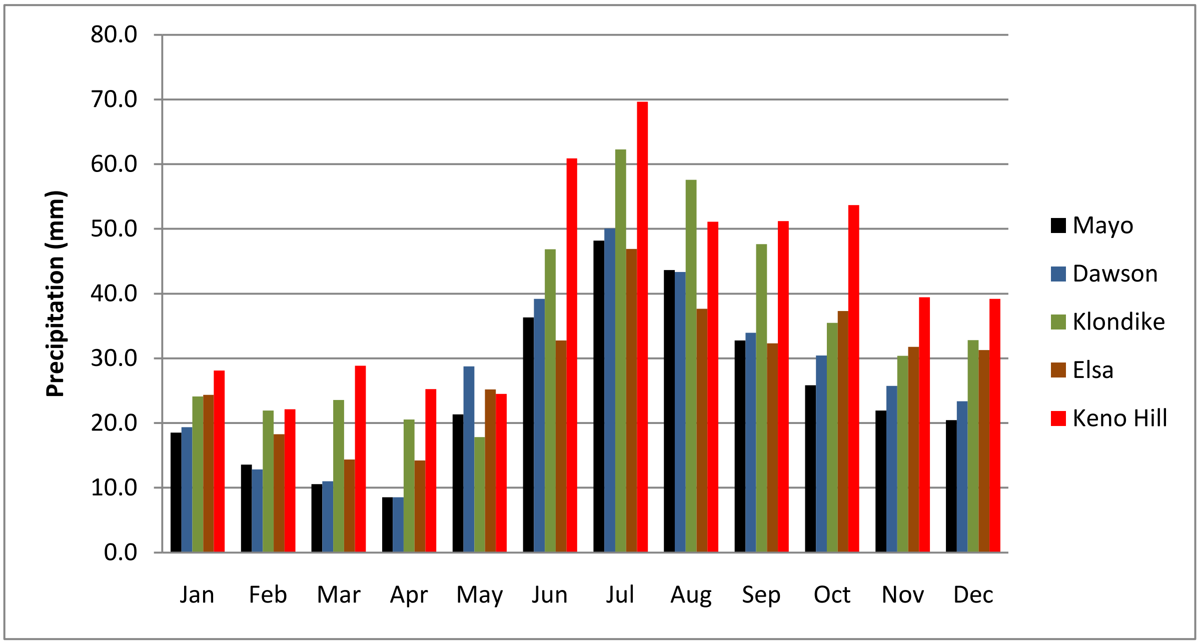

Figure 5-5: Regional Mean Monthly Precipitation Data

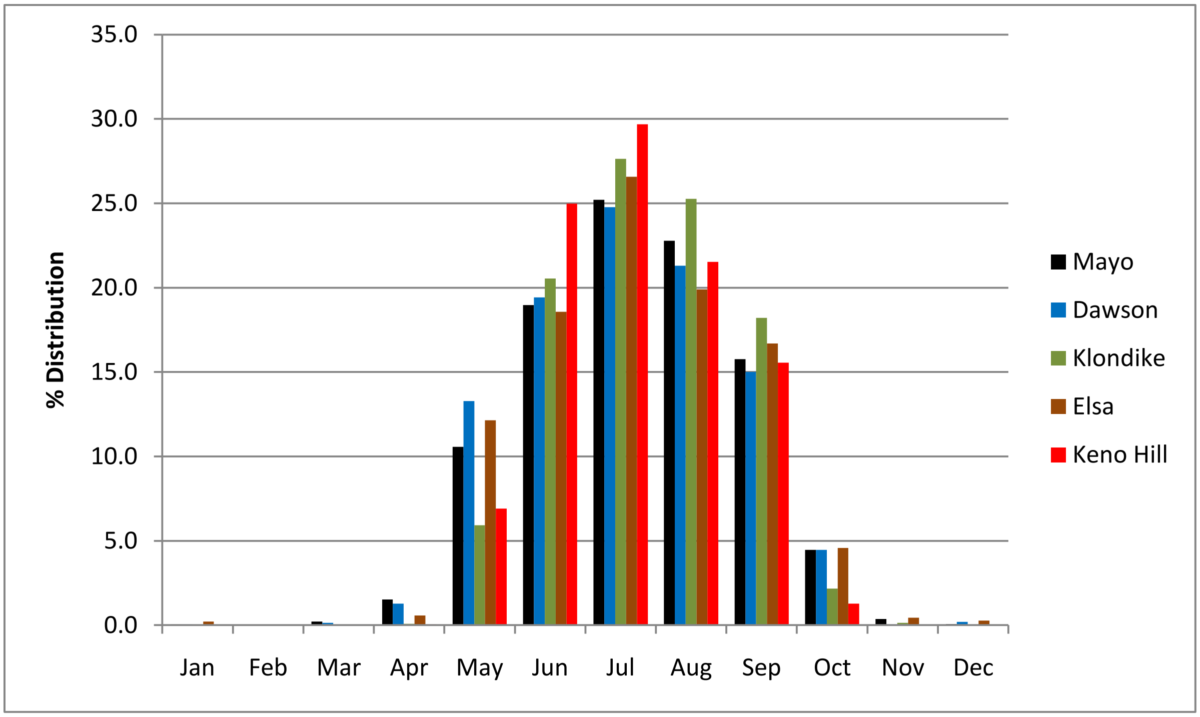

Figure 5-6: Monthly Distribution of Rainfall at Regional Stations

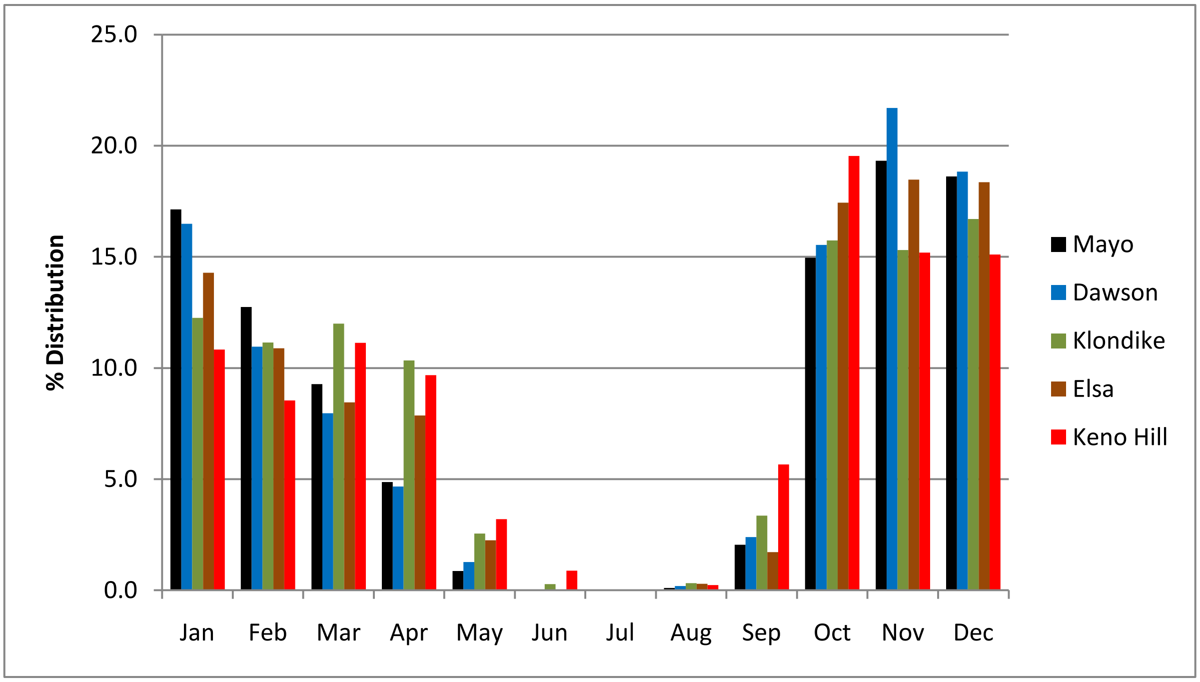

Figure 5-7: Monthly Distribution of Snowfall at Regional Stations

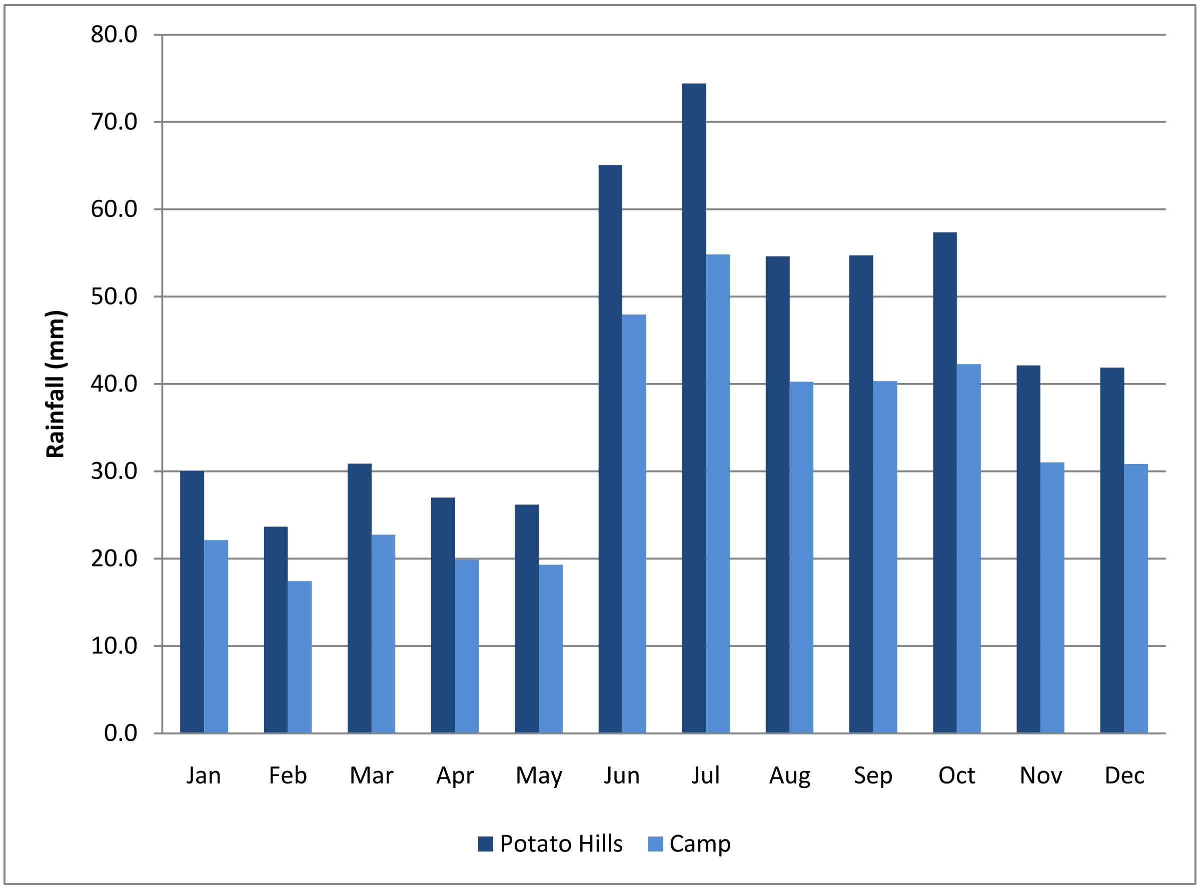

Figure 5-8: Estimated Mean Monthly Precipitation at Study Area Compared to Regional Data

APPENDIX A

Tables

Table 2-1: Regional Climate Data, Yukon Territory

Station	Location			Years of Record*	Data
Mayo A	63.6	-135.9	504	1925-2009 (83)	T, P, R, S, SoG, IDFs, Storms
Dawson A	64.0	-139.1	370	1976-2007 (30)	T, P, R, S, SoG, IDFs, Storms
Klondike	64.5	-138.2	973	1966-2007 (40)	T, P, R, S, SoG
Elsa	63.9	-135.5	814	1948-1965; 1974-1989 (32)	T,P,R,S
Keno Hill	63.9	-135.2	1473	1974-1982 (8)	T,P,R,S
Whitehorse	60.4	-135.0	706	1960-2001 (37)	IDFs
Watson Lake	60.1	-128.5	687	1970-1992 (23)	IDFs
Teslin	60.1	-132.4	705	1967-1995 (23)	IDFs
Pelly Ranch	62.5	-137.2	454	1966-2000 (34)	IDFs

NOTES:

T = Temperature (degs C)
P = Precipitation (mm)
R = Rainfall (mm)
S = Snowfall (cm)
SoG = Snow on Ground (cm)
* Some years may be partial years

Storms = 1:x year event depth (mm)
SWE = Snow-water equivalent (mm)
ET = Evapotranspiraton (mm)
M = Snow melt (mm)
IDFs = Intensity=Duration-Frequency Curves

Table 4-1: Study Area Mean Monthly Temperature

Recent	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	**Potato Hills Station**												
Mean (°C)	–	–	–	–	–	–	–	10.7	1.0	-6.9	-9.9	-16.3	-5.9
Maximum (°C)	–	–	–	–	–	–	–	21.3	11.6	2.1	-4.5	-8.7	21.3
Minimum (°C)	–	–	–	–	–	–	–	4.2	-9.4	-15.6	-17.3	-28.8	-28.8
2008	**Potato Hills Station**												
Mean (°C)	-17.7	-17.3	-11.3	-4.8	3.3	8.7	8.1	6.1	1.9	-7.7	-10.9	-18.6	-4.2
Maximum (°C)	-5.6	-1.6	-1.0	6.2	16.7	19.9	17.9	14.4	10.8	5.4	-4.9	-7.4	19.9
Minimum (°C)	-35.6	-33.1	-32.7	-19.5	-4.2	1.4	1.0	-1.5	-10.6	-23.6	-22.6	-27.9	-35.6
2009	**Potato Hills Station**												
Mean (°C)	-19.3	-17.2	-16.8	-0.4	nm*	8.3*	12.6	7.4	3.3	-5.3			1.7
Maximum (°C)	0.8	-8.8	-4.1	12.8	nm*	19.6*	26.9	20.3	14.6	1.5			26.9
Minimum (°C)	-36.5	-33.4	-27.3	-16.0	nm*	0.2*	1.2	-1.0	-8.7	-15.4			-36.5
	Camp Station												
Mean (°C)	–	–	–	–	–	–	–	9.7[a]	6.2	-2.5			4.5
Maximum (°C)	–	–	–	–	–	–	–	13.7[a]	19.9	4.8			19.9
Minimum (°C)	–	–	–	–	–	–	–	0.9[a]	-11.8	-13.6			-13.6
	Potato Hills Station^												
Mean (°C)								6.4	3.3	-5.3			0.0
Maximum (°C)								13.4	14.6	1.6			14.6
Minimum (°C)								0.9	-8.7	-15.4			-15.4

NOTES:
[a] Data collection began Aug 21 2009
* Instrument error - missing data May 1 - June 6
All values in degrees Celsius
– No available data
^ Data for period where stations operated at the same time
Minimum and Maximum values are extreme monthly means

Table 4-2: Historical Study Area Mean Monthly Temperature

Historical	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1993												
Mean (°C)	–	–	–	–	–	–	14.3	10.5	4	-2.1	-15.7	-14.9
1994												
Mean (°C)	-23.7	-24.8	–	–	–	–	17.1	15.4	3.6	-2.2	-19.2	-20.3
1995												
Mean (°C)	–	-16.8	-13.0	3.8	9.9	15.5	–	–	–	–	–	-17.3
1996												
Mean (°C)	-22.3	-15	-11.5	-1.5	3.6	10.8	13.4	6.6	3.6	–	–	–

NOTE:
Data summarized from HKP (1996) and Clearwater (1996)
Data recorded at Camp Station

Table 4-3: Study Area Monthly Precipitation, 2007 – 2009

	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007	**Potato Hills Station**												
Rainfall (mm)	–	–	–	–	–	–	–	24.0[a]	100.8	2.0	0.0	0.2	103.0
SWE (mm)	–	–	–	–	–	–	–	0.0[d]	–	–	–	–	–
2008	**Potato Hills Station**												
Rainfall (mm)	0.0	0.0	3.4	4.8	58.4	52	201.2	130	11.2	1.2	0.0	0.0	462.2
SWE (mm)	–	–	–	–	–	0.0[d]	0.0[d]	0.0[d]	–	–	–	–	–
2009	**Potato Hills Station**												
Rainfall (mm)	0.0	0.0	0.0	1.6	*	50.6*	12.6	75.4	44.4	1.2	0.0	0.0	135.2
SWE (mm)	–	–	–	410.0**	–	0.0[d]	0.0[d]	0.0[d]	–	–			385[b]
	Camp Station												
Rainfall (mm)	–	–	–	–	–	–	–	30.7[c]	34.8	7.8			73.3
SWE (mm)	–	–	–	110.0**	–	–	–	0.0[d]	0.0[d]	–			85[b]

NOTES:
* Instrument error - missing data May 1 - June 6 2009
** Based on snow survey
[a] Data collection began Aug 14 2007
b Annual SWE based on maximum snowpack (May 1) - 25 mm sublimation estimate (after Clearwater, 1996)
[c] Data collection began Aug 21 2009
[d] Based on estimate of precipitation from temperature data
– No available data
SWE = snow water equivalent

Table 4-4: Study Area Monthly Precipitation, 1993 – 1996

	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
1993													
Rainfall (mm)	–	–	–	–	–	21.2	81.4	59.8	18.4	9.4	–	–	190.2
1994													
Rainfall (mm)	–	–	–	–	–	–	13.8	17.2	40.8	15.2	–	–	87.0
1995													
Rainfall (mm)	–	–	0.2	1.4	15.4	41.4	–	–	–	–	–	–	58.4
1996													
Rainfall (mm)	–	–	–	–	23.5	35.8	70.8	61.8	57.5	–	–	–	249.4

NOTE:
Data summarized from HKP (1996) and Clearwater (1996)
Data recorded at Camp station
Annual data are partial totals for year based on available data

Table 4-5: 2009 Snow Survey Data Summary

Site	March 2009		April 2009				May 2009	
	Calumet	Mayo	Calumet	Mayo	Study Area		Calumet	Mayo
					Potato Hills	Campy		
Depth (cm)	86.0	50.0	103.0	59.0	126.0	69.0	98.0	0.0
Density	0.19	0.21	0.23	0.22	0.33	0.16	0.24	0.0
SWE (mm)	161.0	104.0	242.0	128.0	410.0	110.0	235.0	0.0

NOTES:
Calumet and Mayo data from Yukon Environment
Study Area data from on-site data collection

Table 4-6: Historical Snow Survey Data Summary for Dublin Gulch, 1996

Site	March 1996		April 1996		May 1996	
	Dublin #1	Dublin #3	Dublin #1	Dublin #3	Dublin #1	Dublin #3
Depth (cm)	42.9	73.7	53.6	82.2	18.8	93.1
Density	0.22	0.22	0.22	0.22	0.22	0.23
SWE (mm)	95.0	163.0	120.0	182.0	58.0	216.0

NOTES:
Dublin#1 was located at the mouth of Dublin Gulch near the camp
Dublin#3 was located near the Potato Hills station
Data from Clearwater (1996)

Table 4-7: Study Area Mean Monthly Wind Speed and Gust Speed, 2007 – 2009

	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007	**Potato Hills Station**											
Wind Speed (m/s)	–	–	–	–	–	–	–	2.3[1]	2.34	2.95	2.96	0.82
Gust Speed (m/s)	–	–	–	–	–	–	–	3.9[1]	3.76	4.66	4.41	1.37
2008	**Potato Hills Station**											
Wind Speed (m/s)	2.76	3.72	3.62	3.61	3.64	3.06	3.07	2.81	1.67	1.29	2.61	3.14
Gust Speed (m/s)	4.01	5.58	5.47	5.38	5.96	5.15	5.16	4.84	3.17	2.48	4.38	5.07
2009	**Potato Hills Station**											
Wind Speed (m/s)	3.22	2.51	3.18	3.04	3.11	2.65	2.85	1.98	2.00	3.40		
Gust Speed (m/s)	5.57	4.04	5.56	5.26	5.69	4.61	4.78	3.24	3.32	5.22		
	Camp Station											
Wind Speed (m/s)	–	–	–	–	–	–	–	1.35[2]	1.25	1.23		

NOTES:
[1] Instrument error - missing data May 1 – June 6 2009
[2] Data collection began Aug 21 2009
– No available data

Table 4-8: Dominant Wind Directions at Study Area, 1993 – 1996

Direction	1993	1994	1995	1996
N	33.4	19.6	16.4	51.1
NE	20.7	26.0	27.3	11.4
E	11.5	14.4	15.4	2.4
SE	3.9	6.1	8.4	5.0
S	11.6	12.4	12.5	21.1
SW	9.4	10.7	10.6	4.4
W	4.3	4.3	3.5	1.1
NW	5.2	6.6	5.9	3.3

NOTES:
Values are percent frequency
Data summarized from HKP (1996) and Clearwater (1996)

Table 4-9: Study Area Mean Monthly Relative Humidity and Solar Radiation

	Month											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2007												
Relative Humidity	–	–	–	–	–	–	–	62.8	83.0	87.5	81.4	87.6
Solar Radiation	–	–	–	–	–	–	–	162.4	87.4	36.5	11.1	2.1
2008												
Relative Humidity	81.7	79.0	74.3	69.5	65.9	60.0	77.1	81.9	83.3	91.0	89.6	73.8
Solar Radiation	8.7	38.0	98.3	162.6	193.9	222.5	180.1	132.0	82.7	21.9	10.1	3.5
2009												
Relative Humidity	75.7	79.5	81.0	70.1	37.4	71.9	68.3	61.7	53.0	85.3	84.6	82.1
Solar Radiation	7.5	34.9	95.1	184.4	249.9	227.9	244.1	116.0	81.0	42.2	-	-

NOTE:
Relative Humidity is percentage
Solar Radiation measured in watts/m^2/day
Data recorded at the Potato Hills station

Table 5-1: Regional Annual Data Summary

Station	Location			Years of Record	Temperature (°C)		Precipitation (mm)				Rain (mm)				Snow Accumulation (cm)				Snow Water Equivalent[1] (mm)			
	Lat.	Long.	Elevation (masl)		Max	Min	Max	Mean	Min	Extreme Daily	Max	Mean	Min	Extreme Daily	Max	Mean	Min	Extreme Daily	Max	Mean	Min	Extreme Daily
Mayo	63.62	-135.87	504	1925-2009	36.1	-62.2	430	302	148	31.8	309	191	100	31.8	292	131	30	35.6	292	131	30	36
Dawson	64.04	-139.13	370	1976-2007	34.7	-55.8	437	316	206	28.8	298	195	79	28.8	237	159	81	23.8	237	159	81	24
Klondike	64.45	-138.22	973	1966-2007	30.0	-51.7	623	426	180	no data	365	233	105	no data	380	197	108	no data	380	207	108	
Elsa	63.92	-135.48	814	1948-1965; 1974-1989	33.9	-51.7	576	349	122	no data	381	233	102	no data	228	168	69	no data	228	168	69	
Keno Hill	63.93	-135.20	1473	1974-1982	27.2	-44.4	634	556	269	no data	324	268	120	no data	331	259	110	no data	331	288	110	

NOTES:
[1] Estimated based on 10% density
Extreme precipitation values not available from Environment Canada at some stations

Table 5-2: Regional Monthly Temperatures

Station	Years of Record		Month												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mayo	1925-2009	Maximum	-20.3	-13.3	-3.5	6.3	14.6	20.8	22.3	19.3	12.2	2.0	-10.8	-17.2	36.1
		Mean	-25.5	-19.6	-10.7	-0.1	8.0	13.7	15.3	12.5	6.4	-2.2	-15.4	-22.3	-3.2
		Minimum	-30.9	-25.9	-18.0	-6.5	1.4	6.5	8.3	5.7	0.6	-6.4	-19.9	-27.5	-62.2
Dawson	1976-2007	Maximum	-21.1	-15.5	-3.7	7.2	15.1	20.9	22.4	19.8	12.3	0.0	-13.6	-19.7	34.7
		Mean	-25.2	-21.2	-11.7	-0.1	8.0	13.4	15.1	12.5	5.9	-4.4	-17.6	-23.9	-4.3
		Minimum	-29.3	-26.8	-19.8	-7.4	0.9	5.9	7.9	5.1	-0.4	-8.7	-21.6	-28.1	-55.8
Klondike	1966-2007	Maximum	-16.1	-11.3	-7.1	1.1	9.7	16.5	17.9	14.7	7.4	-1.8	-9.8	-12.7	30.0
		Mean	-22.3	-18.1	-14.5	-5.8	3.5	9.6	11.2	8.2	2.0	-6.5	-14.8	-18.3	-5.4
		Minimum	-27.8	-23.4	-18.3	-10.3	-1.4	2.8	3.3	-0.1	-6.4	-13.7	-21.9	-25.4	-51.7
Elsa	1948-1965; 1974-1989	Maximum	-17.9	-14.1	-6.2	3.0	11.3	18.1	20.1	16.7	9.5	-1.2	-10.8	-15.7	33.9
		Mean	-20.9	-18.0	-11.7	-2.6	6.1	12.5	14.6	11.3	4.8	-4.7	-14.2	-19.4	-4.1
		Minimum	-24.2	-21.8	-17.2	-8.2	0.9	6.9	9.0	5.8	0.0	-8.2	-17.5	-23.0	-51.7
Keno Hill	1974-1982	Maximum	-13.3	-10.7	-7.8	-1.3	5.6	11.7	14.4	12.9	6.0	-2.5	-7.7	-11.4	27.2
		Mean	-16.7	-14.2	-11.3	-4.8	2.1	7.8	10.4	9.1	2.9	-5.3	-11.0	-16.2	-4.0
		Minimum	-20.2	-17.7	-14.8	-8.2	-1.5	3.8	6.4	5.0	-0.3	-8.0	-14.3	-19.4	-44.4

NOTES:
All values in degrees Celsius
Data from Environment Canada

Table 5-3: Regional Monthly Precipitation

Station	Years of Record		Month											
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mayo	1925-2009	Maximum	99.6	36.3	39.4	44.7	46.1	81.3	108.7	100.3	81.4	67.3	52.6	66.8
		Minimum	0.0	0.0	0.0	0.0	4.2	6.9	9.9	4.8	1.5	3.8	0.0	2.0
		Mean	18.5	13.6	10.6	8.5	21.3	36.3	48.2	43.7	32.8	25.9	21.9	20.5
		% Distribution	6.1	4.5	3.5	2.8	7.1	12.0	16.0	14.5	10.9	8.6	7.3	6.8
Dawson	1976-2007	Maximum	41.1	34.1	41.4	25.2	61.4	84.6	99.0	83.4	71.9	71.5	54.8	56.0
		Minimum	4.6	1.4	0.0	0.0	10.3	9.4	10.7	8.2	6.4	7.1	4.8	0.0
		Mean	19.4	12.9	11.0	8.5	28.8	39.2	50.0	43.3	34.0	30.4	25.8	23.4
		% Distribution	5.9	3.9	3.4	2.6	8.8	12.0	15.3	13.3	10.4	9.3	7.9	7.2
Klondike	1966-2007	Maximum	78.7	73.2	69.1	84.1	46.5	101.4	149.6	126.1	120.6	92.8	84.0	82.0
		Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Mean	24.1	22.0	23.6	20.5	17.8	46.8	62.3	57.6	47.6	35.5	30.4	32.8
		% Distribution	5.7	5.2	5.6	4.9	4.2	11.1	14.8	13.7	11.3	8.4	7.2	7.8
Elsa	1948-1965; 1974-1989	Maximum	57.3	51.0	45.4	40.6	56.8	119.8	121.1	99.1	132.1	143.0	105.2	82.6
		Minimum	2.3	7.6	1.4	0.5	4.8	12.2	29.7	8.7	5.8	9.7	16.0	7.0
		Mean	24.3	18.3	14.4	14.2	25.2	32.8	46.9	37.6	32.3	37.3	31.8	31.3
		% Distribution	7.0	5.3	4.1	4.1	7.3	9.5	13.5	10.9	9.3	10.8	9.2	9.0
Keno Hill	1974-1982	Maximum	86.3	45.0	65.9	61.7	59.9	117.0	113.7	109.0	103.4	111.2	70.0	97.8
		Minimum	11.0	5.6	11.8	8.1	3.4	31.5	35.5	20.3	14.2	31.6	27.2	6.4
		Mean	28.1	22.1	28.9	25.2	24.5	60.9	69.6	51.1	51.2	53.7	39.4	39.2
		% Distribution	5.7	4.5	5.8	5.1	5.0	12.3	14.1	10.3	10.4	10.9	8.0	7.9

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-4: Regional Monthly Rainfall

Station		Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mayo	Maximum	6.8	0.3	16.0	39.6	46.1	81.3	108.7	100.3	81.4	32.2	6.6	5.2
	Minimum	0.0	0.0	0.0	0.0	3.0	6.9	9.9	4.8	0.0	0.0	0.0	0.0
	Mean	0.1	0.0	0.4	2.9	20.2	36.3	48.2	43.6	30.1	8.5	0.7	0.1
	% Distribution	0.1	0.0	0.2	1.5	10.6	19.0	25.2	22.8	15.8	4.5	0.4	0.1
Dawson	Maximum	1.2	1.0	4.4	12.4	61.4	84.6	99.0	83.4	61.4	39.0	2.0	7.7
	Minimum	0.0	0.0	0.0	0.0	10.3	9.4	10.7	8.2	3.2	0.0	0.0	0.0
	Mean	0.1	0.0	0.3	2.6	26.8	39.2	50.0	43.0	30.3	9.0	0.1	0.4
	% Distribution	0.0	0.0	0.1	1.3	13.3	19.4	24.8	21.3	15.0	4.5	0.0	0.2
Klondike	Maximum	0.0	1.0	0.0	4.0	46.5	101.4	149.6	126.1	104.9	33.1	7.0	0.0
	Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.2	13.4	46.3	62.3	56.9	41.0	4.9	0.3	0.0
	% Distribution	0.0	0.0	0.0	0.1	5.9	20.5	27.6	25.3	18.2	2.2	0.1	0.0
Elsa	Maximum	12.0	1.0	0.0	10.0	56.8	119.8	121.1	99.1	132.1	26.7	20.3	8.0
	Minimum	0.0	0.0	0.0	0.0	0.0	12.2	29.7	8.7	5.8	0.0	0.0	0.0
	Mean	0.4	0.0	0.0	1.0	21.4	32.8	46.9	35.1	29.4	8.1	0.8	0.5
	% Distribution	0.2	0.0	0.0	0.6	12.2	18.6	26.6	19.9	16.7	4.6	0.5	0.3
Keno Hill	Maximum	0.0	0.0	0.0	1.0	36.4	117.0	113.7	106.2	70.9	13.0	0.0	0.0
	Minimum	0.0	0.0	0.0	0.0	0.8	23.4	35.5	20.3	12.2	0.0	0.0	0.0
	Mean	0.0	0.0	0.0	0.1	16.2	58.6	69.6	50.5	36.5	3.0	0.0	0.0
	% Distribution	0.0	0.0	0.0	0.1	6.9	25.0	29.7	21.5	15.6	1.3	0.0	0.0

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-5: Monthly Rainfall Totals at Mayo, Keno Hill, and Potato Hills

Mayo	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total Rain	Partials*
1974		1.0	18.0	59.7	65.5	62.0	10.7	22.6		239.5	215.9
1975		0.8	26.4	51.1	104.9	30.2	60.2	6.6		280.2	272.8
1976			44.7	54.4	75.9	35.3	21.6	5.6		237.5	231.9
1977		3.5	24.7	27.8	45.4	12.9	34.7	2.4		151.4	149.0
1978		0.2	14.6	38.5	76.2	11.4	28.8	5.2		174.9	174.7
1979	11.5		15.4	15.7	108.7	30.2	38.2	8.2	4.4	232.3	216.4
1980		2.6	22.7	44.4	38.3	48.0	45.6	32.2		233.8	130.7
1981	0.2	0.4	9.5	64.6	45.5	17.6	44.7	25.9		208.4	88.2
1993		0.2	16.2	35.8	33.2	45.2	9.0	3.4		143.0	126.6
1994		4.8	27.0	43.9	24.7	20.4	36.0	12.2		169.0	93.3
2007		4.2	7.8	72.4	34.7	40.5	56.0	1.6		217.2	98.1
2008		1.2	30.4	27.7	95.2	89.3	50.6	14.9		309.3	309.3
2009		0.4	9.2	37.5	13.0	59.6	49.4	10.0		179.1	159.9
Keno Hill	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Total Rain**	**Partials**
1974			0.8	80.8	65.3	106.2	12.2			265.3	265.3
1975			17.3	43.9	95.5	75.4	70.9			303.0	303.0
1976			32.5	23.4	63.5	53.3	58.9			231.6	231.6
1977		1.0	30.3	106.3	35.5	20.3	53.8			247.2	247.2
1978			10.2	117.0	106.5	62.1	24.0	4.3		324.1	324.1
1979			2.1	51.5	113.7	20.8	31.3	6.6		226.0	226.0
1980				36.4	45.0	77.0				158.4	158.4
1981						66.0	41.0	13.0		120.0	120.0
Potato Hills	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Total Rain**	**Partials**
1993				21.2	81.4	59.8	18.4	9.4		190.2	190.2
1994					13.8	17.2	40.8	15.2		87.0	87.0
2007						24.0	100.8	2.0		126.8	126.8
2008	3.4	4.8	58.4	52.0	201.2	130.0	11.2	1.2		458.8	458.8
2009		1.6		50.6	12.6	75.4	44.4	1.2		185.8	184.6

NOTE:
* Indicates rainfall totals where data records coincide
All values in millimeters

Potato Hills/Mayo Mean Monthly Precipitation Ratios

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total Rain	Partials
1993				0.59	2.45	1.32	2.04	2.76		1.33	1.50
1994					0.56	0.84	1.13	1.25		0.51	0.93
2007						0.59	1.80	1.25		0.58	1.29
2008		4.00	1.92	1.88	2.11	1.46	0.22	0.08		1.48	1.48
2009		4.00		1.35	0.97	1.27	0.90	0.12		1.04	1.09
										Mean	**1.26**

Keno Hill/Mayo Mean Monthly Precipitation Ratios

	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Total Rain	Partials
1974			0.04	1.35	1.00	1.71	1.14			1.11	1.23
1975			0.66	0.86	0.91	2.50	1.18			1.08	1.11
1976			0.73	0.43	0.84	1.51	2.73			0.98	1.00
1977		0.29	1.23	3.82	0.78	1.57	1.55			1.63	1.66
1978			0.70	3.04	1.40	5.45	0.83	0.83		1.85	1.86
1979			0.14	3.28	1.05	0.69	0.82	0.80		0.97	1.04
1980			0.00	0.82	1.17	1.60				0.68	1.21
1981						3.75	0.92	0.50		0.58	1.36
										Mean	**1.31**

Table 5-6: Study Area Monthly Estimated Precipitation

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum													
Potato Hills	37.7	29.7	38.7	33.8	32.9	81.6	93.3	68.5	68.6	71.9	52.8	52.5	662.3
Camp	30.7	24.2	31.5	27.5	26.7	66.4	76.0	55.8	55.9	58.6	43.0	42.7	539.2
% Distribution	5.7	4.5	5.8	5.1	5.0	12.3	14.1	10.3	10.4	10.9	8.0	7.9	–
Minimum													
Potato Hills	13.0	10.3	13.4	11.7	11.4	28.2	32.3	23.7	23.7	24.9	18.3	18.2	229.7
Camp	10.5	8.2	10.8	9.4	9.1	22.7	25.9	19.0	19.1	20.0	14.7	14.6	184.7
% Distribution	5.7	4.5	5.8	5.1	5.0	12.3	14.1	10.3	10.4	10.9	8.0	7.9	–

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean													
Potato Hills	30.0	23.7	30.9	27.0	26.2	65.1	74.4	54.6	54.7	57.4	42.1	41.9	528.2
Camp	22.1	17.4	22.7	19.9	19.3	48.0	54.8	40.3	40.3	42.3	31.0	30.8	388.9
% Distribution	5.7	4.5	5.8	5.1	5.0	12.3	14.1	10.3	10.4	10.9	8.0	7.9	–

NOTES:
All values in millimetres
Maximum, minimum and mean precipitation totals were derived using regression analysis; see text for details
% distribution is the Keno Hill annual precipitation distribution
Regression equations:
Maximum: $y = 0.2062x+369.53$ $r^2 = .80$
Mean: $y = 0.2332x+197.01$ $r^2 = .93$
Minimum: $y = 0.0754x+122.62$ $r^2 = .33$

Table 5-7: Eagle Gold Project Site Monthly Estimated Rainfall

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum													
Potato Hills	0.0	0.0	0.0	0.2	24.4	88.2	104.8	76.0	54.9	4.5	0.0	0.0	352.7
Camp	0.0	0.0	0.0	0.2	23.1	83.7	99.4	72.1	52.1	4.3	0.0	0.0	335.3
% Distribution	0.0	0.0	0.0	0.1	6.9	25.0	29.7	21.5	15.6	1.3	0.0	0.0	–
Minimum													
Potato Hills	0.0	0.0	0.0	0.1	8.3	30.0	35.6	25.8	18.7	1.5	0.0	0.0	119.5
Camp	0.0	0.0	0.0	0.1	7.0	25.2	30.0	21.7	15.7	1.3	0.0	0.0	101.1
% Distribution	0.0	0.0	0.0	0.1	6.9	25.0	29.7	21.5	15.6	1.3	0.0	0.0	–
Mean													
Potato Hills	0.0	0.0	0.0	0.1	18.4	66.5	79.0	57.3	41.4	3.4	0.0	0.0	266.2
Camp	0.0	0.0	0.0	0.1	15.5	56.0	66.5	48.2	34.9	2.9	0.0	0.0	223.7
% Distribution	0.0	0.0	0.0	0.1	6.9	25.0	29.7	21.5	15.6	1.3	0.0	0.0	–

NOTES:
All values in millimetres
Maximum, minimum and mean rain totals were derived using regression analysis, see details in text
Regression equation calculated from mean annual rainfall values versus elevation at regional climate stations
% distribution is the Keno Hill annual rainfall distribution
Regression equations:
Maximum: $y = 0.0292x+311.22$ $r^2 = .12$
Mean: $y = 0.0712x+165.12$ $r^2 = .95$
Minimum: $y = 0.0309x+75.66$ $r^2 = .83$

Table 5-8: Mayo Return Period Rainfall (mm)

Duration	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	Years
5 Minutes	2.7	3.9	4.8	5.8	6.6	7.4	21
10 Minutes	3.6	5.2	6.3	7.7	8.7	9.8	21
15 Minutes	4.2	5.9	7.1	8.5	9.6	10.6	21
30 Minutes	5.2	7.1	8.4	10.1	11.3	12.5	21
1 Hour	6.3	8.2	9.4	11.0	12.2	13.3	22
2 Hour	8.3	10.2	11.5	13.2	14.4	15.6	22
6 Hour	12.1	14.4	16.0	17.9	19.3	20.8	19
12 Hour	14.4	17.8	20.1	22.9	25.0	27.1	19
24 Hour	18.0	22.6	25.6	29.4	32.2	35.0	22

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-9: Dawson Return Period Rainfall (mm)

Duration	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	Years
5 Minutes	3.6	5.9	7.5	9.4	10.9	12.3	26
10 Minutes	5.0	7.7	9.4	11.7	13.3	15.0	26
15 Minutes	5.7	8.7	10.6	13.0	14.8	16.6	26
30 Minutes	6.9	10.4	12.7	15.6	17.7	19.9	26
1 Hour	8.4	12.1	14.5	17.6	19.9	22.2	26
2 Hour	10.3	14.1	16.6	19.8	22.2	24.5	27
6 Hour	13.5	16.8	19.0	21.8	23.8	25.9	25
12 Hour	16.0	20.1	22.9	26.4	29.0	31.5	25
24 Hour	19.0	23.5	26.4	30.1	32.9	35.6	27

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-10: Pelly Ranch Return Period Rainfall (mm)

Duration	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	Years
5 Minutes	3.3	5.2	6.4	8.0	9.2	10.4	32
10 Minutes	4.7	7.3	9.0	11.3	12.9	14.5	32
15 Minutes	5.7	9.1	11.4	14.2	16.3	18.5	32
30 Minutes	6.9	11	13.7	17.1	19.7	22.2	32
1 Hour	8.2	13.2	16.5	20.7	23.8	26.9	33
2 Hour	10.2	15.4	18.9	23.3	26.5	29.8	33
6 Hour	13.5	18.7	22.1	26.5	29.7	33.0	33
12 Hour	16.2	21.7	25.3	29.9	33.3	36.7	33
24 Hour	19.3	25.6	29.7	35.0	38.9	42.7	33

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-11: Teslin Return Period Rainfall (mm)

Duration	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	Years
5 Minutes	2.7	3.7	4.5	5.3	6.0	6.7	23
10 Minutes	4.2	5.9	7.0	8.4	9.4	10.5	23
15 Minutes	5.0	7.4	9.0	10.9	12.4	13.9	23
30 Minutes	6.1	8.8	10.5	12.8	14.4	16.0	23
1 Hour	7.4	10.5	12.5	15.1	17.0	18.9	23
2 Hour	9.5	12.7	14.9	17.6	19.6	21.6	23
6 Hour	13.1	16.9	19.4	22.5	24.9	27.2	23
12 Hour	15.7	20.0	22.7	26.3	28.9	31.5	23
24 Hour	19.5	24.6	28.0	32.3	35.4	38.6	23

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-12: Whitehorse Return Period Rainfall (mm)

Duration	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	Years
5 Minutes	1.9	2.7	3.3	4.0	4.5	5.0	37
10 Minutes	2.7	4.2	5.2	6.4	7.4	8.3	37
15 Minutes	3.3	5.1	6.4	7.9	9.1	10.2	37
30 Minutes	4.3	6.7	8.4	10.5	12.0	13.5	37
1 Hour	5.8	8.7	10.5	12.9	14.6	16.4	37
2 Hour	8.0	11.3	13.4	16.2	18.2	20.2	37
6 Hour	12.1	16.3	19.2	22.7	25.3	28.0	37
12 Hour	15.3	22.0	26.4	31.9	36.1	40.1	37
24 Hour	18.6	26.6	31.9	38.6	43.6	48.5	37

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-13: Watson Lake Return Period Rainfall (mm)

Duration	2 Years	5 Years	10 Years	25 Years	50 Years	100 Years	Years
5 Minutes	2.7	4.6	5.9	7.5	8.7	9.9	23
10 Minutes	4.1	6.4	8.0	10.0	11.5	13.0	23
15 Minutes	5.0	8.2	10.3	13.0	15.0	16.9	23
30 Minutes	6.1	9.7	12.2	15.2	17.5	19.7	23
1 Hour	7.2	11.0	13.5	16.7	19.0	21.3	23
2 Hour	9.7	13.4	15.9	19.0	21.3	23.6	23
6 Hour	15.6	21.0	24.6	29.2	32.5	35.9	23
12 Hour	20.8	28.6	33.8	40.4	45.2	50.1	23
24 Hour	26.6	36.7	43.4	51.9	58.2	64.4	23

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-14: Historical Study Area Wet and Dry Year Precipitation

Return Period	Annual % Probability	Mayo	Precipitation	
Elevation		504	790	1350
20 (dry)	95%	224	294	432
5 (dry)	80%	225	335	492
2 (mean)	50%	294	386	568
5 (wet)	20%	344	452	664
10 (wet)	10%	375	493	724
20 (wet)	5%	403	530	778
50 (wet)	2%	437	574	844
100 (wet)	1%	461	606	890
200 (wet)	0.5%	484	636	934
500 (wet)	0.2%	513	674	990

NOTES:
Data from Clearwater (1996)
Return Period is in years
Precipitation is in millimeters
Elevations are for station locations

Table 5-15: Regional Monthly Snowfall

Station		Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mayo	Maximum	99.6	51.6	44.2	35.6	22.6	2.8	0.0	7.6	33.5	58.5	73.4	66.8
	Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Mean	22.4	16.7	12.1	6.4	1.1	0.0	0.0	0.1	2.7	19.6	25.3	24.4
	% Distribution	17.1	12.7	9.3	4.9	0.9	0.0	0.0	0.1	2.1	15.0	19.3	18.6
Dawson	Maximum	65.4	37.8	42.6	28.2	22.5	0.0	0.0	9.4	25.4	62.7	71.9	56.2
	Minimum	5.2	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.8	0.0
	Mean	27.1	18.0	13.1	7.7	2.1	0.0	0.0	0.3	3.9	25.5	35.6	30.9
	% Distribution	16.5	11.0	8.0	4.7	1.3	0.0	0.0	0.2	2.4	15.5	21.7	18.8
Klondike	Maximum	24.1	21.9	23.6	20.3	5.0	0.6	0.0	0.6	6.6	30.9	30.6	33.8
	Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	24.1	21.9	23.6	20.3	5.0	0.6	0.0	0.6	6.6	30.9	30.1	32.8
	% Distribution	12.3	11.1	12.0	10.3	2.5	0.3	0.0	0.3	3.4	15.7	15.3	16.7
Elsa	Maximum	57.3	51.0	45.4	36.8	24.9	0.0	0.0	14.5	15.8	124.2	84.8	82.6
	Minimum	2.3	7.6	1.4	0.5	0.0	0.0	0.0	0.0	0.0	1.3	16.0	7.0
	Mean	24.0	18.3	14.2	13.2	3.8	0.0	0.0	0.5	2.9	29.2	31.0	30.8
	% Distribution	14.3	10.9	8.4	7.9	2.3	0.0	0.0	0.3	1.7	17.4	18.5	18.4
Keno Hill	Maximum	86.3	45.0	65.9	60.7	27.4	10.2	0.0	2.8	32.5	106.9	70.0	97.8
	Minimum	11.0	5.6	11.8	8.1	0.0	0.0	0.0	0.0	0.0	31.6	27.2	6.4
	Mean	28.1	22.1	28.9	25.1	8.3	2.3	0.0	0.6	14.7	50.7	39.4	39.2
	% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1

NOTES:
All values in centimeters
Data from Environment Canada

Table 5-16: Regional Monthly Snow-Water Equivalent

Station		Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mayo	Maximum	99.6	51.6	44.2	35.6	22.6	2.8	0.0	7.6	33.5	58.5	73.4	66.8
	Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0
	Mean	22.4	16.7	12.1	6.4	1.1	0.0	0.0	0.1	2.7	19.6	25.3	24.4
Dawson	Maximum	65.4	37.8	42.6	28.2	22.5	0.0	0.0	9.4	25.4	62.7	71.9	56.2
	Minimum	5.2	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	5.8	0.0
	Mean	27.1	18.0	13.1	7.7	2.1	0.0	0.0	0.3	3.9	25.5	35.6	30.9
Klondike	Maximum	78.7	73.2	69.1	84.1	42.4	10.2	0.0	7.0	44.0	88.4	84.0	82.0
	Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Mean	24.1	21.9	23.6	20.3	5.0	0.6	0.0	0.6	6.6	30.9	30.1	32.8
Elsa	Maximum	57.3	51.0	45.4	36.8	24.9	0.0	0.0	14.5	15.8	124.2	84.8	82.6
	Minimum	2.3	7.6	1.4	0.5	0.0	0.0	0.0	0.0	0.0	1.3	16.0	7.0
	Mean	24.0	18.3	14.2	13.2	3.8	0.0	0.0	0.5	2.9	29.2	31.0	30.8
Keno Hill	Maximum	86.3	45.0	65.9	60.7	27.4	10.2	0.0	2.8	32.5	106.9	70.0	97.8
	Minimum	11.0	5.6	11.8	8.1	0.0	0.0	0.0	0.0	0.0	31.6	27.2	6.4
	Mean	28.1	22.1	28.9	25.1	8.3	2.3	0.0	0.6	14.7	50.7	39.4	39.2

NOTES:
All values in millimeters
Data from Environment Canada

Table 5-17: Regional Snow on Ground

Station		Month											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mayo	Maximum	79.0	109.0	99.0	33.0	0.0	0.0	0.0	0.0	11.0	28.0	48.0	71.0
	Mean	31.0	32.3	27.2	1.6	0.0	0.0	0.0	0.0	0.2	5.6	14.7	22.8
Dawson	Maximum	111.0	101.0	43.0	0.0	0.0	0.0	0.0	31.0	33.0	46.0	95.0	109.0
	Mean	56.3	47.0	2.5	0.0	0.0	0.0	0.0	2.1	12.3	28.2	42.7	51.0
Klondike	Maximum	86.0	85.0	80.0	70.0	0.0	0.0	0.0	0.0	0.0	35.0	58.0	70.0
	Mean	24.5	23.2	15.9	10.4	0.0	0.0	0.0	0.0	0.0	3.6	11.9	19.7

NOTES:
SoG is measured as snow depth (cm) on ground on last day of month
Data from Environment Canada

Table 5-18: Study Area Estimated Monthly Snowfall

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum													
Potato Hills	36.7	32.7	29.1	23.6	16.0	0.0	0.0	9.3	10.1	79.6	54.3	52.9	344.2
Camp	31.3	27.8	24.8	20.1	13.6	0.0	0.0	7.9	8.6	67.8	46.3	45.1	293.3
% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1	–
Minimum													
Potato Hills	7.0	23.3	4.3	1.5	0.0	0.0	0.0	0.0	0.0	4.0	49.0	21.5	110.6
Camp	5.1	16.7	3.1	1.1	0.0	0.0	0.0	0.0	0.0	2.9	35.2	15.4	79.4
% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1	–

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean													
Potato Hills	38.4	29.3	22.7	21.1	6.1	0.0	0.0	0.8	4.6	46.9	49.7	49.4	269.0
Camp	27.2	20.7	16.1	14.9	4.3	0.0	0.0	0.6	3.3	33.1	35.1	34.9	190.1
% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1	–

NOTES:
All values in centimeters
Maximum, minimum and mean snowfall totals were derived using regression analysis, see text for details
% distribution is the Keno Hill annual snowfall distribution
Regression equations: Maximum: $y = 0.0852x+223.2$ $r^2 = .33$ Mean: $y = 0.1321x+81.371$ $r^2 = .89$ Minimum: $y = 0.0523x+36.36$ $r^2 = .48$

Table 5-19: Study Area Estimated Monthly Snow-Water Equivalent

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum													
Potato Hills	36.7	32.7	29.1	23.6	16.0	0.0	0.0	9.3	10.1	79.6	54.3	52.9	344.2
Camp	31.3	27.8	24.8	20.1	13.6	0.0	0.0	7.9	8.6	67.8	46.3	45.1	293.3
% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1	–
Minimum													
Potato Hills	7.0	23.3	4.3	1.5	0.0	0.0	0.0	0.0	0.0	4.0	49.0	21.5	110.6
Camp	5.1	16.7	3.1	1.1	0.0	0.0	0.0	0.0	0.0	2.9	35.2	15.4	79.4
% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1	–
Mean													
Potato Hills	38.4	29.3	22.7	21.1	6.1	0.0	0.0	0.8	4.6	46.9	49.7	49.4	269.0
Camp	27.2	20.7	16.1	14.9	4.3	0.0	0.0	0.6	3.3	33.1	35.1	34.9	190.1
% Distribution	10.8	8.5	11.1	9.7	3.2	0.9	0.0	0.2	5.7	19.5	15.2	15.1	–

NOTES:
All values in millimetres
% distribution is the Keno Hill annual snowfall distribution

Table 5-20: Historical Snow Survey Data Summary for Calumet (1975 – 2009) and Mayo, YT, (1968 – 2009)

Depth (cm)	Calumet Historical			Mayo Historical		
	March	April	May	March	April	May
Mean	85.2	92.3	84.1	46.9	43.1	4.2
Maximum	130.0	126.0	113.6	72.0	70.0	30.0
Minimum	60.0	65.0	39.0	21.0	8.0	0.0
Density						
Mean	0.20	0.21	0.24	0.19	0.22	0.05
Maximum	0.25	0.27	0.33	0.30	0.32	0.37
Minimum	0.16	0.15	0.14	0.12	0.12	0.00
SWE (mm)						
Mean	176.5	200.3	199.1	89.8	95.6	12.7
Maximum	298.0	300.0	285.0	160.0	176.0	94.0
Minimum	94.0	101.0	87.0	30.0	10.0	0.0

NOTE:
Calumet and Mayo data from Yukon Environment

Table 5-21: Study Area Estimated Monthly Evapotranspiration

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Potato Hills	0.0	0.0	0.0	0.0	47.0	76.0	69.0	50.0	30.0	0.0	0.0	0.0	272.0
Camp	0.0	0.0	0.0	0.0	47.0	76.0	67.0	49.0	27.0	0.0	0.0	0.0	266.0

NOTES:
All values in millimeters
Evapotranspiration estimates were derived using a Thornthwaite model
Input to the model included mean precipitation estimates, mean monthly temperature

Table 5-22: Study Area Evaporation Estimates

Station	Month												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2007													
Potato Hills	–	–	–	–	–	–	–	39.1	20.6	2.0	0.0	0.0	61.7
2008													
Potato Hills	0.0	0.0	0.0	6.3	45.7	75.2	70.3	48.8	25.4	2.4	0.0	0.0	274.2
2009													
Potato Hills	0.0	0.0	0.0	7.0	- *	57.75*	94.8	56.5	29.8	0.0			188.0
Camp	–	–	–	–	–	–	–	18.2[a]	36.2	7.9			

NOTES:

[a] Data collection began Aug 21 2009

* Instrument error - missing data May 1 - June 6 2009

– No available data

Data derived from Hamon evaporation model

Annual data are partial totals from available data