EAGLE GOLD MINE

ENVIRONMENTAL CHARACTERIZATION REPORT

JULY 2020

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List of Acronyms and Abbreviations

%	percent
~	approximately
<	less than
>	greater than
AP	acid potential in kg $CaCO_3$/t equivalent
ARD	acid rock drainage
ARSA	Access Road Study Area
asl	above sea level
BC	British Columbia
BGC	BGC Engineering Ltd.
CBA	Cooperation and Benefits Agreement
cm	centimeter
DOC	dissolved organic carbon
EMSAMP	Environmental Monitoring, Surveillance and Adaptive Management Plan
FNNND	First Nation of Na-Cho Nyäk Dun
GMZ	Game Management Zone
ha	hectares
HCR	Haggart Creek Road
HRIA	Heritage Resource Impact Assessment
km	kilometers
km^2	square kilometers
LAA	Local Assessment Area
LSA	Local Study Area
masl	meters above sea level
m	meters
m^3	cubic meters
mg/L	milligrams per liter
m^3/ha	cubic meters per hectare

ML .... metal leaching

mm .... millimeter

m/s .... meters per second

N/A .... not applicable

Non-PAG .... Non-potentially acid generating

NP .... neutralization potential in kg $CaCO_3$/t equivalent

NP/AP .... neutralization potential to acid potential ratio

PAG .... Potential Acid Generation

pH .... potential of hydrogen (measure of acidity)

Project .... Eagle Gold Mine

RAA .... Regional Assessment Area

RCSA .... road corridor study area

RSA .... Regional Study Area

RTC .... Registered Trapline Concession

SARA .... Species at Risk Act

SARPR .... Species at Risk Public Registry

SGC .... StrataGold Corporation

SRK .... SRK Consulting (Canada) Inc.

SWE .... Snow Water Equivalent

TEM .... Terrestrial Ecosystem Mapping

TK .... traditional knowledge

TOC .... total organic carbon

TSS .... total suspended solids

UTM .... Universal Transverse Mercator

VGC .... Victoria Gold Corp.

VWB .... Vibrating Wire Piezometer

WKA .... Wildlife Key Area

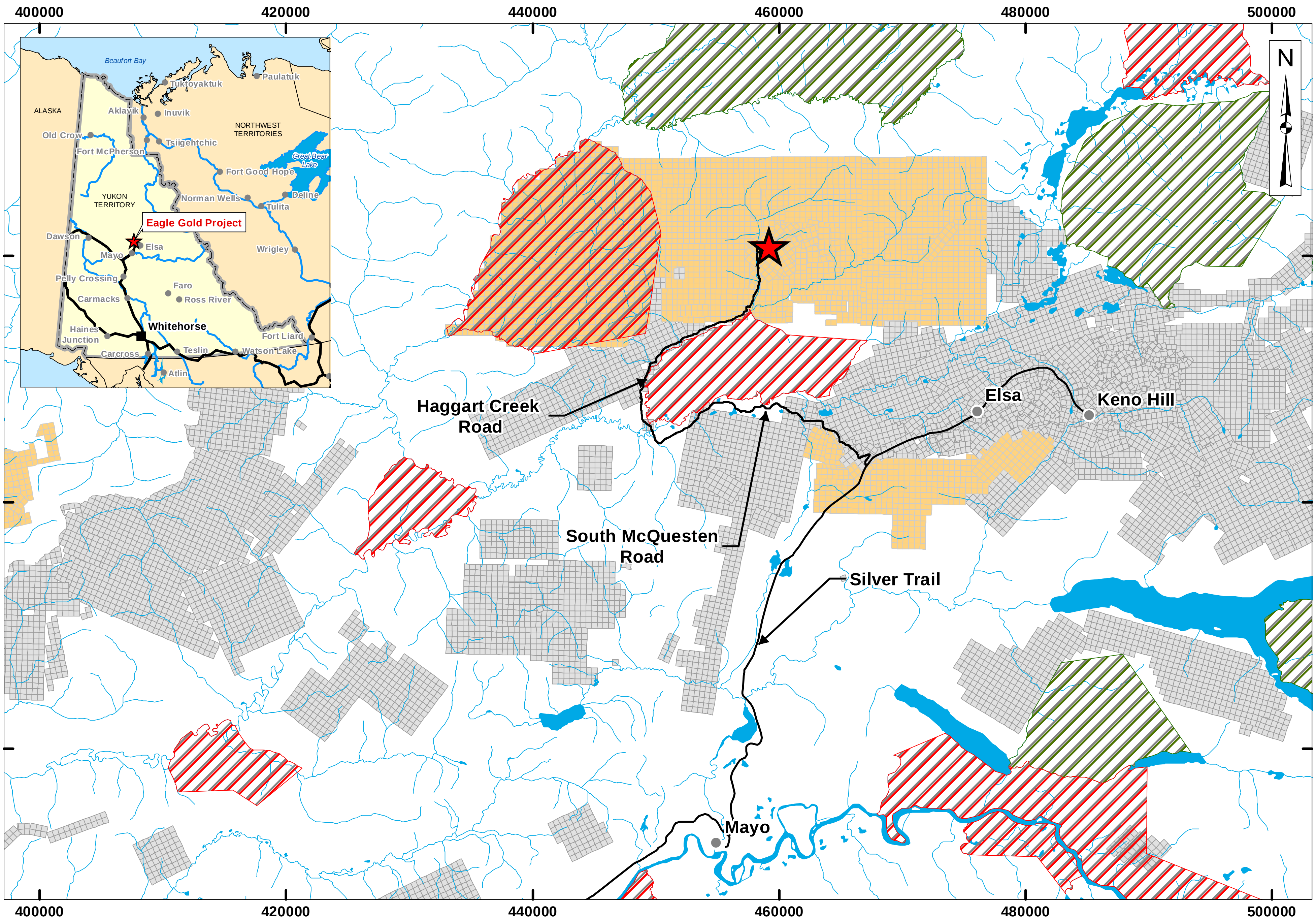
yrs .... years

YT .... Yukon Territory

1 INTRODUCTION

The Eagle Gold Mine (the Project) is located in central Yukon, approximately 350 km north of Whitehorse and approximately 85 km north-northeast of the village of Mayo (Figure 1-1). The Project is accessible via the Silver Trail and the South McQuesten and Haggart Creek Roads. Victoria Gold (Yukon) Corp. (VGC) began construction of the Project in August 2017. During 2019, the construction of the Project was completed and the Project transitioned to the operations phase. The environmental monitoring programs are conducted in accordance with the Environmental Monitoring, Surveillance and Adaptive Management Plan (EMSAMP). Monitoring programs under the EMSAMP have shifted from baseline data collection to monitoring and evaluating changes related to the phases of, and activities required for, the Project. This report is an update to the 2015 version of the Environmental Characterization Report and includes additional environmental data collected since the finalization of the 2015 version of the report.

The Project is located within the Boreal Cordillera ecozone, which comprises much of the southern Yukon and a large portion of northern British Columbia, and more specifically within the Yukon Plateau-North ecoregion. The Boreal Cordillera ecozone is broadly characterized by the presence of several mountain ranges that trend in the northwesterly direction and include extensive plateau regions. The plateaus consist of flat or gently rolling upland terrain separated by broad valleys and lowlands. The climate is characterized by long, cold, dry winters and short, warm, wet summers, with conditions varying according to altitude and aspect.



Legend:

Eagle Gold Project	Town / Village	Category A Settlement Land
Victoria Gold Claims	Road	Category B Settlement Land
Other Claims	Watercourse	

VICTORIA GOLD CORP

0 3 6 12 Kilometres

Projection: NAD 83 Zone 8N	Drawn By: HC	EAGLE GOLD PROJECT YUKON TERRITORY
Date: 2020/06/01	Figure: 1-1	Project Location

2 METEOROLOGY AND AIR QUALITY

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. Lower elevations are typically snow free by early May, whereas the higher elevations are typically snow free by mid-June. Frost action may occur at any time during the summer or fall.

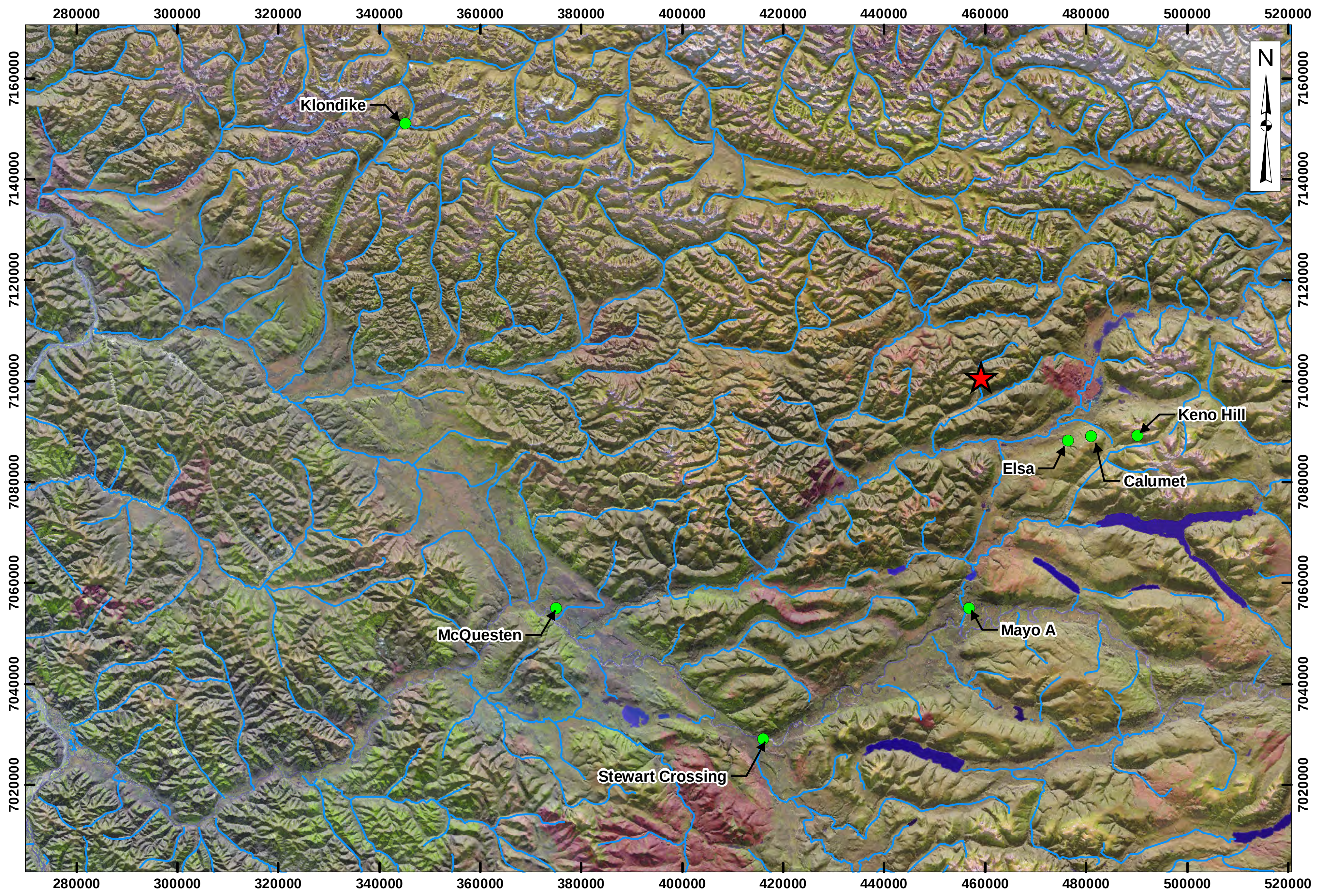
2.1 CLIMATE STATIONS

Regional climatic data are available from several stations in the area which provide a long-term database (Figure 2-1). Site specific climate data have been collected and analyzed from two climate stations that were established on the Project site from 1993 – 1996 and again in 2007 and 2009. One 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. These sites were the same locations established by a prior operator in the Project area from 1993 – 1996. The lower Camp station was re-located to a nearby site (778 m asl) in September 2010 due to construction of new camp facilities. The stations characterize climatic conditions in the upper and lower elevations of the Project area which exhibits significant variability due to elevation and physiography (Figure 2-2).

The Project climate stations and snow survey locations, as well as regional climate station in proximity to the project area, are presented in Table 2-1.

Table 2-1: Regional and Project Climate Stations

Station	Elevation (m asl)	Latitude/ UTM E	Longitude/ UTM N	Record Period
Regional Climate Stations				
Keno Hill (Stations ID 2100677)	1473	N 63°56'	W 135°12'	1974-1982
Klondike (Stations ID 2100679)	973	N 64°27'14"	W 138°12'56"	1966-2010
Elsa (Station ID 2100500)	814	N 63°55'	W 135°29'	1948-1989
Mayo A (Station ID 2100700)	504	N 63°37'	W 135°52'	1925-Active
McQuesten (Station ID 2100719)	457	N 63°36'	W 137°31'	1986-2014
Stewart Crossing (Station ID 2101030)	480	N 63°22'48”	W 136°40'48”	1963-2008
Calumet (Snow Station ID 09DD-SC1)	1310	N 63°54'60"	W 135°24'00"	1975-Active
Project Site Climate Stations				
Camp Station	782	458,164	7,101,036	2009-present
Potato Hills Station	1420	463,544	7,100,833	2007-present
Project Site Snow Survey Locations				
Camp Snow Survey	782	458,164	7,101,036	2009-present
Ann Gulch Snow Survey	875	458,945	7,101,185	2012-2017
HLF Snow Survey	1078	459,859	7,102,319	2019
Potato Hills Snow Survey	1420	463,290	7,100,568	2009-present



Legend:

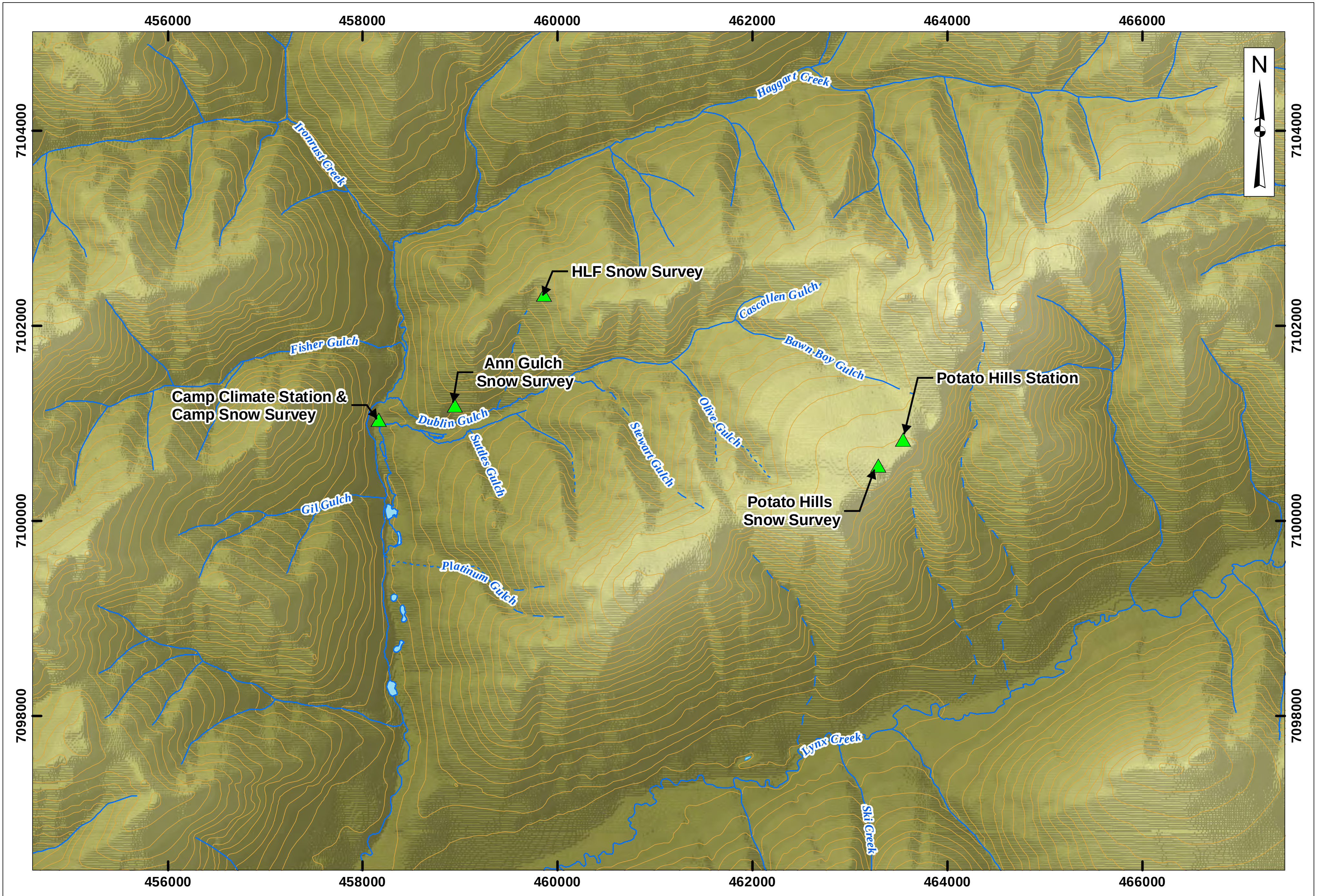
★ Eagle Gold Project — Watercourse

● Climate Station

VICTORIA GOLD CORP

0 5 10 20 Kilometres

Projection: NAD 83 Zone 8N	Drawn By: HC	EAGLE GOLD PROJECT YUKON TERRITORY
Date: 2020/06/01	Figure: 2-1	Regional Climate Station Locations



Legend:

Snow/Climate	Perennial
Contour (100ft)	Ephemeral
	Intermittent

VICTORIA GOLD CORP

0 0.25 0.5 1
Kilometres

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date: 2020/06/01	Figure: 2-2	Project Climate Station Locations

2.2 TEMPERATURE

2.2.1 Regional Temperature

Mean annual air temperature estimates range from -5.6°C to -1.9°C, with higher mean annual air temperature values occurring at stations showing lower elevation – and vice versa. Overall, regional data show that during the months of March to October inclusive, a standard lapse rate applies, with temperatures decreasing with rising elevation, and are cooler at the upper station, on average. However, during the winter months of November to February, temperature inversions are common in the region, with temperatures being cooler on average in the valley bottom than at the height of land (Lorax 2020a).

Mean monthly temperature summaries for the regional stations are provided in Table 2-2. 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.

Table 2-2: Mean Monthly Temperatures at Regional Climate Stations

MSC Station Name	Elev (m asl)	Period of Record	Temperature (°C)												
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann.
Keno Hill	1473	1974-1982	-16.7	-14.2	-11.5	-4.8	2.1	7.8	10.4	9.1	2.9	-5.3	-11.0	-16.2	-4.0
Klondike	973	1966-2010	-22.6	-18.2	-14.4	-5.9	3.4	9.9	11.6	8.4	2.3	-6.7	-15.9	-18.9	-5.6
Elsa	814	1948-1989	-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
Mayo A	504	1925-Active	-25.5	-19.0	-10.6	0.2	8.3	14.0	15.6	12.8	6.6	-2.3	-15.7	-22.2	-3.1
McQuesten	457	1986-2014	-22.8	-19.1	-12.8	0.1	8.5	13.7	15.0	12.4	6.4	-2.9	-16.4	-24.4	-2.9
Stewart Crossing	480	1963-2008	-21.9	-16.8	-11.5	0.0	8.3	14.0	15.6	12.6	6.4	-2.5	-14.7	-18.6	-1.9

NOTES:
1. Regional temperature data obtained from Environment Canada's national climate data and information archive and summarized in Lorax 2020.

2.2.2 Local Temperatures

Although mean monthly air temperatures measurably differ between the Camp station (782 m asl) and Potato Hills station (1,420 m asl), the mean annual air temperature at the project site for both sites is -3.6°C over their respective periods of record. July is typically the warmest month with mean July temperatures at the Camp station ranging from 12.2°C to 15.2°C and from 8.1°C to 13.6°C at the Potato Hills station. The coldest temperatures are generally experienced in January; mean January temperatures at the Camp station ranged from -13.1°C to -25.2°C, while they ranged from -9.2°C to -19.8°C at the Potato Hills station.

During the period in which the Potato Hills and Camp stations have collected data simultaneously, the higher Potato Hills station has generally reported colder temperatures than the lower Camp station; however, autumn and winter temperature inversions do occur at the site as is common in mountainous regions, and the Camp station has a much larger range in recorded temperature. The minimum (maximum) recorded 15-minute temperatures were -46.4°C (31.6°C) and -37.6°C (31.7°C) at the Camp and Potato Hills stations, respectively.

Table 2-3 summarizes the mean temperatures recorded at the Camp and Potato Hills climate stations.

Table 2-3: Project Site Mean Monthly Temperatures

Location	Year	Mean Temperature °C												
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Potato Hills Station (1,420 m asl)	2007	-	-	-	-	-	-	-	-	1.0	-6.9	-12.0	-15.2	-
	2008	-17.7	-17.2	-11.3	-4.8	3.3	8.7	8.1	5.3	1.9	-7.7	-10.8	-18.6	-5.1
	2009	-19.3	-17.2	-16.7	-4.4	M	M	12.6	7.4	3.3	-5.3	-12.8	-11.9	-
	2010	-14.5	-9.7	-9.4	-1.8	5.2	8.8	10.5	9.7	2.3	-5.3	-11.7	-18.2	-2.9
	2011	-15.5	-18.3	-13.9	-5.6	4.8	8.8	10.3	7.0	4.1	-5.7	-18.0	-13.0	-4.6
	2012	-19.8	-11.1	-13.4	-1.9	3.1	11.3	10.9	M	M	-8.4	-18.8	-19.4	-
	2013	-17.6	-11.3	-14.2	*-10.4*	*2.8*	12.1	11.6	11.0	3.0	-2.9	-16.0	-19.5	-4.3
	2014	-10.0	-15.9	-11.5	-3.4	*5.6*	8.7	11.8	8.7	2.1	-5.6	-11.6	-11.4	-2.7
	2015	-14.4	-13.8	-9.6	*-2.3*	*8.6*	*8.6*	*9.5*	7.1	0.1	-3.7	-13.5	-13.6	-3.1
	2016	-9.2	-10.4	-6.2	M	7.2	12.0	12.2	9.3	2.8	-6.8	-10.1	-16.2	-
	2017	-13.0	-13.3	-16.7	-3.2	4.5	9.7	M	M	M	M	-17.4	-10.2	-
	2018	-14.4	-16.9	-12.0	-6.1	M	M	M	M	M	-3.3	-9.9	M	-
	2019	-16.0	M	-5.1	-3.5	M	11.1	13.6	8.9	M	M	-10.8	M	-
Camp Station (782m asl)	2009	-	-	-	-	-	-	-	10.5	6.2	-2.6	-13.6	-17.3	-
	2010	-17.1	-10.8	-6.9	1.1	8.3	12.1	13.6	12.1	4.4	-3.4	-13.5	-24.1	-2.0
	2011	-22.9	-21.3	-15.9	-3.2	7.7	11.5	12.8	9.2	5.1	-2.8	-20.7	M	-
	2012	-25.2	-12.2	-13.4	0.4	5.9	13.3	12.6	10.5	5.0	M	-24.1	-25.9	-
	2013	-21.6	-13.3	-15.5	-8.6	5.0	14.2	14.0	11.9	5.5	-2.5	-18.7	-26.7	-4.7
	2014	-14.9	-23.4	-13.8	-1.8	7.0	11.0	13.4	10.6	3.7	-3.5	-15.8	-15.2	-3.6
	2015	-19.4	-18.1	-11.5	-0.1	10.1	11.2	12.2	9.0	2.9	-1.5	-15.1	-15.2	-3.0
	2016	-13.1	-13.5	-5.1	2.3	8.2	12.4	13.6	11.5	4.1	-8.3	-13.7	-21.9	-1.9
	2017	-19.6	-18.8	-17.2	-1.4	7.3	M	M	11.8	6.3	-4.1	-22.9	-16.6	-
	2018	-19.4	-24.3	-11.9	-3.7	5.9	11.8	13.8	9.9	1.9	-3.8	-12.8	-16.0	-3.9
	2019	-20.4	-23.1	-6.2	-0.9	8.7	13.0	15.2	8.6	5.3	-4.6	-14.4	-18.7	-3.1

NOTES:
1. Values are calculated from average daily temperatures.
2. Data is considered missing for a month when there are less than 25 days of data available for that month (beginning of data record until end of 2019).
3. Monthly values in italics for the Potato Hills station, for the period of 2013 through 2015 have been infilled using monthly regression relationships with temperature data from the Camp station.
4. Monthly values in gray for the period of June 2014 to March 2015, May through July 2016 and November 2019 were recorded by a standalone HOBO temperature sensor.
5. 'M' denotes data missing due to a sensor/datalogger malfunction.

2.3 RAINFALL

For regional climate stations surrounding the Project site, mean annual precipitation varies appreciably with elevation. For example, mean annual precipitation ranges from 324 mm at the Mayo A station (504 m; situated approximately 50 km to the south of the Project) to 572 mm at the Keno Hill station (1,473 m; ~30 km southeast of the Project). An inspection of available data from regional climate stations indicates both precipitation phases exhibit increases with elevation, with the regional gradients averaging 5%/100 m of elevation gain for rainfall, 11%/100 m for snowfall, and an average mean annual precipitation gradient of 7%/100 m (Lorax, 2020a). On an annual basis, total precipitation in the region is comprised of roughly 60% rainfall and 40% snowfall, noting proportions vary to some degree from station to station, but notably by elevation (Lorax, 2020a).

Precipitation data is collected at the Project site using tipping bucket rain gauges, which have not been adapted to measure snowfall. Therefore, the precipitation data presented in Table 2-4 is for rainfall only, collected between the months of March and October, inclusive. Generally, precipitation falls as snow from November through March, with precipitation falling as a mix of rain and snow in April and October. Rainfall data for March is included in the table below, where the temperature record indicates that precipitation would have fallen as rain (i.e., daily average air temperature was above zero).

Table 2-4: Project Site Monthly Rainfall Data

Climate Station	Rainfall (mm)									
	Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
Camp Station (782 masl)	2009	-	-	-	-	-	-	35.0	*8.0*	-
	2010	5.0	9.0	20.0	62.0	34.0	28.0	25.0	*12.0*	195.0
	2011	11.0	10.0	16.0	31.0	75.0	44.0	40.0	*9.0*	236.0
	2012	13.0	1.0	22.0	18.0	74.6	29.8	24.0	*4.8*	187.2
	2013	8.6	10.4	34.6	25.6	28.4	35.2	58.6	*25.2*	226.6
	2014	5.4	8.8	9.2	52.8	43.2	70.4	28.8	*23.2*	241.8
	2015	20.8	13.0	8.2	28.8	64.0	62.0	38.6	*13.4*	248.8
	2016	6.2	4.4	14.0	32.6	55.0	31.0	25.6	*2.6*	171.4
	2017	S	2.2	24.4	M	M	12.8	20.4	*6.0*	-
	2018	12.0	1.4	63.2	49.4	1.6	34.4	4.6	*12.4*	179.0
	2019	M	M	M	M	M	M	M	M	-
	All Years Mean	10.3	6.7	23.5	37.5	47.0	38.6	30.1	11.7	210.7
	All Years Maximum	20.8	13.0	63.2	62.0	75.0	70.4	58.6	*25.2*	248.8
	All Years Minimum	5.0	1.0	8.2	18.0	1.6	12.8	4.6	*2.6*	171.4
Potato Hills Station (1420 masl)	2007	S	-	-	-	-	24.0	100.8	*2.0*	-
	2008	3.4	4.8	58.4	52.0	201.2	130.0	11.2	*1.2*	462.2
	2009	S	3.0	M	50.8	12.6	75.4	44.4	*1.2*	-

Climate Station	Rainfall (mm)								
	Year	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Annual
	2010	1.0	6.2	16.4	77.2	45.8	39.4	4.2	*5.4*	195.6
	2011	0.2	7.2	21.2	38.0	92.8	83.8	34.4	*0.4*	278.0
	2012	S	0.6	9.6	24.2	64.8	37.8	21.0	*4.6*	162.6
	2013	2.2	0.2	29.6	33.2	18.0	18.2	63.8	*10.0*	175.2
	2014	S	M	M	M	M	M	M	*M*	-
	2015	S	M	M	M	M	48.5	27.1	*10.0*	-
	2016	D	D	14.5	23.0	38.3	42.6	24.6	*0.6*	-
	2017	D	D	16.2	25.8	46.3	21.8	53.0	*6.1*	-
	2018	D	D	D	46.5	13.5	77.0	4.0	*3.8*	-
	2019	D	D	D	D	18.5	D	D	D	-
	All Years Mean	1.7	3.7	22.7	38.0	55.2	54.4	35.3	4.1	254.7
	All Years Maximum	3.4	7.2	58.4	77.2	201.2	130.0	100.8	*10.0*	462.2
	All Years Minimum	0.2	0.2	9.6	9.5	12.6	18.2	4.0	*0.4*	162.6

Notes:
1. Winter precipitation data (October through April in many years) are unreliable due to the majority falling as snow. The months where no rainfall was recorded due to freezing conditions are denoted by an 'S'.
2. Data for the month of October are in italics, as rainfall is not measured for the entire month.
3. 'M' denotes when there are less than 25 days of data available for that month.
4. In August 2015, the primary rain gauge at the Potato Hills Station was replaced by a standalone tipping bucket rain gauge. The replacement gauge is deployed each spring (i.e., in April or May) then decommissioned in the autumn (October). Missing data at Potato Hills Station denoted by 'D' indicate time periods during which the standalone tipping bucket rain gauge was not functioning.

2.4 SNOW DEPTH

Snow data is being actively collected at three snow courses at the Project site. The snowpack surveys were conducted near each climate station since 2009 and a third station (in the area of the HLF) was added to the program in 2013. Sampled information included snow depth, snow density and snow water equivalent (SWE).

At the Project site, the annual maximum SWE value generally occurs in late-March or early-April. Field measurements from site show that snow density is generally lower earlier in the season, corresponding to colder temperatures, but increases through winter as the snowpack deepens, consolidates and as snow melt progresses.

The Potato Hills snow survey was conducted in the immediate vicinity of the weather station from 2009 to 2011. However, due to the exposed location, snow redistribution resulted in variable measurements, and therefore the survey was moved to its current and more sheltered location in 2012, several hundred metres to the south-east. Note that high snowpacks did not allow access to the Potato Hills snow course in March 2012, and therefore the survey was conducted at Stewart Gulch that year. In 2013, an additional snow survey station was established on the south-facing slopes near Ann Gulch. Snow surveys conducted at the Heap Leach facility in 2019 were primarily above or below the diversion ditch.

Field methods followed the survey techniques according to Yukon Environment (2009) and Ministry of Environment of British Columbia (MOE, 1981). Snow survey data is summarized in Table 2-5.

Table 2-5: Snow Survey Data

Station	Year	Survey Date	Depth (cm)	SWE (mm)	Density (%)
Camp Station (728 masl)	2009	21/04/2009	69	112	16%
	2010	31/03/2010	50	99	20%
		21/04/2010	69	112	16%
	2011	28/03/2011	55	93	17%
	2012	20/03/2012	78	161	21%
		20/04/2012	56.4	79	14%
	2013	02/03/2013	60.9	108.3	18%
		02/04/2013	59.3	108.4	18%
		05/05/2013	57.6	106	18%
	2014	12/03/2014	56.8	126	22%
		02/04/2014	54.6	100	18%
	2016	02/03/2016	53	118	22%
		09/04/2016	38	140	37%
	2017	17/03/2017	50.9	89	17%
		13/04/2017	46	117	25%
		04/05/2017	7	28	40%
	2018	28/02/2018	53	100	19%
		04/04/2018	53.9	109	20%
	2019	02/03/2019	48.3	94	20%
		01/04/2019	25.3	72	31%
		30/04/2019	0	0	-
		16/05/2019	0	0	-
		01/06/2019	0	0	-
Ann Gulch (Snow Survey #2; 995 masl)	2013	20/02/2013	69.6	97.1	14%
		02/03/2013	66.9	115	17%
		02/04/2013	61.8	117.2	19%
		16/04/2013	62.2	85.1	14%
		03/05/2013	58	105.3	18%
	2014	12/03/2014	51	94	18%
		02/04/2014	46	98	21%
	2016	02/03/2016	52.6	117	22%
		09/04/2016	22.2	115	52%

Station	Year	Survey Date	Depth (cm)	SWE (mm)	Density (%)
	2017	17/03/2017	50.3	100	20%
		13/04/2017	30.1	82	27%
		04/05/2017	0	0	NA
HLF Station (1,078 masl)	2019	02/03/2019	56.2	119	21%
		02/04/2019	37.2	93	25%
		30/04/2019	31.7	71	18%
Potato Hills Station (1,420 masl)	2009	21/04/2009	126	410	33%
	2010	31/03/2010	103	278	27%
		21/04/2010	126	405	32%
	2011	28/03/2011	105	251	24%
	2012	20/03/2012	99	237	24%
		22/04/2012	117	262	22%
	2013	28/02/2013	95.6	184.9	19%
		03/04/2013	90	189.7	21%
		05/05/2013	116.8	166.5	14%
	2014	11/03/2014	97.5	276	28%
		02/04/2014	96.2	275	29%
		08/05/2014	69.6	258	37%
	2016	02/03/2016	95.4	214	22%
		10/04/2016	107.4	257	24%
		03/05/2016	95	226	24%
	2017	17/03/2017	84	206	25%
		13/04/2017	98	244	25%
		03/05/2017	89	236	27%
	2018	28/02/2018	85.1	203	24%
		04/04/2018	90.5	219	24%
		16/05/2018	80.7	226	28%
	2019	02/03/2019	78.7	205	26%
		01/04/2019	79.3	171	22%
		30/04/2019	91	200	22%
		16/05/2019	48.3	111	23%
		01/06/2019	0	0	-

NOTES:
1. Snow survey data for Potato Hills collected on 2012-03-20 is from the Stewart Gulch survey (Snow Survey #2) at 995 masl.
2. No snow surveys were conducted at site in 2015.
3. Snow survey data for Heap Leach Facility collected on 2019-04-02 from above and below the diversion ditch, respectively.
4. Snow survey data for Heap Leach Facility collected on 2019-04-30 from above the diversion ditch.

Continuous snow depth data has also been collected at the Camp climate station since 2012, as shown in Figure 2-3. The evolution of the snowpack for the 2012 to 2019 time-period shows the pack depth initial and appreciable accumulation through the months of November and December, typically reaching maximum depth by mid-March each year. These data then show snowpack depth remains deep and relatively stable to April.

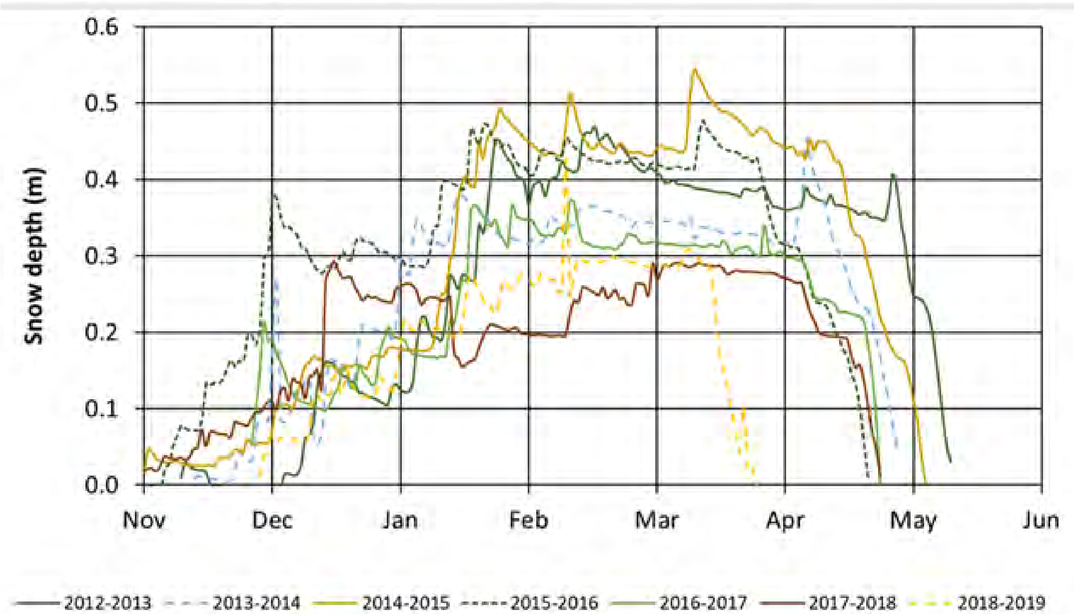


Figure 2-3: Summary of Continuous Snow Depth Data for the Camp Climate Station (2012-2019)

2.5 WIND SPEED AND DIRECTION

Wind speed and direction are measured on-site at the Potato Hills and Camp climate stations at 15-minute intervals and data are available for the period from August 2007 through December 2019 and August 2009 through December 2019, respectively. The Project site wind speed data are presented in Table 2-6.

The mean annual wind speed for Potato Hills and Camp is 2.4 m/s (9 km/hr) and 1.2 m/s (4.7 km/hr), respectively. The mean monthly wind speeds for both stations are higher in the spring, summer and autumn and lower in the winter. The maximum recorded gust speed at the Camp station was 23.5 m/s over a 15-minute interval (August 15, 2016). At the Potato Hills station, wind speeds averaged 23.5 m/s over a 1-hour period (November 3, 2010; 15-min maximum gust of 23.9 m/s). The predominant wind direction for Potato Hills and Camp is from the west-northwest and north to north-northwest, respectively.

Table 2-6: Project Site Monthly Average Wind Speed

Climate Station	Wind Speed (m/s)													
	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Camp Station (782 masl)	2009	-	-	-	-	-	-	-	1.4	1.2	1.2	1.1	0.7	-
	2010	1.2	1.1	2.2	2.0	1.9	1.5	1.4	1.3	1.5	1.2	0.7	1.0	1.4
	2011	0.6	1.2	1.3	1.8	1.7	1.5	1.3	1.2	1.4	0.9	0.9	0.2	1.2
	2012	0.9	1.2	1.6	1.4	1.9	1.3	1.4	1.3	1.5	1.1	1.3	0.7	1.3

Climate Station	Wind Speed (m/s)													
	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	2013	0.8	0.9	1.2	2.2	1.5	1.7	1.5	1.3	1.6	0.8	0.7	0.7	1.2
	2014	0.1	0.8	1.3	1.5	1.8	1.6	1.5	1.2	1.2	1.3	0.9	0.5	1.2
	2015	0.2	0.3	1.1	1.4	1.6	1.6	1.2	1.2	1.3	1.1	0.7	0.0	1.0
	2016	0.7	0.7	1.4	1.5	1.7	1.5	1.2	1.3	1.2	1.2	0.5	0.5	1.1
	2017	R	R	1.6	1.7	1.6	2.1	1.3	1.2	1.0	0.8	0.5	R	-
	2018	0.5	0.7	1.3	1.7	1.5	1.5	1.5	1.4	1.4	1.1	0.7	0.8	1.2
	2019	0.3	0.8	1.3	1.8	1.7	1.8	1.5	1.5	1.2	1.0	1.0	1.1	1.3
	Average	0.6	0.9	1.4	1.7	1.7	1.6	1.4	1.3	1.3	1.1	0.8	0.6	1.2
Potato Hills Station (1420 masl)	2007	-	-	-	-	-	-	-	2.3	2.3	3.0	3.0	0.8	-
	2008	2.8	3.7	3.6	3.6	3.6	3.1	3.1	2.8	1.7	1.3	2.6	3.1	2.9
	2009	3.2	2.5	3.2	3.0	3.1	2.7	2.9	2.0	2.0	3.4	2.3	2.1	2.7
	2010	2.1	2.1	3.9	3.6	2.7	2.0	2.6	2.7	3.0	2.8	1.5	1.0	2.5
	2011	2.0	3.2	3.4	3.2	3.4	2.0	1.8	2.3	1.2	0.4	2.0	1.4	2.2
	2012	0.0	0.2	1.4	2.0	2.9	1.8	1.9	2.0	2.9	2.5	2.6	0.7	1.7
	2013	1.7	0.7	2.9	4.8	2.6	2.3	2.5	1.8	2.9	2.2	2.1	2.2	2.4
	2014	1.6	2.6	2.5	3.0	2.7	M	M	M	M	M	M	M	-
	2015	M	M	M	M	M	M	0.9	1.8	2.5	1.4	0.0	0.0	-
	2016	1.3	2.7	2.8	M	M	M	M	2.1	2.1	1.6	1.3	0.6	-
	2017	2.2	2.8	2.5	3.1	2.6	2.5	M	M	M	M	1.6	1.0	-
	2018	2.8	2.7	2.7	3.2	M	M	M	M	M	2.5	0.7	M	-
	2019	0.7	M	3.0	3.1	M	2.8	2.0	M	M	M	M	M	-
	Average	1.9	2.3	2.9	3.3	3.0	2.4	2.2	2.2	2.3	2.1	1.8	1.3	2.4

Notes:

1. Zero value for January 2012 is likely due to icing of the wind sensor.
2. ‘M’ denotes data missing when there are less than 25 days per month due to a sensor malfunction and R an indicator the wind sensor affected by rime.

2.6 RELATIVE HUMIDITY

Relative humidity is measured on-site at the Potato Hills and Camp site climate stations and data are available for the period from August 2007 through December 2019 and August 2009 through December 2019, respectively. The mean annual relative humidity for Potato Hills and Camp is 77% and 70%, respectively. The mean monthly relative humidity values for Potato Hills are lowest in the spring (60% to 74% in the months of March through May) and higher throughout the rest of the year (65% to 89% in the months of June through February). The mean monthly relative humidity values for Camp are lowest in the spring (55% to 64% in the months of March through May) and higher throughout the rest of the year (61% to 80% in the months of June through February). All monthly average relative humidity values from both climate stations are provided in Figure 2-4.

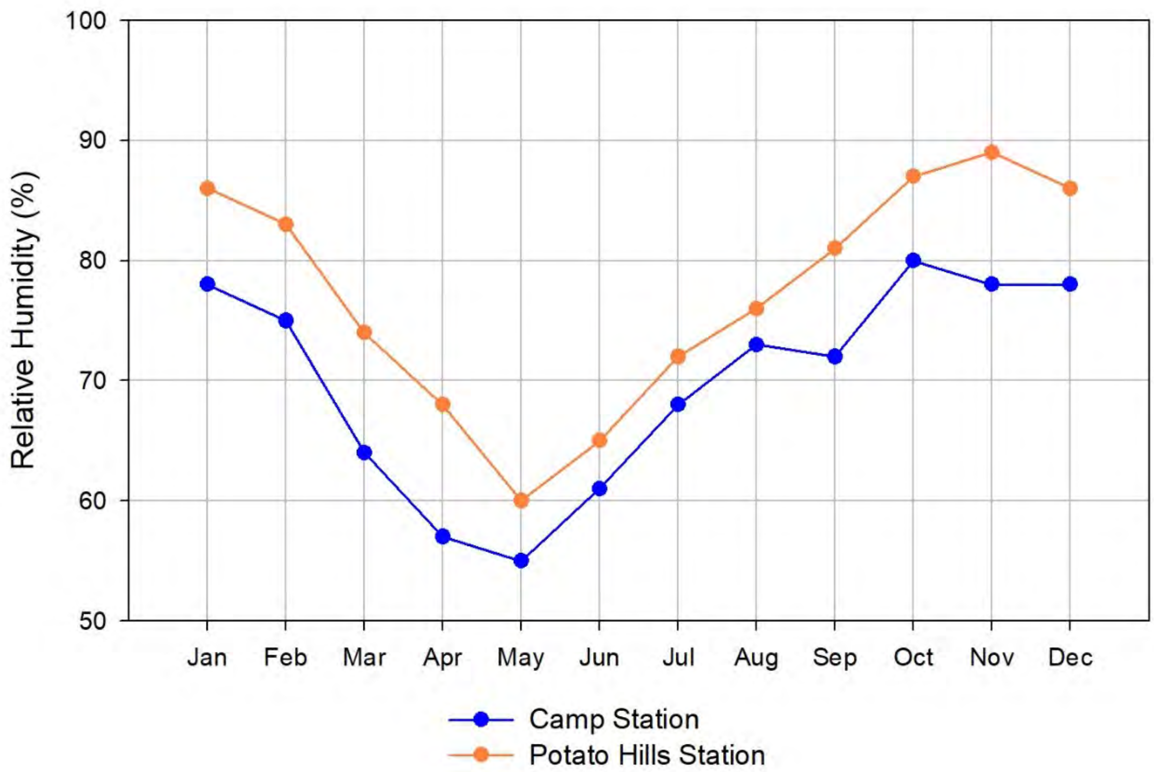


Figure 2-4: Average Monthly Relative Humidity for the Period of Record

2.7 BAROMETRIC PRESSURE

Barometric pressure is measured on-site at the Potato Hills and Camp site climate stations and data are available for the period from August 2007 through December 2019 and August 2009 through December 2019, respectively. Average barometric pressure data are collected on hourly increments at each of the project climate stations. Annual average barometric pressure is 84.9 kPa at the Potato Hills station, and 91.9 kPa at the Camp station. Barometric pressure tends to be highest in summer (May through August) with 85.6 kPa and 92.2 KPa recorded at the Potato Hills and Camp stations respectively and lowest during November, with 84.5 kPa and 91.6 kPa recorded at Potato Hills and Camp stations, respectively.

2.8 SOLAR RADIATION

Solar radiation is measured on-site at the Potato Hills and Camp site climate stations and data are available for the period from August 2007 through December 2019 and August 2009 through December 2019, respectively. Given the high-latitude location of the Project site, day length, and therefore solar radiation, fluctuate greatly on a seasonal basis. The average annual minimum of 1 W/m^2 (Camp station) and 3 W/m^2 (Potato Hills station) occur in the month of December, while the average annual maximum of 209 W/m^2 and 224 W/m^2 occur in June the

Camp station and in May at the Potato Hills station, respectively. The Camp station location in the valley bottom results in slightly lower incident solar radiation, presumably due to the shading effect of the surrounding terrain.

2.9 POTENTIAL EVAPORATION

15-minute potential evaporation (PE) rates were computed for the Camp station using available climate and the Ref-ET calculator – a compiled, stand-alone computer program that calculates reference evapotranspiration (ASCE, 2005). For the period of available record (Jan 2013 to Dec 2019), a 15-minute climate input file was prepared for the Eagle Gold site (Lorax, 2020b). May to end-September PE for the Camp station is estimated to range from 367-448 mm with the Penman-Monteith equation resulting in average PE estimates ~4% mm higher than PE calculated using the Priestley-Taylor equation. The highest monthly rates of PE are expected in May, June, July and August of each year.

2.10 AIR QUALITY

Three Beta-Attenuation Particulate Monitors (EBAMs) are installed west of the camp. The EBAM system includes real time data transmission that can be monitored remotely with daily summaries automatically generated by the associated software platform. In addition, site personnel complete routine checks and monthly maintenance. Routine measurements are taken on 15-minute intervals for Total Suspended Particulates (TSPs), Fine Particulate Matter ($PM_{2.5}$) and Coarse Particulate Matter (PM_{10}).

Annual averages have been calculated from the data covering the time period January 1 to December 31, 2019. All measured air quality particulates were below the annual average outlined by the YAAQS. Daily recorded air quality results are summarized and compared to the Yukon Ambient Air Quality Standards (YAAQS) in Table 2-7 and shown in Figure 2-5. There were three short-lived occurrences in May and June of TSP exceeding the 24hr standard. There were also six short-lived exceedances of the 24hr YAAQS for $PM_{2.5}$, once each in May and July, and then for a short stretch of multiple days in September. PM_{10} results displayed five short-lived occurrences of 24hr YAAQS exceedances, once in May (the same day that measured an exceedance of TSP), then the same days in September that measured exceedances in $PM_{2.5}$. The May and July exceedances were associated with construction activities during exceptionally dry periods and the September exceedances were related to forest fires in the Project area.

Table 2-7: Daily Air Quality Results Compared to the Yukon Ambient Air Quality Standards

Contaminant	Annual Ambient Air Quality Objectives (µg/m³)	Results			24hr Ambient Air (µg/m³)	No. of Exceedances
		Min	Max	Mean		
TSP	60	0	273.4	21.36	120	6
$PM_{2.5}$	10	0	12.71	1.19	28	0
PM_{10}	*	4.99	174.48	7.91	50	4

NOTE: *No Annual Ambient Air Quality Objectives outlined in the Yukon Standard.

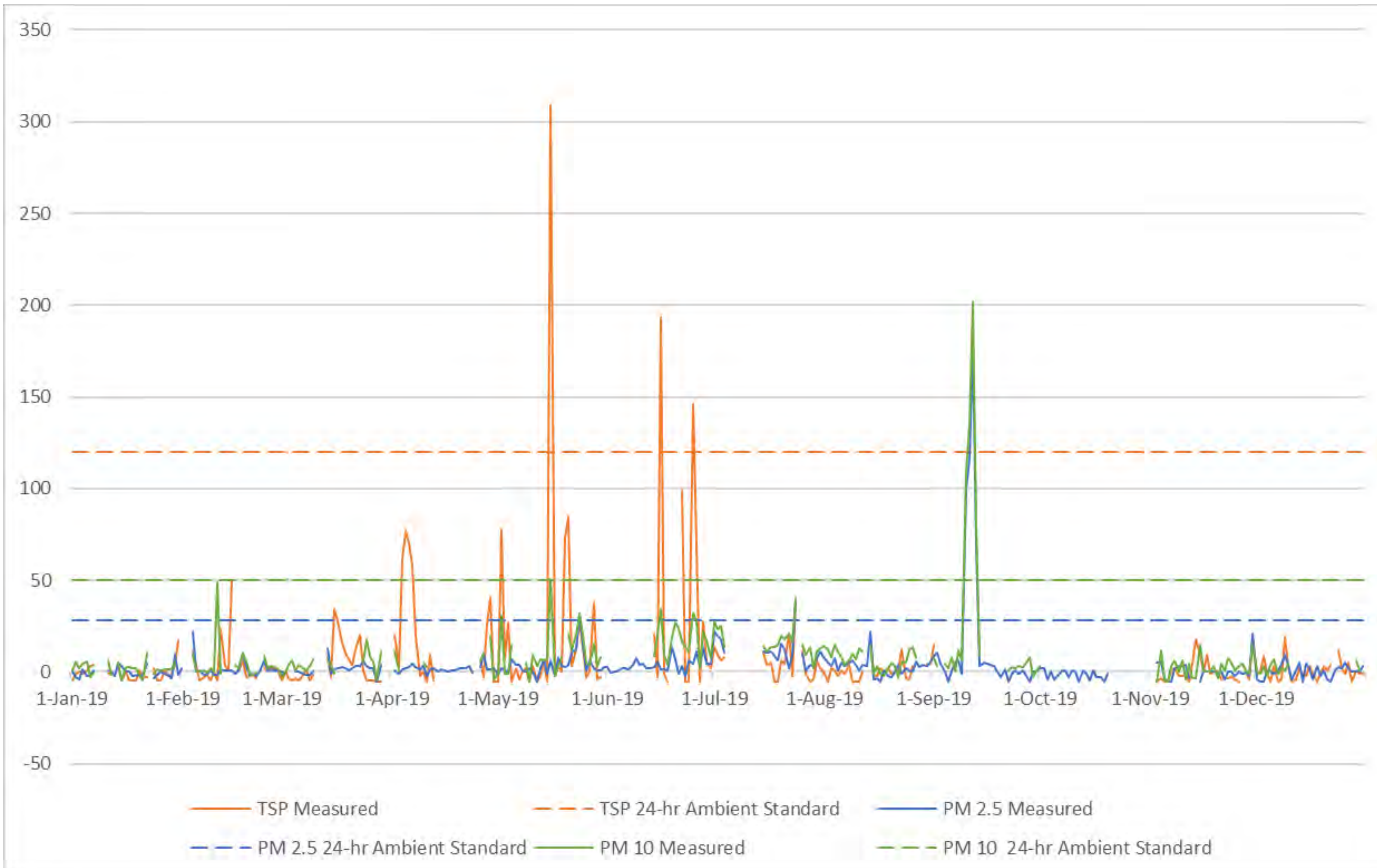


Figure 2-5: TSP, $PM_{2.5}$ and PM_{10} Monitoring Results 2019 in ug/m^3

3 GEOLOGY AND SOILS

3.1 PHYSIOGRAPHY

The Project is situated within the Yukon Plateau North Ecoregion. Nearly all terrain in the ecoregion lays above 900 masl, with the majority between 1,200 and 1,700 masl. The majority of the Project site lies within the Dublin Gulch watershed which flows into Haggart Creek and eventually feeds into the McQuesten River. Elevations in the vicinity of the Project range from approximately 730 masl near the confluence of 15 Pup and Haggart Creek, to about 1,525 masl at the summit of the Potato Hills which forms the eastern boundary of the Dublin Gulch watershed. The Ecoregion is broken into tablelands by a network of deeply cut broad valleys. While some of these tablelands are remarkably level and non-dissected, with streams flowing at relatively gentle gradients in open valleys, the areas north of the McQuesten River, do not share these features. Instead the majority of the Project area was un-glaciated during the last glacial period (Bostock 1965), and has not been glaciated for more than 200,000 years (Figure 3-1). Much of the Project area displays physiographic characteristics of the unglaciated areas of the region, with narrow, V-shaped valleys and rounded upland surfaces. The valleys are deep and narrow to the head of streams, where they rise steeply and end abruptly.

Despite the extensive time since glaciations, evidence of glacial–ice action is still visible. This historic glaciation is responsible for the formation of the tributaries of Dublin Gulch with cirque-like headwaters, including from east to west, Cascallen, Bawn Boy, Olive, Ann, Stewart, Eagle, Suttles and Platinum Gulches (Figure 3-1). Within these gulches the post-glacial terrain has been modified by gravity, water, and freeze-thaw mechanics, as evidenced by many headscarps of ancient landslides, and observed rock and debris slides. While most of the mass wasting is historic, there are a few areas of ongoing rock fall that continue to modify the terrain, particularly in the Stewart, Bawn Boy, and Olive Gulches. These active areas of rock fall exist generally in the eastern portion of the Local Study Area and outside of the Project area.

3.2 SURFICIAL GEOLOGY AND SOILS

3.2.1 Surficial Geology

The surficial geology of the Project area has been substantially affected by historic glaciation over 200,000 years ago, including two major glaciation episodes in the Quaternary period; the pre-Reid (~2.5Ma-400ka BP) and the Reid (~200 ka BP) (Bond 1997; 1998a; b). Glacial limits are provided in Figure 3-1. In each case, ice likely originated from the Ogilvie and Wernecke Mountains, with glaciations being more extensive during the pre-Reid period.

Preservation of pre-Reid glacial deposits and landforms is rare. A few intact deposits and diorite erratics at high elevations are the only records left (Bond 1998a). Glacial deposits from the Reid glaciation are moderately preserved. Colluvium, alluvium, and small areas of shallow organics drape the Reid glacial sediments and the interglacial sediments throughout the area.

Dominant surficial materials within the Local Study Area (LSA) are weathered bedrock and colluvium. Competent bedrock outcrops are rare, as sufficient geologic time has passed to allow extensive weathering of exposed rock. In the larger RSA, the dominant material is colluvium, while along the McQuesten Road sections of the RSA, some of the surficial materials are largely coarse-textured fluvial deposits due to the proximity of the road to the river.

3.2.2 Soils

The largest influence on soil development in the area of the Project is climate, and the resulting permafrost which is discontinuous throughout the area. Despite over 200,000 years of soil development, pedogenic processes have been slow due to the cold climate and to the short growing season for vegetation, resulting in a predominance of ice-affected and relatively undeveloped soils (Cryosols and Brunisols).

Non-frozen soils encountered in the area of the Project include Brunisols, minor areas of Luvisols (on fine-textured till), and Gleysols (on poorly and imperfectly drained materials). The majority of the soil textures in the area are sandy-silt to silty-sand loam matrix with angular or tabular coarse fragments ranging from gravels to boulders.

Rooting depths are on average 50 cm, but can reach depths of over 120 cm. Baseline arsenic levels are naturally high in the soil as arsenic is often associated with gold bearing anomalies in the region reflecting the natural mineralization of the Project area. The naturally high arsenic concentrations in soils are not reflected as relatively high in the plant tissues and do not limit soil reclamation suitability. This incongruity may be related to the bioavailability associated with arsenic speciation (Laberge, 2019).

Results from the recent soils monitoring programs indicate that, consistent with prior characterization programs, the soils at the Project are relatively nutrient poor. The soil samples were also analyzed for pH and a suite of 36 metals. The soil was alkaline (8.23) at D2B, located upslope of the camp climate station and slightly acidic at D-4B (6.00) located on the west side of the site access road upstream of the Haggart Creek culvert crossing. Of the 36 elements analyzed, boron and tin were not detected. With the exception of arsenic (and only at D2B) all metals were below CCME guidelines and Yukon Contaminated Sites Regulations as shown in Table 3-1 (Laberge 2019).

Table 3-1: Results of Soil Monitoring Compared to CCME and Yukon CSR

Element	CCME (mg/kg)		Yukon CSR (mg/kg)		D2B	D4B
	Agriculture	Parkland	Agriculture	Parkland		
Antimony (Sb)	20	20	20	20	2.32	3.44
Arsenic (As)	12	12	15	15	32.8	5.17
Barium (Ba)	750	500	750	500	348	327
Beryllium (Be)	4	4	4	4	0.31	0.30
Cadmium (Cd)	1.4	10	1.5	1.5	0.380	0.418
Chromium (Cr)	64	64	50	60	18.8	6.18
Cobalt (Co)	40	50	40	50	8.81	3.86
Copper (Cu)	63	63	90	90	27.9	25.9
Lead (Pb)	70	140	100	100	12.6	8.43
Mercury (Hg)	6.6	6.6	0.6	15	0.0329	0.146
Molybdenum (Mo)	5	10	5	10	1.01	0.66
Nickel (Ni)	45	45	150	150	24.3	12.8
Selenium (Se)	1	1	2	1	0.32	0.86
Silver (Ag)	20	20	20	20	0.15	0.58

Element	CCME (mg/kg)		Yukon CSR (mg/kg)		D2B	D4B
	Agriculture	Parkland	Agriculture	Parkland		
Thallium (Ti)	1	1	2	-	0.088	0.054
Tin (Sn)	5	50	5	50	<2.0	<2.0
Uranium (U)	23	23	-	-	0.600	0.998
Vanadium (V)	130	130	200	200	33.8	8.55
Zinc (Zn)	250	250	150	150	66.8	20.3

NOTES:
Source Laberge 2019; ND=not detected.

3.2.3 Permafrost

The project site is located in a region of widespread discontinuous permafrost (Brown, 1979). On the regional scale, permafrost distribution is typically controlled by mean annual temperature and precipitation, whereas on a local scale it is controlled by vegetation, surface sediments, soil moisture, slope aspect, and snow depth. Within the project area, frozen ground occurs typically on north- and east-facing slopes at higher elevations, and within poorly drained areas lower in the valleys. The distribution and thickness of frozen ground is highly variable across the site.

Frozen ground, when observed, is generally encountered immediately below the organic cover. Ground temperatures have been measured with thermistors installed on site in 1995-1996, and 2009-2012. The measured ground temperatures showed the frozen ground to be relatively warm when observed, typically between 0°C and -1°C.

Detailed investigations into the presence, distribution, thickness and temperature of permafrost across the project site and in specific areas where development could occur were conducted in 1995 (Knight Piesold 1996a and 1996b), 1996 (Sitka Corp, 1996), and from 2009 to 2013. Results of these more recent studies are described and summarized in BGC (2010, 2011, 2012a, 2012b, 2012c and 2012d). A total of thirteen thermistor strings were installed in test holes around the site between 2009 and 2019 and continue to be monitored as part of the EMSAMP.

3.3 BEDROCK GEOLOGY

3.3.1 Regional Geology

The Eagle Gold deposit is located within the Tintina Gold Province, an area of more than 150,000 km^2 covering parts of Alaska and the Yukon (Figure 3-2). The TGP is defined by more than 15 individual gold belts and districts traditionally mined for their placer resources and more recently recognized for their lode gold potential. Technological advances in heap leach mining have allowed for economically successful recovery of gold at sub-arctic operations such as Fort Knox and Brewery Creek (SRK 2014). The geology of the Eagle Gold Project is provided in a number of references including that of Brown et al. (2001), Goldfarb et al. (2007), Wardrop (2009).

The Project is underlain by Proterozoic to Lower Cambrian-age Hyland Group metasediments and the Cretaceous intrusive Dublin Gulch granodioritic stock. The granodiorite stock is elongate, measuring approximately 5 km in length and trends 070°. It has a maximum width of approximately 2 km. The long axis of the stock is coincident with the axis of the interpreted Dublin Gulch anticline. Sheet-like sills of granodiorite extend from the stock and cut the metasedimentary strata at low angles (Figure 3-3).

The stock has been dated at approximately 93 million years, and is therefore a member of the Tombstone Plutonic Suite. The Hyland Group is composed of interbedded quartzites and phyllitic metasedimentary rocks. The quartzites are variably gritty, micaceous, and massive. Phyllitic metasediments are composed of muscovite-sericite and chlorite. Limestone units are a relatively minor constituent of this stratigraphic sequence and are not significant in the contact zone around the Eagle deposit. The metasedimentary rocks dip at various angles, although all generally dip to the North. Hyland Group rocks take on a more easterly and steeper dipping orientation north of an as yet undefined structure, probably a fault, which runs along the course of Dublin Gulch. Some vein associated mineralisation is found in the Hyland Group but again not in significant amounts in the area local to the Eagle Zone.

The Dublin Gulch stock is comprised of four phases, the most significant of which is granodiorite. Quartz diorite, quartz monzonite, leucogranite and aplite comprise younger intrusive phases that occur predominantly as dikes and sills and cut both the granodiorite and surrounding country rocks. The stock has intruded the Hyland Group metasediments near their contact with the underlying Upper Schist.

Mineralisation in the Eagle Zone consists of sheeted quartz vein systems of differing densities which host gold. Additional to this, disseminated, lower grade gold is found throughout the intrusive body and is associated with arsenopyrite mineralisation, with minor pyrite/pyrrhotite. A model for the mineralisation style was published by Craig Hart in 1999 which describes a ‘Reduced Intrusion-Related Gold System (RIRGS) which also applies to the Fort Knox deposit in Alaska.

3.3.2 Deposit Geology

Geologically the deposit can be simplified and described as an intrusive suite, predominantly granodiorite in composition, emplaced within a metasediment package, predominantly phyllitic in nature. The granodiorite has been subdivided into three units, an oxidized unit, an altered unit, and an unaltered unit. Alteration tends to be dominated by albite, potassium feldspar, sericite, carbonate and chlorite and only occurs very locally around veining. While mineralization is associated with the intrusive stock, it is not spatially limited to the intrusive. Gold-bearing veins are found in all of the main geological units including the metasediments.

Gold occurs primarily as pure gold in association with very small amounts of metallic bismuth (Bi) and arsenopyrite (FeAsS). Other vein minerals include pyrite/marcasite (FeS_2) > pyrrhotite ($Fe_{1-x}S$) >>sphalerite ([Zn,Fe]S), chalcopyrite ($CuFeS_2$), galena (PbS), molybdenite (MoS_2) and iron oxides/hydoxides as well as metallic bismuth, Pb-Sb-(Cu,Zn) sulphosalts (e.g. bournonite ($PbCuSbS_3$) and boulangerite ($Pb_5Sb_4S_{11}$) and tetrahedrite ($Cu_{12}Sb_4S_{13}$).

3.3.3 Geochemical Characterization

Bedrock

Acid rock drainage and metal leaching (ARD/ML) evaluations to support the environmental assessment and water licensing processes were initiated by SGC in 2007 and are described and summarized by SRK (2013 and 2014). Previous to that, a comprehensive characterization program was conducted by New Millennium Mining Ltd to support a Feasibility Study in 1995/1996 (Lawrence 1997).

The objectives of the characterization program were to provide an assessment of the geochemical behaviour of proposed facilities (i.e., waste rock piles, pit walls, and heap leach facility) associated with the Project and to support engineering decisions and mitigation measures as required. Specifically, for each of these site components, the program focused on the quantification, description and assessment of:

- acid generation and neutralization potential,
- solids metal chemistry,
- mineralogy,
- metal leaching potential,
- rate of sulphide mineral oxidation,
- rate of depletion of neutralization potential,
- relative rate of depletion of neutralization potential compared to acid potential, and
- release rates of elements for input into water quality predictions.

Characterization of the metasediments and granodiorite indicated that carbonates, predominantly calcite, were generally well in excess of sulphides. Calcite content was generally 1 to 4% (from X-ray diffraction) whereas sulphur was most often less than 0.5% (from Leco S and ICP-S). Static testing showed a strong propensity towards non-acid generating conditions with the large majority of samples tested having a neutralization potential to acid potential ratio above 4. Acid rock drainage, or ARD, is therefore not anticipated for the Project.

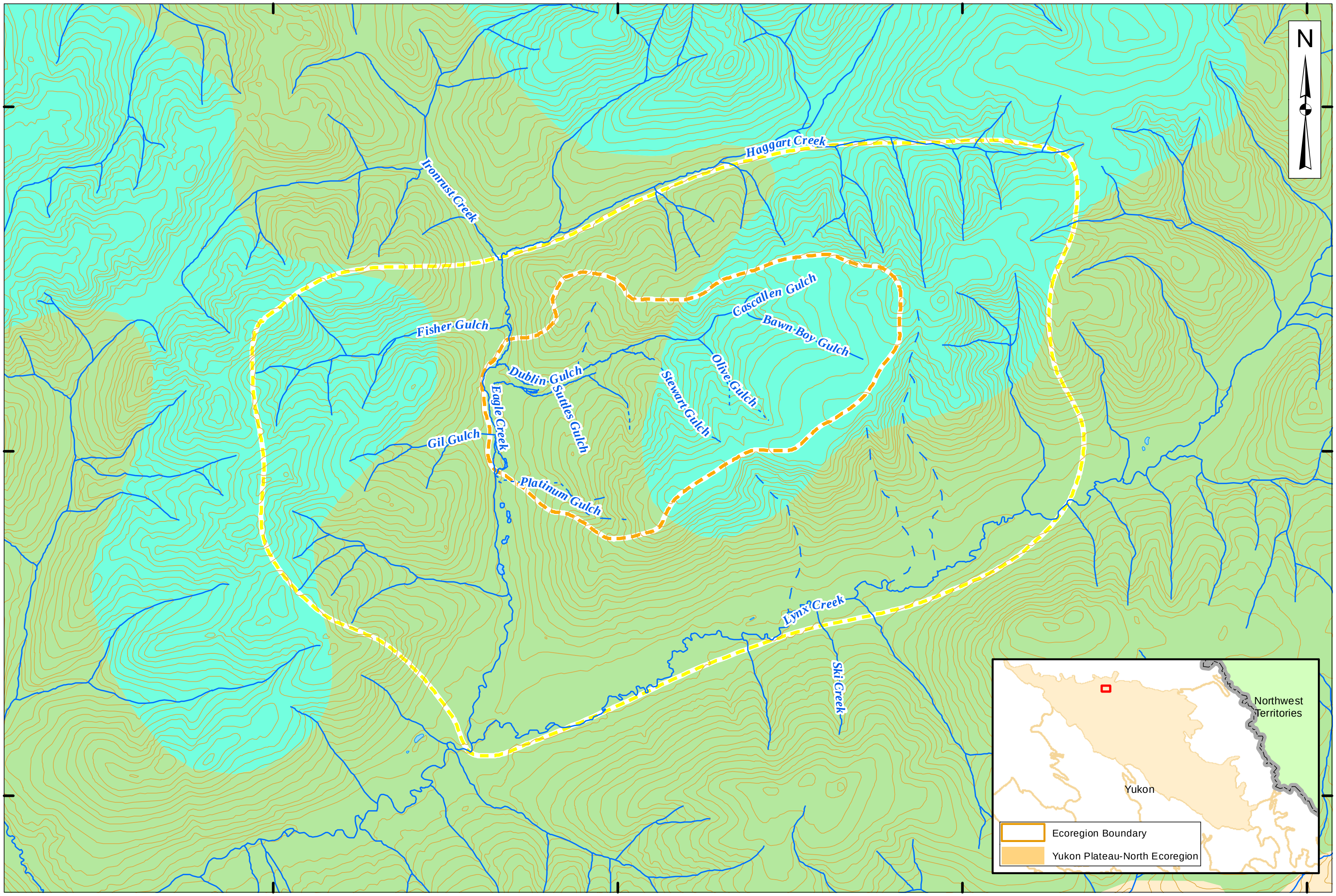
Kinetic testing based on humidity cell testing and a field barrel program indicate that, although pH conditions are expected to be neutral, some metal leaching may still occur. This may include leaching of sulphate, arsenic, cadmium, manganese, antimony, selenium and uranium, and potentially fluoride, iron, lead, molybdenum, and zinc.

Construction Materials

In total, 72 samples were collected and analyzed for characterizing the geochemistry of proposed excavation areas and borrow sources during baseline characterization programs. This included 32 samples from the proposed site roads, 19 from placer tailings and alluvium borrow sources, and 19 from potential cut and fill (excavation) areas. Most of these samples (n=66) were from surficial materials, five were from metasedimentary bedrock, and one was from a granodiorite outcrop.

The paste pH for the samples ranged from 4.6 to 8.6 (median values of 6.6). The samples typically had low sulphur and low NP and TIC levels. This is in contrast to the characterization work from the deposit area that states NP in the form of carbonate minerals was present in modest amounts throughout the deposit area (SRK 2010). Based on having a sulphur content of <0.02%, 65% of samples were considered non-reactive. For the remaining samples, based on NP/AP or TIC/AP ratios, 7 to 14% were PAG, 11 to 14% had an uncertain potential for ARD, and 10 to 14% were non-PAG.

During construction activities in 2018 and 2019, 26 and 14 samples, respectively, were collected from various borrow locations to determine if the materials met the geochemical criteria established by the regulatory approvals for construction grade rock. All samples collected met the criteria required for construction or fill purposes, with a pH of at least 5.0, an NP:AP ratio of at least 3:1, and a total sulphide sulphur content of no greater than 0.3%. Samples ranged in pH from 6.6 to 9.2, with a median of 8.1 in 2018 samples and 8.4 in 2019 samples, with Sulphur content ranging from non-detect at < 0.01% to 22% in 2018 samples 0.04% in 2019 samples and a median of 0.02 in 2018 samples and 0.025 in 2019 samples.



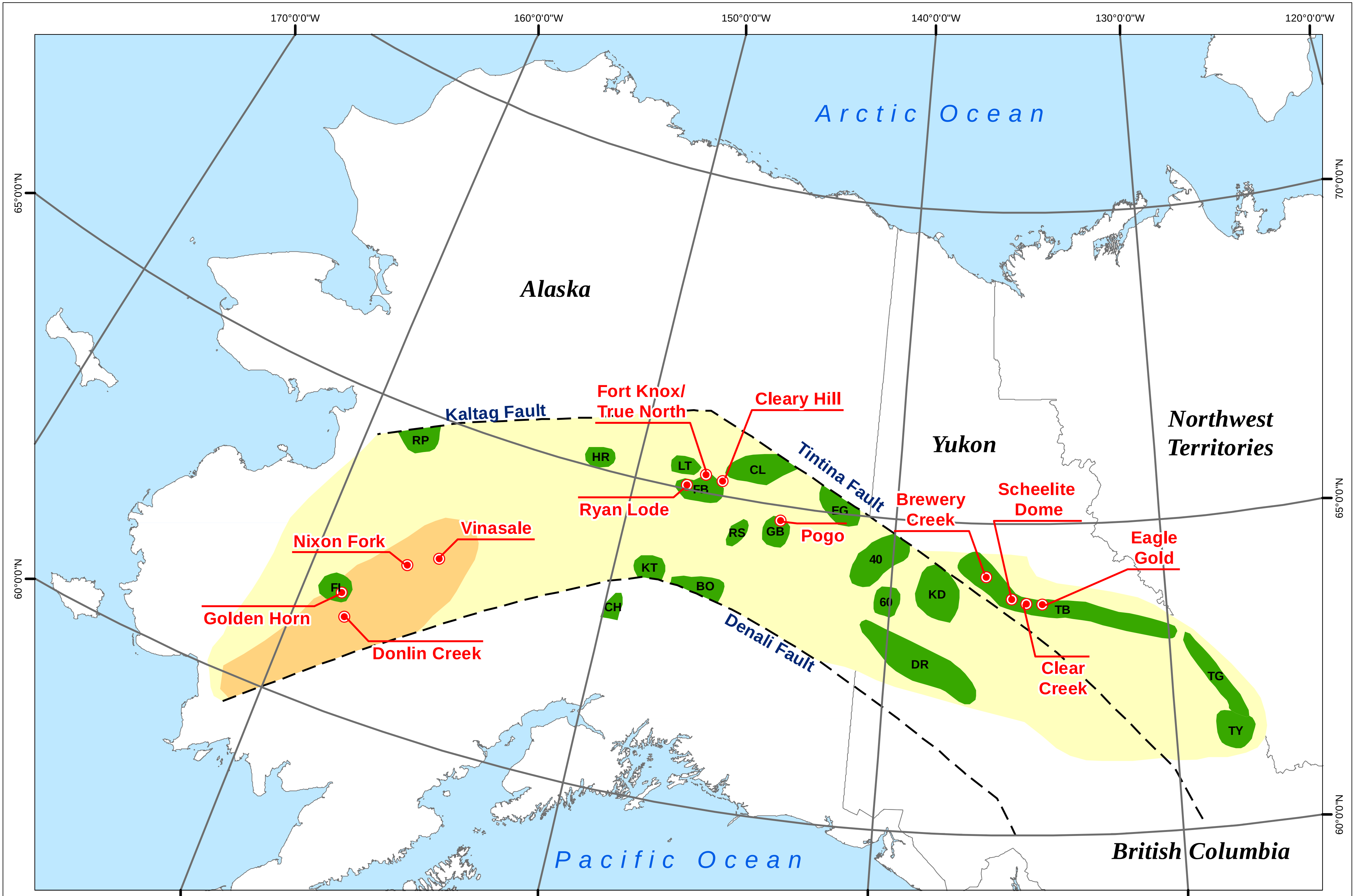
Legend:

- 200 Thousand years ago (Reid Glaciation)
- 3 Million years ago (Pre-Reid Glaciation)
- Soils and Vegetation Local Study Area
- Soils and Vegetation Regional Study Area
- Contour (100ft)
- Perennial
- Ephemeral
- Intermittent

VICTORIA GOLD CORP

0 0.5 1 2 Kilometres

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date:	Figure:	Regional and Local Study Areas with Glacial Limit Extents
2020/06/01	3-1	



Legend:

Major Mineral Deposit

Kuskokwim Basin

Major Geologic Fault System

Tintina Gold Belt

Mining or Placer District

VICTORIA GOLD CORP

0 50 100 200 Kilometers

Projection:

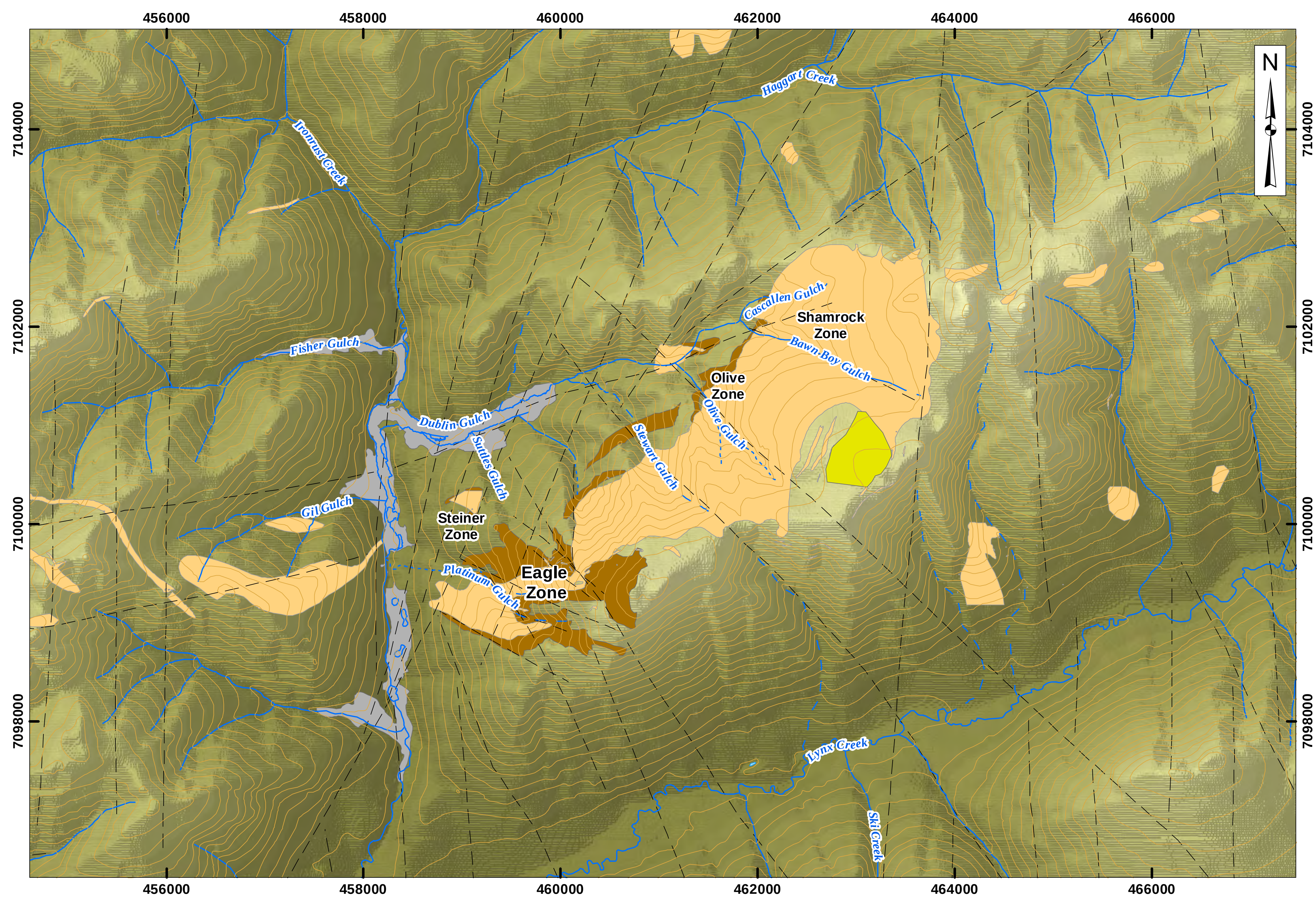
Drawn By: HC

Date: 2020/06/01

Figure: 3-2

EAGLE GOLD PROJECT YUKON TERRITORY

Main Gold Districts of the Tintina Gold Province



Legend:

Granodiorite	Placer Workings	Perennial Stream
Hornfels	Interpreted Geologic Fault	Ephemeral Stream
Wolf Tungsten Deposit	Contour (100ft)	Intermittent Stream

VICTORIA GOLD CORP

0 0.25 0.5 1
Kilometres

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date: 2020/06/01	Figure: 3-3	Eagle Gold Project Property Geology

4 GROUNDWATER

Hydrogeologic baseline characterization studies conducted from 2009 to 2012 are described and summarized in Stantec (2011a and 2012c) and BGC (2013a). Previous hydrogeologic investigations conducted in 1995 and 1996 (GeoViro 1996 and Knight Piesold 1996a, 1996b, and 1996c) are also summarized in Stantec (2011a and 2012c) and BGC (2013a). Material property data available for the Project comprises results of packer tests, slug tests and pumping tests from drilled bore holes and wells at site. Hydraulic head data (instantaneous and continuous[1]) has been collected from 104 monitoring wells, standpipe piezometers, vibrating wire piezometers, and aquifer test wells located across eight different sub-basins that include Bawn Boy Gulch, Olive Gulch, Stewart Gulch, Eagle Pup, Suttles Gulch, Platinum Gulch, Dublin Gulch, and Ann Gulch. In addition, since 2009 water quality data has been collected on a regular basis from site monitoring wells in these same sub-basins. The groundwater level and groundwater quality data collection program that began in 2009 is still on-going.

The data obtained has been used to identify local groundwater recharge and discharge zones, groundwater flow patterns, characterize groundwater quality and to conduct an initial numerical hydrogeological model (BGC, 2014) that was updated in 2019 (BGC, 2019).

4.1 HYDROGEOLOGIC SETTING

There are two principal water-bearing units in the Project area: deeper relatively low permeability bedrock and the near-surface moderately permeable surficial deposits.

Surficial materials at the site comprise a thin layer of overburden (typically less than 10 m thick) that is generally composed of a thin veneer of colluvium in the uplands, while alluvium and reworked placer tailings dominate in the valley floors. Deposits along the lower Dublin Gulch valley generally wary from 0 to 30 m thick between Eagle Pup and Haggart Creek. Discontinuous, relatively warm (typically 0° to -10° celsius) permafrost is present on northeast to northwest facing slopes with a highly variable distribution in the overall area. Because of its discontinuous nature, permafrost is assumed to have limited influence on the groundwater flow system. The bedrock of the project area can be broadly divided into the Hyland Group metasediments and intrusive rocks of the Dublin Gulch stock.

Results from hydrogeologic tests conducted in the bedrock to date show that the hydaulic conductivity of the intrusive and metasediment units is generally similar and assoicated with fractures, although considerable variation in results is apparent for each unit at any given depth (i.e., 2 to 4 orders of magnitude). Meaured hydraulic conductivity ranges from $3x10^{-5}$ to $4x10^{-3}$ m/s in placer and fluvial overburden materials, and $4x10^{-7}$ to $3x10^{-5}$ m/s for colluvium. Within bedrock, hydraulic conductivity estimtes from site data range from $2x10^{-6}$ to $2x10^{-8}$ m/s and exhibit a decreasing trend with depth. Specific storage estimated from pumping tests ranged from $8x10^{-6}$ m^{-1} to $1x10^{-5}$ m^{-1} for bedrcok and from approximately $3x10^{-5}$ m^{-1} to $6x10^{-3}$ m^{-1} for overburden (BGC, 2019).

Further details of the spatial distribution and characteristics of these materials are found in Stantec (2010d) and BGC (2014, 2019).

[1] In addition to the four to five months in 2010, continuous hydraulic head has been collected from nine wells since May 2011

4.2 GROUNDWATER OCCURRENCE

Generally, groundwater has been observed deeper (approximately >6 m below ground) at higher elevations and shallow to artesian in lower elevations and in valley bottoms. Springs and seeps have been observed in a few locations where valley bottoms have narrowed. These are typically associated with the re-emergence of a stream from channel deposits (i.e., a gaining reach). In these instances (e.g., Eagle Pup, Stewart Gulch), thin alluvium overlying shallow bedrock is the likely cause of the emergence. Groundwater levels within the lower Dublin Gulch valley have been observed to have seasonally delayed trends due to higher groundwater levels during spring freshet and/or associated with rainstorms and lower groundwater levels during dry summer periods.

Groundwater elevation data exhibit common seasonal trends in all monitored locations, characterized by relatively high-water levels corresponding to spring freshet and fall precipitation events, and relatively low water levels related to dry summer and frozen winter conditions. Small but discernible responses to precipitation events were observed in all monitoring well records.

Hydraulic head observations were available from vibrating wire piezometers (VWP) and monitoring wells, pumping wells or standpipe piezometers installed between 1995 and 2019 (Figure 6.2-1). Data collection at a portion of these locations is still ongoing, both manually and with dataloggers.

Based on the available data, the water table is generally shallow (within 10 m of ground surface) at low elevations near the valley bottoms and along creeks and gulches. At ridge tops within the Project area the water table is typically deeper with measured water depths up to 40 m below ground surface. The interpreted piezometric surface appears to generally mimic the surface topography.

The measured values indicate that seasonal fluctuations in groundwater elevation range from less than 2 m near creeks (e.g., MW10-DG6, MW09-DG4, VWP nest BH-BHC11-68), gulches and at low elevations in the valleys, and up to 4 to 15 m in higher elevation ridges (e.g., MW96-9b, VWP nest BH-BGC11-73).

Continuous head data indicate that groundwater elevations decline through the winter and spring (i.e. November to April), and are highest during the summer and fall quarter (i.e. June to September). The seasonal variation in groundwater levels is consistent with the seasonal precipitation and temperature trends. Groundwater levels recorded in 2019 reflect similar trends to previous years; however, for almost all the wells, groundwater levels (i.e., peaks associated with freshet melt and summer baseline) were measurably lower in 2019 than previously measured. This likely reflects the lower snow volumes recorded in early 2019, and the lack of summer rainfall.

4.3 GROUNDWATER FLOW

Groundwater flow in the bedrock occurs in fractures and fault zones, while preferentially flowing through more permeable (and porous) sediments within the surficial deposits. General orientation of groundwater flow contours mimic the topography of the site as groundwater flows from the highest areas to lowest. Throughout most of the Project area the groundwater divides of each sub-basin approximately coincide with the surface water divides (i.e., groundwater from the Eagle Pup and Suttles Gulch drain to Eagle Creek, while groundwater from Ann and Stewart Gulch Basins drain to Dublin Gulch). In the lower Dublin Gulch valley, the groundwater divide between the Eagle Creek and Dublin Gulch basins in the placer tailings is not clearly defined. Field observations suggest that at times the divide migrates across the valley so that groundwater from the Dublin Gulch basin may flow towards Eagle Creek. This shifting is seasonal and also due in part to the variability in the timing of the freshet and/or rainfall events across the entire watershed.

Groundwater recharge occurs at higher elevations throughout the Dublin Gulch-Eagle Creek drainage basin and ultimately discharges to surface water (in some cases as seeps and springs) at lower elevations in the valley or directly to surface streams, or ultimately into Haggart Creek. The main groundwater flow in conjunction with the highest groundwater elevations is expected to occur during the snowmelt in late spring (e.g., May to June) after thawing of the shallow sediment.

4.4 SURFACE WATER - GROUNDWATER CONNECTIVITY

Base flow values represent the groundwater contributions to streams. Groundwater contributes to stream flows where the groundwater table elevation intersects the ground surface, typically these intersections are located in stream channel inverts (e.g., Eagle Pup appears in mid-channel where the valley is well confined by bedrock); however, they also appear as seepage from slopes within the placer deposits of the lower Dublin Gulch valley. Groundwater from the lower Dublin Gulch valley likely contributes a measurable portion of the baseflow to Haggart Creek. The baseflow contributions to the streams maintain flow in the larger creeks during the drier months of the year (including winter flows).

4.5 GROUNDWATER FLOW PROPERTIES

The hydraulic conductivity of the colluvial, alluvial, and till deposits was generally higher than that of the placer material, and the variable hydraulic conductivity seen in the bedrock is typical of fractured crystalline rock, which showed decreasing hydraulic conductivity with depth. The test data did not demonstrate a measurable difference in the hydraulic conductivities of granodiorite and metasedimentary rock. This suggests that the flow properties of both rock types are similar.

The bedrock hydraulic conductivity dataset includes over 80 packer tests and slug tests conducted in over 50 boreholes and six pumping tests; two 24-hour duration tests carried out in the Open Pit area and in the upper reaches of Bawn Boy Gulch in 1996 (GeoViro, 1996), two pumping tests (a 7-day test in the lower Dublin Gulch valley and a 5-day test in the Open Pit area) carried out in 2011 (BGC, 2012e and 2012f), and a 10-day test in the lower Dublin Gulch valley in 2012 (BGC, 2013b). Results of the pumping tests are typically considered to be more representative of the larger scale (bulk) hydraulic conductivity of the rock mass. Results of the two GeoViro pumping tests at MW96-11 and MW96-19, conducted at depths less than 55 m yielded hydraulic conductivity values ranging from 3×10^{-7} m/s to 5×10^{-7} m/s. Mean results of the two pumping tests conducted in 2011 by BGC were 8×10^{-6} m/s in the lower valley (at PW-BGC11-01) and 9×10^{-8} m/s in the Open Pit area (at PW-BGC11-02) at depths up to 100 m and 140 m below ground, respectively. Results from the 2012 testing of PW-BGC12-04 in the lower Dublin Gulch valley bedrock aquifer are about an order of magnitude higher (9.0×10^{-5} m/s) than results from 2011 testing; however, these results are specific to an 18 m thick zone targeted by the well, whereas the 2011 well was tested over a thicker (37 m) zone.

Generally, the hydraulic conductivity of the intrusive units and metasediments is similar and tends to decrease with depth, although considerable variation in results is apparent for each unit at any given depth. The general trend of decreasing hydraulic conductivity is common in bedrock settings as described by Rutqvist and Stephansson (2003).

4.6 GROUNDWATER QUALITY

The groundwater quality data suggests that the chemical composition of groundwater in the Project area depends on the local and up gradient rock-types. Groundwater quality data collected in Eagle Pup, Dublin, Suttles, Ann, Stewart, Olive, Bawn Boy and Platinum Gulches. The dataset was used to characterize the groundwater quality in the Project area prior to construction (Core Geoscience Services, 2017). Box plots resulting from this characterization for all highlighted parameters, which provide a visual representation of the data and facilitate comparison between sub-basin data and site-wide data, are provided below in Figure 4-1 and Figure 4-2.

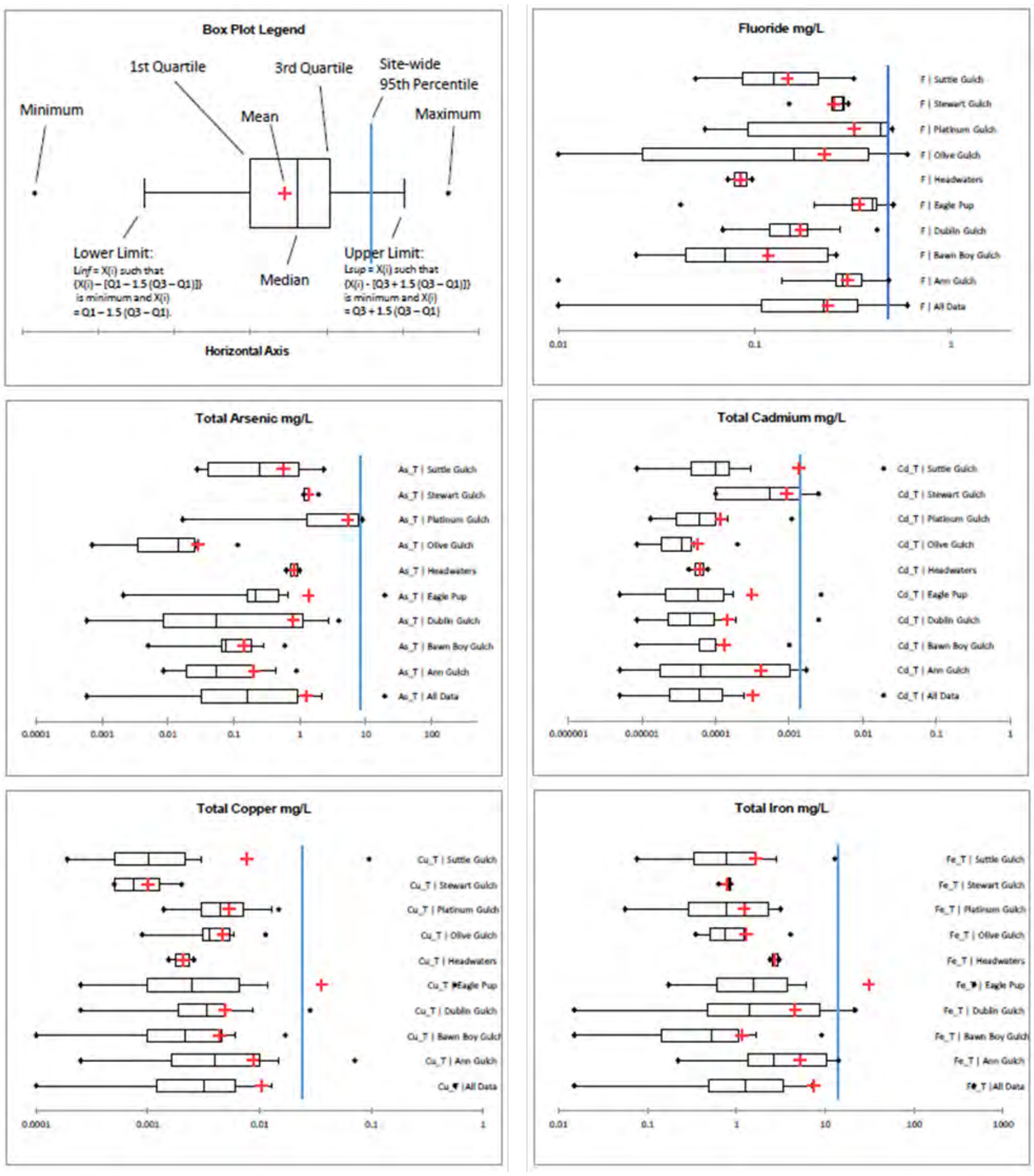


Figure 4-1: Groundwater Quality Boxplots

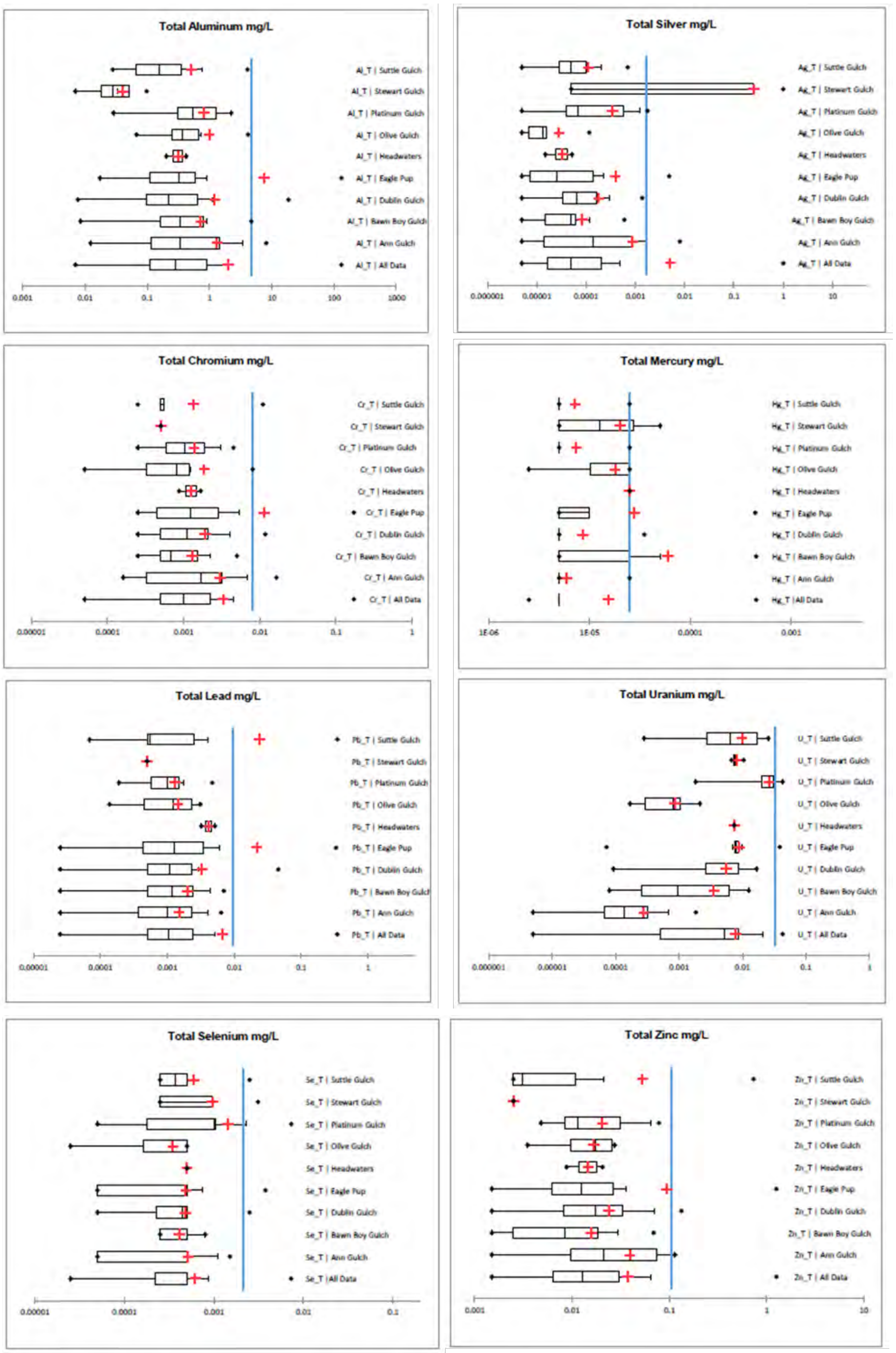


Figure 4-2: Groundwater Quality Boxplots

Very few parameters show a low degree of variability in central tendency between sub-basins as shown by the interquartile range (the range of values between the 25th percentile and 75th percentile). The most consistent interquartile range is shown by total lead, which varies and spans approximately an order of magnitude among sub-basins and has a site-wide interquartile range very similar to most sub-basins. For total lead, only Stewart Gulch (N=4) and Headwaters (N=2) have narrow interquartile ranges, which likely reflect the few data points available for these areas.

More commonly, a large degree of variation is seen within sub-basins for most parameters. Interquartile range width varies substantially by sub-basin, with the sub-basins with the largest interquartile range width typically larger than the site-wide interquartile range. For example, fluoride shows a broad interquartile range in Olive Gulch (N= 6) and arsenic has broad interquartile range in Dublin Gulch (N=64). The range of variability within each sub-basin is often independent of sample size. For example, the interquartile range for total cadmium in Stewart Gulch (N=4) is approximately twice as large as the interquartile range for total cadmium in Dublin Gulch (N=64).

Site-wide central tendencies and background concentrations provide a reasonable site-wide overview but have an obvious averaging effect on regional variation and extremes. As noted above, for a given parameter, the site-wide interquartile range is typically somewhat narrower than the maximum interquartile range for some of the sub-basins, and site-wide background concentration (i.e., the 95th percentile) is typically higher than the upper limit (the end mark on the box plot whisker as determined by the equation Lsup = X(i) such that {X(i) – [Q3+1.5 (Q3-Q1)]} is minimum and X(i) = Q3+1.5(Q3-Q1).The only exception to this is total silver in Stewart Gulch, which shows the interquartile range extending approximately two orders of magnitude above the site-wide background concentration, but not above the maxima.

Major variations between site-wide central tendencies and individual sub-basins are highlighted in the following examples:

- Total aluminum, which shows an interquartile range in Stewart Gulch approximately an order of magnitude lower than the site-wide range.
- Total arsenic, which shows an interquartile range approximately an order of magnitude lower than the site-wide range in Olive Gulch, and approximately an order of magnitude higher in Platinum Gulch than the site-wide range.
- Total cadmium, which shows an interquartile range approximately an order of magnitude higher in Stewart Gulch than the site-wide range, and a broader interquartile range that spans to approximately an order of magnitude higher than the site-wide range.
- Total copper, which shows an interquartile range of approximately an order of magnitude lower in Suttles and Stewart Gulch than the site-wide range.
- Total silver, which shows an interquartile range in Stewart Gulch extending approximately three orders of magnitude higher than the site-wide interquartile range.
- Total uranium, which shows an interquartile range of approximately an order of magnitude lower than the site-wide range in Ann Gulch and approximately an order of magnitude higher in Platinum Gulch than the site-wide range.

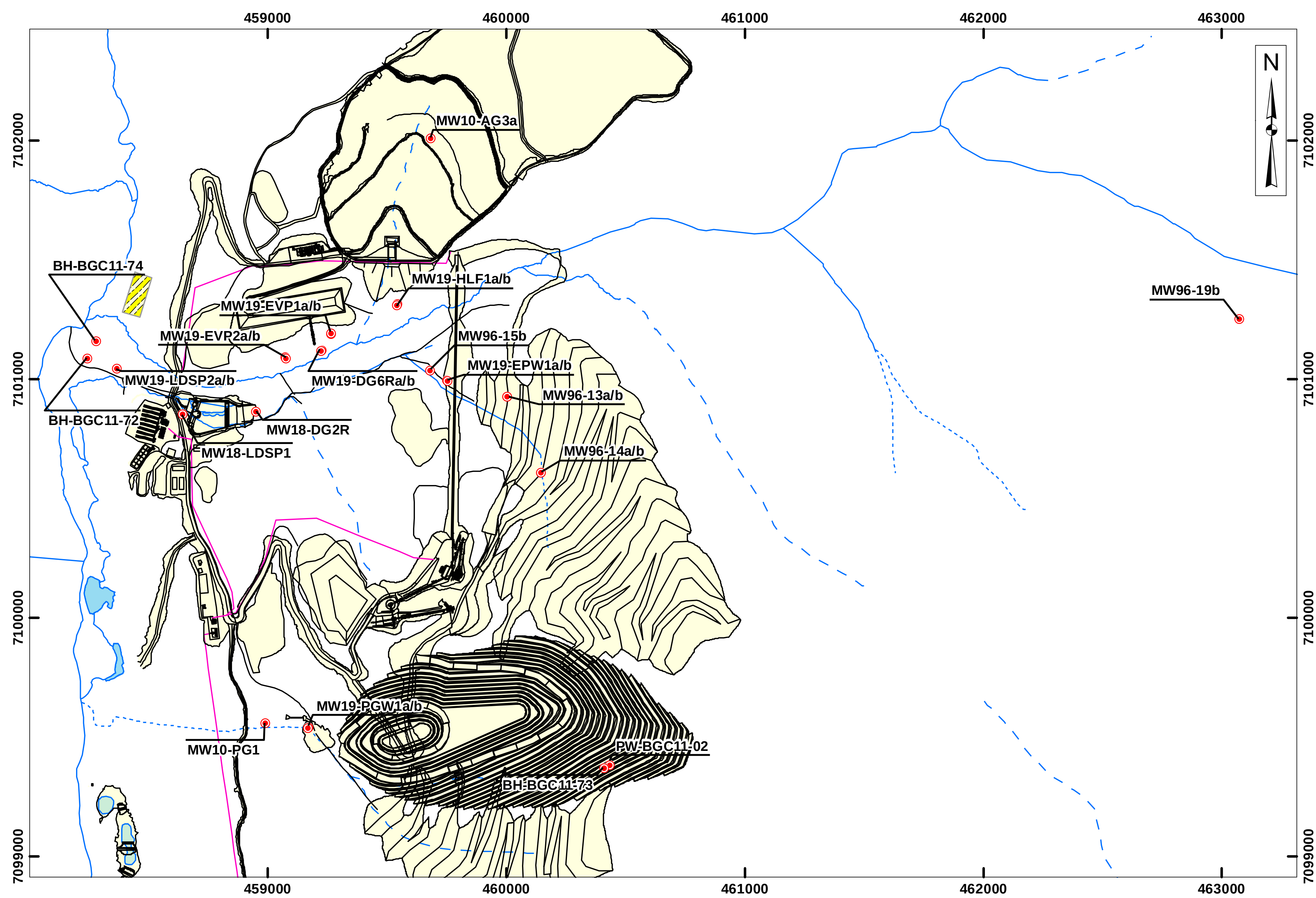
Groundwater quality monitoring continues to be undertaken on the Project site as considered in the EMSAMP (Figure 4-3). For 2019 license reporting, six wells were analysed in detail. These wells represent Ann Gulch and the HLF area (MW10-AG3a and MW10-AG6), Dublin Gulch valley (MW10-OBS1, MW10-DG6) and Eagle Pup (MW96-13a and MW96-15). Five of these wells have a long-term data records extending back to either 2009 (MW96-13a, MW96-15) or 2010 (MW10-AG3a, MW10-AG6, MW10-DG6). Sampling in MW10-OBS1 began in 2017. The parameters analyzed included dissolved and total metals, nutrients, anions and other general parameters.

The groundwater samples were classified based on their major ion chemical composition, taking into account the major anions and cations. Calcium is the dominating cation in most groundwater samples from the site; however, some sampling locations magnesium concentrations exceeded calcium. Carbonate was the dominating anion in all samples, and was particularly high in some samples.

For the wells with long term monitoring record the following observations have been made:

- Except for MW10-DG6, dissolved aluminum concentrations are relatively low (less than 1.0 mg/L), and depending on the well as much as two orders of magnitude lower than total aluminum concentrations. Except for a slight increase over time with MW10-AG3A, there were no discernible increasing or decreasing trends over time. Further, there is no discernible effect from 2019 construction and operation activities on dissolved aluminum concentrations.
- For dissolved arsenic concentrations, there is a wide range in concentrations evident when considering all six wells (about four orders of magnitude from 0.00034 mg/L in MW10-OBS1 to 3.9 in MW10-DG6), while all but one well (MW96-13a), varies within about one order of magnitude. In some cases, variability is much less than one order of magnitude (MW10- DG6, MW10-AG3A and MW96-15). When considering total versus dissolved arsenic concentration for each well, some wells exhibit very similar concentrations (MW10-DG6), while others (MW96-15, MW96-13a, MW10-OBS1) exhibit up to three orders of magnitude difference between total and dissolved. These characteristics reflect baseline conditions prior to and after construction began. However, for two of the substitution wells (MW19-LDSP2A for MW10-OBS1 and MW19-HLF1B for MW10-AG), dissolved arsenic concentrations were markedly different (up to an order of magnitude).
- Dissolved iron ranges over three orders of magnitude when considering all the wells, but varies less than two orders of magnitude per well. In one case (MW10-DG6), dissolved iron remained relatively high and constant over time (~10 mg/L), while the other six wells vary considerably more, and there were no discernible increasing or decreasing trends over time.
- Total and dissolved selenium concentrations are very similar for all the wells, and no increasing or decreasing trends are evident.
- Dissolved copper ranges over two orders of magnitude when considering all the wells, but varies around one order of magnitude per well. In one case (MW10-AG3A), dissolved copper has an outlier which occurred during a sampling May 8 2014 prior to any construction on site.
- Relatively small range in dissolved zinc concentration is evident when considering all six wells, with most wells having an even smaller confined range. There is no overall apparent decreasing trend over time with dissolved zinc observed at each station that is due to a reduction in laboratory detection limits and not due to the natural variability in groundwater chemistry.

- A narrow range in dissolved lead concentration (less than two orders of magnitude) is evident when considering all six wells, while the majority of concentrations are at or near the method detection limit since 2009.
- pH remains relatively neutral to slightly basic. The average and median pH of all six wells combined is 7.93 and 8.01, respectively, with a range from 7.00 in MW10-AG3A to 8.53 in MW96-13A. There are no measurable increases or decreases in pH over time at any of the stations.



Legend:

- Groundwater Monitoring Location
- Reserved Area
- Facility
- Site Power
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

VICTORIA GOLD CORP

0 125 250 500
Meters

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date: 2020/07/30	Figure: 4-3	Site Plan with Groundwater Monitoring Locations

5 SURFACE WATER HYDROLOGY

The majority of the Project site lies within the Dublin Gulch watershed, a second order tributary to the larger Haggart Creek watershed, which is a major tributary of the South McQuesten River. The South McQuesten River joins the Stewart River, which flows west to its eventual confluence with the Yukon River.

The hydrology of the region is characterized by a dominant snowmelt driven freshet signature, which typically occurs between early May and early June. The recession limb of the freshet tapers to a lower summer flow regime reflective of groundwater primarily, which is punctuated by periodic rainfall driven runoff events, typically one to four days in duration. Base flows are lowest in the winter and flow sub-ice; in the smaller creeks, groundwater is depleted in the winter and no flow conditions under the ice are typical.

In larger tributaries, groundwater discharge maintains limited amounts of streamflow below the ice throughout the winter (i.e., November through end March). Aufeis (i.e., groundwater that seeps and freezes onto- and adjacent to local watercourses) is present in several places throughout streams at the Project site. As with shelf ice in the streams, aufeis melts during the freshet, but may in some cases persist into the early summer.

Historical placer mining activities in the Project site streams have altered the natural channel conditions, and in some cases, have also altered the drainage areas of several sub-watersheds.

The current surface water baseline data collection program commenced in 2007 and has included up to 23 streamflow monitoring stations. The locations, and data collection and monitoring frequency of the program within the Project area has evolved somewhat since 2007 due primarily to changing program objectives associated with the requirements of environmental assessment and water licensing processes and the continuing development of the project. Table 5-1 provides a summary of automated and manual streamflow monitoring stations, as well as the year or years in which streamflow data were collected.

Table 5-1: Summary of Streamflow Monitoring Stations

Drainage Basin	Monitoring Site	Type of Station	Year(s) of Record
Haggart Creek	W4 - DS Dublin Gulch	Automatic	2007 - ongoing
	W5 - US Lynx Creek	Automatic	2007 - ongoing
	W22 - US Dublin Gulch	Automatic	2007 - ongoing
	W23 - DS Lynx Creek	Manual	2007 – 2011, 2018 - ongoing
	W29 - DS Eagle Creek	Automatic Manual	2010 – 2015 2016 - ongoing
	W39 – US South McQuesten River	Manual	2017 - ongoing
	W99 – US 15 Pup	Automatic	2019 - ongoing
Eagle Creek	W27 – Midway, near camp	Automatic	2007 - ongoing
	W45 - US Haggart Creek	Manual Automatic	2012, 2013 2018 - ongoing
	W61 - US Suttles Gulch	Manual	2009 - 2011
	W62 - DS Suttles Gulch	Manual	2009 - 2011
	WECP - Eagle Creek Pond	Manual Automatic	2009, 2010 2011 - 2013
	W10 - Suttles Gulch	Manual	2010, 2011
Dublin Gulch	W1 - US Stewart Gulch	Automatic	2007-ongoing

Drainage Basin	Monitoring Site	Type of Station	Year(s) of Record
	W21 - Dublin Gulch near mouth	Manual	2007 – 2013, 2018
	W32 - Ann Gulch	Manual	2010, 2011
	W26 - Stewart Gulch at flume	Manual Automatic	2007 - 2011 2010, 2012-ongoing
	W36 - Stewart Gulch	Manual	2009
	W31 - Olive Gulch	Automatic	2009-2010
	W52 - Dublin US Olive	Manual	2009
	W51 - Dublin DS Cascallen	Manual	2009
	W20 - Bawn Boy Gulch	Manual Automatic	2007, 2008 2009
	W30 - Cascallen Gulch	Manual	2009
Lynx Creek	W6 - Lynx Creek US Haggart	Automatic	2007 - ongoing
	W13 - Lynx Creek midway	Automatic	2007
South McQuesten River	W49 – DS Haggart Creek	Manual	2017 - ongoing

Note: 1. Automated stations are not continuous through the winter

Stantec (2010b and 2012b) and Lorax (2020c) provide a comprehensive review of regional data and a baseline hydrology data summary for the project site through 2019.

5.1 MONITORING METHODS

The continuous streamflow monitoring stations noted in Table 5-1 consist of a permanent staff gauge, pressure transducer and datalogger that record water level continuously at 15 minute intervals. Discharge measurements were conducted during periodic station visits and related to the corresponding water level at time of measurement from which stage-discharge rating curves were developed. The continuous streamflow gauging stations are typically installed prior to the spring freshet and removed at the end of the open-water season in late October or early November to avoid damage from winter freeze.

5.2 WATERBODIES WATERCOURSES, AND DRAINAGE BASINS

The hydrology local study area includes the Dublin Gulch, Eagle Creek, and Haggart Creek (above the Lynx Creek confluence) drainage basins ((Figure 5-1). The basin areas of these water bodies are 10.4 km^2, 4.7 km^2, and 98 km^2 respectively. The basins are characterized by high relief (750 to 800 m), steep gradients (mean gradient of 18%), and well-vegetated slopes.

Dublin Gulch, Eagle Creek, and Haggart Creek are all perennial streams. Several of the tributaries in the Project area are intermittent streams (i.e., the stream becomes dry at sections along the water course where flow goes subsurface) or ephemeral streams (i.e., the stream channel has little to no groundwater storage and flow is in response to snowmelt of heavy rains). The upper sections of Platinum Gulch are channelized with sections of perennial stream flow; however, the lower sections of Platinum Gulch are dry during the summer months. Suttles Gulch appears to be dry for most of the year, although more continuous flow occurs in some reaches due to permafrost melting from the adjacent slopes. Ann Gulch is a dry channel during most of the summer: in-channel observations of flow during and just after freshet indicate that the channel is wet in the late spring (e.g. May to June) as a result of snowmelt runoff.

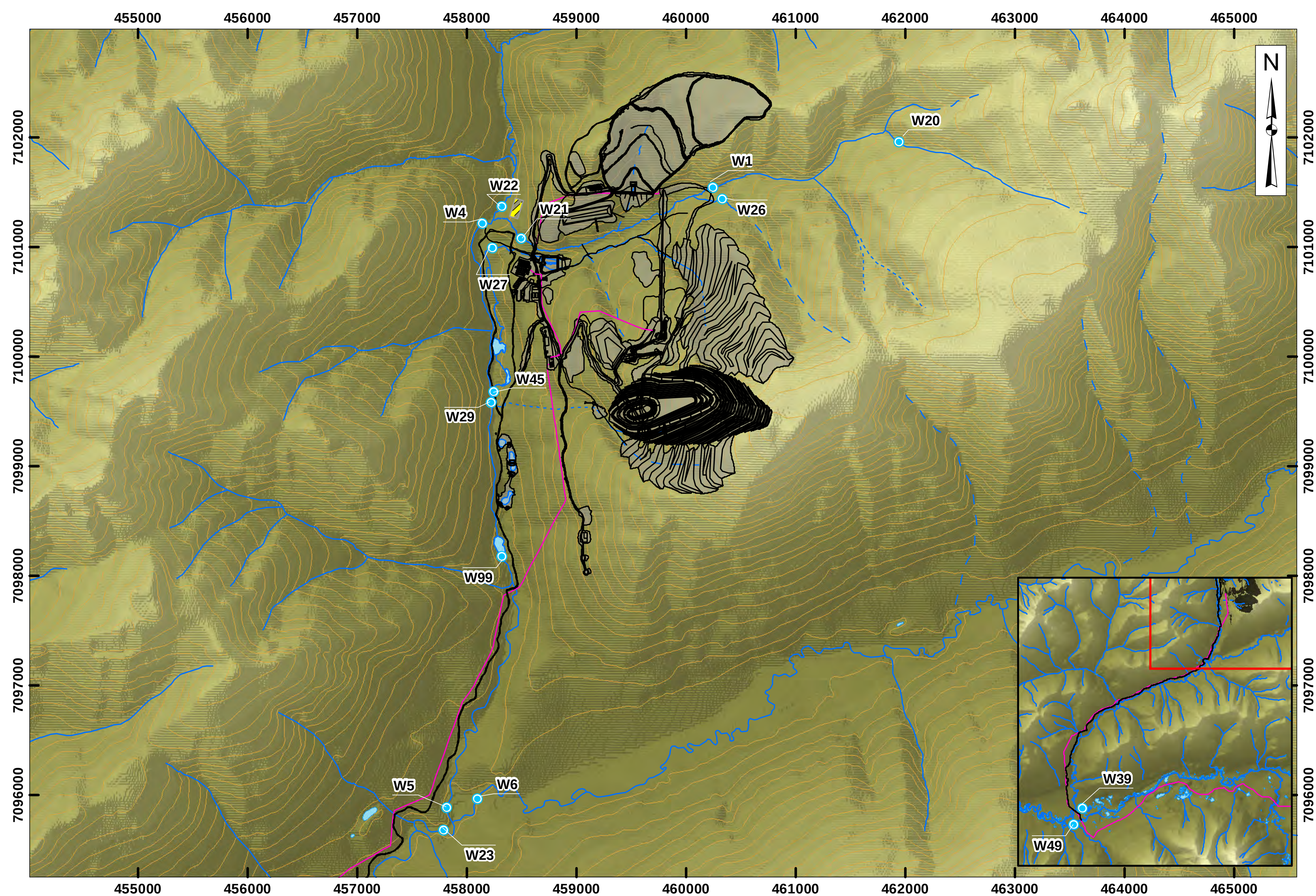
5.3 STREAM FLOWS

The open-water season pattern is characterized by freshet-generated peak flow in May to early June, followed by a relatively rapid recession to low base flow throughout July and August. Heavy rain events caused short-term increases in stream flow with storm-event recessions being generally rapid in the late summer and fall, both reflective of low groundwater storage capacity of the basins. Winter flows, though not continuously gauged, have been measured and observed by field personnel in Haggart Creek and lower Dublin Gulch and are the lowest flows of the year reflective of base flow contributions. These seasonal changes are represented in the hydrograph for Haggart Creek at station W4 (Figure 5-2). Monthly summaries and hydrographs for all the gauged streams are provided in Lorax (2020c). Summary of monthly average discharge, unit yield and runoff for Project site hydrometric stations is presented in **Error! Reference source not found.**.

Table 5-2: Summary of Monthly Average Discharge, Unit Yield and Runoff for Project Site Hydrometric Stations

Station (Discharge Area)	Variable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average/ Total
W1 (6.8 km^2)	Average Discharge (m^3/s)	--	--	--	0.024	0.235	0.097	0.086	0.083	0.087	0.098	0.069	--	0.097
	Average Yield (L/s/km^2)	--	--	--	3.5	34.5	14.2	12.7	12.2	12.7	14.4	10.1	--	14.3
	Runoff (mm)	--	--	--	5	64	34	34	31	33	21	4	--	225
W4 (76.9 km^2)	Average Discharge (m^3/s)	--	--	--	0.256	2.064	0.976	0.773	0.813	0.856	0.778	--	--	0.931
	Average Yield (L/s/km^2)	--	--	--	3.3	26.8	12.7	10.1	10.6	11.1	10.1	--	--	12.1
	Runoff (mm)	--	--	--	2	53	30	27	28	29	17	--	--	185
W5 (97.5 km^2)	Average Discharge (m^3/s)	--	--	--	--	3.125	1.292	0.975	0.957	0.995	1.059	--	--	1.401
	Average Yield (L/s/km^2)	--	--	--	--	32.1	13.3	10.0	9.8	10.2	10.9	--	--	14.4
	Runoff (mm)	--	--	--	--	64	32	27	25	26	14	--	--	188
W6 (100.9 km^2)	Average Discharge (m^3/s)	--	--	--	--	3.656	1.024	0.919	1.044	1.131	0.965	0.574	--	1.330
	Average Yield (L/s/km^2)	--	--	--	--	36.2	10.2	9.1	10.3	11.2	9.6	5.7	--	13.2

Station (Discharge Area)	Variable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average/ Total
	Runoff (mm)	--	--	--	--	59	22	23	27	29	15	3	--	178
W21 (66.8 km^2)	Average Discharge (m^3/s)	--	--	--	--	--	0.116	0.075	0.197	0.098	0.060	--	--	0.109
	Average Yield (L/s/km^2)	--	--	--	--	--	14.4	9.2	24.3	12.0	7.4	--	--	13.5
	Runoff (mm)	--	--	--	--	--	17	10	27	31	16	--	--	102
W22 (66.8 km^2)	Average Discharge (m^3/s)	--	--	--	0.531	2.170	0.851	0.656	0.752	0.766	0.723	0.937	--	0.923
	Average Yield (L/s/km^2)	--	--	--	7.9	32.5	12.7	9.8	11.3	11.5	10.8	14.0	--	13.8
	Runoff (mm)	--	--	--	13	57	32	25	29	30	16	15	--	216
W26 (1.3 km^2)	Average Discharge (m^3/s)	--	--	--	--	0.018	0.014	0.011	0.013	0.011	0.007	--	--	0.012
	Average Yield (L/s/km^2)	--	--	--	--	14.0	10.8	8.4	9.8	8.7	5.6	--	--	9.6
	Runoff (mm)	--	--	--	--	11	22	22	26	21	6	--	--	108
W27 (2.7 km^2)	Average Discharge (m^3/s)	--	--	--	--	0.068	0.031	0.027	0.025	0.021	0.028	--	--	0.033
	Average Yield (L/s/km^2)	--	--	--	--	25.1	11.5	9.9	9.1	7.9	10.3	--	--	12.3
	Runoff (mm)	--	--	--	--	48	28	22	23	20	11	--	--	152
W29 (8 km^2)	Average Discharge (m^3/s)	--	--	--	--	2.508	1.300	1.224	1.165	1.043	0.980	--	--	1.370
	Average Yield (L/s/km^2)	--	--	--	--	29.1	15.1	14.2	13.5	12.1	11.4	--	--	15.9
	Runoff (mm)	--	--	--	--	44	27	38	35	31	20	--	--	196
W99 (90.1 km^2)	Average Discharge (m^3/s)	--	--	--	--	--	0.574	0.321	0.270	0.470	0.403	--	--	0.408
	Average Yield (L/s/km^2)	--	--	--	--	--	6.4	3.6	3.0	5.2	4.5	--	--	4.5
	Runoff (mm)	--	--	--	--	--	13	10	8	14	6	--	--	50



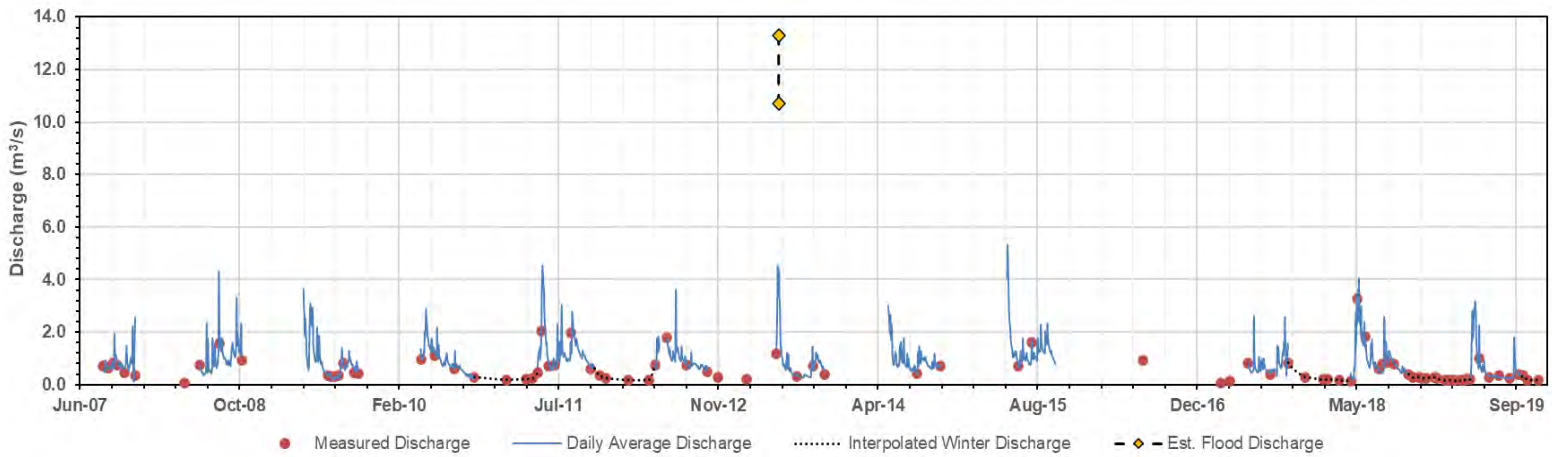
Legend:

- Hydrology Station
- Reserved Area
- Facility
- Site Power
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

VICTORIA GOLD CORP

0 250 500 1,000
Meters

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date: 2020/07/30	Figure: 5-1	Location of Streamflow Monitoring Stations



Note: Values for May 29, 2013 are estimates based on high water marks and channel surveys at W29 extrapolated by drainage area to W4 (Laberge, 2013).

Figure 5-2: Haggart Creek (W4) Average Daily Discharge Record (2007 to 2019)

6 SURFACE WATER QUALITY AND AQUATIC BIOTA

The current water quality and aquatic biota baseline program began in 2007. Water quality characterization has occurred every year since 2007 and is ongoing. Historical data (1976/1977 for sediment only and 1993 – 1996 for surface water, sediment, and biota) are provided in Stantec (2010c).

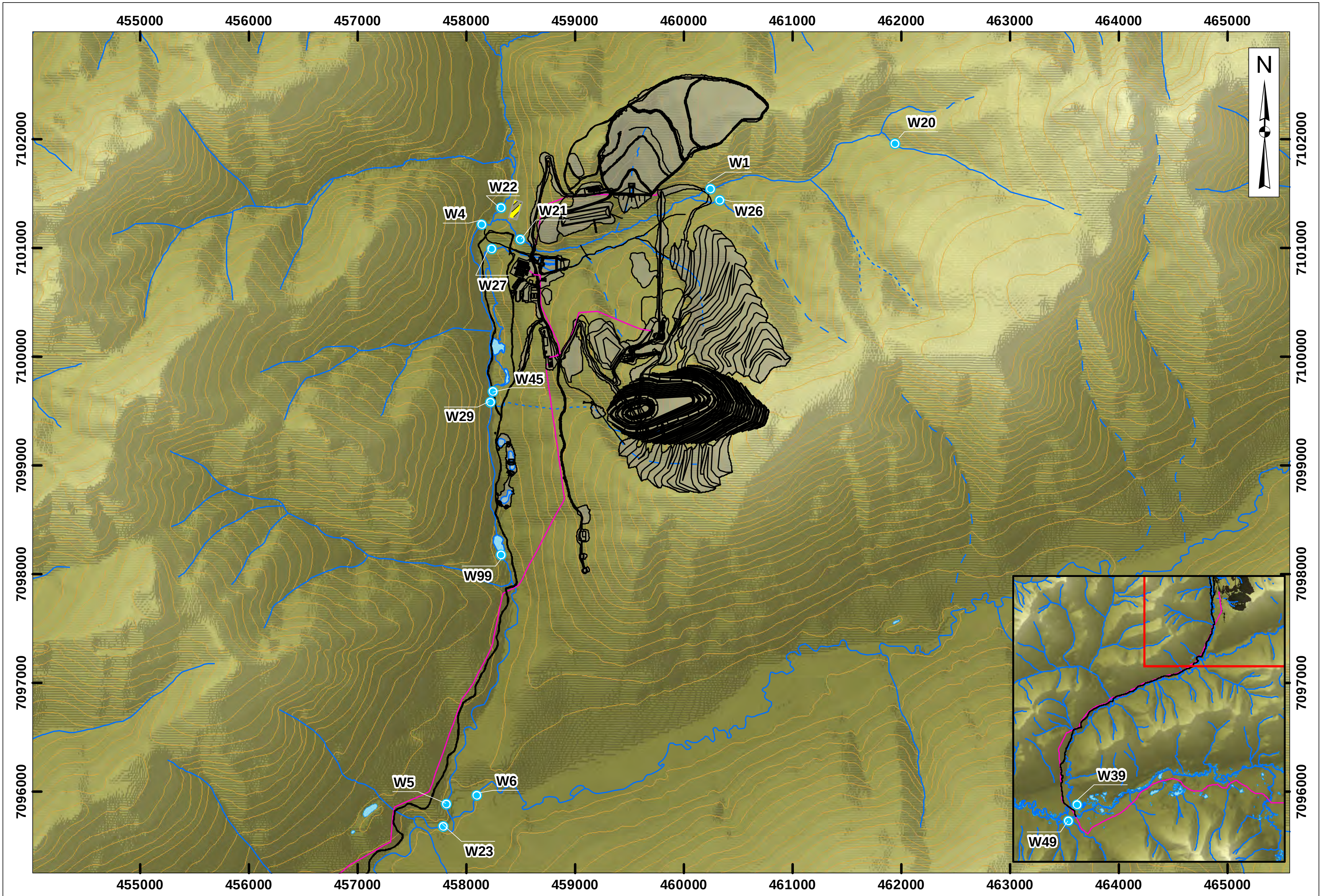
6.1 SURFACE WATER QUALITY

The current study area (Table 6-1 and Figure 6-1) includes the Haggart Creek, Dublin Gulch, Eagle Creek basins, which have been subject to placer mining in the past, and the Lynx Creek basin, which has not been subject to placer mining. Sites within the Haggart Creek, Dublin Gulch, and Eagle Creek drainage basins were selected upstream and downstream of the Project footprint, where possible. Lynx Creek drains a large catchment to the south of the Project area that will be unaffected by development activities.

Table 6-1: Water Quality Sampling Locations and Rationale by Drainage

Site	Location	Site Type	Rationale	Coordinates	
				North	East
Haggart Creek Drainage					
W22	Haggart above Dublin Gulch	Reference	Above Project influence	7101377	458319
W4	Haggart below Dublin Gulch	Exposure	Below Project influence	7101223	458144
W29	Haggart below Eagle Cr	Exposure	Below Project influence	7099583	458225
W5	Haggart above Lynx Cr	Exposure	Below Project influence	7095887	457815
W23	Haggart below Lynx Cr	Exposure	Below Project influence	7095682	457790
W99	Haggart above 15 Pup	Exposure	Below Project Influence	7098180	458322
W39	Haggart above S. McQuesten	Far Field	Below Project influence	7086504	449780
Dublin Gulch Drainage					
W20	Bawn Boy Gulch	Reference	Above Project influence	7101961	461945
W1	Dublin above Stewart Gulch	Reference	Above Project influence	7101545	460249
W26	Stewart Gulch	Reference	Above Project influence	7101443	460331
W21	Dublin above Haggart Cr	Exposure	Below Project influence	7101261	458359
Eagle Creek Drainage					
W27	Eagle Creek midway	Exposure	Below Project influence	7100997	458235
W45	Eagle above Haggart Cr	Exposure	Below Project influence	7099684	458243
Lynx Creek Drainage					
W6	Lynx above Haggart Cr	Reference	No Project influence	7095964	458099
South McQuesten River Drainage					
W49	S. McQuesten below Haggart	Far Field	Below Project influence	7085495	449221

Procedures for collecting data and information on conditions in streams of the study area have used methods consistent with standards under Yukon and federal legislation. Water samples have been collected midstream following methods outlined in the BC Freshwater Biological Sampling Manual (BC Ministry of Water, Land Air Protection 2003). Grab samples were collected from just below the surface, facing upstream and using narrow mouth bottles. Samples requiring filtration and/or preservation were dealt with as soon as possible after returning to shore. All samples and blanks were kept in coolers with ice packs until arrival at the laboratory. In situ measurements were also taken on each sampling date for pH, temperature, conductivity and dissolved oxygen. For the receiving environment discussion, 2019 monitoring data are the focus of the analysis. Where appropriate, reference to historical results is also provided as a comparison to pre-development baseline conditions.



Legend:

- Water Quality Station
- Reserved Area
- Facility
- Site Power
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

VICTORIA GOLD CORP

0 250 500 1,000
Meters

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date: 2020/07/30	Figure: 6-1	Surface Water Quality Monitoring Stations

6.1.1 Dublin Gulch Drainage

Water quality in Dublin Gulch is characterized using monitoring data from stations W1 and W21 (Figure 6-1). Data from station W20 in the upper reaches of Dublin Gulch in Bawn Boy Gulch is also considered as it strongly influences trace element concentrations in Dublin Gulch, in particular the arsenic signature throughout the stream. Station W26 in Stewart Gulch is also discussed as naturally elevated As concentrations exist and contribute to the overall As loading in Dublin Gulch. The monitoring data for key parameters within the drainage are presented in Figure 6-2 to Figure 6-5.

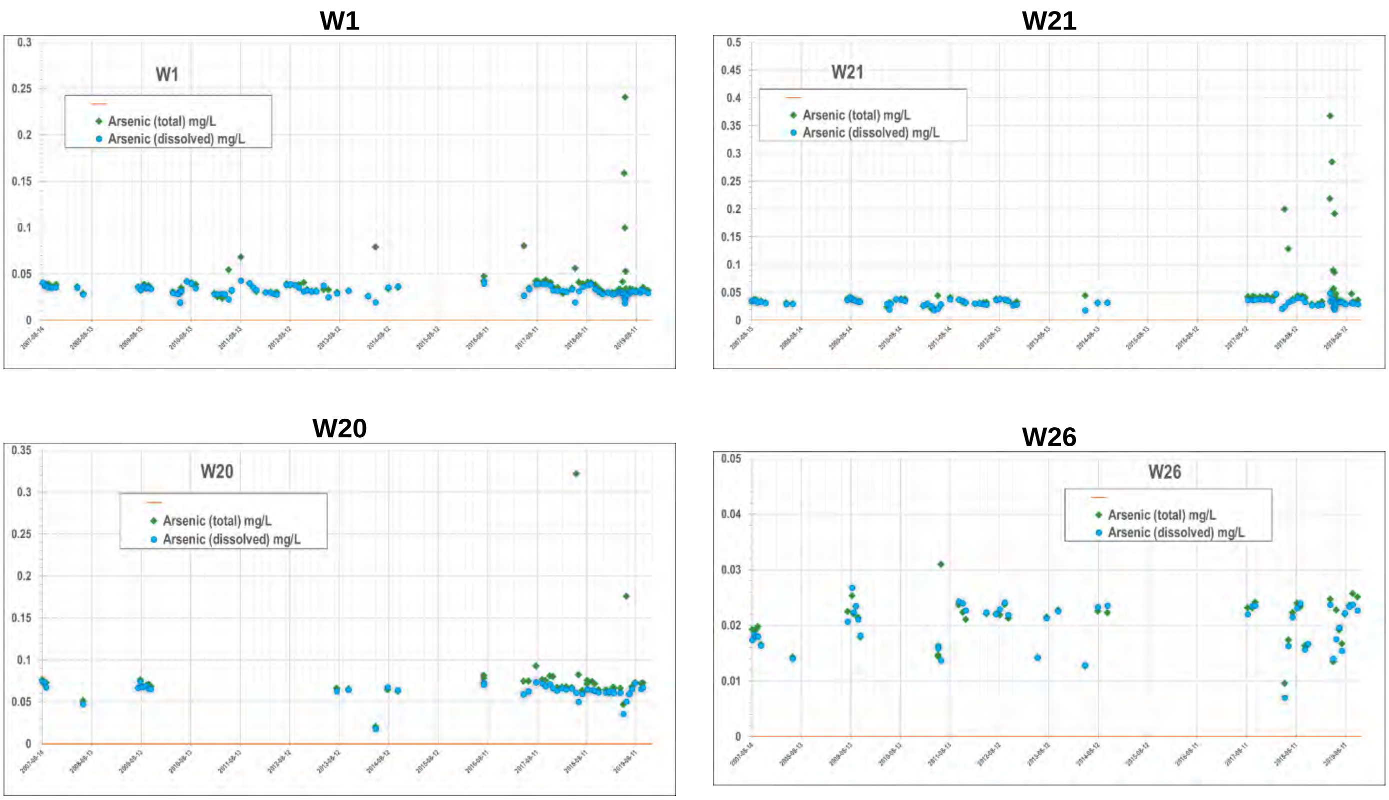


Figure 6-2: Arsenic Concentrations in Dublin Gulch Drainage

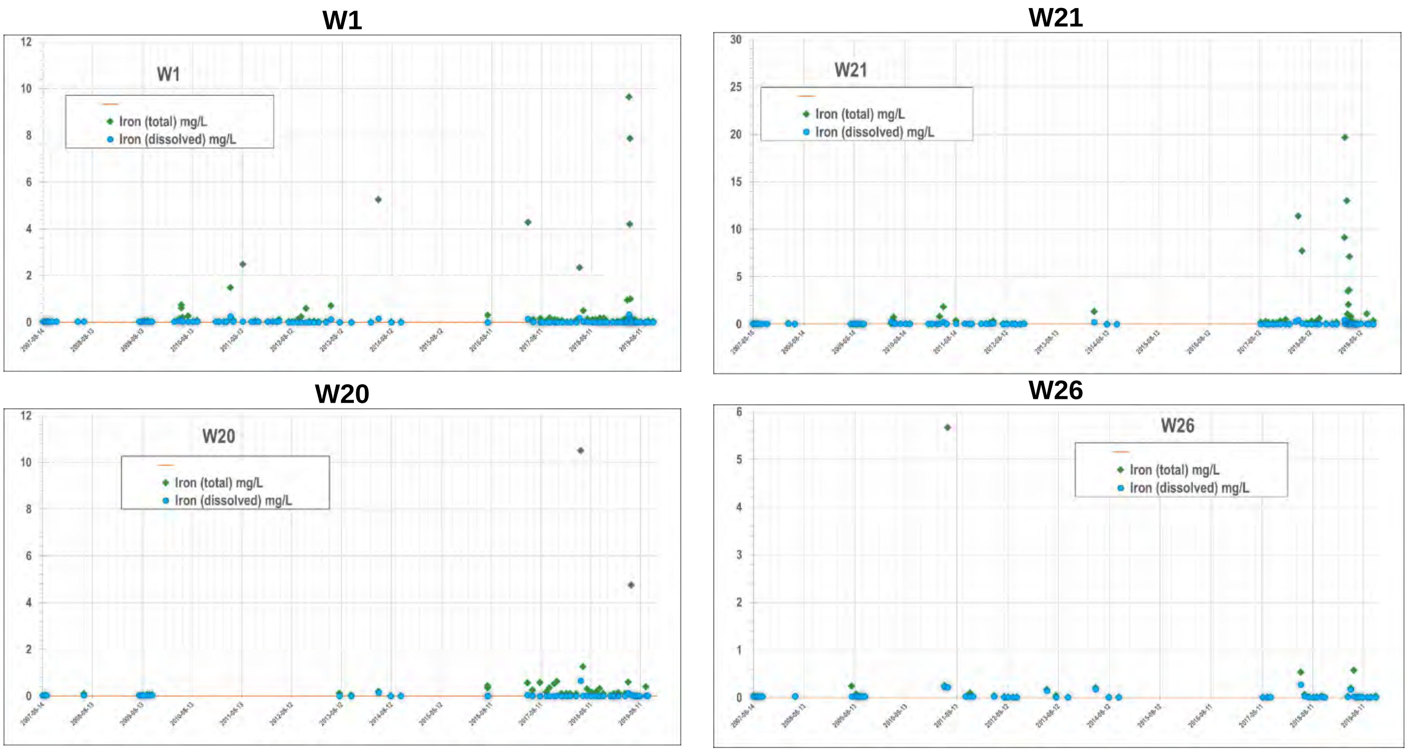


Figure 6-3: Iron Concentrations in Dublin Gulch Drainage

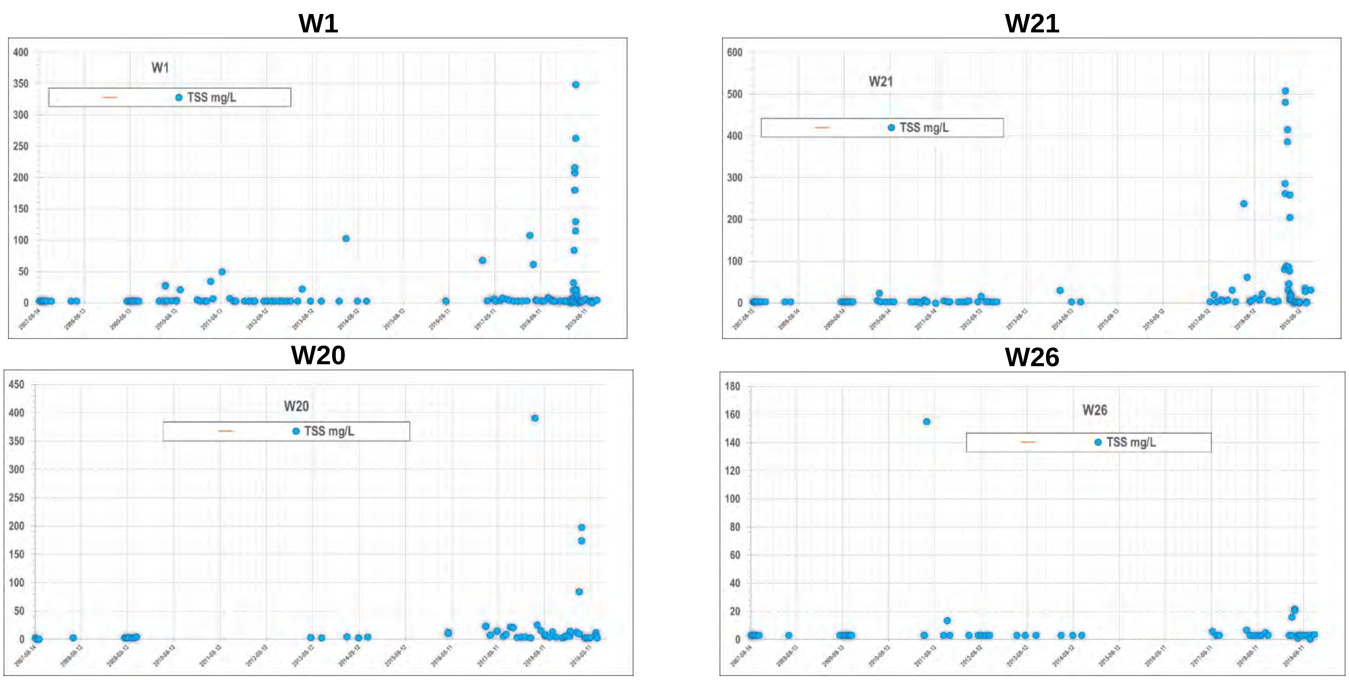


Figure 6-4: TSS Concentrations in Dublin Gulch Drainage

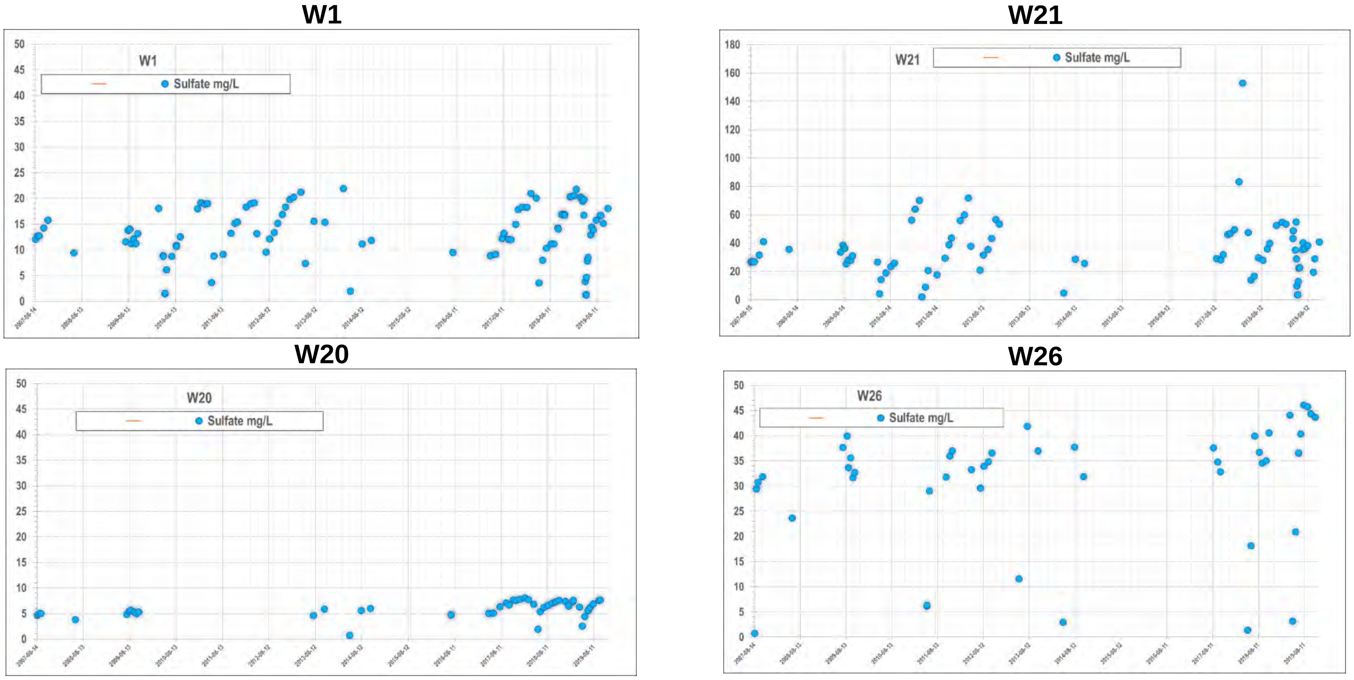


Figure 6-5: Sulphate Concentrations in Dublin Gulch Drainage

6.1.2 Eagle Creek Drainage

Water quality in Eagle Creek is characterized using monitoring data from station W27 in Eagle Pup (Figure 6-1). The monitoring data for key parameters within the drainage are presented in Figure 6-6.

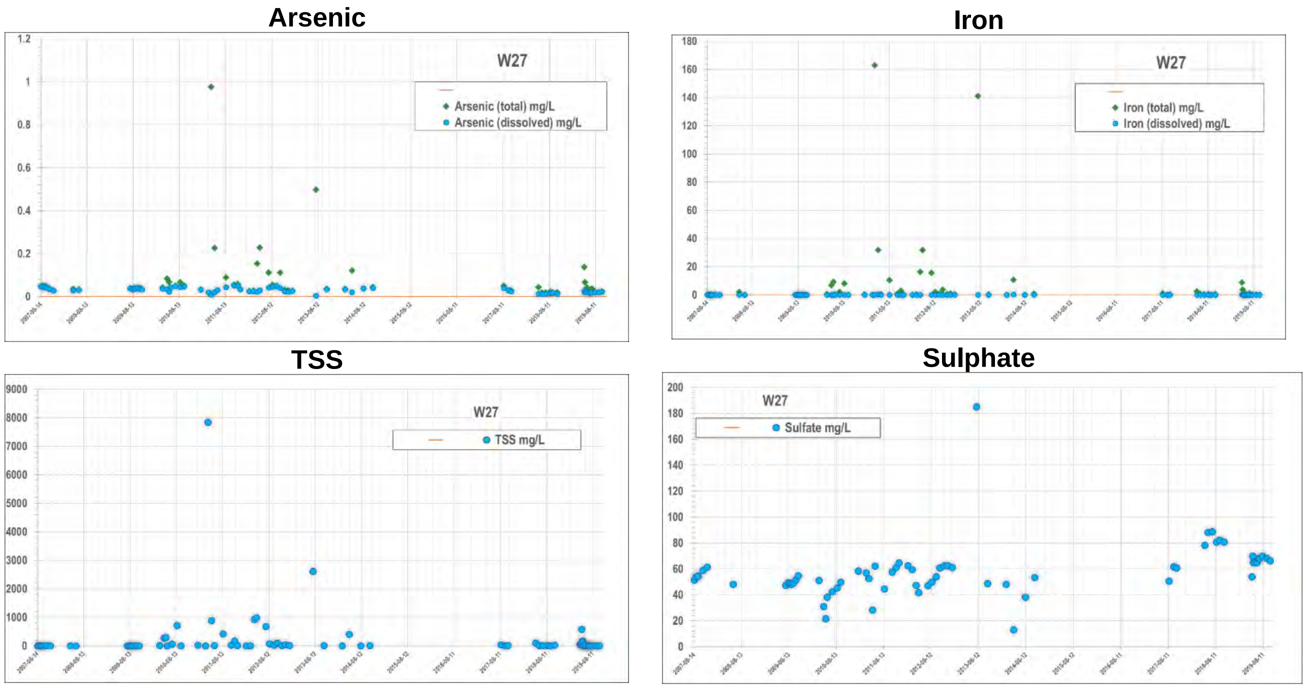


Figure 6-6: Monitoring Data in Eagle Creek Drainage

6.1.3 Haggart Creek Drainage

Haggart Creek is the largest project affected stream and the primary receiving environment stream for the Project. The main monitoring stations on Haggart Creek are shown on Figure 6-1 and include stations W22 (upstream of all project activities), W4 (immediately downstream of the confluence with Dublin Gulch), W29 (downstream of Dublin Gulch, Eagle Creek, Gil Gulch and Platinum Gulch confluences), W5 and W23 (immediately upstream and downstream, respectively of the confluence with Lynx Creek).

The monitoring data for key parameters within the drainage are presented in Figure 6-7 to Figure 6-10.

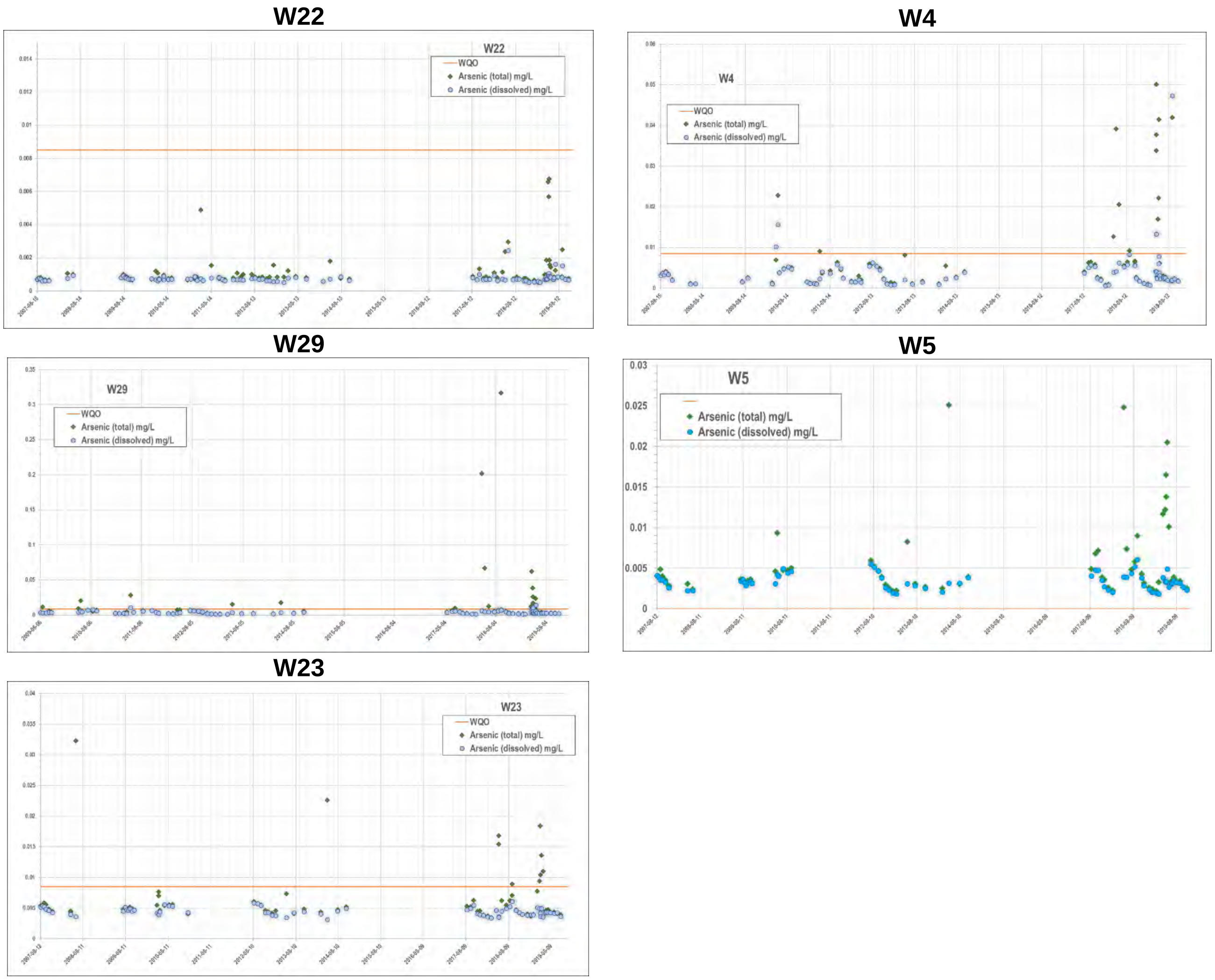
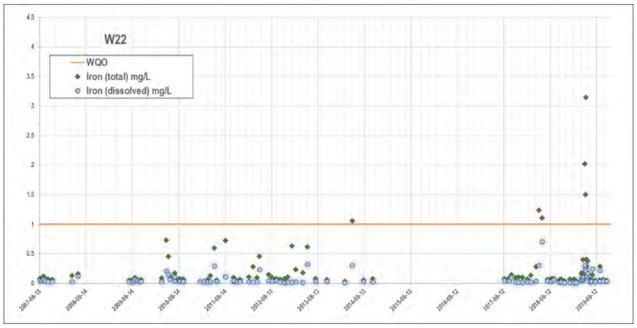
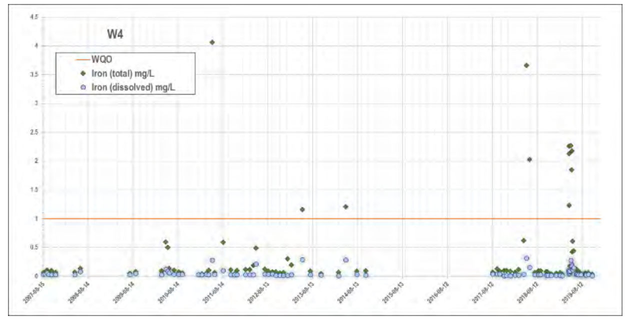


Figure 6-7: Arsenic Concentrations in Haggart Creek Drainage

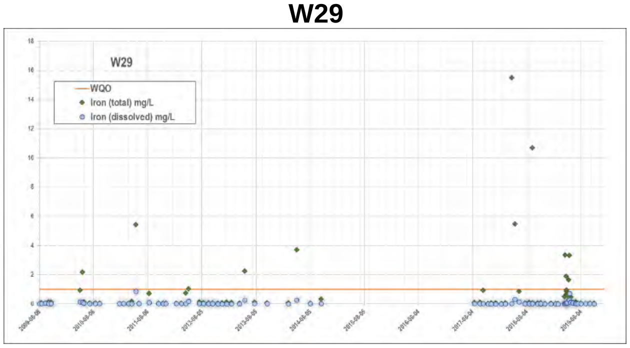
W22



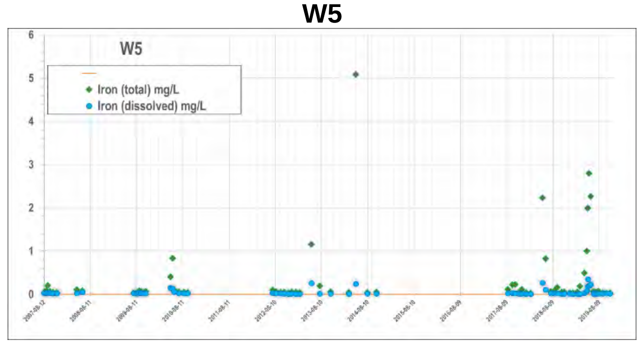
W4



W29



W5



W23

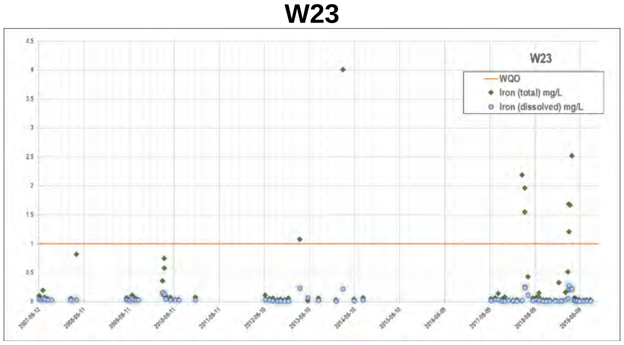


Figure 6-8: Iron Concentrations in Haggart Drainage

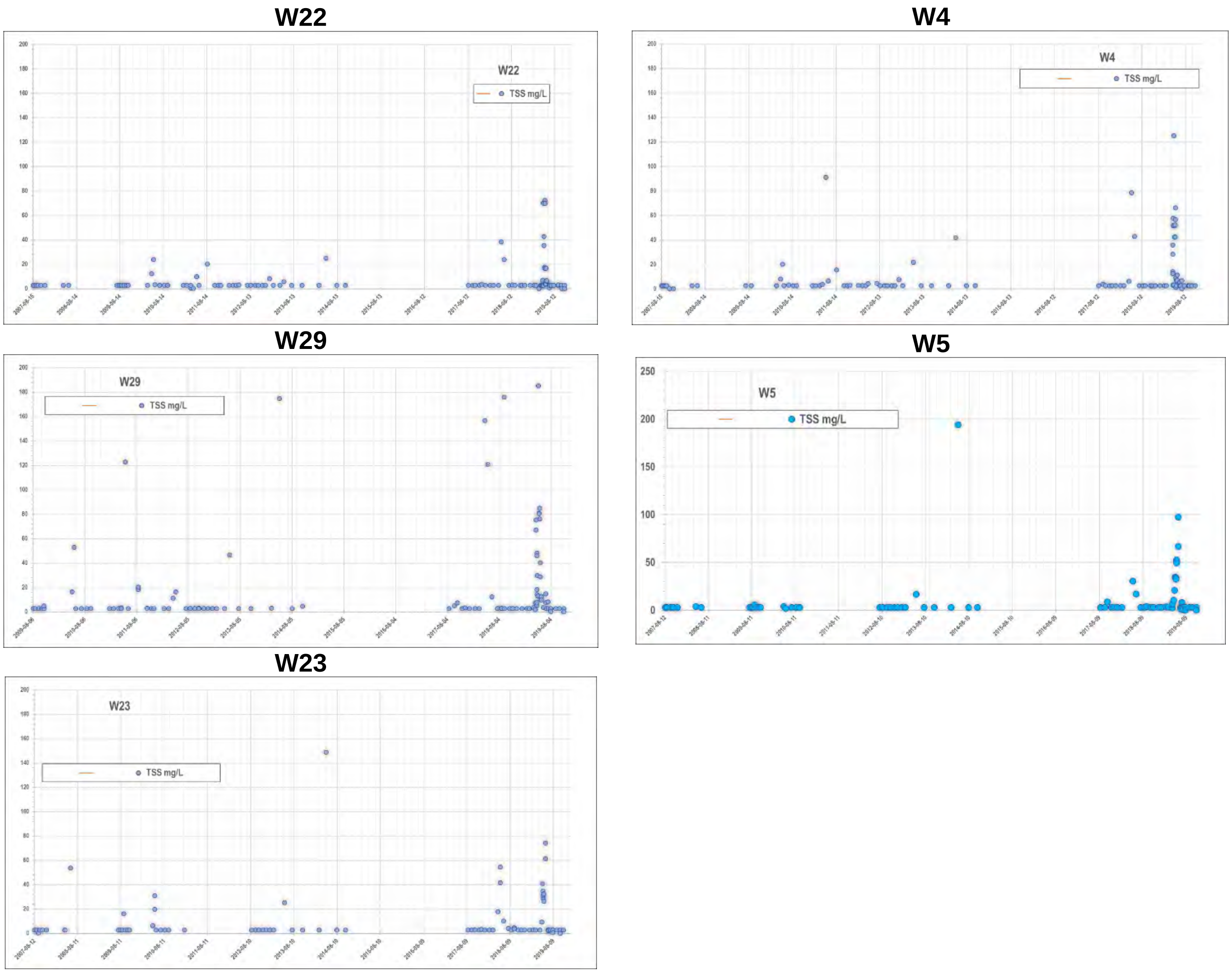


Figure 6-9: TSS Concentrations in Haggart Drainage

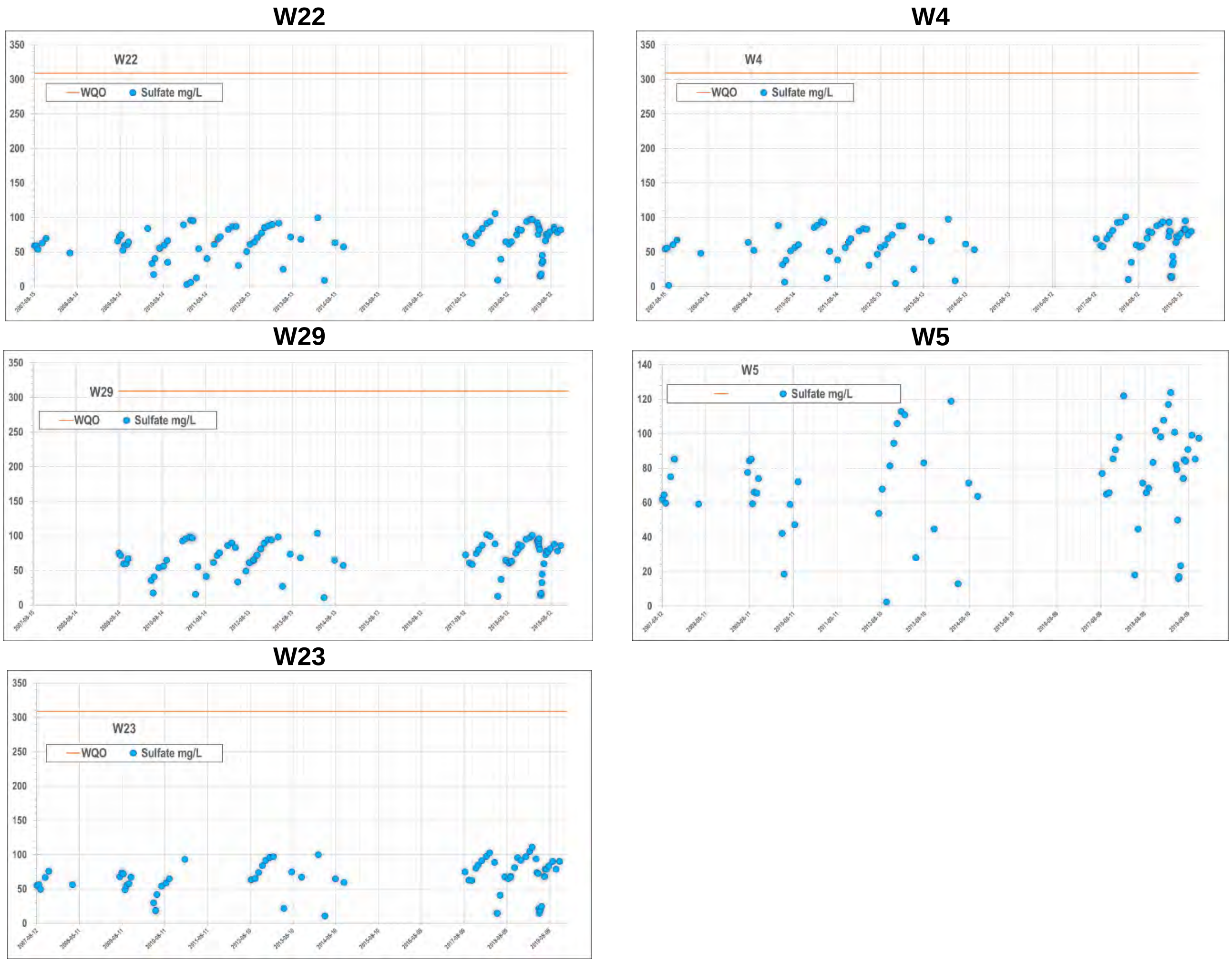


Figure 6-10: Sulphate Concentrations in Haggart Creek Drainage

6.1.4 Lynx Creek Drainage

Lynx Creek is an undisturbed catchment that drains into Haggart Creek downstream of the project area. Monitoring in Lynx Creek has occurred primarily at station W6, at the mouth of Lynx Creek and immediately prior to entering Haggart Creek (Figure 6-1). The monitoring data for key parameters within the drainage are presented in Figure 6-11.

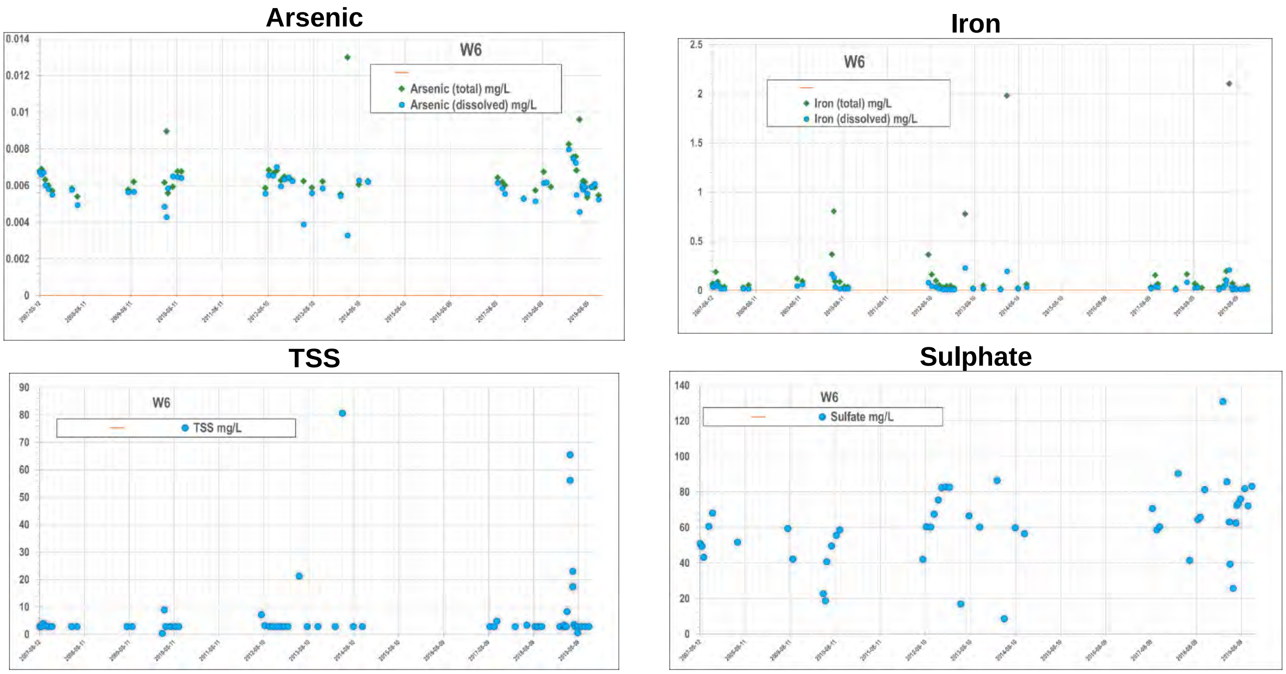


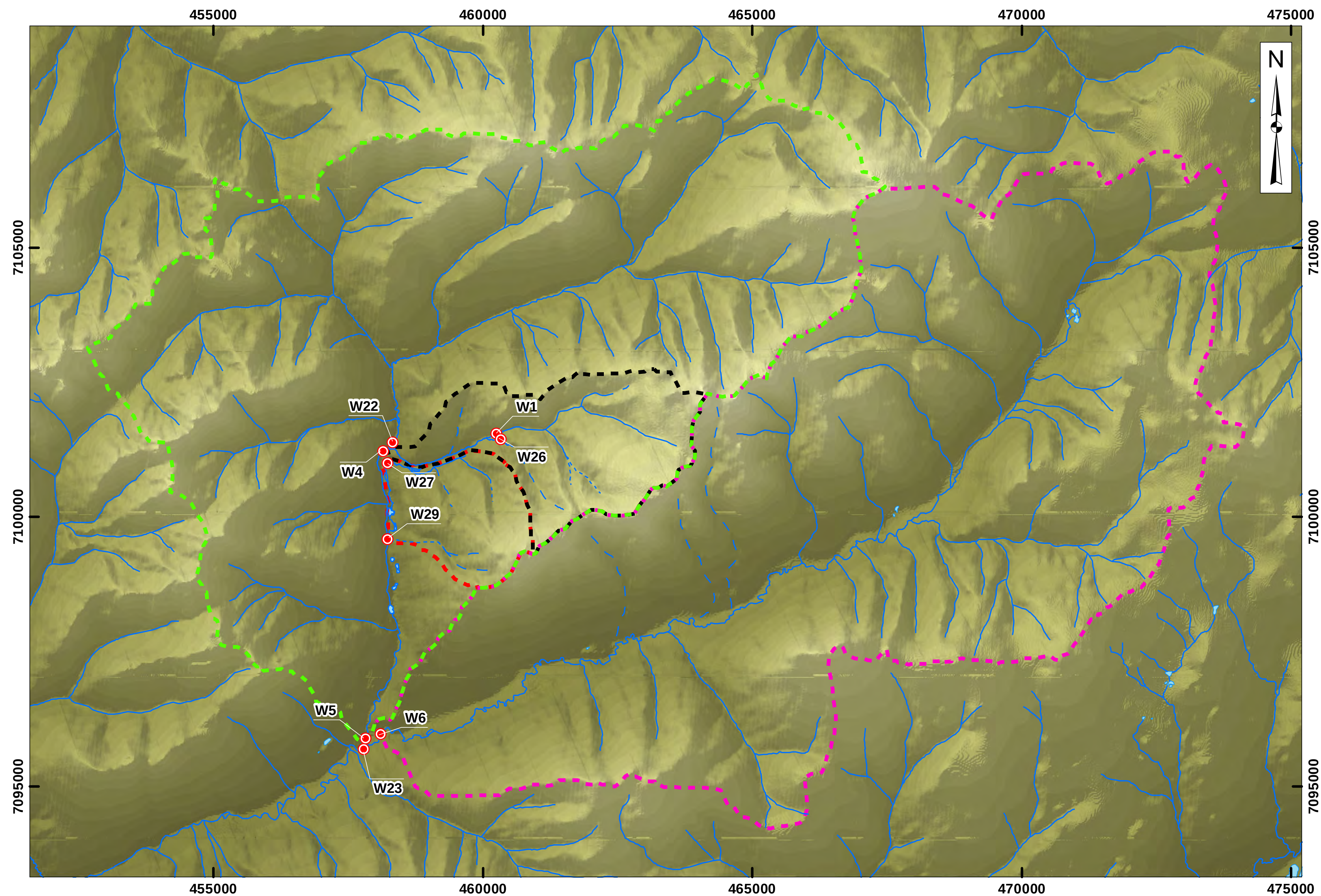
Figure 6-11: Monitoring Data in Lynx Creek Drainage

6.2 AQUATIC BIOTA

Sediment, periphyton, and benthic invertebrate characteristics of watercourses in the project area were studied during 1993-1996, 2007-2011, and ongoing from 2017. The objectives of the studies were to:

- obtain baseline data on water quality and sediment to assess potential Project impacts,
- identify parameters that may be present at elevated levels, and to use this information if needed to propose site-specific water quality objectives,
- provide baseline data that could be used to support biological monitoring programs,
- measure abundance and diversity of the periphyton and benthic invertebrate communities for comparison to future levels,
- evaluate changes related to the sequential phases of the Project.

Aquatic biota monitoring is currently undertaken in the four drainage basins in the Project area (Figure 6-12).



Legend:

- Aquatic Biota Monitoring Station
- Haggart Creek Watershed
- Lynx Creek Watershed
- Eagle Creek Watershed
- Dublin Gulch Watershed
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

VICTORIA GOLD CORP

0 0.5 1 2
Kilometers

Projection:	Drawn By:	EAGLE GOLD PROJECT YUKON TERRITORY
NAD 83 Zone 8N	HC	
Date: 2020/07/30	Figure: 6-12	Aquatic Biota Monitoring Stations

6.2.1 Sediment

Stream sediment samples have been collected in the general Project area in 1976, 1977, 1993, 1995, 2007, 2009 and 2010 (Stantec, 2011d), in 2017 (Laberge, 2017), in 2018 (Laberge, 2018), and in 2019 (Laberge, 2020a). The number of sites sampled, and the number of replicates collected varied in a given year. Data were examined from these surveys where the analysis was completed on the portion of the sediment that was less than 63 microns and for sites that were sampled in 2019.

High levels of arsenic were reported at all sites and on all occasions and exceeded the Probable Effects Level (PEL). Concentrations tended to fluctuate year to year at the sites.

Concentrations of nickel exceeded the lower British Columbia Working Sediment Quality Guidelines (BCWSQG) throughout the study area and study period with the exception in 2007 at Stewart Gulch (W26), and 2009 at Dublin Gulch (W1). There were periodic exceedances of guidelines of other metals in the earlier studies. This data has not been presented here but is available in a report prepared by Stantec (2011d).

The mean concentrations for arsenic and nickel over time have been tabulated (Table 6-2). Values that exceeded the PEL (or upper BCWSQG) are highlighted in grey. Where the Interim Sediment Quality Guidelines (ISQG) (or lower BCWSQG) is exceeded, the values are bolded.

While there are exceedances in certain metals throughout the study area at sites both upstream and downstream of project influence, the high metal concentrations generally reflect the natural geochemistry of the mineralized watersheds in the area.

Table 6-2: Mean Concentrations of Arsenic and Nickel in Stream Sediments, 1996 - 2019

Drainage	Site	Arsenic (mg/kg)							Nickel (mg/kg)						
		1995 n=5	2007 n=3	2009 n=3	2010 n=3	2017 n=3	2018 n=3	2019 n=3	1995 n=5	2007 n=3	2009 n=3	2010 n=3	2017 n=3	2018 n=3	2019 n=3
Haggart Creek	W22	**70.0**	**40.1**	**129.2**		**55.5**	**115.6**	**106**	**27.0**	**27.4**	**25.0**		**31.3**	**53.2**	**50.0**
	W4	**152.7**	**91.5**		**165.0**	**109.6**	**202.3**	**303**	**21.0**	**24.5**		**35.2**	**28.0**	**28.5**	**39.6**
	W29			**63.6**	**142.4**	**127.2**	**126.3**	**71**			**25.3**	**25.7**	**31.7**	**25.0**	**26.3**
	W5	**128.5**	**92.7**	**118.3**		**76.8**	**114.0**	**161**	**22.4**	**25.6**	**26.8**		**26.9**	**29.8**	**42.4**
	W23		**93.4**			**88.8**	**105.6**	**128**		**28.8**			**25.9**	**26.7**	**39.7**
Dublin Gulch	W1		**300.0**	**156.0**	**360.4**	**458.0**	**383.0**	**444**		**65.5**	13.3	**39.3**	**57.2**	**41.7**	**36.1**
	W26		**89.1**	**342.0**		**209.0**	**269.7**			15.7	**17.0**		**28.7**	**34.6**	
Eagle Creek	W27		**175.0**	**173.7**	**77.9**	**200.3**	**252.7**	**253**		**25.3**	**20.6**	**21.1**	**31.0**	**28.4**	**29.7**
Lynx Creek	W6		**65.9**			**85.8**	**79.5**	**96**		**23.6**			**27.5**	**29.7**	**39.6**
CEQG Guidelines	ISQG	5.9							16*						
	PEL	17							75*						

Notes: * BCWSQG upper and lower guidelines used

6.2.2 Periphyton

Materials consulted to complete the baseline study of periphyton in the Project area include the 1995 study (Hallam Knight Piésold 1996a) and 2007 study (Jacques Whitford-AXYS 2008). The 1995 and 2007 sampling programs followed conventional guidance to sample riffle habitat in late summer, after peak flows have subsided and maximum development of the periphyton community had occurred (MWLAP 2003). In August 1995, periphyton samples were collected from 11 sites (Hallam Knight Piésold 1996a). In August 2007, periphyton samples were collected from 11 sites, some of which had been sampled in 1995. The sites were co-located with selected water, sediment, and benthic invertebrate sampling locations. Detailed descriptions of the field and laboratory methods, including QA/QC protocols, used to characterize periphyton are provided in Stantec (2010c).

Chlorophyll *a* levels suggest oligotrophic conditions in the streams, as indicated by nutrient chemistry. Taxonomic richness, diversity, and evenness indices were highest at sites in Haggart Creek, suggesting better conditions for growth there than in Dublin Gulch and Eagle Creek, or in Lynx Creek. This could be related to a number of factors, alone or in combination, including water quality, habitat conditions, and stream order (more opportunity for colonization from upstream communities than in smaller and headwater streams). Haggart Creek communities were dominated by diatoms and blue-green algae, whereas those in Dublin, Eagle and Lynx Creeks consisted mainly of blue-green algae.

6.2.3 Benthics

Materials consulted to complete the baseline study include data collected in 1995 (Hallam Knight Piésold (1996a), 2007 (Jacques Whitford AXYS 2008), 2009 and 2010 (Stantec 2010c), and 2017 to 2019 (Laberge, 2020b). Samples were collected during the late summer low flow period in 1995 (11 sites), 2007 (11 sites), 2009 (7 sites), 2010 (7 sites), 2017 – 2019 (9 sites). Samples were collected from riffle habitat to target the preferred habitat of the more sensitive benthic invertebrate species. Detailed descriptions of the field and laboratory methods, including QA/QC protocols, used to characterize benthic invertebrates are provided in Stantec (2010c) and Laberge (2020b).

Benthic invertebrate communities in all streams monitored had abundant pollution sensitive benthic invertebrate taxa that are common prey for fish. High abundance and numbers of taxa of Ephemeroptera, Plecoptera and Trichoptera (mayflies, stoneflies and caddisflies or EPT) is generally considered an indicator of good water quality and of food for fish.

In 2019, the highest densities of benthic invertebrates on record were documented in the Haggart Creek, Eagle Creek and Lynx Creek drainages. In fact, for Haggart Creek in particular, the densities were 2-3 times those of all previous years. Although densities were relatively high in 2019 for Dublin Gulch (W1), the highest density documented in the Dublin Gulch watershed occurred in 1995. Generally, except for Stewart Gulch (W26) in 1995, all sites had relatively high Simpson’s Diversity Index values over time, with the highest diversities for most sites occurring in 2018, and the lowest overall diversities occurring in 2010.

Fluctuation in numbers between monitoring events is related to many variables. Benthic community population numbers can be affected by climate (flooding, drought, rainfall events, unusually high or low temperatures), time of year sampled, sampling methods, disturbance to riparian zones, etc.

Although neither the same number of sites nor the same frequency of sampling is available per drainage, averages have been performed to give an overall idea of potential differences between watersheds. Based on the inclusion of 2019 data, these averages indicate that the most diverse communities are found in Haggart Creek, and in particular W4 and W23. The greatest populations of benthic communities have been in Dublin Gulch but they are less diverse. The greatest densities of organisms with moderately diverse communities have been documented in Lynx Creek. Overall, the limited data suggests stable benthic communities at all the sites sampled.

When comparing the most upstream site W22, Haggart Creek above Project influence, with all sample sites in Haggart Creek downstream of Project influence, the densities and diversities are very similar. This data suggests that there is little, if any, impact to Haggart Creek from construction activities at the Eagle Gold project site.

7 FISH AND FISH HABITAT

Baseline fish and fish habitat information was gathered from existing consultant reports, government databases, and the results of field studies conducted for the Project prior to VGC‘s claim ownership. Field studies were completed for watercourses located within the local Project area to obtain biophysical habitat data, determine fish presence and abundance, and characterize fish populations (i.e., size, age, and tissue metal concentrations). The fish and fish habitat study area includes:

- All watercourses in the Dublin Gulch watershed and lower Haggart Creek (below Dublin Gulch)
- Reference watercourses that would be uninfluenced by flows from the Dublin Gulch watershed (i.e., Ironrust Creek, Lynx Creek, and upper Haggart Creek [above Dublin Gulch])
- All watercourses that are crossed by or approach within 30 m of the site access road, which parallels Haggart Creek.

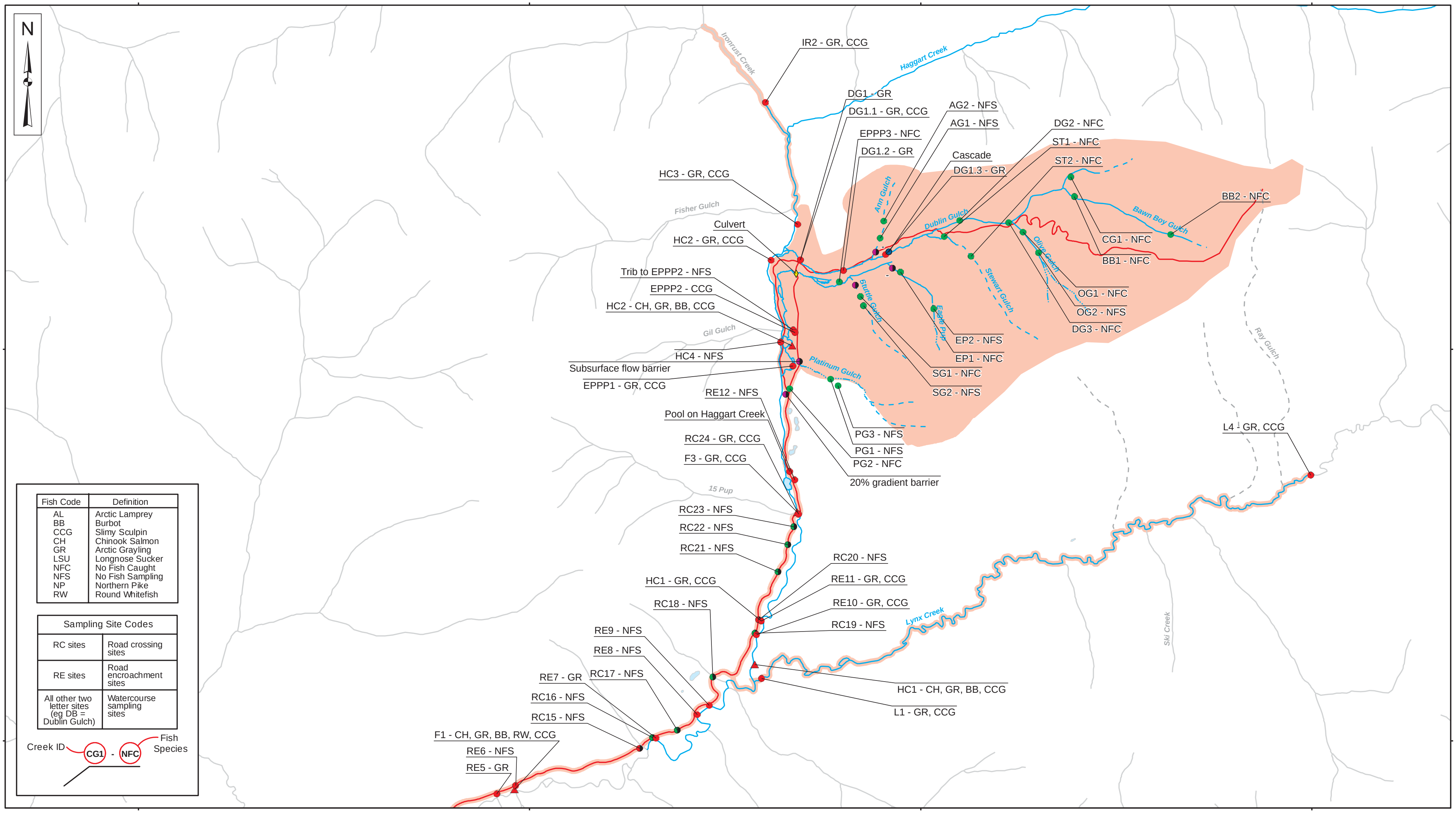
Although placer mining has occurred throughout the upper Haggart Creek watershed, including Dublin Gulch, it has not occurred in two of the selected reference watercourses: Ironrust and Lynx Creeks.

Field studies within the study area were completed over four sampling periods (August 2007, October 2007, April 2008, and July 2009) and included 59 sample sites, located on 28 mapped or field identified watercourses (Figure 7-1 to Figure 7-3). Results from the 2007-2009 Environmental Baseline Report: Fish and Fish Habitat are provided in Stantec (2010e). Since 2017, a total of 5 monitoring sites (HC1, HC2, HC3, IR2, and L1 Figure 7-4) are being monitored in the Haggart, Ironrust and Lynx creeks as per the Project’s Environmental Monitoring, Surveillance and Adaptive Management Plan (de Graff, 2020; de Graff 2019; de Graff 2017). The ongoing monitoring program focuses on monitoring the potential effects of the Project on the fish and fish habitat, with these sampling locations consistent with reaches and locations sampled as part of the baseline surveys and include representative reaches that include all mesohabitat types present in the watercourse.

Sampled watercourses were characterized as fish-bearing unless:

- Fish were not captured, despite the application of appropriate capture methods, during at least two different sampling periods
- The watercourse had physical characteristics that could explain fish absence (i.e., gradient >20% or a permanent barrier to upstream fish passage where no perennial fish habitat exists upstream of the barrier).

Fish density per unit area was estimated for fish-bearing sites sampled in Dublin Gulch, Ironrust Creek, Lynx Creek, and a subset of sites in Haggart Creek, using electrofishing via multiple pass removal methods.



Fish Code	Definition
AL	Arctic Lamprey
BB	Burbot
CCG	Slimy Sculpin
CH	Chinook Salmon
GR	Arctic Grayling
LSU	Longnose Sucker
NFC	No Fish Caught
NFS	No Fish Sampling
NP	Northern Pike
RW	Round Whitefish

Sampling Site Codes	
RC sites	Road crossing sites
RE sites	Road encroachment sites
All other two letter sites (eg DB = Dublin Gulch)	Watercourse sampling sites

LEGEND

Hallam Knight Piesold Ltd. Sampling (1996)
- Fish bearing
- Non fish bearing

Stantec Sampling
- Fish bearing
- Fish bearing (inferred)
- Non fish bearing
- Non fish bearing (inferred)
- Cascade barrier
- Culvert barrier
- Gradient barrier

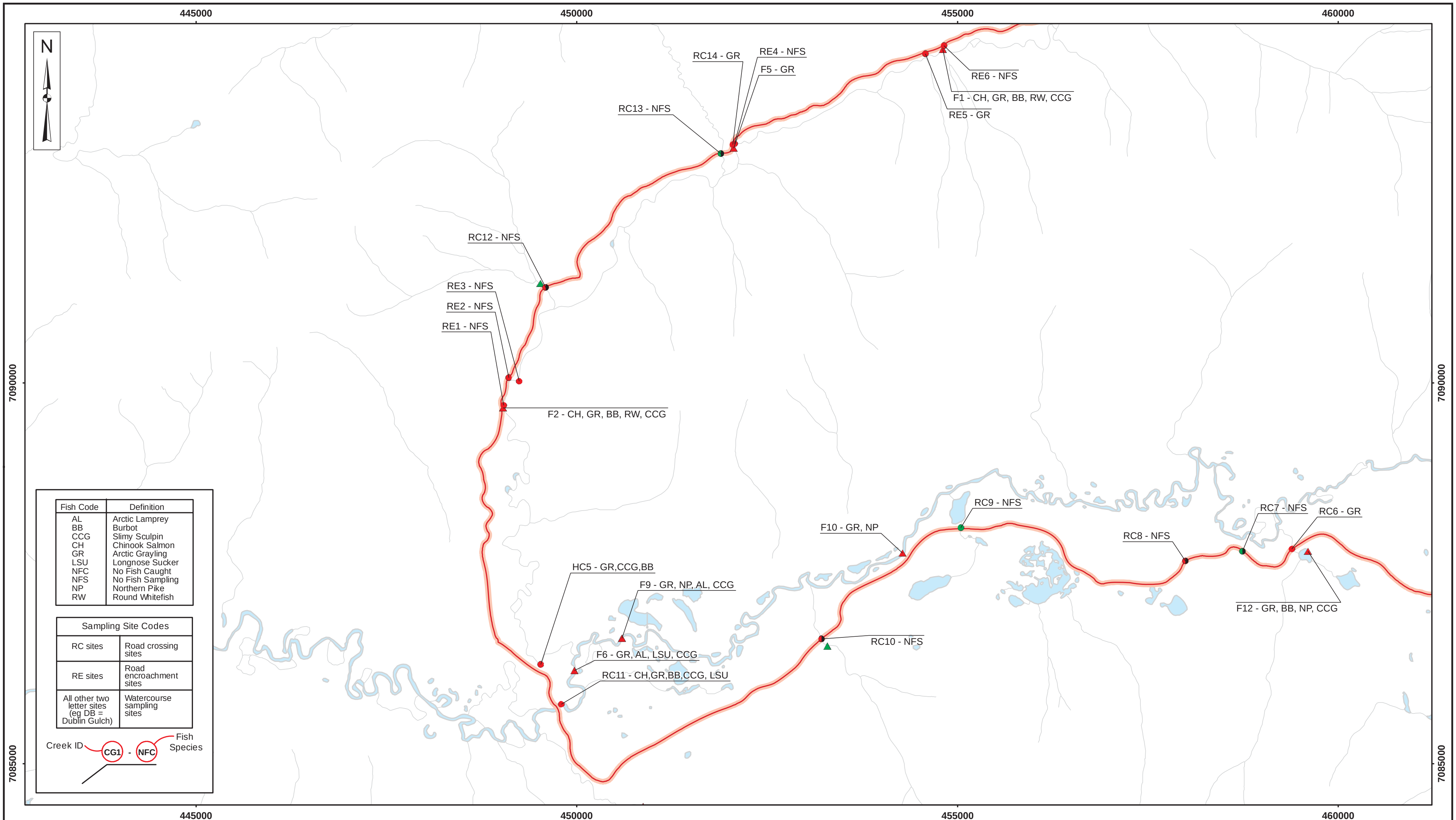
Watercourse
- Fish bearing (perennial)
- Non-fish bearing (perennial)
- Non-fish bearing (intermittent)
- Non-fish bearing (ephemeral)
- Unsampled (perennial)
- Unsampled (ephemeral)

- Fish and Fish Habitat Local Study Area
- Road - Gravel
- Waterbody

VICTORIA GOLD CORP

0 1 2
Kilometres
Scale = As Shown

PROJECTION	DRAWN BY	EAGLE GOLD PROJECT YUKON TERRITORY
NAD83 Zone 8N		
DATE	FIGURE	FISH AND FISH HABITAT STUDY AREA SHEET 1 OF 3
2014/03/26	7-1	



LEGEND

Hallam Knight Piesold Ltd. Sampling (1996)
- Fish bearing
- Non fish bearing

Stantec Sampling
- Fish bearing
- Fish bearing (inferred)
- Non fish bearing
- Non fish bearing (inferred)

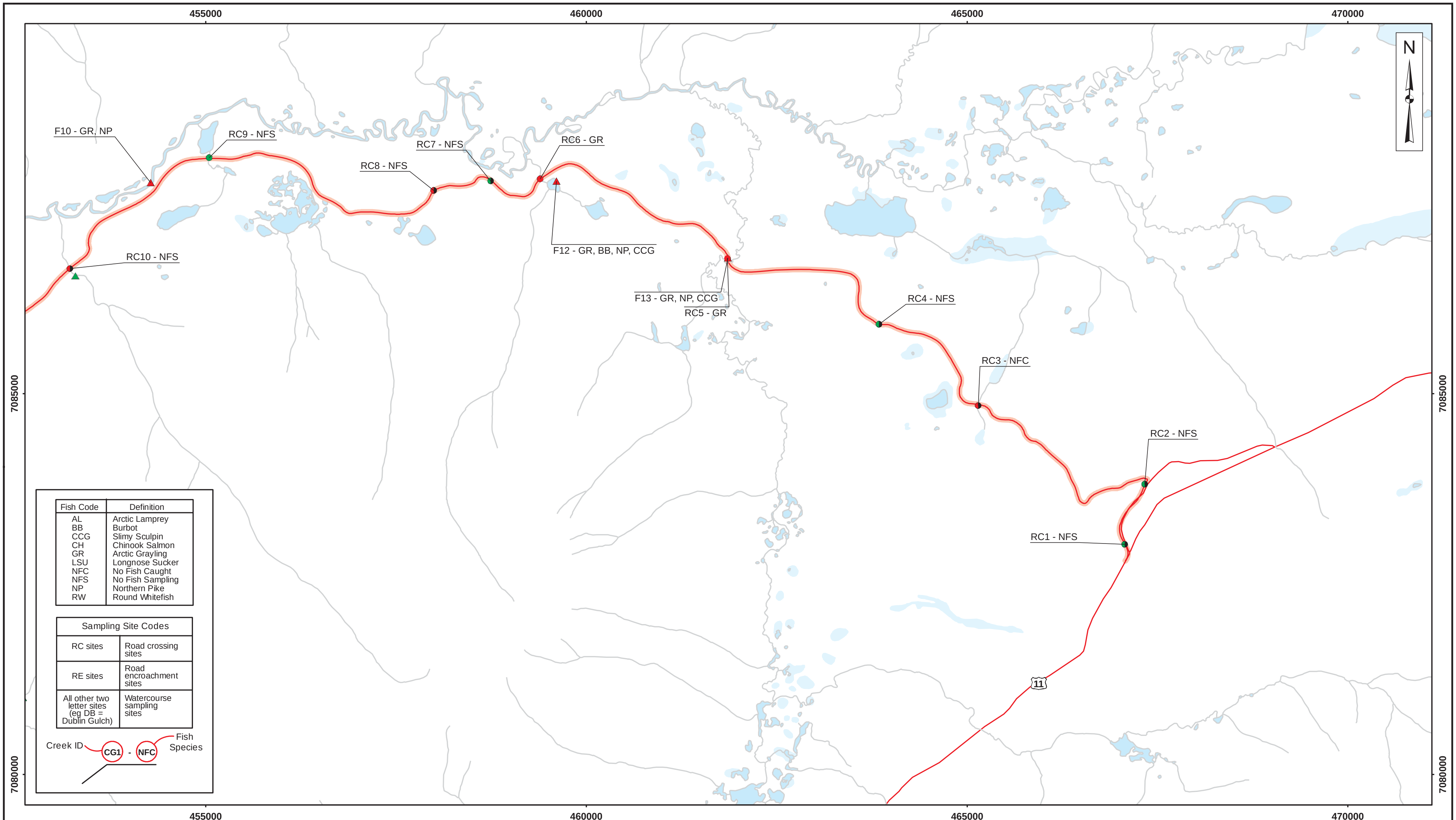
Watercourse
- Unsampled (perennial)

- Fish and Fish Habitat Local Study Area
- Road - Gravel
- Waterbody

VICTORIA GOLD CORP

0 1 2
Kilometres
Scale = As Shown

PROJECTION	DRAWN BY	EAGLE GOLD PROJECT YUKON TERRITORY
NAD83 Zone 8N		
DATE	FIGURE	FISH AND FISH HABITAT STUDY AREA SHEET 2 OF 3
2014/03/26	7-2	



Fish Code	Definition
AL	Arctic Lamprey
BB	Burbot
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CH	Chinook Salmon
GR	Arctic Grayling
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NFC	No Fish Caught
NFS	No Fish Sampling
NP	Northern Pike
RW	Round Whitefish

Sampling Site Codes	
RC sites	Road crossing sites
RE sites	Road encroachment sites
All other two letter sites (eg DB = Dublin Gulch)	Watercourse sampling sites

LEGEND

Hallam Knight Piesold Ltd. Sampling (1996)
- Fish bearing
- Non fish bearing

Stantec Sampling
- Fish bearing
- Fish bearing (inferred)
- Non fish bearing
- Non fish bearing (inferred)

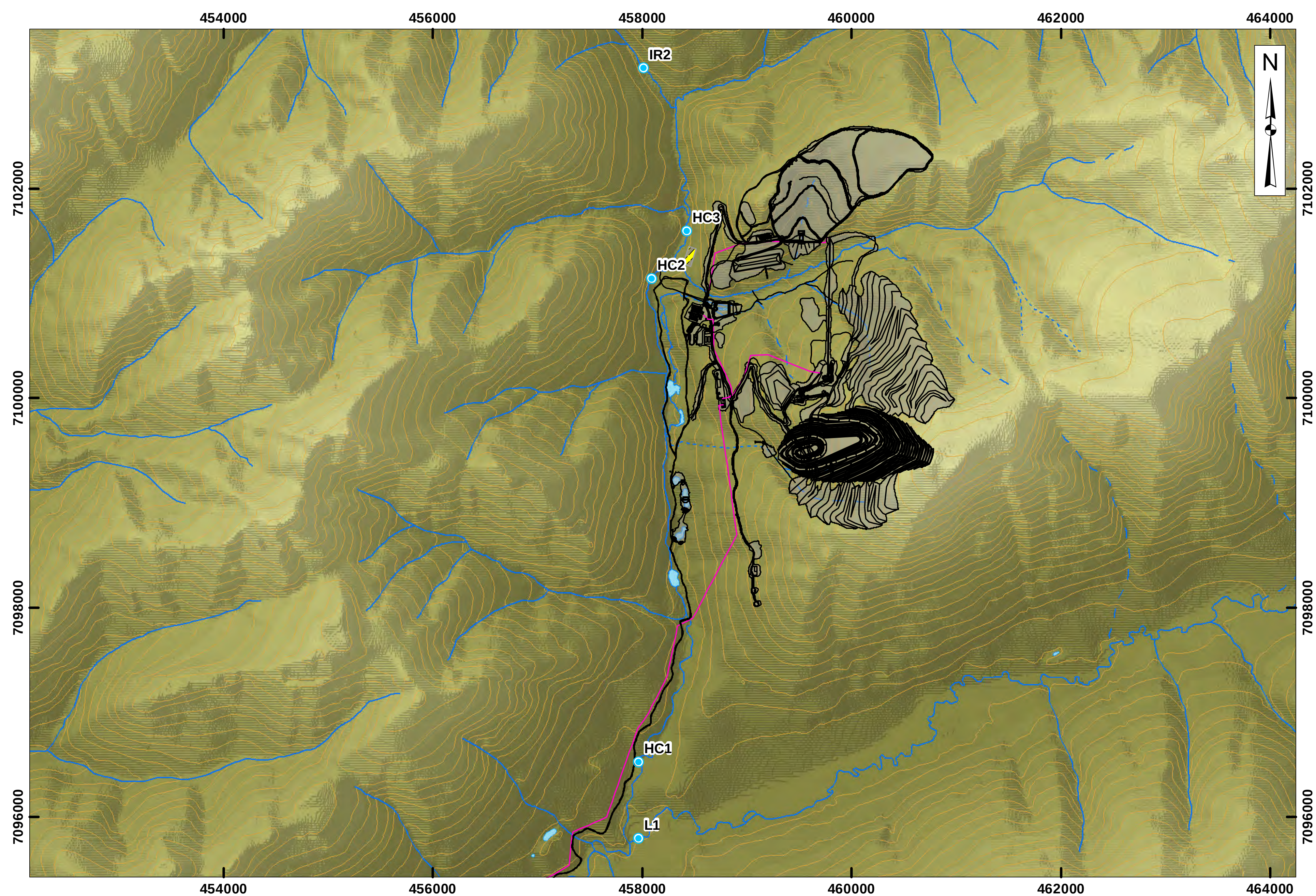
Watercourse
- Unsampled (perennial)

- Fish and Fish Habitat Local Study Area
- Road
- Waterbody
- Waterbody

VICTORIA GOLD CORP

0 1 2
Kilometres
Scale = As Shown

PROJECTION	DRAWN BY	EAGLE GOLD PROJECT YUKON TERRITORY
NAD83 Zone 8N		
DATE	FIGURE	FISH AND FISH HABITAT STUDY AREA SHEET 3 OF 3
2014/03/26	7-3	



Legend:

- Monitoring Location
- Reserved Area
- Facility
- Site Power
- Contour (100ft)
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

VICTORIA GOLD CORP

0 0.25 0.5 1
Kilometers

Projection: NAD 83 Zone 8N	Drawn By: HC	EAGLE GOLD PROJECT YUKON TERRITORY	
Date: 2020/07/30	Figure: 7-4	Current Fish and Fish Habitat Study Area	

7.1 WATERCOURSE FISH-BEARING STATUS

Of the 26 watercourses sampled in the study area during the 2007-2009 field studies, 14 were identified as fish-bearing or potentially fish-bearing and 12 were as non-fish-bearing (Figure 7-1 to Figure 7-3). The 14 fish-bearing watercourses were:

- Haggart Creek, lower reaches of Dublin Gulch, and the lower reaches of Eagle Pup (including a pond created for historic placer mining operations and its tributary stream)
- Two watercourses sampled as reference watercourses—Lynx Creek and Ironrust Creek
- Nine additional watercourses crossed by the site access road including: North Star, Bighorn, Cadillac, and Secret creeks; the South McQuesten River, one unnamed tributary of Haggart Creek, and two unnamed tributaries of the South McQuesten River.

A summary of the data collected for all identified fish-bearing watercourses is presented in Stantec (2010e). The 12 watercourses identified as non-fish-bearing were as follows:

- Two watercourses with barriers to upstream fish passage—Upper Dublin Gulch (a gradient barrier located 1.5 km upstream of the confluence with Haggart Creek) and Upper Eagle Pup (a perched culvert located 1.9 km upstream of the confluence with Haggart Creek)
- Six tributaries to the non-fish-bearing upper reaches of Dublin Gulch and Eagle Pup—Suttles Gulch, Ann Gulch, Bawn Boy Gulch, Stewart Gulch, Olive Gulch, Cascallen Gulch
- Four watercourses with fish passage barriers that were located outside the Dublin Gulch and Eagle Pup watersheds: Platinum Gulch and three un-named watercourses crossed by the access road (sample site numbers RC1, RC13, and RC16).

7.2 FISH SPECIES DISTRIBUTION

At least 11 fish species are known to occur in the South McQuesten River watershed, including Chinook salmon (*Oncorhynchus tshawytscha*), Arctic grayling (*Thymallus arcticus*), northern pike (*Esox lucius*), longnose sucker (*Catostomus catostomus*), Arctic lamprey (*Lampetra camtschatica*), burbot (*Lota lota*), slimy sculpin (*Cottus cognatus*), round whitefish (*Prosopium cylindraceum*), inconnu (*Stenodus leucichthys*), lake whitefish (*Coregonus clupeaformis*), and rainbow trout (*Oncorhynchus mykiss*) (DFO 2010). No freshwater fish species on Schedules 1 or 2 of the Federal *Species at Risk Act* (SARA) are present in the South McQuesten River watershed or the entire Yukon Territory (Government of Canada 2012). Haggart and Lynx creeks are both known to contain five fish species: Chinook salmon, Arctic grayling, round whitefish, burbot, and slimy sculpin (DFO 2010). Ironrust Creek, Dublin Gulch and Eagle Pup are known to be inhabited by Arctic grayling and slimy sculpin (Hallam Knight Piésold 1996b, DFO 2010).

The 2007 to 2009 baseline field program for this Project captured five fish species from ten different watercourses (Figure 7-1 to Figure 7-3). Arctic grayling were captured in nine watercourses and slimy sculpin were captured in seven. Burbot were captured in the South McQuesten River and lower Haggart Creek. Chinook salmon and longnose sucker were observed in the South McQuesten during the July 2009 snorkel survey.

Previous studies reported the presence of Chinook salmon (*Oncorhynchus tshawytscha*) in Haggart and Lynx creeks (Madrone 2006; Hallam Knight Piésold 1995, 1996b, 1996c; DFO 2010). In the 2007 to 2009 Dublin Gulch sampling programs, Chinook salmon were not captured at any of the Haggart and Lynx creek sites. Previous studies also reported the presence of Chinook salmon in the South McQuesten River, which was confirmed by the sighting of juvenile Chinook (est. age 1+) during a snorkel survey of the South McQuesten River at the access road crossing on July 23, 2009. No adult Chinook spawners or evidence of spawning were observed in the South McQuesten River during the July 2009 survey. However, Chinook spawners were observed in August 2009 adjacent to the South McQuesten River Bridge immediately downstream of the mouth of Haggart Creek by Stantec personnel (Gardner 2010, pers. comm.). During the 2019 survey, six Chinook salmon were captured at site HC1, three at site HC3 and one at site IR2 (de Graff, 2020). The presence of juvenile Chinook salmon at these locations represents their furthest upstream occurrence to date in the Haggart Creek watershed. Chinook salmon juveniles (age 0+) were not captured during the 2018 assessment and their absence is believed to be related to either a weaker brood year and/or cold environmental conditions at the time of sampling in mid-September influencing their distribution in the drainage.

The composition of captured fish in 2019 was represented by four species that included in decreasing frequency: slimy sculpin (35), Arctic grayling (24), Chinook, salmon (10) and burbot (1) (de Graff, 2020). Slimy sculpin dominated the overall catch in 2019 and were found at all five monitoring sites. Sites HC1 and HC3 in Haggart Creek were locations that had the highest frequency of capture. Only modest numbers (5 or less) were encountered at sites HC2, IR2 and L1. Sculpin total lengths ranged from 50 to 125 mm indicating the presence of both juvenile and adult life history stages. This size range was similar to those reported by Stantec (2010) in their baseline study. Based on captures, the implied densities of sculpin encountered at the Haggart Creek sites were generally greater than in 2018 and similar to 2017. It is believed that the cold-water temperatures and ice conditions during the 2018 assessment negatively influenced catch.

Arctic grayling were most frequently captured at site HC1 during 2019 survey, as was the case during the 2017 and 2018 assessments. Only a few were captured at the other sites (3 or less) with the exception of site IR2 where they were neither observed or caught. All captures during this assessment, with the exception of one large male that was angled at site L1, were believed to be young-of-the-year and ranged in fork length from 67 to 85 mm. Older age classes were noticeably absent in the catch. This artifact may have been a function of their distribution in the watershed during the September sampling window.

7.3 FISH RELATIVE ABUNDANCE

Arctic grayling and slimy sculpin were the only species caught during electrofishing depletion surveys, which were completed in Ironrust Creek, Haggart Creek, Lynx Creek, and in Dublin Gulch. Both species were present in low densities in these watercourses. There were no consistent differences in estimated Arctic grayling densities among the waterbodies sampled.

The results from the 2019 monitoring program were comparable to the 2017 and 2018 assessments as well as past baseline studies as indicated by the measured biophysical characteristics and fish species found inhabiting each of the five monitoring sites. While the absolute number of fish captures varied, the species composition continues to be consistent and indicative of a stable fish community (de Graff, 2020).

7.4 HABITAT USAGE

The majority of Arctic grayling in the Project area are thought to overwinter in the South McQuesten River and migrate into Haggart Creek and its tributaries to rear during summer (Pendray 1983). The summer migration into Lynx Creek has been observed to occur during June and early July (Pendray 1983). The timing of outmigration to overwintering areas has not been observed for the Project Area; however, baseline assessment for this Project demonstrated that densities of Arctic grayling in Dublin Gulch were similar during July, August, and October, even though anchor ice was beginning to form on the stream margins during the October sampling program. This suggests that significant outmigration may not occur from Dublin Gulch until after October.

The documented capture of juvenile Arctic grayling in Haggart Creek during May, at a location 19 km upstream from the South McQuesten River (Pendray 1983), suggests that some Arctic grayling may overwinter in the Haggart Creek watershed. The baseline assessment documented potential overwintering habitat (i.e., with residual pool depth ≥0.8 m) at sample sites in Lynx and Haggart creeks. Furthermore, a large number of Arctic grayling were captured from a large pool on Haggart Creek in April 2008 (i.e., after freeze up but before breakup). It is assumed that this unnaturally large pool (1 ha in area and over 10 m deep) was created by placer mining operations and was not present during fish studies conducted in the early 1980’s (Pendray 1983) or 1996 (Hallam Knight Piésold 1996b, 1996c). This pool created by placer mining and the South McQuesten River likely represent important overwintering habitat for Arctic grayling in the study area. The quality of potential overwintering habitat in fish-bearing streams within the Project footprint (i.e., Dublin Gulch and Eagle Creek) is poor due to residual pool depths ≤0.3 m that most likely freeze to the bottom in winter.

Pendray (1983) observed that spawning by Arctic grayling in this region occurred predominantly in the South McQuesten River during the last two weeks of May. He also identified a small area at the mouth of Haggart Creek as a probable spawning site. Since spawning occurs in late May, immediately after ice breakup, Arctic grayling that winter in the Haggart Creek watershed might also spawn in the Haggart watershed. The baseline fisheries assessment for the Project identified areas of good to excellent quality potential spawning habitat for Arctic grayling—with modest currents (0.5 – 1.0 m/s), depths of 0.1 – 0.4 m, and 2 – 4 cm diameter gravel (McPhail 2007)—in Lynx, Haldane, Secret, and Haggart creeks. The quality of potential spawning habitat provided by Dublin Gulch and Eagle Creek within the mine site footprint was poor, primarily due to lack of suitable gravel.

As the majority of Arctic grayling in the study area are thought to overwinter and spawn in the South McQuesten River (Pendray 1983), Arctic grayling primarily use study area streams as summer rearing habitat. Good to excellent rearing habitat was present at sample sites in the South McQuesten River, Bighorn Creek, Haggart Creek, Haldane Creek, Lynx Creek, Ironrust Creek, and North Star Creek. The quality of potential rearing habitat provided by the fish-bearing streams Dublin Gulch and Eagle Creek was moderate, primarily due to lack of cover, high stream gradients, or insufficient channel depths.

8 VEGETATION

The information below summarizes Stantec (2011c) and Laberge (2019). Vegetation baseline study areas consist of a Local Study Area (LSA), a Regional Study Area (RSA), and a Road Corridor Study Area (RCSA). For the purposes of the vegetation assessment, the RSA and RCSA were combined to form the Regional Assessment Area (RAA), while the Local Assessment Area (LAA) includes the baseline LSA and a buffered area adjacent to the transmission line and access road.

The current vegetation monitoring program commenced in 2018 and has been designed to evaluate changes to metal deposition and uptake within vegetation during the construction and operational phases of the Project. Specifically, metal burden in and on plant tissues is measured annually during the growing season of each year to help identify whether any trends may be attributed to the Project.

8.1 LAND COVER (ECOSYSTEM MAPPING)

Terrestrial ecosystem mapping (TEM) was completed for an area of approximately 7,538 ha surrounding the Project. This included 1:10,000 scale mapping of the 1,606 ha LSA covering the area where Project disturbances were/are expected and the 7,538 ha RSA. The 1:20,000 RSA mapping is used to provide regional context. Ecosystem mapping (1:20,000) was also prepared for the one kilometre wide Road Corridor Study Area (RCSA) along the 44.8 km long access road (4,580 ha). A Project specific ecosystem classification system, based on field data collected in 2009 and literature review, was developed for the study areas. A completed description of the TEM methodology is provided in Stantec (2011c). The area occupied by each of the vegetated and non-vegetated ecosystem units summarized by ecological zone (i.e., Forested and Subalpine) for the study areas is provided in Table 8-1**Error! Reference source not found.**. The table also presents the area covered by disturbances such as main roads, exploration trails, seismic lines, and mining activity such as placer, trenching or drilling prior to construction of the Project. A total of 21 vegetated ecosystem units and nine non-vegetated units were mapped.

Two ecological zones were delineated in the baseline study areas: the Subalpine zone and the Forested (Boreal) zone. The majority of Project activities occur in the Forested zone. The Subalpine zone, which covers 1,502 ha in the RSA, occurs on the ridge tops and high plateaus above approximately 1,225 masl. Baseline condition tree cover was discontinuous or absent at this elevation, and the vegetation is dominated by dwarf birch, willows, ericaceous shrubs, herbs, mosses, and lichens. The highest points within the three study areas is 1,520 masl. These upper elevations are dominated by dwarf-shrub, heath and lichen communities.

The Forested zone (11,450 ha), which is part of the northern boreal forest (Boreal Cordillera Ecoregion), includes the valley bottoms, and the slopes of the mountains below the treeline. The elevation range of this zone in the three study areas is 600 masl up to the Subalpine zone, about 1,225 masl. Open canopy stands of black spruce are generally present on moist sites and on the lower portions of north facing slopes. However, coniferous dominated forests consisting of white and black spruce are found along creeks and rivers and on well drained sites. Ericaceous shrubs and feather mosses are most common in the understory of the coniferous forests. On the upper slopes, open subalpine fir stands are predominant with trees becoming smaller and more spread out with increasing elevation; the cover of willows, dwarf birch and ericaceous shrubs increase as the canopy opens. Mixed forests, consisting of white spruce, trembling aspen, and Alaska birch are also present on warm aspects or near-mesic sites that have been disturbed by forest fire. Small deciduous stands dominated by aspen (warm aspects) and Alaska birch are also occasionally present in the study area.

Table 8-1: Summary of Mapped Ecosystem Units

Ecological Zone	Map Code	Eagle Gold Ecosystem Name	LSA (ha)	RSA (ha)	RCSA (ha)	Totals (ha)
Forested	AK	Aspen – Kinnikinnick	13.7	63.0	47.7	124.4
Forested	AW	Alaska birch-White spruce-Willow	30.3	383.3	280.1	693.7
Forested	BL	Dwarf birch-Lichen	10.4	31.6	0.1	42.1
Forested	BS	Black spruce-Sphagnum	-	163.1	319.6	482.7
Forested	CL	Cliff	-	0.3	-	0.3
Forested	ES	Exposed Soil	2.7	0.3	-	3.0
Forested	FC	Subalpine fir-Cladina	353.6	1,363.7	59.7	1,777.0
Forested	FF	Subalpine fir-Feathermoss	95.9	729.8	41.5	867.2
Forested	FM	Subalpine Fir-Labrador tea	93.9	1,012.7	116.8	1,223.4
Forested	FP	Subalpine fir–Dwarf birch-Crowberry	61.6	128.7	0.4	190.7
Forested	GB	Gravel Bar	0.1	0.1	16.1	16.3
Forested	MA	Marsh	-	0.5	19.5	20.0
Forested	OW	Open Water	-	-	66.2	66.2
Forested	PD	Pond	-	-	1.9	1.9
Forested	PH	Balsam poplar-Horsetail	-	-	16.0	16.0
Forested	PM	Placer Mine	5.1	14.6	18.0	37.7
Forested	RI	River	0.1	30.2	75.4	105.7
Forested	RO	Rock Outcrop	3.1	23.2	0.4	26.7
Forested	SA	Dwarf birch-Northern rough fescue	35.3	93.4	-	128.7
Forested	SC	Black spruce-Cladina	-	18.0	401.5	419.5
Forested	SF	White spruce-Feathermoss	4.6	-	374.9	379.5
Forested	SH	White spruce-Horsetail	25.0	139.4	423.8	588.2
Forested	SL	Black spruce-Labrador Tea-Feathermoss	166.7	852.7	1,989.8	3,009.2
Forested	TA	Talus	4.4	5.6	-	10.0
Forested	WG	Willow-Groundsel	28.1	70.1	11.3	109.5
Forested	WH	Willow-Horsetail	10.5	-	35.8	46.3
Forested	WM	Willow-Mountain sagewort	-	67.3	-	67.3
Forested	WS herb stage	Willow-Sedge	0.4	8.3	15.1	23.8
Forested	WS shrub stage	Willow-Sedge	-	-	38.3	38.3
Subalpine	BL	Dwarf birch-Lichen	60.8	151.2	–	212.0
Subalpine	ES	Exposed Soil	0.1	0.4	–	0.5
Subalpine	FP	Subalpine fir–Dwarf birch-Crowberry	56.4	232.4	–	288.8
Subalpine	MM	Mountain heather meadow	4.0	33.8	–	37.8
Subalpine	MW	Mountain avens – Dwarf willow	7.3	32.6	–	39.9

Ecological Zone	Map Code	Eagle Gold Ecosystem Name	LSA (ha)	RSA (ha)	RCSA (ha)	Totals (ha)
Subalpine	RO	Rock Outcrop	–	11.1	–	11.1
Subalpine	SA	Dwarf birch-Northern rough fescue	249.2	176.7	–	425.9
Subalpine	TA	Talus	3.5	26.1	–	29.6
Subalpine	WG	Willow-Groundsel	11.8	–	–	11.8
Subalpine	WM	Willow-Mountain sagewort	25.9	0.3	–	26.2
Subtotals			**1,364.7**	**5,853.7**	**4.370.1**	**11,588.5**
Pre Project-Construction Disturbances			241.3	78.4	210.5	530.2
Totals			**1,606.0**	**5,932.1**	**4,580.5**	**12,118.6**

8.2 METALS IN VEGETATION

To characterize baseline levels of trace metal concentrations in vegetation, samples were collected and analyzed for a full suite of metals at nine locations in and around the LSA during the ecological mapping field survey. Samples consisting of leafy branches or stems and/or leaves were collected from willows species and graminoids at each site. All samples were analyzed using inductively coupled plasma mass spectrometry (ICP-MS) at CANTEST in Richmond, BC. Mercury concentrations were determined using Cold Vapour Atomic Absorption Spectrophotometry or Cold Vapour Atomic Fluorescence Spectrophotometry.

Results of the analysis were compared to dietary tolerances of cattle based on thresholds outlined in Puls (1994). Tolerances of cattle were used since the dietary tolerance of wild ungulates is generally not known. All elements were below toxic levels for dietary intake by cattle for all sites and species sampled based on dietary guidelines. Barium concentration was high, but not toxic/excessive, in grasses at one site and willows at another. Phosphorus and potassium concentrations were deficient for all sites and all plant species.

Four sites were established as part of the Environmental Monitoring, Surveillance and Adaptive Management Plan, with samples collected in August 2018 and July 2019. For the majority of the metals compared against the same dietary tolerances as earlier studies (Puls 1994), concentrations in the 2019 foliar samples were well below these levels (Leberge 2019). The exception to this was manganese and selenium. Dwarf birch leaves from the east and north plots at D-1 and the east plot at D-3 slightly exceeded the low end of the manganese toxic threshold of 2000 mg/kg. This was a similar result as noted in the 2018 sampling program. The toxic threshold for selenium was exceeded in one equisetum tissue sample collected from the north plot of D-2B, however all other selenium samples within the D-2B plot were well below the selenium guideline. In comparison, selenium concentrations in the 2018 samples were well below the toxic threshold. Barium does not have a toxic threshold; however, a concentration of 20 mg/kg was considered high by Puls (1994). This value was exceeded in many of the foliar samples collected from all of the sites in both 2018 and 2019.

Potential emissions related to the gold recovery process include the metals arsenic, cadmium, chromium, mercury and lead. No exceedances of toxicity thresholds for beef cattle (Puls 1994) were reported for these elements in 2018 and 2019 samples.

8.3 PLANT COMMUNITIES AND ASSEMBLAGES

The area occupied by ecosystem units was summarized by various land cover types (or patches) for the study areas (Table 8-2**Error! Reference source not found.**) during the baseline vegetation assessment completed in 2009 and 2010 for the Project (Stantec, 2011c). At the effective date of the assessment, coniferous dominated forest was the most common land cover type found in the LSA (45%), RSA (67%) and RCSA (65%). Dwarf birch dominated ecosystems are the next most common land cover type in the LSA and RSA. They occupied about 29 and 14% of these areas, respectively. These ecosystems dominate the ridge top and plateau found in the Subalpine zone. Disturbances, associated with exploration and previous mining activities cover about 15% of the LSA compared to about 1% of the RSA overall and 5% of the RCSA. Riparian areas (7%) and deciduous forest (3%) are the next most common land cover types in the LSA. Riparian areas are associated with Haggart Creek, Dublin Gulch and ephemeral streams found throughout the LSA. Wetlands are uncommon in both the local and regional study areas, however they are the second most abundant cover type in the RCSA. Non-vegetated units such as rock, talus and exposed soil and dwarf shrub land-cover types each occupy less than one percent of the LSA. The dwarf shrub ecosystem types are found in the Subalpine ecozone.

Table 8-2: Ecosystem Category Summaries

Ecosystem Category	Map Codes	LSA		RSA		RCSA	
		(ha)	(%)	(ha)	(%)	(ha)	(%)
Conifer forest	FC, FF, FM, SC, SF, SL	714.8	45	3,976.9	67	2,984.2	65
Dwarf birch dominated	BL, FP, SA	473.8	29	813.8	14	0.5	<1
Riparian areas*	GB, PH, RI, SH, WG, WM	120.6	7	399.2	7	664.4	15
Deciduous forest	AK, AW, PH	44.0	3	446.3	8	343.8	8
Wetlands	BS, MA, OW, PD, WH, WS	10.8	<1	161.5	3	495.5	11
Rivers	RI	0.1	<1	30.2	<1	75.4	2
Rock/talus/exposed soil	CL, ES, RO, TA	13.8	<1	67.0	1	0.4	<1
Dwarf shrub	MM, MW	11.3	<1	66.4	1	0	0
Mining areas	PM	5.1	<1	14.6	<1	18.0	<1
Disturbances	Na	241.3	15	78.4	1	210.5	5

NOTE: Only riparian ecosystems are listed in the table, although other ecosystems and non-vegetated units are present within the riparian corridors.

Old forest patches occupy about 14% of the LSA. These consist of ecosystems dominated by white or black spruce at lower elevations and ecosystems dominated by subalpine at higher elevations.

Rare plant surveys were conducted in 2009 and 2010 within the local study area and along specific sections of the road in 2010. One rare plant species, island purslane (*Koenigia islandica* L.), was identified at a single location in the LSA. A relatively small patch of this plant, covering about 2 m x 2 m was found in Bawn Boy Gulch.

8.4 WETLANDS

Wetlands are uncommon in the LSA. These shrub and herb dominated wetlands cover about 10.8 ha (<1%) of the area.

Wetlands are more common in the RSA (3%). These wetlands are associated with the Lynx and Haggart Creek valley bottoms. The nearest major wetland complex identified by Smith, et al. (2004) is located at McQuesten Lake, approximately 25 to 30 km to the east-northeast of the Project. Wetlands are most common in the RCSA (11%) largely due to the fact the access road is located in valley bottoms.

9 WILDLIFE AND WILDLIFE HABITAT

Background information, methods, and results for the baseline wildlife studies conducted for the project are provided in Stantec (2011b). Ongoing monitoring for the Project, since the completion of baseline wildlife studies, includes the annual late winter moose survey, pre-clearing surveys, and completion of incidental wildlife observation records. With the exception of the discussion regarding moose distribution, the information presented for wildlife and wildlife habitat represents pre-construction conditions.

9.1 WILDLIFE STUDY AREAS

9.1.1 Local Study Area

The baseline Local Study Area (LSA) consisted of an approximately 18 km^2 area encompassing the Project site and a surrounding buffer ranging from 0.5 to 1 km as shown in Figure 9-1. The LSA was chosen to encompass the area in which direct effects on wildlife could occur.

9.1.2 Access Road Study Area

The Access Road Study Area (ARSA) was designed to assess the potential effects associated with the access road. The ARSA was created by buffering the South McQuesten Road and the Haggart Creek Access Road by 500 m on each side up to the Eagle Gold camp site. The ARSA is approximately 44.8 km in length and 45.8 km^2 (Figure 9-1). The access road study area was intended to provide a baseline for potential disturbance to wildlife resources that may occur due to realignment of the Project access road and use of the road during the Project.

9.1.3 Regional Study Area

The Regional Study Area (RSA) consisted of a 23 km by 21 km (483 km^2) area surrounding the Project site (Figure 9-1). This area was chosen because it is large enough to potentially encompass a grizzly bear home range, raptor nest sites (e.g., cliff habitat), and movement corridors (riparian drainages). It includes the Lynx Creek watershed to the south (which is relatively undisturbed when compared to the majority of the placer-mined drainages in the area), the McQuesten River watershed to the north, and the major habitat types present in the region

9.2 ABUNDANCE AND DISTRIBUTION OF HABITAT TYPES

The wildlife Regional Study Area (RSA) contains two ecological zones:

- The forested zone ranges from 600 m asl elevation to 1,225 m asl and includes the valley bottoms and the slopes of the mountains below the tree line. In the valley bottoms, forests are dominated by open canopy stands of black spruce (*Picea mariana*) with white spruce (*Picea glauca*) found along creeks and rivers. Lower forested habitats adjacent to riparian corridors are areas with high potential to support wildlife. In particular, both moose (*Alces alces*) and grizzly bear (*Ursus arctos*) are likely to use these areas seasonally at differing levels of intensity when forage opportunities are most abundant (e.g., seasonally ripe berries, newly emerged vegetation) or when shelter and insulation from winter weather is required. On the mid to lower slopes, continuous stands of subalpine fir (*Abies lasiocarpa*) occur along with minor components of white spruce, Alaska birch (*Betula neoalaskana*), trembling aspen (*Populus* *tremuloides*), and black spruce. On the upper slopes and up to tree line, open subalpine fir stands are predominant with trees becoming smaller and more spread out with increasing elevation.

- The subalpine zone occurs on the ridge tops and high plateaus above 1,225 m asl. Here tree cover is discontinuous or absent and the vegetation is dominated by scrub birch (*Betula glandulosa*), willows (*Salix* sp.), ericaceous shrubs, herbs, as well as mosses and lichens. The tree and shrub layers found in the subalpine zone are used by moose to support both feeding and cover from spring through fall. Elevations above 1,500 m asl are dominated by ecosystems containing a mixture of shrubs, graminoids, herbs, bryophytes, and lichens.

Terrestrial ecosystem mapping was completed for the LSA following standard methods (Resource Inventory Committee [RIC] 2002). A total of 21 vegetated ecosystem units and nine non-vegetated units were mapped in the LSA. A description of the site characteristics and dominant species for these ecosystems is provided in Stantec (2011c).

Coniferous forest habitat dominates the LSA, covering 66% of the area. It is composed of primarily subalpine fir, white spruce, and black spruce. Dwarf birch (*Betula nana*) dominated ecosystems cover a smaller portion of the LSA (11%). They are represented by dwarf birch, alpine herbs and lichens. Little deciduous forest habitat occurs, covering only seven percent of the LSA. It is dominated by trembling aspen, Alaska birch, and balsam poplar (*Populus balsamifera*). These patterns influence the distribution of wildlife species, as described in the following sections.

9.3 HABITATS OF SPECIAL INTEREST

The Yukon Government has identified Wildlife Key Areas (WKAs), which are used by wildlife for critical life functions (Environment Yukon 2009). The nearest WKA to the Project lies outside the RSA in the South McQuesten River and McQuesten Lake area. It includes summer nesting habitat for ducks in the wetlands upstream of McQuesten Lake; for Peregrine Falcon (*Falco peregrines anatum/tundrius*), Osprey (*Pandion haliaetus*), and Bald Eagle (*Haliaeetus leucocephalus*) on McQuesten Lake; and for Gyrfalcon (*Falco rusticolus*) and Golden Eagle (*Aquila chrysaetos*) immediately north of McQuesten Lake. Based upon local knowledge (Environment Yukon 2009), late-winter moose range is identified approximately 55 kilometres northwest of the Project site, outside of the RSA. No WKA is recorded in the RSA or LSA (Environment Yukon 2009). Information obtained via the Traditional Knowledge and Use Study (Stantec 2010f) indicated that FNNND Settlement Lands south of the Project site and adjacent to the access road and the area north of the Project site near the Potato Hills provide important moose habitat at various seasons.

A number of important habitat types are present within the LSA (Figure 9-2). They are considered important based upon their relative scarcity within the LSA and their importance for wildlife species that are specialized or considered habitat type obligates. These habitats include:

- Old growth Forest
- Wetlands
- Riparian corridors
- Areas previously disturbed by fire

Approximately 2,077 ha, or 18% of the LSA, is comprised of old growth coniferous forest. These forests consist of ecosystems dominated by white or black spruce at lower elevations and ecosystems dominated by subalpine fir at higher elevations. Old growth forest habitat is important for wildlife species such as American marten (*Martes americana*). Bears may use these areas for hibernation, with dens dug beneath the root wads of large trees. Moose may also seek out mature coniferous forest primarily for warmth in winter.

Wetlands are uncommon and account for approximately 6% of the LSA. They include sphagnum bogs, sedge fens, marshes, ponds, and areas of open water. The majority of wetlands in the LSA are adjacent to the access road, and are associated with the poorly drained valley bottoms along Lynx Creek, Haggart Creek, and portions of the South McQuesten River. While no wetlands have been identified as WKAs within the RSA or LSA, these ecosystems still play important roles for animals that frequent the RSA and LSA, such as preferred feeding habitat for moose and grizzly bear as well as other wildlife species such as Rusty Blackbird (*Euphagus carolinus*). The access road, particularly along the first approximately 20 km leading from the Silver Trail Highway, parallels the South McQuesten River and associated wetlands. This area is known locally as an important calving and rutting area for moose (O'Donoghue 2010a, pers. comm.).

Riparian corridors and drainages account for approximately 10% of the LSA. They are used as travel corridors for many species (including moose and grizzly bear) moving within and between habitat types. Riparian corridors are often attractive to these species as they provide food resources, protective cover, and relatively homogeneous topography, facilitating energy efficient movement. This is particularly true of riparian corridors found in the lower valley bottoms including Lynx Creek, Haggart Creek, and the South McQuesten River. Moose and grizzly bear may move between upper and lower elevation habitats seasonally as well as regular daily movements between forage resource areas and protective cover habitat. Helicopter-based wildlife surveys completed for the Project identified wildlife trails connecting forest habitat and distinct riparian and wetland habitats. Many of these appeared to have long term use, particularly by moose, and appeared to form connections between alpine or sub alpine habitats and lower elevation valley bottoms.

A relatively recent fire (<20 years) occurred on the south facing slope above Lynx Creek within the LSA. This area occupies 481 ha, or 4% of the LSA. Burned areas usually develop early successional vegetation (shrubs and herb species) preferred by grizzly bear and ungulates during early spring and summer. Other species, such as Olive-sided Flycatcher (*Contopus cooperi*), may use the abundance of dead snags for perching and foraging from and adjacent forest habitats for nesting.

9.4 WILDLIFE RESOURCES

The RSA provides habitat for a wide range of wildlife species that typically inhabit the central Yukon area. In addition to those mentioned above, species which have been documented in the RSA and LSA include mammals such as woodland caribou (*Rangifer tarandus caribou)*, black bear (*Ursus americanus*), grizzly bear, wolverine (*Gulo gulo*), grey wolf (*Canis lupus*), red fox (*Vulpes vulpes*), American marten, snowshoe hare (*Lepus americanus*), and red squirrel (*Tamiasciurus hudsonicus*). Game bird species include Spruce Grouse (*Canachites Canadensis*), Dusky Grouse (*Dendragapus Obscures*), Ruffed Grouse (*Bonasa Umbellus*), and three species of ptarmigan (*Lagopus* sp). Raptors present may include Golden Eagle, Red-tailed Hawk (*Buteo jamaicensis*), Northern Hawk Owl (*Surnia Ulula*), Great Gray Owl (*Strix Nebulosa*), and Gyrfalcon (*Falco Rusticolus*). A variety of passerine or songbird species are also present. They include Dark-eyed Junco (*Junco Hyemalis*), Gray Jay (*Perisoreus Canadensis*), Tree Swallow (*Tachycineta Bicolor*), and Townsend's Solitaire (*Myadestes Townsendi*).

Waterfowl species include Trumpeter Swan (*Cygnus Buccinators*), Mallard (*Anas Platyrhynchos*), and Canada Goose (*Branta Canadensis*).

9.5 SPECIES AT RISK

Species at risk that may occur in the RSA are listed in Table 9-1. In Canada, the status of each species is provided by the *Species at Risk Act* (SARA); Species at Risk Public Registry (Government of Canada 2010) or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2010).

Table 9-1: Species at Risk

Species	SARA*	COSEWIC
Mammals		
Grizzly bear *Ursus arctos*	No Status	Special Concern
Woodland caribou – northern mountain population *Rangifer tarandus caribou*	Special Concern	Special Concern
Wolverine *Gulo gulo*	No Status	Special Concern
Birds		
Canada Warbler *Wilsonia Canadensis*	Threatened	Threatened
Common Nighthawk *Chordeiles Minor*	Threatened	Threatened
Eskimo Curlew *Numenius Borealis*	Endangered	Endangered
Horned Grebe *Podiceps Auritus*	No Status	Special Concern
Olive-sided Flycatcher *Contopus Cooperi*	Threatened	Threatened
Peregrine Falcon *Falco Anatum* *Falco Tundrius*	Special Concern Special Concern	Threatened Special Concern
Red Knot Calidris Canatus Roseri type	Threatened	Threatened
Rusty Blackbird *Euphagus Carolinus*	Special Concern	Special Concern
Short-eared Owl *Asio Flammeus*	No Status	Special Concern

NOTES:

* SARA listed species are those considered on Schedule 1 of the Species at Risk Act.

The Yukon Wildlife Act lists species as ―specially protected‖, including cougar, Gyrfalcon, Peregrine Falcon and Trumpeter Swan (Yukon Government 2010b). These species are afforded protection under the *Yukon Wildlife Act* because they are considered particularly susceptible to hunting pressure.

While the ranges of species listed in Table 9-1 overlap the LSA, species specific habitat requirements may not be met within the LSA. For example, there is little or no cliff nesting-habitat for Peregrine Falcon or tall grass habitat for Short-eared Owl in the LSA.

9.6 ABUNDANCE AND DISTRIBUTION OF MAJOR WILDLIFE SPECIES

Baseline surveys confirmed the presence of 31 species of wildlife within the RSA. Information on species of management concern is summarized below.

9.6.1 Moose

While moose are not a species at risk, they are hunted and therefore important to both the FNNND and Environment Yukon.

Moose are recognized as an important species for harvest by local First Nations and are consistently reported within the LSA and portions of the RSA. Important calving and rutting areas within these areas have also been identified. Densities of moose in the Mayo area are close to 200 animals for every 1,000 km^2, which is above the Yukon average (Yukon Government 2003a). Farther north in the FNNND Traditional Territory, local knowledge acquired via the TKU Study and professional opinion suggest that moose densities are closer to 50 to 100 animals per 1,000 km^2 (Yukon Government 2003a). One participant in the TKU Study indicated that Haggart Creek and other creeks in the Project area provide food and shelter for moose in the springtime. While the surveys show that the population is about the same density as it was in the mid 1990s, there is an interest in the community to be proactive about harvest management before population levels decline further (Na-Cho Nyäk Dun Fish and Wildlife Planning Team, 2014).

Moose were the most commonly detected species during baseline surveys. Moose were detected across all surveys and in the widest range of habitat types indicating a relatively strong presence within the RSA. The majority of moose detections from late summer were in lower elevation forested habitat zones. Moose utilize low-elevation forested vegetation types in the RSA during much of the year, particularly in the winter. During the winter period (mid-December through late-April), moose requirements for suitable thermal and foraging habitat becomes increasingly important in order to survive harsh weather conditions. As such, winter thermal and winter feeding habitat life requisites are the focus for habitat modeling conducted for moose.

In winter, moose are more likely to migrate to low elevation forest habitats and riparian areas associated with valley bottoms for optimal thermal shelter, ease of movement via lower snow accumulations in these areas and associated feeding opportunities. Habitats with closed canopies and south-facing slopes accumulate less snow, providing favorable thermal conditions (Moose Management Team 1996). Riparian forests with tall shrub vegetation provide winter browse, including woody twigs of poplar, birch, alder and willow.

During spring through fall, moose are more widely distributed and can occur in any of the vegetation types found in the RSA. In general, ideal habitat conditions contain a mosaic of habitat types, providing a combination of shelter, forage, or reproduction opportunities (Moose Management Team 1996).

One Game Management Zone (GMZ 2, Subzone 2-62) overlaps the RSA. Harvest records between 1999 and 2008 for this subzone indicate a total reported average harvest of 2.1 moose annually within the management zone. Adjacent GMZ subzones report slightly higher harvest rates with an overall average of 3.65 moose per GMZ Subzone per year. No harvest data for the RSA were available from the FNNND.

Late winter aerial moose surveys have been conducted in 2018 and 2019 to document distribution and abundance of moose during construction phase of the Project, and built on the baseline/pre-construction studies conducted from 2011 to 2013.

During the 2020 survey, a total of 91 moose were observed of which 82 were observed within the study area boundary. Most moose were observed as individuals or pairs. The number of moose observed within the survey area in 2020 was similar to 2018 and 2019; however, the number of moose observed in 2018, 2019 and 2020 was considerably higher than in previous surveys. Potential factors for the variation in moose numbers typically include observer bias and seasonal variability in the regional distribution of moose. The latter can be influenced by annual and regional variations in snow characteristics such as depth and hardness. Variability could also be the result of high wolf activity preceding surveys within or near habitats seasonally important to moose.

9.6.2 Woodland Caribou

The northern mountain population of woodland caribou was listed as a species of special concern under Schedule 1 of SARA in 2002 (Government of Canada 2010); however they are not included in the list of specially protected species by the Yukon Government.

All information suggests that the RSA receives low levels of caribou use and does not provide important habitat for this species. The closest woodland caribou herd to the Project is the Clear Creek Herd, followed by the Hart River and Bonnet Plume Herds (Environment Yukon 2009b). No WKAs for caribou occur within the RSA. Discussions with Yukon Environment staff familiar with the area noted that while woodland caribou are wide ranging, telemetry data indicate that the LSA is peripheral to the range of the Clear Creek herd (approximately 900 individuals) which is largely located on the opposite side of the North McQuesten River (O'Donoghue 2010, pers. comm.). Hunting records between 1999 and 2008 indicate there were no caribou harvests in GMZ Subzone 2-62, which overlaps with the RSA.

Field surveys support the conclusion that caribou are present at low densities within the LSA. Only three caribou detections were recorded when combining all past and present data. All detections occurred within subalpine habitat types within the RSA. One scat detection in the LSA was likely linked to a single individual moving beyond typical herd boundaries. The FNNND report overall declines in the presence of caribou since the 1950s, although they were previously abundant in the Proctor Lake area.

9.6.3 Grizzly Bear

While grizzly bears in Canada have no status under SARA or the Yukon Government (Government of Canada 2010), they have been listed special concern by COSEWIC (2010). A species of special concern is stable but vulnerable to decline from inherent conditions such as a low reproductive rate, and vulnerabilities to human activities such as attraction to non-natural food sources that can result in mortality.

Grizzly bears are a wide ranging species that seasonally use a variety of habitat types. The RSA provides a variety of potentially attractive habitats for grizzly, including forested riparian gullies, marsh habitats and subalpine areas. Grizzly bears are omnivorous and opportunistic feeders, using a variety of foods according to seasonal accessibility. Spring and fall feeding were selected as the critical life requisites used for grizzly bear habitat modeling as part of the assessment of Project effects.

Baseline data documented four detections of grizzly bear. Only one of these detections was in the LSA. The remaining three detections occurred in the larger RSA. The LSA at baseline does reflect a modest disturbance regime with exploration activities, drilling, and the creation and maintenance of a secondary road. Additionally, the LSA specifically was not found to contain a seasonally attractive magnet food resource, such as spawning salmon or highly productive berry patches that tend to attract grizzly bears.

Harvest records for Game Management Subzone 2-62 indicate no grizzly bears were reported harvested in the RSA between 1999 and 2008. For the overall region, grizzly bear is the least harvested wildlife species with an annual average rate of 0.1 bears per GMZ Subzone per year.

9.6.4 American Marten

The American marten is not listed as a species-at-risk by either Yukon Government or SARA (Government of Canada 2010). Although they are not a species of direct conservation concern, American marten provides significant economic and cultural value to local citizens, including the FNNND.

Marten in the northern boreal forest are closely associated with late successional coniferous stands, especially those dominated by spruce and fir, with complex structure near the ground (i.e., coarse woody debris) (Slough 1989; Buskirk and Powell 1994). Marten typically forage on small mammal species such as red-backed voles (*Clethrionomys rutilus*), birds and bird eggs, crowberries (*Empetrum nigrum*), and occasionally on grouse, ptarmigan, snowshoe hare and moose or caribou carrion when food becomes more scarce (Environment Yukon 2009b). Commonly reported refuge sites include ground burrows, rock piles and crevices, downed logs, stumps, snags, brush or slash piles and squirrel middens (Mech and Rogers 1977; Steventon and Major 1982; Buskirk and Powell 1994).

The FNNND identifies marten as present in, or in the vicinity of the RSA, concentrated in low elevational areas adjacent to riparian corridors. FNNND citizens report recent declines in the local marten population but suggest it might be part of a naturally fluctuating cycle for marten in the region (Stantec 2010f). There were no marten detections during 2009 baseline surveys, however past data (Hallam Knight Piésold Ltd. 1994; 1996a) provided a total of ten detections not linked to any specific habitat type or precise locations.

The LSA contains habitat typically associated with this species. Old growth coniferous forest accounts for approximately 2,077 ha, or 18% of the LSA.

9.6.5 Olive-sided Flycatcher

Olive-sided Flycatcher is listed as Threatened on Schedule 1 of SARA (Government of Canada 2010) because of a widespread and consistent population decline over the past 30 years (COSEWIC 2007b). The rate of decline for the Yukon population is estimated at -0.2% per year between 1998 and 2008, lower than the -3.1% estimated national decline for the same period (Environment Canada 2009a).

Olive-sided Flycatcher range within the Yukon extends north to include the Yukon Plateau-North ecoregion (Yukon Government 2010b). Across its range, the flycatcher typically occurs in coniferous and mixed-coniferous forest (Altman and Sallabanks 2000, COSEWIC 2007b, Kotliar 2007). Clear-cuts and other young (0 to 10 years old) forests are used if they contain snags or residual live trees for singing and foraging perches (Altman and Sallabanks 2000, COSEWIC 2007). Similarly, recent (0 to 30 years old) burns are considered important habitat (Boreal Avian Monitoring Project [BAMP] 2009), likely because of the creation of forest openings and edge habitat, as well as availability of snags and live trees (Altman and Sallabanks 2000; COSEWIC 2007b; Kotliar 2007). Deciduous forests are generally avoided.

A relatively recent fire (<15 years) occurred on the south facing slope above Lynx Creek. The area is approximately 481.5 ha in size and represents potential preferred habitat for this species within the LSA.

Breeding has been confirmed in the region, including four Olive-sided Flycatcher detections in the period 2006 – 2010 on the annual Mayo Landing breeding-bird survey route (US Geological Survey [USGS] 2010). No Olive-sided Flycatchers were detected within the RSA during baseline surveys completed in 2009. However, these surveys were completed outside the breeding-bird nesting period.

9.6.6 Rusty Blackbird

Rusty Blackbird is listed as a species of Special Concern on Schedule 1 of SARA (Government of Canada 2010) because of a significant long-term and severe population decline (Savignac 2006). The national rate of decline for Rusty Blackbird is estimated at -6.9% annually during 1988 through 2008. The species appears to be declining faster in Yukon with population declines estimated at -9.1% annually for the same period (Environment Canada 2009b).

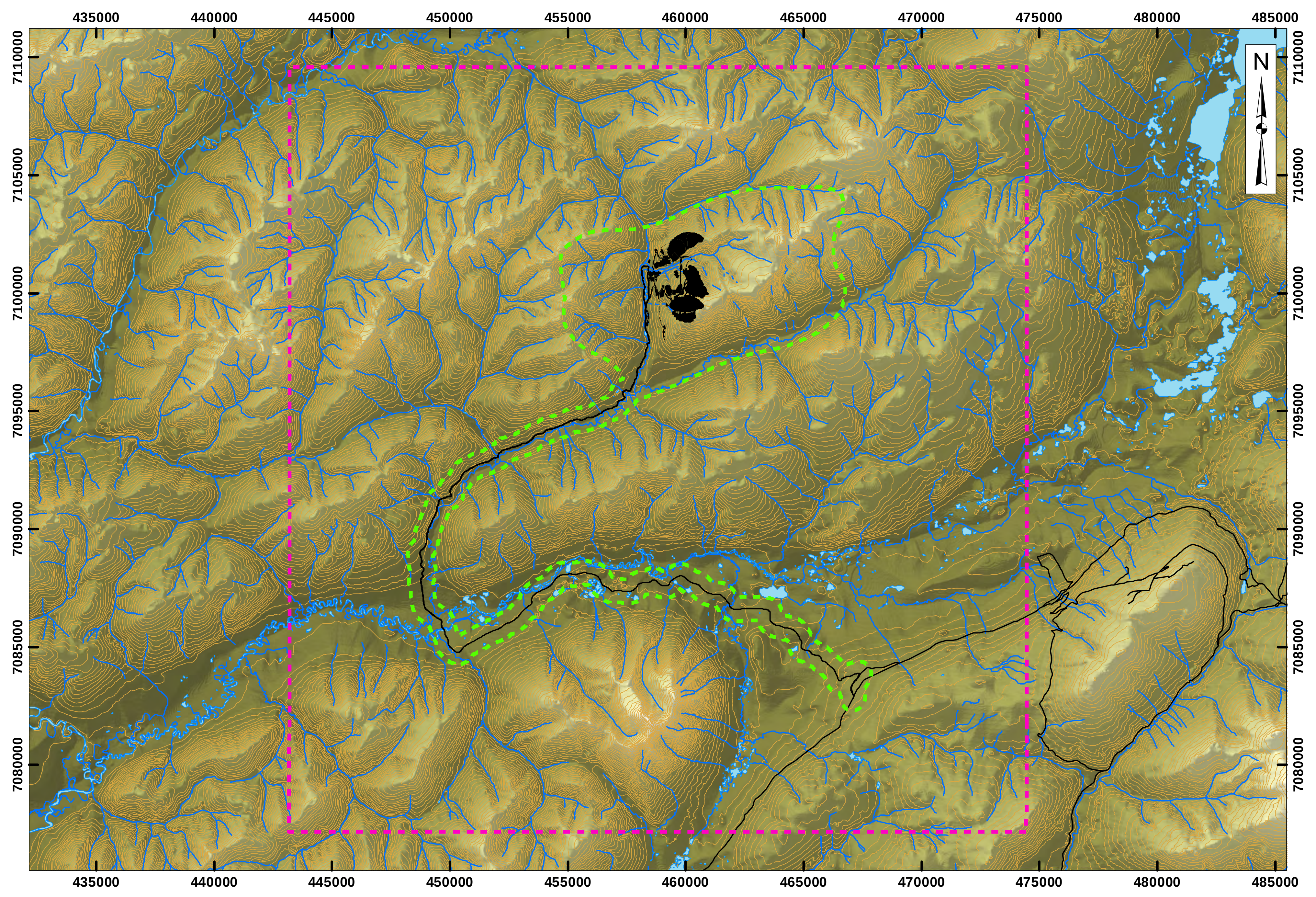
Rusty Blackbird is present in the Yukon primarily during the breeding season (early May through late August), although migrants and non-breeding birds may be present until late October and into winter (Semenchuk 1992; Federation of Alberta Naturalists [FAN] 2007). Its range extent includes the Yukon Plateau-North ecoregion, overlying both the LSA and RSA.

In Yukon, Rusty Blackbird nesting locations are closely associated with conifer forest wetlands, including bogs (with or without ponds), fens, muskegs, swamps and wet shrubby meadows (Yukon Government 2007, Avery 1995, Savignac 2006, Shaw 2006). It also uses shrubby riparian areas along the margins of lakes, beaver ponds, rivers, and creeks in coniferous and mixed wood forests (Semenchuk 1992, Avery 1995, Savignac 2006, FAN 2007). Wetlands and riparian areas combined account for approximately 15% of the LSA, or 1,818 ha of habitat potentially suitable for this species. Estimated Rusty Blackbird densities (Avery 1995) suggest this amount of potentially suitable habitat may support less than one Rusty Blackbird bird.

Two Rusty Blackbirds were observed most recently during the annual breeding-bird survey conducted at Mayo Landing in 2004 (USGS 2010). There were no recorded observations of Rusty Blackbirds during 2009 baseline surveys within the LSA or RSA, although as mentioned above, these surveys were completed after the nesting period.

9.6.6.1 2011 Breeding-bird Surveys

Breeding-bird point-count surveys were conducted June 16 – 22, 2011. A total of 605 individuals, consisting of 46 species, were recorded during the surveys. An additional three species were observed incidental to the point-count surveys, bringing the total number of species recorded to 49. Ten Olive-sided Flycatcher were observed within the LSA and along the access road. Three Rusty Blackbirds were observed adjacent to wetland areas along the access road. No other species at risk, raptors, or stick nests were observed.



Legend:

- Wildlife Regional Assessment Area
- Wildlife Local Assessment Area
- Project Footprint
- Contour (100ft)
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

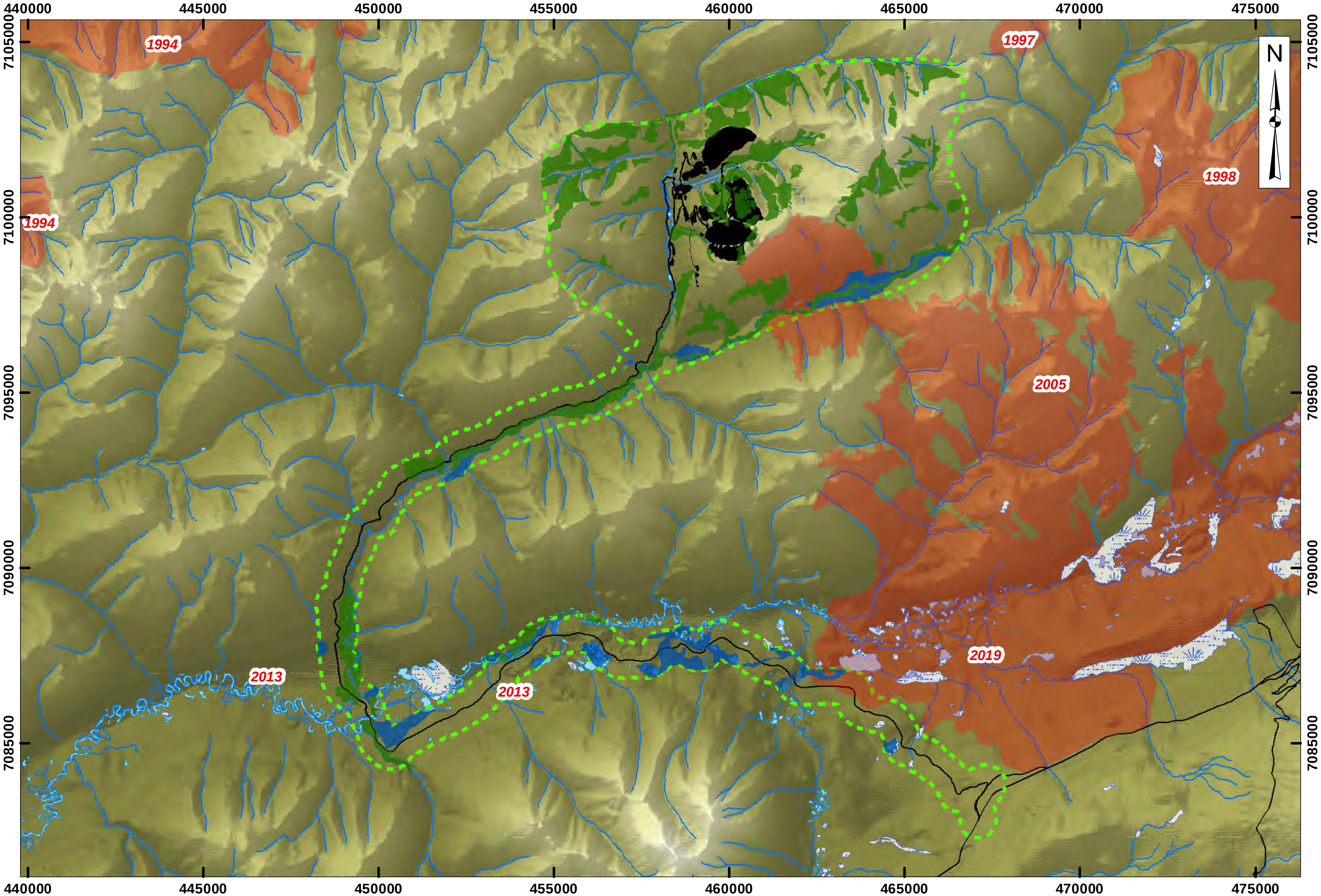
VICTORIA GOLD CORP

0 1 2 4
Kilometers

Projection:	Drawn By:
NAD 83 Zone 8N	HC
Date:	Figure:
2020/07/30	9-1

EAGLE GOLD PROJECT YUKON TERRITORY

Wildlife Local and Regional Study Areas



Legend:

- TEM Old Forest
- Wetland Ecosystem
- Wetland
- Fire-affected Areas
- Wildlife Local Assessment Area
- Project Footprint
- Perennial Watercourse
- Ephemeral Watercourse
- Intermittent Watercourse

VICTORIA GOLD CORP

0 1 2 4
Kilometers

Projection: NAD 83 Zone 8N	Drawn By: HC	EAGLE GOLD PROJECT YUKON TERRITORY
Date: 2020/07/30	Figure: 9-2	Wildlife Habitats of Special Intereset Within the Local Study Area

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