StrataGold Corporation

Eagle Gold Project

2019 Water Balance and Water Quality Model Update Report

WBM v.4.1

Project No. A562-1
14 April 2020

Prepared by:
Lorax Environmental Services Ltd.
Vancouver, BC

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1. Introduction

1.1 Project Description

The Eagle Gold Project (the Project) is owned by StrataGold Corporation, a wholly owned subsidiary of Victoria Gold Corp. (the "Company"). The Project is located in the Central Yukon Territory, approximately 350 km north of Whitehorse and approximately 45 km north of Mayo. Much of the mine site lies within the Dublin Gulch watershed, a tributary that reports to Haggart Creek, and which then flows to the South McQuesten River. Ultimately, the South McQuesten River joins the Stewart River, which flows west to its eventual confluence with the Yukon River.

A Type A Water Use License (QZ14-041) was issued for the Eagle Gold Project on December 3, 2015 and subsequently amended (QZ14-041-1) on August 22, 2019 to allow the construction, operation and closure of the open pit heap leach gold mine in central Yukon.

The Eagle Gold Mine water balance and water quality model (WBWQM) has been updated to reflect the most recent baseline information, heap leach water balance modeling and updated geochemical source term modeling.

1.2 Scope of Report

The Eagle Gold WBWQM is a GoldSim-based integrated water balance and quality model that was previously developed in two parts. The initial water balance model design was led by Knight-Piésold (KP) who used a runoff-based approach to determine natural and mine-impacted runoff from the catchments that comprise the Eagle mine site. Precipitation was back-calculated from runoff where a precipitation input was required. KP also integrated the Excel-based monthly heap leach facility (HLF) water balance model provided by the Mines Group. The water quality component was developed by Lorax Environmental Services Ltd. (Lorax) and integrated within the water balance model (WBM) to combine source concentrations of potential contaminants of concern with contact and non-contact flows to track contaminant loading through the mine site and into the receiving waters of Haggart Creek. The culmination of both these efforts was the 2014 water quality model used in support of StrataGold's Type A Water Use License Application submitted in August 2014 (Exhibit 1.11.1 on the Yukon Water Board Waterline website registry for StrataGold's Type A Water Use License).

Since submission of the 2014 WBWQM, the model has been updated in March 2018, further revised in June 2018, and completely updated in March 2020 to reflect operational water management practices and infrastructure.

This report presents the most recent update of the Eagle Gold water balance model (WBM) and water quality model (WQM) that fully integrates the following:

- Description of the water management plan as described in: *Eagle Gold Project Construction and Operations Water Management Plan*. Version 2018-01. August 2018;
- Revisions to the heap leach facility water balance modeling as described in: *Weekly Water Balance Modeling for the Eagle Gold Mine Heap Leach Pad Facility*. Report prepared by The Mines Group, October 2018 and through discussions with Forte Dynamics;
- Baseline climate and hydrology data collected since 2007 and inclusive of data collected in 2019;
- Updated baseline surface water quality monitoring data collected from 2007 to 2017 prior to initiation of construction in August 2017;
- Surface water quality monitoring data collected in 2018 and 2019 reflective of Construction and early Operations phases; and
- Geochemical source term data collected from active field bins of waste rock and leached ore materials, with consideration of data collected up through the 2019 ice-free season.

Following this introduction, Section 2 presents the updated input parameters and assumptions used to update the water balance and water quality models. Section 3 presents a summary of the water quality model results and Section 4 provides a summary of the results for water quantity.

2. Model Inputs and Assumptions

2.1 Water Balance Model Inputs and Assumptions

For the purposes of this 2019 update, the Goldsim model structure, parameterization and assumptions have been substantively updated from those presented in the previous water balance model report submitted in support of the WUL application (Knight Piésold, 2014) and the updates provided in 2018. These updates were necessary to reflect the evolution of the mine plan as the Project completed Construction and began Operations. Section 2.1.1 discusses changes to the WBM based on hydrometeorological updates through 2019, while Section 2.1.5 uses streamflow data current to the end of 2019 data to help validate the WBM.

2.1.1 Hydro-meteorological Updates

Following the issuance of WUL QZ14-041 in 2015, the collection of climate and streamflow data has continued at the Project site. This additional data has been incorporated into the site monitoring records, and the results are presented in the climate and hydrology data summary reports (Lorax 2020a and 2020b). In previous iterations of the WBM, the annual runoff at the W4 hydrometric station was assumed to represent the effective precipitation at the Project site and formed the primary driver of the WBM. The model inputs were updated in 2018 to reflect slight changes in estimated runoff values that resulted from additional streamflow and climate data collected since the WUL submission in 2013. The changes from the initial estimates made by Knight Piesold in 2013 relevant to the WBM parameterization were consistent with Lorax (2018) and were as follows:

- Mean annual precipitation (MAP) at the 1,125 m elevation decreased by 6%, from 500 mm to 472 mm;
- Mean annual runoff (MAR) for the W4 hydrometric station increased by 7% from 230 mm to 247 mm;
- The annual orographic precipitation gradient decreased from +10%/100 m to +7%/100 m; and
- The monthly distribution of annual runoff used to distribute the MAR value for W4 changed slightly, as outlined in Table 2.1-2.

For the 2019 WBM update, all assumptions and methods related to the derivation of the synthetic climate dataset were consistent with those described in Lorax (2017a), with two exceptions:

- The synthetic record was updated to include 2019 based on the Mayo A climate record; and

- The winter (October to March) precipitation gradient was reduced from 11%/100m to 7%/100m, based on additional site snow survey data, and calibration of the Project area watershed model. This change reduces the MAP at the 1,125 m elevation by a further 9% to 428 mm.

Since the 2018 WBM updates, the Project has completed construction, and began Operations in September 2019. Given that monitoring data is now available with which to characterize the Projects water management regime, and potential changes to streamflows in Haggart Creek, the WBM has undergone another update.

The previous runoff based WBM has been shifted to a watershed model architecture, driven by a climate time-series input. The WBM is configured to include all relevant Project infrastructure, including the HLF, open pits, WRSAs, 90-day ore stockpiles, and water management infrastructure (*e.g.*, sediment ponds, collection ditches, event ponds, *etc*.). Within the Base Case module of the WBM, each mine component is spatially defined by year of the Project life, which allows the footprints (sub-catchments) and /or volumes of each component to expand as the mine development progresses. Each sub-catchment represents a single land cover type (*e.g.*, WRSA, open pit, natural ground, *etc*.)

The climate inputs are comprised of daily temperature and precipitation data which are used to drive the WBM, with meteoric water being converted to runoff using assumptions and coefficients specific to the land surface type represented in each sub-catchment. All sub-catchments are assembled in hierarchical order, with runoff tracked and aggregated across the Project site and downstream into the receiving environment. The climate input series is based on the Mayo A record, adjusted according to relationships developed between the Mayo A and site climate records as measured at the Camp and Potato Hills stations (Lorax 2017).

The previous average runoff inputs were replaced with the daily climate series from a representative average year (2016) to drive the WBM. Mean annual precipitation (MAP) at the Camp station elevation (782 m) is 360 mm, and total annual precipitation in 2016 was 364 mm (Figure 3-2). There are a total of 10 years within the 72 year synthetic climate record that fall within 2% of the MAP value, however 2016 was chosen as it falls within the site baseline monitoring period, and extensive climate, snowpack and streamflow data are available with which to benchmark the model performance.

The daily time-series of climate parameters is scaled by elevation for temperature on a monthly basis (Table 2.1-4), and for precipitation on a seasonal basis, as follows:

- Winter (October to March) – 7%/100 m
- Summer (April to September) – 4%/100 m

Monthly summaries of the synthetic climate series parameters are presented for the three representative elevations that bound the Project site in Table 2.1-4.

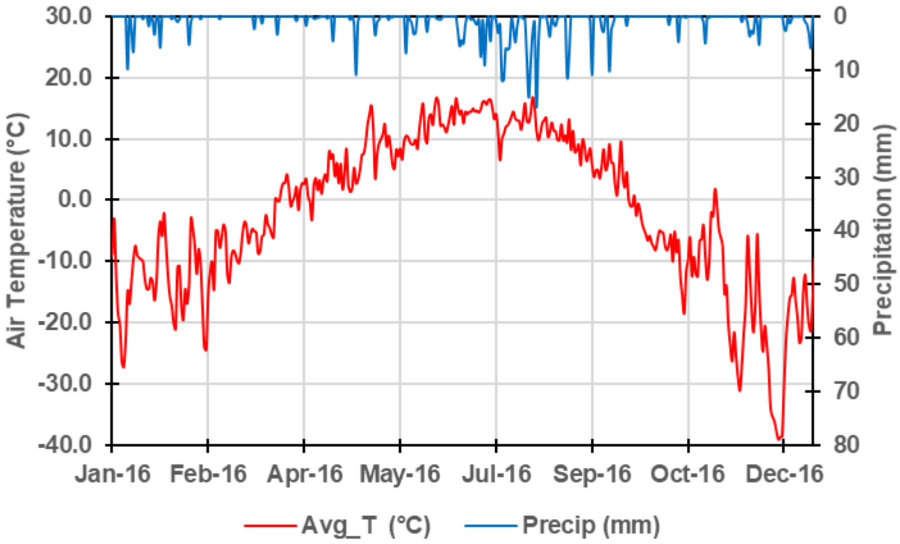


Figure 2.1-1: Daily temperature and precipitation from the Camp Station elevation (782 m) for the representative average year (2016) used as WBM input.

Table 2.1-1:
Air temperature lapse rates by month estimated from Camp and Potato Hills station records

Lapse Rate (°C/100 m)			
Month	**Max_T**	**Min_T**	**Mean_T**
Jan	0.5	1.2	0.9
Feb	-0.2	0.9	0.4
Mar	-0.7	0.6	-0.1
Apr	-0.7	0.0	-0.5
May	-0.8	0.5	-0.2
Jun	-0.1	0.2	-0.2
Jul	-0.3	0.2	-0.2
Aug	-0.3	0.1	0.0
Sep	0.7	-0.4	-0.2
Oct	-0.6	0.0	-0.3
Nov	0.2	0.8	0.5
Dec	0.5	0.9	0.6

Table 2.1-2:
Monthly climate parameters input to the WBM by representative elevation

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Camp Station (782 m)												
Max_T (°C)	-19.4	-13.9	-6.0	4.1	12.2	17.9	18.7	16.1	9.3	-0.8	-12.6	-17.0	18.7
Min_T (°C)	-27.2	-22.9	-18.0	-8.6	-2.1	4.5	7.4	4.1	-1.1	-7.7	-20.0	-25.2	-27.2
Avg_T (°C)	-23.3	-18.4	-12.0	-2.2	5.1	11.2	13.0	10.1	4.1	-4.2	-16.3	-21.1	-4.5
Precipitation (mm)	23.1	17.0	11.4	9.0	23.4	42.3	59.2	50.8	38.8	32.1	27.4	25.5	360.0
PET (mm)	3.9	5.2	12.3	40.6	81.7	90.1	97.2	77.8	43.7	17.0	6.4	4.2	479.9
	HLF Elevation (1,125 m)												
Max_T (°C)	-17.5	-14.3	-8.2	1.6	9.5	17.7	17.8	15.1	11.6	-2.7	-11.9	-15.3	17.8
Min_T (°C)	-23.1	-20.3	-16.6	-8.7	-0.5	5.2	7.9	4.3	-2.5	-7.9	-17.4	-22.2	-23.1
Avg_T (°C)	-20.3	-17.3	-12.4	-3.6	4.5	11.4	12.8	9.7	4.6	-5.3	-14.7	-18.8	-4.1
Precipitation (mm)	29.2	21.5	14.4	10.3	26.8	48.4	67.7	58.1	44.4	40.4	34.6	32.1	427.8
PET (mm)	4.8	4.9	9.3	32.8	69.6	89.1	91.9	72.7	53.4	13.6	7.0	5.1	454.0
	Potato Hills Station (1,420 m)												
Max_T (°C)	-15.6	-14.2	-9.6	-0.6	7.2	17.6	17.0	14.2	13.6	-4.2	-11.1	-13.8	17.6
Min_T (°C)	-19.8	-18.5	-15.8	-8.8	0.6	5.7	8.3	4.4	-3.7	-8.2	-15.4	-19.7	-19.8
Avg_T (°C)	-17.7	-16.3	-12.7	-4.7	3.9	11.6	12.6	9.3	5.0	-6.2	-13.2	-16.8	-3.8
Precipitation (mm)	35.6	26.2	17.6	11.5	30.1	54.3	76.0	65.2	49.8	49.4	42.2	39.2	497.2
PET (mm)	5.8	5.0	7.9	27.1	60.5	88.3	87.4	68.1	62.4	11.4	7.7	6.2	437.8

Note: Min_T and Max_T are the minimum and maximum daily **average** temperatures.

2.1.2 Site-wide WBM Approach and Assumptions

This section presents the inputs and assumptions employed in the assembly, calibration and running of the site-wide WBM. At a high-level, the WBM produces outputs of monthly discharge values for Project site stations based on the currently licensed mine plan and water management activities associated with the Project. To capture the highly dynamic nature of streamflows and water management activities at the Project site, the WBM is run on a daily time-step while outputs are at a monthly time-step.

The natural catchment runoff module of the WBM generates estimates of streamflow from climate data using a watershed modeling approach. The architecture of the watershed model assumes that streamflow is comprised of three components: quickflow, interflow and baseflow (Maidment, 1993). The natural catchment WBM was assembled using three reservoirs to represent these components (Section 2.1.4), and the factors governing the rates at which these reservoirs fill via precipitation and snowmelt were varied by basin and/or mine component type (*e.g.,* natural ground, WRSAs, open pits). This architecture is used consistently within each natural or mine sub-catchment to convert meteoric water into runoff based on sub-catchment characteristics (*e.g.*, elevation, surface type, water management infrastructure). The delineation of mine area sub-catchments is covered in detail in Section 2.1.4.

Modelled flows for each sub-catchment are routed to the next downstream node depending on water management practices or natural catchment topography, as applicable. This allows the predicted flows to be derived for any sub-catchment in the WBM, or aggregated and reported for a collection point of interest (*e.g.*, sediment collection pond discharge, or receiving environment node). This approach also allows concentrations and loadings for parameters of interest to be tracked for each sub-catchment and mine component, and balanced at each successive downstream node.

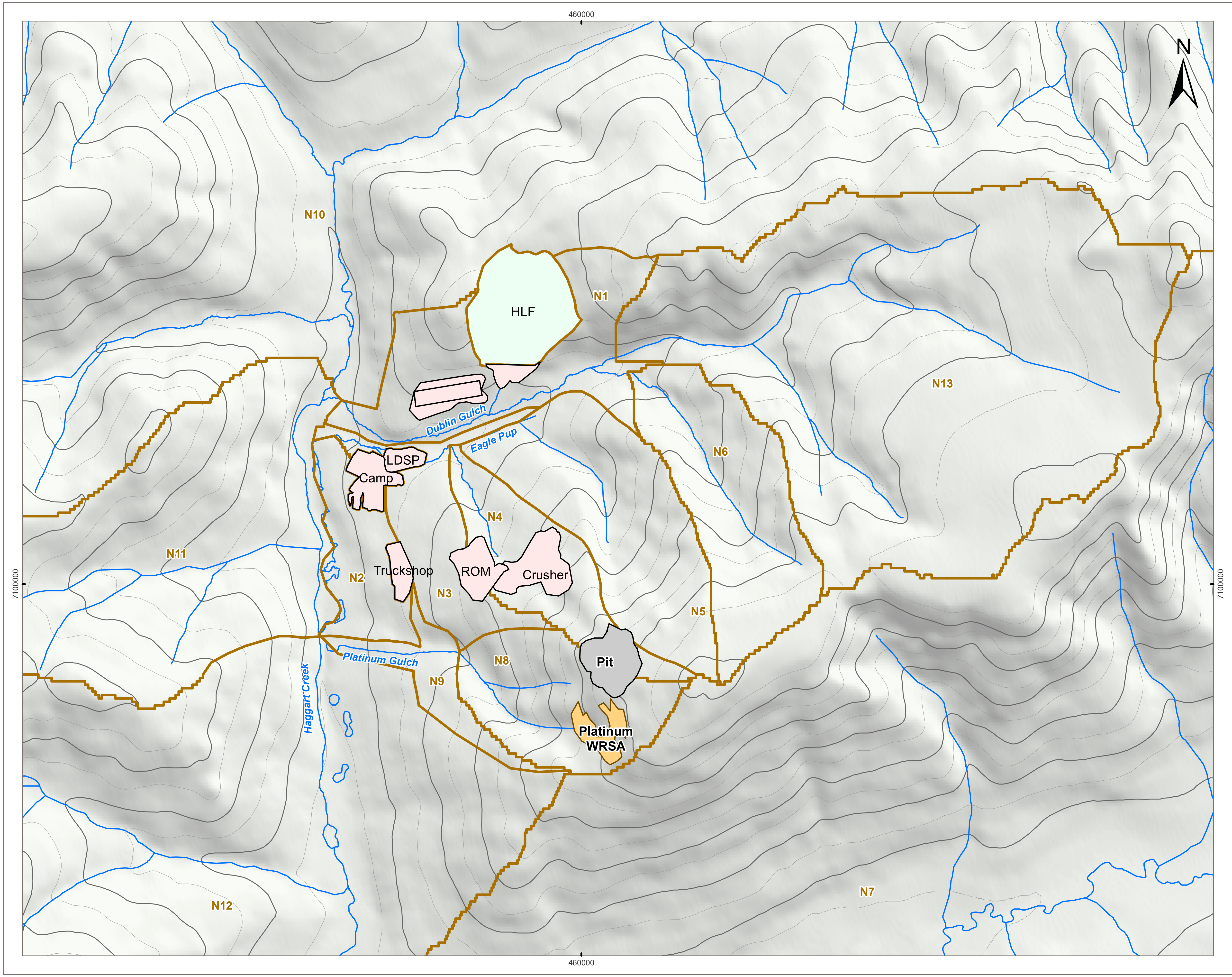
All mine facilities are assumed to be developed according to the development schedules and timelines set out in the Project Description, as summarized in Section 2.1.3.

The HLF water balance model provided by Forte Dynamics (B. Fetter, *pers. comm*, March 2020) forms a sub-component of the site-wide water balance model, while using the same climate data inputs. Integration of the HLF WBM outputs is described in further detail in Section 2.1.5.

2.1.3 Mine Area Catchment Delineation

In order to generate predictions of water volume from a climate driven watershed model, effective precipitation and evapotranspiration depths must be multiplied by drainage area at each time-step. This required the delineation of all mine affected and adjacent natural catchment areas, for each year of mine life. The resultant delineated sub-catchments are presented for each year of mine life in Figure 2.1-2 through Figure 2.1-10.

Annual areas for all sub-catchments are presented for natural areas (Table 2.1-3), open pits (Table 2.1-4), WRSAs (Table 2.1-5), other mine infrastructure (Table 2.1-6), and the HLF (Table 2.1-7). Hypsometric curves were calculated for each catchment and used to determine the median elevation within each basin/sub-catchment, which formed the elevation target for orographic scaling of the climate inputs.



LEGEND

- 🟧 Waste Rock Storage Area
- ⬜ Pit
- 🟩 Heap Leach Facility
- 🟥 Site Facility
- ▭ Model Catchment
- — Water Course
- — Contour (100m)
- — Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2019 (Year 1) Site Layout

PROJECTION
Transverse Mercator UTM Zone 8

DATUM
NAD83

CLIENT
Victoria GOLD CORP

Scale: 1:25,000
200 100 0 200
Metres

LORAX ENVIRONMENTAL

FILE NO.

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

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Figure 2.1-2

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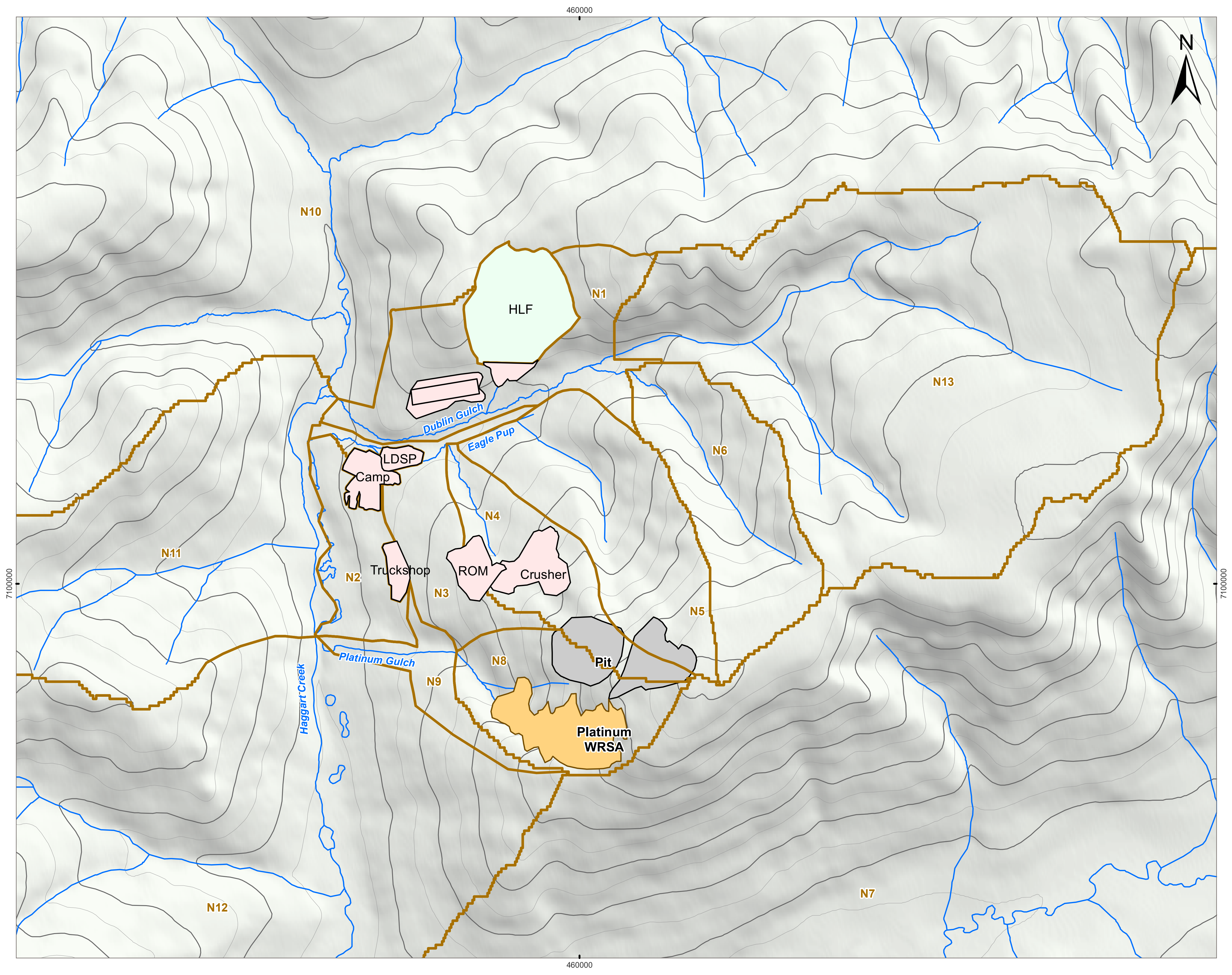

LEGEND

🟧	Waste Rock Storage Area
▨	Pit
🟩	Heap Leach Facility
🟥	Site Facility
☐	Model Catchment
—	Water Course
—	Contour (100m)
—	Contour (50m)

NOTES
Base data source:

STATUS
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EAGLE GOLD PROJECT
YUKON TERRITORY

2020 (Year 2) Site Layout

PROJECTION
Transverse Mercator UTM Zone 8

DATUM
NAD83

CLIENT

Scale: 1:25,000
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Metres

FILE NO.

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

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Figure 2.1-3

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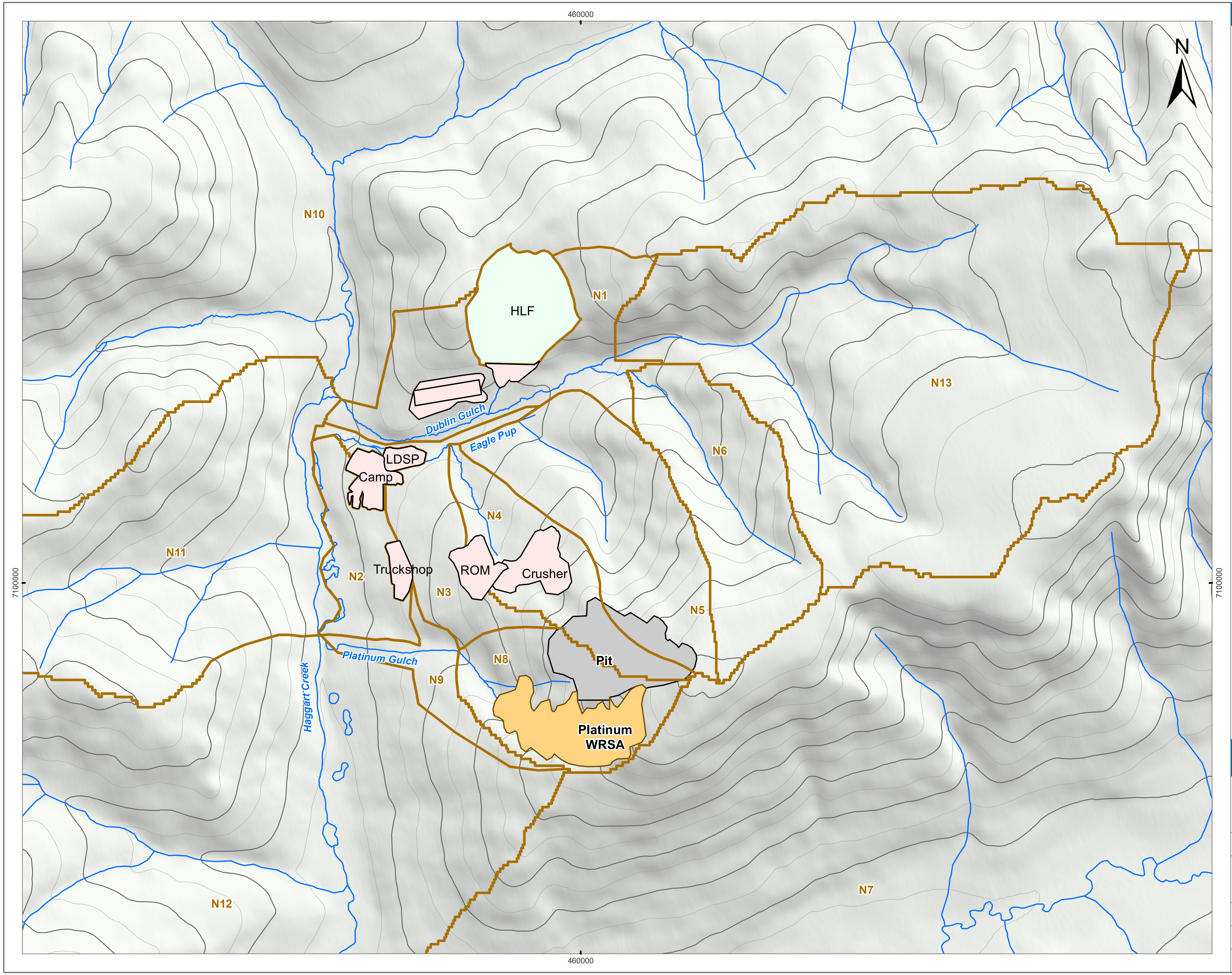

LEGEND

- 🟧 Waste Rock Storage Area
- ▨ Pit
- 🟩 Heap Leach Facility
- 🟥 Site Facility
- ☐ Model Catchment
- — Water Course
- — Contour (100m)
- — Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2021 (Year 3) Site Layout

PROJECTION
Transverse Mercator UTM Zone 8

DATUM
NAD83

CLIENT

Scale: 1:25,000
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Metres

FILE NO.

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Eagle Gold	AL	SJ	DHF	1

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Figure 2.1-4

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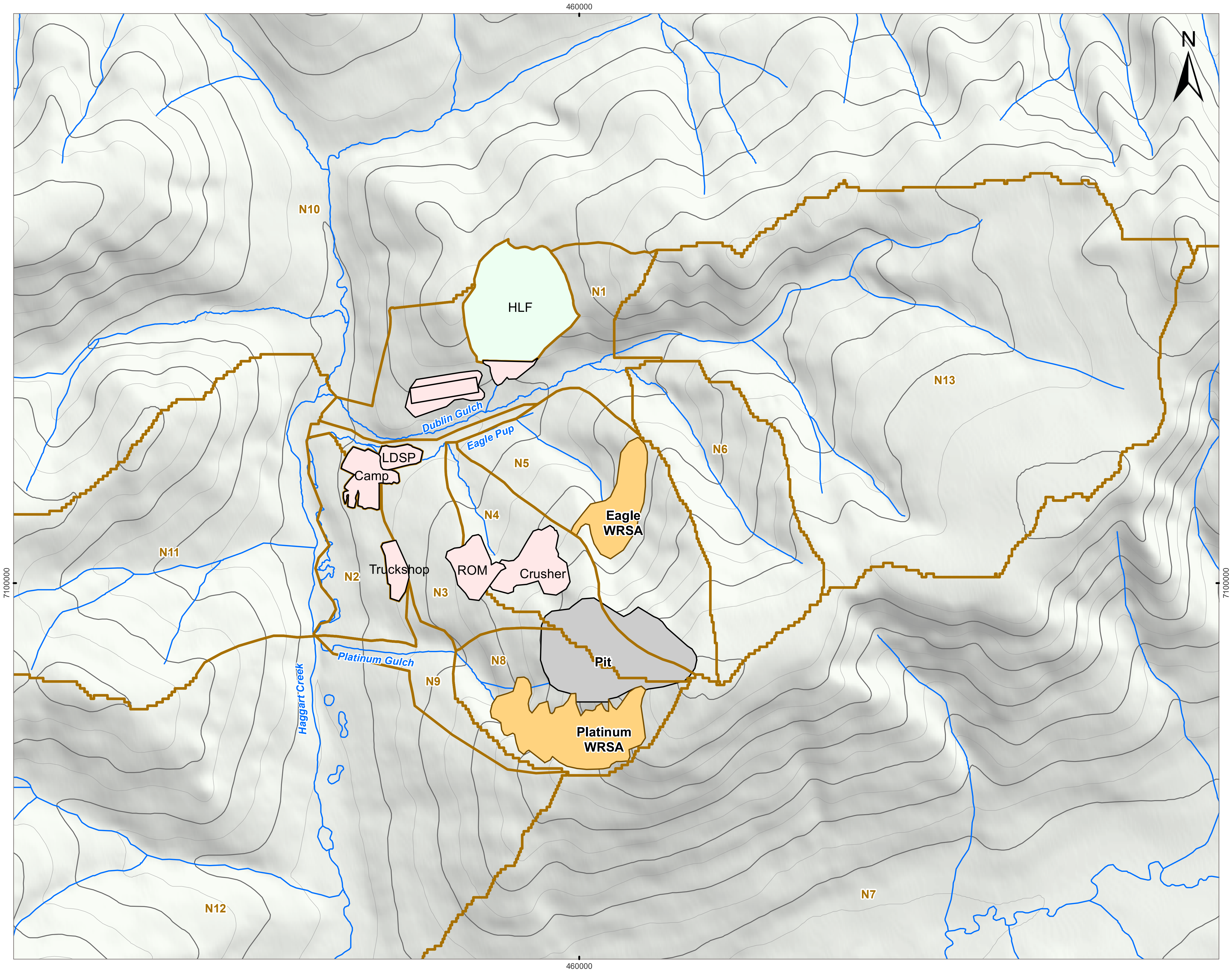

LEGEND

🟧	Waste Rock Storage Area
⬜	Pit
🟩	Heap Leach Facility
🟥	Site Facility
☐	Model Catchment
—	Water Course
—	Contour (100m)
—	Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2022 (Year 4) Site Layout

PROJECTION Transverse Mercator UTM Zone 8	DATUM NAD83	CLIENT Victoria GOLD CORP
Scale: 1:25,000 200 100 0 200 Metres		LORAX ENVIRONMENTAL
FILE NO.		

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

OFFICE

DATE
April 08, 2020

Figure 2.1-5

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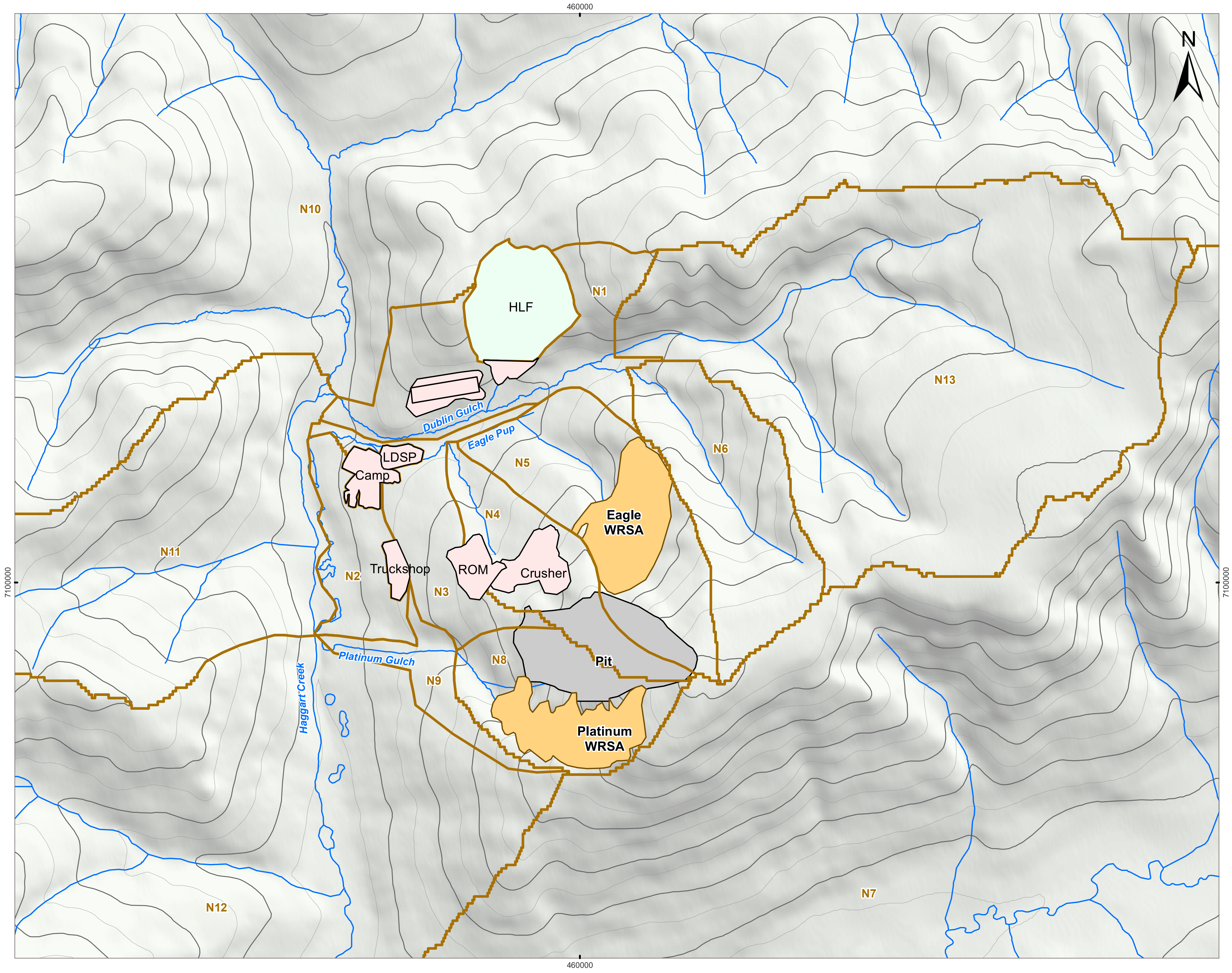

LEGEND

- 🟧 Waste Rock Storage Area
- ⬜ Pit
- ⬜ Heap Leach Facility
- ⬜ Site Facility
- ⬜ Model Catchment
- — Water Course
- — Contour (100m)
- — Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2023 (Year 5) Site Layout

PROJECTION
Transverse Mercator UTM Zone 8

DATUM
NAD83

CLIENT
Victoria GOLD CORP

Scale: 1:25,000
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Metres

LORAX ENVIRONMENTAL

FILE NO.

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

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Figure 2.1-6

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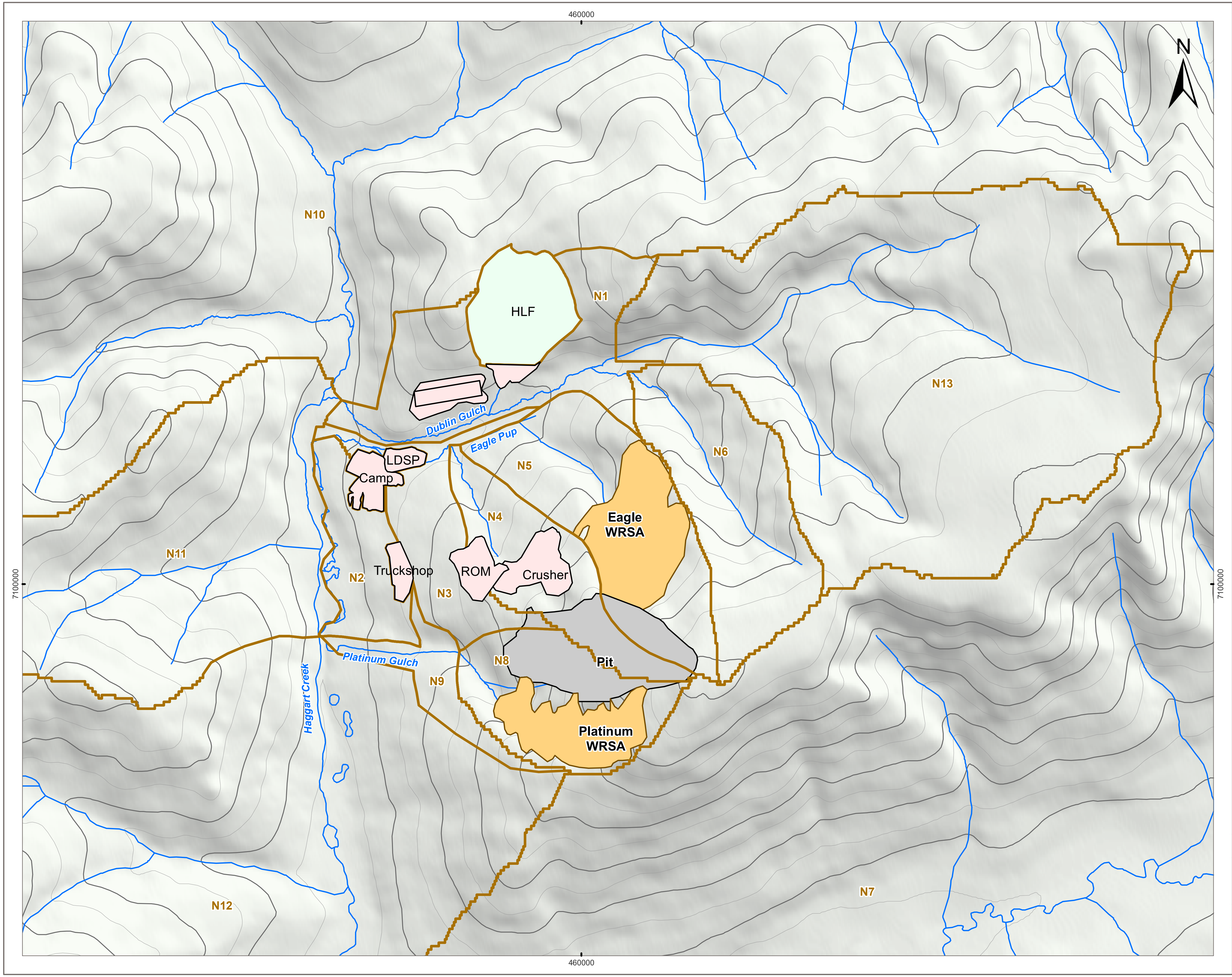

LEGEND

- 🟧 Waste Rock Storage Area
- ▨ Pit
- 🟩 Heap Leach Facility
- ▨ Site Facility
- ☐ Model Catchment
- — Water Course
- — Contour (100m)
- — Contour (50m)

NOTES
Base data source:

STATUS
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EAGLE GOLD PROJECT
YUKON TERRITORY

2024 (Year 6) Site Layout

PROJECTION	DATUM	CLIENT
Transverse Mercator UTM Zone 8	NAD83	Victoria GOLD CORP

Scale: 1:25,000

200 100 0 200

Metres

FILE NO.

LORAX ENVIRONMENTAL

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

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Figure 2.1-7

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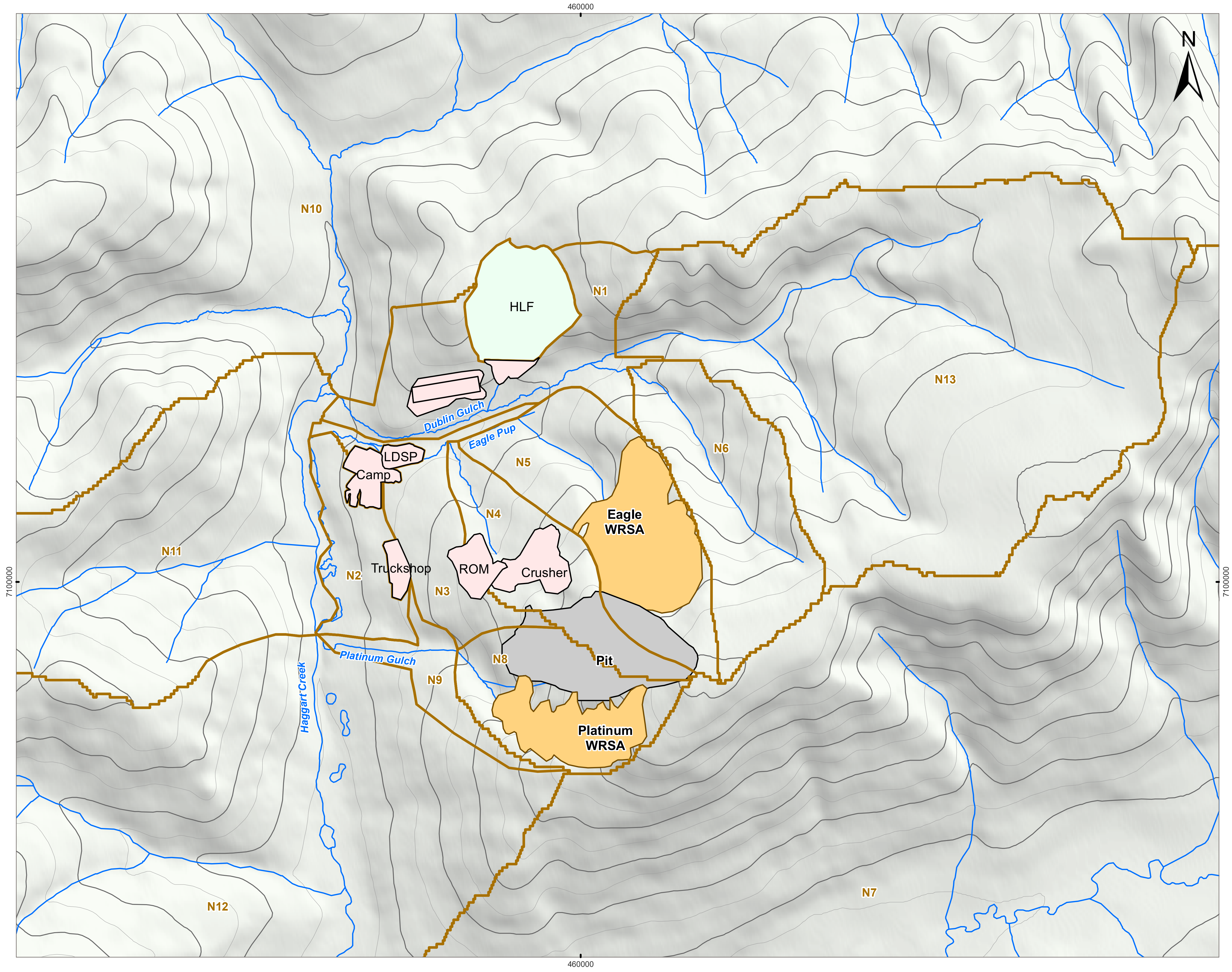

LEGEND

🟧	Waste Rock Storage Area
⬜	Pit
🟩	Heap Leach Facility
🟥	Site Facility
☐	Model Catchment
—	Water Course
—	Contour (100m)
—	Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2025 (Year 7) Site Layout

PROJECTION
Transverse Mercator UTM Zone 8

DATUM
NAD83

CLIENT

Scale: 1:25,000
200 100 0 200
Metres

FILE NO.

PROJECT
Eagle Gold

DWN	CKD	APVD	REV
AL	SJ	DHF	1

OFFICE

DATE
April 08, 2020

Figure 2.1-8

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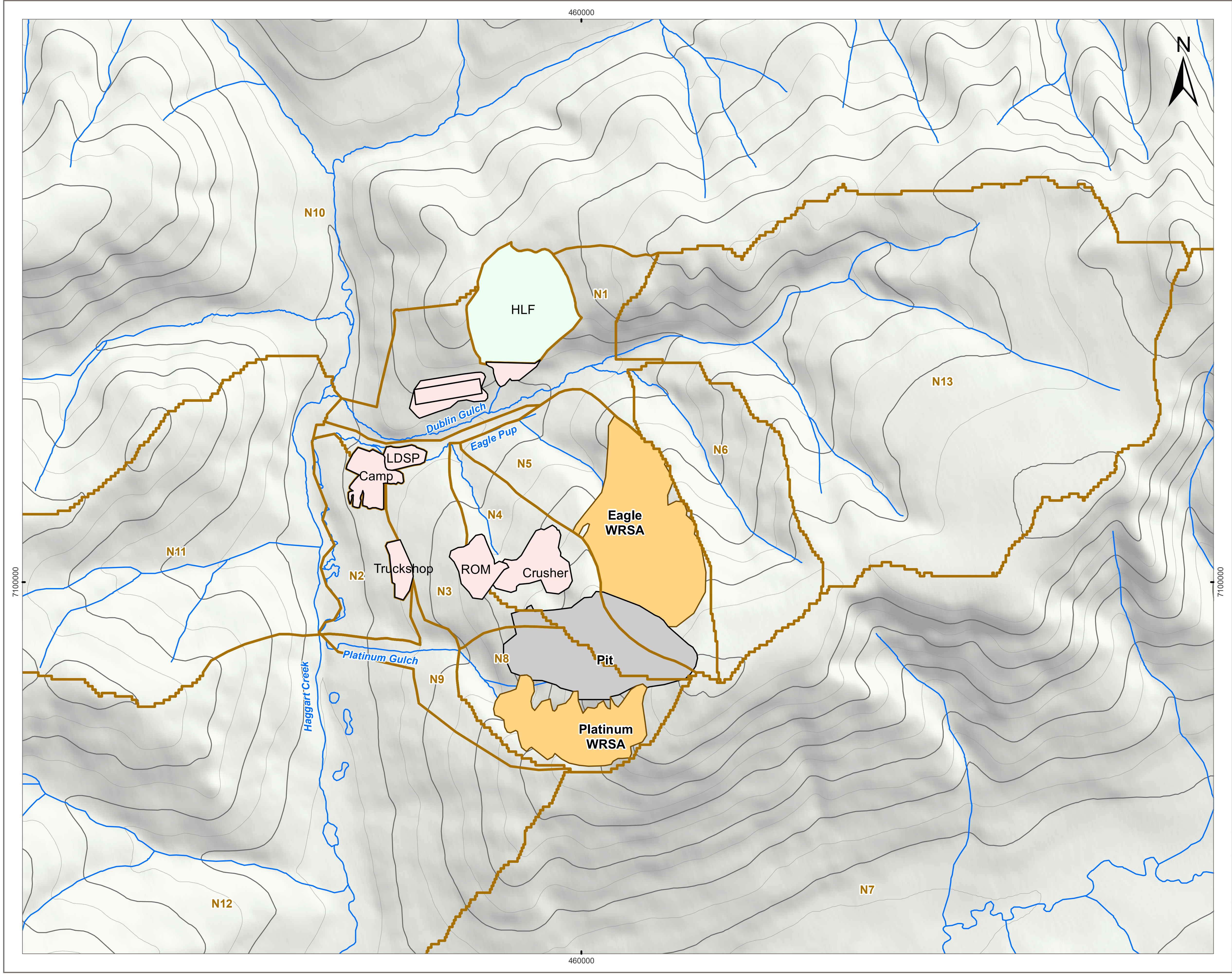

LEGEND

🟧	Waste Rock Storage Area
▨	Pit
🟩	Heap Leach Facility
🟥	Site Facility
☐	Model Catchment
—	Water Course
—	Contour (100m)
—	Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2026 (Year 8) Site Layout

PROJECTION	DATUM	CLIENT
Transverse Mercator UTM Zone 8	NAD83	Victoria GOLD CORP

Scale: 1:25,000
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Metres

FILE NO.

LORAX ENVIRONMENTAL

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

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DATE
April 08, 2020

Figure 2.1-9

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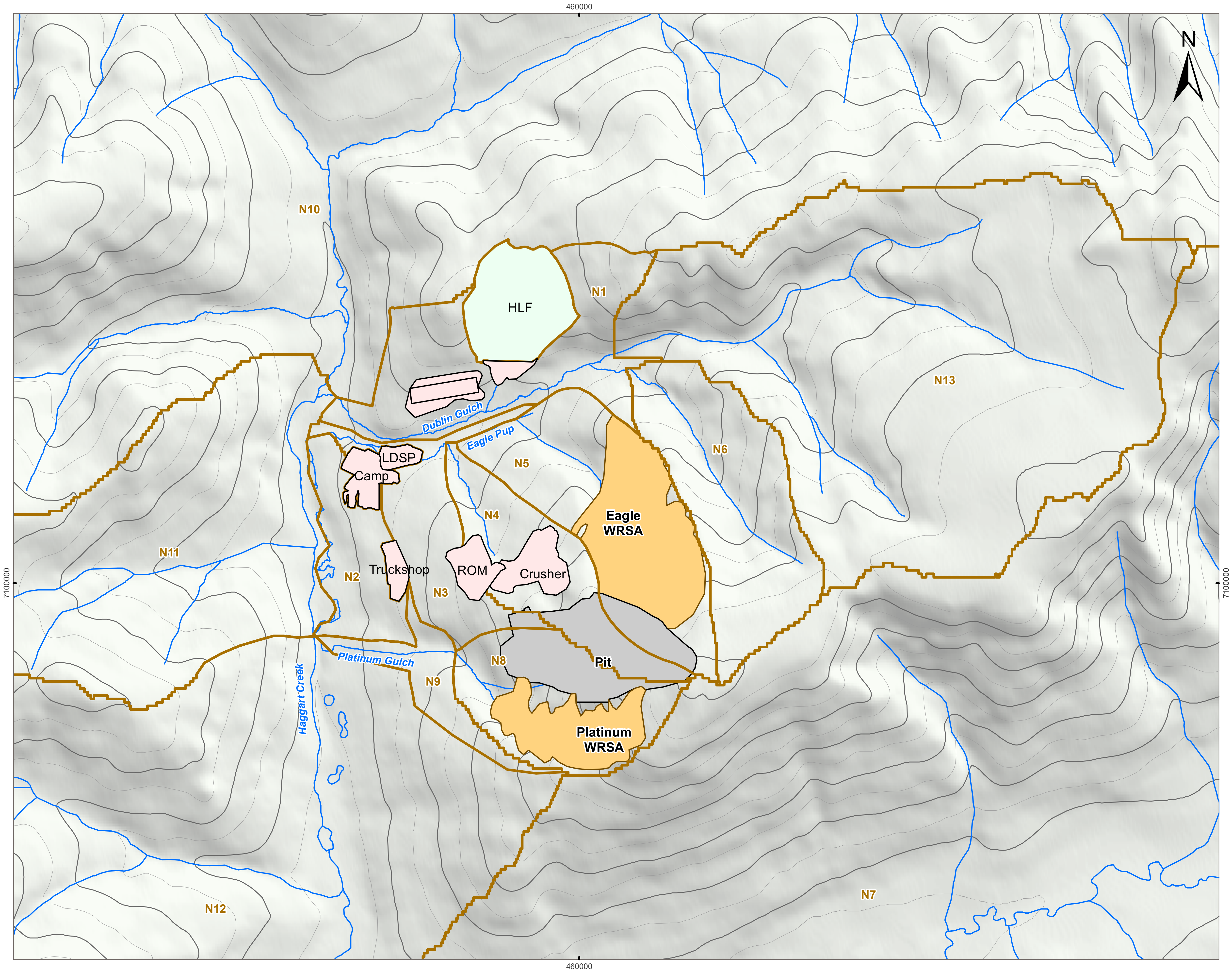

LEGEND

🟧	Waste Rock Storage Area
▨	Pit
🟩	Heap Leach Facility
🟥	Site Facility
☐	Model Catchment
—	Water Course
—	Contour (100m)
—	Contour (50m)

NOTES
Base data source:

STATUS
FOR INTERNAL USE ONLY

EAGLE GOLD PROJECT
YUKON TERRITORY

2027 (Year 9) Site Layout

PROJECTION
Transverse Mercator UTM Zone 8

DATUM
NAD83

CLIENT
Victoria GOLD CORP

Scale: 1:25,000
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Metres

LORAX ENVIRONMENTAL

FILE NO.

PROJECT	DWN	CKD	APVD	REV
Eagle Gold	AL	SJ	DHF	1

OFFICE

DATE
April 08, 2020

Figure 2.1-10

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Table 2.1-3:
Non-contact catchment areas by year (all areas in hectares)

Catchment	**N1 Ann Gulch**	**N2 Camp**	**N3 Above Camp**	**N4 Suttles Gulch**	**N5 Eagle Pup**	**N6 Stewart Gulch**	**N7 Lynx Creek**	**N8 Platinum Gulch**	**Platinum Gulch N9 above Road**	**N10 (W22)**	**N11 Gil Gulch +**	**N12 W5 Incremental**	**N13 Upper Dublin W1**
Comment	W1	Eagle Creek D/S camp and U/S W45. Diverted by road ditch and culvert	Runoff to LDSP	W10	W9 Eagle Creek	W26	W6	Platinum Gulch, Toe of Max WR dump	Platinum Gulch D/S of Ditch A to Haggart Ck.	W22	West runoff, D/S W21/22 conf., U/SW29	W5	W1
Baseline	128.7	53.4	70.2	71.3	154.4	141.6	10,156.2	102.0	35.8	6,644.3	423.5	1,150.9	684.7
2019	111.8	53.4	70.2	58.2	154.4	141.6	10,156.2	88.8	35.8	6,644.3	423.5	1,150.9	684.7
2020	107.6	53.4	70.2	50.3	147.4	141.6	10,156.2	60.4	35.8	6,644.3	423.5	1,150.9	684.7
2021	94.6	53.4	70.2	47.3	144.6	141.6	10,156.2	48.3	35.8	6,644.3	423.5	1,150.9	684.7
2022	94.6	53.4	69.9	44.0	124.1	141.6	10,156.2	45.3	35.8	6,644.3	423.5	1,150.9	684.7
2023	94.6	53.4	68.5	40.5	103.0	141.6	10,156.2	39.5	35.8	6,644.3	423.5	1,150.9	684.7
2024	94.6	53.4	68.5	39.4	92.8	141.6	10,156.2	36.8	35.8	6,644.3	423.5	1,150.9	683.4
2025	74.1	53.4	68.5	38.0	81.3	141.6	10,156.2	36.8	35.8	6,644.3	423.5	1,150.9	683.4
2026	74.1	53.4	67.7	37.1	74.1	140.0	10,156.2	36.7	35.8	6,644.3	423.5	1,150.9	683.4
2027	74.1	53.4	67.7	37.1	74.1	140.0	10,156.2	36.7	35.8	6,644.3	423.5	1,150.9	683.4

Table 2.1-4:
Open pit catchment areas by year (all areas in hectares)

Catchment	N3 Pit	N4 Pit	N5 Pit	N8 Pit	Pit Total
Baseline	0.0	0.0	0.0	0.0	0.0
2019	0.0	8.0	0.0	5.2	13.2
2020	0.0	16.0	7.0	11.1	34.1
2021	0.0	19.0	9.9	15.6	44.4
2022	0.3	21.7	11.5	18.6	52.1
2023	1.7	22.1	13.3	24.4	61.5
2024	1.7	22.1	13.3	27.1	64.2
2025	1.7	22.1	13.3	27.1	64.2
2026	2.5	22.1	13.3	27.2	65.2
2027	2.5	22.1	13.3	27.2	65.2

Table 2.1-5:
WRSA catchment areas by year (all areas in hectares)

Catchment	N5 Eagle WR	N8 Platinum WR
Baseline	0.0	0.0
2019	0.0	8.0
2020	0.0	30.5
2021	0.0	38.1
2022	19.5	38.1
2023	41.9	38.1
2024	53.1	38.1
2025	65.9	38.1
2026	77.2	38.1
2027	77.2	38.1

**Table 2.1-6:
Mine infrastructure catchment areas by year (all areas in hectares)**

Catchment	N1 HLF Infrastructure	HLF Total	N4 Crusher	N4 ROM	Camp (In N2)	LDSP (In N3)	LTF and Substation (In N2)
Baseline	16.9	0.0	13.9	0.0	9.8	3.7	4.3
2019	16.9	0.0	13.9	5.1	9.8	3.7	4.3
2020	16.9	20.5	13.9	5.1	9.8	3.7	4.3
2021	16.9	20.5	13.9	5.1	9.8	3.7	4.3
2022	16.9	20.5	13.9	5.1	9.8	3.7	4.3
2023	16.9	20.5	13.9	5.1	9.8	3.7	4.3
2024	16.9	51.6	13.9	5.1	9.8	3.7	4.3
2025	16.9	51.6	13.9	5.1	9.8	3.7	4.3
2026	16.9	51.6	13.9	5.1	9.8	3.7	4.3
2027	16.9	51.6	13.9	5.1	9.8	3.7	4.3

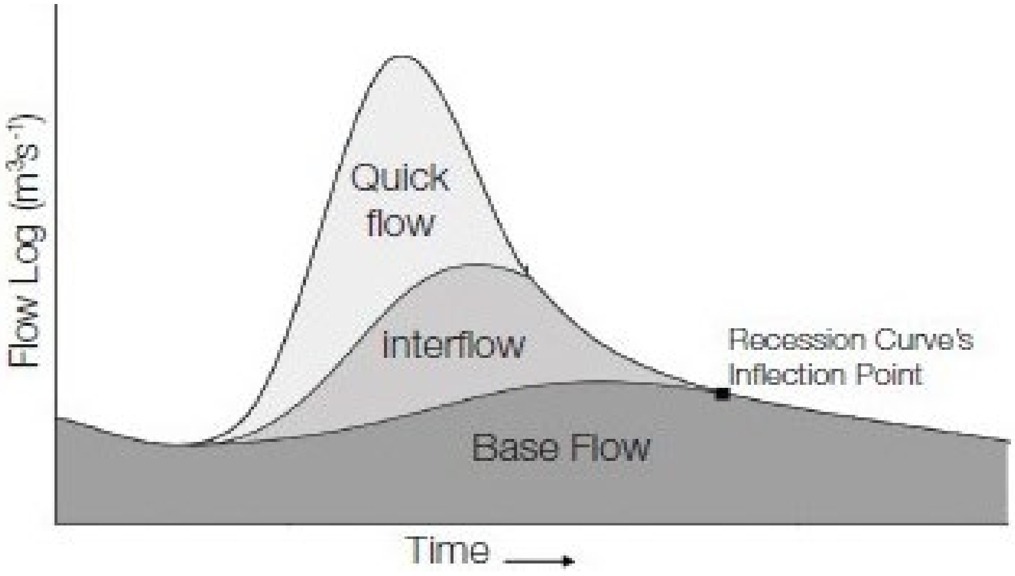
2.1.4 Natural Catchment Watershed Model

A customized site-wide water balance model was constructed in the GoldSim modeling environment to allow the Project site streamflow regime to be accurately replicated. The streamflow regime at the Project site is highly variable, with multiple peak flow events common place throughout the year, driven by an initial freshet and following convective rainfall events in the summer. Significant volumes of water can report to local tributaries in the span of 2 days yet may subsequently be followed by prolonged dry periods where surface flows diminish to the point where groundwater discharge is the main driver of streamflow.

As the open water season progresses, active layer melt above the permafrost contributes increasing amounts of discharge to local creeks, which is expressed as an increasing low flow signature throughout the summer. Finally, during winter, when average winter temperatures fall well below zero, surface flow in small catchments is reduced to zero as the stream channels freeze-up. In winter, the only moving water is generally sub-ice or from active springs generated by discharging groundwater, which will freeze in laminae (aufeis) as cold conditions progress. This icing phenomenon continues throughout the winter, and results in ice sheets that greatly exceed the existing channel width.

Figure 2.1-11 shows the commonly accepted components of streamflow with surface volumes of water reporting from with one of three signatures:

- Quick (or Fast) flow – generated by storm or snowmelt events and often resulting in peak flow events. For the Project site tributaries, water contributed via this mechanism may report to creeks in less than 2 days time;
- Interflow – a component of Slow Flow, this refers to the lateral movement of infiltrated meteoric water through the shallow organics and colluvial layer to the stream channel. Flow reporting to creeks along this pathway is often referred to as vadose or unsaturated zone flow, and comprises a significant component of the total flow reporting to Dublin Gulch and its tributaries; and
- Baseflow – a component of Slow flow, it is the portion of surface flow derived from groundwater discharge. At the Project site, this composes the majority of streamflow during summer low flow periods and all the flow through the winter season.



Source: http://turmalina.igc.usp.br/img/revistas/guspsc/v13n1/a01fig07.jpg

Figure 2.1-11:Conceptual hydrograph showing runoff partitioning.

The watershed model assembled to replicate the streamflow regime at the Project site incorporates this understanding of streamflow composition and response directly into the model architecture. Accordingly, streamflow (as quick flow, interflow and baseflow), are all represented in the site-wide WBM, using an extensively modified version of the Birkenes model (Christophersen and Seip, 1982) to account for variability in catchment areas at the Project site. This includes specific representation of snowfall/melt processes during freshet and aufeis production during winter. The Birkenes model was developed as part of a research program to understand linkages between stream chemistry and flow in a small (< 1 km^2) catchment in southern Norway (*e.g.,* Christophersen and Seip, 1982; Seip *et al*., 1985; Stone and Seip, 1989). Note that while the catchments of interest at the Project are up to two orders of magnitude larger, the model structure allows the discharge signature to be tuned for each reservoir to reflect the response in each catchment, regardless of size. The modelling approach is depicted as a conceptual diagram in Figure 2.1-12.

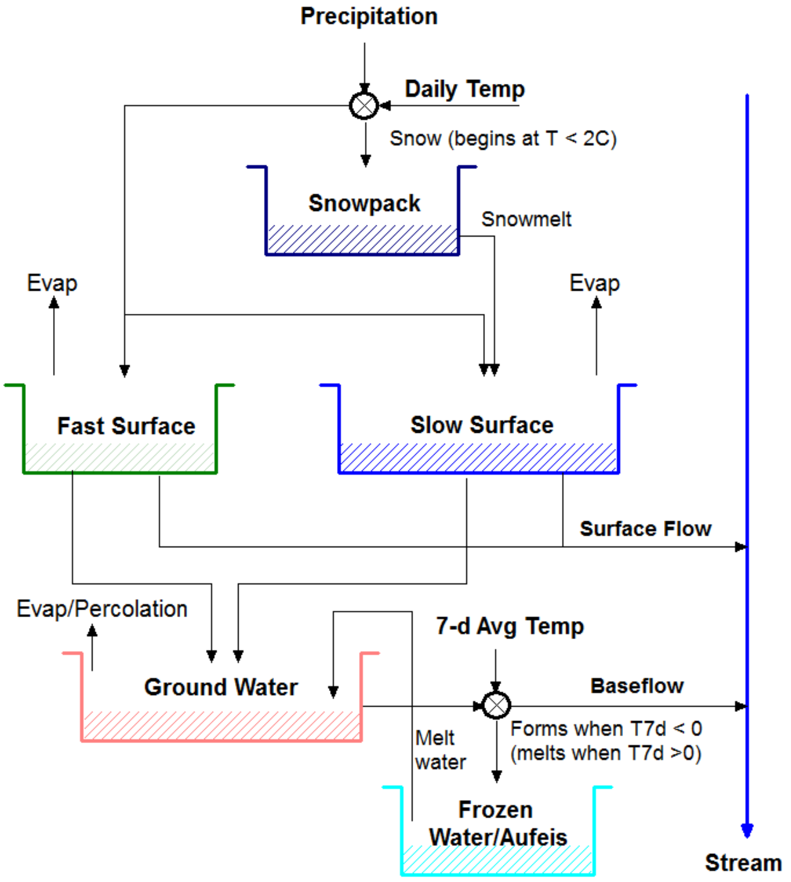


Figure 2.1-12:Schematic presenting an overview of the three-reservoir water balance model in conceptual format.

Conceptually, incoming precipitation is partitioned in the WBM to rain or a snow reservoir based on air temperature thresholds. As shown in Figure 2.1-12, all precipitation falls as snow at -2°C and rain at +2°C, with the proportions of each changing linearly between these thresholds. Rainfall is then directed into Fast and Slow Surface reservoirs, which represent areas of fast (or quick) runoff response, and interflow (or slower-draining soil areas) respectively. In both cases, the runoff volume at each time-step is calculated as a set proportion of the reservoir water volume at that time-step. If no precipitation is introduced in the following time-step, a proportionately smaller volume is released. In this way, the draindown response follows a negative exponential decay function.

Fast and slow surface recession flow from the surface storage reservoirs goes first to runoff at a rate specific to each reservoir, and the remainder at each time-step percolates to Groundwater. Figure 2.1-12 shows that when the Groundwater reservoir fills, slow recession flow from the reservoir reports to baseflow (and fractionally to aufeis in winter).

Where aufeis has been modelled (based on air temperature) to freeze completely during the winter months, streamflow is zero. In the model, evaporation is withdrawn preferentially from the Fast reservoir, and then at a much slower rate from the Slow reservoir. Groundwater is protected from evaporation and provides a source for winter baseflow. Finally, snowmelt and melting of aufeis are indexed to the rolling 7-day average air temperature. Aufeis is assumed to melt at 10% of the snowmelt rate, due to its higher density and location in the shaded valley bottoms.

Overall, the incorporation of additional baseline climate data and updated synthetic precipitation and runoff estimates (Section 2.1.1) have resulted in several changes to the Project site water balance. The noted change in winter orographic precipitation gradient resulted in a 9% decrease in estimated mean annual precipitation (MAP).

Table 2.1-7:
Comparison of 2014 and 2017 updated monthly runoff distributions

Basin	Median Basin Elevation (m)	Area (km^2)	2018 Annual Runoff (mm)	2019 Annual Runoff (mm)	% change MAR from 2018 WBM
Upper Dublin Gulch (W1)	1303	6.8	279	245	-12%
Stewart Gulch (W26)[1]	1183	1.3	212	316	49%
Haggart Ck u/s Dublin Gulch (W22)	1113	66.8	245	227	-7%
Haggart Ck d/s Dublin Gulch (W4)	1125	76.9	247	227	-8%
Ann Gulch	1029	0.89	231	219	-5%
Eagle Pup	1116	1.54	202	266	31%
Suttles Gulch	994	0.85	186	220	18%
Platinum Gulch	1070	0.77	196	190	-3%
Lynx Ck u/s Haggart Ck (W6)	1049	100.9	235	198	-16%

Note:
[1] The modelled runoff includes a portion of the predicted runoff to be bypassed through the alluvial sediments and ultimately to Haggart Creek.

2.1.5 Validation of Watershed Model With Monitoring Data

Following the update of the baseline streamflow time-series to include data collected in 2019, a verification exercise was conducted to ensure that the water balance model inputs were still adequately representing site conditions. As outlined in Section 2.1.1, the model was updated to a watershed model, three-bucket architecture, that has been calibrated to measured flow data collected at site monitoring locations that span a wide variety of catchment types and sizes. These catchments include those that are reflective of the receiving environment in Haggart Creek and are therefore largely unimpacted by mining activities (*e.g.*, W4), and catchments that are located within the mine site (*e.g.*, Ann Gulch).

In most cases, the measured streamflow records cover the open water season from May to October, with May generally showing incomplete data due to extensive channel icing conditions. Therefore, depending on the availability of data for May at each station, it is expected that the measured runoff will be less than the modelled runoff. The winter flow data for November to April, where available, are based on monthly averages of manual measurements that are made concurrent with the water quality sampling trips.

Figure 2.1-13 to Figure 2.1-17 present the results of the verification exercise and compare measured and model runoff from key locations within the Haggart Creek, Dublin Gulch and Lynx Creek catchments. Overall, the model outputs replicate the monthly distribution of runoff well, however it is notable that modelled runoff exceeds measured runoff at some stations. Given that the measured record spans from 8 to 14 years, and that many of the monthly averages calculated from this record are based on incomplete records (*e.g.*, May, when average monthly measured runoff underestimates actual runoff), the updated watershed model is thought to best represent the long-term average runoff conditions at site. For several of the smaller watersheds (*e.g.*, Stewart Gulch, Eagle Pup and Suttles Gulch), the modelled runoff is notably higher than measured values (Table 2.1-8). The higher modelled runoff values are supported by corresponding fluctuations in stream chemistry, and it is likely that the measured runoff is underestimated relative to actual values due to a portion of the predicted flow that bypasses the gaging station through alluvial sediments (*i.e.*, a losing stream).

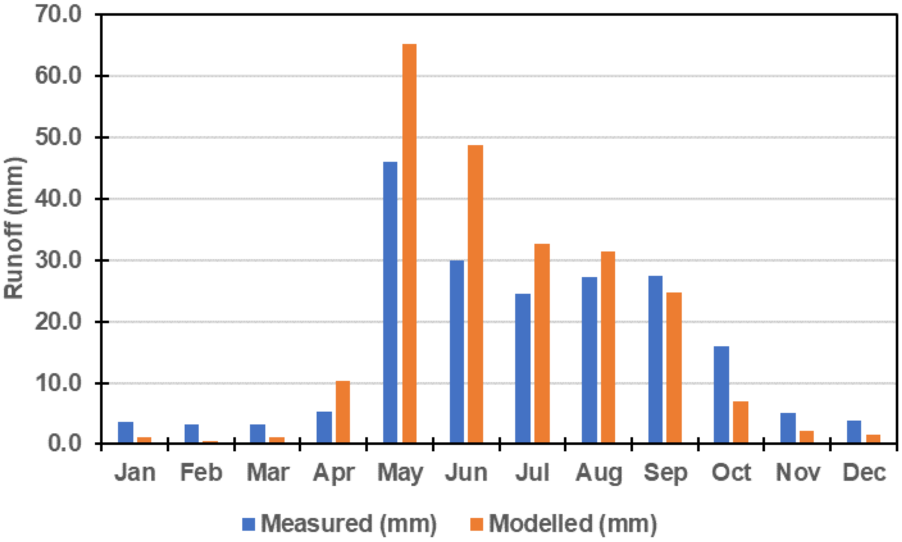


Figure 2.1-13:Measured and modelled runoff for the W22 station (Haggart Creek upstream of Dublin Gulch).

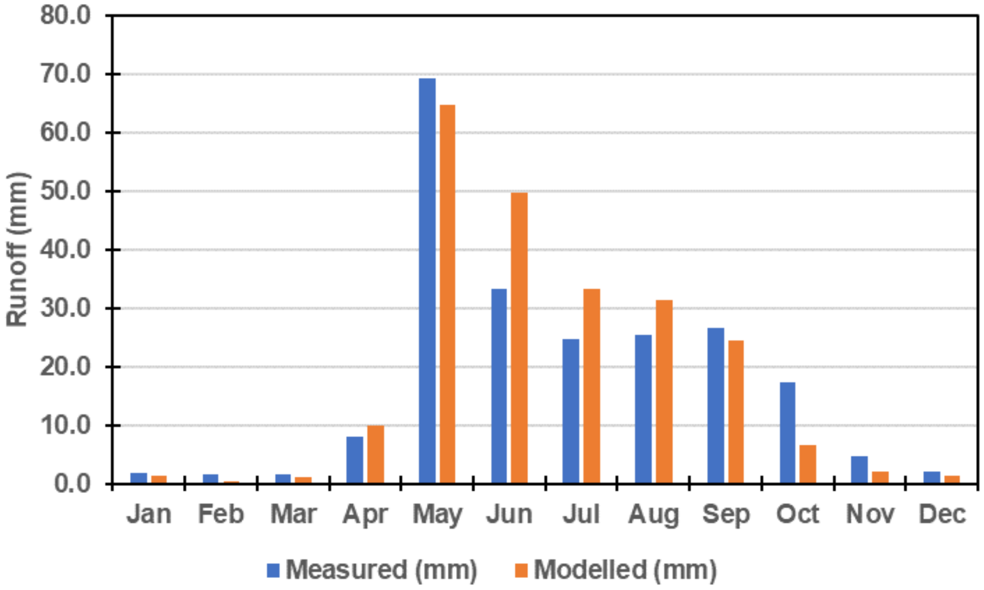


Figure 2.1-14: Measured and modelled runoff for the W4 station (Haggart Creek downstream of Dublin Gulch).

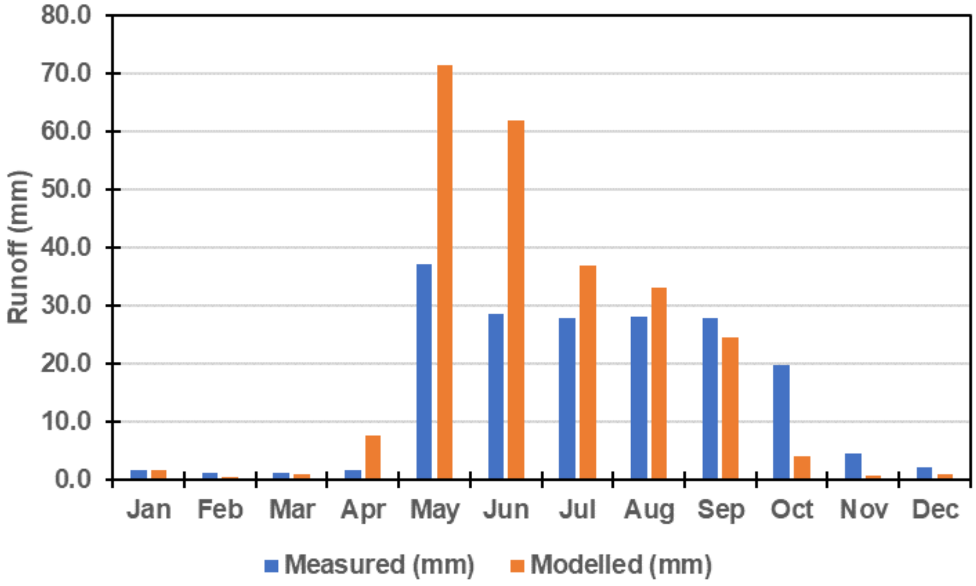


Figure 2.1-15: Measured and modelled runoff for the W1 station (Upper Dublin Gulch).

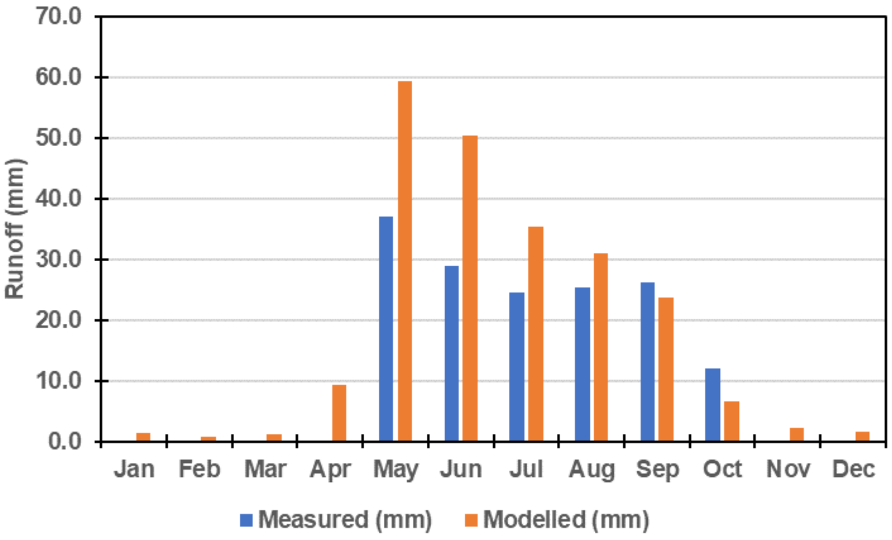


Figure 2.1-16: Measured and modelled runoff for the W5 station (Haggart Creek (immediately upstream of confluence with Lynx Creek).

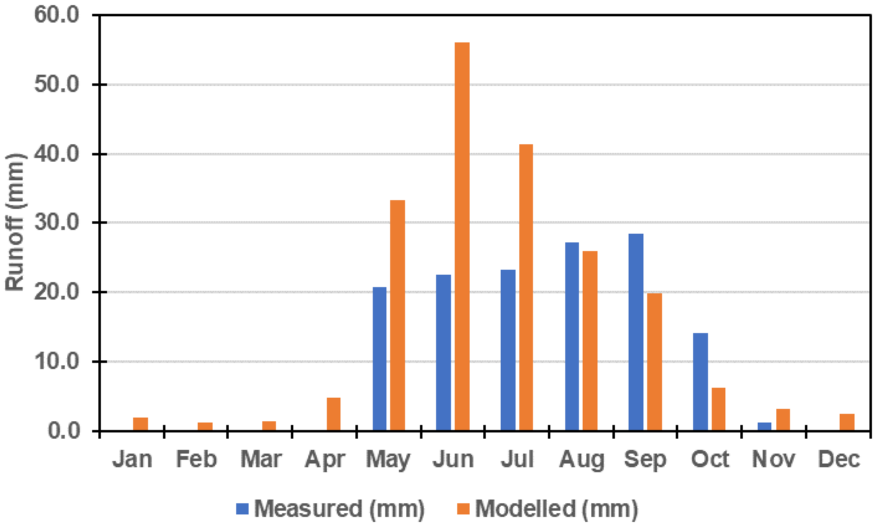


Figure 2.1-17: Measured and modelled runoff for the W6 station (Lynx Creek upstream of Haggart Creek).

2.1.6 Heap Leach Facility Water Balance Model Updates

The GoldSim HLF model has been revised by Forte Dynamics to include new ore water content estimates and to employ an up to date ore placement schedule consistent with the current mine plan in the site wide water balance model. Forte GoldSim model outputs, including makeup water demand, integrated drain-down volume and post-closure seepage rates were inputted into the site-wide GoldSim model so that they could be sourced within the site wide model. Drain down was refined to reflect the assumed practice for recycling water back to the heap pad during treatment to manage discharge loading; additionally, post-closure seepage from the Forte model was scaled assuming a cover is placed on the HLF after final rinse.

2.1.7 Mine Infrastructure

Since the 2019 WUL application was submitted, there have been changes to the mine infrastructure layout and migration of water balance model structure to a precipitation-driven watershed-based model. These updates are outlined below.

2.1.7.1 Waste Rock Storage Area Progression and Assumptions

Waste rock storage facility placement phasing for Eagle Pup and Platinum Gulch are presented by year in Table 2.1-4. The WB/WQM assumes that the Platinum Gulch WRSA is covered at the end of 2022. Prior to cover placement, basal seepage from this facility is predicted to range from 35% to 41% of MAP, dropping to 18% after the cover is in place. Similarly, the Eagle Pup WRSA is scheduled to be covered at the end of 2028, with a comparable decrease in the proportion of MAP reporting as basal seepage.

The proportion of runoff versus infiltration for the WRSAs during operations was determined by the individual watershed models applied to each facility. This proportion is characterized as the percent of total precipitation:

- Operations (until closure covers are assumed to be effective):
    - WRSAs and HLF – 35-41% of total precipitation (wet years infiltrate more than dry years) assumed to infiltrate, with incidental runoff (the majority of non-infiltrated water evaporates).
- Closure (once closure covers are assumed to be effective):
    - WRSAs – 18% of total precipitation was targeted for infiltration to the WRSAs (a 50% reduction from operations consistent with 2019 update assumptions), and 22% of the total precipitation as surface runoff from the cover.
        - Platinum Gulch WRSA – closure cover effective as of Year 4;
        - Eagle Pup WRSA – closure cover effective as of Year 10, and;
        - HLF – a cover with similar efficiency to the WRSA covers is assumed to be in place at the beginning of drain down (beginning in Year 12, 2 years after end of ore stacking).

Water that infiltrates the WRSAs recesses out to seepage with a lag time of several weeks before that water reports to the control pond (LDSP). This reflects the influence of water retention within the pore spaces of the WRSA, and the slower release of water than would be seen in a natural catchment with thinner overburden cover.

Table 2.1-8:
Waste Rock Storage Areas Tonnages and Surface Area by Year

Facility	Waste Type	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Eagle Pup WRSA	Mass incremental (t)	0	0	0	9,522,000	15,236,000	14,812,000	13,132,000	8,939,000	9,430,000	6,979,000
	Mass cumulative (t)	0	0	0	9,522,000	24,758,000	39,570,000	52,702,000	61,641,000	71,071,000	78,050,000
	Area (ha)	0.0	0.0	0.0	8.4	19.5	41.8	53.1	65.9	77.3	77.3
Platinum Gulch WRSA	Mass incremental (t)	0	2,442,000	13,275,000	7,426,000						
	Mass cumulative (t)	0	0	13,275,000	23,140,000	23,140,000	23,140,000	23,140,000	23,140,000	23,140,000	23,140,000
	Area (ha)	0	8.0	30.5	38.1	38.1	38.1	38.1	38.1	38.1	38.1

2.1.7.2 Sediment Control Ponds

The LDSP serves as the primary contact water management pond for the Project throughout Operations, and all contact water from the Eagle Pup WRSA, 90-day ore stockpile, Open Pit and Platinum Gulch WRSA will be directed to this pond.

<u>Contact Water Ditches</u>

A detailed description of contact water ditches and design parameters are presented in StrataGold (2018); a relevant summary of ditch locations, and the specific water sources reporting to the contact water ditches is presented below.

Ditch A

Ditch A collects contact water from the Platinum Gulch WRSA, 90-day stockpile and the open pit, as well as non-contact water from Platinum Gulch, and routes it northwards to the LDSP.

Ditch B/Eagle Creek

Ditch B/Eagle Creek collects contact water from the Eagle Pup WRSA, as well as non-contact water from the Eagle Pup and Suttles Gulch drainage. This ditch is aligned with the natural Eagle Creek drainage and flows west from the northern end of the Eagle Pup WRSA to the LDSP. Only the lower portion of Ditch B is currently routed to the LDSP (i.e., during 2019 and 2020 upper Eagle Creek is still diverted to Dublin Gulch). Ditch B is assumed to extend up to the toe of the EP WRSA for freshet in 2021.

Ditch C

Ditch C routes the LDSP outflow westward to Haggart Creek where it discharges just downstream of the confluence of Dublin Gulch and upstream of W4. At closure, the updated mine plan routes HLF draindown water requiring treatment to the MWTP and is then discharged directly to Ditch C.

Passive Treatment Systems

The Platinum Gulch PTS will be constructed during the operations phase (2023) of the Project to serve as a trial passive treatment system (PTS). Initially, PTS drainage is still routed to the MWTP until it can be proven that it can meet discharge criteria. This is assumed to occur five years after installation, after which outflow is routed to Haggart Creek. This PTS will continue in operation during the closure and post-closure phases.

A PTS will be constructed upstream of the LDSP and handle all inflow from Ditch B. Outflow from the PTS will still be routed to the MWTP until it can be proven to meet discharge criteria. This is assumed to occur five years after installation, after which overflow is routed to Ditch C and then to Haggart Creek. This PTS will continue in operation during the closure and post-closure phases.

At post-closure, HLF seepage water is directed to a PTS (i.e., the Events Ponds is converted to a PTS), which discharges directly to Haggart Creek immediately upstream of the confluence with Dublin Gulch.

2.2 Water Quality Model Inputs and Assumptions

The Eagle Gold Project water quality model (WQM) is a mass-conserving mixing model that predicts water quality for 38 parameters at key monitoring and compliance points in the receiving waters affected by mine activity. The model was designed on the GoldSim® platform and utilizes a GoldSim® water balance model (WBM). Both the WBM and the WQM use a daily time-step for 50 years, spanning operations, closure and several years into post-closure. Below is a brief description of water quality model inputs including seepage contact water source terms, Mine Water Treatment Plant (MWTP) and Passive Treatment Systems (PTS) effluent discharge requirements and background water quality for non-contact flows.

2.2.1 Seepage Contact Water – Geochemical Source Terms

The drainage chemistry from the various Eagle Gold mine facilities discussed herein is influenced by a variety of geochemical and physical aspects. Overarching controls that govern the water quality associated with any facility that contains exposed waste rock and ore, include:

- mineralogy and geochemistry of the exposed material;
- grain size distribution;
- water/rock ratio;
- depositional environment (*e.g.*, saturated versus unsaturated conditions); and
- temperature.

The rate at which minerals weather chemically in laboratory kinetic tests is typically observed to be many times faster than rates inferred from field observations of drainage from the toe of waste rock piles (Malmström, 2000). This discrepancy is in part due to the formation of distinct flow channels within the waste rock pile that results in the incomplete flushing of weathering products from the waste rock dump (Nichol et al., 2005).

The prediction of both the major and trace elemental geochemistry of waters in contact with the modelled facilities was conducted by upscaling of loading rates derived from kinetic tests (humidity cells). A flow chart of the work stages involved in this exercise is given in Figure 2.2-1. The following sections describe in detail the different modelling steps used in the generation of the geochemical source term model for the WRSAs, pit walls, and the 90-day ore stockpile. Note that the Heap Leach Facility (HLF) was not re-modelled in the current source term update as drainage from the HLF following the end of heap leaching is expected to be in geochemical equilibrium and therefore relatively insensitive to minor changes in the facility tonnage. Therefore, the draindown and long-term drainage chemistry predictions from this facility were adopted from Lorax (2014a).

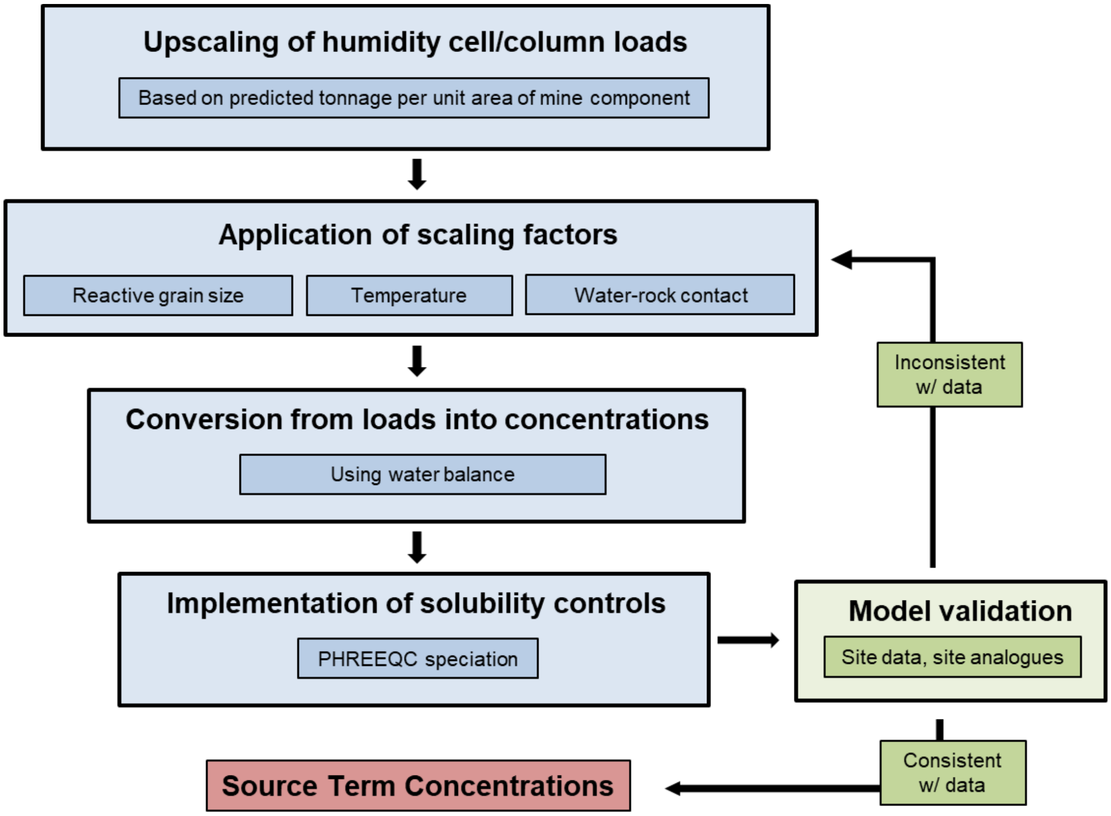


Figure 2.2-1: Work stages involved in the scaling of geochemical source terms

2.2.1.1 *Selection of Input Loading Rates*

As a first step in the development of geochemical source terms, the appropriate input solution chemistry needed to be defined. Dissolved concentrations for all chemical species produced during recent and historical kinetic experiments were converted into geochemical loads (in $mg/kg_{rock}/wk$) by multiplying each species with the amount of leachate output volume (in L) and dividing this load by the mass of rock reacting with the leachate (standard humidity cell = 1 kg).

Eagle Gold humidity cells were grouped to represent the various waste rock types and ore expected to be exposed during mine development. Humidity cells used to produce the individual input solutions are listed in Table 2.2-1.

Table 2.2-1:
Summary of kinetic test cells used for the individual rock units modelled

Lithology/Material	Kinetic cell used
Oxidized Granodiorite (OGD)	HC 5, HC 10
Fresh Granodiorite (FGD)	HC 3, HC 9
Altered Granodiorite (AGD)	HC 4, HC 6, HC 11
Oxide Metasediment (OMS)	HC 8
Fresh Metasediment (FMS)	HC 1, HC 2, HC 8, HC 13
Overburden (OB)	HC 10
Stockpiled ore (SP)	HC 7, HC 12

Two different scenarios are presented for the WRSAs and pit wall source terms; an operational and a post-closure scenario. More specifically, for the operational scenario, the 75th percentile of all available humidity cell leachates for a given species were used as the model input solution. In contrast, to model longer term ("stable") geochemical loading rates, the 75th percentile loading rates of the last three humidity cell cycles (weeks) with metal analysis were utilized to produce a solution input, assuming geochemical reaction rates reach a steady-steady state after soluble minerals have been flushed. Note that for the derivation of the model pH, the respective median value was used for operational and post-closure scenarios.

Drainage chemistry predictions for the 90-day ore stockpile are based on the 75th percentile of all leachates from two ore composite humidity cells (HC 7, 12; Table 2.2-1) to account for the relatively short duration of storage of material and expected initially high flushing concentrations. The annual tonnage and water balance in the temporary ore stockpile were not precisely constrained at the time of source term development such that the maximum expected stockpile capacity (~1 Mt) was used for the calculation of geochemical loading rates.

Table 2.2-2 and Table 2.2-3 provide an overview of the input solution chemistries used for waste rock and ore-containing facilities, respectively. Note that these values are identical to previous model iterations and a detailed list of all model inputs can be found in Lorax (2014a). Refer to SRK (2014) for a detailed description of humidity cell sample selection rationale and solid phase characteristics.

Table 2.2-2:
Composite input loads (mg/kg/wk) used for the different model scenarios in Eagle Gold waste rock facilities

Scenario	Operational (75th percentile)						Post-Closure (75th percentile)					
Lithology	OGD	AGD	FGD	OMS	FMS	OB	OGD	FGD	AGD	OMS	FMS	OB
pH	7.6	7.7	7.6	7.3	7.4	7.3	7.5	7.6	7.4	7.1	7.3	7.1
Alkalinity	15	16	14	5.1	15	5.1	13	15	12	4.7	9.2	4.7
Sulfate	12	9.1	12	1.7	24	1.7	8.2	6.7	6.6	1.5	15	1.5
Chloride	0.19	0.26	0.18	0.12	0.26	0.12	0.18	0.16	0.12	0.12	0.16	0.12
Fluoride	0.081	0.10	0.15	0.030	0.088	0.030	0.028	0.027	0.11	0.019	0.052	0.019
Al	0.025	0.032	0.049	0.021	0.033	0.021	0.019	0.026	0.038	0.016	0.025	0.016
As	0.0040	0.031	0.0012	0.016	0.012	0.016	0.0028	0.020	0.00048	0.014	0.0091	0.014
Ba	0.0049	0.0028	0.0036	0.00022	0.0028	0.00022	0.0044	0.0019	0.0022	0.00029	0.0015	0.00029
Ca	7.7	7.7	7.9	1.6	12	1.6	5.6	5.9	5.8	1.4	6.9	1.4
Cd	0.0000041	0.0000084	0.0000049	0.0000012	0.0000046	0.0000012	0.0000025	0.0000043	0.0000025	0.0000012	0.0000028	0.0000012
Co	0.000026	0.000040	0.000025	0.000018	0.000065	0.000018	0.000014	0.000024	0.000014	0.000014	0.000039	0.000014
Cr	0.000024	0.000024	0.000059	0.000042	0.000029	0.000042	0.000060	0.000035	0.000057	0.000076	0.000037	0.000076
Cu	0.00036	0.00051	0.00040	0.00023	0.00042	0.00023	0.00032	0.00023	0.00032	0.00021	0.00023	0.00021
Fe	0.0045	0.0033	0.0022	0.0038	0.0035	0.0038	0.0026	0.0036	0.0017	0.0031	0.0029	0.0031
Hg	0.0000024	0.0000024	0.0000025	0.0000024	0.0000024	0.0000024	0.0000024	0.0000024	0.0000024	0.0000024	0.0000024	0.0000024
K	2.2	1.2	1.2	0.41	2.1	0.41	1.6	0.48	0.54	0.35	0.96	0.35
Mg	0.90	1.1	0.86	0.099	1.1	0.099	0.74	1.0	0.61	0.082	0.66	0.082
Mn	0.0048	0.0038	0.0040	0.00097	0.0094	0.00097	0.0030	0.0019	0.0032	0.00053	0.0065	0.00053
Mo	0.0060	0.0037	0.0013	0.00048	0.00034	0.00048	0.0024	0.0014	0.00043	0.00029	0.00013	0.00029
Na	0.71	0.53	1.6	0.18	0.34	0.18	0.14	0.10	0.16	0.081	0.10	0.081
Ni	0.00013	0.00015	0.00014	0.00013	0.00030	0.00013	0.000088	0.000074	0.00010	0.00018	0.00016	0.00018
P	0.00062	0.0026	0.0010	0.00048	0.00049	0.00048	0.00048	0.0015	0.00048	0.00048	0.00048	0.00048
Pb	0.000028	0.000068	0.000027	0.000019	0.000036	0.000019	0.000015	0.000042	0.000022	0.0000047	0.00015	0.0000047
Sb	0.000099	0.021	0.017	0.00037	0.0027	0.00037	0.000073	0.012	0.0089	0.00023	0.0010	0.00023
Se	0.00028	0.0020	0.00056	0.00012	0.00077	0.00012	0.00018	0.0011	0.00035	0.000093	0.00028	0.000093
Si	0.68	0.70	0.65	0.45	0.97	0.45	0.56	0.38	0.53	0.40	0.63	0.40
Sn	0.000012	0.000015	0.000019	0.000015	0.00010	0.000015	0.0000089	0.000071	0.0000097	0.0000024	0.000097	0.0000024
U	0.0017	0.012	0.023	0.00091	0.00053	0.00091	0.0013	0.0051	0.0096	0.00067	0.00034	0.00067
Zn	0.00027	0.00044	0.00036	0.00019	0.00044	0.00019	0.00016	0.00032	0.00030	0.00013	0.00035	0.00013

Notes: All chemical species given in mg/kg/wk;
OGD = Oxidized granodiorite; FGD = fresh granodiorite; AGD = altered granodiorite; OMS = oxidized metasediment; FMS= fresh metasediment; OB = overburden

Table 2.2-3:
Composite input loads (mg/kg/wk) used for the Eagle Gold 90-day ore stockpile

	Ore (90-day stockpile)
	Operational
pH	7.6
Alkalinity	15
Sulfate	7.7
Chloride	0.14
Al	0.029
As	0.026
Ba	0.0029
Ca	7.1
Cd	0.0000044
Co	0.000020
Cr	0.000024
Cu	0.00047
Fe	0.0019
Hg	0.0000023
Mg	0.52
Mn	0.0021
Mo	0.0024
Na	0.67
Ni	0.00013
P	0.00078
Pb	0.000035
Sb	0.019
Se	0.00070
U	0.0041
Zn	0.00054

2.2.1.2 *Upscaling of Kinetic Test Loads*

Once the input solution chemistry was defined, the geochemical loads were upscaled to match the tonnage of the mine facility in question. Current estimates of mine tonnage stored in WRSAs, ore stockpile and HLF were provided by StrataGold. The waste production schedule and pit wall exposures used for this assessment are given in Table 2.2-4. Note that approximately 2.4 Mt of waste rock material were already deposited in the Platinum Gulch WRSA by the end of 2019. This tonnage was accounted for in the upscaling exercise. A detailed discussion of site analogues used for the calibration and comparison of scaling factors was provided in Lorax (2014a).

Table 2.2-4:
Waste rock production schedule and pit wall proportions by mine-year for the modelled Eagle Gold mine components

Facility	Waste Type	2020	2021	2022	2023	2024	2025	2026	2027
Platinum Gulch (in kt)	OGD	749	783	-	-	-	-	-	-
	AGD	10	27	-	-	-	-	-	-
	FGD	70	120	-	-	-	-	-	-
	OMS	6,016	2,085	-	-	-	-	-	-
	FMS	942	3,352	-	-	-	-	-	-
	OB	5,488	1,059	-	-	-	-	-	-
Eagle Pup (in kt)	OGD	-	1,050	1,528	4,536	3,014	249	152	1,026
	AGD	-	36	20	16	285	469	126	257
	FGD	-	160	410	1,339	2,821	3,597	3,142	2,505
	OMS	-	2,796	6,689	4,048	2,796	3,932	3,782	3,283
	FMS	-	4,495	6,804	6,256	5,234	2,825	3,425	859
	OB	-	1,420	1,506	1,244	1,310	778	1,498	1,224
Pit walls (in %)	OGD	40%	33%	25%	24%	18%	14%	12%	12%
	AGD	2%	3%	4%	5%	4%	4%	3%	3%
	FGD	8%	14%	18%	25%	32%	34%	37%	40%
	OMS	39%	28%	21%	17%	16%	17%	18%	17%
	FMS	11%	22%	31%	30%	30%	30%	31%	28%

Notes: OGD = Oxidized granodiorite; FGD = fresh granodiorite; AGD = altered granodiorite; OMS = oxidized metasediment; FMS= fresh metasediment; OB = overburden.
Waste rock deposited in the Platinum Gulch WRSA in 2019 (~2.4 Mt) is accounted for in the source term model.

While the rock mass of the described mine components can be easily translated from the waste and ore production schedule, the derivation of reactive rock mass within the exposed pit walls is less straightforward. The final pit walls are expected to be fractured as a result of blasting operations. Fracturing of the pit walls exposes a greater proportion of the wall rock to weathering and hence wall rock drainage will have the geochemical signature of the respective rock type. In this assessment, it was assumed that controlled blasting would be used at the limits of the proposed open pit mine. However, controlled blasting of rock does not completely eliminate fracture of underlying rock but results in a blast-damaged transition zone extending into the pit walls. This blast-damaged transition zone comprises a blast-fractured zone and a blast-influenced zone that would be subject to oxidative weathering. The penetration depth of the blast-damaged zones into the wall rock is dependent on a variety of parameters. Hustrulid (1999) estimated ranges of 0.85 to 1.05 m and 2.65 to 3.15 m for the blast-fractured and the blast-influenced zones, respectively. These estimates are based on controlled blasting and an intermediate rock strength. For the Eagle Gold pit walls, penetration depths of 0.9 and 2.9 m were chosen for the blast-fractured and the blast-influenced zones, respectively. Using a bulk density of 2.5 t/m^3 along with the annual surface areas broken out into waste rock type, these thicknesses were subsequently used to calculate a rock mass that will come in contact with infiltrating waters and produce a geochemical load.

Alkalinity is generally limited by the solubility of carbonate phases and is closely related to pH. Upscaling alkalinity in the same manner as dissolved metals would lead to unrealistically high values affecting the PHREEQC input file and cause extensive carbonate precipitation which would, in turn, alter the output pH inordinately. In that context, field barrels represent a useful analogue (see Section 2.2.1.7) with an acid-base balance and climatic conditions similar to those expected in the Eagle Gold mine components. Therefore, constant typical values seen in field barrel leachates and reflective of a pH of around 8 were used for the predictive model (100 mg $CaCO_3$/L for WRSAs, and ore stockpile; 60 mg $CaCO_3$/L for pit walls).

2.2.1.3 Adjustment of Upscaled Loads

Owing to several lab-to-field comparison studies it has been recognized that drainage chemistry predictions based on direct mass upscaling often strongly overestimate the quantities of dissolved solids that are leached from the mine rock (Malmström et al., 2000; Sapsford *et al*., 2009; Plante *et al.,* 2014; Kirchner & Mattson, 2015). This is due to a variety of differences between lab and field conditions such as climate, water/rock ratios, hydrogeological pathways, grain size distribution and secondary mineral controls, all of which are factors that reduce geochemical loads per mass contacted in the field. As a result, it is the industry standard to implement scaling factors when upscaling humidity cell leachate results to account for these discrepancies. The following describes the scaling factors applied in the Eagle Gold source term model and the rationale for correcting for specific conditions. Refer to Kempton (2012) for a review of the various scaling factors commonly considered for geochemical source term predictions.

Temperature

The Eagle Gold project is located in the Yukon with average monthly temperatures ranging from approximately -21 to 10.5˚C for January and July, respectively. Kinetic experiments used for the source term model were conducted at SGS laboratories at a temperature of 22˚C and it is well established that the rate of many geochemical reactions leading to the release of acidity and dissolved metals is temperature-dependent. For Eagle Gold ore and waste rock, the oxidation of pyrite can be considered the driving force in terms of contaminant leaching for most parameters of concern. This reaction has been extensively studied and its rate has been determined over a range of temperatures that can be expressed in terms of an Arrhenius correlation. The Arrhenius relationship describing pyrite oxidation rate as a function of temperature is given by:

$$Temperature\ adjustment\ [\%] = e^{[E_a * (T_x - T_y)/(R * T_x * T_y)]}$$

With E_a = activation energy;
R = universal gas constant;
T_x = temperature of interest; and
T_y = experimental temperature.

The activation energy determines the slope of this function and, therefore, the temperature-dependence of the oxidation reaction. For the purposes of this model, an E_a of 40 kJ/mol was chosen to be consistent with the range of values reported in the literature (e.g., Lowson, 1982; Nicholson *et al.*, 1988; and, Kamei and Ohmoto, 1999).

The bulk portion of waste and ore piles will not adopt ambient air temperatures but have a much smaller amplitude in temperature variation throughout the year. To account for this thermal inertia, monthly temperatures were adjusted for these mine components to produce a smoother temperature distribution curve while still maintaining average annual ambient temperatures and an average temperature scaling factor of approximately 28% (range from 24-34% depending upon month; Table 2.2-5). For the pit walls, the temperature distribution was only smoothed slightly as the depth of reaction is shallow, yielding a wider range in scaling factors (16-41%) while showing a similar average scaling factor throughout the year.

Table 2.2-5:
Temperature scaling factors applied to the modelled Eagle Gold mine components

Month	Pit walls	Stockpiles*
Jan	16%	24%
Feb	17%	24%
Mar	19%	25%
Apr	28%	29%
May	33%	31%
Jun	39%	33%
Jul	41%	34%
Aug	37%	33%
Sep	33%	31%
Oct	24%	28%
Nov	21%	26%
Dec	16%	24%
Average	27%	28%

*Stockpiles include both WRSAs and the 90-day ore stockpile

Grain Size Distribution

Before representative material is placed into laboratory kinetic test cells, rock samples are crushed to a nominal grain size of <1/4” (6.35 mm) to allow for better comparability of reaction rates between different cells containing different geological material. The smaller the grain size, the higher the amount of surface area that is exposed to weathering, thereby causing increased reaction rates. Studies investigating the effect of grain size distribution on drainage chemistry in mine environments found that >80% of the geochemical loads are leached from the <25 mm fraction (Strömberg and Banwart, 1999; Stockwell *et al*., 2006). Highly dependent on the rock type and blasting method, it was estimated that this fraction represents between 10 and 40% by mass of a typical waste dump with the majority of studied waste dumps falling into the lower end of this range. Wickland and Wilson (2004) measured the particle size distribution of a waste rock dump and material less than 6 mm accounted for approximately 15% of the total dump mass. For the lack of detailed work regarding the grain size distribution at Eagle Gold, grain size scaling factors were set in accordance with literature values. For the WRSA source term models, a scaling factor of 20% was utilized. For the pit wall blast-fractured zone, a reasonably conservative scaling factor of 30% was implemented to account for the increased mass of reactive rock in response to blasting activities. A grain size scaling factor of 20% was assigned to the less damaged pit wall blast-influenced zone.

For optimized gold recovery, ore grade material will go through three crushing cycles before being stacked on the heap leach pads. The final crushed ore product will have a target grain size of 80% <6.5 mm, roughly equivalent to particle size distribution used in kinetic testing. The primary crusher setting is designed to produce a particle size of 150 mm or less in the temporary ore stockpile, which falls between the expected grain sizes of waste rock and the final ore product, so a grain size correction factor of 50% was implemented.

Contact Water

Humidity cell experiments are conducted using water/rock ratios that allow for the flushing of all rock material placed into the cells. Various studies suggest that only a portion of the rock mass contained in a waste dump is contacted by infiltrating water. In one study, for example, a small-scale waste rock dump was disassembled one year after its construction and the distribution of moisture contents within the dump indicated that the development of preferential flow paths is an important process (Marcoline *et al.,* 2006). Under low-flow conditions, water is retained in and will travel along the fine fractions within the waste dumps, whereas heavy rainfalls may flush relatively higher proportions of the coarser grain sizes (Andrina, 2009). It has also been suggested that, in months of higher rain intensity, a larger overall portion of the dump is contacted as more pathways are being activated. In accordance with this concept, a contact water scaling factor was applied that was dependent on the infiltration volume in each month. Furthermore, as the WRSAs becomes larger with time during operations, it was assumed that the percentage of contact water decreases with increasing dump size over time as larger zones within the facility become isolated from infiltration as a result of the increasing volume-to-area ratio. An overview of the maximum assumed contact water factors for the two WRSAs is provided in Table 2.2-6. Note that these values are normalized to the water-rock ratio in a given year. This approach was carried forward into the post-closure scenario where the WRSAs will be covered with soil as part of the closure process to reduce infiltration.

Table 2.2-6:
Maximum contact water scaling factors implemented over time for the WRSA prediction model

	Eagle Pup	Platinum Gulch
2020*	-	9%
2021*	5%	4%
2022*	2%	4%
2023	3%	-
2024	4%	-
2025	4%	-
2026	4%	-
2027	3%	-
PC	2%	-

*Concentrations were set to initial field barrel concentrations if found to be higher than the modelled concentrations

A similar approach was taken for the 90-day ore stockpile where seasonal changes in water balance and material tonnage were considered as best as possible leading to a maximum contact water factor of 40%. The maximum contact water factor was held constant for pit walls over time with 100% and 80% assumed to come in contact with the blast-fractured and blast-influenced zones in the month with the highest pit wall runoff (May), respectively.

Stored Loads

Pyrite oxidation occurs at relatively low moisture contents (down to <1%) and may therefore even proceed in the unfrozen portions of the waste dump and pit walls that are not regularly flushed. Conceptually, in months with relatively low infiltration rates, a portion of hydrogeological pathways are not actively rinsed, however the moisture content in these months is still sufficient to promote sulphide weathering. Geochemical loads produced during these months are then temporarily stored and subsequently released when these pathways become activated again (*e.g.*, during heavy rainfall events in May). This mechanism has been observed in various mine settings where increased concentrations correlated with heavy rainfalls, especially after extended dry periods (Kempton and Atkins, 2000). This seasonal variation of the load distribution was accounted for by tracking the amount of loads being produced in lower-infiltration months followed by subsequent release of a small portion (5%) of these stored loads in April and May in which the largest increase in water contact with respect to the prior months is predicted.

2.2.1.4 Mineral Solubility Control

Water/rock ratios in humidity cell testing are high enough to prevent supersaturation of most species such that secondary mineral precipitation in the test cells is unlikely to strongly affect leachate chemistry. Upscaling of geochemical loads as described above is generally carried out with no consideration given to mineral phases that may limit the dissolved concentrations of insoluble elements such as Fe, and Al, particularly at circum-neutral pH. In order to avoid the calculation of unrealistically high concentrations of species that are known to form secondary phases in mine drainage, PHREEQC - a thermodynamic mineral solubility model (Parkhurst and Appelo, 1999) - was employed on the upscaled concentrations to account for mineral solubility controls. Minerals commonly seen in mine drainage were allowed to precipitate from the predicted drainage solutions. An overview of the modelled phases is given in Table 2.2-7. Phases that were in fact identified to be supersaturated in at least one output solution draining from the individual mine components are indicated by a check mark. Unmarked phases merely served as a theoretical concentration cap.

Table 2.2-7:
Mineral phase allowed to precipitate in the Eagle Gold speciation model (PHREEQC)

Mineral	Ideal Formula	Eagle Pup	Platinum Gulch	Pit walls	90-day SP
Barite	$BaSO_4$	✓	✓	✓	✓
Calcite	$CaCO_3$	✓	✓	✓	✓
Dolomite	$(Ca, Mg)(CO_3)_2$				
Ferrihydrite	$Fe(OH)_3(a)$	✓	✓	✓	✓
Gibbsite	$Al(OH)_3$	✓	✓	✓	✓
Gypsum	$CaSO_4*2H_2O$				
Malachite	$CuCO_3$				
Quartz	SiO_2	✓	✓	✓	✓
Rhodochrosite	$MnCO_3$				
Smithsonite	$ZnCO_3$				

To maintain conservatism with respect to the dissolved parameters of concern, and to not overcomplicate the prediction model, adsorption modelling was omitted in this approach. This is further justified by the fact that the drainage prediction model was calibrated using site analogue data and bulk scaling factors that already inherently account for adsorption and other forms of attenuation, as “real” drainage data is used as a reference point (Lorax, 2014a).

2.2.1.5 Nitrogen Source Term Derivation

Nitrogen based blasting reagents have been identified by Pommen (1983) as a source of nitrogen compounds from surface mining operations. The nitrogen compounds ammonia (NH_3) and nitrate (NO_3) are constituents of the explosives, while nitrite (NO_2) is typically an intermediate oxidation product of ammonia. The release of nitrogen compounds from blasting reagents can occur within the pit during mining operations and from residual reagents stored within blasted rock. The release of nitrogen from explosives loaded in boreholes and from explosive residue on blasted rock surfaces occurs by dissolution of nitrogen compounds into water and subsequent aqueous transport to the downstream receiving environment.

A detailed discussion of the Eagle Gold nitrogen-specific source term assumptions and results was presented in Lorax (2014a). For this iteration, no changes to this approach were made and the model output remains the same; the reader is referred to Lorax (2014a) for an overview of these results.

2.2.1.6 *Field Kinetic Experiments*

Field barrel experiments represent meso-scale field-kinetic tests in which rock material is placed into ~120 L, free-draining drums that are exposed to precipitation under site-climatic conditions. Contact water is captured in collection jugs that are connected to the bottom of the drums and is sent for geochemical analysis several times throughout the year. This method has advantages over laboratory-based kinetic tests (i.e. humidity cells) because it more suitably resembles the actual conditions present within WRSAs and pit walls including site-specific climate, scale, grain-size, and water-rock ratios. A total of eight field barrels (FB) containing ~225 kg of representative waste rock lithologies (drill core) were constructed by StrataGold in 2012. These kinetic experiments are currently ongoing. Specifically, the barrels are composed of:

- FB 1: Oxide metasediment
- FB 2: Fresh metasediment
- FB 3: Oxide/fresh metasediment
- FB 4: Oxide granodiorite
- FB 5: Fresh granodiorite
- FB 6: Altered granodiorite
- FB 7: Oxide/fresh granodiorite
- FB 8: Overburden

This section serves as an overview of the FB data, including incorporation of the most recent 2019 results, relevant to the geochemical source term predictions for the updated model. Details with regards to the construction and sampling protocol for the FB are discussed in detail in SRK (2014). Figure 2.2-2 to Figure 2.2-5 illustrate the temporal leaching behaviour observed from 2012 to October 2019 for parameters of interest. For reference, field barrel leachate concentrations presented in the context to the range of source term predictions for the two WRSAs.

While pH remains relatively stable between 7.5 and 8.5 (not shown) in field barrel leachates, dissolved sulphate and Se concentrations display a decreasing trend over time with occasional spikes in concentration likely being caused by increased contact water/rock ratios in response to heavier rain fall events (Figure 2.2-2 and Figure 2.2-3, respectively). The initially relatively high concentrations are, at least in part, inferred to be a result of stored loads that may have accumulated on waste rock surfaces during storage of drill core.

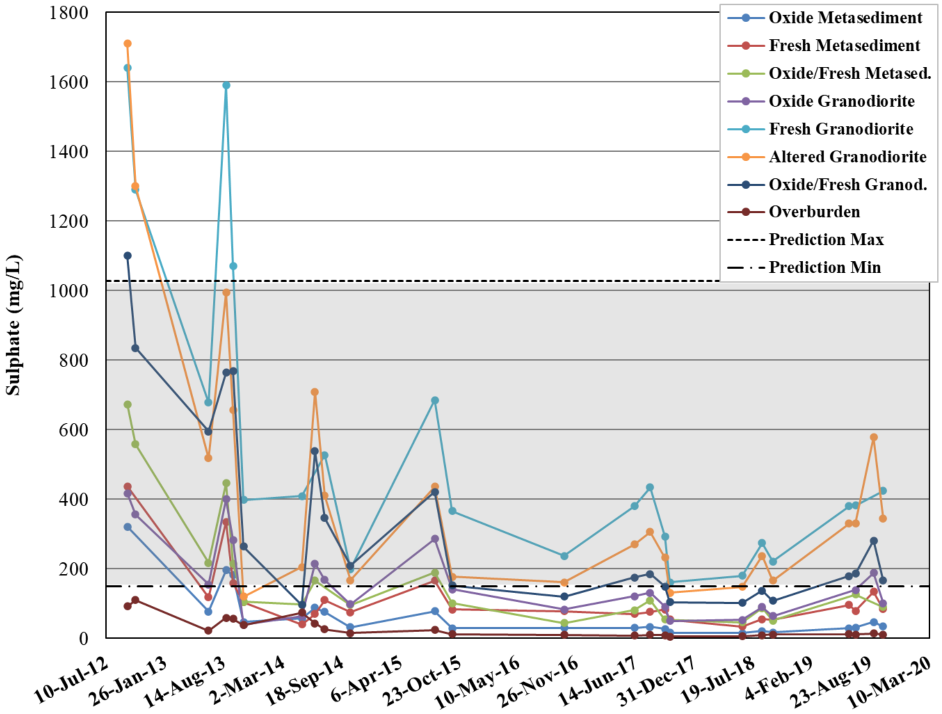


Figure 2.2-2 Sulphate concentrations over time in leachates from Eagle Gold field barrels. The range of predicted concentrations for the Eagle Pup and Platinum Gulch WRSAs is shaded grey.

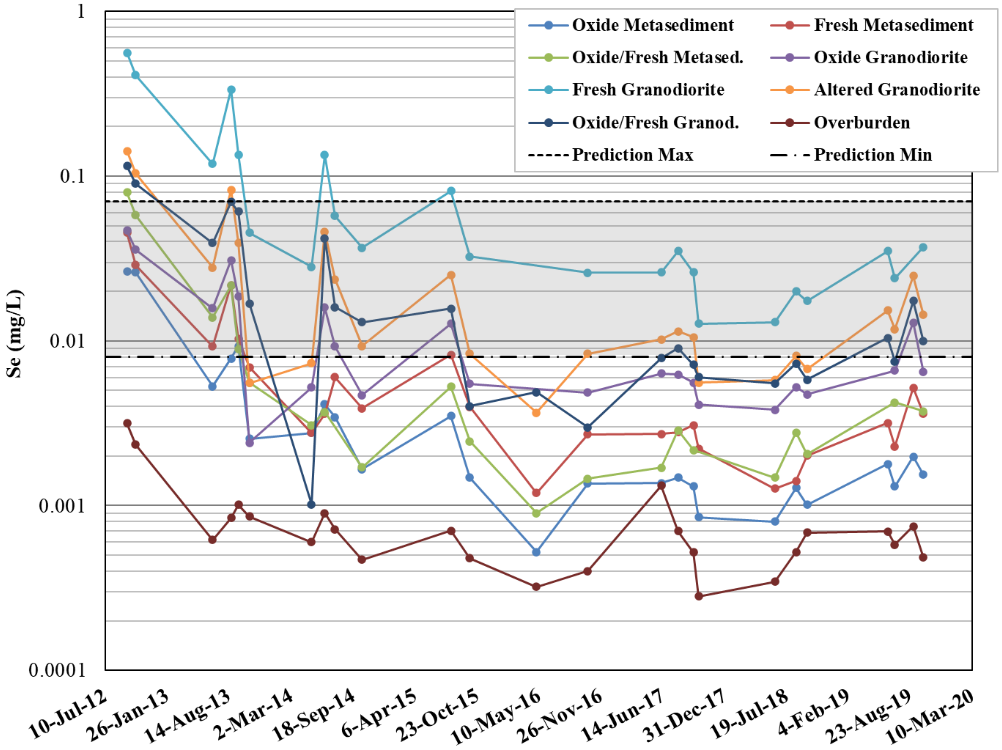


Figure 2.2-3 Selenium concentrations over time in leachates from Eagle Gold field barrels. The range of predicted concentrations for the Eagle Pup and Platinum Gulch WRSAs is shaded grey.

Arsenic and Sb concentrations remain relatively constant over the 8-year period (Figures 2.2-4 and 2.2-5) with some seasonal variability. The only exception to these trends is the increase in As concentration observed in the Oxide Granodiorite field barrel. For As, a marked increase to a value of approximately 3.0 mg/L was observed for the oxide granodiorite barrel in 2018 (Figure 2.2-4); this sample has the highest solid-phase As content (1065 ppm) and is well above the respective 90th percentile value (607 ppm) of the static test database for Eagle Gold waste rock. In other words, less than 10% of oxide granodiorite rock is expected to have an As content as high as that measured in the field barrel sample. However, there does not seem to be a correlation of maximum dissolved As concentrations in field barrel leachates and the solid-phase As content for the remaining tested materials. Variability in concentration that is consistent across field barrel leachates (e.g., drop in As concentration in October 2013) is most likely due to infiltration rates, where increased or decreased flushing directly affected the leachate concentrations. Conversely, the more systematic increase in arsenic seen in the oxide granodiorite barrel over the last 4 years may be explained by either the accumulation and flushing of stored loads or saturation within the field bins due to blockage resulting in reductive dissolution of arsenic.

The highest As concentrations are leaching from the two field barrels made up entirely of oxide materials (5-10 times higher than the other six barrels), although FB1 (oxide metasediment) has relatively low S content, suggests that these materials contain As-bearing phases that are relatively mobile. By definition, oxide materials are made up of rocks that have been naturally weathered under oxic conditions. While this does not mean that these rock types are benign after blasting and exposure to the atmosphere, the reaction and metal leaching rates under oxidizing conditions are commonly lower than those observed in sulphide bearing un-oxidized mine waste.

Sb concentrations are typically around 0.4 mg/L in leachate from FB6 (altered granodiorite barrel), which has the highest Sb content at 37 ppm suggesting that the solid-phase composition has some effect on leaching behaviour in these materials. Except for the Oxide and Altered Granodiorite samples, all barrels release Sb concentrations below 0.05 mg/L (Figure 2.2-5).

It is important to note that, although high As and Sb concentrations are leaching from specific field barrels, most field barrel results are either in the range of or fall below the source term predictions developed for the updated WBWQM (Figure 2.2-4 and Figure 2.2-5). Seepage from the WRSAs will come in contact with various different rock types and as such, it is unlikely that its chemistry will be controlled by specific lithologies with elevated solid-phase contents of these respective species.

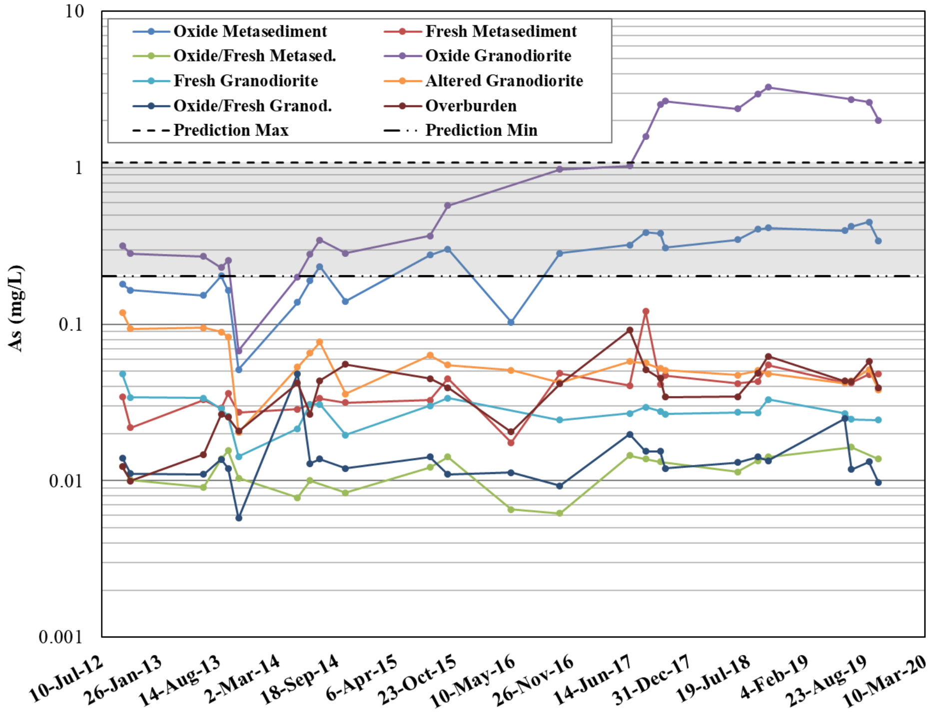


Figure 2.2-4 Arsenic concentrations over time in leachates from Eagle Gold field barrels. The range of predicted concentrations for the Eagle Pup and Platinum Gulch WRSAs is shaded grey.

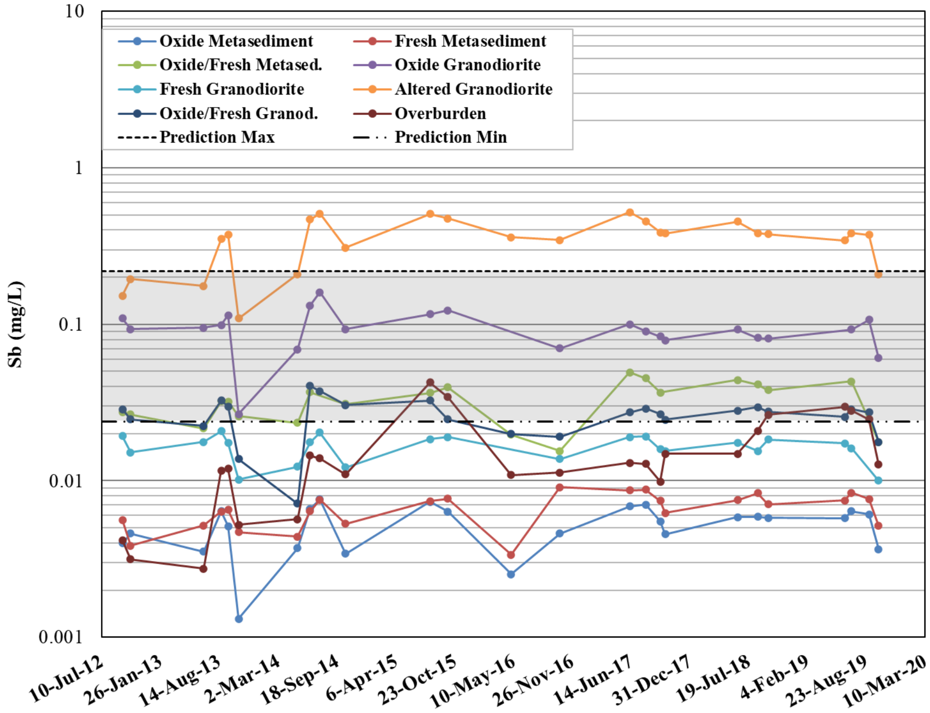


Figure 2.2-5 Antimony concentrations over time in leachates from Eagle Gold field barrels. The range of predicted concentrations for the Eagle Pup and Platinum Gulch WRSAs is shaded grey.

2.2.1.7 Results

For the 2019 WBWQM update, geochemical source term predictions were updated for four Eagle Gold mine components, namely the Eagle Pup and Platinum Gulch Waste Rock Storage Areas (WRSA), Pit Walls, and the 90-day Ore Stockpile (Appendix A). As mentioned previously, HLF geochemical source term results presented in Lorax (2014) are still considered valid and have been carried forward in the current WBM v4.1 model update.

One of the most salient model outcomes is that drainage from all facilities is expected to show a circum-neutral pH around 8 for all mine phases or, in other words, no acid rock drainage is expected at the Eagle Gold mine.

In previous source term models (Lorax, 2014a, 2018), the WRSA output concentrations were unrealistically low for some species during early operations using the adjusted humidity cell scale-up alone. Based on this finding, modelled concentrations falling below a “first year flush” value taken from field barrel leachates were set to this value to account for the rinsing of fresh particle surfaces. This approach was also adopted in the current 2019 source term model update although fewer parameters and scenarios were affected by this adjustment. The first-year flush concentrations were derived by calculating the average concentration observed over the first year of field barrel testing. The very first leachate sample from each field bin was excluded in this calculation to reduce the statistical bias towards high concentrations caused by flushing of oxidation products that have accumulated over months to years of core storage.

Another adaption made to the upscaled loads is the derivation of selenium concentrations. Kinetic test data suggest that Se is strongly correlated with dissolved sulphate and is interpreted to be mineralogically associated with sulphur in both sulphate and sulphide minerals. For predictions made based on humidity cell upscaling, Se concentrations were modelled as a function of the sulphate concentration using Se/SO_4 ratios observed in the individual field barrels and proportioned according to rock type.

Figure 2.2-6 to Figure 2.2-9 show time-series plots of predicted source term concentrations for the main parameters of potential concern. The relatively large range in the values within a scenario and mine component presented can be explained by the proportion of surfaces rinsed in response to seasonally variable flow rates, the consideration of temperature effects, as well as the seasonal release of stored loads.

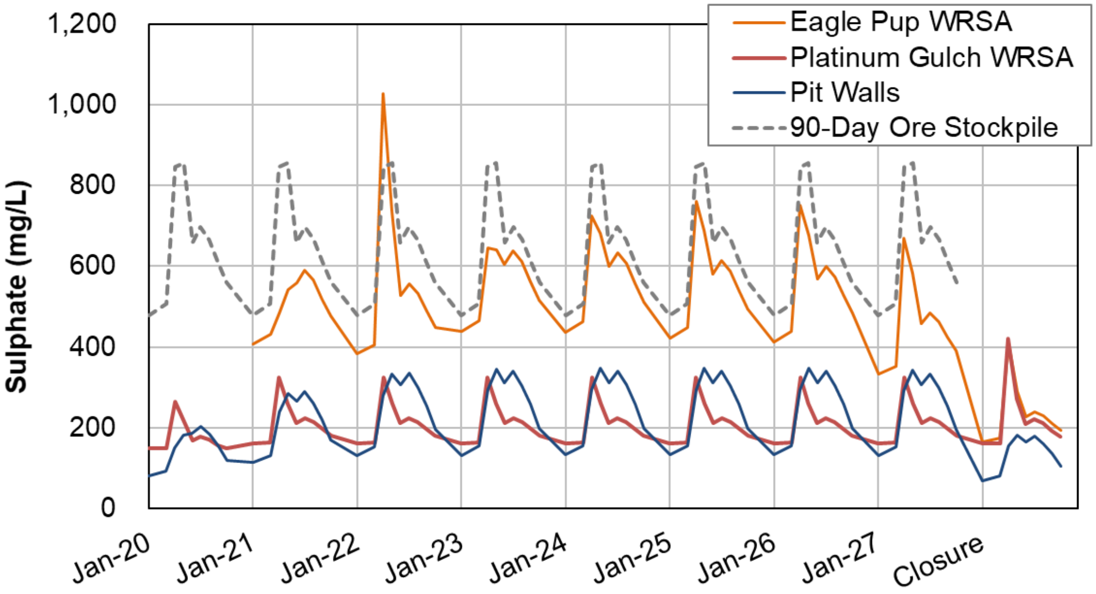


Figure 2.2-6 Predicted sulphate concentrations for the modelled Eagle Gold mine facilities over the life of mine and in post-closure.

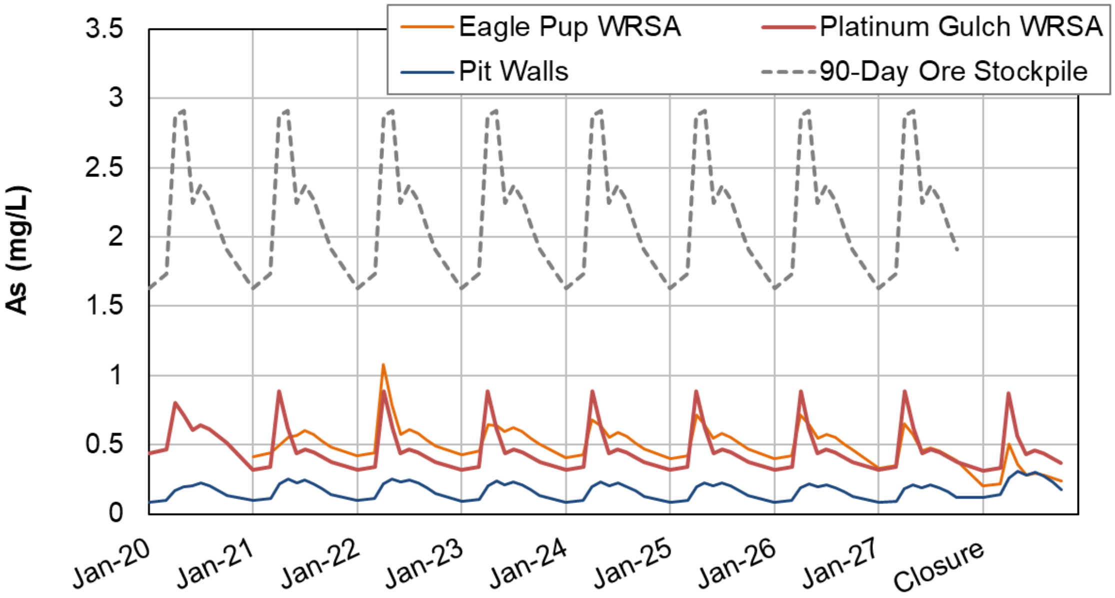


Figure 2.2-7: Predicted arsenic concentrations for the modelled Eagle Gold mine facilities over the life of mine and in post-closure.

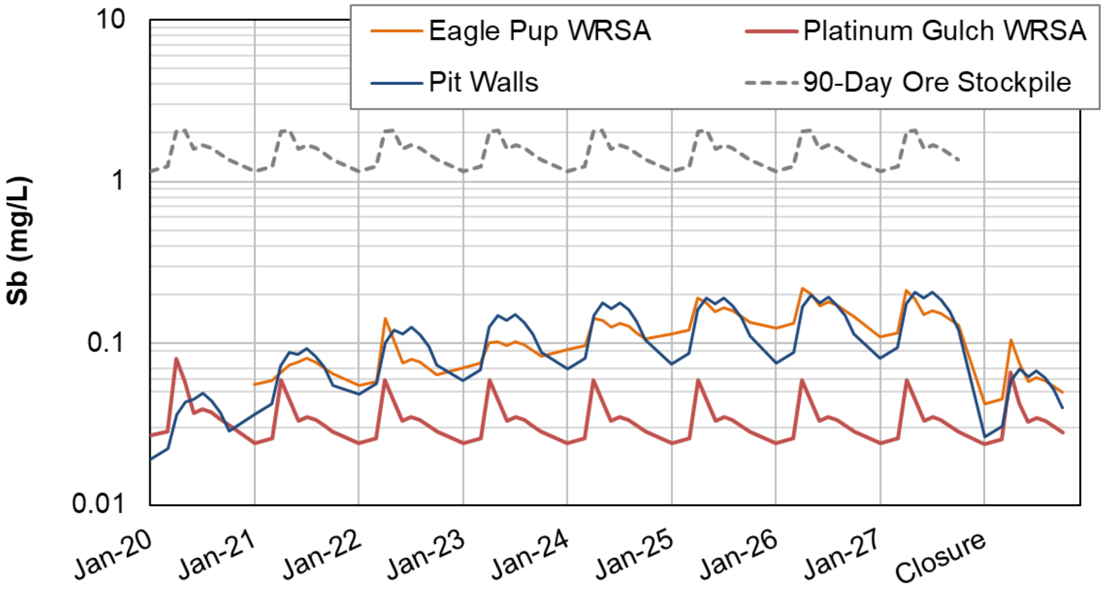


Figure 2.2-8 Predicted antimony concentrations for the modelled Eagle Gold mine facilities over the life of mine and in post-closure.

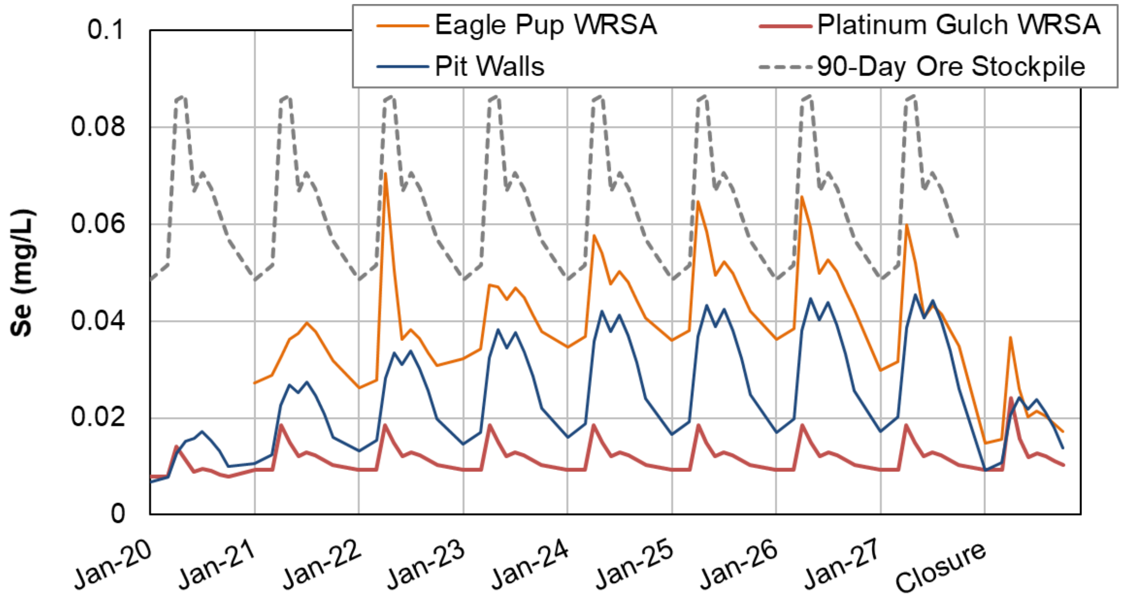


Figure 2.2-9 Predicted selenium concentrations for the modelled Eagle Gold mine facilities over the life of mine and in post-closure.

2.2.2 MWTP and PTS Effluent Quality Standards

Effluent quality standards (EQS) were set during the Water Use License process for the MWTP during operations and PTS for the closure phase (Table 2.2-8). The EQS values are specified in QZ14-041-1 (Part F; 108). The effluent quality standards for each component are utilized in the model representing treatment flows and chemistry.

During the Water Use License application process, it was agreed upon by all parties that the Project would be required to go through additional evaluation to support establishment of final effluent quality standards for the closure phase. As a conservative approach to closure and post closure water quality modeling, it has been assumed that the higher discharge criteria initially proposed by StrataGold would represent the effluent quality discharge. It is understood that continued modeling and eventual field trials of passive treatment systems for the Project will be undertaken by StrataGold to support the planned final reclamation and assessment and permitting for the closure plan of the Project.

Table 2.2-8:
MWTP and PTS Effluent Water Quality Used in Model

Parameter	*Effluent Quality Standards (mg/L)*
pH	6.5 to 8
TSS	15
Cl	250
SO_4	1850
Nitrate-N	19.5
Nitrite-N	0.12
NH_3-N	7.5
CN_{WAD}	0.03
Al (diss)	0.4
Sb	0.13
As	0.053
Cd	0.00125
Cu	0.026
Co	0.026
Fe	6.4
Pb	0.05
Hg	0.00008
Mn	7.7
Mo	0.45
Ni	0.5
Se	0.025
Ag	0.01
U	0.09
Zn	0.23

2.2.3 Background Water Quality Inputs

Background flows and water quality from runoff (e.g. non-contact water) and background receiving environment water chemistry were fully characterized and included in the model.

Water quality data collected from project area streams from 2007 to August 2017, prior to construction, were incorporated into the water quality baseline dataset.

2.2.4 Modeling Approach

Flows from background sources and mine facilities were taken directly from the daily flows generated by the WBM. Watershed model parameters that control runoff and infiltration rates were adjusted depending on catchment type; for flow through waste rock facilities the infiltration rates were adjusted to attenuate the flow within the waste rock pile in a manner consistent with observed waste rock seepage hydrographs from other sites.

Water quality parameters tracked by the model are listed in Table 2.2-11. Each parameter is treated as a conservative tracer which is mixed at model nodes (confluences) by the following equation:

$$C_r = \frac{\sum_i Q_i C_i}{\sum_i Q_i}$$

where C_r is the resultant concentration, Q_i are the source flows into the mixing point and C_i are the concentrations associated with the source flows. The only exceptions to this flow-weighted instantaneous mixing scheme are for the Lower Dublin South Pond (LDSP) and for the HLF event pond which are represented by constituent transport flow cells in GoldSim which are specifically designed to handle complex reservoir constituent mass balance computations involving multiple inflows and outflows.

Table 2.2-9:
Eagle Gold Project Water Quality Model Parameters

Parameter	Cont'd	Cont'd
NH_4	Al	Mn
Cl	Sb	Hg
F	As	Mo
NO_3	Ba	Ni
NO_2	B	K
N	Cd	Se
P	Ca	Si
SO_4	Cr	Ag
WADCN	Co	Na
	Cu	Tl
	Fe	U
	Pb	V
	Mg	Zn

As previously indicated, the WQM simulates 50 years of mine life, beginning in operation and ending several years into post-closure. The model time step is daily, with concentrations reported as monthly averages. The three principal mine periods for reporting are:

1. Operations (Corresponds to mine–years 1 to 9, with years 10 to 11 used for HLF rinse) with LDSP treated in the MWTP beginning in year 3; in Phase 5 the heap is rinsed during cyanide destruction;
2. Early Closure (Corresponds to mine–years 12 to 22): LDSP remains for flow control and is converted for use as a PTS, and the heap drain-down is controlled with the MTWP operating to treat heap seepage. Eagle Pup WRSA and Platinum Gulch WRSA seepage waters are passively treated (or actively, if required) before discharge to receiving waters;
3. Late Closure (Years 23+): Waste rock, pit overflow contact water and heap seepages are passively treated before discharge to receiving waters.

Source terms were developed for the median and 75th percentile case. To remain conservative, the discussion is based on the results of the 75th percentile source terms coupled with the median WBM flow scenario.

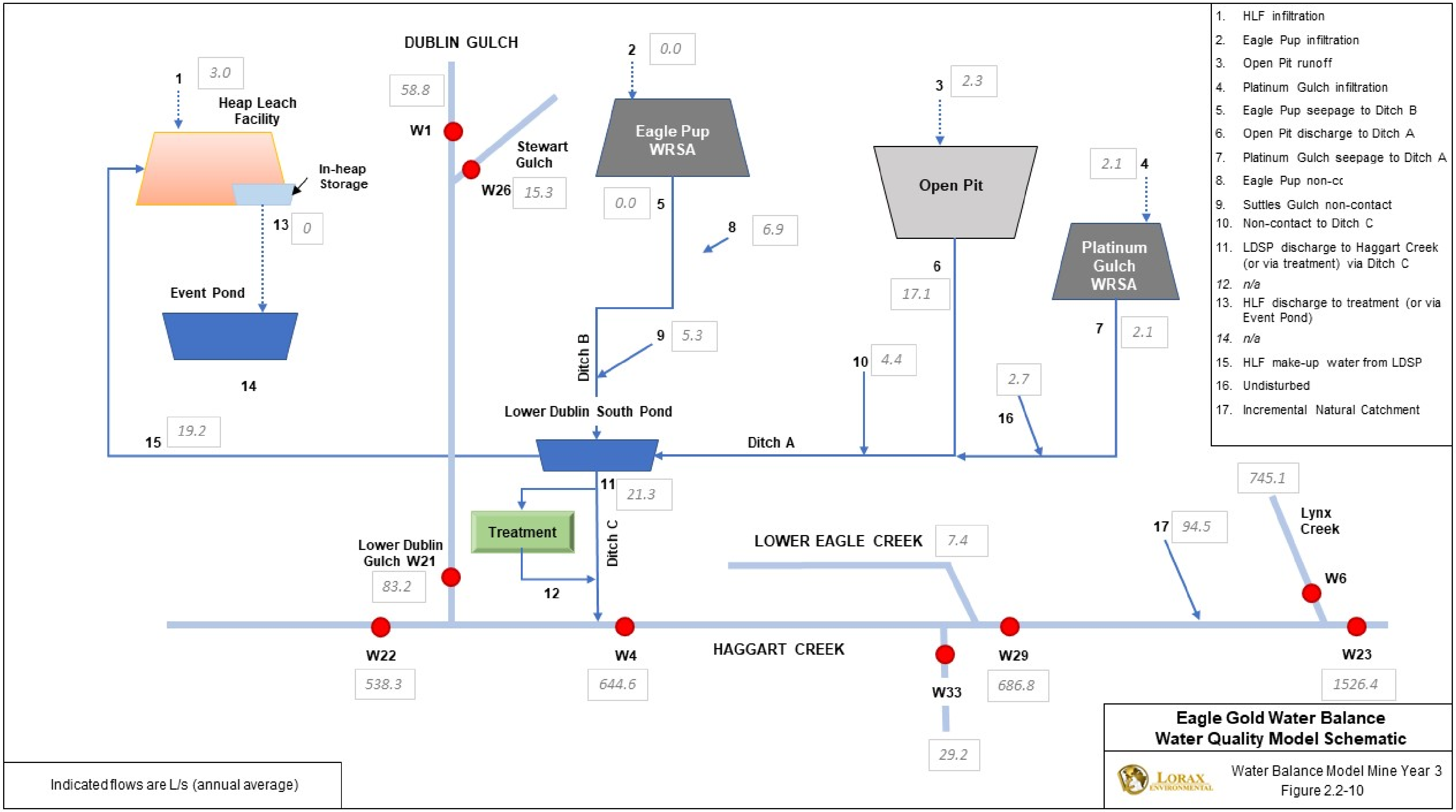
Water quality from mine discharge during operations is driven by the contact water reporting to the Lower Dublin South Pond. Contact water from the Eagle Pup and Platinum Gulch WRSAs, the temporary ore stockpile, and the sump water from the open pit all report to the LDSP at some point during operations. Water from the LDSP is treated through the MWTP to meet the effluent quality standards in Table 2.2-8 and discharged to Haggart Creek upstream of W4. Figure 2.2-10 and Figure 2.2-11 are schematic illustrations of the water balance and water quality model for mine year 3 and 10, respectively.

Beginning in year 12, the Eagle Pup waste rock seep is treated by the LDSP passive treatment system to meet the discharge criteria in Table 2.2-9. The Platinum Gulch Pond PTS (established in approximately year 4) also reports to the LDSP via Ditch A until the end of active treatment, after which it reports to Haggart Creek upstream of station W29. During this time period (Phase 6), HLF drain-down water reports to the MWTP and is treated to meet discharge criteria as indicated in Table 2.2-8. Figure 2.2-12 illustrates the water balance conditions for mine year 15.

The late closure period begins with the decommissioning of the MWTP and the full application of passive treatment for all contact mine waters including pit overflow waters (year 22+). At this time, the HLF has little excess water to drain, and post-closure monthly discharge is driven largely by infiltration. After year 22, the HLF seep is treated solely through a PTS to values indicated in Table 2.2-10 (Figure 2.2-13).

The WQM provides monthly predictions of water quality at key locations in Haggart Creek, namely:

- W4 in Haggart Creek just downstream of the chief compliance point (i.e., MWTP discharge);
- W29 and W99 in Haggart Creek downstream of all project influences; and
- W23 in Haggart Creek, immediately downstream of the confluence with Lynx Creek.



1. HLF infiltration
2. Eagle Pup infiltration
3. Open Pit runoff
4. Platinum Gulch infiltration
5. Eagle Pup seepage to Ditch B
6. Open Pit discharge to Ditch A
7. Platinum Gulch seepage to Ditch A
8. Eagle Pup non-cc
9. Suttles Gulch non-contact
10. Non-contact to Ditch C
11. LDSP discharge to Haggart Creek (or via treatment) via Ditch C
12. *n/a*
13. HLF discharge to treatment (or via Event Pond)
14. *n/a*
15. HLF make-up water from LDSP
16. Undisturbed
17. Incremental Natural Catchment

Indicated flows are L/s (annual average)

Eagle Gold Water Balance
Water Quality Model Schematic

Water Balance Model Mine Year 3
Figure 2.2-10

Figure 2.2-10: Eagle Gold Water Balance and Water Quality Model Schematic for Year 3 of Operations.

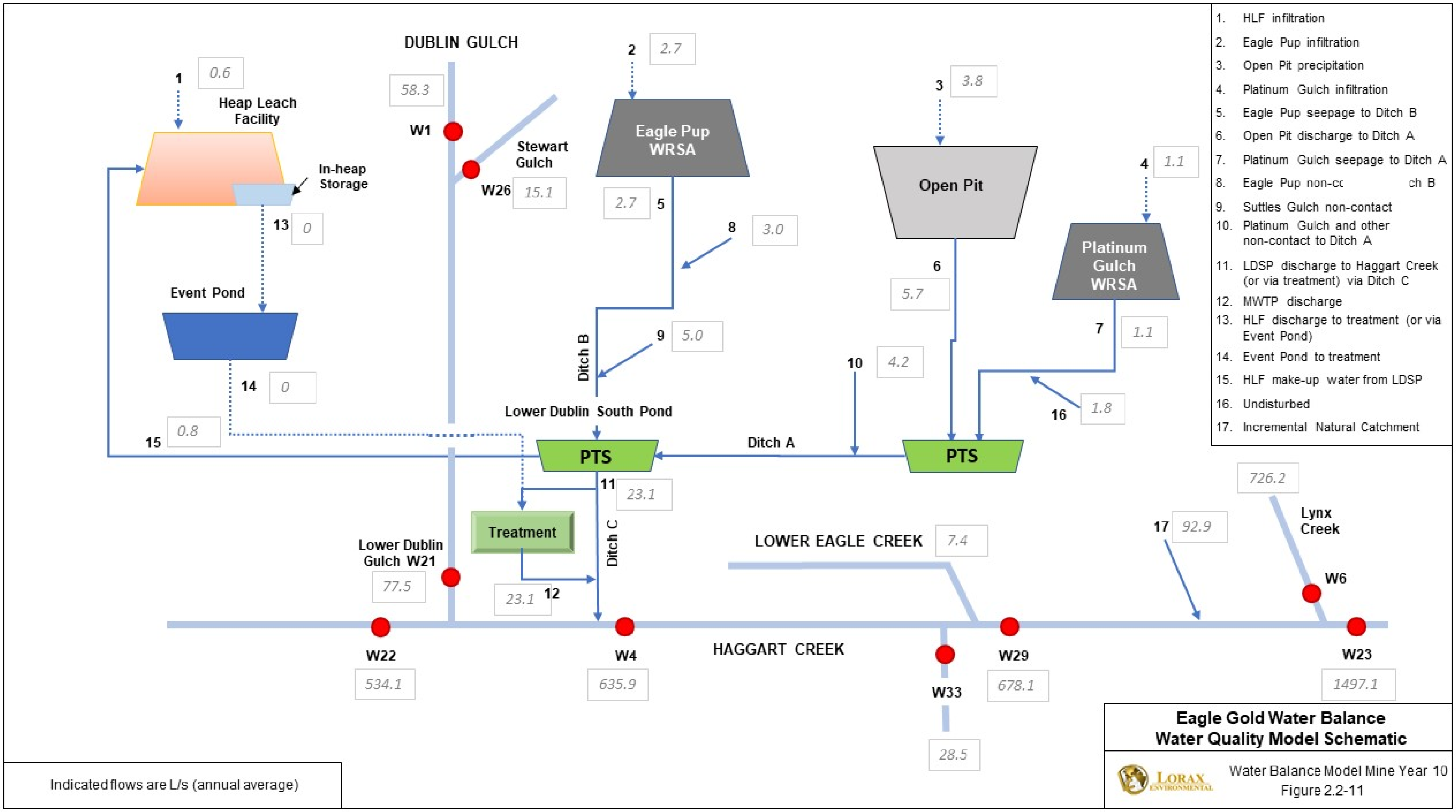


Figure 2.2-11: Eagle Gold Water Balance and Water Quality Model Schematic for Year 10

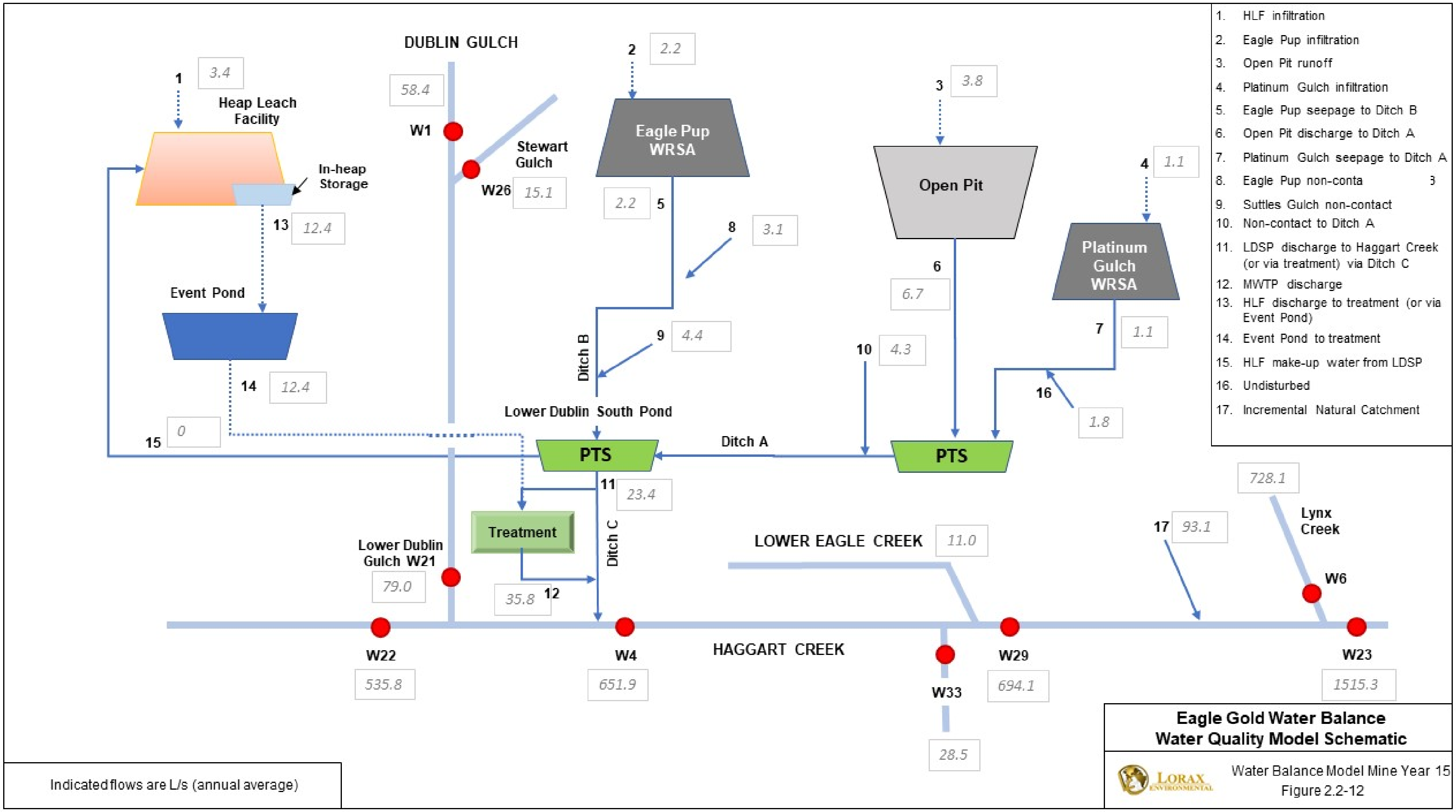


Figure 2.2-12: Eagle Gold Water Balance and Water Quality Model Schematic for Year 15

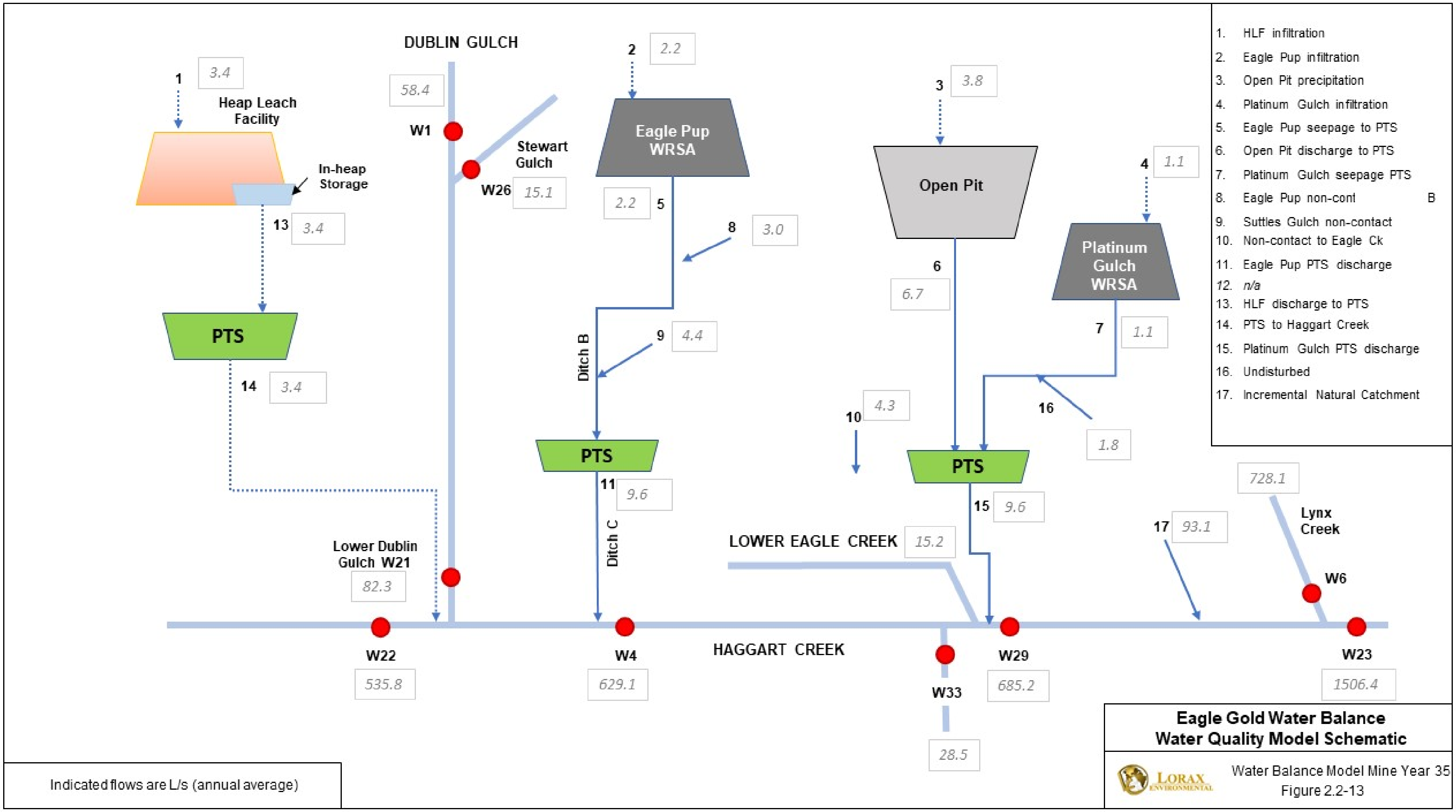


Figure 2.2-13: Eagle Gold Water Balance and Water Quality Model Schematic for Year 35 (end of active closure).

3. Water Quality Predictions

The results of the updated Water Balance Water Quality Model (WBM v4.1) are presented in this section. Results are presented in downstream order for the three Haggart Creek water quality objective monitoring stations (W4), (W29) and (W23), for the main parameters of interest, namely As and Se. Time-series of all predicted parameters are provided in Appendix B of this report and all raw output data is provided in Appendix C (electronically).

3.1 Station W4 – Haggart Creek

Station W4 in Haggart Creek is located just downstream of the chief compliance location for the Eagle Gold project (i.e., discharge via Ditch C from the MWTP and/or the LDSP). Water quality objectives for W4 were developed during the licensing process (Table 3.1-1) and were based on the effluent quality standards specified in QZ14-041.

Table 3.1-1:
Water Quality Objectives for Haggart Creek at W4

Parameter List		WQ Objectives at W4
Dissolved Parameters	SO_4	309
	Cl	150
	Nitrate-N	3
	Nitrite-N	0.02
	NH_3-N	1.13
	CN_{WAD}	0.005
	Al (diss)	0.1
Total Metalloids and Metals	Sb	0.02
	As	0.0085
	Cd	0.000197
	Cu	0.005
	Co	0.004
	Fe	1.0
	Pb	0.0077
	Hg	0.00002
	Mn	1.17
	Mo	0.073
	Ni	0.116
	Se	0.002
	Ag	0.0015
	U	0.015
	Zn	0.038

All values as mg/L

Figure 3.1-1 summarizes the updated water quality model predictions for As at W4 in Haggart Creek. The updated model predicts short-duration seasonal peak As concentrations at W4 during late operations (Y8 to Y11) of approximately 0.0078 mg/L. Peak As concentrations of approximately 0.0084 mg/L are predicted to occur in July during HLF draindown (Yr 13 to Yr 22). During this period, peak As concentrations of approximately 0.007 mg/L to 0.008 mg/L are predicted for most months of the year (see Appendix C).

Post closure peak As concentrations (Yr 23 onwards) are predicted to be on the order of 0.0077 mg/L (July) with winter low flow peak concentrations of approximately 0.003 mg/L (Figure 3.1-1).

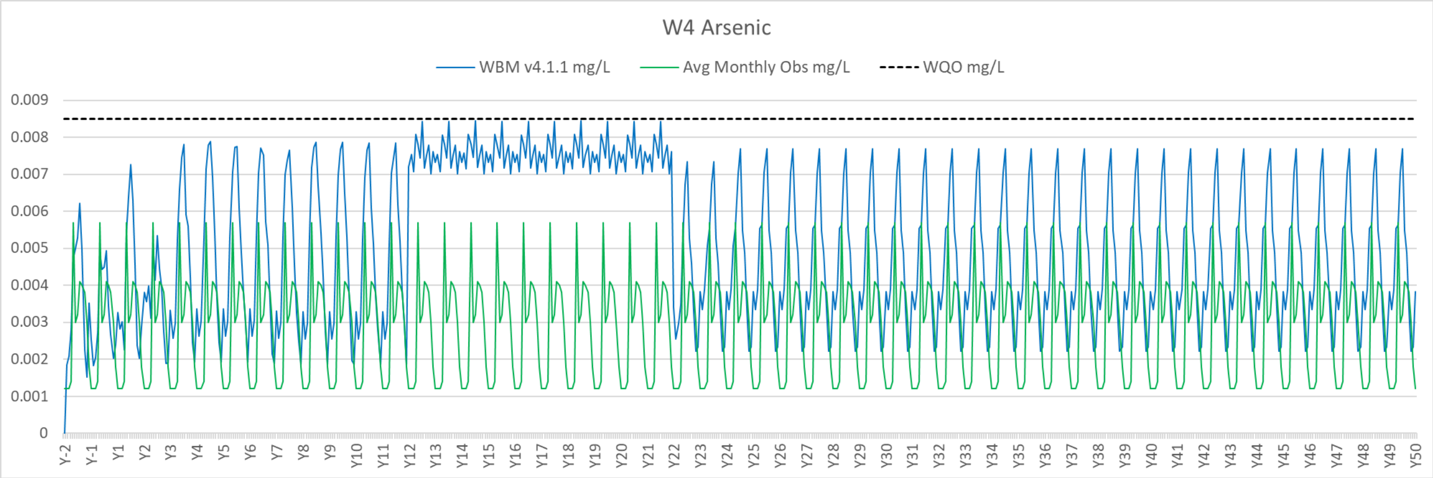


Figure 3.1-1: Predictions for Total As at W4 in Haggart Creek for WBM v4.1. Baseline mean monthly concentration denoted by green line; Water Quality Objective denoted by dashed line.

Similar results are observed for Se at W4 in Haggart Creek (Figure 3.1-2). The primary source of Se is associated with the HLF. Updated predictions indicate that Se concentrations are highest during the post closure period, following cessation of MWTP. Peak concentrations during this period are predicted to be roughly 0.0014 mg/L and occur during April (Appendix C). During most of the open water period, Se concentrations are predicted to be below 0.001 mg/L.

Table 3.1-2 summarizes the maximum WQM v4.1 predicted concentrations for all parameters at W4 in Haggart Creek. As illustrated, all parameters are predicted to be below their respective water quality objective. WQM v4.1 output for all parameters for station W4 can be found in Appendix B and Appendix C.

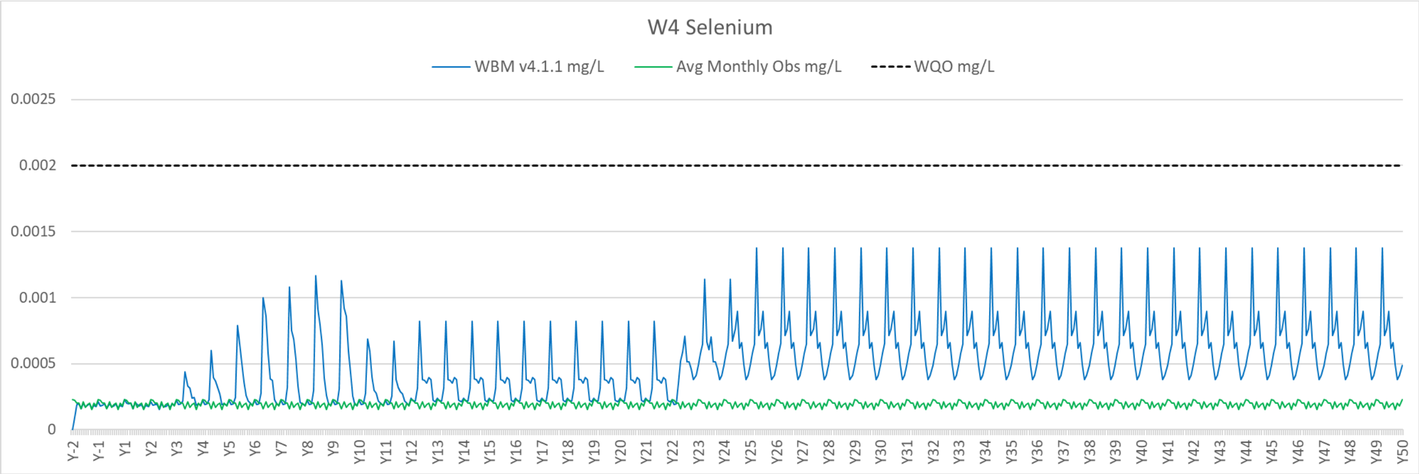


Figure 3.1-2: Predictions for Total Se at W4 in Haggart Creek for WBM 4.0. Baseline mean monthly concentration denoted by green line; Water Quality Objective denoted by dashed line.

Table 3.1-2:
Maximum WBM v4.1 Predicted Concentrations Compared to Water Quality Objectives at W4 for Haggart Creek

Parameter List		Maximum Predicted Concentration at W4	WQ Objectives at W4
Dissolved Parameters	SO_4	204	309
	Cl	17	150
	Nitrate-N	1.4	3
	Nitrite-N	0.009	0.02
	NH_3-N	0.5	1.13
	CN_{WAD}	0.0024	0.005
	Al (diss)	0.15	0.1
Total Metalloids and Metals	Sb	0.009	0.02
	As	0.0084	0.0085
	Cd	0.0001	0.000197
	Cu	0.003	0.005
	Co	0.002	0.004
	Fe	0.54	1.0
	Pb	0.0034	0.0077
	Hg	0.000015	0.00002
	Mn	0.57	1.17
	Mo	0.03	0.073
	Ni	0.035	0.116
	Se	0.0018	0.002
	Ag	0.0007	0.0015
	U	0.007	0.015
	Zn	0.02	0.038

All values as mg/L

3.2 Station W29 – Haggart Creek

WBM v4.1 output is graphically presented in Figure 3.2-1 for As at station W29 in Haggart Creek. Peak As concentrations at W29 are predicted to be slightly lower as compared to station W4 during the operation and draindown period (e.g. Yr 1 to Yr 22) and below the water quality objective of 0.0085 mg/L. Peak As concentrations for this period are approximately 0.0076 mg/L and occur during the month of July (Appendix C). During post closure, As loadings occur to Haggart Creek upstream of W29 from Platinum Gulch PTS, which treats water from waste rock seepage and pit overflow water. Post closure predicted As concentrations are highly flow dependent during this period of passive discharge with values ranging from approximately 0.003 mg/L in November to monthly mean maximum values of roughly 0.0077 mg/L in July (Figure 3.2-1). As expected, higher monthly As concentrations are experienced during the open water period (April to September) when the EP PTS and PG PTS are discharging.

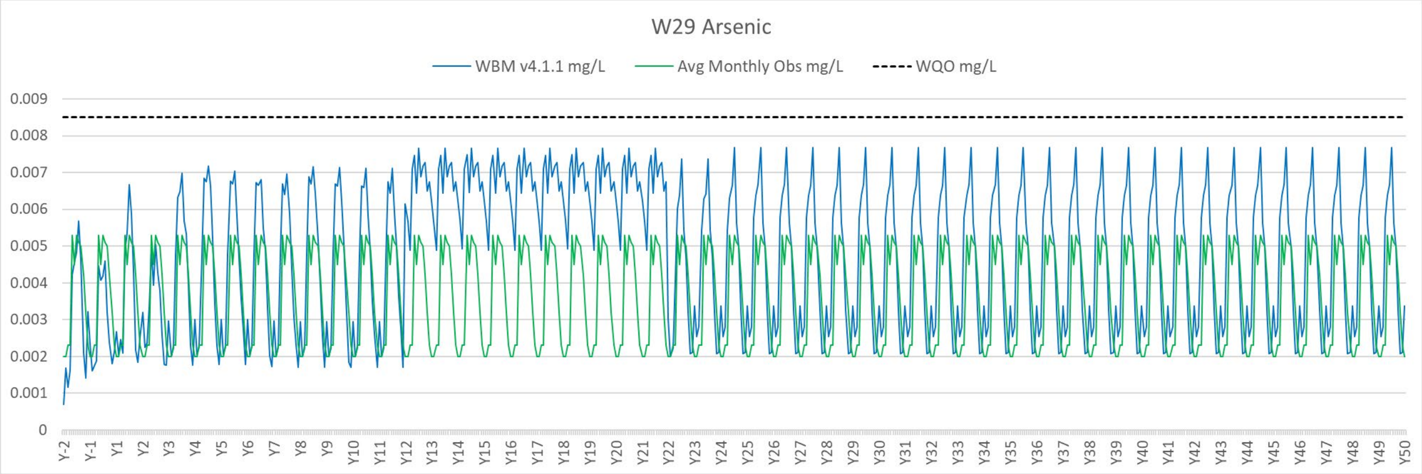


Figure 3.2-1: Predictions for Total As at W29 in Haggart Creek for WBM v4.1. Baseline mean monthly concentration denoted by green line; Water Quality Objective denoted by dashed line.

The peak monthly mean Se concentrations at W29 are predicted to be on the order of 0.0017 mg/L and to occur during the post-closure period and slightly higher than predicted concentrations at station W4 in Haggart Creek. The primary reason for this is additional loadings from the Platinum Gulch PTS. During the operations phase and draindown, the MWTP is operational and Se concentrations at W29 are predicted to be at or below 0.001 mg/L (Figure 3.2-2).

Full excel output data for all parameters modelled at station W29 is presented in Appendix C.

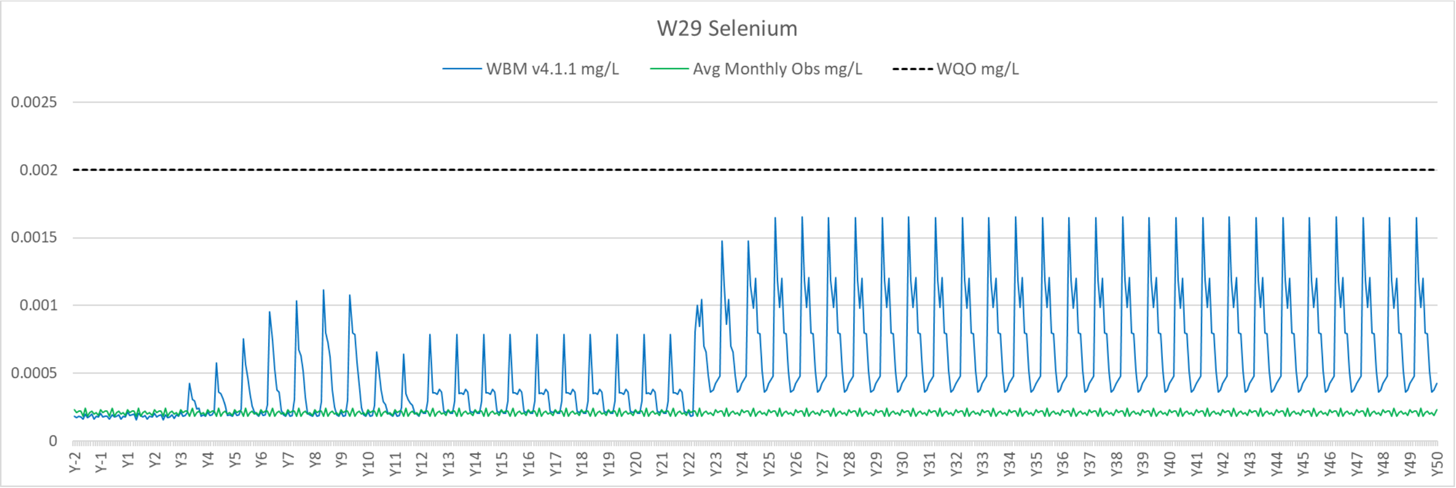


Figure 3.2-2: Predictions for Total Se at W29 in Haggart Creek for WBM v4.1. Baseline mean monthly concentration denoted by green line; Water Quality Objective denoted by dashed line.

3.3 Station W23 – Far-Field Haggart Creek

WBM v4.1 predictions for total As at W23 in Haggart Creek are graphically presented in Figure 3.3-1. Unlike stations more proximal to the Eagle Mine in Haggart Creek (e.g. W4 and W29), predicted peak As concentrations at W23 are less variable throughout the life of mine period. For example, peak As concentrations during operations are not predicted to exceed 0.007 mg/L and maximum predicted concentrations throughout life of mine are 0.0073 mg/L. Most notably, the maximum predicted incremental increase in As concentrations at W23, over baseline values, is roughly 0.0023 mg/L and occurs during January. During the open water period of April to September, predicted incremental increases in As over background are typically on the order of 0.001 mg/L or less. Predicted maximum concentrations of As at W23 throughout the mine life are all well below the water quality objective.

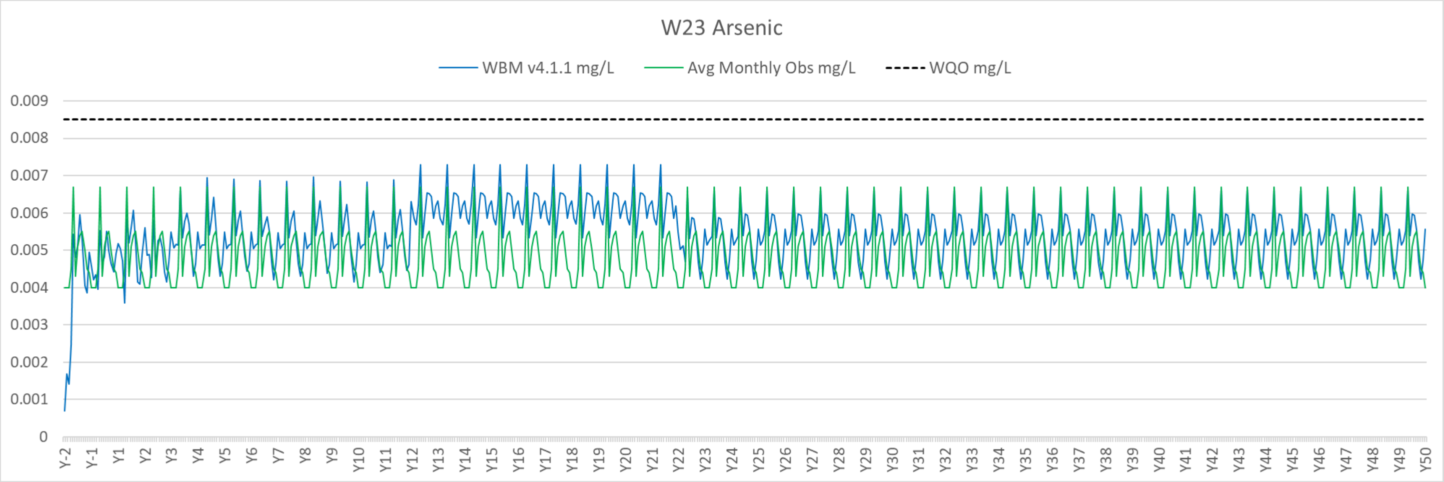


Figure 3.3-1: Predictions for Total As at W23 in Haggart Creek for WBM v4.1. Baseline mean monthly concentration denoted by green line; Water Quality Objective denoted by dashed line.

Water quality predictions for total Se at W23 are presented in Figure 3.3-2. Maximum predicted total Se concentrations in WBM v4.1 are approximately 0.001 mg/L and, like upstream locations in Haggart Creek, occur during the post closure period. Post closure maximum monthly mean Se concentration predictions are between 0.0004 mg/L and 0.001 mg/L (Appendix C). All predicted concentrations are well below the water quality objective for Se of 0.002 mg/L (Figure 3.3-2).

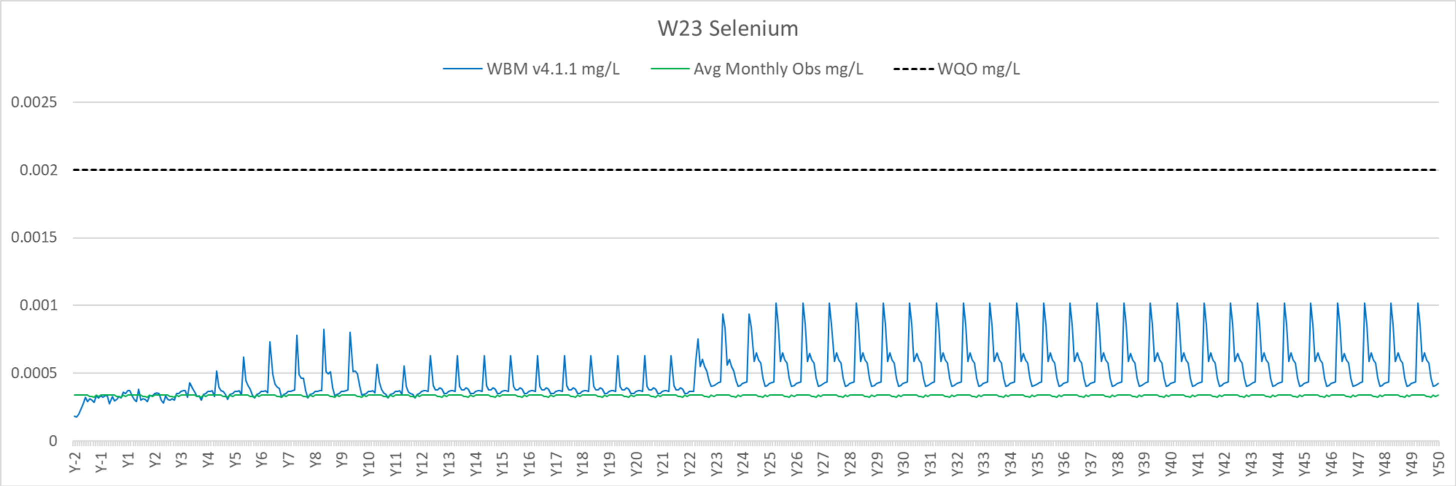


Figure 3.3-2: Predictions for Total Se at W23 in Haggart Creek for WBM v4.1. Baseline mean monthly concentration denoted by green line; Water Quality Objective denoted by dashed line.

4. Water Quantity Predictions

4.1 Predicted Streamflow Changes

The results of the WBM v4.1 are presented in this section. There have been no substantive changes from the 2014 WBM outputs as a result of the changes in the mine plan since 2014. The predicted changes to the baseline streamflow regime as a result of mine development and operation are presented for the average monthly discharge for four distinct years of the mine life – representative of key changes to the management of site water, and primarily to the staging of discharges from the MWTP. These correspond to the WBM/WQM schematics presented in Figure 2.2-10 through Figure 2.2-13.

- Modelled Year 2020 = Year 2 (between Phase 1 and 2 of the HLF)
- Modelled Year 2028 = Year 10 (first year of rinse/gold recovery)
- Modelled Year 2030 = Year 12 (first year of HLF draindown)
- Modelled Year 2042 = Year 24 (end of active closure)

The average monthly baseline and mine affected streamflows are presented for two key receiving environment nodes W4 (Haggart Creek downstream of Dublin Gulch) and W29 (Haggart Creek downstream of Platinum Gulch) in tabular (Table 4.1-1) and figure formats (Figure 4.1-1 through Figure 4.1-8).

Table 4.1-1:
Predicted percent change in receiver stream flows for key years in the Project life, for the W4 and W29 nodes.

Mine Phase	Operations (Year 2)		First Year of HLF Rinsing		First Year of HLF Draindown		End of Active Closure	
Month	**W4**	**W29**	**W4**	**W29**	**W4**	**W29**	**W4**	**W29**
Jan	-10%	-12%	-12%	-14%	-5%	-8%	-12%	-14%
Feb	-10%	-12%	-15%	-16%	-2%	-7%	-12%	-14%
Mar	-4%	-8%	-8%	-11%	-2%	-6%	-5%	-9%
Apr	3%	0%	-1%	-4%	3%	0%	0%	-1%
May	3%	0%	3%	0%	4%	1%	1%	0%
Jun	-19%	-21%	-22%	-23%	-22%	-23%	-23%	-23%
Jul	4%	-1%	1%	-4%	4%	-2%	2%	-3%
Aug	3%	1%	0%	-2%	3%	0%	0%	-1%
Sep	3%	1%	2%	0%	7%	5%	4%	2%
Oct	287%	261%	289%	264%	315%	286%	291%	268%
Nov	13%	10%	15%	12%	30%	25%	15%	12%
Dec	-15%	-15%	-17%	-16%	-3%	-5%	-14%	-14%
Average	**21%**	**17%**	**20%**	**15%**	**28%**	**22%**	**21%**	**17%**
May-Sept	**-1%**	**-4%**	**-3%**	**-6%**	**-1%**	**-4%**	**-3%**	**-5%**

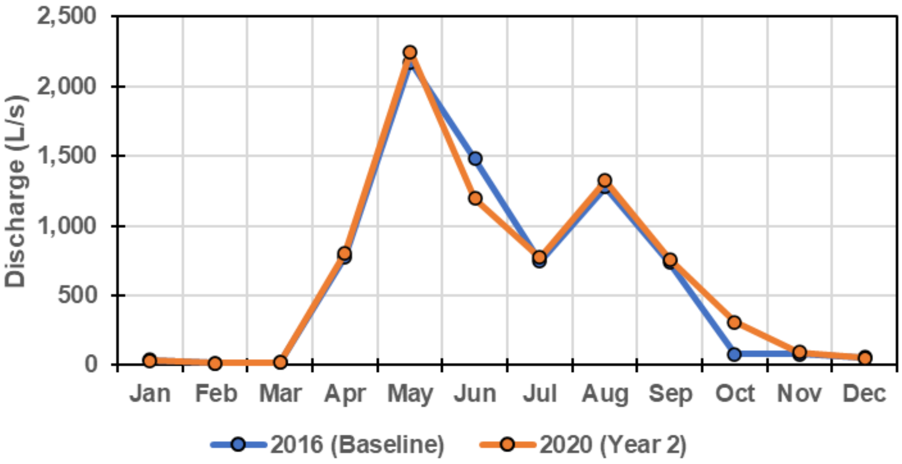


Figure 4.1-1: Average monthly and predicted mine affected streamflows for the W4 node (Year 2; WBM v4.1).

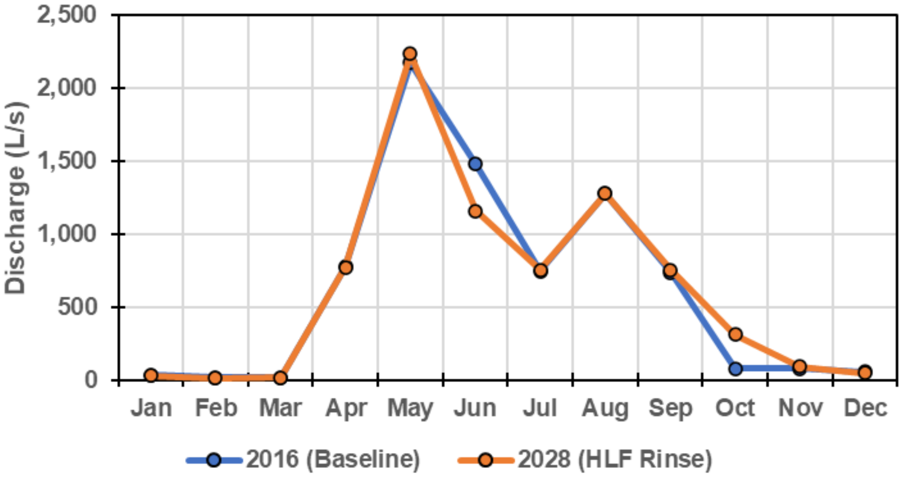


Figure 4.1-2: Average monthly and predicted mine affected streamflows for the W4 node (Year 10; WBM v4.1).

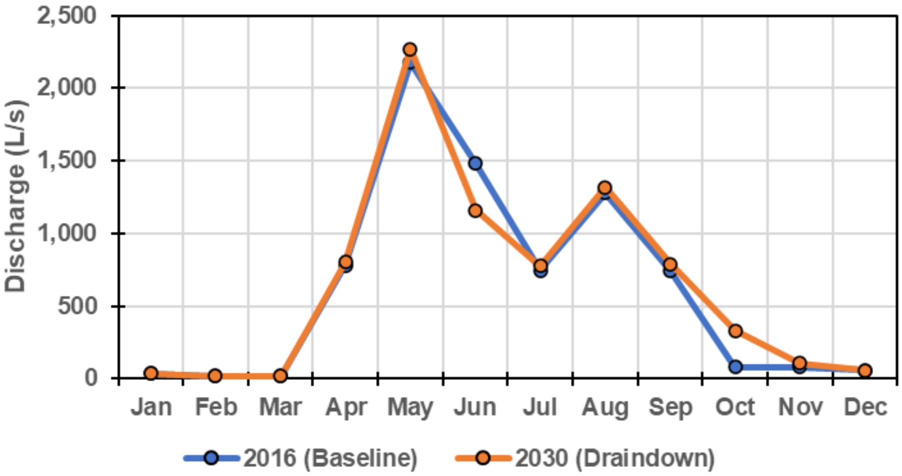


Figure 4.1-3: Average monthly and predicted mine affected streamflows for the W4 node (Year 12; WBM v4.1).

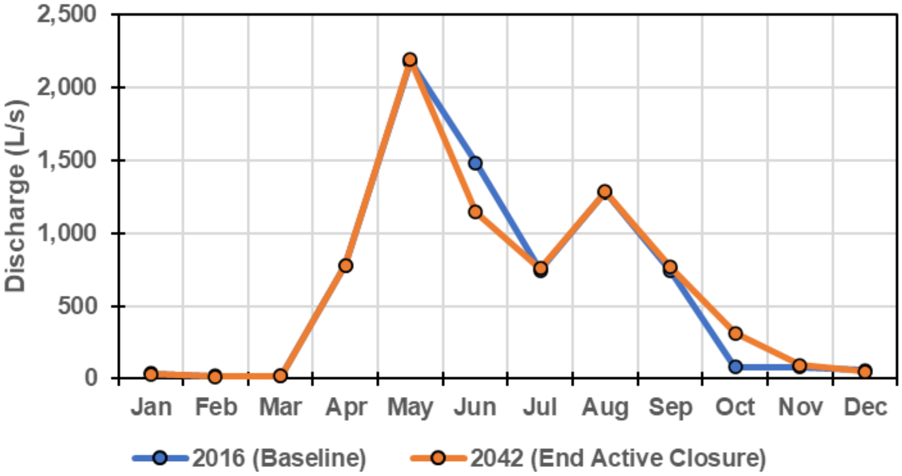


Figure 4.1-4: Average monthly and predicted mine affected streamflows for the W4 node (Year 24; WBM v4.1).

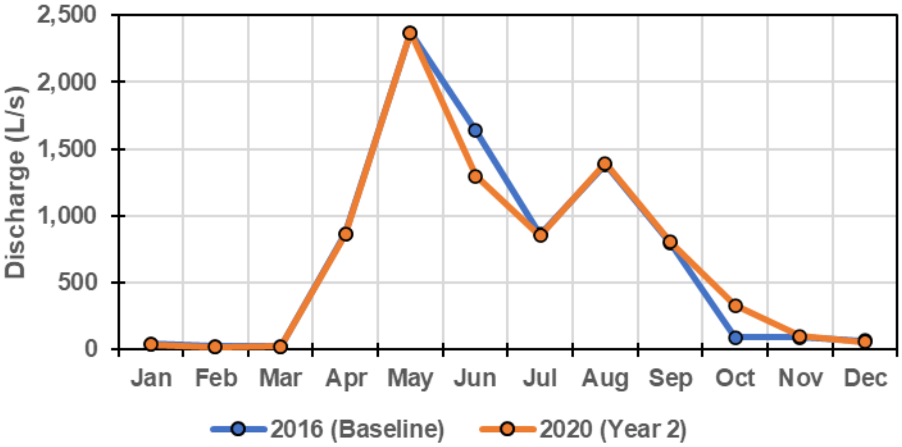


Figure 4.1-5: Average monthly and predicted mine affected streamflows for the W29 node (Year 2; WBM v4.1).

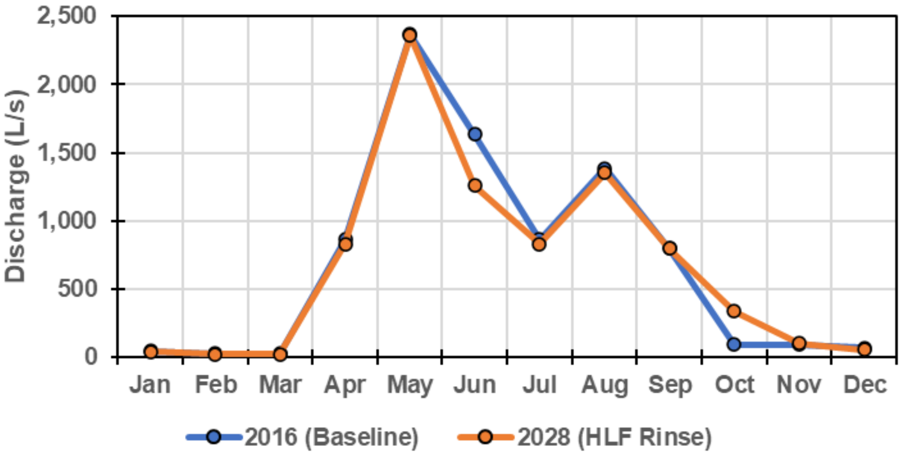


Figure 4.1-6: Average monthly and predicted mine affected streamflows for the W29 node (Year 10; WBM v4.1).

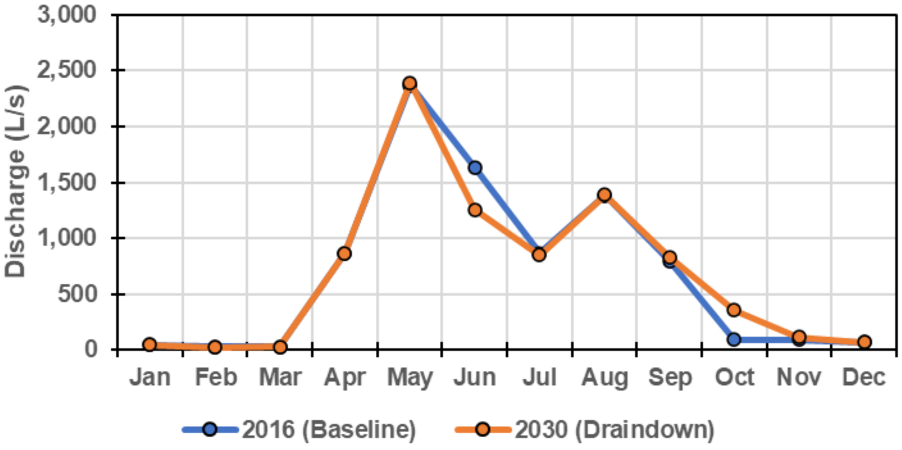


Figure 4.1-7: Average monthly and predicted mine affected streamflows for the W29 node (Year 12; WBM v4.1).

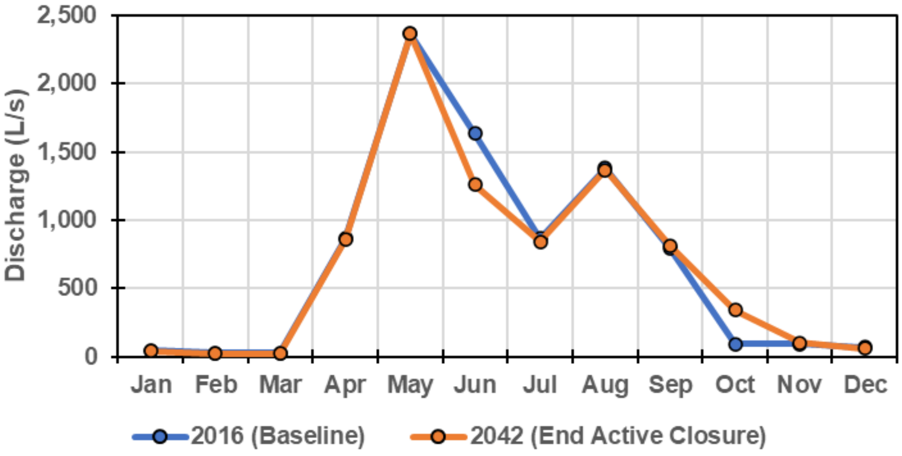


Figure 4.1-8: Average monthly and predicted mine affected streamflows for the W29 node (Year 24; WBM v4.1).

Maximum expected decreases in the baseline streamflow volumes occur in June (-19% to -23%), and the minimum predicted changes occur in April, May, August and September (-4% to 7%; Table 4.1-1). On average, the average open water season (May-September) flow changes are predicted to be minimal, varying from -22% to 7% at W4 for Operations (Year 13). On an average annual basis, flows in Haggart Creek at W4 are predicted to change from baseline by 20% to 28%, and by 15% to 22% at W29. The annual averages are significantly skewed by the October results, when the MWTP continues to discharge treated water. Note that due to the low flows experienced in Haggart Creek during the winter and shoulder seasons (October to April), small changes in predicted flows due to mine operations result in larger relative predicted changes to the baseline streamflow regime. This is also the period for which continuous flow data are not available due to extensive channel icing, and thus characterization of the baseline flow regime is based largely on infrequent spot flow measurements. For these reasons, relatively less weight is placed on the predicted changes to the winter streamflow regime in Haggart Creek.

5. Closure

We trust that this report meets your expectations. Please contact the undersigned with any questions or comments.

Sincerely,

LORAX ENVIRONMENTAL SERVICES LTD.

Prepared by:

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Principal

Scott Tinis, Ph.D.
Senior Numerical Modeller

Scott Jackson, M.Sc., P.Geo.
Hydrologist

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Appendix A:
Source Term Output

Appendix A.1: Eagle Pup WRSA

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2021	Jan	7.9	27	407	6.0	2.0	0.000040	0.0060	0.41	0.38	0.011	0.00015	205
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	26	432	6.4	2.1	0.000040	0.0059	0.44	0.40	0.011	0.00016	218
	Apr	7.9	25	485	7.2	2.4	0.000050	0.0057	0.49	0.45	0.010	0.00018	248
	May	7.9	24	541	8.0	2.7	0.000050	0.0055	0.55	0.51	0.0100	0.00020	279
	Jun	7.9	24	560	8.3	2.8	0.000050	0.0054	0.57	0.52	0.0098	0.00021	289
	Jul	7.8	24	591	8.8	2.9	0.000060	0.0053	0.60	0.55	0.0096	0.00022	306
	Aug	7.9	24	566	8.4	2.8	0.000050	0.0054	0.58	0.53	0.0098	0.00021	292
	Sep	7.9	25	519	7.7	2.6	0.000050	0.0055	0.53	0.49	0.010	0.00019	267
	Oct	7.9	25	477	7.1	2.4	0.000040	0.0057	0.49	0.45	0.011	0.00018	243
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2022	Jan	7.9	27	383	5.9	2.0	0.000040	0.0061	0.42	0.38	0.012	0.00015	193
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	27	406	6.2	2.1	0.000040	0.0060	0.44	0.40	0.011	0.00016	206
	Apr	7.8	21	1027	15	5.2	0.00010	0.0045	1.1	0.99	0.0078	0.00039	550
	May	7.8	23	736	11	3.7	0.000070	0.0049	0.79	0.72	0.0089	0.00029	389
	Jun	7.9	25	527	8.1	2.7	0.000050	0.0055	0.58	0.52	0.010	0.00021	273
	Jul	7.9	24	556	8.6	2.8	0.000060	0.0054	0.61	0.55	0.0099	0.00022	290
	Aug	7.9	25	532	8.2	2.7	0.000050	0.0055	0.58	0.53	0.010	0.00021	276
	Sep	7.9	25	488	7.5	2.5	0.000050	0.0056	0.53	0.49	0.010	0.00019	252
	Oct	7.9	26	449	6.9	2.3	0.000040	0.0058	0.49	0.45	0.011	0.00018	230
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2023	Jan	7.9	26	440	6.7	2.3	0.000040	0.0058	0.43	0.42	0.011	0.00017	227
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	25	466	7.1	2.5	0.000050	0.0057	0.46	0.45	0.011	0.00018	242
	Apr	7.8	23	645	9.8	3.4	0.000060	0.0051	0.65	0.63	0.0094	0.00025	342
	May	7.8	23	641	9.7	3.4	0.000060	0.0051	0.63	0.62	0.0094	0.00025	341
	Jun	7.8	24	605	9.2	3.2	0.000060	0.0052	0.59	0.58	0.0097	0.00023	320
	Jul	7.8	23	639	9.7	3.4	0.000060	0.0051	0.63	0.62	0.0095	0.00025	339
	Aug	7.8	24	611	9.3	3.3	0.000060	0.0052	0.60	0.59	0.0096	0.00024	324
	Sep	7.8	24	561	8.5	3.0	0.000050	0.0054	0.55	0.54	0.0100	0.00022	296
	Oct	7.9	25	515	7.8	2.8	0.000050	0.0055	0.50	0.50	0.010	0.00020	270
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.1: Eagle Pup WRSA

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2021	Jan	0.00010	0.0013	0.0011	0.011	0.0022	0.000080	44	0.058	21	0.17	0.052	38
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00010	0.0013	0.0012	0.011	0.0023	0.000080	46	0.062	22	0.18	0.052	38
	Apr	0.00012	0.0015	0.0013	0.013	0.0024	0.000090	52	0.070	25	0.20	0.052	38
	May	0.00013	0.0017	0.0014	0.014	0.0024	0.00010	58	0.078	28	0.22	0.052	38
	Jun	0.00014	0.0017	0.0015	0.014	0.0025	0.00010	60	0.080	29	0.23	0.052	38
	Jul	0.00014	0.0018	0.0016	0.015	0.0025	0.00011	64	0.085	31	0.24	0.052	38
	Aug	0.00014	0.0018	0.0015	0.015	0.0025	0.00011	61	0.081	29	0.23	0.052	38
	Sep	0.00013	0.0016	0.0014	0.013	0.0024	0.00010	56	0.074	27	0.21	0.052	38
	Oct	0.00012	0.0015	0.0013	0.012	0.0023	0.000090	51	0.068	25	0.19	0.056	41
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2022	Jan	0.000090	0.0012	0.0011	0.010	0.0022	0.000080	42	0.055	20	0.16	0.060	40
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00010	0.0013	0.0012	0.011	0.0022	0.000080	44	0.059	21	0.17	0.060	40
	Apr	0.00025	0.0032	0.0028	0.020	0.0030	0.00020	111	0.15	53	0.42	0.082	40
	May	0.00018	0.0023	0.0021	0.018	0.0027	0.00014	80	0.11	38	0.30	0.060	40
	Jun	0.00013	0.0017	0.0015	0.014	0.0024	0.00010	57	0.076	27	0.21	0.060	40
	Jul	0.00014	0.0018	0.0016	0.015	0.0025	0.00011	60	0.080	29	0.23	0.060	40
	Aug	0.00013	0.0017	0.0015	0.014	0.0024	0.00011	58	0.077	28	0.22	0.060	40
	Sep	0.00012	0.0016	0.0014	0.013	0.0024	0.00010	53	0.070	25	0.20	0.060	40
	Oct	0.00011	0.0014	0.0013	0.012	0.0023	0.000090	49	0.065	23	0.18	0.056	41
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2023	Jan	0.00011	0.0013	0.0012	0.012	0.0023	0.000080	50	0.066	24	0.18	0.056	41
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00012	0.0014	0.0013	0.012	0.0023	0.000090	53	0.070	25	0.19	0.056	41
	Apr	0.00016	0.0020	0.0018	0.017	0.0026	0.00013	72	0.096	35	0.26	0.066	41
	May	0.00016	0.0020	0.0018	0.017	0.0026	0.00012	72	0.096	34	0.26	0.068	41
	Jun	0.00015	0.0019	0.0017	0.016	0.0025	0.00012	68	0.091	33	0.24	0.065	41
	Jul	0.00016	0.0020	0.0018	0.017	0.0026	0.00012	72	0.096	34	0.26	0.069	41
	Aug	0.00015	0.0019	0.0017	0.016	0.0025	0.00012	69	0.092	33	0.25	0.066	41
	Sep	0.00014	0.0017	0.0016	0.015	0.0025	0.00011	63	0.084	30	0.23	0.060	41
	Oct	0.00013	0.0016	0.0014	0.014	0.0024	0.00010	58	0.077	28	0.21	0.056	41
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.1: Eagle Pup WRSA

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2021	Jan	0.0064	0.30	0.00087	0.055	0.027	5.2	0.0017	1.5	0.00011	0.038	0.0029	0.0100
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0068	0.30	0.00092	0.059	0.029	5.2	0.0018	1.6	0.00011	0.041	0.0031	0.011
	Apr	0.0077	0.30	0.0010	0.066	0.032	5.2	0.0021	1.8	0.00013	0.046	0.0035	0.012
	May	0.0086	0.30	0.0012	0.074	0.036	5.2	0.0023	2.0	0.00014	0.051	0.0039	0.013
	Jun	0.0089	0.30	0.0012	0.076	0.037	5.2	0.0024	2.0	0.00015	0.053	0.0040	0.014
	Jul	0.0094	0.30	0.0013	0.080	0.040	5.2	0.0025	2.2	0.00016	0.056	0.0042	0.014
	Aug	0.0090	0.30	0.0012	0.077	0.038	5.2	0.0024	2.1	0.00015	0.053	0.0040	0.014
	Sep	0.0082	0.30	0.0011	0.070	0.035	5.2	0.0022	1.9	0.00014	0.049	0.0037	0.013
	Oct	0.0075	0.30	0.0010	0.065	0.032	5.2	0.0020	1.7	0.00013	0.057	0.0034	0.012
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2022	Jan	0.0063	0.30	0.00085	0.055	0.026	5.2	0.0016	1.4	0.00010	0.041	0.0028	0.0097
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0066	0.30	0.00090	0.058	0.028	5.2	0.0017	1.5	0.00011	0.044	0.0030	0.010
	Apr	0.016	0.30	0.0022	0.14	0.070	5.1	0.0044	3.8	0.00027	0.10	0.0075	0.026
	May	0.012	0.30	0.0016	0.10	0.050	5.2	0.0031	2.7	0.00020	0.076	0.0054	0.018
	Jun	0.0086	0.30	0.0012	0.075	0.036	5.2	0.0023	2.0	0.00014	0.057	0.0039	0.013
	Jul	0.0091	0.30	0.0012	0.079	0.038	5.2	0.0024	2.1	0.00015	0.060	0.0041	0.014
	Aug	0.0087	0.30	0.0012	0.076	0.037	5.2	0.0023	2.0	0.00014	0.058	0.0039	0.013
	Sep	0.0080	0.30	0.0011	0.070	0.034	5.2	0.0021	1.8	0.00013	0.053	0.0036	0.012
	Oct	0.0073	0.30	0.0010	0.064	0.031	5.2	0.0019	1.7	0.00012	0.057	0.0033	0.011
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2023	Jan	0.0069	0.30	0.00096	0.071	0.032	5.2	0.0018	1.8	0.00013	0.065	0.0033	0.011
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0073	0.30	0.0010	0.075	0.034	5.2	0.0019	2.0	0.00014	0.069	0.0035	0.012
	Apr	0.010	0.30	0.0014	0.10	0.047	5.2	0.0026	2.6	0.00019	0.091	0.0049	0.016
	May	0.010	0.30	0.0014	0.10	0.047	5.2	0.0026	2.7	0.00019	0.093	0.0048	0.016
	Jun	0.0094	0.30	0.0013	0.097	0.044	5.2	0.0024	2.5	0.00018	0.089	0.0046	0.015
	Jul	0.0100	0.30	0.0014	0.10	0.047	5.2	0.0026	2.7	0.00019	0.094	0.0048	0.016
	Aug	0.0095	0.30	0.0013	0.098	0.045	5.2	0.0024	2.6	0.00018	0.090	0.0046	0.015
	Sep	0.0088	0.30	0.0012	0.090	0.041	5.2	0.0022	2.3	0.00016	0.083	0.0042	0.014
	Oct	0.0080	0.30	0.0011	0.083	0.038	5.2	0.0021	2.2	0.00015	0.076	0.0039	0.013
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.1: Eagle Pup WRSA

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2024	Jan	7.9	25	436	6.6	2.5	0.000040	0.0058	0.40	0.42	0.011	0.00017	227
		-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	25	463	7.0	2.6	0.000040	0.0057	0.43	0.44	0.011	0.00018	242
	Apr	7.8	22	726	11	4.0	0.000070	0.0049	0.68	0.70	0.0090	0.00028	391
	May	7.8	22	681	10	3.8	0.000070	0.0050	0.63	0.65	0.0092	0.00026	366
	Jun	7.8	23	600	9.0	3.4	0.000060	0.0052	0.55	0.57	0.0097	0.00023	320
	Jul	7.8	23	633	9.6	3.6	0.000060	0.0051	0.59	0.60	0.0095	0.00024	340
	Aug	7.8	23	606	9.1	3.4	0.000060	0.0052	0.56	0.58	0.0096	0.00023	324
	Sep	7.8	24	556	8.4	3.1	0.000050	0.0053	0.51	0.53	0.0100	0.00021	296
	Oct	7.9	24	511	7.7	2.9	0.000050	0.0055	0.47	0.49	0.010	0.00019	270
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2025	Jan	7.9	25	423	6.5	2.5	0.000040	0.0058	0.40	0.42	0.011	0.00017	223
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	25	449	6.9	2.7	0.000040	0.0057	0.42	0.44	0.011	0.00018	237
	Apr	7.8	22	761	12	4.5	0.000070	0.0048	0.71	0.74	0.0089	0.00030	416
	May	7.8	22	689	11	4.1	0.000070	0.0050	0.65	0.67	0.0092	0.00027	375
	Jun	7.8	23	582	8.9	3.5	0.000060	0.0052	0.55	0.57	0.0099	0.00023	314
	Jul	7.8	23	614	9.4	3.7	0.000060	0.0051	0.58	0.60	0.0097	0.00024	333
	Aug	7.8	23	588	9.0	3.5	0.000060	0.0052	0.56	0.58	0.0098	0.00023	317
	Sep	7.9	24	539	8.3	3.2	0.000050	0.0054	0.51	0.53	0.010	0.00021	289
	Oct	7.9	24	495	7.6	3.0	0.000050	0.0055	0.47	0.49	0.011	0.00019	264
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2026	Jan	7.9	26	413	6.4	2.6	0.000040	0.0058	0.40	0.41	0.011	0.00017	218
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	25	438	6.8	2.7	0.000040	0.0057	0.42	0.44	0.011	0.00018	233
	Apr	7.8	22	750	12	4.6	0.000070	0.0048	0.72	0.75	0.0090	0.00030	412
	May	7.8	22	677	10	4.2	0.000070	0.0050	0.65	0.68	0.0093	0.00027	370
	Jun	7.8	23	568	8.8	3.5	0.000060	0.0053	0.55	0.57	0.0100	0.00023	308
	Jul	7.8	23	600	9.3	3.7	0.000060	0.0052	0.58	0.60	0.0098	0.00024	326
	Aug	7.8	23	574	8.9	3.5	0.000060	0.0052	0.55	0.58	0.0099	0.00023	311
	Sep	7.9	24	527	8.2	3.3	0.000050	0.0054	0.51	0.53	0.010	0.00021	284
	Oct	7.9	24	484	7.5	3.0	0.000050	0.0055	0.46	0.49	0.011	0.00019	259
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.1: Eagle Pup WRSA

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2024	Jan	0.00011	0.0013	0.0012	0.012	0.0023	0.000080	49	0.067	24	0.18	0.050	16
		-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00012	0.0014	0.0013	0.012	0.0024	0.000090	52	0.071	26	0.19	0.053	17
	Apr	0.00019	0.0022	0.0020	0.018	0.0027	0.00014	82	0.11	40	0.29	0.081	25
	May	0.00018	0.0020	0.0019	0.018	0.0026	0.00013	77	0.10	37	0.27	0.077	24
	Jun	0.00016	0.0018	0.0017	0.016	0.0025	0.00011	68	0.092	33	0.24	0.068	21
	Jul	0.00017	0.0019	0.0018	0.017	0.0026	0.00012	72	0.097	35	0.25	0.072	23
	Aug	0.00016	0.0018	0.0017	0.016	0.0026	0.00012	69	0.093	33	0.24	0.069	22
	Sep	0.00015	0.0017	0.0016	0.015	0.0025	0.00011	63	0.085	31	0.22	0.063	20
	Oct	0.00013	0.0015	0.0014	0.014	0.0024	0.00010	58	0.078	28	0.21	0.058	18
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2025	Jan	0.00011	0.0013	0.0013	0.012	0.0023	0.000080	48	0.066	24	0.17	0.047	17
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00012	0.0014	0.0013	0.012	0.0023	0.000090	51	0.070	25	0.18	0.050	18
	Apr	0.00020	0.0023	0.0022	0.018	0.0027	0.00015	86	0.12	42	0.31	0.085	29
	May	0.00019	0.0021	0.0020	0.018	0.0027	0.00013	78	0.11	38	0.28	0.077	27
	Jun	0.00016	0.0018	0.0017	0.016	0.0025	0.00011	66	0.090	33	0.23	0.064	23
	Jul	0.00017	0.0019	0.0018	0.017	0.0026	0.00012	69	0.095	34	0.25	0.068	25
	Aug	0.00016	0.0018	0.0017	0.016	0.0025	0.00012	66	0.091	33	0.24	0.065	23
	Sep	0.00015	0.0016	0.0016	0.015	0.0025	0.00011	61	0.084	30	0.22	0.060	22
	Oct	0.00013	0.0015	0.0015	0.014	0.0024	0.00010	56	0.077	28	0.20	0.055	20
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2026	Jan	0.00011	0.0013	0.0013	0.012	0.0023	0.000080	46	0.064	23	0.17	0.044	17
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00012	0.0013	0.0014	0.012	0.0023	0.000090	49	0.068	25	0.18	0.046	19
	Apr	0.00021	0.0023	0.0023	0.018	0.0027	0.00015	84	0.12	42	0.30	0.080	31
	May	0.00019	0.0020	0.0021	0.018	0.0027	0.00014	76	0.11	38	0.27	0.072	28
	Jun	0.00016	0.0017	0.0018	0.016	0.0025	0.00011	64	0.089	32	0.23	0.060	24
	Jul	0.00017	0.0018	0.0019	0.017	0.0026	0.00012	67	0.093	34	0.24	0.063	25
	Aug	0.00016	0.0017	0.0018	0.016	0.0025	0.00012	64	0.089	32	0.23	0.060	24
	Sep	0.00015	0.0016	0.0016	0.015	0.0025	0.00011	59	0.082	30	0.21	0.055	22
	Oct	0.00013	0.0015	0.0015	0.014	0.0024	0.00010	54	0.075	27	0.19	0.051	20
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.1: Eagle Pup WRSA

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2024	Jan	0.0067	0.020	0.00095	0.091	0.035	5.2	0.0017	2.1	0.00013	0.093	0.0034	0.011
		-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0071	0.021	0.0010	0.097	0.037	5.2	0.0018	2.2	0.00014	0.099	0.0036	0.012
	Apr	0.011	0.032	0.0016	0.14	0.058	5.2	0.0028	3.4	0.00022	0.14	0.0056	0.018
	May	0.010	0.030	0.0015	0.14	0.054	5.2	0.0026	3.2	0.00021	0.14	0.0052	0.017
	Jun	0.0092	0.027	0.0013	0.13	0.048	5.2	0.0023	2.9	0.00019	0.13	0.0046	0.015
	Jul	0.0097	0.028	0.0014	0.13	0.050	5.2	0.0024	3.1	0.00020	0.14	0.0049	0.016
	Aug	0.0093	0.027	0.0013	0.13	0.048	5.2	0.0023	2.9	0.00019	0.13	0.0047	0.015
	Sep	0.0085	0.025	0.0012	0.12	0.044	5.2	0.0021	2.7	0.00017	0.12	0.0043	0.014
	Oct	0.0078	0.023	0.0011	0.11	0.041	5.2	0.0020	2.5	0.00016	0.11	0.0039	0.013
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2025	Jan	0.0065	0.020	0.00095	0.11	0.036	5.2	0.0016	2.4	0.00014	0.12	0.0034	0.011
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0069	0.022	0.0010	0.12	0.038	5.2	0.0017	2.5	0.00015	0.13	0.0036	0.011
	Apr	0.012	0.036	0.0017	0.19	0.065	5.2	0.0029	4.1	0.00024	0.20	0.0060	0.019
	May	0.011	0.033	0.0015	0.18	0.058	5.2	0.0026	3.8	0.00022	0.19	0.0055	0.018
	Jun	0.0090	0.028	0.0013	0.16	0.049	5.2	0.0022	3.3	0.00019	0.17	0.0047	0.015
	Jul	0.0095	0.030	0.0014	0.17	0.052	5.2	0.0023	3.5	0.00020	0.18	0.0049	0.016
	Aug	0.0091	0.028	0.0013	0.16	0.050	5.2	0.0022	3.3	0.00019	0.17	0.0047	0.015
	Sep	0.0083	0.026	0.0012	0.15	0.046	5.2	0.0021	3.0	0.00018	0.16	0.0043	0.014
	Oct	0.0076	0.024	0.0011	0.13	0.042	5.2	0.0019	2.8	0.00016	0.14	0.0040	0.013
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2026	Jan	0.0064	0.021	0.00094	0.12	0.036	5.2	0.0016	2.5	0.00014	0.14	0.0034	0.011
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0068	0.022	0.0010	0.13	0.038	5.2	0.0017	2.6	0.00014	0.15	0.0036	0.011
	Apr	0.012	0.037	0.0017	0.22	0.066	5.2	0.0029	4.4	0.00025	0.24	0.0061	0.019
	May	0.011	0.034	0.0015	0.20	0.059	5.2	0.0026	4.0	0.00022	0.22	0.0055	0.018
	Jun	0.0089	0.028	0.0013	0.17	0.050	5.2	0.0022	3.4	0.00019	0.19	0.0046	0.015
	Jul	0.0094	0.030	0.0014	0.18	0.053	5.2	0.0023	3.6	0.00020	0.20	0.0049	0.016
	Aug	0.0090	0.029	0.0013	0.17	0.050	5.2	0.0022	3.5	0.00019	0.19	0.0047	0.015
	Sep	0.0082	0.026	0.0012	0.16	0.046	5.2	0.0020	3.2	0.00017	0.18	0.0043	0.014
	Oct	0.0075	0.024	0.0011	0.15	0.042	5.2	0.0018	2.9	0.00016	0.16	0.0039	0.013
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.1: Eagle Pup WRSA

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2027	Jan	7.9	27	333	5.3	2.1	0.000030	0.0063	0.33	0.35	0.013	0.00014	174
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	7.9	27	353	5.6	2.3	0.000040	0.0061	0.35	0.37	0.012	0.00015	186
	Apr	7.8	22	670	11	4.2	0.000070	0.0050	0.66	0.69	0.0094	0.00027	369
	May	7.8	23	583	9.2	3.7	0.000060	0.0052	0.57	0.60	0.0099	0.00024	319
	Jun	7.9	25	458	7.3	2.9	0.000050	0.0056	0.45	0.48	0.011	0.00019	246
	Jul	7.9	24	483	7.7	3.1	0.000050	0.0055	0.48	0.50	0.011	0.00020	261
	Aug	7.9	25	463	7.3	3.0	0.000050	0.0056	0.46	0.48	0.011	0.00019	249
	Sep	7.9	25	424	6.7	2.7	0.000040	0.0058	0.42	0.44	0.011	0.00018	227
	Oct	7.9	26	390	6.2	2.5	0.000040	0.0059	0.39	0.40	0.012	0.00016	207
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	8.1	35	165	3.1	0.98	0.000030	0.0082	0.20	0.27	0.018	0.00011	80
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.1	34	175	3.3	1.0	0.000040	0.0080	0.22	0.28	0.017	0.00011	85
	Apr	7.9	25	410	7.8	2.4	0.000080	0.0058	0.51	0.66	0.011	0.00026	222
	May	8.0	28	290	5.5	1.7	0.000060	0.0065	0.36	0.47	0.013	0.00019	152
	Jun	8.0	31	227	4.3	1.3	0.000050	0.0072	0.28	0.36	0.015	0.00015	115
	Jul	8.0	30	240	4.6	1.4	0.000050	0.0070	0.30	0.39	0.015	0.00015	122
	Aug	8.0	31	229	4.4	1.4	0.000050	0.0072	0.28	0.37	0.015	0.00015	116
	Sep	8.0	32	210	4.0	1.2	0.000040	0.0074	0.26	0.34	0.016	0.00014	105
	Oct	8.0	33	193	3.7	1.1	0.000040	0.0077	0.24	0.31	0.017	0.00012	96
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L

Alkalinity is given as $CaCO_3$

Appendix A.1: Eagle Pup WRSA

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2027	Jan	0.000090	0.0010	0.0011	0.0096	0.0021	0.000070	38	0.053	19	0.13	0.037	15
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.00010	0.0011	0.0012	0.010	0.0022	0.000070	40	0.056	20	0.14	0.039	16
	Apr	0.00019	0.0020	0.0021	0.018	0.0027	0.00014	76	0.11	38	0.27	0.072	29
	May	0.00016	0.0018	0.0019	0.017	0.0025	0.00012	66	0.092	33	0.23	0.064	26
	Jun	0.00013	0.0014	0.0015	0.013	0.0024	0.00010	52	0.072	26	0.18	0.050	21
	Jul	0.00014	0.0015	0.0016	0.014	0.0024	0.00010	55	0.076	27	0.19	0.053	22
	Aug	0.00013	0.0014	0.0015	0.013	0.0024	0.00010	52	0.073	26	0.18	0.051	21
	Sep	0.00012	0.0013	0.0014	0.012	0.0023	0.000090	48	0.067	24	0.17	0.047	19
	Oct	0.00011	0.0012	0.0013	0.011	0.0023	0.000080	44	0.062	22	0.16	0.043	18
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	0.000050	0.00049	0.0013	0.0055	0.0018	0.000050	16	0.023	9.7	0.070	0.012	2.4
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000050	0.00052	0.0014	0.0058	0.0018	0.000060	17	0.024	10	0.074	0.013	2.5
	Apr	0.00012	0.0012	0.0032	0.014	0.0023	0.00013	40	0.056	24	0.17	0.030	5.9
	May	0.000080	0.00086	0.0023	0.0096	0.0021	0.000090	28	0.040	17	0.12	0.021	4.2
	Jun	0.000060	0.00067	0.0018	0.0075	0.0019	0.000070	22	0.031	13	0.096	0.016	3.3
	Jul	0.000070	0.00071	0.0019	0.0080	0.0020	0.000080	23	0.033	14	0.10	0.017	3.5
	Aug	0.000070	0.00068	0.0018	0.0076	0.0019	0.000070	22	0.031	14	0.097	0.017	3.3
	Sep	0.000060	0.00062	0.0016	0.0070	0.0019	0.000070	20	0.029	12	0.089	0.015	3.0
	Oct	0.000060	0.00057	0.0015	0.0064	0.0018	0.000060	19	0.026	11	0.082	0.014	2.8
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L
Alkalinity is given as $CaCO_3$

Appendix A.1: Eagle Pup WRSA

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2027	Jan	0.0053	0.018	0.00078	0.11	0.030	5.2	0.0013	2.1	0.00011	0.12	0.0028	0.0089
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0056	0.019	0.00082	0.12	0.032	5.2	0.0013	2.3	0.00012	0.13	0.0030	0.0094
	Apr	0.011	0.035	0.0015	0.21	0.060	5.2	0.0025	4.2	0.00023	0.24	0.0056	0.018
	May	0.0092	0.030	0.0014	0.19	0.052	5.2	0.0022	3.7	0.00020	0.21	0.0049	0.015
	Jun	0.0072	0.024	0.0011	0.15	0.041	5.2	0.0017	2.9	0.00016	0.17	0.0038	0.012
	Jul	0.0076	0.026	0.0011	0.16	0.043	5.2	0.0018	3.1	0.00017	0.18	0.0041	0.013
	Aug	0.0073	0.024	0.0011	0.15	0.041	5.2	0.0017	3.0	0.00016	0.17	0.0039	0.012
	Sep	0.0067	0.022	0.00099	0.14	0.038	5.2	0.0016	2.7	0.00015	0.16	0.0036	0.011
	Oct	0.0062	0.021	0.00091	0.13	0.035	5.2	0.0015	2.5	0.00013	0.15	0.0033	0.010
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	0.0033	0.011	0.0012	0.042	0.015	5.2	0.00079	1.1	0.000070	0.045	0.0017	0.0051
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0035	0.012	0.0013	0.045	0.016	5.2	0.00083	1.1	0.000070	0.048	0.0018	0.0054
	Apr	0.0082	0.027	0.0030	0.11	0.037	5.2	0.0020	2.6	0.00017	0.11	0.0043	0.013
	May	0.0058	0.019	0.0021	0.075	0.026	5.2	0.0014	1.9	0.00012	0.079	0.0030	0.0089
	Jun	0.0045	0.015	0.0017	0.058	0.020	5.2	0.0011	1.5	0.00010	0.062	0.0024	0.0070
	Jul	0.0048	0.016	0.0018	0.062	0.021	5.2	0.0011	1.5	0.00010	0.066	0.0025	0.0074
	Aug	0.0046	0.015	0.0017	0.059	0.020	5.2	0.0011	1.5	0.00010	0.063	0.0024	0.0071
	Sep	0.0042	0.014	0.0015	0.054	0.019	5.2	0.0010	1.4	0.000090	0.058	0.0022	0.0065
	Oct	0.0038	0.013	0.0014	0.050	0.017	5.2	0.00092	1.2	0.000080	0.053	0.0020	0.0060
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L
Alkalinity is given as $CaCO_3$

Appendix A.2: Platinum Gulch WRSA

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2020	Jan	8.1	38	151	3.9	1.1	0.000030	0.0089	0.44	0.34	0.020	0.00014	68
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.1	37	151	4.2	1.2	0.000040	0.0086	0.47	0.36	0.020	0.00015	72
	Apr	7.9	29	264	7.5	2.3	0.000060	0.0064	0.80	0.63	0.015	0.00025	156
	May	8.0	30	217	6.5	1.9	0.000060	0.0069	0.71	0.56	0.017	0.00022	128
	Jun	8.0	33	168	5.4	1.6	0.000050	0.0076	0.60	0.47	0.020	0.00019	97
	Jul	8.0	32	178	5.7	1.6	0.000050	0.0074	0.64	0.50	0.019	0.00020	104
	Aug	8.0	33	170	5.5	1.6	0.000050	0.0076	0.61	0.48	0.019	0.00019	99
	Sep	8.0	34	156	5.0	1.4	0.000040	0.0078	0.56	0.44	0.020	0.00017	89
	Oct	8.1	35	151	4.6	1.3	0.000040	0.0082	0.51	0.40	0.021	0.00016	81
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2021	Jan	8.1	36	162	3.5	1.0	0.000030	0.0084	0.32	0.26	0.019	0.00011	76
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.1	35	164	3.6	1.1	0.000030	0.0082	0.34	0.28	0.019	0.00011	82
	Apr	7.9	27	324	8.6	2.5	0.000070	0.0061	0.88	0.71	0.014	0.00028	188
	May	8.0	29	259	6.3	1.9	0.000050	0.0067	0.62	0.50	0.015	0.00020	142
	Jun	8.0	32	212	4.7	1.4	0.000040	0.0073	0.44	0.36	0.016	0.00014	110
	Jul	8.0	31	224	4.9	1.5	0.000040	0.0072	0.46	0.38	0.016	0.00015	117
	Aug	8.0	32	214	4.7	1.4	0.000040	0.0073	0.44	0.37	0.016	0.00015	111
	Sep	8.0	33	197	4.3	1.3	0.000030	0.0076	0.41	0.34	0.017	0.00013	101
	Oct	8.0	34	181	4.0	1.2	0.000030	0.0079	0.37	0.31	0.018	0.00012	92
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	8.1	37	162	3.5	1.0	0.000030	0.0085	0.32	0.26	0.019	0.00010	75
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.1	36	162	3.5	1.1	0.000030	0.0083	0.33	0.28	0.019	0.00011	80
	Apr	7.9	26	420	9.2	2.8	0.000070	0.0057	0.87	0.72	0.012	0.00029	235
	May	8.0	29	272	6.0	1.8	0.000050	0.0067	0.56	0.47	0.014	0.00019	146
	Jun	8.0	32	209	4.6	1.4	0.000040	0.0074	0.43	0.36	0.016	0.00014	108
	Jul	8.0	31	221	4.9	1.5	0.000040	0.0072	0.46	0.38	0.016	0.00015	115
	Aug	8.0	32	211	4.6	1.4	0.000040	0.0074	0.44	0.36	0.016	0.00014	109
	Sep	8.0	33	194	4.3	1.3	0.000030	0.0076	0.40	0.33	0.017	0.00013	99
	Oct	8.0	34	178	3.9	1.2	0.000030	0.0079	0.37	0.30	0.018	0.00012	90
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L
Alkalinity is given as $CaCO_3$

Appendix A.2: Platinum Gulch W

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2020	Jan	0.000080	0.00093	0.0011	0.0076	0.0017	0.000070	19	0.020	11	0.056	0.067	36
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000080	0.00093	0.0012	0.0077	0.0017	0.000070	20	0.022	11	0.059	0.067	36
	Apr	0.00010	0.0013	0.0021	0.014	0.0021	0.00013	38	0.043	15	0.12	0.067	36
	May	0.000090	0.0011	0.0019	0.012	0.0020	0.00011	32	0.036	13	0.098	0.067	36
	Jun	0.000080	0.00093	0.0016	0.0100	0.0019	0.000090	26	0.028	11	0.077	0.067	36
	Jul	0.000080	0.00094	0.0017	0.011	0.0019	0.00010	28	0.029	11	0.081	0.067	36
	Aug	0.000080	0.00093	0.0016	0.010	0.0019	0.00010	26	0.028	11	0.078	0.067	36
	Sep	0.000080	0.00093	0.0015	0.0093	0.0018	0.000090	24	0.026	11	0.071	0.067	36
	Oct	0.000080	0.00093	0.0013	0.0085	0.0018	0.000080	22	0.024	11	0.066	0.067	36
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2021	Jan	0.000080	0.00090	0.00084	0.0073	0.0018	0.000050	20	0.024	12	0.066	0.062	36
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000080	0.00090	0.00089	0.0073	0.0018	0.000060	21	0.025	12	0.070	0.062	36
	Apr	0.00011	0.0015	0.0023	0.015	0.0022	0.00014	45	0.051	18	0.14	0.062	36
	May	0.000080	0.0011	0.0016	0.011	0.0020	0.00010	35	0.040	14	0.11	0.062	36
	Jun	0.000080	0.00090	0.0012	0.0084	0.0019	0.000070	27	0.032	12	0.091	0.062	36
	Jul	0.000080	0.00090	0.0012	0.0089	0.0019	0.000080	29	0.034	12	0.096	0.062	36
	Aug	0.000080	0.00090	0.0012	0.0085	0.0019	0.000070	27	0.033	12	0.092	0.062	36
	Sep	0.000080	0.00090	0.0011	0.0078	0.0019	0.000070	25	0.030	12	0.084	0.062	36
	Oct	0.000080	0.00090	0.00098	0.0073	0.0018	0.000060	23	0.028	12	0.077	0.062	36
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	0.000080	0.00090	0.00083	0.0073	0.0017	0.000050	19	0.023	12	0.065	0.062	36
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000080	0.00090	0.00088	0.0073	0.0018	0.000060	21	0.025	12	0.069	0.062	36
	Apr	0.00013	0.0017	0.0023	0.015	0.0023	0.00014	54	0.064	23	0.18	0.062	36
	May	0.000080	0.0011	0.0015	0.011	0.0021	0.000090	35	0.041	15	0.12	0.062	36
	Jun	0.000080	0.00090	0.0011	0.0083	0.0019	0.000070	27	0.032	12	0.089	0.062	36
	Jul	0.000080	0.00090	0.0012	0.0087	0.0019	0.000080	28	0.034	12	0.094	0.062	36
	Aug	0.000080	0.00090	0.0012	0.0084	0.0019	0.000070	27	0.032	12	0.090	0.062	36
	Sep	0.000080	0.00090	0.0011	0.0077	0.0019	0.000070	25	0.030	12	0.083	0.062	36
	Oct	0.000080	0.00090	0.00097	0.0073	0.0018	0.000060	23	0.027	12	0.076	0.062	36
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L

Alkalinity is given as $CaCO_3$

Appendix A.2: Platinum Gulch W

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2020	Jan	0.0046	0.30	0.00061	0.027	0.0080	5.2	0.00064	0.68	0.000080	0.037	0.0017	0.0075
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0046	0.30	0.00064	0.028	0.0080	5.2	0.00068	0.72	0.000080	0.039	0.0018	0.0075
	Apr	0.0076	0.30	0.0012	0.080	0.014	5.2	0.0013	1.6	0.00016	0.091	0.0033	0.012
	May	0.0067	0.30	0.0010	0.058	0.012	5.2	0.0011	1.3	0.00014	0.071	0.0029	0.010
	Jun	0.0055	0.30	0.00083	0.037	0.0089	5.2	0.00088	0.94	0.00011	0.051	0.0024	0.0086
	Jul	0.0059	0.30	0.00088	0.039	0.0094	5.2	0.00092	0.99	0.00011	0.054	0.0025	0.0091
	Aug	0.0056	0.30	0.00084	0.037	0.0090	5.2	0.00088	0.95	0.00011	0.051	0.0024	0.0087
	Sep	0.0051	0.30	0.00077	0.034	0.0083	5.2	0.00081	0.87	0.00010	0.047	0.0022	0.0080
	Oct	0.0047	0.30	0.00071	0.031	0.0080	5.2	0.00075	0.80	0.000090	0.043	0.0020	0.0075
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2021	Jan	0.0045	0.30	0.00051	0.024	0.0093	5.2	0.00072	0.68	0.000060	0.032	0.0015	0.0070
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0045	0.30	0.00054	0.026	0.0094	5.2	0.00076	0.71	0.000060	0.032	0.0016	0.0070
	Apr	0.0088	0.30	0.0013	0.060	0.019	5.2	0.0016	1.6	0.00016	0.074	0.0038	0.014
	May	0.0065	0.30	0.00094	0.044	0.015	5.2	0.0012	1.2	0.00012	0.052	0.0028	0.010
	Jun	0.0049	0.30	0.00069	0.033	0.012	5.2	0.00099	0.92	0.000080	0.037	0.0021	0.0075
	Jul	0.0051	0.30	0.00073	0.035	0.013	5.2	0.0010	0.97	0.000090	0.039	0.0022	0.0079
	Aug	0.0049	0.30	0.00070	0.034	0.012	5.2	0.0010	0.93	0.000080	0.037	0.0021	0.0076
	Sep	0.0045	0.30	0.00064	0.031	0.011	5.2	0.00092	0.85	0.000080	0.034	0.0020	0.0070
	Oct	0.0045	0.30	0.00059	0.028	0.010	5.2	0.00084	0.78	0.000070	0.032	0.0018	0.0070
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	0.0045	0.30	0.00050	0.024	0.0093	5.2	0.00071	0.68	0.000060	0.032	0.0015	0.0070
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0045	0.30	0.00053	0.025	0.0093	5.2	0.00075	0.70	0.000060	0.032	0.0016	0.0070
	Apr	0.0096	0.30	0.0014	0.066	0.024	5.2	0.0020	1.8	0.00017	0.073	0.0042	0.015
	May	0.0062	0.30	0.00089	0.043	0.016	5.2	0.0013	1.2	0.00011	0.047	0.0027	0.0096
	Jun	0.0048	0.30	0.00068	0.033	0.012	5.2	0.00097	0.91	0.000080	0.036	0.0021	0.0074
	Jul	0.0051	0.30	0.00072	0.035	0.013	5.2	0.0010	0.96	0.000090	0.038	0.0022	0.0078
	Aug	0.0048	0.30	0.00069	0.033	0.012	5.2	0.00098	0.91	0.000080	0.036	0.0021	0.0075
	Sep	0.0045	0.30	0.00063	0.030	0.011	5.2	0.00090	0.84	0.000080	0.033	0.0019	0.0070
	Oct	0.0045	0.30	0.00058	0.028	0.010	5.2	0.00083	0.77	0.000070	0.032	0.0018	0.0070
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L

Alkalinity is given as $CaCO_3$

Appendix A.3: Pit Walls

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2020	Jan	8.1	41	80	1.5	0.59	0.000010	0.0097	0.087	0.10	0.023	0.000042	48
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.1	39	93	1.7	0.69	0.000012	0.0092	0.10	0.12	0.027	0.000049	55
	Apr	8.0	33	152	2.8	1.1	0.000020	0.0077	0.17	0.20	0.020	0.000079	90
	May	8.0	31	182	3.4	1.4	0.000024	0.0072	0.20	0.24	0.018	0.000095	109
	Jun	8.0	30	188	3.5	1.4	0.000025	0.0071	0.20	0.25	0.018	0.000098	113
	Jul	8.0	30	205	3.8	1.5	0.000027	0.0069	0.22	0.27	0.017	0.00011	123
	Aug	8.0	31	184	3.4	1.4	0.000024	0.0072	0.20	0.24	0.018	0.000096	110
	Sep	8.0	32	156	2.9	1.2	0.000020	0.0076	0.17	0.20	0.020	0.000082	93
	Oct	8.1	36	120	2.2	0.89	0.000016	0.0084	0.13	0.16	0.024	0.000063	71
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2021	Jan	8.1	37	113	1.8	0.78	0.000012	0.0087	0.095	0.12	0.024	0.000047	64
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.1	35	132	2.1	0.91	0.000014	0.0083	0.11	0.14	0.022	0.000055	75
	Apr	8.0	29	240	4.0	1.7	0.000027	0.0066	0.21	0.26	0.016	0.00011	140
	May	7.9	27	286	4.8	2.0	0.000031	0.0063	0.25	0.31	0.014	0.00012	167
	Jun	7.9	28	267	4.3	1.8	0.000028	0.0064	0.22	0.28	0.015	0.00011	154
	Jul	7.9	27	291	4.7	2.0	0.000030	0.0063	0.24	0.30	0.014	0.00012	169
	Aug	7.9	28	261	4.2	1.8	0.000027	0.0065	0.22	0.27	0.015	0.00011	151
	Sep	8.0	29	221	3.6	1.5	0.000023	0.0069	0.19	0.23	0.016	0.000092	127
	Oct	8.0	32	170	2.8	1.2	0.000018	0.0075	0.14	0.18	0.019	0.000071	97
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2022	Jan	8.1	36	131	1.9	0.85	0.000012	0.0084	0.097	0.12	0.022	0.000047	72
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.0	34	152	2.3	0.99	0.000014	0.0079	0.11	0.14	0.020	0.000055	84
	Apr	7.9	28	281	4.3	1.9	0.000026	0.0064	0.21	0.26	0.014	0.00011	160
	May	7.9	26	332	5.0	2.2	0.000031	0.0060	0.25	0.31	0.013	0.00012	190
	Jun	7.9	27	307	4.6	2.0	0.000028	0.0062	0.23	0.28	0.014	0.00011	174
	Jul	7.9	26	335	5.0	2.2	0.000030	0.0060	0.25	0.30	0.013	0.00012	190
	Aug	7.9	27	300	4.5	2.0	0.000027	0.0063	0.22	0.27	0.014	0.00011	170
	Sep	8.0	28	255	3.8	1.7	0.000023	0.0066	0.19	0.23	0.015	0.000092	143
	Oct	8.0	31	196	2.9	1.3	0.000018	0.0072	0.15	0.18	0.017	0.000071	109
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.3: Pit Walls

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2020	Jan	0.000027	0.00024	0.00030	0.0028	0.0016	0.000021	12	0.015	5.4	0.032	0.024	4.7
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000032	0.00028	0.00035	0.0032	0.0016	0.000024	14	0.017	6.3	0.038	0.029	5.4
	Apr	0.000052	0.00045	0.00057	0.0053	0.0018	0.000040	23	0.028	10	0.062	0.046	8.9
	May	0.000062	0.00054	0.00068	0.0063	0.0019	0.000048	28	0.034	12	0.074	0.056	11
	Jun	0.000064	0.00056	0.00070	0.0065	0.0019	0.000049	28	0.035	13	0.076	0.058	11
	Jul	0.000070	0.00061	0.00077	0.0071	0.0020	0.000054	31	0.038	14	0.083	0.063	12
	Aug	0.000063	0.00055	0.00069	0.0064	0.0019	0.000048	28	0.034	12	0.075	0.056	11
	Sep	0.000053	0.00046	0.00058	0.0054	0.0018	0.000041	24	0.029	10	0.063	0.048	9.1
	Oct	0.000041	0.00036	0.00045	0.0042	0.0017	0.000031	18	0.022	8.1	0.049	0.037	7.0
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2021	Jan	0.000035	0.00032	0.00034	0.0034	0.0017	0.000024	15	0.020	7.2	0.045	0.024	6.0
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000041	0.00037	0.00040	0.0039	0.0018	0.000027	17	0.023	8.3	0.053	0.028	6.9
	Apr	0.000077	0.00069	0.00077	0.0074	0.0020	0.000053	33	0.043	15	0.096	0.056	13
	May	0.000091	0.00081	0.00090	0.0088	0.0021	0.000062	38	0.050	18	0.11	0.066	15
	Jun	0.000083	0.00075	0.00081	0.0080	0.0021	0.000056	35	0.046	17	0.11	0.057	14
	Jul	0.000091	0.00082	0.00088	0.0087	0.0021	0.000060	38	0.051	18	0.12	0.062	15
	Aug	0.000082	0.00074	0.00079	0.0078	0.0021	0.000054	34	0.045	16	0.10	0.056	14
	Sep	0.000069	0.00062	0.00067	0.0066	0.0020	0.000046	29	0.039	14	0.088	0.047	12
	Oct	0.000053	0.00048	0.00052	0.0051	0.0019	0.000035	22	0.030	11	0.068	0.036	8.9
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2022	Jan	0.000039	0.00036	0.00035	0.0036	0.0017	0.000024	15	0.022	8.0	0.052	0.021	6.4
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000045	0.00042	0.00041	0.0042	0.0018	0.000028	18	0.025	9.3	0.060	0.024	7.4
	Apr	0.000085	0.00078	0.00077	0.0078	0.0021	0.000053	34	0.047	17	0.11	0.048	14
	May	0.00010	0.00093	0.00091	0.0093	0.0022	0.000062	40	0.056	20	0.13	0.056	16
	Jun	0.000092	0.00085	0.00082	0.0084	0.0022	0.000056	36	0.051	19	0.12	0.049	15
	Jul	0.00010	0.00093	0.00089	0.0092	0.0022	0.000061	40	0.056	20	0.13	0.053	16
	Aug	0.000090	0.00083	0.00080	0.0082	0.0021	0.000054	36	0.050	18	0.12	0.048	15
	Sep	0.000076	0.00071	0.00068	0.0070	0.0021	0.000046	30	0.042	16	0.10	0.040	12
	Oct	0.000058	0.00054	0.00052	0.0054	0.0019	0.000035	23	0.032	12	0.077	0.031	9.5
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.3: Pit Walls

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2020	Jan	0.0013	0.0054	0.00022	0.019	0.0067	5.2	0.00021	0.50	0.000045	0.027	0.00081	0.0023
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0015	0.0063	0.00026	0.022	0.0078	5.2	0.00024	0.59	0.000053	0.032	0.00094	0.0027
	Apr	0.0024	0.010	0.00042	0.036	0.013	5.2	0.00039	0.96	0.000086	0.052	0.0015	0.0044
	May	0.0029	0.012	0.00051	0.044	0.015	5.2	0.00047	1.1	0.00010	0.062	0.0018	0.0053
	Jun	0.0030	0.013	0.00053	0.045	0.016	5.2	0.00049	1.2	0.00011	0.064	0.0019	0.0055
	Jul	0.0033	0.014	0.00057	0.049	0.017	5.2	0.00053	1.3	0.00012	0.070	0.0021	0.0060
	Aug	0.0029	0.012	0.00051	0.044	0.015	5.2	0.00048	1.2	0.00010	0.062	0.0019	0.0054
	Sep	0.0025	0.011	0.00044	0.037	0.013	5.2	0.00040	0.98	0.000088	0.053	0.0016	0.0045
	Oct	0.0019	0.0081	0.00034	0.029	0.010	5.2	0.00031	0.76	0.000068	0.041	0.0012	0.0035
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2021	Jan	0.0016	0.0065	0.00027	0.036	0.011	5.2	0.00034	0.77	0.000053	0.044	0.0010	0.0030
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0019	0.0076	0.00032	0.042	0.012	5.2	0.00039	0.89	0.000062	0.051	0.0012	0.0035
	Apr	0.0036	0.014	0.00060	0.073	0.023	5.2	0.00069	1.6	0.00012	0.091	0.0022	0.0065
	May	0.0042	0.017	0.00071	0.087	0.027	5.2	0.00083	1.9	0.00014	0.11	0.0026	0.0076
	Jun	0.0039	0.015	0.00064	0.085	0.025	5.2	0.00079	1.8	0.00013	0.10	0.0024	0.0070
	Jul	0.0042	0.017	0.00070	0.093	0.027	5.2	0.00086	2.0	0.00014	0.11	0.0026	0.0076
	Aug	0.0038	0.015	0.00063	0.084	0.025	5.2	0.00077	1.8	0.00012	0.10	0.0023	0.0068
	Sep	0.0032	0.013	0.00053	0.071	0.021	5.2	0.00065	1.5	0.00010	0.086	0.0020	0.0058
	Oct	0.0025	0.0098	0.00041	0.054	0.016	5.2	0.00050	1.2	0.000080	0.066	0.0015	0.0045
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2022	Jan	0.0018	0.0070	0.00029	0.049	0.013	5.2	0.00042	0.92	0.000056	0.054	0.0011	0.0032
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0021	0.0082	0.00034	0.057	0.015	5.2	0.00049	1.1	0.000066	0.063	0.0013	0.0038
	Apr	0.0039	0.015	0.00064	0.10	0.028	5.2	0.00088	2.0	0.00012	0.11	0.0024	0.0071
	May	0.0046	0.018	0.00076	0.12	0.034	5.2	0.0011	2.3	0.00015	0.14	0.0028	0.0083
	Jun	0.0042	0.016	0.00069	0.11	0.031	5.2	0.00099	2.2	0.00013	0.13	0.0025	0.0076
	Jul	0.0046	0.018	0.00075	0.12	0.034	5.2	0.0011	2.3	0.00015	0.14	0.0028	0.0083
	Aug	0.0041	0.016	0.00067	0.11	0.030	5.2	0.00096	2.1	0.00013	0.12	0.0025	0.0075
	Sep	0.0035	0.014	0.00057	0.095	0.026	5.2	0.00082	1.8	0.00011	0.11	0.0021	0.0063
	Oct	0.0027	0.011	0.00044	0.073	0.020	5.2	0.00063	1.4	0.000085	0.081	0.0016	0.0049
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.3: Pit Walls

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2023	Jan	8.1	35	132	2.0	0.91	0.000012	0.0083	0.090	0.12	0.022	0.000047	74
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.0	33	154	2.3	1.1	0.000014	0.0079	0.11	0.14	0.020	0.000055	86
	Apr	7.9	27	294	4.4	2.0	0.000026	0.0063	0.20	0.26	0.014	0.00011	167
	May	7.9	26	346	5.1	2.4	0.000031	0.0060	0.24	0.31	0.013	0.00012	198
	Jun	7.9	27	312	4.6	2.2	0.000028	0.0062	0.21	0.28	0.014	0.00011	178
	Jul	7.9	26	340	5.0	2.3	0.000030	0.0060	0.23	0.30	0.013	0.00012	195
	Aug	7.9	27	305	4.5	2.1	0.000027	0.0062	0.21	0.27	0.014	0.00011	174
	Sep	8.0	28	259	3.8	1.8	0.000023	0.0066	0.18	0.23	0.015	0.000092	147
	Oct	8.0	31	199	2.9	1.4	0.000018	0.0072	0.14	0.18	0.017	0.000071	112
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2024	Jan	8.1	35	133	2.0	0.97	0.000012	0.0083	0.086	0.12	0.022	0.000047	74
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.0	33	155	2.3	1.1	0.000014	0.0078	0.10	0.14	0.020	0.000055	87
	Apr	7.9	27	295	4.4	2.1	0.000026	0.0063	0.19	0.26	0.014	0.00011	169
	May	7.9	26	348	5.1	2.5	0.000031	0.0059	0.23	0.31	0.013	0.00012	200
	Jun	7.9	27	312	4.6	2.3	0.000028	0.0061	0.20	0.28	0.014	0.00011	179
	Jul	7.9	26	340	5.0	2.5	0.000030	0.0060	0.22	0.30	0.013	0.00012	196
	Aug	7.9	27	306	4.5	2.2	0.000027	0.0062	0.20	0.27	0.014	0.00011	175
	Sep	8.0	28	259	3.8	1.9	0.000023	0.0065	0.17	0.23	0.015	0.000092	148
	Oct	8.0	31	199	2.9	1.5	0.000018	0.0072	0.13	0.18	0.017	0.000071	113
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2025	Jan	8.1	35	133	2.0	0.98	0.000012	0.0083	0.087	0.12	0.022	0.000047	74
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.0	33	155	2.3	1.1	0.000014	0.0078	0.10	0.14	0.020	0.000055	87
	Apr	7.9	27	295	4.3	2.2	0.000026	0.0063	0.19	0.26	0.014	0.00011	169
	May	7.9	26	348	5.1	2.6	0.000031	0.0059	0.23	0.31	0.013	0.00012	200
	Jun	7.9	27	312	4.6	2.3	0.000028	0.0061	0.20	0.28	0.014	0.00011	179
	Jul	7.9	26	340	5.0	2.5	0.000031	0.0060	0.22	0.30	0.013	0.00012	196
	Aug	7.9	27	305	4.5	2.3	0.000027	0.0062	0.20	0.27	0.014	0.00011	175
	Sep	8.0	28	259	3.8	1.9	0.000023	0.0065	0.17	0.23	0.015	0.000092	148
	Oct	8.0	31	199	2.9	1.5	0.000018	0.0072	0.13	0.18	0.017	0.000071	113
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.3: Pit Walls

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2023	Jan	0.000040	0.00036	0.00036	0.0036	0.0018	0.000024	16	0.022	8.2	0.052	0.020	7.2
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000047	0.00042	0.00042	0.0042	0.0018	0.000028	18	0.026	9.5	0.060	0.024	8.3
	Apr	0.000089	0.00080	0.00080	0.0081	0.0021	0.000053	35	0.049	18	0.12	0.046	15
	May	0.00011	0.00095	0.00094	0.0095	0.0022	0.000062	41	0.058	21	0.14	0.054	18
	Jun	0.000095	0.00085	0.00086	0.0086	0.0022	0.000056	36	0.053	19	0.12	0.048	17
	Jul	0.00010	0.00093	0.00093	0.0093	0.0022	0.000061	40	0.057	21	0.13	0.052	18
	Aug	0.000093	0.00083	0.00084	0.0084	0.0022	0.000054	36	0.051	19	0.12	0.047	16
	Sep	0.000079	0.00070	0.00071	0.0071	0.0021	0.000046	30	0.044	16	0.10	0.040	14
	Oct	0.000061	0.00054	0.00055	0.0055	0.0019	0.000036	23	0.033	12	0.078	0.031	11
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2024	Jan	0.000041	0.00036	0.00039	0.0037	0.0018	0.000024	15	0.022	8.2	0.051	0.018	7.9
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000048	0.00042	0.00045	0.0043	0.0018	0.000028	18	0.026	9.6	0.060	0.021	9.2
	Apr	0.000091	0.00080	0.00085	0.0082	0.0021	0.000053	34	0.050	18	0.11	0.041	17
	May	0.00011	0.00094	0.00100	0.0096	0.0022	0.000062	40	0.059	21	0.14	0.048	20
	Jun	0.000097	0.00085	0.00091	0.0086	0.0022	0.000056	35	0.053	19	0.12	0.042	19
	Jul	0.00011	0.00092	0.00099	0.0094	0.0022	0.000061	39	0.058	21	0.13	0.046	20
	Aug	0.000095	0.00083	0.00089	0.0085	0.0022	0.000055	35	0.052	19	0.12	0.041	18
	Sep	0.000080	0.00070	0.00075	0.0072	0.0021	0.000046	29	0.044	16	0.10	0.035	15
	Oct	0.000062	0.00054	0.00058	0.0055	0.0019	0.000036	23	0.034	12	0.077	0.027	12
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2025	Jan	0.000041	0.00036	0.00040	0.0037	0.0018	0.000024	15	0.022	8.1	0.051	0.016	8.1
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000048	0.00042	0.00046	0.0043	0.0018	0.000028	17	0.026	9.5	0.060	0.018	9.4
	Apr	0.000092	0.00080	0.00087	0.0082	0.0021	0.000053	33	0.050	18	0.11	0.036	18
	May	0.00011	0.00094	0.0010	0.0096	0.0022	0.000062	39	0.059	21	0.13	0.043	21
	Jun	0.000097	0.00085	0.00093	0.0087	0.0022	0.000056	35	0.053	19	0.12	0.037	19
	Jul	0.00011	0.00093	0.0010	0.0094	0.0022	0.000061	38	0.057	21	0.13	0.041	21
	Aug	0.000095	0.00083	0.00091	0.0085	0.0022	0.000055	34	0.051	19	0.12	0.037	19
	Sep	0.000080	0.00070	0.00077	0.0072	0.0021	0.000046	29	0.044	16	0.10	0.031	16
	Oct	0.000062	0.00054	0.00059	0.0055	0.0019	0.000036	22	0.034	12	0.077	0.024	12
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.3: Pit Walls

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2023	Jan	0.0018	0.0074	0.00029	0.059	0.015	5.2	0.00041	1.1	0.000057	0.067	0.0011	0.0033
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0021	0.0086	0.00034	0.068	0.017	5.2	0.00048	1.2	0.000067	0.079	0.0013	0.0038
	Apr	0.0040	0.016	0.00065	0.13	0.032	5.2	0.00092	2.3	0.00013	0.14	0.0025	0.0073
	May	0.0047	0.019	0.00077	0.15	0.038	5.2	0.0011	2.7	0.00015	0.17	0.0029	0.0086
	Jun	0.0042	0.017	0.00069	0.14	0.034	5.2	0.00097	2.5	0.00014	0.16	0.0026	0.0078
	Jul	0.0046	0.019	0.00076	0.15	0.038	5.2	0.0011	2.7	0.00015	0.17	0.0029	0.0085
	Aug	0.0041	0.017	0.00068	0.14	0.034	5.2	0.00095	2.4	0.00013	0.16	0.0026	0.0076
	Sep	0.0035	0.014	0.00058	0.11	0.029	5.2	0.00080	2.1	0.00011	0.13	0.0022	0.0065
	Oct	0.0027	0.011	0.00044	0.088	0.022	5.2	0.00062	1.6	0.000086	0.10	0.0017	0.0050
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2024	Jan	0.0018	0.0076	0.00029	0.070	0.016	5.2	0.00041	1.2	0.000055	0.082	0.0012	0.0034
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0021	0.0089	0.00034	0.081	0.019	5.2	0.00048	1.4	0.000064	0.096	0.0013	0.0039
	Apr	0.0040	0.017	0.00065	0.15	0.036	5.2	0.00092	2.6	0.00012	0.17	0.0026	0.0074
	May	0.0047	0.020	0.00077	0.18	0.042	5.2	0.0011	3.1	0.00015	0.21	0.0030	0.0088
	Jun	0.0042	0.018	0.00069	0.16	0.038	5.2	0.00097	2.8	0.00013	0.19	0.0027	0.0079
	Jul	0.0046	0.020	0.00075	0.18	0.041	5.2	0.0011	3.1	0.00014	0.21	0.0030	0.0086
	Aug	0.0041	0.018	0.00068	0.16	0.037	5.2	0.00095	2.7	0.00013	0.19	0.0027	0.0077
	Sep	0.0035	0.015	0.00057	0.14	0.031	5.2	0.00081	2.3	0.00011	0.16	0.0023	0.0066
	Oct	0.0027	0.011	0.00044	0.10	0.024	5.2	0.00062	1.8	0.000083	0.12	0.0017	0.0050
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2025	Jan	0.0018	0.0077	0.00029	0.074	0.017	5.2	0.00042	1.2	0.000054	0.087	0.0012	0.0034
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0021	0.0090	0.00034	0.086	0.019	5.2	0.00049	1.4	0.000063	0.10	0.0014	0.0039
	Apr	0.0040	0.017	0.00065	0.16	0.037	5.2	0.00093	2.7	0.00012	0.19	0.0026	0.0075
	May	0.0047	0.020	0.00077	0.19	0.043	5.2	0.0011	3.2	0.00014	0.23	0.0030	0.0089
	Jun	0.0042	0.018	0.00069	0.17	0.039	5.2	0.00099	2.9	0.00013	0.21	0.0027	0.0080
	Jul	0.0046	0.020	0.00075	0.19	0.042	5.2	0.0011	3.2	0.00014	0.22	0.0030	0.0087
	Aug	0.0041	0.018	0.00067	0.17	0.038	5.2	0.00097	2.9	0.00012	0.20	0.0027	0.0078
	Sep	0.0035	0.015	0.00057	0.14	0.032	5.2	0.00082	2.4	0.00011	0.17	0.0023	0.0066
	Oct	0.0027	0.012	0.00044	0.11	0.025	5.2	0.00063	1.9	0.000081	0.13	0.0017	0.0051
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

Appendix A.3: Pit Walls

Year	Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
2026	Jan	8.1	35	133	1.9	1.00	0.000012	0.0083	0.083	0.12	0.022	0.000047	74
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.0	33	154	2.3	1.2	0.000014	0.0079	0.097	0.14	0.020	0.000055	87
	Apr	7.9	27	295	4.3	2.2	0.000027	0.0063	0.19	0.26	0.014	0.00011	169
	May	7.9	26	347	5.1	2.6	0.000031	0.0059	0.22	0.31	0.013	0.00012	200
	Jun	7.9	27	312	4.6	2.3	0.000028	0.0062	0.20	0.28	0.014	0.00011	179
	Jul	7.9	26	340	5.0	2.6	0.000031	0.0060	0.21	0.30	0.013	0.00012	195
	Aug	7.9	27	305	4.5	2.3	0.000027	0.0062	0.19	0.27	0.014	0.00011	175
	Sep	8.0	28	259	3.8	1.9	0.000023	0.0066	0.16	0.23	0.015	0.000092	147
	Oct	8.0	31	199	2.9	1.5	0.000018	0.0072	0.12	0.18	0.017	0.000071	112
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2027	Jan	8.1	35	130	1.9	1.0	0.000012	0.0083	0.081	0.12	0.022	0.000047	74
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.0	33	152	2.2	1.2	0.000014	0.0079	0.095	0.14	0.020	0.000055	86
	Apr	7.9	27	291	4.3	2.3	0.000027	0.0063	0.18	0.26	0.014	0.00011	168
	May	7.9	26	343	5.1	2.7	0.000031	0.0059	0.21	0.31	0.013	0.00012	198
	Jun	7.9	27	307	4.5	2.4	0.000028	0.0062	0.19	0.28	0.014	0.00011	177
	Jul	7.9	26	334	4.9	2.6	0.000031	0.0060	0.21	0.30	0.013	0.00012	194
	Aug	7.9	27	300	4.4	2.3	0.000027	0.0062	0.19	0.27	0.014	0.00011	173
	Sep	8.0	28	254	3.8	2.0	0.000023	0.0066	0.16	0.23	0.015	0.000093	146
	Oct	8.0	31	196	2.9	1.5	0.000018	0.0072	0.12	0.18	0.017	0.000071	111
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	8.2	44	70	1.4	0.33	0.000016	0.010	0.12	0.12	0.014	0.000047	41
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	8.2	41	81	1.7	0.39	0.000018	0.0098	0.14	0.14	0.016	0.000055	47
	Apr	8.0	33	155	3.2	0.74	0.000035	0.0077	0.26	0.26	0.020	0.00010	89
	May	8.0	31	183	3.7	0.87	0.000041	0.0073	0.31	0.31	0.018	0.00012	106
	Jun	8.0	32	164	3.4	0.78	0.000037	0.0076	0.28	0.28	0.019	0.00011	95
	Jul	8.0	31	179	3.7	0.85	0.000040	0.0073	0.30	0.30	0.018	0.00012	103
	Aug	8.0	33	160	3.3	0.76	0.000036	0.0076	0.27	0.27	0.019	0.00011	93
	Sep	8.1	34	136	2.8	0.65	0.000030	0.0081	0.23	0.23	0.021	0.000092	78
	Oct	8.1	38	105	2.1	0.50	0.000023	0.0089	0.18	0.18	0.021	0.000070	60
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L

Alkalinity is given as $CaCO_3$

Appendix A.3: Pit Walls

Year	Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
2026	Jan	0.000041	0.00036	0.00041	0.0037	0.0018	0.000024	14	0.022	8.1	0.051	0.014	8.3
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000047	0.00042	0.00047	0.0043	0.0018	0.000028	17	0.026	9.4	0.059	0.017	9.7
	Apr	0.000091	0.00080	0.00090	0.0082	0.0021	0.000053	32	0.050	18	0.11	0.033	18
	May	0.00011	0.00094	0.0011	0.0096	0.0022	0.000062	38	0.059	21	0.13	0.039	22
	Jun	0.000096	0.00084	0.00096	0.0086	0.0022	0.000056	34	0.053	19	0.12	0.034	20
	Jul	0.00010	0.00092	0.0010	0.0094	0.0022	0.000061	37	0.057	21	0.13	0.037	21
	Aug	0.000094	0.00083	0.00093	0.0084	0.0022	0.000055	33	0.051	19	0.12	0.033	19
	Sep	0.000079	0.00070	0.00079	0.0072	0.0021	0.000046	28	0.044	16	0.100	0.028	16
	Oct	0.000061	0.00054	0.00061	0.0055	0.0019	0.000036	22	0.034	12	0.077	0.022	12
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2027	Jan	0.000041	0.00035	0.00041	0.0037	0.0017	0.000024	14	0.022	8.1	0.050	0.015	8.6
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000048	0.00041	0.00048	0.0043	0.0018	0.000028	17	0.026	9.4	0.058	0.017	10
	Apr	0.000091	0.00079	0.00091	0.0082	0.0021	0.000053	32	0.050	18	0.11	0.033	19
	May	0.00011	0.00092	0.0011	0.0096	0.0022	0.000062	37	0.058	21	0.13	0.039	22
	Jun	0.000097	0.00083	0.00097	0.0086	0.0022	0.000056	34	0.053	19	0.12	0.035	20
	Jul	0.00011	0.00090	0.0011	0.0094	0.0022	0.000061	37	0.057	21	0.13	0.038	22
	Aug	0.000095	0.00081	0.00095	0.0085	0.0022	0.000055	33	0.051	19	0.12	0.034	20
	Sep	0.000080	0.00069	0.00081	0.0072	0.0021	0.000046	28	0.044	16	0.098	0.029	17
	Oct	0.000062	0.00053	0.00062	0.0055	0.0019	0.000036	21	0.033	12	0.075	0.022	13
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	0.000023	0.00022	0.00054	0.0023	0.0016	0.000023	6.8	0.0093	4.9	0.028	0.0068	0.98
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.000027	0.00026	0.00063	0.0027	0.0016	0.000027	7.9	0.011	5.7	0.032	0.0079	1.1
	Apr	0.000052	0.00049	0.0012	0.0052	0.0018	0.000052	15	0.021	11	0.062	0.015	2.2
	May	0.000061	0.00058	0.0014	0.0061	0.0019	0.000061	18	0.024	13	0.073	0.018	2.6
	Jun	0.000055	0.00052	0.0013	0.0054	0.0019	0.000055	16	0.022	12	0.065	0.016	2.3
	Jul	0.000060	0.00057	0.0014	0.0059	0.0019	0.000060	17	0.024	13	0.071	0.017	2.5
	Aug	0.000054	0.00051	0.0012	0.0053	0.0018	0.000054	16	0.022	11	0.064	0.016	2.3
	Sep	0.000046	0.00043	0.0011	0.0045	0.0018	0.000046	13	0.018	9.5	0.054	0.013	1.9
	Oct	0.000035	0.00033	0.00081	0.0035	0.0017	0.000035	10	0.014	7.3	0.042	0.010	1.5
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L
Alkalinity is given as $CaCO_3$

Appendix A.3: Pit Walls

Year	Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
2026	Jan	0.0018	0.0075	0.00029	0.076	0.017	5.2	0.00042	1.3	0.000049	0.092	0.0012	0.0034
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0021	0.0088	0.00033	0.088	0.020	5.2	0.00049	1.5	0.000057	0.11	0.0014	0.0039
	Apr	0.0040	0.017	0.00064	0.17	0.038	5.2	0.00094	2.8	0.00011	0.20	0.0026	0.0075
	May	0.0047	0.020	0.00075	0.20	0.045	5.2	0.0011	3.3	0.00013	0.24	0.0031	0.0089
	Jun	0.0042	0.018	0.00067	0.18	0.040	5.2	0.00100	3.0	0.00012	0.22	0.0028	0.0080
	Jul	0.0046	0.019	0.00074	0.19	0.044	5.2	0.0011	3.3	0.00013	0.23	0.0030	0.0087
	Aug	0.0041	0.017	0.00066	0.17	0.039	5.2	0.00097	2.9	0.00011	0.21	0.0027	0.0078
	Sep	0.0035	0.015	0.00056	0.15	0.033	5.2	0.00083	2.5	0.000095	0.18	0.0023	0.0066
	Oct	0.0027	0.011	0.00043	0.11	0.026	5.2	0.00063	1.9	0.000073	0.14	0.0018	0.0051
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
2027	Jan	0.0018	0.0078	0.00029	0.080	0.017	5.2	0.00040	1.3	0.000051	0.098	0.0012	0.0034
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0021	0.0091	0.00034	0.094	0.020	5.2	0.00047	1.6	0.000059	0.11	0.0014	0.0039
	Apr	0.0040	0.017	0.00064	0.18	0.039	5.2	0.00091	2.9	0.00011	0.21	0.0026	0.0075
	May	0.0047	0.020	0.00075	0.21	0.045	5.2	0.0011	3.5	0.00013	0.25	0.0031	0.0089
	Jun	0.0042	0.018	0.00068	0.19	0.041	5.2	0.00095	3.1	0.00012	0.23	0.0028	0.0080
	Jul	0.0045	0.020	0.00074	0.21	0.044	5.2	0.0010	3.4	0.00013	0.25	0.0030	0.0087
	Aug	0.0041	0.018	0.00066	0.18	0.040	5.2	0.00093	3.1	0.00012	0.23	0.0027	0.0078
	Sep	0.0035	0.015	0.00056	0.16	0.034	5.2	0.00079	2.6	0.000099	0.19	0.0023	0.0066
	Oct	0.0027	0.012	0.00043	0.12	0.026	5.2	0.00061	2.0	0.000076	0.15	0.0018	0.0051
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-
PC	Jan	0.0014	0.0063	0.00052	0.026	0.0092	4.7	0.00041	0.49	0.000072	0.017	0.00069	0.0023
	Feb	-	-	-	-	-	-	-	-	-	-	-	-
	Mar	0.0016	0.0074	0.00060	0.031	0.011	5.2	0.00048	0.57	0.000083	0.019	0.00080	0.0026
	Apr	0.0031	0.014	0.0011	0.059	0.021	5.2	0.00091	1.1	0.00016	0.037	0.0015	0.0050
	May	0.0037	0.017	0.0014	0.069	0.024	5.2	0.0011	1.3	0.00019	0.043	0.0018	0.0059
	Jun	0.0033	0.015	0.0012	0.062	0.022	5.2	0.00096	1.1	0.00017	0.039	0.0016	0.0053
	Jul	0.0036	0.016	0.0013	0.068	0.024	5.2	0.0010	1.2	0.00018	0.042	0.0018	0.0058
	Aug	0.0032	0.015	0.0012	0.061	0.021	5.2	0.00094	1.1	0.00017	0.038	0.0016	0.0052
	Sep	0.0027	0.012	0.0010	0.052	0.018	5.2	0.00080	0.95	0.00014	0.032	0.0013	0.0044
	Oct	0.0021	0.0095	0.00077	0.040	0.014	5.2	0.00061	0.73	0.00011	0.025	0.0010	0.0034
	Nov	-	-	-	-	-	-	-	-	-	-	-	-
	Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L
Alkalinity is given as $CaCO_3$

Appendix A.4: 90-Day Ore Stockpile

Month	pH	Alkalinity	Sulphate	Cl	F	Ag	Al	As	B	Ba	Be	Ca
Jan	7.8	22	479	11	5.0	0.000074	0.0046	1.6	0.72	0.014	0.00029	420
Feb	-	-	-	-	-	-	-	-	-	-	-	-
Mar	7.8	21	508	11	5.3	0.000079	0.0045	1.7	0.77	0.014	0.00031	447
Apr	7.7	20	846	15	8.8	0.00013	0.0041	2.9	1.3	0.012	0.00051	760
May	7.7	20	855	15	8.9	0.00013	0.0041	2.9	1.3	0.012	0.00052	769
Jun	7.7	20	659	12	6.9	0.00010	0.0042	2.2	0.99	0.013	0.00040	587
Jul	7.7	20	696	12	7.3	0.00011	0.0042	2.4	1.1	0.013	0.00042	621
Aug	7.7	20	666	12	7.0	0.00010	0.0042	2.3	1.0	0.013	0.00040	593
Sep	7.7	21	611	11	6.4	0.000095	0.0043	2.1	0.92	0.013	0.00037	542
Oct	7.7	21	561	11	5.9	0.000087	0.0044	1.9	0.85	0.013	0.00034	496
Nov	-	-	-	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-	-	-	-

Month	Cd	Co	Cr	Cu	Fe	Hg	K	Li	Mg	Mn	Mo	Na
Jan	0.00027	0.0027	0.0015	0.019	0.0029	0.00015	63	0.11	32	0.13	0.15	53
Feb	-	-	-	-	-	-	-	-	-	-	-	-
Mar	0.00029	0.0027	0.0016	0.019	0.0029	0.00015	67	0.11	34	0.14	0.16	53
Apr	0.00048	0.0027	0.0026	0.024	0.0035	0.00026	112	0.19	57	0.23	0.26	73
May	0.00049	0.0027	0.0026	0.024	0.0035	0.00026	113	0.19	57	0.23	0.27	74
Jun	0.00038	0.0027	0.0020	0.021	0.0032	0.00020	87	0.15	44	0.18	0.21	57
Jul	0.00040	0.0027	0.0021	0.022	0.0032	0.00021	92	0.15	47	0.19	0.22	60
Aug	0.00038	0.0027	0.0020	0.021	0.0032	0.00020	88	0.15	45	0.18	0.21	58
Sep	0.00035	0.0027	0.0019	0.020	0.0031	0.00018	81	0.14	41	0.16	0.19	53
Oct	0.00032	0.0027	0.0017	0.020	0.0030	0.00017	74	0.12	38	0.15	0.18	53
Nov	-	-	-	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-	-	-	-

Month	Ni	P	Pb	Sb	Se	Si	Sn	Sr	Tl	U	V	Zn
Jan	0.0079	0.30	0.0022	1.2	0.049	5.2	0.0039	10	0.00035	0.25	0.0082	0.034
Feb	-	-	-	-	-	-	-	-	-	-	-	-
Mar	0.0084	0.30	0.0023	1.2	0.051	5.1	0.0042	11	0.00037	0.27	0.0087	0.036
Apr	0.014	0.30	0.0038	2.1	0.086	5.1	0.0069	18	0.00061	0.45	0.014	0.060
May	0.014	0.30	0.0039	2.1	0.087	5.1	0.0070	19	0.00062	0.45	0.015	0.060
Jun	0.011	0.30	0.0030	1.6	0.067	5.1	0.0054	14	0.00048	0.35	0.011	0.047
Jul	0.011	0.30	0.0032	1.7	0.070	5.1	0.0057	15	0.00050	0.37	0.012	0.049
Aug	0.011	0.30	0.0030	1.6	0.067	5.1	0.0055	14	0.00048	0.35	0.011	0.047
Sep	0.010	0.30	0.0028	1.5	0.062	5.1	0.0050	13	0.00044	0.32	0.010	0.043
Oct	0.0092	0.30	0.0026	1.4	0.057	5.1	0.0046	12	0.00041	0.30	0.0096	0.040
Nov	-	-	-	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-	-	-	-

All concentrations are in mg/L

Alkalinity is given as $CaCO_3$

Max pile capacity = 1.016 Mt

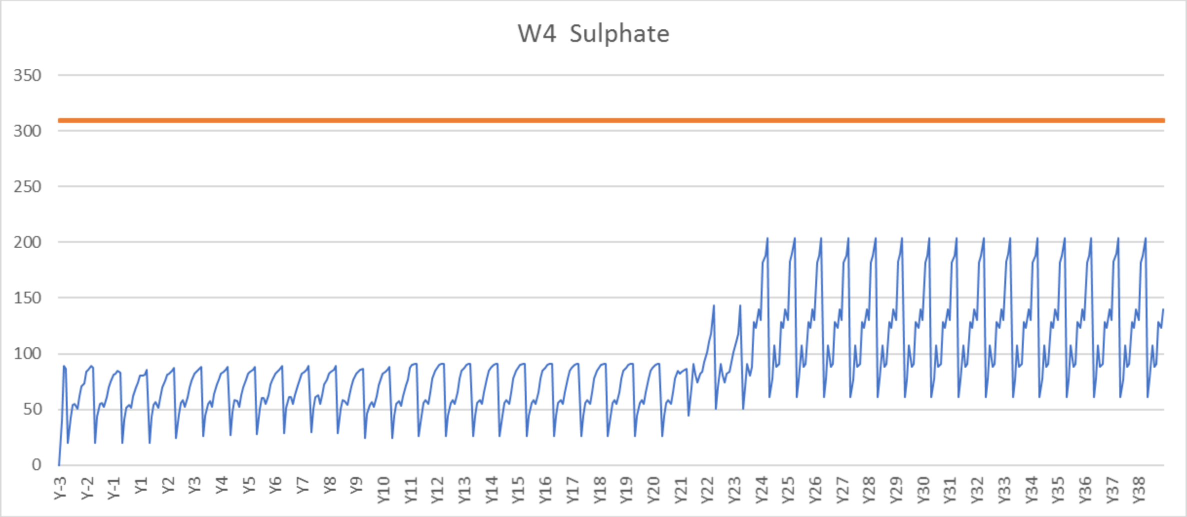
Appendix B: Water Quality Model Plots for all Parameters

B.1. Haggart Creek below Dublin Gulch (W4) – Water Quality Predictions

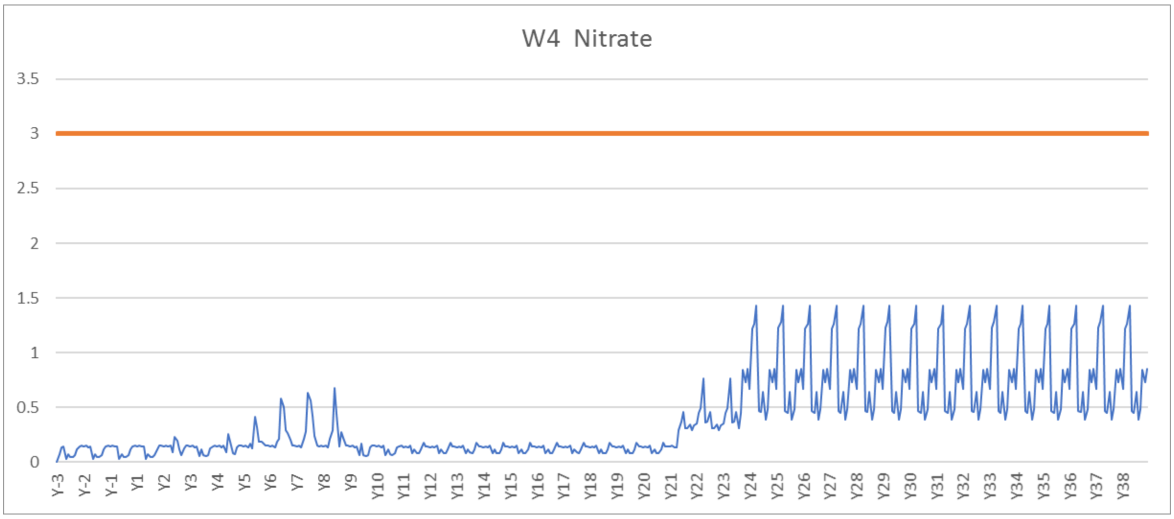
B.2. Haggart Creek below Eagle Creek (W29) – Water Quality Predictions

B.3. Haggart Creek below Lynx Creek (W23) – Water Quality Predictions

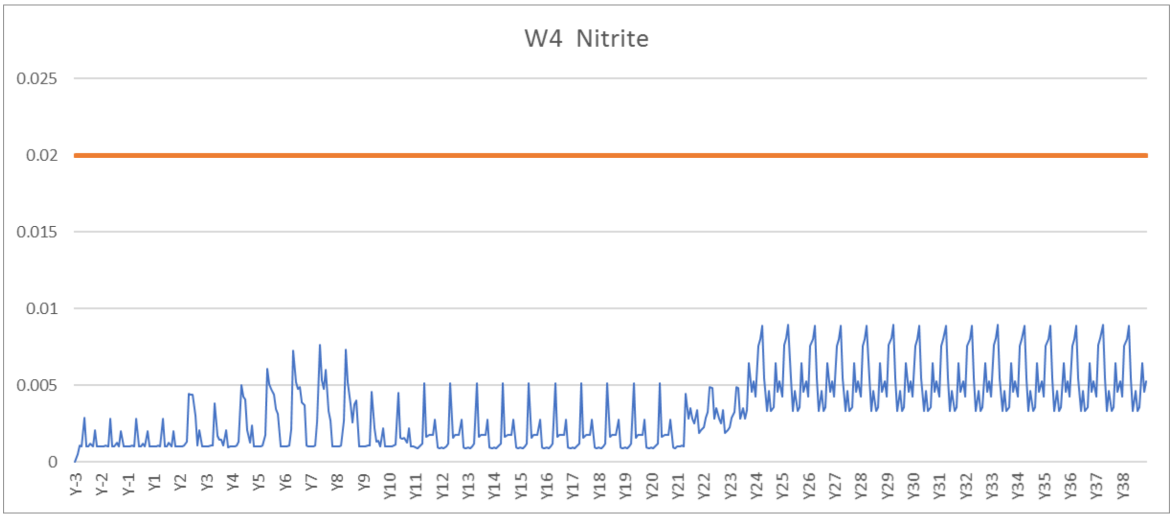
B.1. Haggart Creek below Dublin Gulch (W4) – Water Quality Predictions



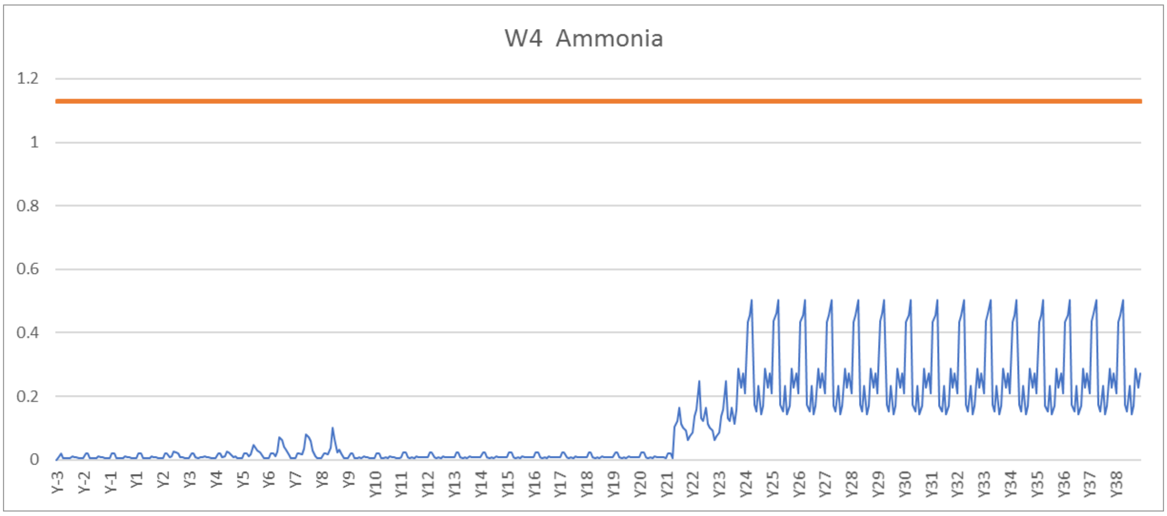
B.1-1: Time series of predicted sulphate concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



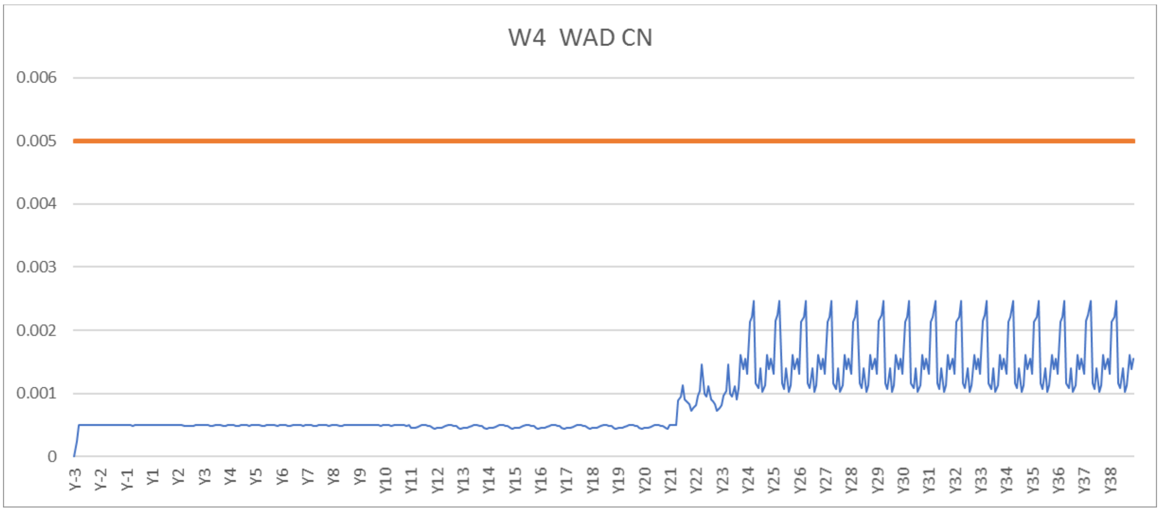
B.1-2: Time series of predicted nitrate concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



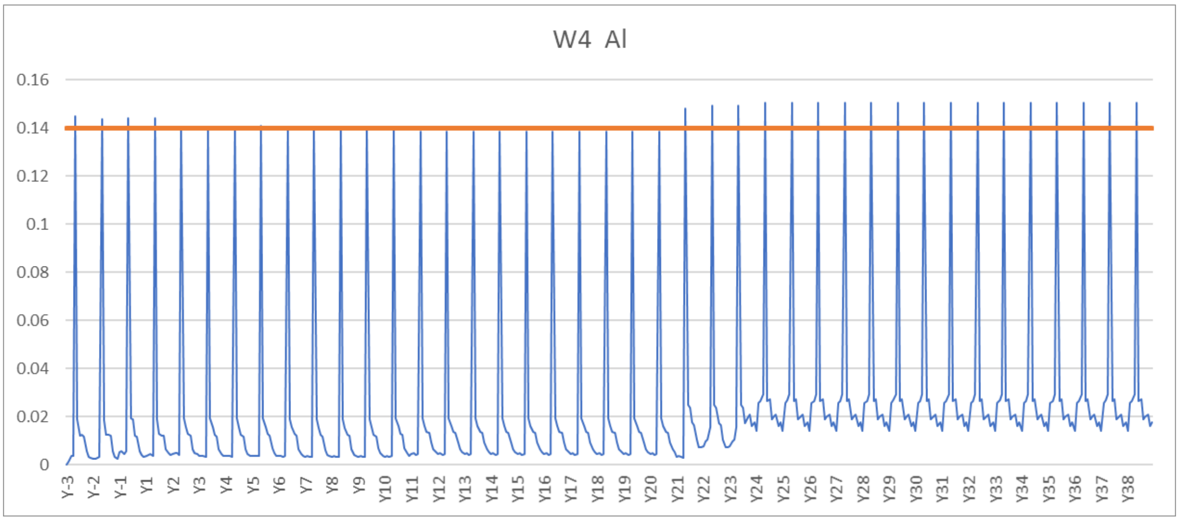
B.1-3: Time series of predicted nitrite concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



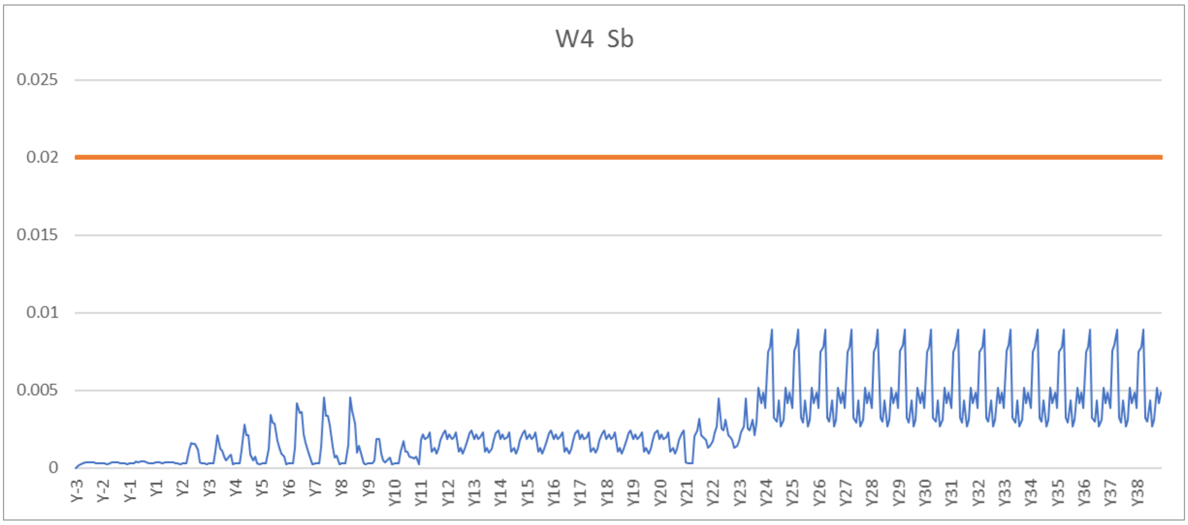
B.1-4: Time series of predicted ammonia concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



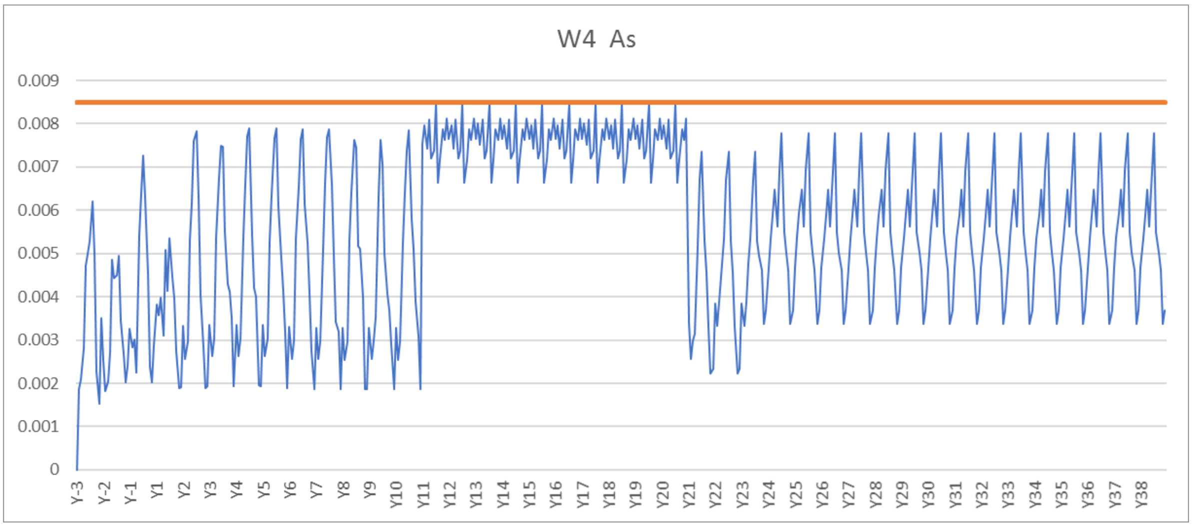
B.1-5: Time series of predicted WAD-CN concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



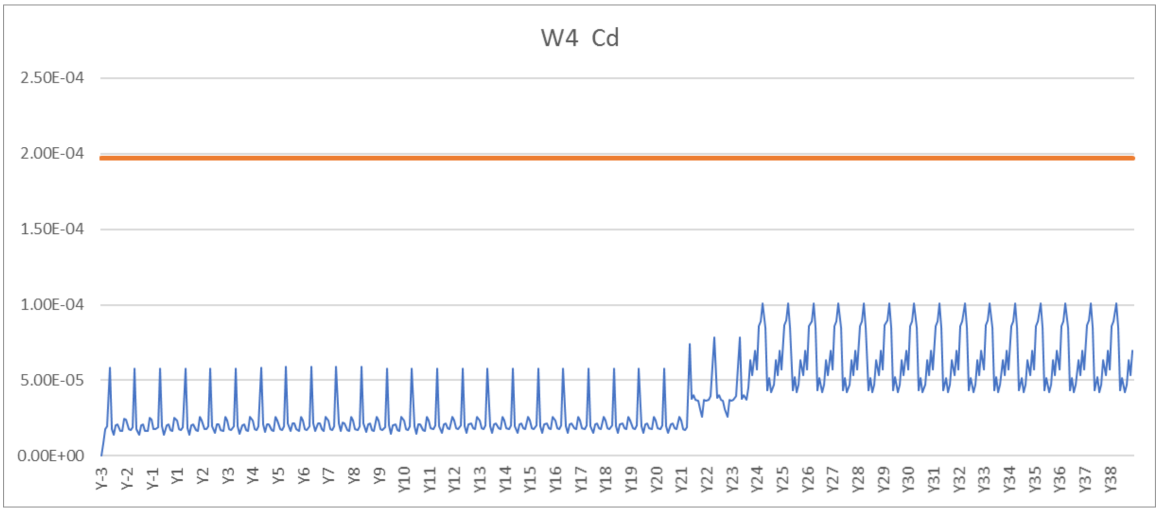
B.1-6: **Time series of predicted aluminum concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



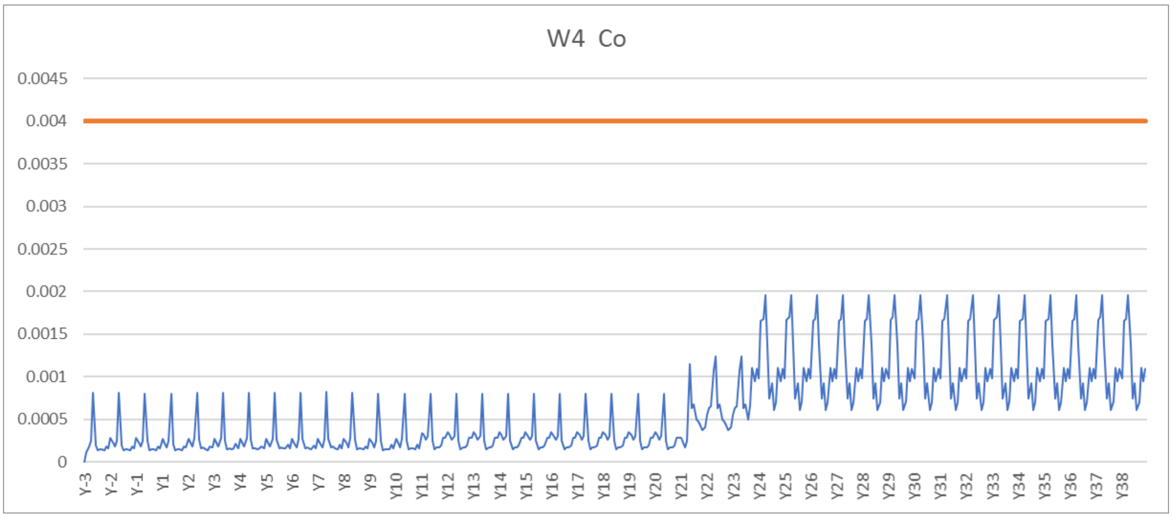
B.1-7: **Time series of predicted antimony concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



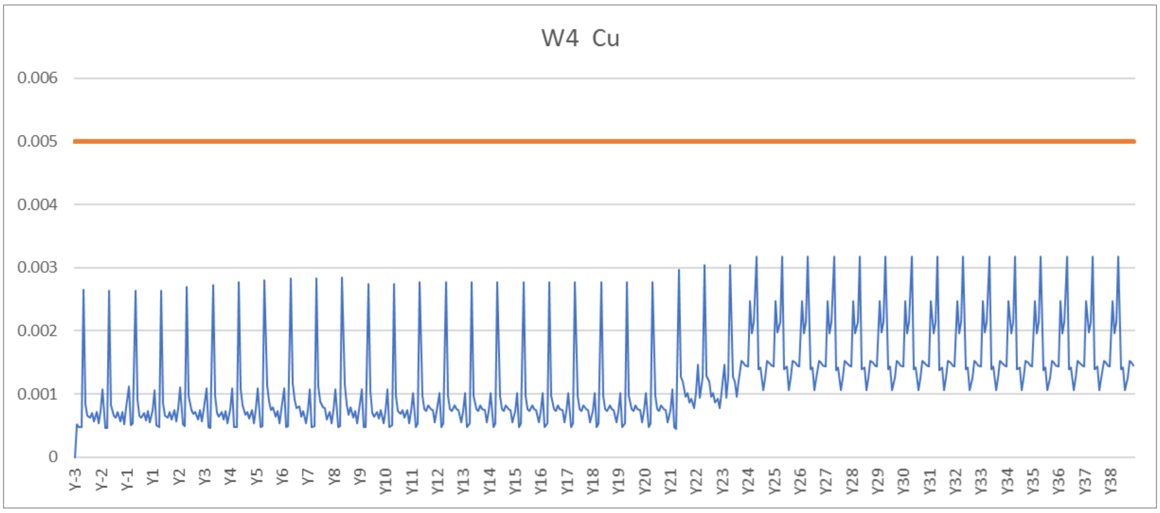
B.1-8: **Time series of predicted arsenic concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



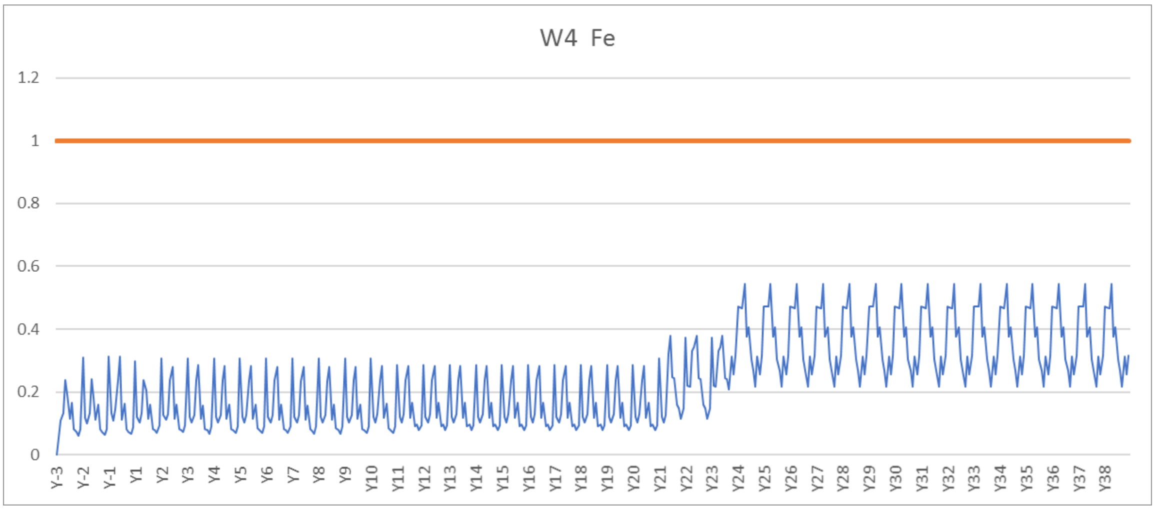
B.1-9: Time series of predicted cadmium concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



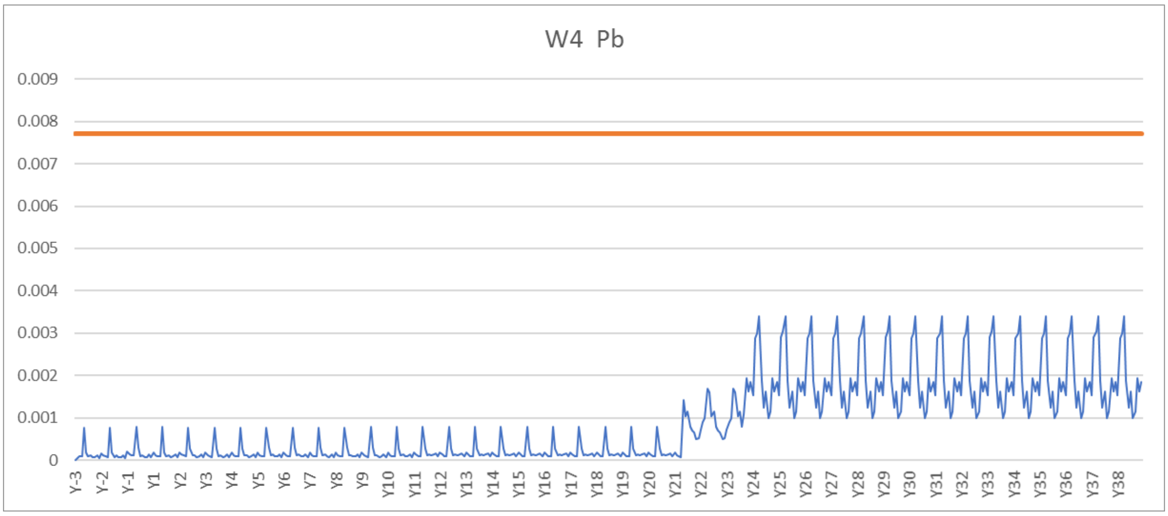
B.1-10: Time series of predicted cobalt concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



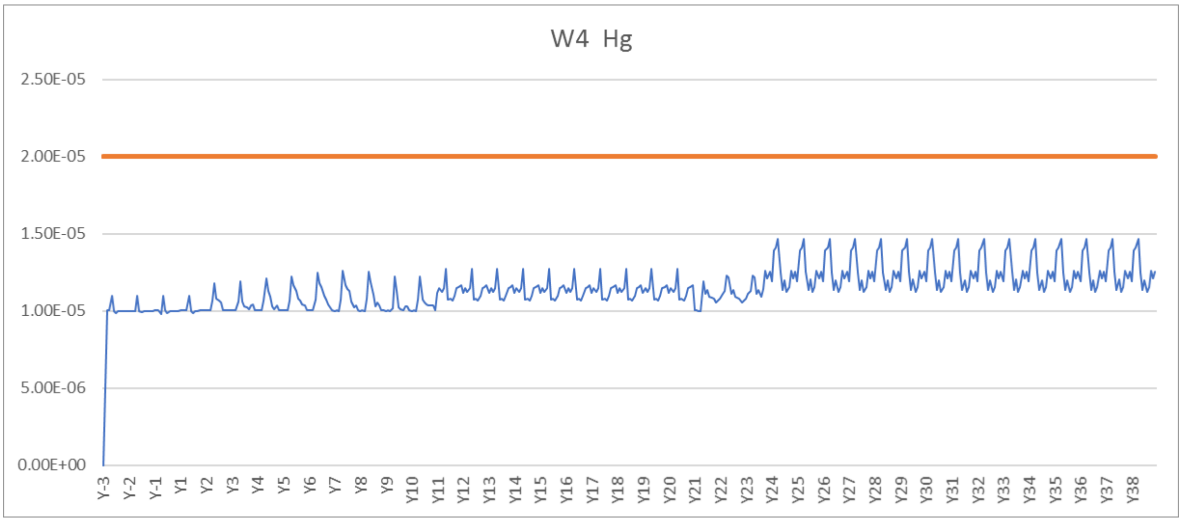
B.1-11: Time series of predicted copper concentrations (mg/L) for W4. Water Quality Objective is shown by red line.



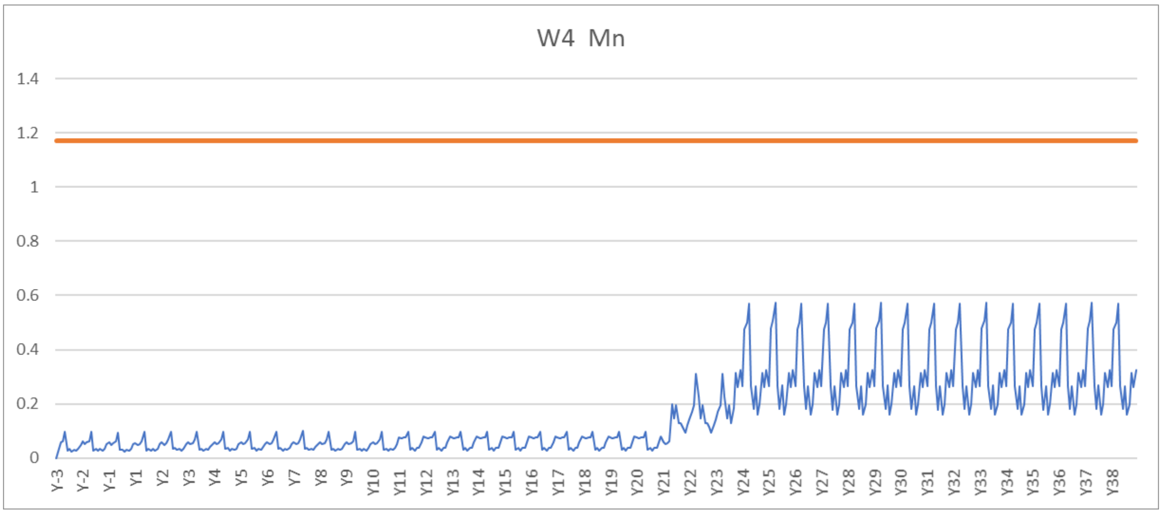
B.1-12: **Time series of predicted iron concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



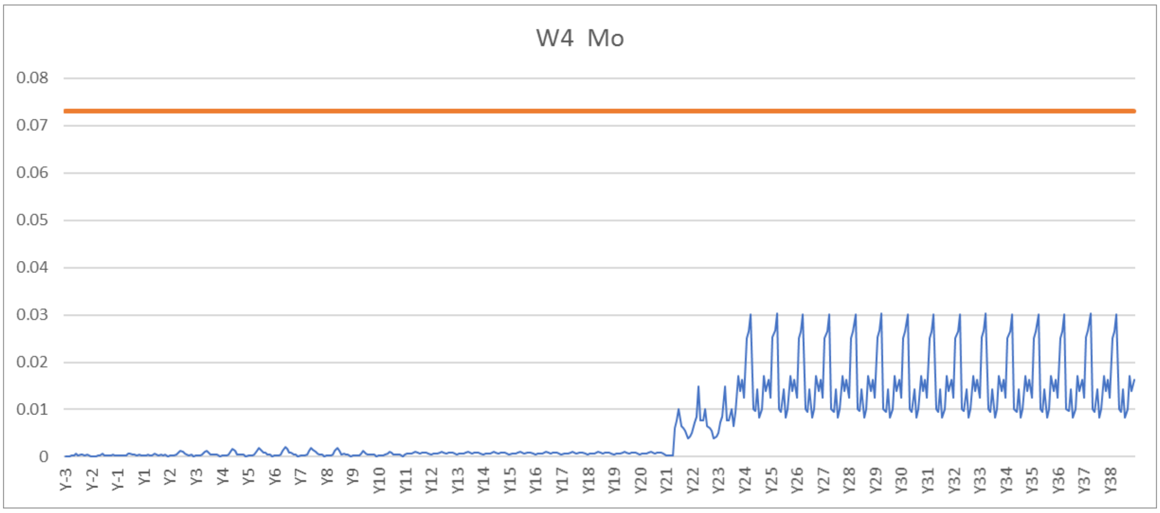
B.1-13: **Time series of predicted lead concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



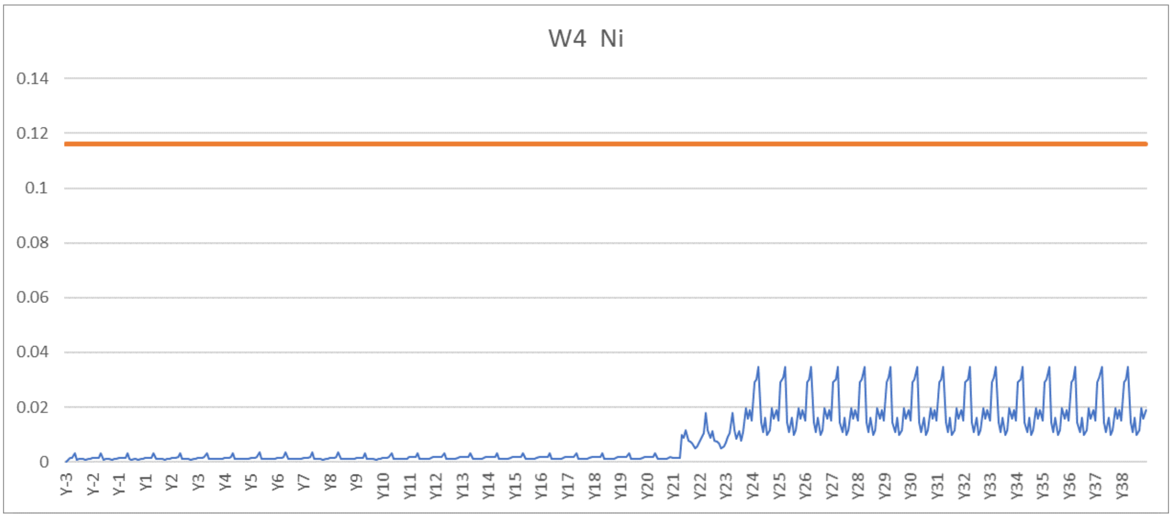
B.1-14: **Time series of predicted mercury concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



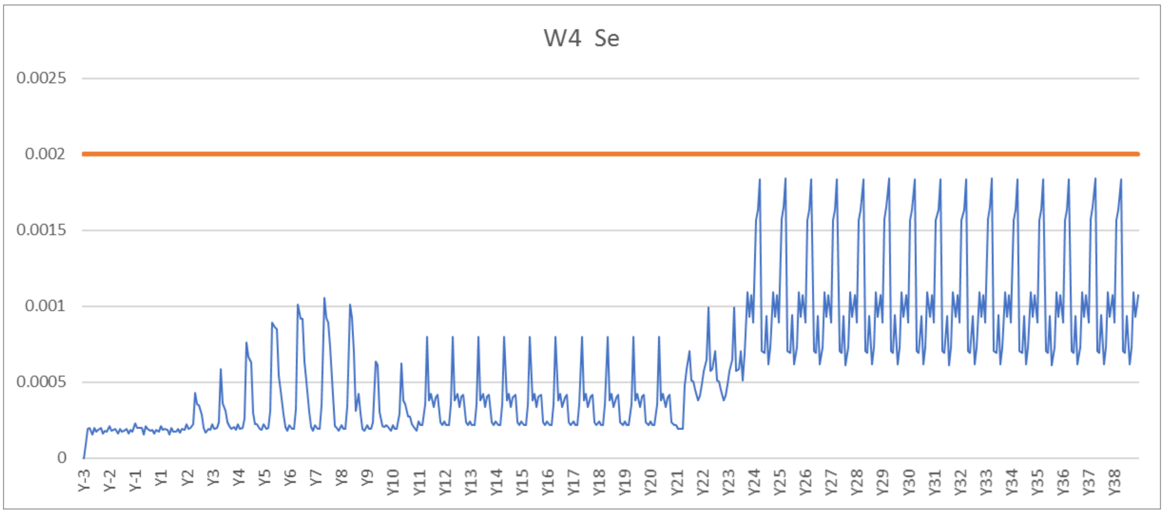
B.1-15: **Time series of predicted manganese concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



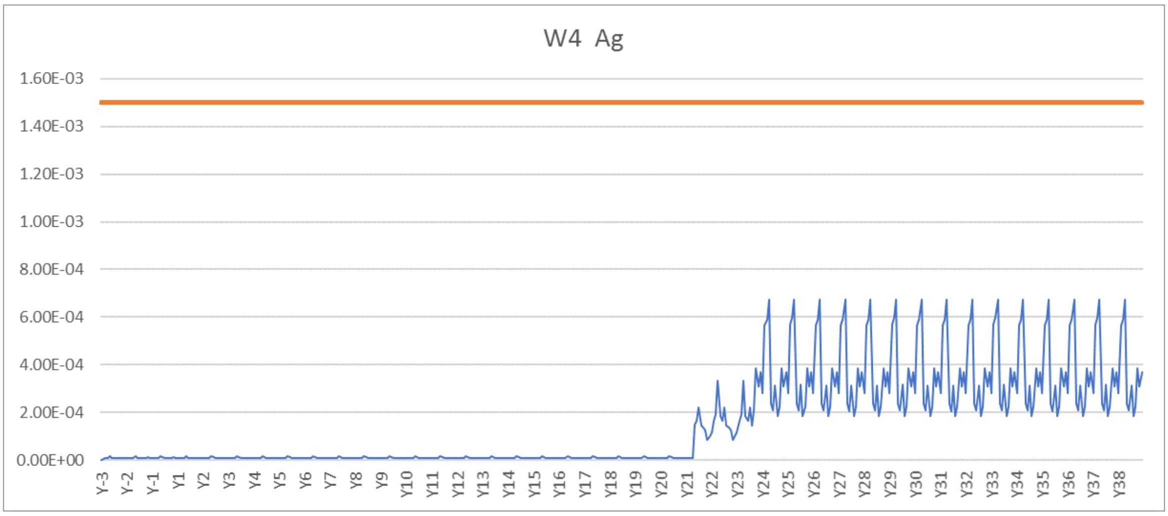
B.1-16: **Time series of predicted molybdenum concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



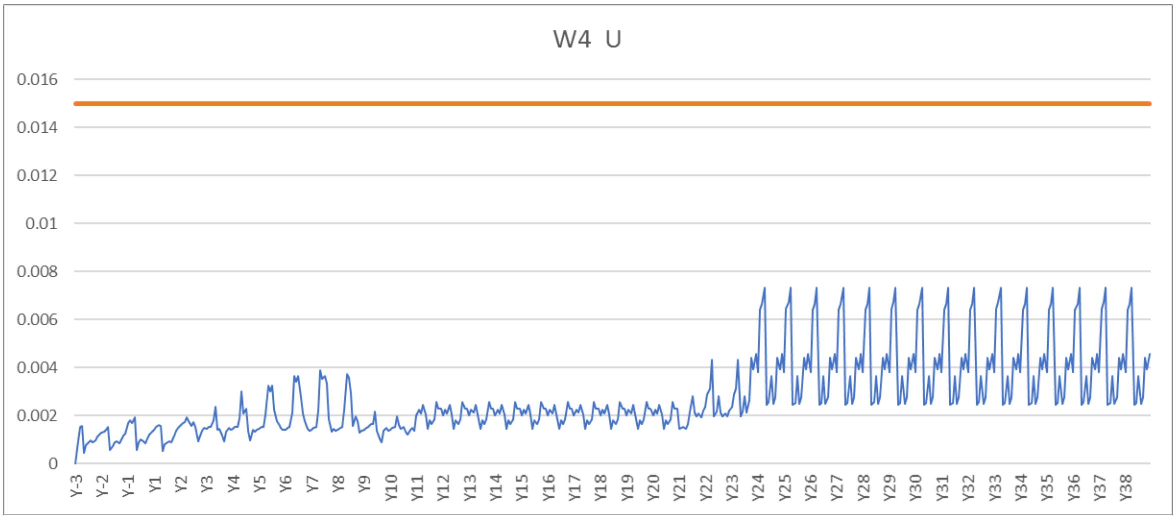
B.1-17: **Time series of predicted nickel concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



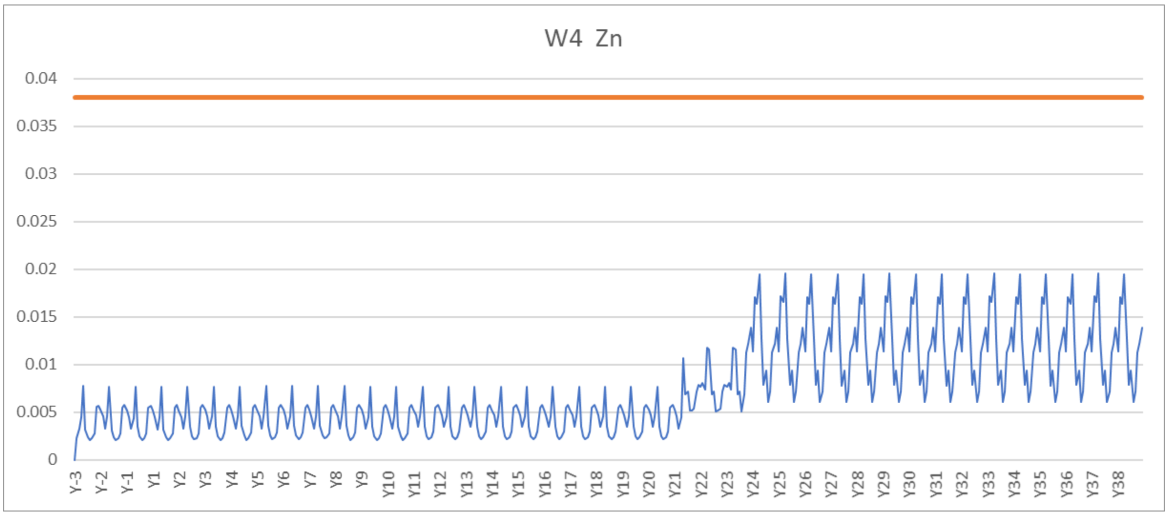
B.1-18: **Time series of predicted selenium concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**



B.1-19: **Time series of predicted silver concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**

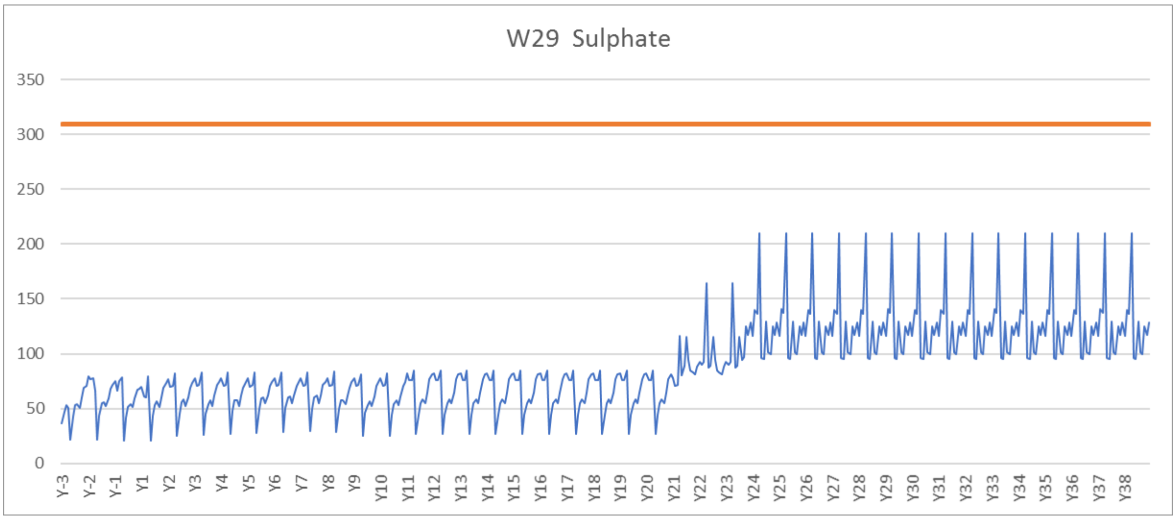


B.1-20: **Time series of predicted uranium concentrations (mg/L) for W4. Water Quality Objective is shown by red line.**

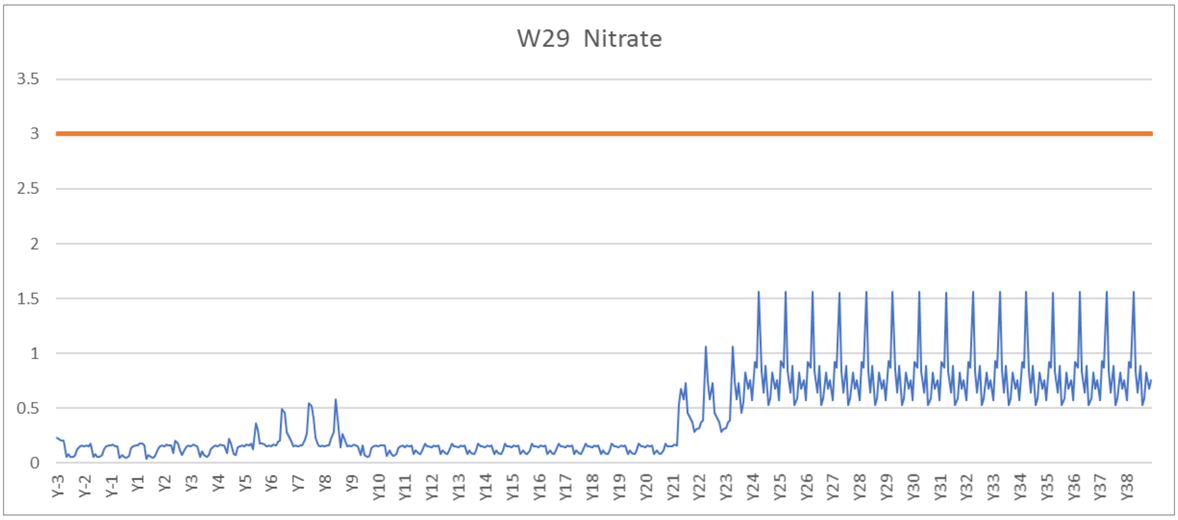


B.1-21: Time series of predicted zinc concentrations (mg/L) for W4. Water Quality Objective is shown by red line.

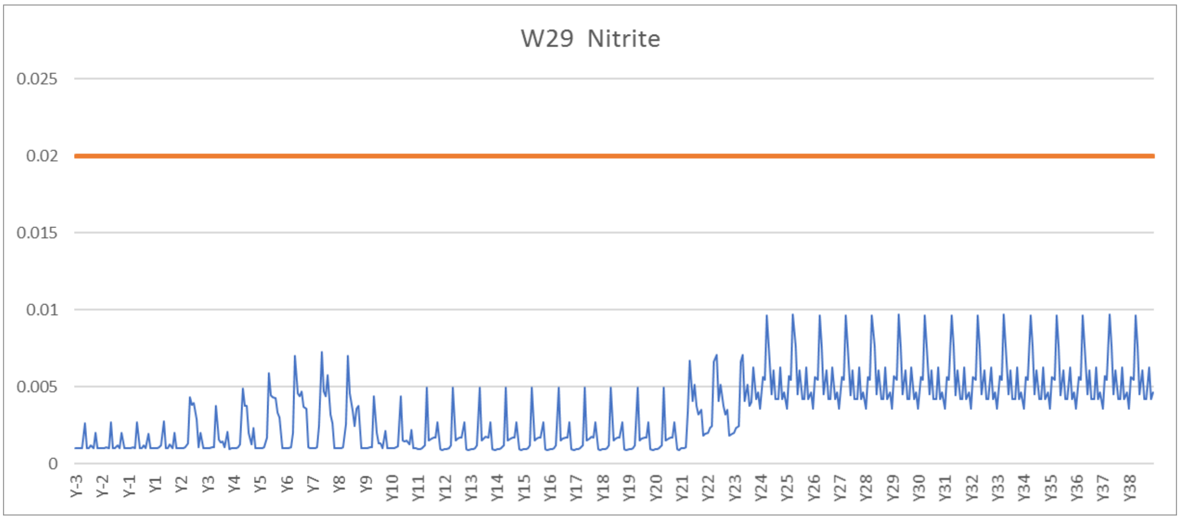
B.2. Haggart Creek below Eagle Creek (W29) – Water Quality Predictions



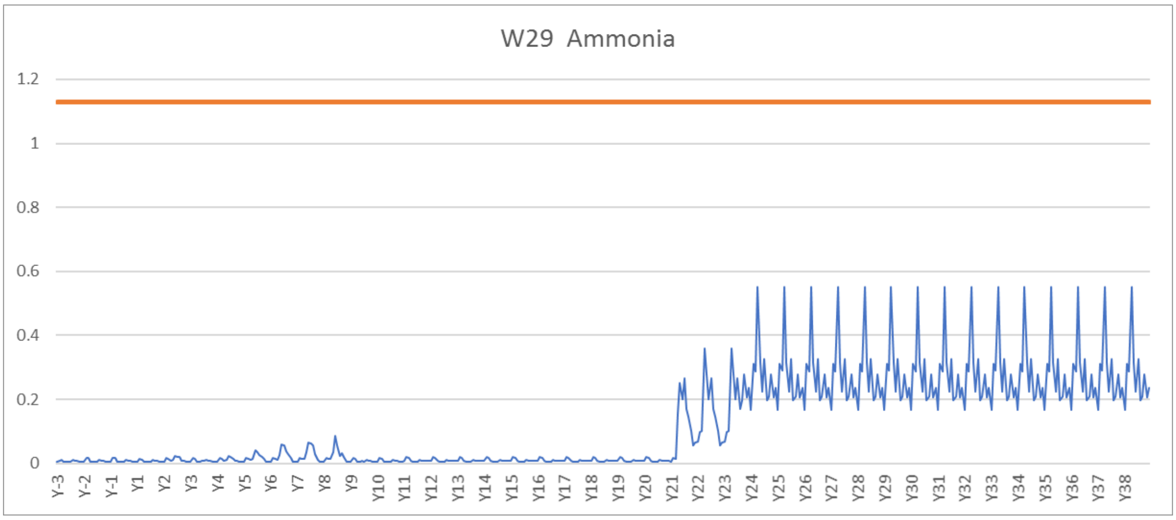
B.2-1: **Time series of predicted sulphate concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



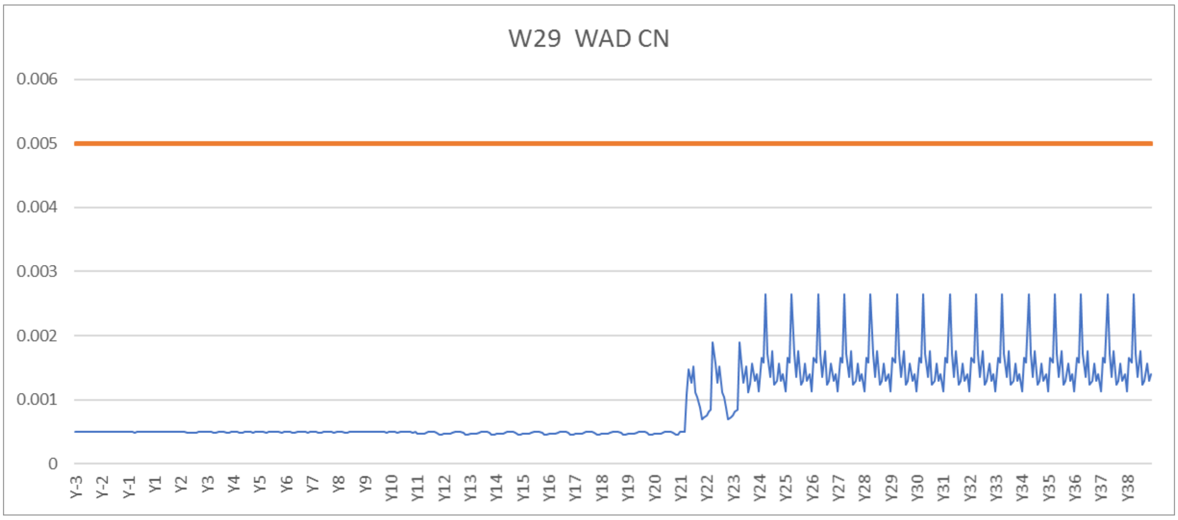
B.2-2: **Time series of predicted nitrate concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



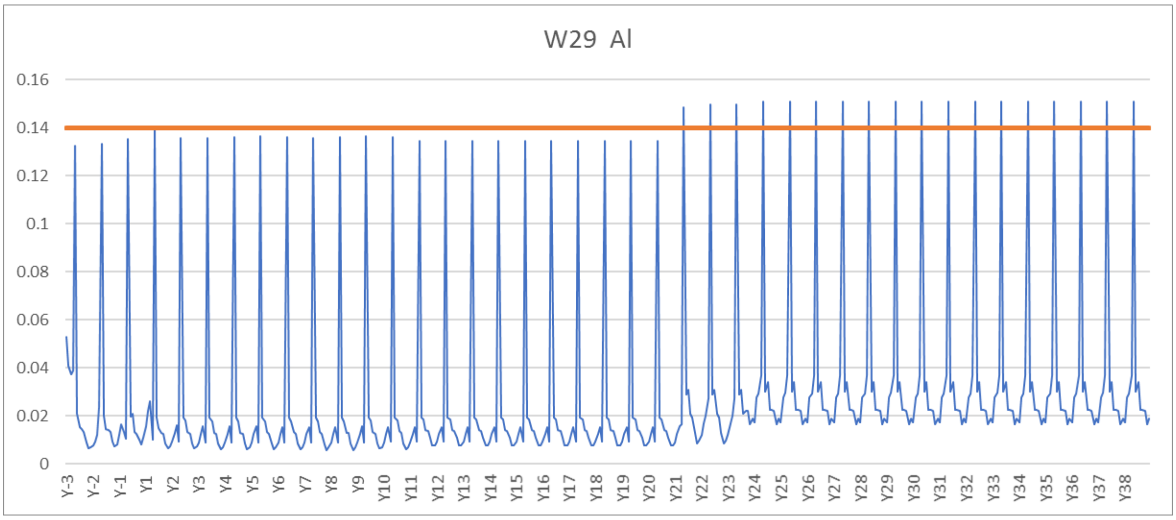
B.2-3: **Time series of predicted nitrite concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



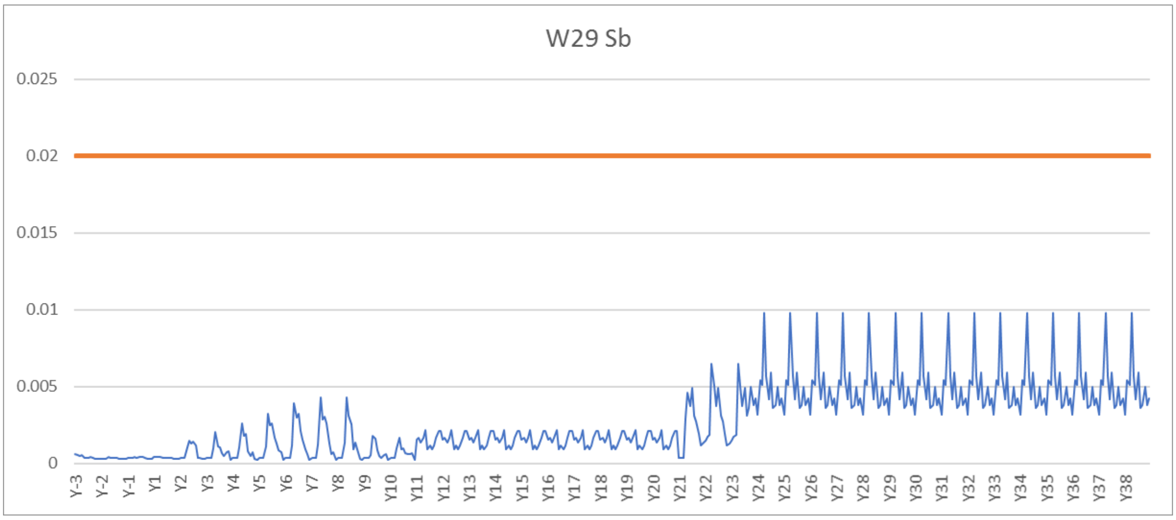
B.2-4: **Time series of predicted ammonia concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



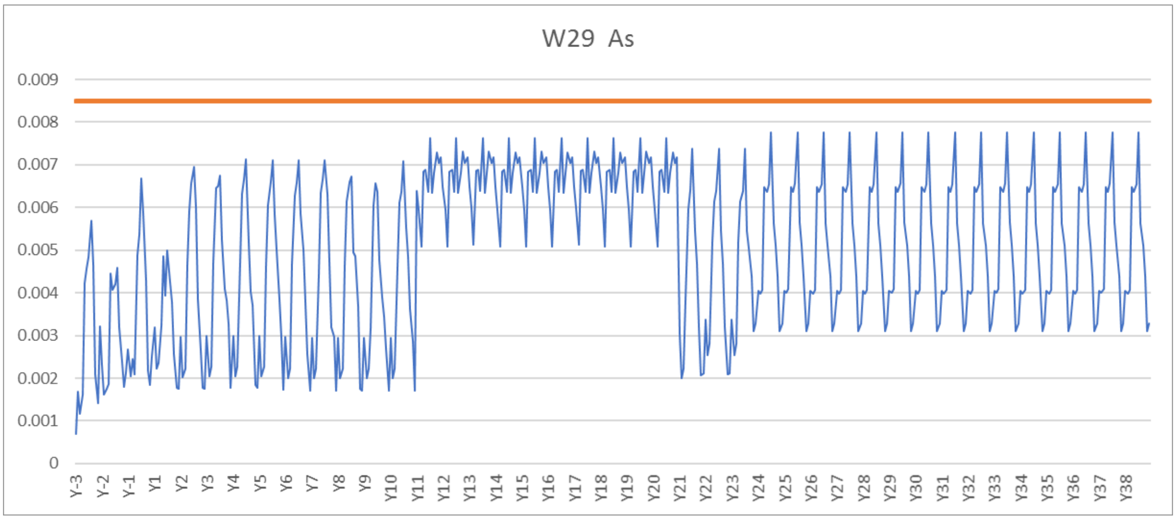
B.2-5: **Time series of predicted WAD-CN concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



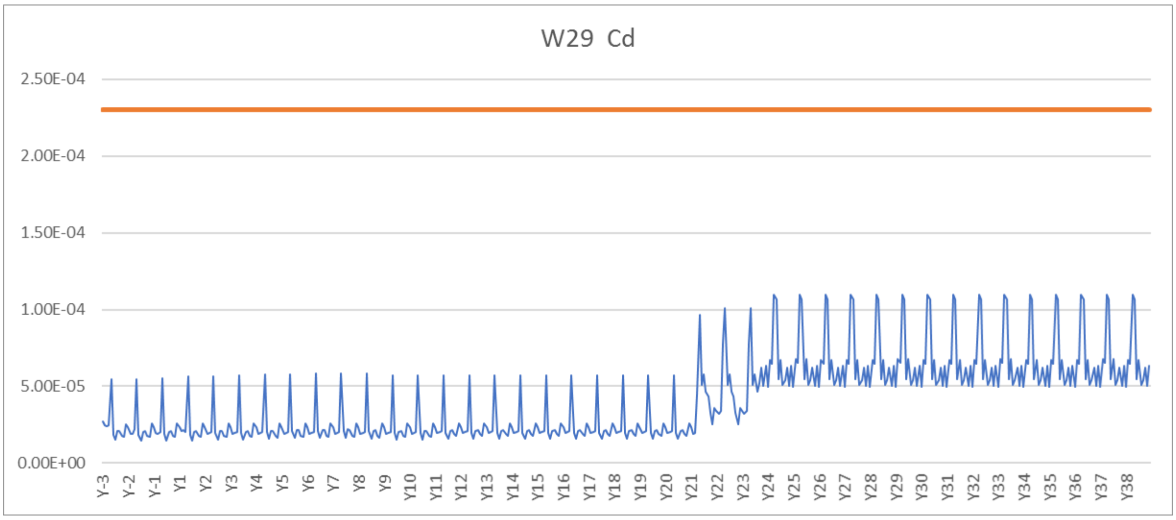
B.2-6: **Time series of predicted aluminum concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



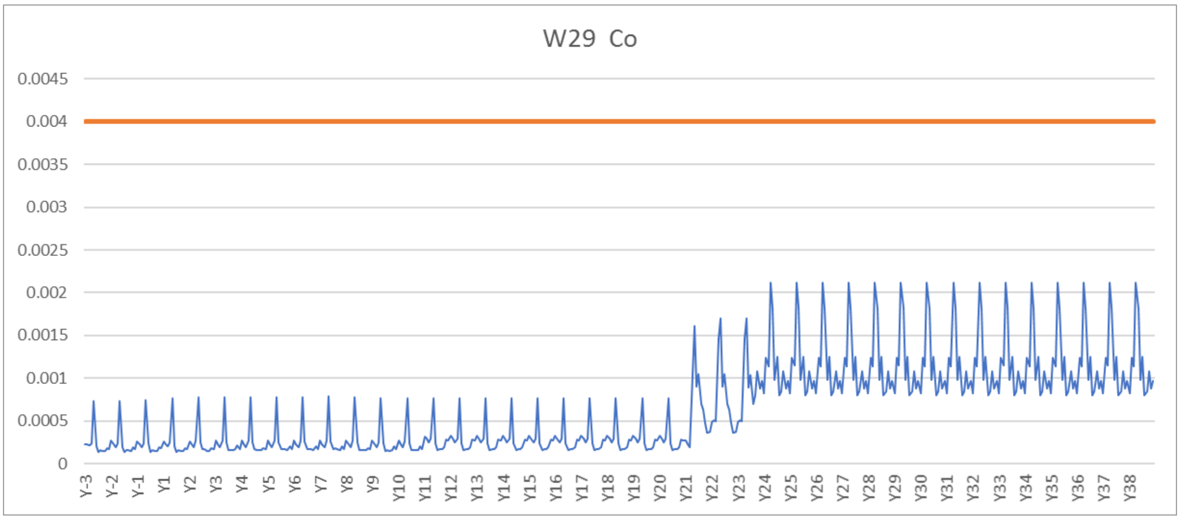
B.2-7: **Time series of predicted antimony concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



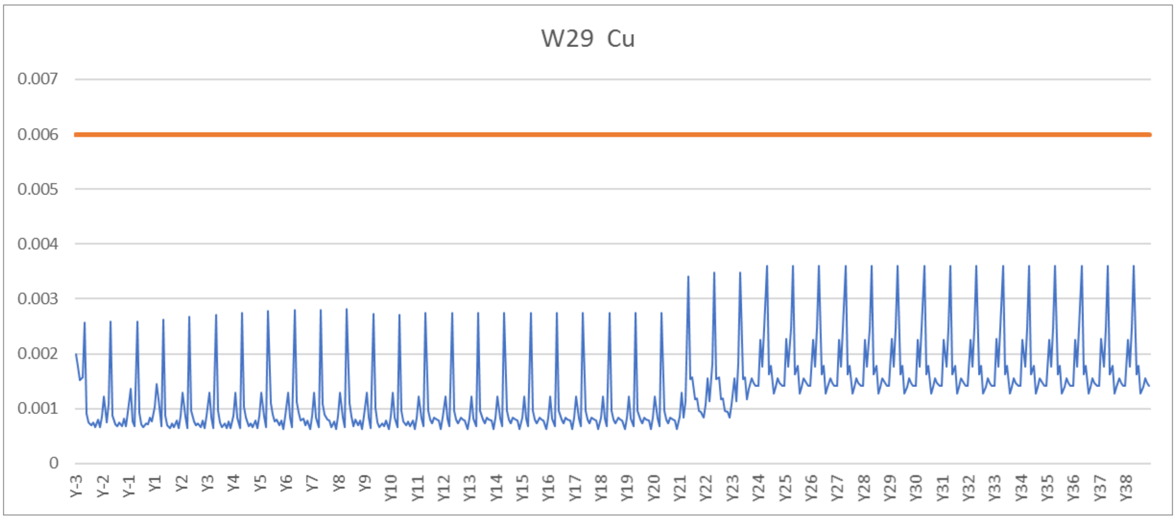
B.2-8: **Time series of predicted arsenic concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



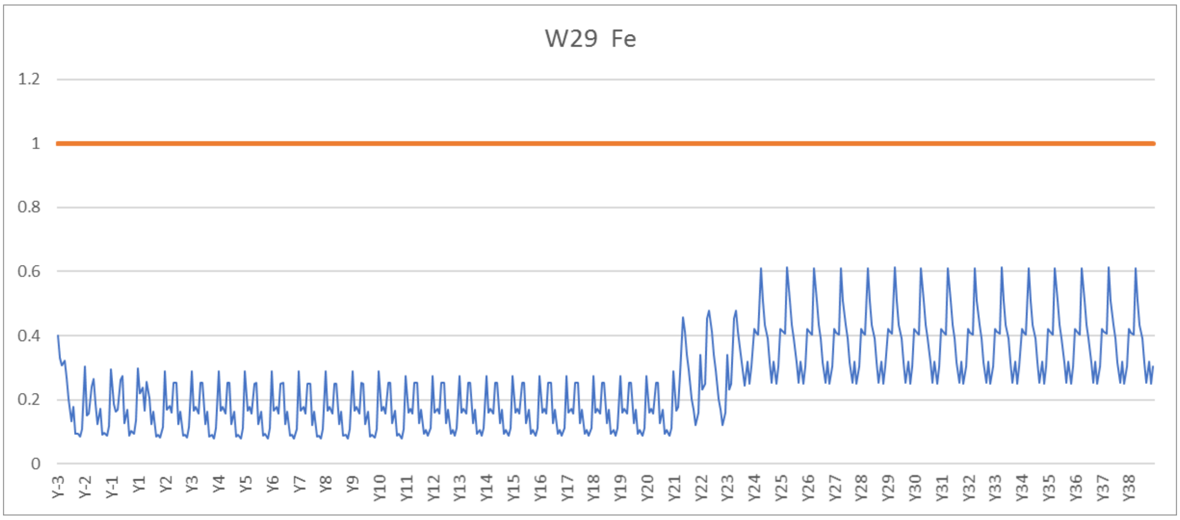
B.2-9: **Time series of predicted cadmium concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



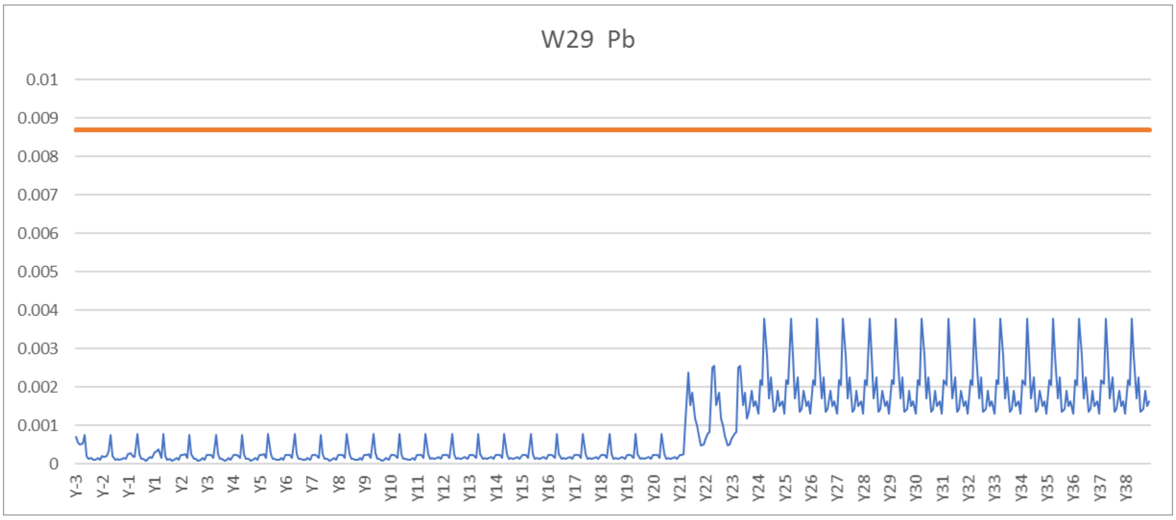
B.2-10: **Time series of predicted cobalt concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



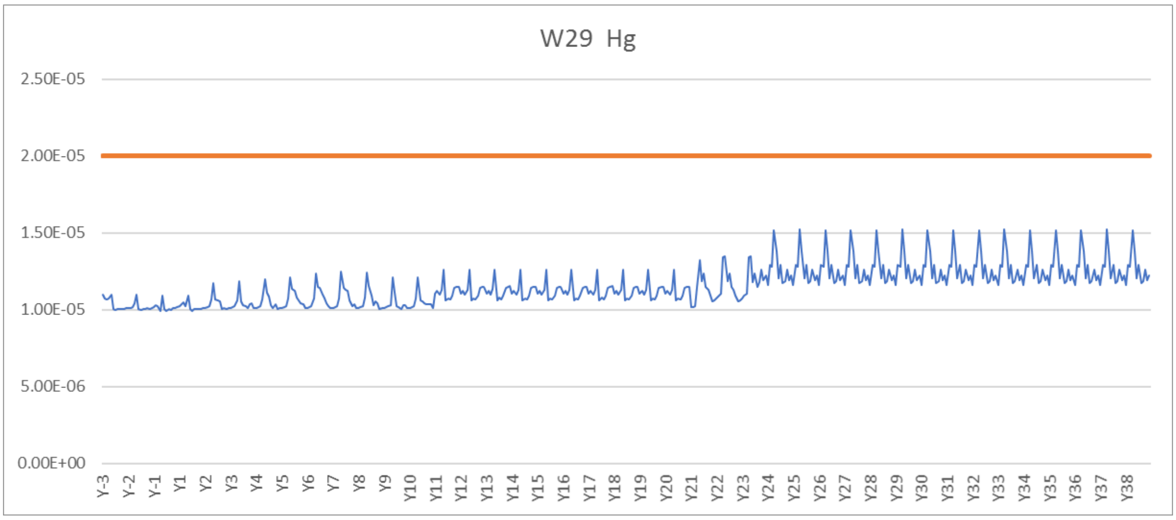
B.2-11: **Time series of predicted copper concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**



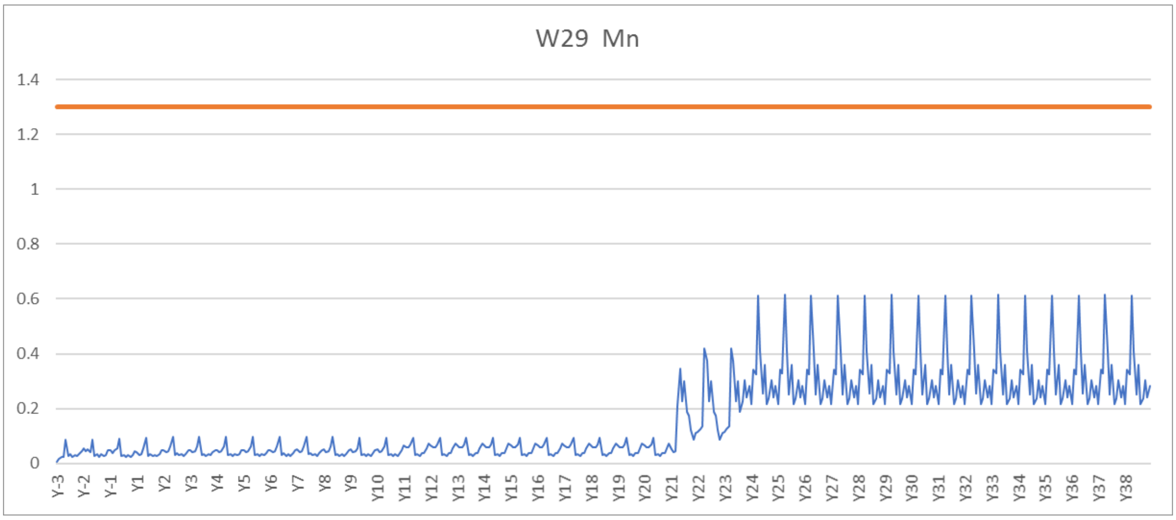
B.2-12: Time series of predicted iron concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



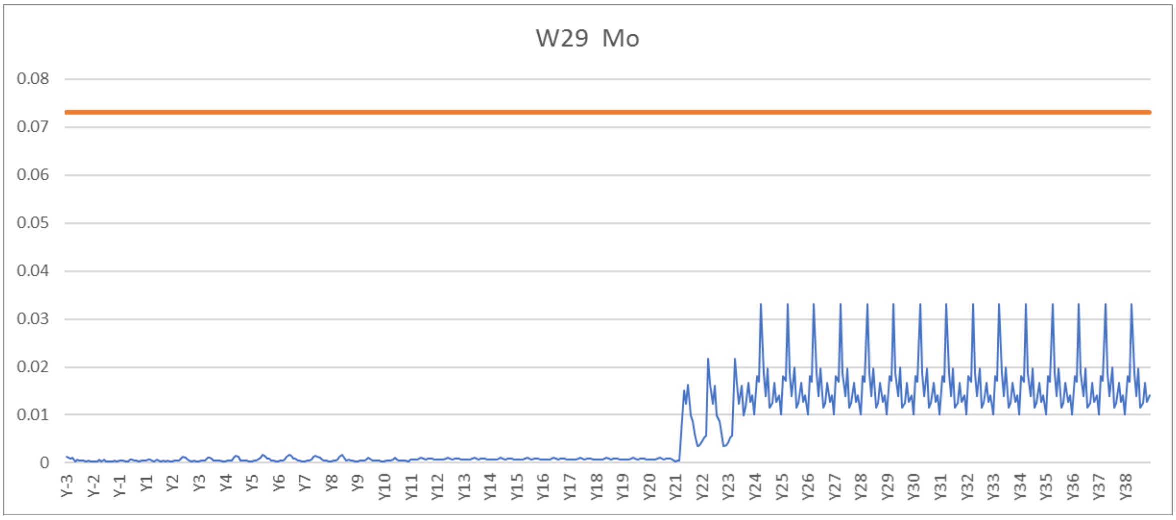
B.2-13: Time series of predicted lead concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



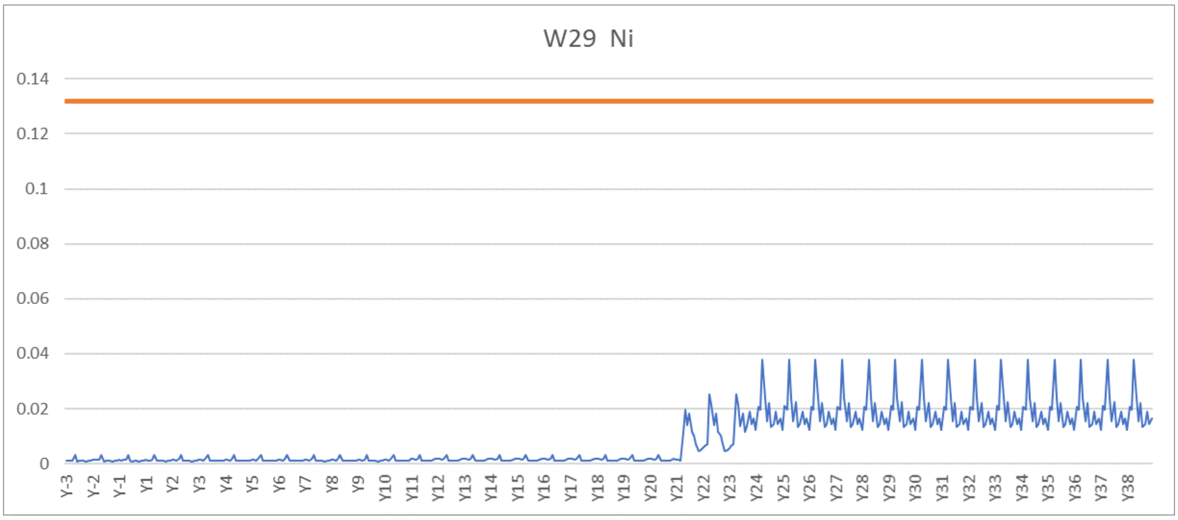
B.2-14: Time series of predicted mercury concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



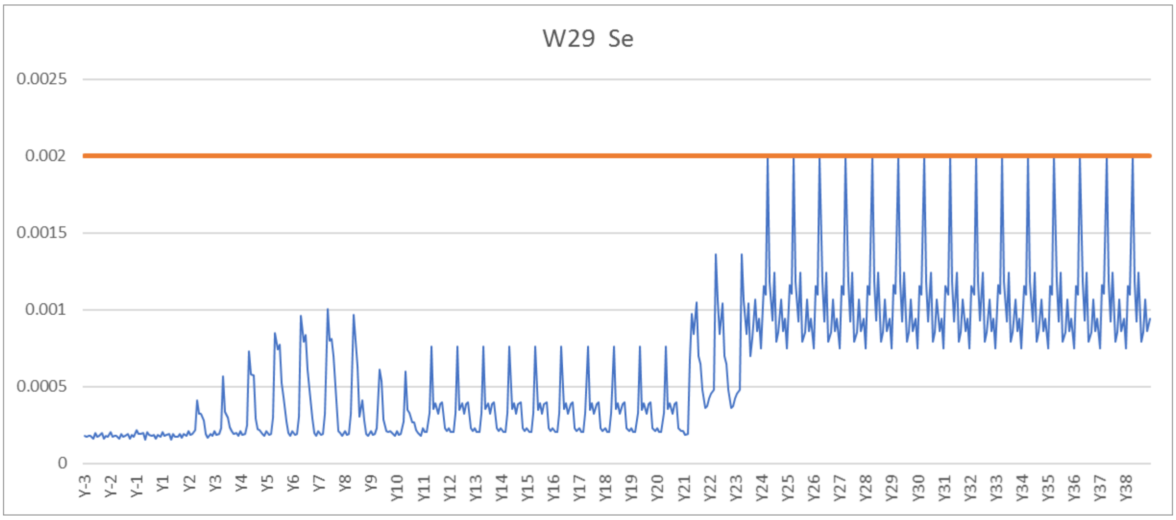
B.2-15: Time series of predicted manganese concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



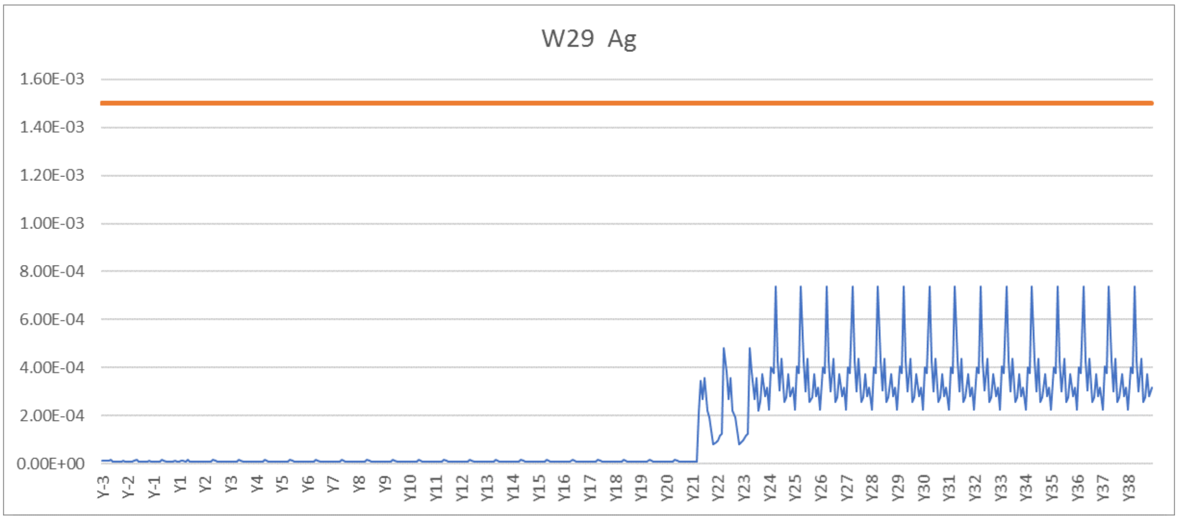
B.2-16: Time series of predicted molybdenum concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



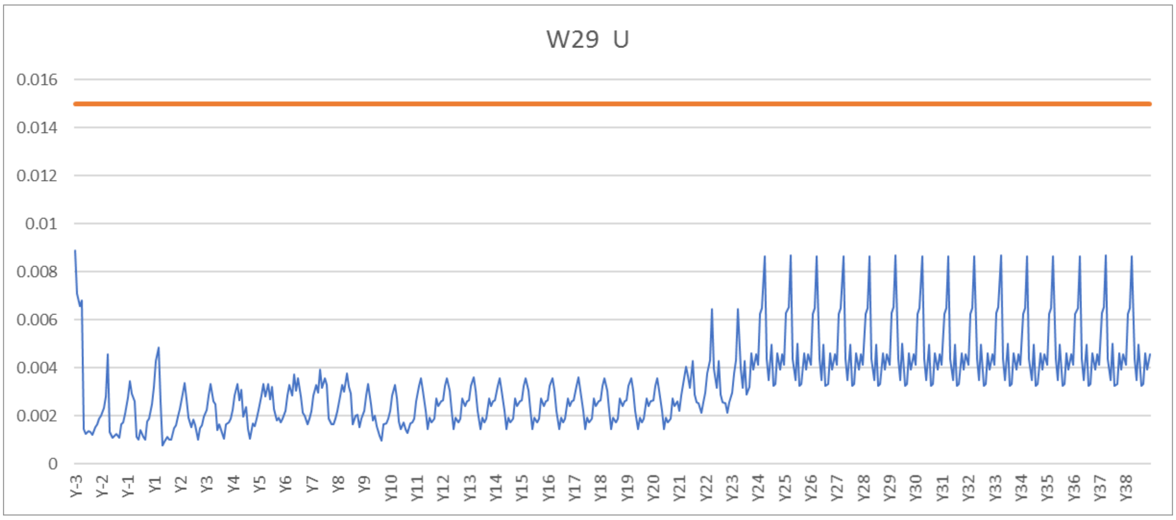
B.2-17: Time series of predicted nickel concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



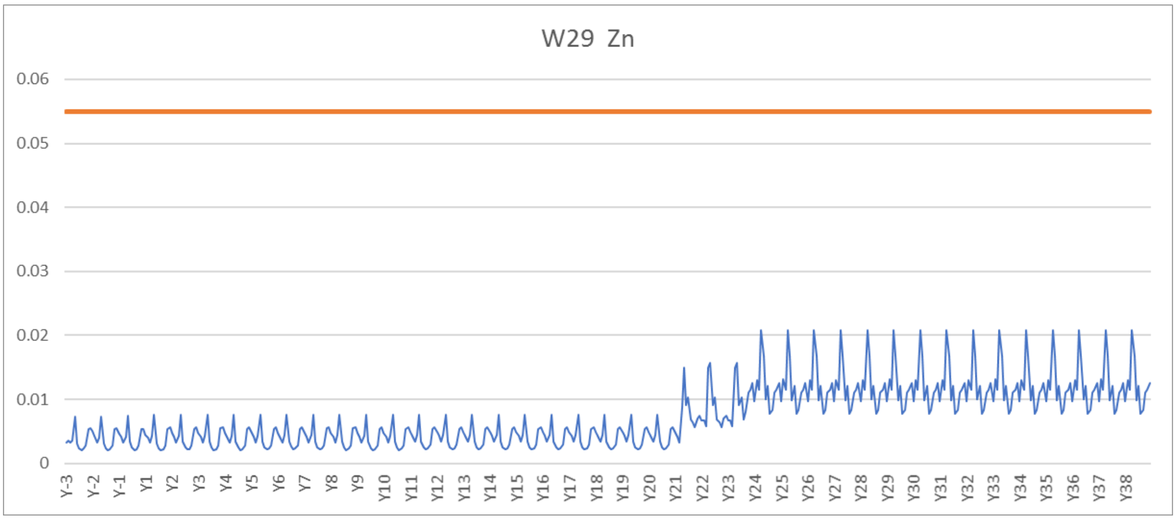
B.2-18: Time series of predicted selenium concentrations (mg/L) for W29. Water Quality Objective is shown by red line.



B.2-19: Time series of predicted silver concentrations (mg/L) for W29. Water Quality Objective is shown by red line.

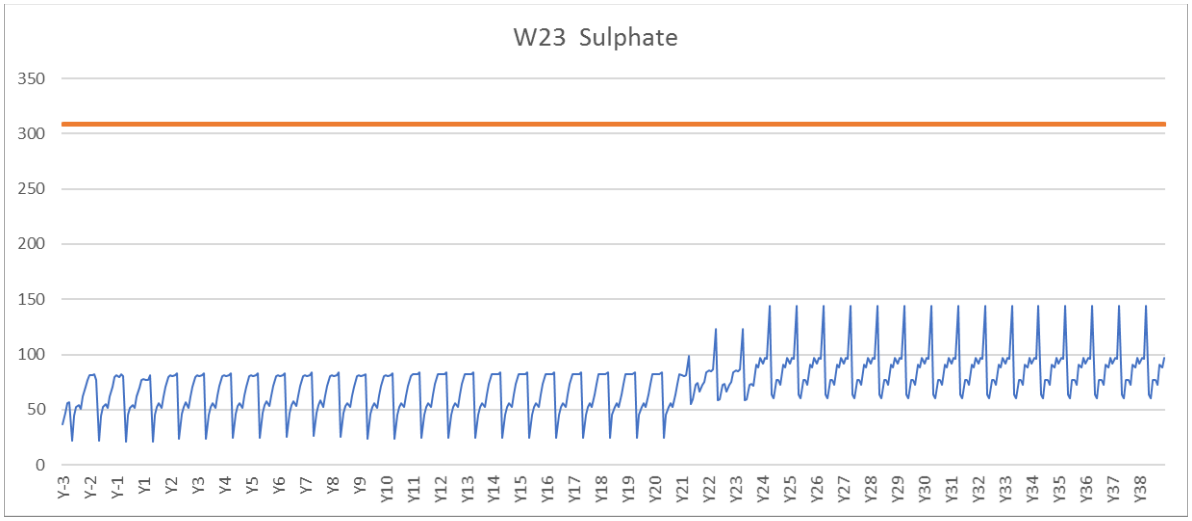


B.2-20: Time series of predicted uranium concentrations (mg/L) for W29. Water Quality Objective is shown by red line.

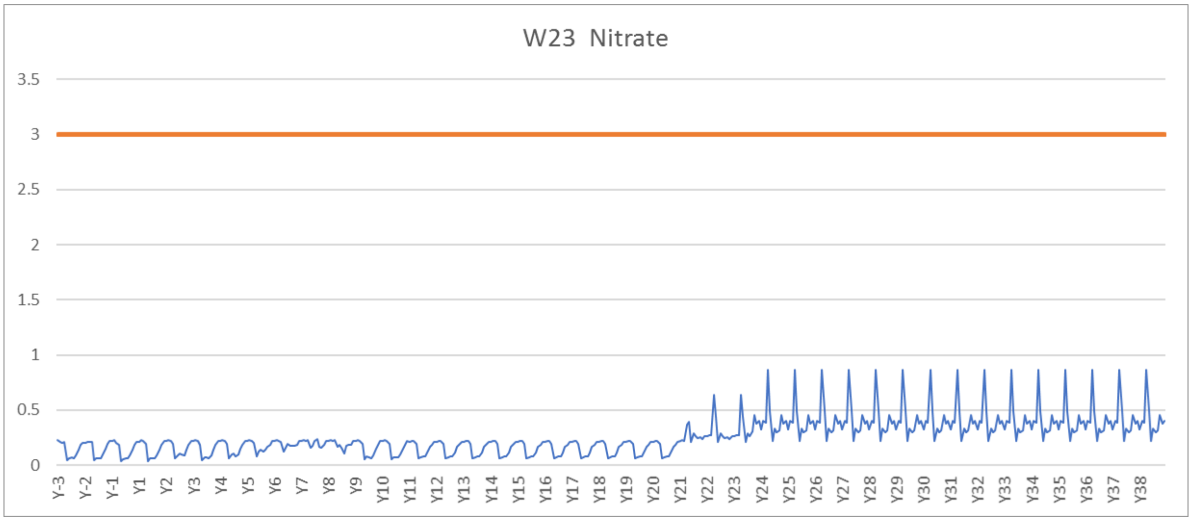


B.2-21: **Time series of predicted zinc concentrations (mg/L) for W29. Water Quality Objective is shown by red line.**

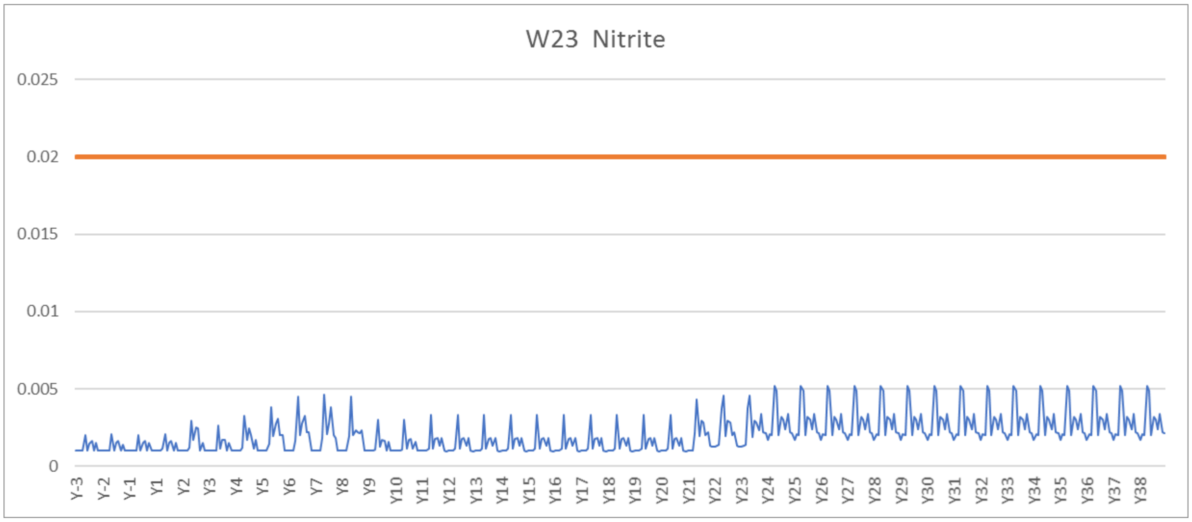
B.3. Haggart Creek below Lynx Creek (W23) – Water Quality Predictions



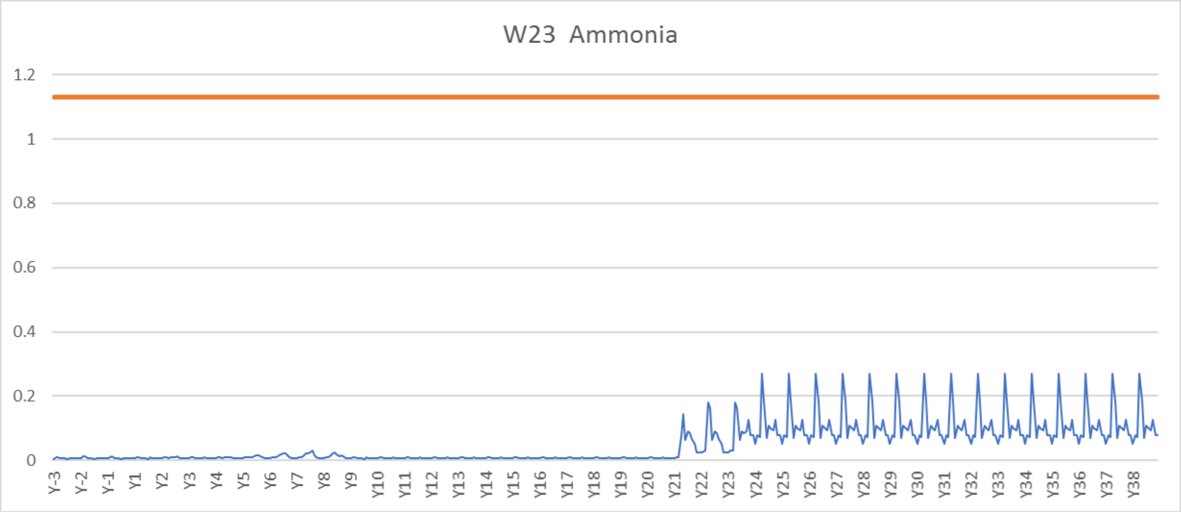
B.3-1: **Time series of predicted sulphate concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



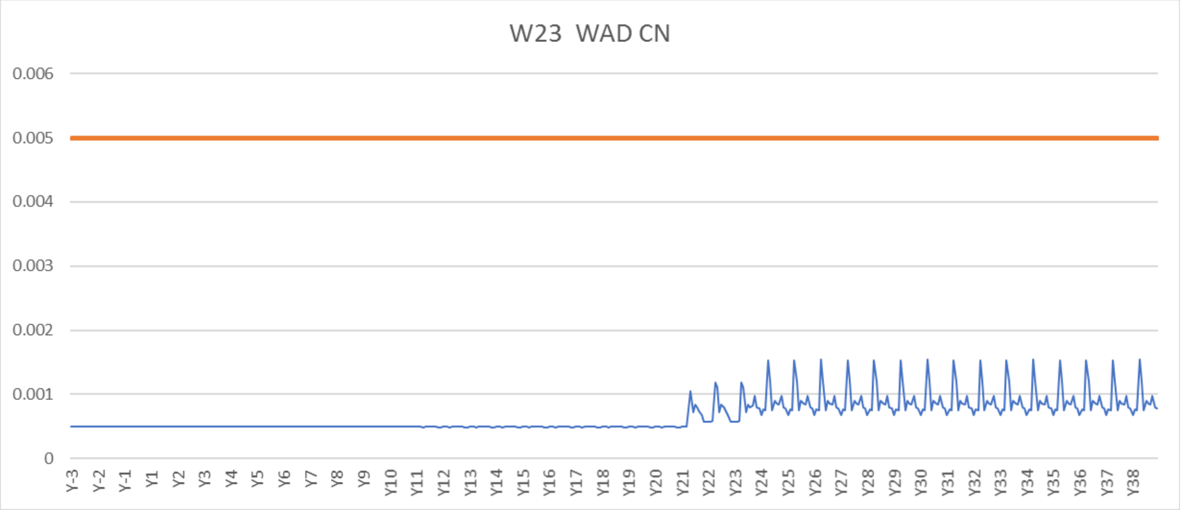
B.3-2: **Time series of predicted nitrate concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



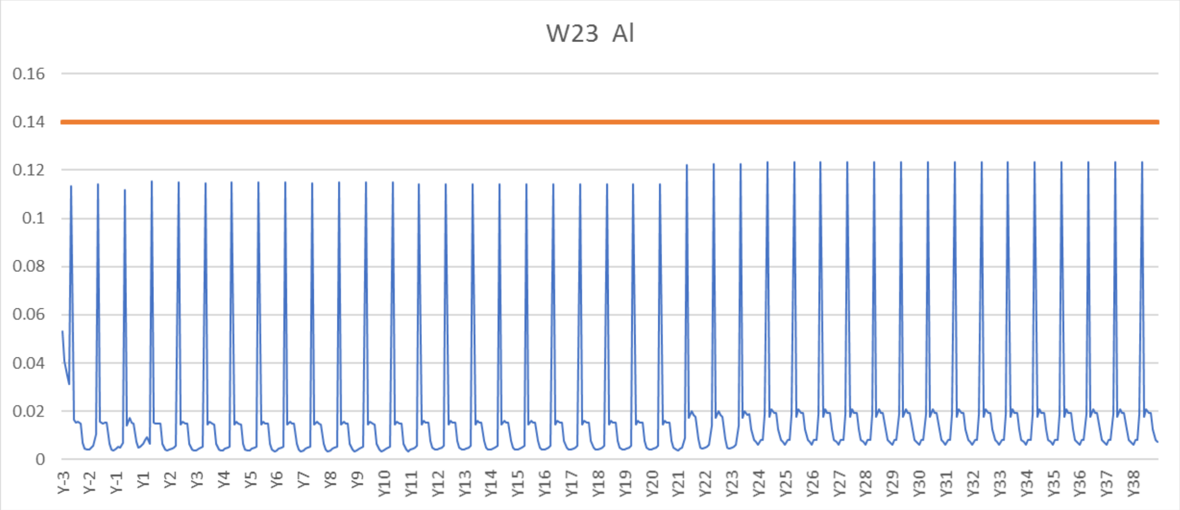
B.3-3: **Time series of predicted nitrite concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



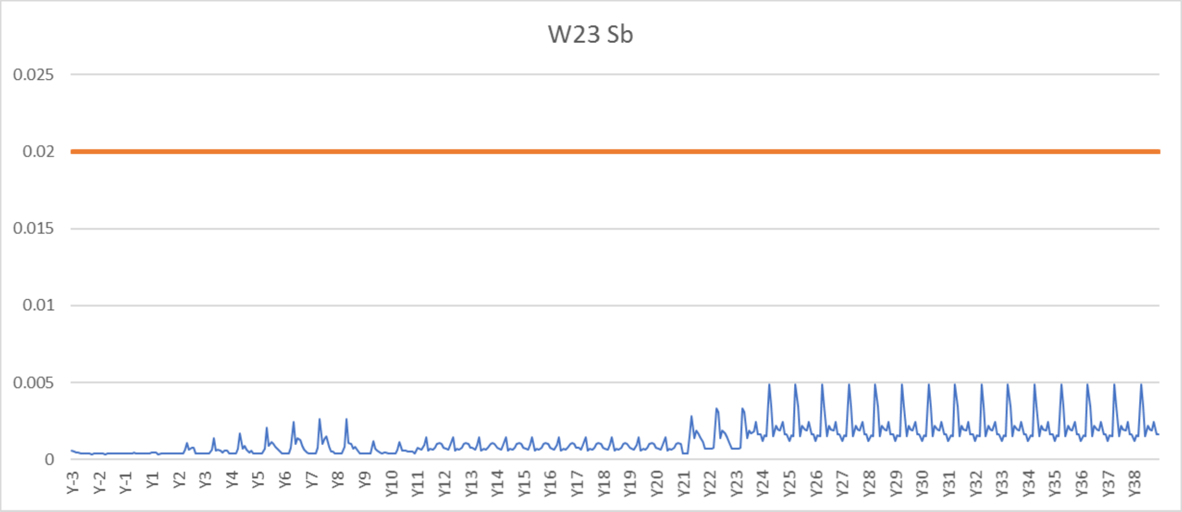
B.3-4: **Time series of predicted ammonia concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



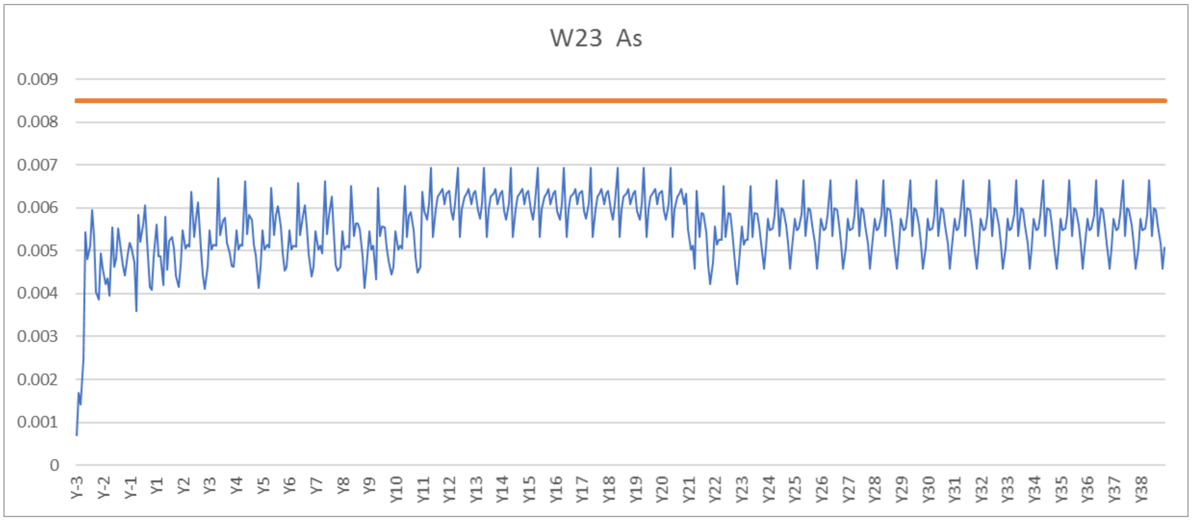
B.3-5: **Time series of predicted WAD-CN concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



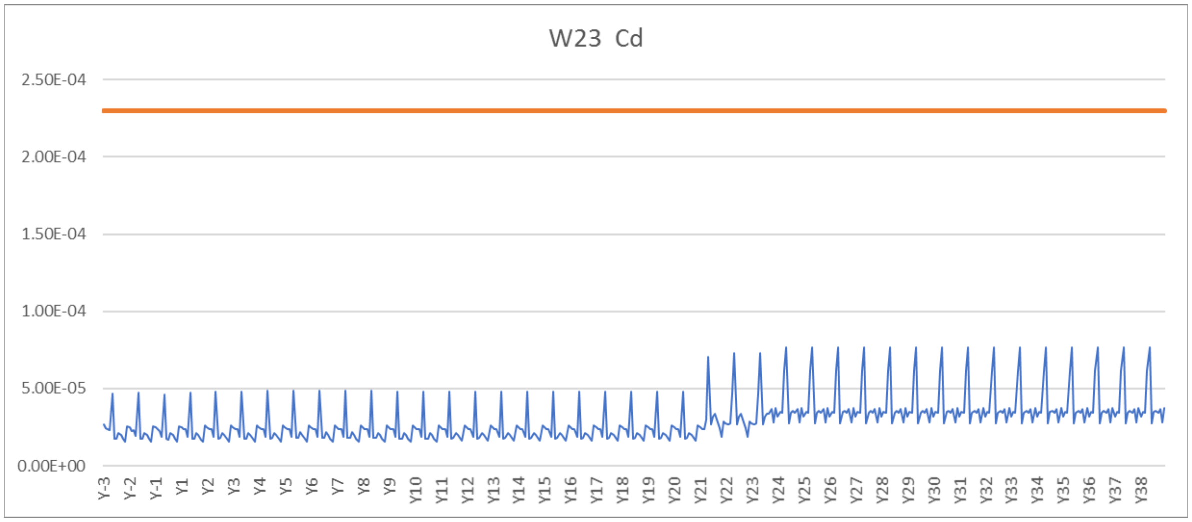
B.3-6: **Time series of predicted aluminum concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



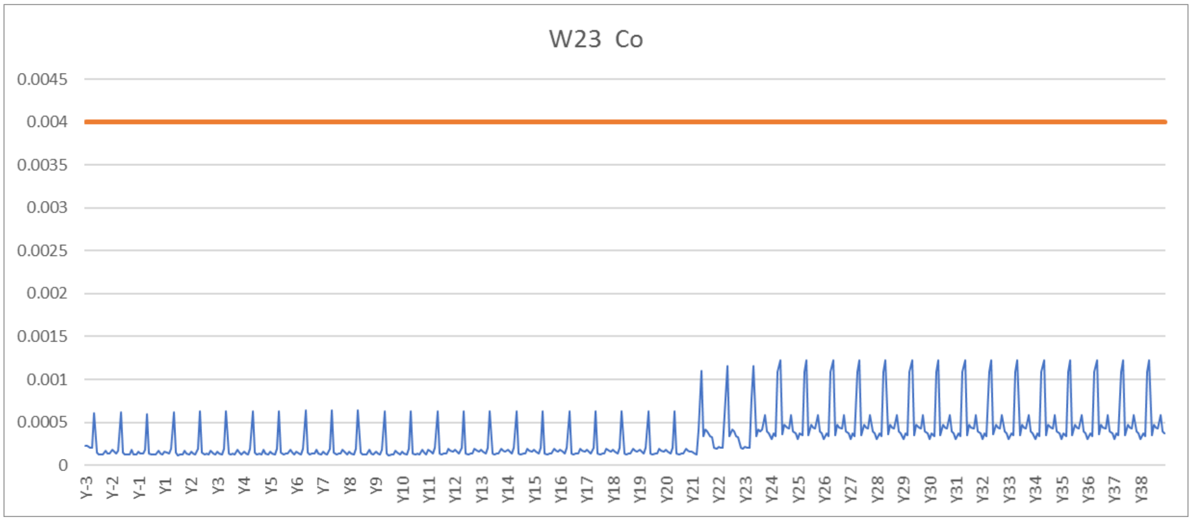
B.3-7: **Time series of predicted antimony concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



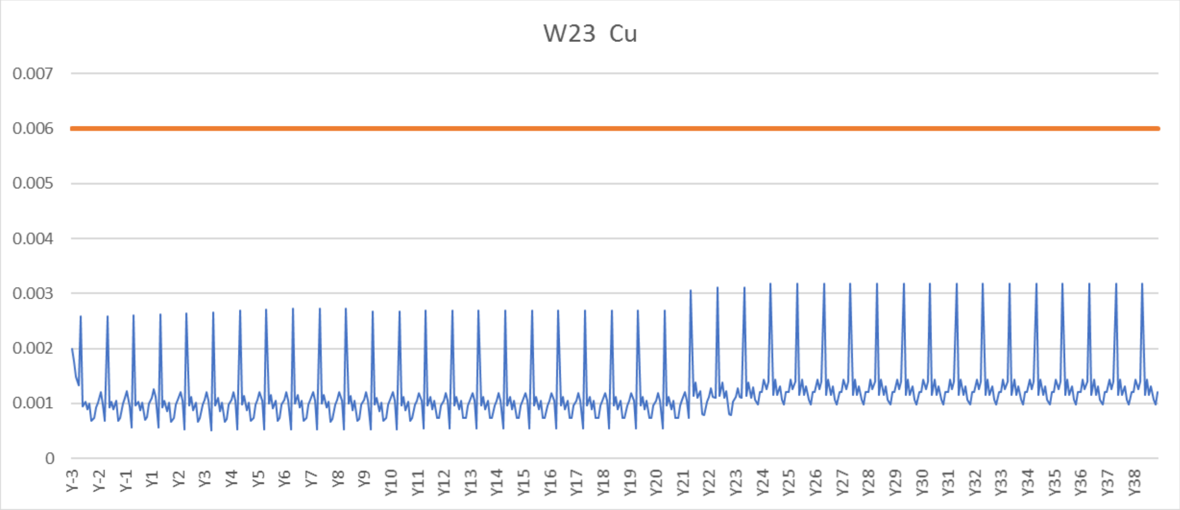
B.3-8: **Time series of predicted arsenic concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



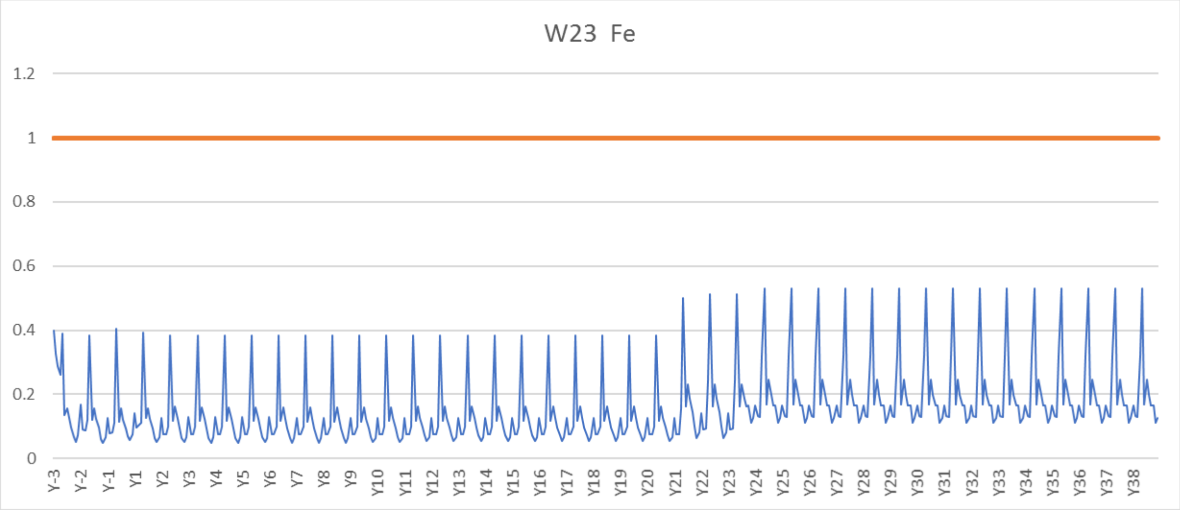
B.3-9: **Time series of predicted cadmium concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



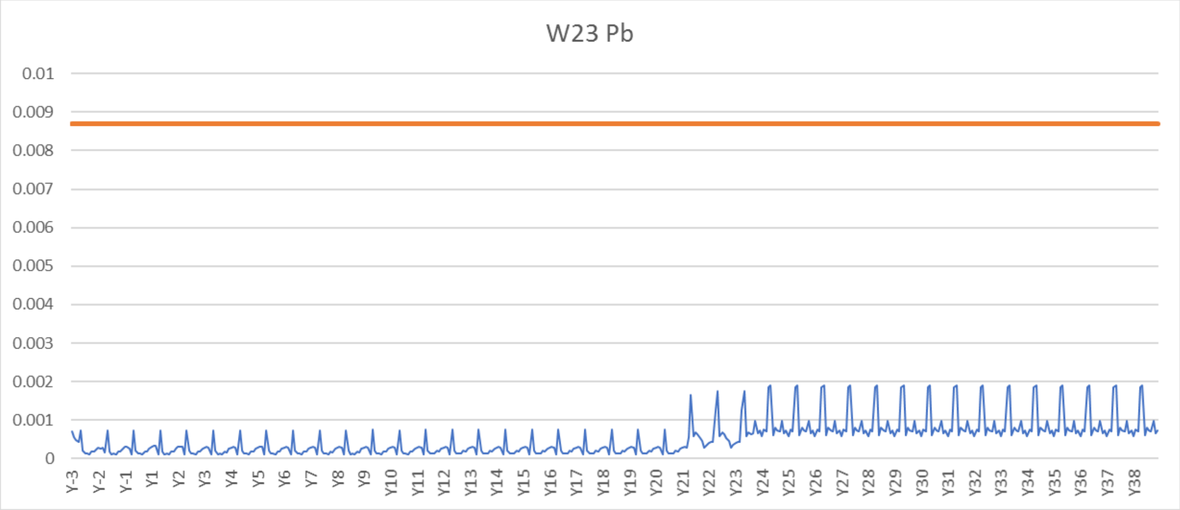
B.3-10: **Time series of predicted cobalt concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



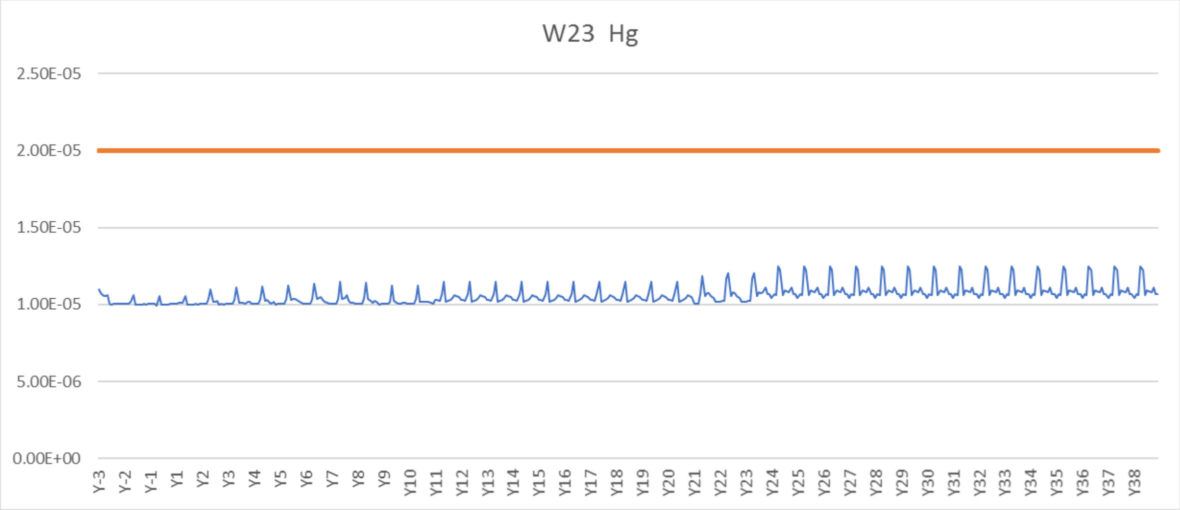
B.3-11: **Time series of predicted copper concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



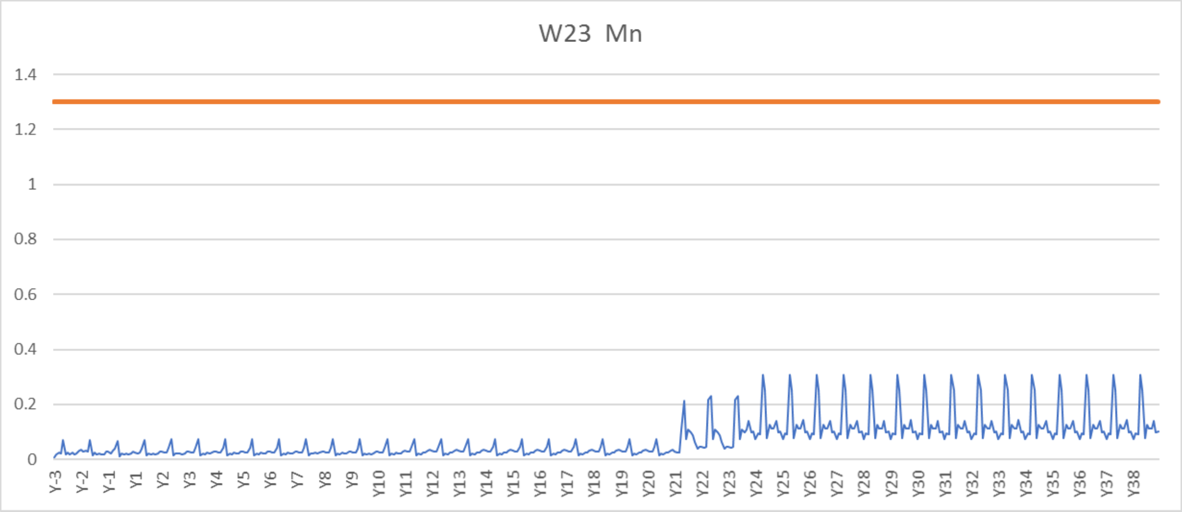
B.3-12: **Time series of predicted iron concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



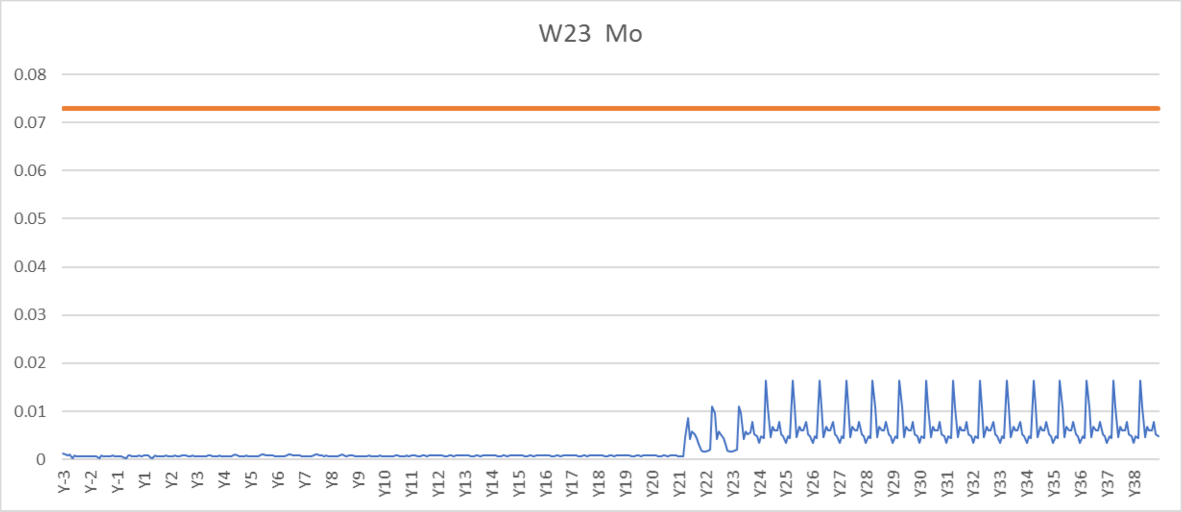
B.3-13: **Time series of predicted lead concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



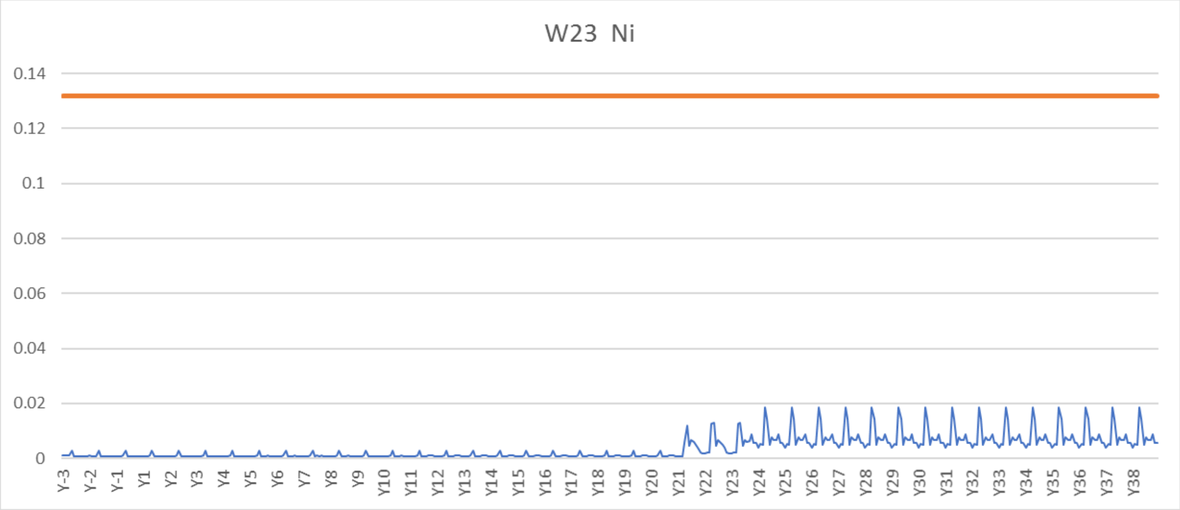
B.3-14: **Time series of predicted mercury concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



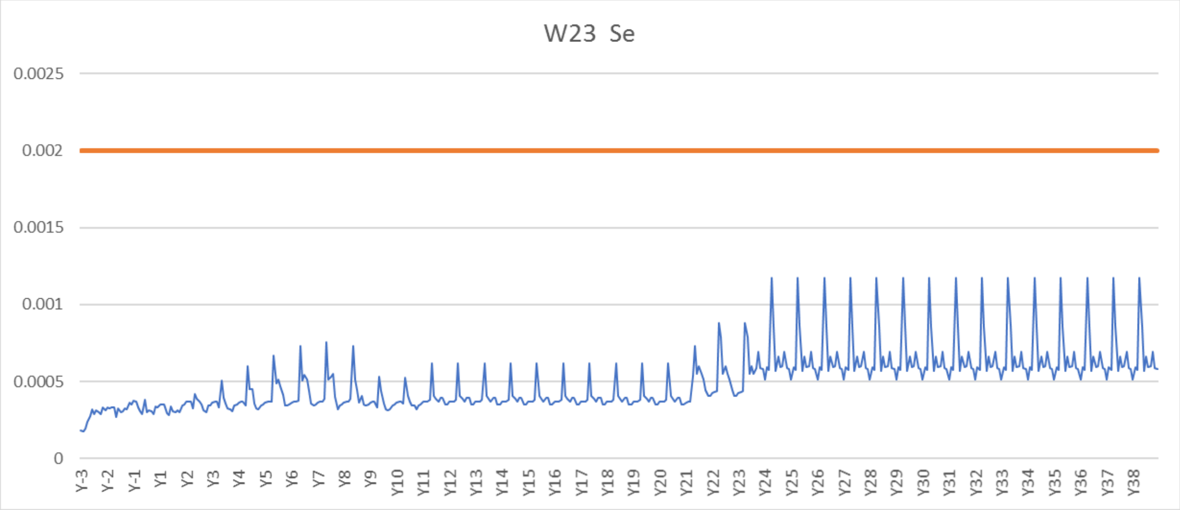
B.3-15: **Time series of predicted manganese concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



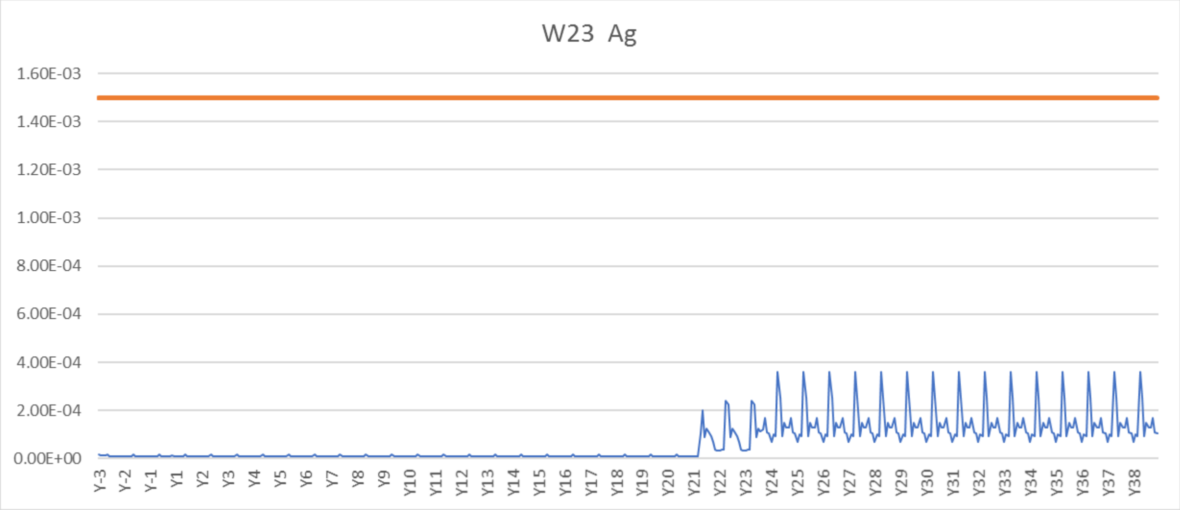
B.3-16: **Time series of predicted molybdenum concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



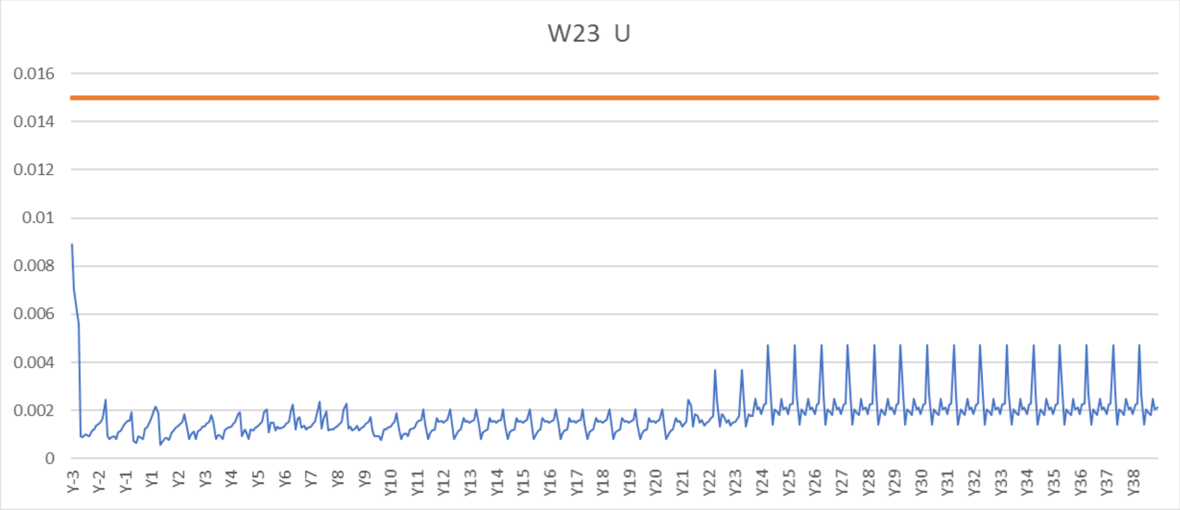
B.3-17: **Time series of predicted nickel concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



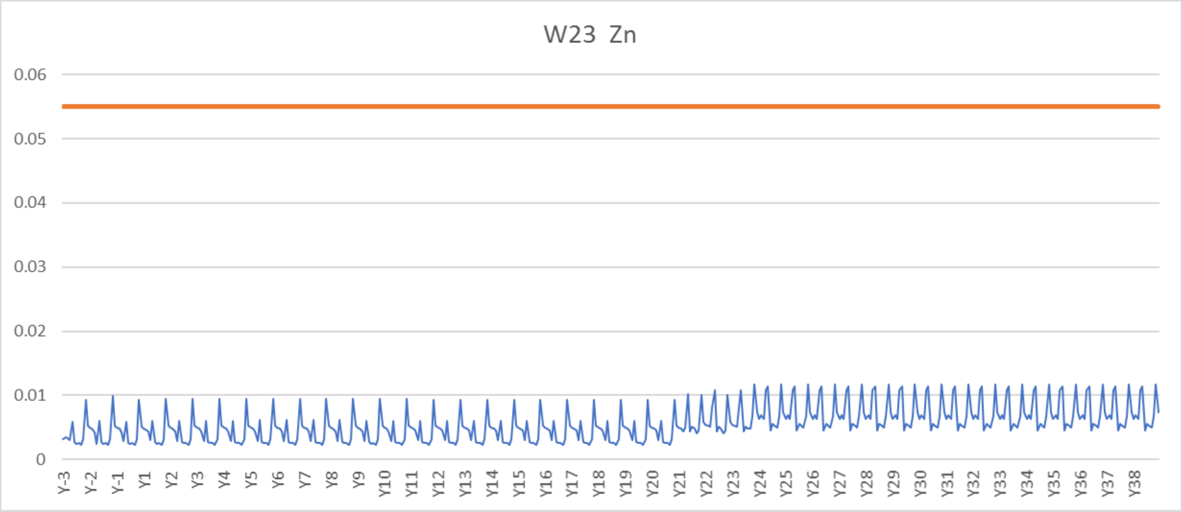
B.3-18: **Time series of predicted selenium concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



B.3-19: **Time series of predicted silver concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



B.3-20: **Time series of predicted uranium concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**



B.3-21: **Time series of predicted zinc concentrations (mg/L) for W23. Water Quality Objective is shown by red line.**

Appendix C:
Water Quality Model Output for all Parameters

Provided electronically