Appendix D Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Stantec

Memo

To:	Alamos Gold Inc., Micheal Raess, Manager, Environment & Community Relations, Development Lynn Lake, Manitoba	From:	Yong Ma, P.Eng. Stantec Consulting Ltd. Calgary, AB
Project/File:	Lynn Lake Gold Project/111473076	Date:	May 13, 2025

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

The Lynn Lake Gold Project (LLGP; the Project) consists of two primary deposit sites, the MacLellan site and Gordon site, which are both located near the Town of Lynn Lake, Manitoba. Alamos Gold Inc. (Alamos) will construct (redevelop), operate and eventually close/reclaim open-pit gold mines at both of these historical mine sites. The Project will be built as two open pit mines with a centralized processing plant and a tailings management facility (TMF). The processing plant, located at the MacLellan site has an expected nominal processing throughput of 8,000 tonnes/day with an estimated 17-year production life.

Stantec Consulting Ltd. (Stantec) completed an Environmental Impact Statement (EIS) for the Project (Stantec 2020). The corresponding Noise and Vibration Valued Component sections include Chapter 7, Volume 1 of the EIS and a Technical Modelling Report in Appendix C, Volume 5 of the EIS. The assessment provides an overview of the existing conditions in the Project area and identifies the changes in noise and vibration levels at key receptor locations to determine potential residual and cumulative changes to noise and vibration as a result of the Project.

Since the submission of the EIS in 2020, Alamos has completed a 2023 Feasibility Study Update (2023 FSU) for the Project. The 2023 FSU includes design updates to the 2019 design. The design updates include, but are not limited to the following:

- Project Development Area (PDA) layouts
- Processing plant (MacLellan site)
- TMF (MacLellan site)
- General infrastructures
- Major equipment lists
- Mine production capacities

Stantec has been engaged to update the noise and vibration impact assessment based on the design updates. This assessment updated the noise and vibration models for the construction and operation phases of the Project, and predicted the noise and vibration effects at selected noise receptors. As an amendment to the EIS (Stantec 2020), this memo summarizes the results of the Noise and Vibration Impact Assessment Update for the Project.

This memo update is based on the 2023 design of the Project, including the 2023 Feasibility Study Update technical report, and also integrates additional detailed engineering changes in 2024.

1 Summary of Key Changes to Project Design

The Noise and Vibration Impact Assessment Update focused on two Project phases: construction and operation. The noise model considered noise emissions from the mobile and stationery equipment during construction and operation activities at both the Gordon site and MacLellan site. Mobile equipment included the trucks travelling around the Project area (e.g., haul trucks, loaders, excavators). Stationery equipment included the processing equipment (e.g.., crushers, mills, pumps, compressors). The vibration model considered open pit production blast-induced ground vibration and air blast overpressure effects on human habitats during the operation phase.

This Noise and Vibration Impact Assessment update is based on the following design information (e.g., excel spreadsheet provided by Alamos for the Project:

- Feasibility Study Update, NI 43-101 Technical Report for the Lynn Lake Project. Issue date: August 22, 2023 (Alamos 2023).
- Capital and Operating Cost Estimate – Gordon 13Aug2023 V1.9 update (Excel Spreadsheet, pers. comm. 2024a).
- Capital and Operating Cost Estimate – MacLellan 13Aug2023 V1.9 update (Excel Spreadsheet, pers. comm. 2024b).
- Gordon Highway Haul Calculator 26Apr2023 Plan V1.9 (Excel Spreadsheet, pers. comm. 2024c).
- Schedule MacLellan 13Apr2023 V1.9 (Excel Spreadsheet, pers. comm. 2024d).
- Schedule Gordon 13Apr2023 V1.9 (Excel Spreadsheet, pers. comm. 2024e).
- LLGP Process Plant Noise Sources Summary_2023 (Excel Spreadsheet, pers. comm. 2024f).

Stantec reviewed and compared the Project design parameters for 2019 and 2023. Changes that may affect the results of the Noise and Vibration Impact Assessment as presented in the EIS are described in the following sections.

1.1 Project Development Area and Project Layouts

Comparison of the updated PDA drawings for both Gordon site and MacLellan site with the 2019 designs indicates changes to the overall Project footprint and Project components (i.e., access road, haul road, open pit area, mine rock storage areas [MRSA], overburden stockpiles, ore stockpiles, TMF, and ore milling and processing plant). The corresponding Local Assessment Area (LAA) and Regional Assessment Area (RAA) for noise and vibration as presented in the EIS are affected by these changes.

Table 1 summarizes the key changes to major Project components based on the 2023 design. These changes may alter the noise and vibration effects at the receptors.

Table 1 Key Changes of Project Major Components in 2023 Design

Mine Site	Project Major Components	2023 Design
Gordon	PDA	Changes
	LAA and RAA	Changes associated with PDA
	Open Pit	Increased area
	MRSA	Changes – new area is larger
	Overburden Stockpile	Increased area
	Topsoil Storage Area	Added to site
	Ore Storage Area	Relocated
	Fresh Water System	New collection pond and discharge pipeline corridor
	Facility Area	Relocated from center to southeast of MRSA
	Stockpile Borrow Source	Added to site for construction borrow materials
	Access Road and Haul Road	New road alignment – haul road routes change with change to location or extents of the stockpiles and pit; access road has no significant changes
MacLellan	PDA	Changes
	LAA and RAA	Changes associated with PDA
	Open Pit	Increased area
	Satellite Pit	New pit located at south of Open Pit
	TMF and MRSA	Changes – changes to the extents of the MRSA, TMF pond, and TMF bank area
	Mine Rock Storage	Changes – new area is larger
	Overburden Stockpile	Increased area
	Topsoil Storage Area	Relocated from south to north of Overburden Stockpile
	Collection Pond and Sump Pond	New
	Construction Laydown Area	New
	Processing Plant	Building and equipment layouts are different
	Access Road and Haul Road	New road alignment – haul road routes change with change to location or extents of the stockpiles and pit; access road has no significant changes

Notes:

PDA = Project Development Area; LAA = Local Assessment Area; RAA = Regional Assessment Area

1.2 Mining Production

Based on the review of the Project mine production data during the operation phase, the years with the highest production rates have changed. Table 2 compares the highest production rate year for the 2019 design with the 2023 design.

Table 2 Comparison of Mining Production between 2019 Design and 2023 Design

Mine Site	2019 Design		2023 Design	
	Total Material Mined (kt/y[1])	Highest Year	Total Material Mined (kt/y[1])	Highest Year
Gordon	16,000	2	16,000	3
MacLellan	28,000	7	33,000	5

Note:

[1] kt/y: thousands of tonnes per year

In the noise model, production year with the highest production rates represents the worst-case noise emission scenario due to higher equipment quantity and activity level. In this assessment update, Gordon site operation Year 3 and MacLellan site operation Year 5 were selected for the noise model.

1.3 Mining Equipment

The 2023 design data sheets “Schedule MacLellan13Apr2023 V1.9.xlsx” and “Schedule Gordon 13Apr2023 V1.9.xlsx” provide the Project mining equipment summary during the operation phase. The summary includes equipment associated with mine general equipment, mine support equipment, drills, loading equipment and hauling equipment for different operation years.

Table 3 summarizes the mining equipment and quantities for the 2023 design in the years with the highest production rates for the MacLellan and Gordon sites. The 2023 design mining equipment type and quantity are different from the 2019 design. Section 5.1.3.2 of Stantec 2020 summarized the mining equipment for the operation phase of the 2019 design.

Table 3 Mining Equipment Included in 2023 Design

Equipment	Gordon Site Quantity (Year 3)	MacLellan Site Quantity (Year 5)
Mine General Equipment		
Lube/Fuel Truck	1	1
Mechanic's Truck	1	1
Welding Truck	1	1
Blasting Loader	1	1
Blasters Truck	1	1
Integrated Tool Carrier WA200-7	1	1
Compactor (BW 211)	1	1
Lighting Plants	6	8
Tire Manipulator (980) (WA500-8)	1	1
Man Bus	2	2
Pickup Trucks	10	16
Crane - 50T	1	1
Crane - 35T	1	1
Pump Truck	1	1
ADT 40 tonne (t)	1	2
Lowboy and tractor (75-100 ton)	1	1
Mine Support Equipment		
Track Dozer - D375A-6	-[1]	5
Grader - GD655-6 - 14'	-	2
Transfer Loader - WA900-3	-	1
Snow Plow/Water Truck	-	3
PC1250LC-8 (6.7 cubic metre (m^3))	-	1
PC490LC-11 (w/hammer)	1	1
Dump Truck - 20 ton	2	3
Road Maintenance Loader - WA500-8	1	1
Drills		
Drill – 178 millimetre (mm) SmartROC D65	3	1
PV275 - 178 mm	-	4

Equipment	Gordon Site Quantity (Year 3)	MacLellan Site Quantity (Year 5)
Loading Equipment		
PC4000 shovel - 22 m^3 (150/200 t)	-	2
PC1250LC-8 (6.7 m^3)	4	-
WA900 loader - 11.5 m^3 (100/150 t)	-	1
Hauling Equipment		
HD1500-7 150t	-	17[2]
HD605-8	15	-

Notes:

[1] "-": not applicable

[2] Year 8 has the most quantity of 17. Year 5 has 14, however, 17 is used in the mode conservatively

1.4 Processing Plant

The 2023 FSU provides new design and layouts for the processing plant at the MacLellan site. The equipment list for each building in the 2023 design is provided in the spreadsheet "LLGP Process Plant Noise Sources Summary_2023.xlsx". The processing plant consists of multiple buildings housing different mine processing equipment, including:

- Main Process Building
- Reagent Storage Building
- Primary Crushing Facility
- Secondary Crushing Building
- Fine Ore Storage Facility
- Oxygen Plant

The processing plant also includes other auxiliary buildings, such as warehouse and workshop, truck maintenance building and truck wash building, laboratory building and administration building. These buildings are not considered as noise sources in the acoustic model.

Section 5.1.3.2 in Stantec 2020 summarized the buildings and equipment in the processing plant associated with the 2019 design. In comparison to the 2019 design, buildings in the 2023 design have different location, sizes, and equipment layout.

Table 4 compares the major buildings associated with the processing plant for the 2019 design with those of the 2023 design.

Table 4 Comparison of Processing Plant Buildings between 2019 and 2023 Designs at MacLellan Site

Building/Equipment	2019 Design	2023 Design
Primary Crusher Building	-[1]	Different building size and equipment setup
Secondary Crusher Building	-[1]	Different building size and equipment setup
Fine Ore Storage Facility	Ore Stockpile, no building	New building with equipment
Main Process Building	Mill Building	Different building size and equipment setup
Reagent Storage Building	Located at northwest of Mill Building	Relocated adjacent to Main Process Building; different building size and equipment setup
Gold Room	Detached building	Relocated inside Main Process Building
Oxygen Plant	Southwest of Mill Building	Relocated south of Main Process Building; different building size and equipment setup
Service Equipment	Not listed	Different locations and equipment setup

Note:
"-": as a comparison base

Table 5 summarizes the processing plant mobile equipment list associated with the 2023 design. A mobile equipment list was not available for the 2019 design.

Table 5 Processing Plant Mobile Equipment List for 2023 Design at MacLellan Site

Equipment	Capacity	Quantity
Single Cab 4WD Pickup	-[1]	6
Twin Cab 4WD Hiab Truck	8 t	1
Bus	22-seat	1
Fire Trailer	5 m^3	1
All Terrain Crane	40/50 t	1
Crane	150 t	-
Plant Forklift	4 t	2
Warehouse Forklift	4 t	1
Front-End Loader	10 t	1
Skid-Steer Loader (Bobcat)	1 t	1
Tip Truck	3 t	2
Telescopic Handler	3 t	1
Boom/Scissor Lift	-	2

Equipment	Capacity	Quantity
Fusion Butt Welder	90/315	1
Portable Compressor	-	1
Diesel Welder	-	2
Portable Pumps Generator	200 kilovolt amperes	1
Gravel truck	10 m^3	2
Water Truck	15,000 litres (L)	1
Potable water Trailers	5,000 L	4
Franna Crane	15 t	1
Yard Crane – Hydraulic	20 t	1
Pick-n Carry Mobile Crane	-	1
Backhoe	11 t	1
Forklift/Telescopic Handler	20 t	1

Note:

"-": data is unavailable

1.5 Pre-production Equipment

The 2023 design data sheets "Schedule MacLellan13Apr2023 V1.9.xlsx" and "Schedule Gordon 13Apr2023 V1.9.xlsx" summarize the mining equipment during the pre-production, including Mine General Equipment, Mine Support Equipment, Drills, Loading Equipment and Hauling Equipment. Table 6 summarizes the 2023 design equipment and quantities associated with the pre-production phase at the MacLellan and Gordon sites.

Section 5.1.2.3 of the Stantec 2020 summarized the mining equipment during the pre-production phase for the 2019 design.

Table 6 Pre-Production Mining Equipment of 2023 Design

Equipment	Gordon Site Quantity (Year -1)	MacLellan Site Quantity (Year -1)
Mine General Equipment		
Lube/Fuel Truck	1	1
Mechanic's Truck	1	1
Welding Truck	1	1
Blasting Loader	1	1

Equipment	Gordon Site Quantity (Year -1)	MacLellan Site Quantity (Year -1)
Blasters Truck	1	1
Integrated Tool Carrier WA200-7	1	1
Compactor (BW 211)	1	1
Lighting Plants	6	8
Tire Manipulator (980) (WA500-8)	1	1
Man Bus	2	2
Pickup Trucks	10	16
Crane - 50T	1	1
Crane - 35T	1	1
Pump Truck	1	1
ADT 40t	1	2
Lowboy and tractor (75-100 ton)	1	1
Mine Support Equipment		
Track Dozer - D375A-6	-	5
Grader - GD655-6 - 14'	-	2
Transfer Loader - WA900-3	-	1
Snow Plow/Water Truck	-	3
PC1250LC-8 (6.7 m^3)	-	1
PC490LC-11 (w/hammer)	1	1
Dump Truck - 20 ton	2	3
Road Maintenance Loader - WA500-8	1	1
Drills		
Drill - 178mm SmartROC D65	1	1
PV275 - 178 mm	-	1
Loading Equipment		
PC4000 shovel - 22 m^3 (150/200 t)	1	1
PC1250LC-8 (6.7 m^3)	2	-
WA900 loader - 11.5 m^3 (100/150 t)	1	1
Hauling Equipment		
HD1500-7 150t	-	4
HD605-8	3	-

1.6 Blasting Parameters

During the operation phase, the primary vibration effects associated with the Project are ground vibration and air overpressure due to blasting activities within the open pit at the Gordon site and the MacLellan site. The primary factors affecting vibration due to blasting are the highest explosive charge per delay and the distance from a blast to the receptor. Table 7 compares the blasting parameters between the 2019 and 2023 designs.

Table 7 Comparison of Blasting Parameters in 2019 Design and 2023 Design

Blasting Parameter	2019 Design (Gordon Site and MacLellan Site)	2023 Design (Gordon Site and MacLellan Site)
Highest Explosive Charge	208 kilogram (kg)/hole	230 kg/hole
Closest distances from blast to receptors (Open Pit Boundary to Receptor)	-[1]	Marginal changes in distances due to different open pit layout. The distance decreases for the closest receptors (ID 73 and ID 76) at the Gordon site and decreases for the closest receptor at the permanent work camp.

Note:
[1] "-": as a comparison base

1.7 Access Road and PR391 Traffic

Table 8 compares the Project-related operation phase access road and Provincial Road (PR)391 road traffic between the 2019 and 2023 design. As a conservative approach, the 2023 design road traffic volume is based on the highest mine production year (1,696 kilotonnes per year (kt/yr) in Year 4) from the Gordon site stockpile to MacLellan site mill. Low traffic volume associate with Gordon Mine Year 3 was not used.

Table 8 Project-Related Operation Access Roads and PR391 Road Traffic

Item	Description	2019 Design Volume (Trucks/hr)	2023 Design Volume (Trucks/hr)
1	Access Road Traffic for Gordon and MacLellan	12	13
2	PR391 Road Traffic	12	13

2 Assessment Approach

The Noise and Vibration Impact Assessment Update was based on an identical approach (i.e., receptor locations, regulatory framework, baseline conditions, and modelling method) to that applied for the Stantec 2020 assessment. Some assessment parameters remain the same as the 2019 design. For example, Project construction phase equipment listings for the processing plant, open pit area and TMF area remain the same as in the 2019 design. Table 9 summarizes the assessment approach for Noise and Vibration Impact Assessment Update; the approach is identical to the approach applied in Stantec 2020. The corresponding sections for Stantec 2020 are provided as references in the table.

Table 9 Assessment Approach

Assessment Method or Parameter	Descriptions	Reference in Stantec 2020
Noise and Vibration Receptors	Selected noise receptors near Gordon site and MacLellan site remain the same, including Receptor ID, Description and Location UTM Coordinates	Table 2-1 – Gordon Site Table 2-2 – MacLellan Site
Regulatory Framework Noise Criteria	Manitoba noise guideline Health Canada Change in percent highly annoyed (%HA) Health Canada Low Frequency Noise	Section 3.1 Section 6.1.4
Regulatory Framework Vibration Criteria	MECP Guidance vibration targets for blasting Health Canada blast overpressure target FTA 2018 structural damage threshold	Section 3.2 Section 6.2.1 Section 6.2.2
Baseline Conditions	Same baseline conditions for all receptors	Section 4.0
Noise Modelling Parameters	Same noise modelling software parameters	Section 5.1.1
Vibration Modelling	Same vibration modelling/calculation methods	Section 5.2.1
Decommissioning/Closure	Quantitative noise modelling of decommissioning/closure phase was not conducted	Section 5.1.4 Section 5.2.4
Construction Equipment List	Remains the same as Stantec 2020 for processing plant and TMF area at MacLellan site	Section 5.1.2
Pile Driving Activity	Activity remains the same as Stantec 2020 for Gordon site and MacLellan site	Table 6-2 Table 6-3
Construction Phase Access Road Traffic Volume	Remain the same as Stantec 2020 for Gordon site and MacLellan site: 2 Trucks/hour – Gordon Site 6 Trucks/hour – MacLellan Site	Table 5-8 Table 5-9
Construction Phase PR391 Road Traffic Volume	Remain the same as Stantec 2020 between Gordon site and MacLellan site: 2 Trucks/hour	Table 5-10

Table 10 summarizes the assessment assumptions; the assumptions for this update are identical to those applied in Stantec 2020. The corresponding sections for the assumptions in Stantec 2020 are provided as references in the table.

Table 10 Assessment Assumptions (Stantec 2020)

Assessment Parameter	Assessment Assumptions (Gordon Site and MacLellan)	Reference in Stantec 2020
Construction Phase		
Processing Plant (MacLellan Site)	• Worst case scenario is based on the period of Year -2 and Year -1 • Mobile equipment operates 10 hours (6 hours daytime and 4 hours nighttime) during a 24-hour period • Stationery equipment operates at 100% capacity • Piling activities were assumed to be less than 12 months • Active piling is assumed to be 30% of the equipment operating time, with a 12 decibel (dB) tonality penalty added to noise emissions • Back-up alarms are assumed to be 20% of the equipment operating time, with a 5 dB tonality penalty added to noise emissions	Section 5.1.2.1
TMF (MacLellan Site)	• Equipment operates 10 hours (6 hours daytime and 4 hours nighttime) during a 24-hour period • Equipment operates at 100% capacity • Back-up alarms are assumed to be 20% of the equipment operating time, with a 5 dB tonality penalty added to noise emissions	Section 5.1.2.2
Pre-Production (MacLellan and Gordon Sites)	• Equipment operates 20 hours (12.5 hours daytime and 7.5 hours nighttime) during a 24-hour period • Equipment operates at 100% capacity • Stationery equipment operates at 100% capacity continuously during 24-hour period • Back-up alarms are assumed to be 20% of the equipment operating time, with a 5 dB tonality penalty added to noise emissions	Section 5.1.2.3
Haul Road Traffic Access Road Traffic PR391 Road Traffic	• Equipment operates 24 hours continuously in 365 days • Equipment operates at 100% capacity • Highest road traffic volumes were used	Section 5.1.2.4 Section 5.1.2.5 Section 5.1.2.6
Operation Phase		
Processing Plant and Primary Mining Equipment Support Equipment	• Stationery equipment (i.e., processing plant) operates at 100% capacity continuously during 24-hour period • Equipment operates at 100% capacity • Mobile equipment operates 20 hours (12.5 hours daytime and 7.5 hours nighttime) during a 24-hour period • Back-up alarms are assumed to be 20% of the equipment operating time, with a 5 dB tonality penalty added to noise emissions	Section 5.1.3.2

Assessment Parameter	Assessment Assumptions (Gordon Site and MacLellan)	Reference in Stantec 2020
Vibration		
Blast-related Vibration	• Vibration prediction used a conservative method with the highest explosive charge weight. The actual blast charges could be lower • Blast-related vibration prediction was based on the shortest distance between receptor and the pit boundary	Section 5.2.1

3 Noise Emissions

3.1 Mine Equipment Noise Sources

As described in the previous sections, this Noise and Vibration Impact Assessment Update will only present the differences between the 2019 design and 2023 design for the Project. Therefore, only noise emissions for the Project equipment that are different with those listed in Stantec 2020 are summarized herein. Updated noise emission sound power levels are summarized and included in Attachment A.

Updated noise emission data for the pre-production and operation phase equipment is presented in Table A-1 to Table A-4 in Attachment A. Construction phase equipment for the processing plant and TMF, and construction haul road traffic noise remains unchanged from the Stantec 2020 assessment, therefore this noise emission information is not included in Attachment A.

3.2 Mine Haul Road Traffic

Based on the highest annual production year of the 2023 design, the operation haul road traffic for the Gordon site and MacLellan site were updated. Table 11 and Table 12 summarize the operation haul road traffic volumes and associated noise emission (e.g., sound power level per equipment unit) at the Gordon site and MacLellan site, respectively.

Table 11 Haul Road Traffic Summary at Gordon Site

Item	Description	Equipment	Year 3 Volume (Trucks/hr)	Sound Power Level [1] (a-weighted decibel sound level [dBA])
1	Open Pit	Haul Truck (69 Ton)	66	116
2	Open Pit to Waste Rock Stockpile	Haul Truck (69 Ton)	54	116
3	Open Pit to Ore Stockpile	Haul Truck (69 Ton)	6	116
4	Open Pit to Overburden Stockpile	Dump Truck (20 Ton)	21	113

Note:

[1] Represent sound power level per unit of mobile equipment

Table 12 Haul Road Traffic Summary at MacLellan Site

Item	Description	Equipment	Year 5 Volume (Trucks/hr)	Sound Power Level [1] (a-weighted decibel sound level [dBA])
1	Within Open Pit	Haul Truck (150 Ton)	64	120
2	Ore Stockpile to Processing Plant	Dump Truck (20 Ton)	11	113
3	Open Pit to Waste Rock Stockpile	Haul Truck (150 Ton)	59	120
4	Open Pit to Low Grade Ore Stockpile	Haul Truck (150 Ton)	2	120
5	Open Pit to Overburden Stockpile	Dump Truck (20 Ton)	11	113
6	Open Pit to Mill	Haul Truck (150 Ton)	1	120

Note:

[1] Represent sound power level per unit of mobile equipment

The operation haul road traffic noise emissions are based on the same assumption or condition as 2019 Desing except equipment operates 350/365 yearly instead of 365/365 in 2019 Design).

4 Noise Model Results

4.1 Construction

Table 13 and Table 14 summarize the Project only daytime, nighttime, and day-night average sound level results at the receptors for the Gordon site and MacLellan site during the construction phase, respectively. Figure 1 and Figure 2 in Attachment B illustrate the construction phase only noise contour maps for the Gordon site and MacLellan site, respectively.

Table 13 Constructon Phase Sound Level at Gordon Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
59	Potential Indigenous Receptor	22.9	22.9	29.3
61	Potential Indigenous Receptor	16.7	16.7	23.1
62	Potential Indigenous Receptor	12.8	12.8	19.2
72	Potential Indigenous Receptor	29.1	29.1	35.5
73	Potential Indigenous Receptor	29.7	29.7	36.1
74	Potential Indigenous Receptor	24.2	24.2	30.6
76	Potential Indigenous Receptor	34.7	34.7	41.1
77	Potential Indigenous Receptor	34.2	34.2	40.6
93	Black Sturgeon Reserve Residence	14.3	14.3	20.7
101	Black Sturgeon Reserve Residence	16.2	16.2	22.6
104	Remote Cottage	4.5	4.5	10.9
126	Recreation Lot	13.7	13.7	20.1
130	Remote Cottage	13.8	13.8	20.2
131	Remote Cottage	28.2	28.2	34.6
132	Trapper Cabin	28.4	28.4	34.8
139	Park Vacation Home	13.9	13.9	20.3

Notes:

L_d = daytime equivalent sound level; L_{dn} day-night average sound level; dBA = A-weighted decibel sound level

Table 14 Construction Phase Sound Level at MacLellan Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
66	Potential Indigenous Receptor	21.8	21.8	28.2
67	Potential Indigenous Receptor	23.2	23.2	29.6
68	Potential Indigenous Receptor	26.1	26.1	32.5
69	Potential Indigenous Receptor	21.0	21.0	27.4
78	Potential Indigenous Receptor	20.9	20.9	27.3
79	Potential Indigenous Receptor	16.8	16.8	23.2
81	Potential Indigenous Receptor	22.8	22.8	29.2
82	Potential Indigenous Receptor	31.0	31.0	37.4
83	Potential Indigenous Receptor	25.0	25.0	31.4
84	Potential Indigenous Receptor	28.2	28.2	34.6
85	Potential Indigenous Receptor	37.7	37.7	44.1
86	Potential Indigenous Receptor	35.1	35.1	41.5
105	Remote Cottage	19.4	19.4	25.8
115	Museum Site	23.0	23.0	29.4
116	Communication Site	25.1	25.1	31.5
121	Recreation Lot	26.5	26.5	32.9
123	Potential Indigenous Receptor	28.4	28.4	34.8
135	Park Vacation Home	26.3	26.3	32.7
163	Lynn Lake Friendship Center	23.6	23.6	30.0
166	Lynn Lake Gospel Church	23.4	23.4	29.8
169	Lynn Lake Library	23.1	23.1	29.5
172	West Lynn Lake High School	22.3	22.3	28.7
173	Lynn Lake Hospital	24.6	24.6	31.0
177	Lynn Lake Residence	23.9	23.9	30.3
178	Lynn Lake Residence	24.4	24.4	30.8
225	Lynn Lake Residence	22.2	22.2	28.6
--	Temporary Work Camp (outdoor)	57.1	57.1	63.5

Notes:

L_d = daytime equivalent sound level; L_{dn} day-night average sound level; dBA = A-weighted decibel sound level

4.2 Operation

Table 15 and Table 16 and summarize the Project only daytime, nighttime, and day-night average sound level results at the receptors for the Gordon site and MacLellan site during the operation phase, respectively. Figure 3 and Figure 4 in Attachment B illustrate the operation phase only noise contour maps for the Gordon site and MacLellan site, respectively.

Table 15 Operation Phase Sound Level at Gordon Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
59	Potential Indigenous Receptor	30.4	30.4	36.8
61	Potential Indigenous Receptor	22	22	28.4
62	Potential Indigenous Receptor	18.6	18.6	25
72	Potential Indigenous Receptor	32	32	24.8
73	Potential Indigenous Receptor	31.4	31.4	38.5
74	Potential Indigenous Receptor	27.6	27.6	37.8
76	Potential Indigenous Receptor	39.9	39.9	34
77	Potential Indigenous Receptor	38.7	38.7	46.3
93	Black Sturgeon Reserve Residence	19.6	19.6	45.2
101	Black Sturgeon Reserve Residence	21.7	21.7	26
104	Remote Cottage	7	7	28.1
126	Recreation Lot	18.6	18.6	13.4
130	Remote Cottage	18.9	18.9	25
131	Remote Cottage	33.7	33.7	25.3
132	Trapper Cabin	32.2	32.2	40.1
139	Park Vacation Home	19	19	25.4

Notes:

L_d = daytime equivalent sound level; L_{dn} day-night average sound level; dBA = A-weighted decibel sound level

Table 16 Operation Phase Sound Level at MacLellan Site

Receptor ID	Description	Project Daytime Sound Level, L_d (dBA)	Project Nighttime Sound Level, L_n (dBA)	Project Day-Night Sound Level, L_{dn} (dBA)
66	Potential Indigenous Receptor	25.8	25.8	32.2
67	Potential Indigenous Receptor	27.4	27.4	33.8
68	Potential Indigenous Receptor	29.6	29.6	36
69	Potential Indigenous Receptor	25.2	25.2	31.6
78	Potential Indigenous Receptor	24.7	24.7	31.1
79	Potential Indigenous Receptor	20.5	20.5	26.9
81	Potential Indigenous Receptor	26.5	26.5	33
82	Potential Indigenous Receptor	34.7	34.7	41.2
83	Potential Indigenous Receptor	28.7	28.7	35.1
84	Potential Indigenous Receptor	30.5	30.5	36.9
85	Potential Indigenous Receptor	38.4	38.4	44.8
86	Potential Indigenous Receptor	38.8	38.8	45.2
105	Remote Cottage	23.8	23.8	30.2
115	Museum Site	27	27	33.4
116	Communication Site	29.2	29.2	35.6
121	Recreation Lot	30.4	30.4	36.8
123	Potential Indigenous Receptor	31.5	31.5	37.9
135	Park Vacation Home	28.4	28.4	34.8
163	Lynn Lake Friendship Center	27.1	27.1	33.5
166	Lynn Lake Gospel Church	27.3	27.3	33.7
169	Lynn Lake Library	27.1	27.1	33.5
172	West Lynn Lake High School	26.1	26.1	32.5
173	Lynn Lake Hospital	29.2	29.2	35.6
177	Lynn Lake Residence	27.3	27.3	33.8
178	Lynn Lake Residence	27.4	27.4	33.8
225	Lynn Lake Residence	26.9	26.9	33.3
--	Temporary Work Camp (outdoor)	59.7	59.7	66.1

Note:

L_d = daytime equivalent sound level; L_{dn} day-night average sound level; dBA = A-weighted decibel sound level

4.3 Comparison to Regulatory Framework

4.3.1 Manitoba

During the construction phase the predicted Project L_d and L_n sound levels (see Table 13 and Table 14) at all residential receptors near both Gordon site and MacLellan site are below the Manitoba noise guideline (i.e., Manitoba Guidelines for Sound Pollution) target of 55 dBA daytime and 45 dBA nighttime. During the operation phase the predicted Project L_d and L_n sound levels (see Table 15 and Table 16) at all residential receptors are below the Manitoba noise guideline target of 55 dBA daytime and 45 dBA nighttime.

4.3.2 Health Canada Change in Percent Highly Annoyed Noise Level

For the construction and operation phases, change in percent highly annoyed (%HA) associated with the Project is compared with the threshold of 6.5% advised by Health Canada guidance (i.e., Guidance for Evaluating Human Health Effects in Impact Assessment: NOISE). The change is %HA at a receptor is based on the difference between the baseline %HA and total (Project and Baseline) %HA.

The changes in %HA associated with the Project construction phase at the Gordon site and the MacLellan site are summarized in Table 17 and Table 18, respectively. The changed in %HA results are compared to the target for change in %HA of 6.5% advised in the Health Canada noise guidance. The changes in %HA at all receptors are below the 6.5% target for the construction phase. The results indicate compliance with the Health Canada guidance.

The changes in %HA associated with the operation phase at the Gordon site and MacLellan site are summarized in Table 19 and Table 20, respectively. The changed in %HA results are compared to the target for change in %HA of 6.5% advised in the Health Canada noise guidance. The changes in %HA at all receptors are below the 6.5% target for the operation phase. The results indicate compliance with the Health Canada guidance.

Table 17 Construction Phase – Change in %HA at Gordon Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
59	Potential Indigenous Receptor	40.0	50.0	2.17	29.3	40.3	50.3	2.28	0.1
61	Potential Indigenous Receptor	40.0	50.0	2.17	23.1	40.0	50.0	2.20	0.0
62	Potential Indigenous Receptor	40.0	50.0	2.17	19.2	40.0	50.0	2.18	0.0
72	Potential Indigenous Receptor	40.0	50.0	2.17	35.5	41.3	51.3	2.58	0.4
73	Potential Indigenous Receptor	40.0	50.0	2.17	36.1	41.5	51.5	2.64	0.5
74	Potential Indigenous Receptor	40.0	50.0	2.17	30.6	40.4	50.4	2.31	0.1
76	Potential Indigenous Receptor	40.0	50.0	2.17	41.1	43.6	53.6	3.46	1.3
77	Potential Indigenous Receptor	40.0	50.0	2.17	40.6	43.3	53.3	3.34	1.2
93	Black Sturgeon Reserve Residence	44.6	54.6	3.92	20.7	44.6	54.6	3.93	0.0
101	Black Sturgeon Reserve Residence	44.6	54.6	3.92	22.6	44.6	54.6	3.94	0.0
104	Remote Cottage	40.0	50.0	2.17	10.9	40.0	50.0	2.18	0.0
126	Recreation Lot	40.0	50.0	2.17	20.1	40.0	50.0	2.19	0.0
130	Remote Cottage	40.0	50.0	2.17	20.2	40.0	50.0	2.19	0.0
131	Remote Cottage	40.0	50.0	2.17	34.6	41.1	51.1	2.51	0.3
132	Trapper Cabin	40.0	50.0	2.17	34.8	41.1	51.1	2.52	0.4
139	Park Vacation Home	40.0	50.0	2.17	20.3	40.0	50.0	2.19	0.0

Notes:

[1] The + 10 dB “peace and quiet” adjustment is included

L_{dn} day-night average sound level; dBA = A-weighted decibel sound level; %HA = percent highly annoyed

Table 18 Construction Phase – Change in %HA at MacLellan Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
66	Potential Indigenous Receptor	40.0	50.0	2.17	28.2	40.2	50.2	2.25	0.1
67	Potential Indigenous Receptor	40.0	50.0	2.17	29.6	40.3	50.3	2.28	0.1
68	Potential Indigenous Receptor	40.0	50.0	2.17	32.5	40.7	50.7	2.39	0.2
69	Potential Indigenous Receptor	40.0	50.0	2.17	27.4	40.2	50.2	2.24	0.1
78	Potential Indigenous Receptor	40.0	50.0	2.17	27.3	40.2	50.2	2.24	0.1
79	Potential Indigenous Receptor	40.0	50.0	2.17	23.2	40.0	50.0	2.20	0.0
81	Potential Indigenous Receptor	40.0	50.0	2.17	29.2	40.3	50.3	2.28	0.1
82	Potential Indigenous Receptor	40.0	50.0	2.17	37.4	41.9	51.9	2.78	0.6
83	Potential Indigenous Receptor	40.0	50.0	2.17	31.4	40.5	50.5	2.34	0.2
84	Potential Indigenous Receptor	40.0	50.0	2.17	34.6	41.1	51.1	2.51	0.3
85	Potential Indigenous Receptor	40.0	50.0	2.17	44.1	45.5	55.5	4.43	2.3
86	Potential Indigenous Receptor	40.0	50.0	2.17	41.5	43.8	53.8	3.57	1.4
105	Remote Cottage	40.0	50.0	2.17	25.8	40.1	50.1	2.22	0.0
115	Museum Site	45.0	55.0	4.15	29.4	45.1	55.1	4.21	0.1
116	Communication Site	45.0	55.0	4.15	31.5	45.2	55.2	4.25	0.1
121	Recreation Lot	42.9	52.9	3.18	32.9	43.3	53.3	3.36	0.2
123	Potential Indigenous Receptor	42.9	52.9	3.18	34.8	43.5	53.5	3.45	0.3
135	Park Vacation Home	42.9	52.9	3.18	32.7	43.3	53.3	3.35	0.2
163	Lynn Lake Friendship Center	45.0	55.0	4.15	30.0	45.1	55.1	4.22	0.1
166	Lynn Lake Gospel Church	45.0	55.0	4.15	29.8	45.1	55.1	4.22	0.1
169	Lynn Lake Library	45.0	55.0	4.15	29.5	45.1	55.1	4.21	0.1
172	West Lynn Lake High School	45.0	55.0	4.15	28.7	45.1	55.1	4.20	0.1
173	Lynn Lake Hospital	45.0	55.0	4.15	31.0	45.2	55.2	4.24	0.1
177	Lynn Lake Residence	45.0	55.0	4.15	30.3	45.1	55.1	4.23	0.1
178	Lynn Lake Residence	45.0	55.0	4.15	30.8	45.2	55.2	4.23	0.1
225	Lynn Lake Residence	45.0	55.0	4.15	28.6	45.1	55.1	4.20	0.1

Notes:

[1] The + 10 dB “peace and quiet” adjustment is included

L_{dn} day-night average sound level; dBA = A-weighted decibel sound level; %HA = percent highly annoyed

Table 19 Operation Phase – Change in %HA at Gordon Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
59	Potential Indigenous Receptor	40.0	50.0	2.17	37.1	41.8	51.8	2.75	0.6
61	Potential Indigenous Receptor	40.0	50.0	2.17	28.7	40.3	50.3	2.26	0.1
62	Potential Indigenous Receptor	40.0	50.0	2.17	25	40.1	50.1	2.21	0.0
72	Potential Indigenous Receptor	40.0	50.0	2.17	38.5	42.3	52.3	2.94	0.8
73	Potential Indigenous Receptor	40.0	50.0	2.17	37.8	42.0	52.0	2.84	0.7
74	Potential Indigenous Receptor	40.0	50.0	2.17	34	40.9	50.9	2.47	0.3
76	Potential Indigenous Receptor	40.0	50.0	2.17	46.3	47.2	57.2	5.48	3.3
77	Potential Indigenous Receptor	40.0	50.0	2.17	45.2	46.3	56.3	4.87	2.7
93	Black Sturgeon Reserve Residence	44.6	54.6	3.92	26.2	44.6	54.6	3.95	0.0
101	Black Sturgeon Reserve Residence	44.6	54.6	3.92	28.3	44.7	54.7	3.97	0.1
104	Remote Cottage	40.0	50.0	2.17	13.4	40.0	50.0	2.18	0.0
126	Recreation Lot	40.0	50.0	2.17	25.3	40.1	50.1	2.21	0.0
130	Remote Cottage	40.0	50.0	2.17	25.5	40.1	50.1	2.22	0.0
131	Remote Cottage	40.0	50.0	2.17	40.4	43.2	53.2	3.30	1.1
132	Trapper Cabin	40.0	50.0	2.17	38.7	42.4	52.4	2.97	0.8
139	Park Vacation Home	40.0	50.0	2.17	25.7	40.1	50.1	2.22	0.0

Note:

[1] The + 10 dB “peace and quiet” adjustment is included

L_{dn} day-night average sound level; dBA = A-weighted decibel sound level; %HA = percent highly annoyed

Table 20 Operation Phase – Change in %HA at MacLellan Site

Receptor ID	Description	Baseline			Project L_{dn} (dBA)	Total			Change in %HA (Between Total and Baseline)
		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA		L_{dn} (dBA)	$L_{dn, adjusted}$ [1] (dBA)	%HA	
66	Potential Indigenous Receptor	40.0	50.0	2.17	32.2	40.6	50.6	2.37	0.2
67	Potential Indigenous Receptor	40.0	50.0	2.17	33.8	40.9	50.9	2.46	0.3
68	Potential Indigenous Receptor	40.0	50.0	2.17	36.0	41.4	51.4	2.63	0.5
69	Potential Indigenous Receptor	40.0	50.0	2.17	31.6	40.5	50.5	2.35	0.2
78	Potential Indigenous Receptor	40.0	50.0	2.17	31.1	40.5	50.5	2.33	0.2
79	Potential Indigenous Receptor	40.0	50.0	2.17	26.9	40.2	50.2	2.23	0.1
81	Potential Indigenous Receptor	40.0	50.0	2.17	32.9	40.7	50.7	2.41	0.2
82	Potential Indigenous Receptor	40.0	50.0	2.17	41.1	43.6	53.6	3.46	1.3
83	Potential Indigenous Receptor	40.0	50.0	2.17	35.1	41.2	51.2	2.55	0.4
84	Potential Indigenous Receptor	40.0	50.0	2.17	36.9	41.7	51.7	2.72	0.5
85	Potential Indigenous Receptor	40.0	50.0	2.17	44.8	46.0	56.0	4.73	2.6
86	Potential Indigenous Receptor	40.0	50.0	2.17	45.2	46.3	56.3	4.91	2.7
105	Remote Cottage	40.0	50.0	2.17	30.2	40.4	50	2.30	0.1
115	Museum Site	45.0	55.0	4.15	33.4	45.3	55.3	4.30	0.2
116	Communication Site	45.0	55.0	4.15	35.6	45.5	55.5	4.40	0.3
121	Recreation Lot	42.9	52.9	3.18	36.8	43.9	53.9	3.60	0.4
123	Potential Indigenous Receptor	42.9	52.9	3.18	37.9	44.1	54.1	3.71	0.5
135	Park Vacation Home	42.9	52.9	3.18	34.8	43.5	53.5	3.45	0.3
163	Lynn Lake Friendship Center	45.0	55.0	4.15	33.5	45.3	55.3	4.31	0.2
166	Lynn Lake Gospel Church	45.0	55.0	4.15	33.7	45.3	55.3	4.32	0.2
169	Lynn Lake Library	45.0	55.0	4.15	33.5	45.3	55.3	4.31	0.2
172	West Lynn Lake High School	45.0	55.0	4.15	32.5	45.2	55.2	4.28	0.1
173	Lynn Lake Hospital	45.0	55.0	4.15	35.6	45.5	55.5	4.40	0.3
177	Lynn Lake Residence	45.0	55.0	4.15	33.7	45.3	55.3	4.32	0.2
178	Lynn Lake Residence	45.0	55.0	4.15	33.8	45.3	55.3	4.32	0.2
225	Lynn Lake Residence	45.0	55.0	4.15	33.3	45.3	55.3	4.30	0.2

Notes:

[1] The + 10 dB “peace and quiet” adjustment is included

L_{dn} day-night average sound level; dBA = A-weighted decibel sound level; %HA = percent highly annoyed

4.3.3 Health Canada Low Frequency Noise

As a target for the low frequency noise (LFN) issue, Health Canada noise guidance recommends that the energy sum of the linear sound levels in the 16, 31.5 and 63-Hz octave bands at a receptor location not exceed 70 dBL.

Table 21 summarizes the predicted octave band sound level at 16 Hz, 31.5 Hz, and 63 Hz for the receptors near the Gordon sites during the construction and operation phases; and Table 22 summarizes the predicted octave band sound level at 16 Hz, 31.5 Hz, and 63 Hz for the receptors near the MacLellan sites during the construction and operation phases.

Assessment of the 16 Hz sound pressure level is not possible because no sound power data is available for the proposed equipment and this octave band is outside of the ISO 9613-2 calculation standard. However, Stantec's professional experience suggests that the 16 Hz octave band sound pressure level will be similar to that of the 31.5 Hz octave band. The sound levels at 16 Hz octave band were therefore assumed to be the same as the sound levels at 31.5 Hz octave band.

Potential for LFN noise effect is low at receptors near both the Gordon site and MacLellan site because the predicted sound level results are below the Health Canada target of 70 dBL.

Table 21 Sound Level at 16 Hz, 31.5 Hz and 63 Hz Octave Band Frequency at Gordon Site

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz	16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz
59	Potential Indigenous Receptor	36.4	36.4	39.5	42.5	39.9	39.9	44.4	46.7
61	Potential Indigenous Receptor	34.6	34.6	36.9	40.3	38.3	38.3	41	44.2
62	Potential Indigenous Receptor	32	32	33.9	37.5	35.6	35.6	38	41.3
72	Potential Indigenous Receptor	44.4	44.4	47	50.2	47.1	47.1	49.6	52.9
73	Potential Indigenous Receptor	45	45	47.4	50.7	47.7	47.7	49.6	53.2
74	Potential Indigenous Receptor	41.1	41.1	43.2	46.7	44.8	44.8	46.8	50.3
76	Potential Indigenous Receptor	49	49	51.4	54.7	53	53	55.6	58.8
77	Potential Indigenous Receptor	48.9	48.9	51.5	54.7	52.3	52.3	55	58.2

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz	16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz
93	Black Sturgeon Reserve Residence	32.6	32.6	34.6	38.1	35.7	35.7	38	41.4
101	Black Sturgeon Reserve Residence	34	34	36.3	39.7	37.7	37.7	40.4	43.6
104	Remote Cottage	27.1	27.1	28.6	32.4	29.2	29.2	30.5	34.4
126	Recreation Lot	32.5	32.5	34.5	38.0	36.1	36.1	38.4	41.8
130	Remote Cottage	32.6	32.6	34.6	38.1	36.2	36.2	38.5	41.9
131	Remote Cottage	42.7	42.7	45.5	48.6	46.1	46.1	49.3	52.2
132	Trapper Cabin	43.6	43.6	46.3	49.5	46.6	46.6	49.3	52.5
139	Park Vacation Home	32.6	32.6	34.6	38.1	36.2	36.2	38.5	41.9

Notes:

L_d = daytime equivalent sound level; L_n nighttime equivalent sound level; dBA = A-weighted decibel sound level; dB = decibel; Hz = Hertz

Table 22 Sound Level at 16 Hz, 31.5 Hz and 63 Hz Octave Band Frequency at MacLellan Site

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz	16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz
66	Potential Indigenous Receptor	42.2	42.2	44.3	47.8	47.3	47.3	48.6	52.5
67	Potential Indigenous Receptor	42.7	42.7	44.9	48.3	48.4	48.4	49.8	53.7
68	Potential Indigenous Receptor	44.1	44.1	46.5	49.8	49.1	49.1	50.7	54.5
69	Potential Indigenous Receptor	40.9	40.9	43	46.5	46.4	46.4	47.8	51.7
78	Potential Indigenous Receptor	40.9	40.9	43	46.5	45.9	45.9	47.3	51.2
79	Potential Indigenous Receptor	37.7	37.7	39.5	43.2	42.5	42.5	43.7	47.7

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Receptor ID	Description	Construction Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)				Operation Phase Predicted Daytime or Nighttime Sound Level, L_d or L_n (dB)			
		16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz	16 Hz	31.5 Hz	63 Hz	Sum of 16 Hz to 63 Hz
81	Potential Indigenous Receptor	42.1	42.1	44.3	47.7	47	47	48.6	52.4
82	Potential Indigenous Receptor	47.7	47.7	50.2	53.5	52.8	52.8	54.8	58.3
83	Potential Indigenous Receptor	43.9	43.9	46.3	49.6	48.9	48.9	50.6	54.3
84	Potential Indigenous Receptor	46.7	46.7	49.3	52.5	50.1	50.1	51.9	55.6
85	Potential Indigenous Receptor	53.2	53.2	56	59.1	56.9	56.9	57.5	61.9
86	Potential Indigenous Receptor	49.7	49.7	52.4	55.6	56.2	56.2	57.7	61.5
105	Potential Indigenous Receptor	40	40	42	45.5	45.8	45.8	46.9	51.0
115	Museum Site	41.8	41.8	44.1	47.5	47.5	47.5	49	52.8
116	Communication Site	43.3	43.3	45.7	49.0	49.2	49.2	50.6	54.5
121	Recreation Lot	44.4	44.4	46.8	50.1	50.1	50.1	51.8	55.5
123	Potential Indigenous Receptor	46.1	46.1	48.4	51.8	50.9	50.9	52.2	56.1
135	Park Vacation Home	45	45	46.9	50.5	48.8	48.8	49.4	53.8
163	Lynn Lake Friendship Center	42.3	42.3	44.6	48.0	47.4	47.4	48.9	52.7
166	Lynn Lake Gospel Church	42	42	44.3	47.7	47.8	47.8	49.4	53.2
169	Lynn Lake Library	41.9	41.9	44.2	47.6	47.5	47.5	49.1	52.9
172	West Lynn Lake High School	41.5	41.5	43.7	47.1	46.8	46.8	48.2	52.1
173	Lynn Lake Hospital	42.7	42.7	45	48.4	49.5	49.5	50.9	41.3
177	Lynn Lake Residence	42.7	42.7	44.9	48.3	47.6	47.6	49	39.5
178	Lynn Lake Residence	42.6	42.6	45	48.3	47.6	47.6	49	39.5
225	Lynn Lake Residence	41.4	41.4	43.6	47.0	47.4	47.4	49	39.1

Notes:

L_d = daytime equivalent sound level; L_n nighttime equivalent sound level; DBA = a-weighted decibel sound level; Hz = Hertz

4.3.4 World Health Organization Sleep Disturbance

The outdoor nighttime annual sound level of 40 dBA was used as the sleep disturbance noise target for this assessment update, based on the World Health Organization Night Guidelines for Europe (WHO 2009). The L_n results in Table 14 and Table 15 indicate that the nighttime equivalent sound level from the Project is below 40 dBA at all residential receptors. No noise-related sleep disturbances of residential receptors are expected from the Project construction and operation during the nighttime period.

It is assumed that a minimum of 30-dB noise reduction is expected for the work camp building walls with the windows closed. Air conditioning units are recommended for the work camp building such that exterior windows and doors can be closed during summer season. The WHO (1999) recommends a target for sleep disturbance as being an indoor sound level of no more than 30 dBA. The predicted daytime or nighttime sound level at the temporary work camp is 57.1 dBA outdoor during the construction phase. The predicted daytime or nighttime sound level at the permanent work camp and 59.7 dBA outdoor during the operation phase. The construction phase noise level inside the temporary work camp is predicted to be 27.1 dBA. The operation phase noise level inside the temporary work camp is predicted to be 29.7 dBA. The indoor level predicted is based on a building transmission loss of 30 dB with the exterior windows and doors closed.

Therefore, the predicted results during both construction and operation phases are below the WHO 1999 indoor sound level target of 30 dBA. No noise-related sleep disturbances of workers are expected from the Project during the daytime and nighttime periods.

5 Vibration Model Results

5.1 Operation Phase

During the operation phase, as described in Section 1.6 due to the increase of the highest blasting charge per hole (i.e., increased from 208 kg in the 2019 design to 230 kg in the 2023 design), and changes to the shortest distances from the receptors to the open pit boundary, the predicted results of the ground-borne vibration and air overpressure levels marginally increase for some receptors in comparison to the Stantec 2020 assessment.

Table 23 and Table 24 present the predicted ground-borne vibration and air overpressure for receptors at the Gordon site and MacLellan site, respectively. To be conservative in the predictions, the distance to each receptor was taken from the final pit boundary, and blasts were assumed to be fired with 230 kg of explosives.

Table 23 Blast Related Vibration Levels for Receptors near Gordon Site

Receptor ID	Description	Distance to Open Pit (m)	Ground-borne Vibration (mm/s)	Air Overpressure with blast charge of 230 kg per hole per delay (dBL)	Air Overpressure with blast charge of 43 kg per hole per delay (dBL)
59	Potential Indigenous Receptor	8465	0.2	113	109
61	Potential Indigenous Receptor	10855	0.2	111	108
62	Potential Indigenous Receptor	10855	0.1	109	106
72	Potential Indigenous Receptor	3080	1.0	119	115
73	Potential Indigenous Receptor	2125	1.8	121[a]	118
74	Potential Indigenous Receptor	3135	1.0	119	115
76	Potential Indigenous Receptor	1420	3.4	124[a]	120
77	Potential Indigenous Receptor	2255	1.7	121[a]	117
93	Black Sturgeon Residence Reserve	11720	0.1	111	107
101	Black Sturgeon Residence Reserve	11655	0.1	111	107
104	Remote Cottage	17070	0.1	108	105
126	Recreation Lot	13345	0.1	110	106
130	Remote Cottage	13155	0.1	110	106
131	Remote Cottage	4135	0.7	117	113
132	Trapper Cabin	3470	0.9	118	115
139	Park Vacation Home	13140	0.1	110	106

Notes:

[a] exceeds the target of 120 dBL based on the blast charge of 230 kg per hole per delay. However, the reduced charge as recommended in the mitigation section will lower the air overpressure to 120 dBL at Receptor ID 73, ID 76 and ID 77.

m = metres; mm/s = millimetres per second; kg = kilograms; dBL = linear (unweighted) decibel sound level

Table 24 Blast Related Vibration Levels for Receptors near MacLellan Site

Receptor ID	Description	Distance to Open Pit (m)	Ground-borne Vibration (mm/s)	Air Overpressure with blast charge of 230 kg per hole per delay (dBL)	Air Overpressure with blast charge of 85 kg per hole per delay (dBL)
66	Potential Indigenous Receptor	9090	0.2	112	110
67	Potential Indigenous Receptor	7790	0.3	113	111
68	Potential Indigenous Receptor	5520	0.4	115	113
69	Potential Indigenous Receptor	9100	0.2	112	110
78	Potential Indigenous Receptor	9100	0.2	112	110
79	Potential Indigenous Receptor	12050	0.1	110	108
81	Potential Indigenous Receptor	7520	0.3	113	111
82	Potential Indigenous Receptor	3785	0.8	117	115
83	Potential Indigenous Receptor	7085	0.3	114	112
84	Potential Indigenous Receptor	6230	0.4	114	112
85	Potential Indigenous Receptor	3050	1.1	119	117
86	Potential Indigenous Receptor	2350	1.6	120	118
105	Remote Cottage	10730	0.2	111	109
115	Museum Site	6875	0.3	114	112
116	Communication Site	5585	0.4	115	113
121	Recreation Lot	5255	0.5	115	113
123	Potential Indigenous Receptor	3935	0.7	117	115
135	Park Vacation Home	3960	0.7	117	115
163	Lynn Lake Friendship Center	6350	0.3	114	112
166	Lynn Lake Gospel Church	6715	0.3	114	112
169	Lynn Lake Library	6765	0.3	114	112
172	West Lynn Lake High School	7125	0.3	114	112
173	Lynn Lake Hospital	6165	0.4	114	112
177	Lynn Lake Residence	6005	0.4	115	113
178	Lynn Lake Residence	6060	0.4	115	113
225	Lynn Lake Residence	7355	0.3	113	111
	Permanent Work Camp (outdoor)	750	8.9	127 [a]	125

Notes:

[a] exceeds the Health Canada target of 125 dBL based on the blast charge of 230 kg per hole per delay. However, the reduced charge of 85 kg per hole per delay will lower the air overpressure to 125 dBL at the permanent work camp.

m = metres; mm/s = millimetres per second; kg = kilograms; dBL = linear (unweighted) decibel sound level

The highest blast charge of 230 kg will result in ground-borne vibration below the vibration target of 10 mm/s at all receptors for the Gordon site. The predicted air overpressures are below the vibration target of 120 dBL at all receptors, with the exception of receptor ID 73, ID 76 and ID 77 near the Gordon site. The predicted air overpressure at receptor ID 73 and ID 77 is 121 dBL and ID 76 is 124 dBL, respectively. When the blast charge is reduced from 230 kg to 43 kg per hole per delay, the predicted overpressures at receptor ID 73, ID 76 and ID 77 meet the 120 dBL target.

The highest blast charge of 230 kg will result in ground-borne vibration below the vibration target of 10 mm/s at all receptors for the MacLellan site. The predicted air overpressures are below the vibration target of 120 dBL at all receptors, with the exception of the permanent work camp at the MacLellan Site. The predicted air overpressure at the permanent work camp is 127 dBL. This level is also above the Health Canada target of 125 dBL for one blast per day. In order to meet the Health Canada target of 125 dBL, the blast charge reduction to 85 kg per hole per delay is required. The reduced blast charge of 85 kg can be implemented initially to achieve the overpressure level of 125 dBL at the permanent work camp. The reduced blast charge of 85 kg can be increased if monitoring results indicate air overpressure level below 125 dBL at the permanent work camp.

5.2 Mitigation

The modelling results presented in Section 5.1 include a scenario with mitigation. In an adaptive management approach, mitigation measures presented in this section will be implemented as needed, and monitoring will help to confirm effectiveness. Mitigation will be achieved by blast design. The mitigation measures that apply to both the Gordon and MacLellan sites are summarized as follows:

- Highest blasting charge per hole that do not exceed 230 kg.
- Only one hole/delay will be fired in the blast.
- Minimum time delay between holes in blasts will not be less than 8 milliseconds (ms).
- The specific mitigation measures for the permanent work cmp within the MacLellan site are as follows:
    - Reduced blast charge of 85 kg can be increased if the distance between the blast and the permanent work camp is more than 750 m.
    - The reduced blast charge of 85 kg can be increased if monitoring results indicate air overpressure level is below 125 dBL at the permanent work camp.
    - Blasting will be scheduled during shift change (e.g., less worker sleeping and more local activities) to reduce potential annoyance at the permanent work camp.

The specific mitigation measures for receptor ID 73, ID 76 and ID 77 near the Gordon site are as follows:

- The reduced blast charge of 43 kg can be increased if the distances between the blast and closest receptor ID 76, ID 73 and ID 77 are more than 1,420 m, 2125 m and 2,255 m, respectively (distance based on receptor location to pit boundary).

- The reduced blast charge of 43 kg can be increased if monitoring results indicate air overpressure level is below 120 dBL at ID 73, ID 76 and ID 77.
- Engagement with Marcel Colomb First Nation to discuss the potential of a seasonal mitigation approach, which relaxes the reduced blast charge of 43 kg during off-season period when trapping activities at receptors (ID 73, ID 76 and ID 77) is not expected.

6 Discussion

This Noise and Vibration Impact Assessment Update predicted the noise and vibration effects to the environment based on the Project 2023 design. Due to the design changes (see Section 1), the predicted results are different from the Stantec 2020 assessment results. Table 25 and Table 26 assessment update and the Stantec 2020 assessment for the construction and operation phase, respectively.

Table 25 Comparison of Predicted Results of Project Construction Phase

Mine Site	Receptor	L_d or L_d (dBA)			L_{dn} (dBA)			Change in %HA (%)		
		2020	Update	Changes	2020	Update	Change	2020	Update	Change
Gordon	ID77	30.7	33.8	+3.1	37.1	40.2	+3.1	2.2	3.3	1.1
MacLellan	ID85	35.5	37.7	+2.2	41.9	44.1	+2.2	3.7	4.4	0.7
	Work Camp	56.7	57.1	+0.4	63.1	63.5	+0.4	-[1]	-	-

Notes:

[1] "-": Not Applicable

dBA = A-weighted decibel sound level; %HA = percent highly annoyed

Table 26 Comparison of Predicted Results of Project Operation Phase

Mine Site	Receptor	L_d or L_d (dBA)			L_{dn} (dBA)			Change in %HA (%)		
		2020	Update	Changes	2020	Update	Change	2020	Update	Change
Gordon	ID76	38.5	39.9	+1.4	44.9	46.3	+1.4	4.8	5.5	+0.7
MacLellan	ID86	37.3	38.8	+1.5	43.7	45.2	+1.5	4.3	4.9	+0.6
	Work Camp	53.5	59.7	+6.2	59.9	66.1	+6.2	-[1]	-	-

Notes:

[1] "-": Not Applicable

dBA = A-weighted decibel sound level; %HA = percent highly annoyed

Table 27 compares that the highest vibration results between this assessment update and the Stantec 2020 assessment.

Table 27 Comparison of Vibration Results

Mine Site	Receptor	Ground-borne Vibration (mm/s)			Overpressure (dBL)		
		2020	Update	Changes	2020	Update	Changes
Gordon	ID76	3.1	3.4	+0.3	123	124	+1
MacLellan	ID86	1.4	1.6	+0.2	120	120	0
	Work Camp	7.4	8.9	+1.5	127	127	0

Notes:
mm/s = millimetres per second; dBL = linear (unweighted) decibel sound level

The Project 2023 design marginally increases both noise and vibration effects at some receptors in comparison to the Stantec 2020 assessment. This is because of the changes described in Section 1. However, the assessment update results indicate that the Project will remain compliant with the applicable noise and vibration thresholds (Section 4) at all receptors.

7 Conclusion

This Noise and Vibration Impact Assessment Update focused on the potential changes of the Project noise and vibration effects due to the updated Project 2023 design during the operation and construction phases. Key changes of the Project design include updates to the PDA, Project layouts, mining production quantities, major mine equipment, operation blast parameters. The noise and vibration models for the construction and operation phases of the Project were updated based on identical approach (i.e., receptor locations, regulatory framework, baseline conditions, and modelling method) to the Stantec 2020 assessment.

Noise effects such as community annoyance, sleep disturbance, and low frequency noise were assessed. The predicted noise level during the construction and operation phases on the selected 32 noise receptors were presented.

The operation phase vibration for the blast induced ground vibration and air blast overpressure effects were evaluated for same 32 noise receptors. Blast designs were recommended to avoid structural damage and reduce annoyance effects from blast induced ground vibrations and air blast overpressure.

Compared with the results in Stantec 2020, the noise and vibration effects of the Project activities marginally increased at some receptors. However, the updated results comply with the applicable noise and vibration thresholds during all Project phases. In conclusion, the Noise and Vibration Impact Assessment Update results do not change the characterization of residual effects, or the significance ratings as presented in the EIS (Stantec 2020).

8 Limitations and Sign-off

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Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Attachment A Noise Emission Sources

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Table A.1 Equipment Sound Power Level Summary – Pre-Construction at Gordon Site

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Loading Equipment											
Material Loader PC1250LC-8 (6.7 m3)	2	117	120	121	112	104	105	101	99	95	111
Mine Support Equipment											
Graders - GD655-6	1	108	111	110	106	102	107	101	97	88	109
Tracked Dozer - D375A-6	1	117	120	121	112	104	105	101	99	95	111
Transfer Loader (WA600)	1	113	116	121	112	112	111	109	107	97	116
Snow Plow/Water Truck	1	101	106	106	106	106	104	100	98	99	109
Material Handler PC1250LC-8 (6.7 m3)	1	117	120	121	112	104	105	101	99	95	111
Hydraulic Excavators (PC490LC-11 whammer)	1	113	116	121	112	112	111	109	107	97	116
Road Maint Loader - WA500-8	1	114	117	112	106	107	105	102	97	89	110
Drills											
Drill (178 mm SmartROC D65)	1	112	115	121	113	115	111	108	103	100	117
Hauling Equipment											
Dump Trucks (20 t)	2	111	114	112	114	111	107	104	100	95	113
Articulated Trucks (HD605-8 69 t)	3	118	121	118	113	112	111	109	105	97	116
Mine General Equipment											
Pump Truck	1	113	116	112	103	101	103	100	96	88	107
Lube/Fuel Truck	1	109	111	119	108	101	103	98	92	83	108
Man Bus	2	95	109	106	103	102	101	92	90	85	104
Pickup Trucks	10	106	109	100	96	96	94	92	88	83	99
Welding Truck	1	106	109	100	96	96	94	92	88	83	99
Blasting Truck	1	106	109	100	96	96	94	92	88	83	99
Blasting Loader	1	106	109	100	96	96	94	92	88	83	99
Mechanics Truck	1	106	109	100	96	96	94	92	88	83	99
Diesel Cranes - 35T	1	91	94	93	86	85	83	80	71	62	88

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Tire Manipulator (980 WA5000-8)	1	98	101	93	91	91	90	87	86	77	95
Integrated Tool Carrier WA200-7 (wheel loader)	1	107	110	109	105	101	106	100	96	87	108
Compactor (BW211)	1	102	105	109	107	107	104	101	95	87	109
Lowboy and Tractor (75-100t)	1	117	120	121	112	104	105	101	99	95	111
ADT 40t	1	101	104	107	103	103	104	101	98	93	108
Light Plants	6	98	101	96	88	84	83	81	78	66	89

Note:

dB – linear sound level; dBA- A-weighted sound level

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Table A.2 Equipment Sound Power Level Summary – Pre-Construction at MacLellan Site

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Loading Equipment											
WA900 Loader (11.5 m3)	1	114	117	112	106	107	105	102	97	89	110
Shovel (PC4000 22 m3)	1	113	116	121	112	112	111	109	107	97	116
Mine Support Equipment											
Graders - GD655-6	2	108	111	110	106	102	107	101	97	88	109
Tracked Dozer - D375A-6	5	117	120	121	112	104	105	101	99	95	111
Transfer Loader (WA600)	1	113	116	121	112	112	111	109	107	97	116
Snow Plow/Water Truck	3	101	106	106	106	106	104	100	98	99	109
Material Handler PC1250LC-8 (6.7 m3)	1	117	120	121	112	104	105	101	99	95	111
Hydraulic Excavators (PC490LC-11 whammer)	1	113	116	121	112	112	111	109	107	97	116
Road Maint Loader - WA500-8	1	114	117	112	106	107	105	102	97	89	110
Drills											
Drill (178 mm SmartROC D65)	1	112	115	121	113	115	111	108	103	100	117
Drill Rigs (178 mm PV275)	1	110	113	121	106	107	108	107	104	102	114
Hauling Equipment											
Dump Trucks (20 t)	3	111	114	112	114	111	107	104	100	95	113
Articulated Trucks (HD1500-150 t)	4	122	125	123	119	119	114	112	107	103	120
Mine General Equipment											
Pump Truck	1	113	116	112	103	101	103	100	96	88	107
Lube/Fuel Truck	1	109	111	119	108	101	103	98	92	83	108
Man Bus	2	95	109	106	103	102	101	92	90	85	104

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Power Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Pickup Trucks	16	106	109	100	96	96	94	92	88	83	99
Welding Truck	1	106	109	100	96	96	94	92	88	83	99
Blasting Truck	1	106	109	100	96	96	94	92	88	83	99
Blasting Loader	1	106	109	100	96	96	94	92	88	83	99
Mechanics Truck	1	106	109	100	96	96	94	92	88	83	99
Diesel Cranes - 35T	1	91	94	93	86	85	83	80	71	62	88
Tire Manipulator (980 WA5000-8)	1	98	101	93	91	91	90	87	86	77	95
Integrated Tool Carrier WA200-7 (wheel loader)	1	107	110	109	105	101	106	100	96	87	108
Compactor (BW211)	1	102	105	109	107	107	104	101	95	87	109
Lowboy and Tractor (75-100t)	1	117	120	121	112	104	105	101	99	95	111
ADT 40t	2	101	104	107	103	103	104	101	98	93	108
Light Plants	8	98	101	96	88	84	83	81	78	66	89

Notes:

dB – linear sound level; dBA- A-weighted sound level

Table A.3 Equipment Sound Power Level Summary – Operation, Processing Plant

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Primary Crusher Building											
Primary & Secondary Crusher Overhead Crane	1	96	99	90	88	85	83	78	70	61	88
Primary Crusher	1	115	115	115	111	109	106	104	100	91	112
Primary Crusher Transfer Conveyor	1	90	90	93	95	98	98	97	92	84	103
Apron Feeder	1	113	113	113	111	109	108	106	100	93	112
Vibrating Grizzly Screen	2	107	110	108	105	105	100	100	97	90	107
Rock Breaker	1	113	116	116	114	117	111	111	108	104	118
Secondary Screen Feed Conveyor	1	90	90	93	95	98	98	97	92	84	103
Pre-leach Thickener mechanism	1	81	81	84	86	89	89	88	83	75	93
Secondary Crusher Building											
Secondary Crusher Overhead Crane	1	96	99	90	88	85	83	78	70	61	88
Secondary Crusher	1	118	118	118	114	112	109	107	103	94	115
Fine Ore Stockpile Feed Conveyor	1	91	91	94	96	99	99	98	93	85	104
Secondary Crusher Bag House	1	104	107	100	100	97	97	92	90	89	101
Secondary Crusher Belt Feeder	1	107	107	107	105	103	102	100	94	87	107
Secondary Screen	1	104	107	105	102	102	97	97	94	87	104
Mill Building											
Cyclone Feed Pump Box	1	78	79	81	83	84	86	83	79	72	90
Cyclone Feed Pump	2	100	101	103	104	104	106	104	100	94	110
Grinding Area Pump	2	100	100	103	105	107	108	106	101	94	112
CIP Tailings Pump	2	97	98	100	102	104	105	103	98	91	109
CIP Area Sump Pump	1	80	81	82	84	85	87	85	81	74	91
Pre-leach Thickener Area Sum Pump	2	85	86	88	90	91	93	91	86	79	97

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Pre-leach Thickener Underflow Pump	2	85	86	88	90	91	93	91	86	79	97
Flocculant Dosing Pump	1	86	87	89	91	92	94	92	87	80	98
Elution Area Sump Pump	2	89	90	92	94	95	97	95	90	83	101
Carbon Transfer Pump	2	82	83	84	86	87	89	87	83	76	93
Carbon Area Sump Pump	2	82	83	84	86	87	89	87	83	76	93
Process Building Overhead Crane	1	103	106	97	95	92	90	85	77	68	95
Cyclone Cluster	1	81	81	84	86	89	89	88	83	75	93
Pre-leach Sampler	2	81	81	84	86	89	89	88	83	75	93
Flocculant Mixing System	1	107	110	108	105	105	100	100	97	90	107
Carbon Safety Screen	1	104	107	105	102	102	97	97	94	87	104
Pebble Conveyor	2	75	75	78	80	83	83	82	77	69	88
Carbon Regen Exhaust Fan	1	85	85	91	92	91	89	88	82	80	94
Ball Mill	1	113	114	113	112	110	111	110	101	91	115
Sag Mill	1	110	111	110	109	107	108	108	99	89	113
Ball Hopper	2	107	110	103	103	100	100	95	93	92	104
Ball Kibble	2	107	110	103	103	100	100	95	93	92	104
Sag Mill Liner Handler	1	103	106	97	95	92	90	85	77	68	95
Carbon Regen Kilin Package	1	107	110	108	105	105	100	100	97	90	107
Trash Screen	1	99	102	100	97	97	92	92	89	82	99
Loaded Carbon Screen	1	99	102	100	97	97	92	92	89	82	99
Stripped Carbon Screen	1	107	110	108	105	105	100	100	97	90	107
CIP Intertank Screen	6	111	114	112	109	109	104	104	101	94	112
Carbon Fines Filter Press	1	107	110	108	105	105	100	100	97	90	107
Air Receiver	5	105	101	106	105	103	106	111	108	101	114
Air Dryer	2	100	96	101	100	98	101	106	103	96	109
Elution Circuit Package	1	94	94	97	99	102	102	101	96	88	107

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Reagent Building											
Lime Distribution Pump	2	87	88	89	91	93	94	92	88	81	99
Lime Slaking System	1	95	96	98	100	102	103	101	97	89	107
Sodium Cyanide Dissolution System	1	95	96	98	100	102	103	101	97	89	107
Sodium Cyanide Dosing Pump	4	90	91	93	95	96	98	95	91	84	102
Tailings Pump	2	84	85	87	88	90	88	84	77	94	96
Regent Area Overhead Crane	6	101	102	104	106	108	109	107	102	95	113
Sambs Exhaust Fan	1	93	96	87	85	82	80	75	67	58	85
Copper Sulphate Transfer Pump	1	81	81	82	74	71	71	66	64	63	76
Copper Sulphate Dosing Pump	1	94	94	96	98	100	101	99	95	88	105
Tailings Sampler	1	94	94	96	98	100	101	99	95	88	105
Tailings Sum Pump	1	81	81	84	86	89	89	88	83	75	93
Process Plan Air Compressor	1	97	98	100	101	101	103	101	97	91	107
Oxygen Plant											
Oxygen Plant	1	105	101	106	105	103	106	111	108	101	115
Fine Ore Bin Building											
Fine Ore Bin	2	115	115	115	113	111	110	108	102	95	115
Fine Ore Reclaim Feeder	2	115	115	115	113	111	110	108	102	95	115
Fine Ore Bin Ven Fan	1	92	92	90	84	78	73	73	68	65	81
Sag Mill Conveyor	1	88	88	91	93	96	96	95	90	82	101
Quick Lime Screw Feder	1	113	113	113	111	109	108	106	100	93	112
Reclaim Area Baghouse	2	115	115	115	113	111	110	108	102	95	115
Gold Room (inside Main Building)											
Electrowinning Cell	2	98	98	96	90	84	79	79	74	71	88
Electrowinning Hoist	1	93	96	87	85	82	80	75	67	58	85
Extraction Fan	2	99	99	97	91	85	80	80	75	72	89
Electrowinning Sludge Pump	1	82	83	84	86	86	89	86	82	76	93
Electrowinning Sludge Filer	1	77	78	79	81	81	84	81	77	71	88

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Electrowinning Cell Rectifier	2	98	98	96	90	84	79	79	74	71	88
Induction Furnace Dust Collector	1	104	107	100	100	97	97	92	90	89	101
Outdoor Service Equipment											
Diesel Feed Pump	2	84	85	86	88	90	91	89	85	78	96
Diesel Station	2	79	80	81	83	84	86	84	80	73	90
Gasoline Feed Pump	1	84	85	86	88	90	91	89	85	78	96
Gasoline Pump	1	84	85	86	88	90	91	89	85	78	96
Freshwater Pump	2	94	94	96	98	100	101	99	95	88	105
Potable Water Feed Pump	1	82	83	84	86	88	89	87	83	76	93
Potable Water Feed Plant (enclosed)	1	77	78	79	81	82	84	82	77	71	88
Firewater Pump (enclosed)	4	71	72	74	76	77	79	77	72	65	83
Quick Lime Vent	1	85	85	91	92	91	89	88	82	80	94
Air Compressor	1	82	78	83	82	80	83	88	85	78	91
Freshwater Pump (enclosed)	2	76	76	78	80	82	83	81	77	70	87
Freshwater Pump	1	94	94	96	98	100	101	99	95	88	105
Potable Water Pump	1	82	83	84	86	88	89	87	83	76	93
Air Compressor (inside truck shop)	1	82	78	83	82	80	83	88	85	78	91
Process Plan Mobile Equipment											
Single Cab 4WD Pickup	6	106	109	100	96	96	94	92	88	83	99
Twin Cab 4WD Hiab Truck	1	106	109	100	96	96	94	92	88	83	99
Bus	1	95	109	106	103	102	101	92	90	85	104
Fire Trailer	1	109	111	119	108	101	103	98	92	83	108
All Terrain Crane	1	103	106	97	95	92	90	85	77	68	95
Crane	1	105	108	107	101	102	101	101	92	83	106
Plant Forklift	2	100	103	94	92	89	87	82	74	65	92
Warehouse Forklift	1	100	103	94	92	89	87	82	74	65	92
Front-End Loader	1	113	116	121	112	112	111	109	107	97	116
Skid-Steer Loader (Bobcat)	1	114	117	112	107	108	103	100	94	87	109

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Tip Truck	2	109	111	119	108	101	103	98	92	83	108
Telescopic Handler	1	100	103	94	92	89	87	82	74	65	92
Boom/Scissor Lift	2	100	103	94	92	89	87	82	74	65	92
Fusion Butt Welder	1	92	95	96	97	96	97	94	89	84	101
Portable Compressor	1	106	109	110	95	100	99	102	101	94	107
Diesel Welder	2	92	95	96	97	96	97	94	89	84	101
Portable Pumps Generator	1	103	106	99	94	90	87	83	84	77	93
Gravel truck	2	109	111	119	108	101	103	98	92	83	108
Water Truck	1	101	106	106	106	106	104	100	98	99	109
Potable water Trailers	4	101	106	106	106	106	104	100	98	99	109
Franna Crane	1	102	105	96	94	91	89	84	76	67	94
Yard Crane – Hydraulic	1	102	105	96	94	91	89	84	76	67	94
Pick-n Carry Mobile Crane	1	102	105	96	94	91	89	84	76	67	94
Backhoe	1	114	117	112	106	107	105	102	97	89	110
Forklift/Telescopic Handler	1	102	105	96	94	91	89	84	76	67	94

Notes:

dB – linear sound level; dBA- A-weighted sound level

Table A.4 Equipment Sound Power Level Summary – Operation

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Primary Equipment – Gordon Site											
Material Loader PC1250LC-8 (6.7 m^3)	4	117	120	121	112	104	105	101	99	95	111
Ore Haul Truck (HD605-8, 69 t)	15	118	121	118	113	112	111	109	105	97	116
Hydraulic Excavators (PC490LC-11 whammer)	1	113	116	121	112	112	111	109	107	97	116
Tracked Dozer D375A	2	117	120	121	112	104	105	101	99	95	111
Articulated Truck (69t)	2	118	121	118	113	112	111	109	105	97	116
Drill (178 mm SmartROC D65)	3	112	115	121	114	117	113	112	107	106	119
Blaster Loader	1	106	109	100	96	96	94	92	88	83	99
Blaster Truck	1	106	109	100	96	96	94	92	88	83	99
Dump Truck (20 t)	2	111	114	112	114	111	107	104	100	95	113
Maintenance and Other General Equipment – Gordon Site											
Pump Truck	1	113	116	112	103	101	103	100	96	88	107
Lube/Fuel Truck	1	109	111	119	108	101	103	98	92	83	108
Man Bus	2	95	109	106	103	102	101	92	90	85	104
Pickup Trucks	10	106	109	100	96	96	94	92	88	83	99
Welding Truck	1	106	109	100	96	96	94	92	88	83	99
Mechanics Truck	1	106	109	100	96	96	94	92	88	83	99
Snow Plow/Water Truck	2	101	106	106	106	106	104	100	98	99	109
Diesel Cranes - 35T	1	91	94	93	86	85	83	80	71	62	88
Tire Manipulator (980 WA5000-8)	1	98	101	93	91	91	90	87	86	77	95
Integrated Tool Carrier WA200-7 (wheel loader)	1	107	110	109	105	101	106	100	96	87	108
Compactor (BW211)	1	102	105	109	107	107	104	101	95	87	109
Lowboy and Tractor (75-100t)	1	117	120	121	112	104	105	101	99	95	111
Light Plants	8	98	101	96	88	84	83	81	78	66	89

Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Road Maint Loader - WA500-8	1	114	117	112	106	107	105	102	97	89	110
ADT 40t	2	101	104	107	103	103	104	101	98	93	108
Primary Equipment – MacLellan Site											
Shovel (PC4000 22 m3)	2	113	116	121	112	112	111	109	107	97	116
Transfer Loader (WA900-3)	1	114	117	112	106	107	105	102	97	89	110
Ore Haul Truck (150 t)	17	122	125	123	119	119	114	112	107	103	120
Graders - GD655-6	2	108	111	110	106	102	107	101	97	88	109
Hydraulic Excavators (PC490LC-11 whammer)	1	113	116	121	112	112	111	109	107	97	116
Tracked Dozer D375A	5	117	120	121	112	104	105	101	99	95	111
WA900 Loader (11.5 m3	1	114	117	112	106	107	105	102	97	89	110
Drill Rigs (178 mm PV275)	4	113	116	122	115	118	114	113	108	107	120
Drill (178 mm SmartROC D65)	1	112	115	121	114	117	113	112	107	106	119
Blaster Loader	1	106	109	100	96	96	94	92	88	83	99
Blaster Truck	1	106	109	100	96	96	94	92	88	83	99
Maintenance and Other General Equipment – MacLellan Site											
Pump Truck	1	113	116	112	103	101	103	100	96	88	107
Lube/Fuel Truck	1	109	111	119	108	101	103	98	92	83	108
Man Bus	2	95	109	106	103	102	101	92	90	85	104
Pickup Trucks	16	106	109	100	96	96	94	92	88	83	99
Welding Truck	1	106	109	100	96	96	94	92	88	83	99
Mechanics Truck	1	106	109	100	96	96	94	92	88	83	99
Snow Plow/Water Truck	3	101	106	106	106	106	104	100	98	99	109
Diesel Cranes - 35T	1	91	94	93	86	85	83	80	71	62	88
Tire Manipulator (980 WA5000-8)	1	98	101	93	91	91	90	87	86	77	95
Integrated Tool Carrier WA200-7 (wheel loader)	1	107	110	109	105	101	106	100	96	87	108
Compactor (BW211)	1	102	105	109	107	107	104	101	95	87	109
Lowboy and Tractor (75-100t)	1	117	120	121	112	104	105	101	99	95	111

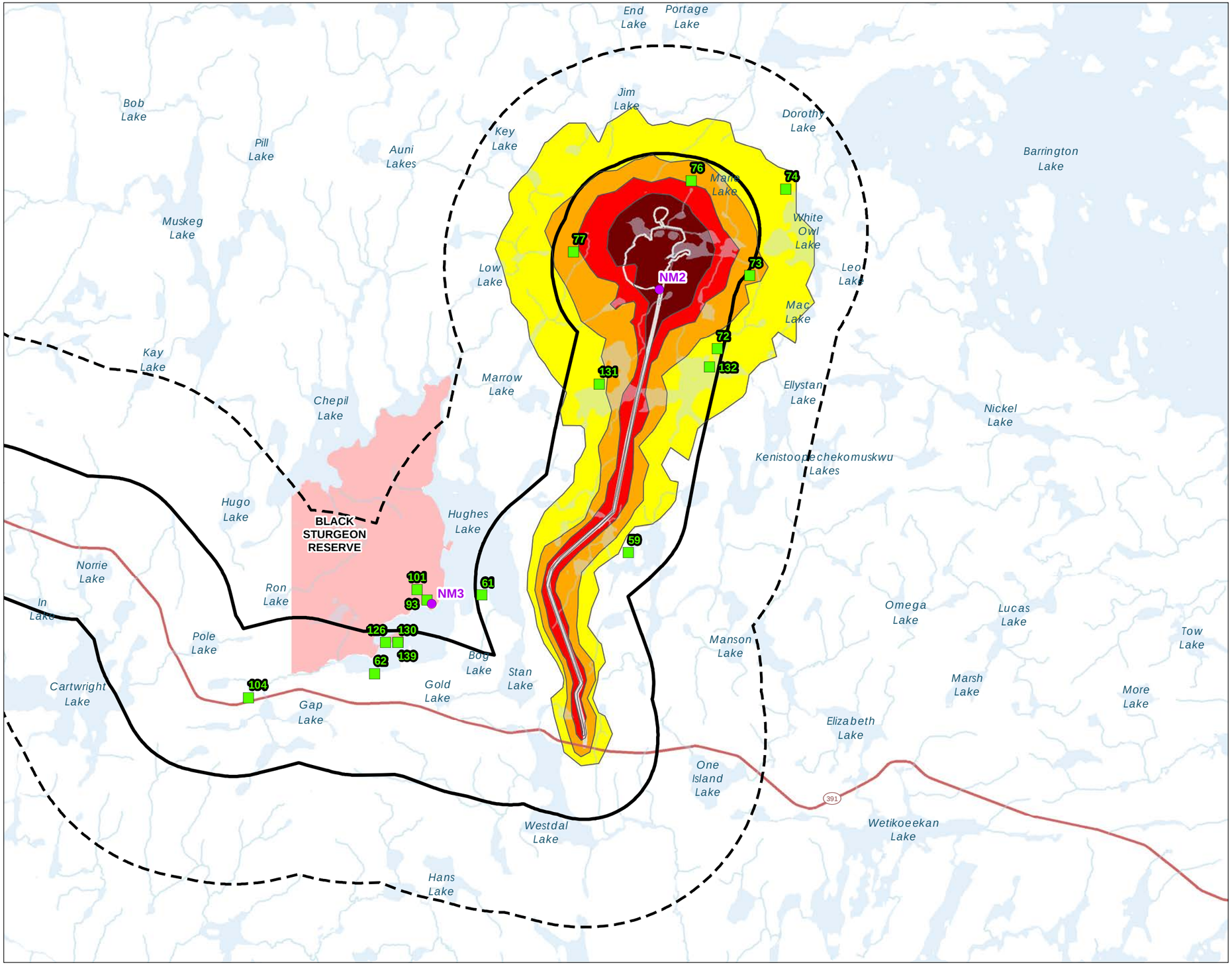
Reference: Lynn Lake Gold Project – Noise and Vibration Impact Assessment Update

Source	Quantity	Sound Levels at Octave Band Center Frequencies for Each Unit (Hz) (dB re 1 pW)									Total dBA
		31.5	63	125	250	500	1000	2000	4000	8000	
Light Plants	8	98	101	96	88	84	83	81	78	66	89
Road Maint Loader - WA500-8	1	114	117	112	106	107	105	102	97	89	110
ADT 40t	2	101	104	107	103	103	104	101	98	93	108

Note:

dB – linear sound level; dBA- A-weighted sound level

Attachment B Figures



Stantec

Study Area

- Project Development Area at Mine
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location

Noise Level (dBA)

- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2 4 Kilometres

(At original document size of 11x17)
1:110,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-05-06
Technical Review by YMa on 2025-05-06

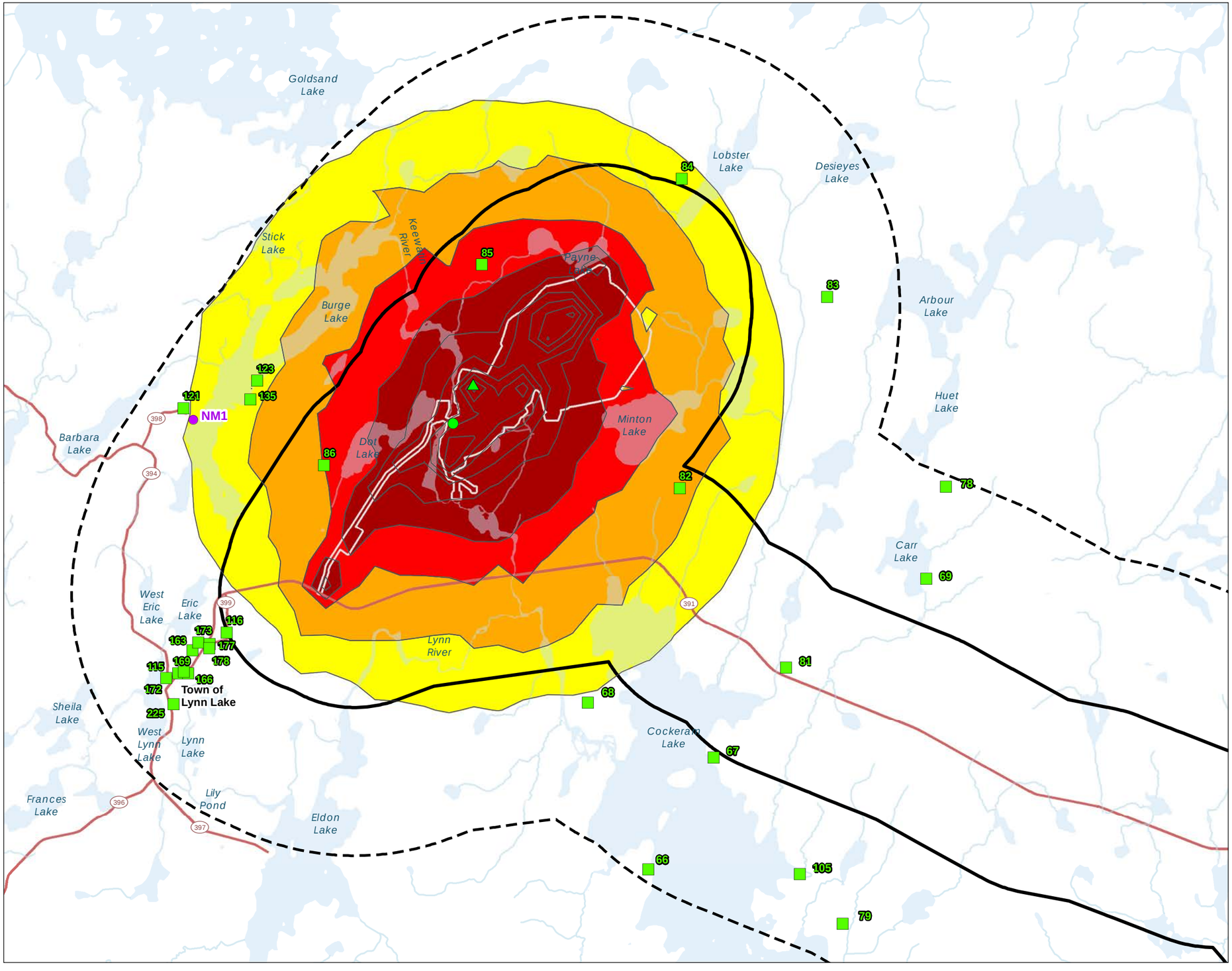
Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

Map No.
1

Title
Construction Phase Noise Contours - Gordon Site

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Stantec

Study Area

- Project Development Area at Mine
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location
- Future Worker Camp
- Temporary Worker Camp

Noise Level (dBA)

- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres

(At original document size of 11x17)
1:80,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-02-24
Technical Review by YMa on 2025-02-24

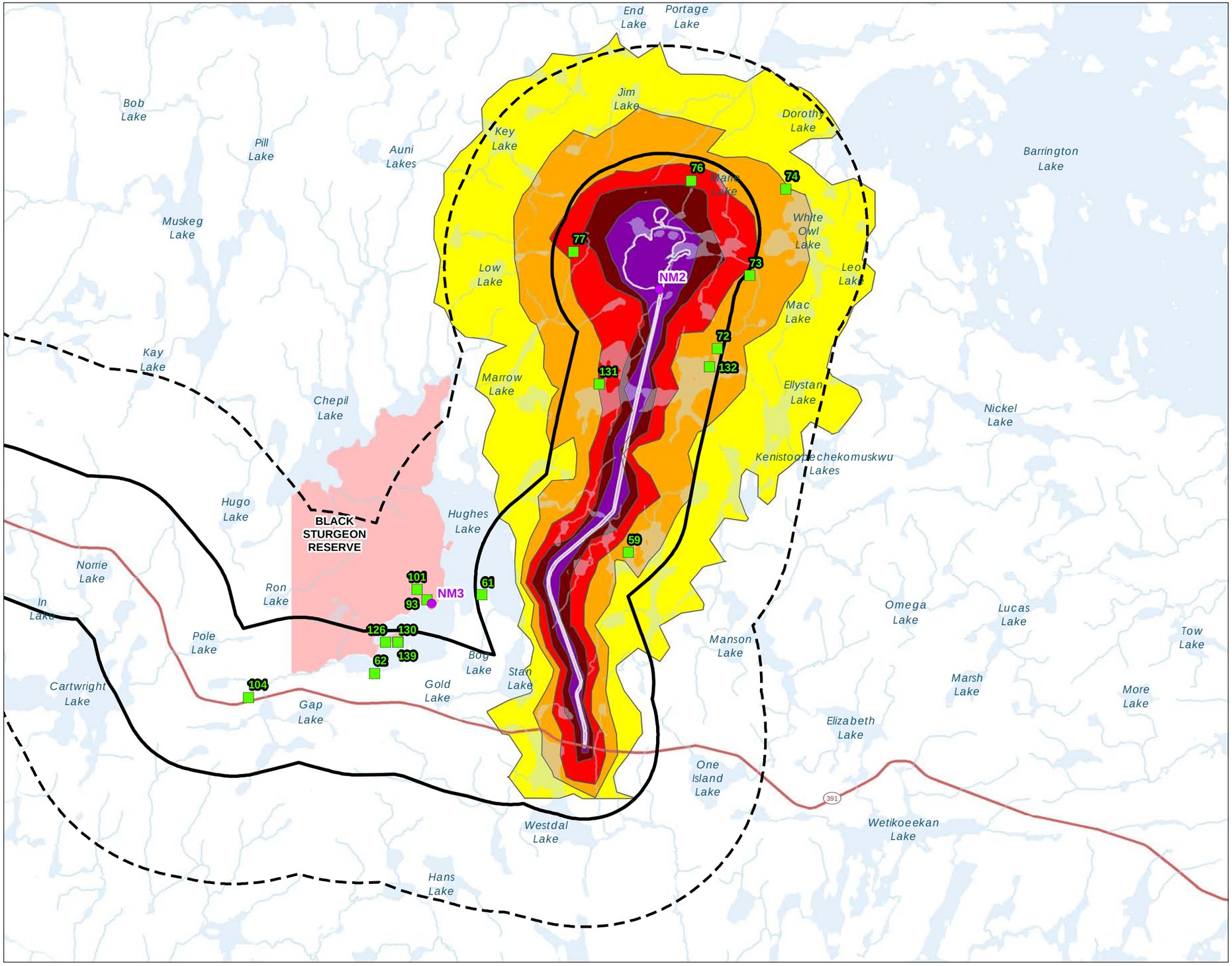
Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Map No.
2

Title
Construction Phase Noise Contours - MacLellan Site

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Stantec

Study Area

- Project Development Area at Mine
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location

Noise Level (dBA)

- >45 dBA
- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody
- First Nation Reserve

N

0 2 4 Kilometres

(At original document size of 11x17)
1:110,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

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Technical Review by YMa on 2025-05-06

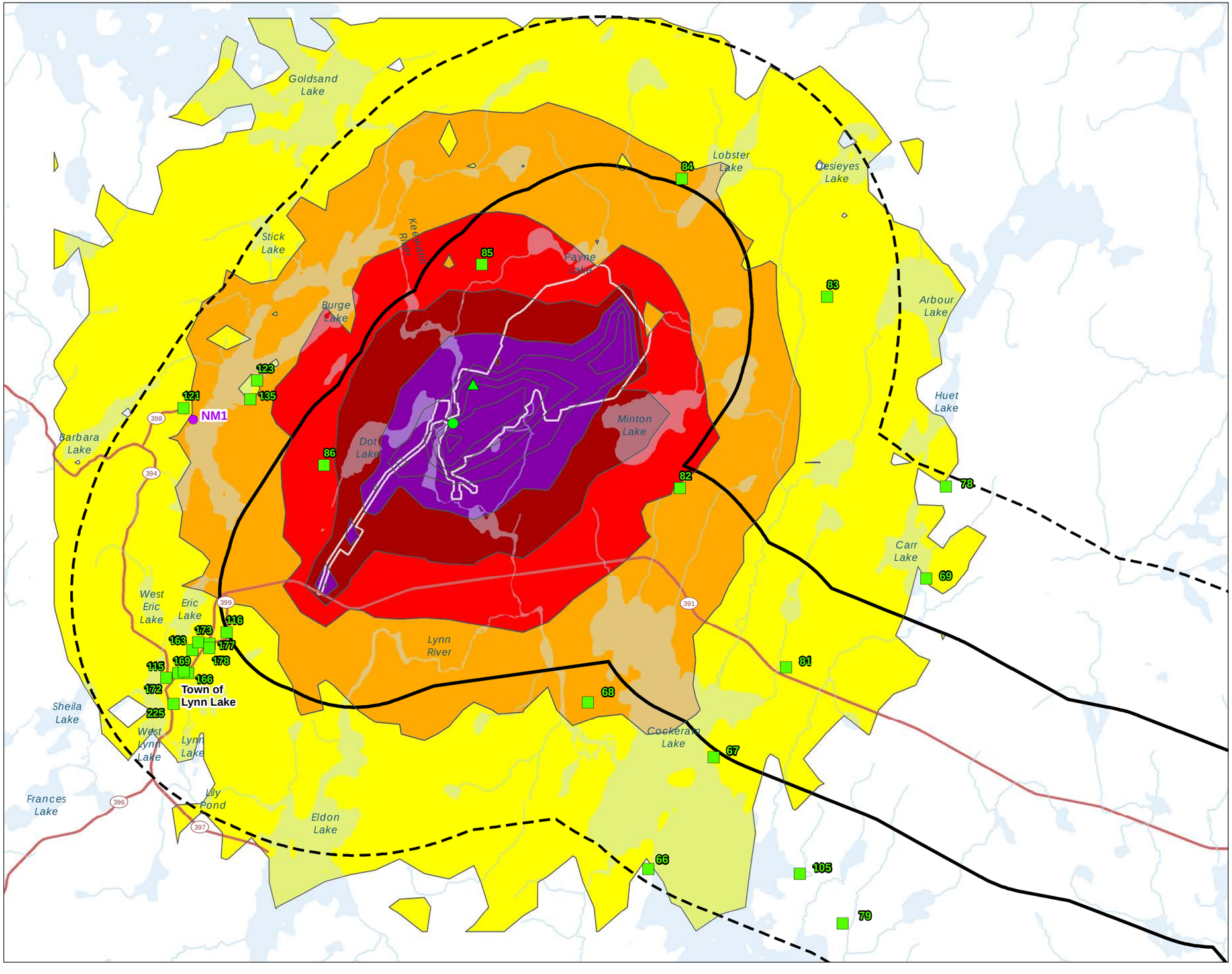
Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

Map No.
3

Title
Operation Phase Noise Contours - Gordon Site

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Study Area

- Project Development Area at Mine
- Noise and Vibration Local Assessment Area (LAA)
- Noise and Vibration Regional Assessment Area (RAA)

Locations

- Noise Monitoring Location
- Receptor Location
- Future Worker Camp
- Temporary Worker Camp

Noise Level (dBA)

- >45 dBA
- >40 dBA
- >35 dBA
- >30 dBA
- >25 dBA

Landbase

- Highway
- Watercourse
- Waterbody

N

0 1.5 3 Kilometres

(At original document size of 11x17)
1:80,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-02-24
Technical Review by YMa on 2025-02-24

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Map No.
4

Title
Operation Phase Noise Contours - MacLellan Site

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Appendix E Groundwater Gordon Site – Groundwater Model Report

Gordon Site – Groundwater Model Report

Lynn Lake Gold Project

Final Report

May 22, 2025

Prepared for:
Alamos Gold Inc

Prepared by:
Stantec Consulting Ltd.

Project Number:
111473076

Stantec

Limitations and Sign-off

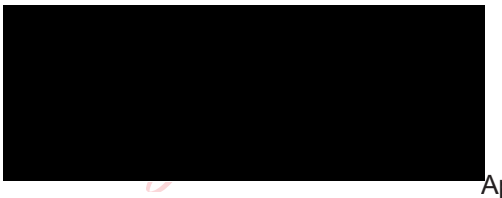
The conclusions in the Report titled Gordon Site – Groundwater Model Report are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

Stantec has assumed all information received from Alamos Gold Inc. (the "Client") and third parties in the preparation of the Report to be correct. While Stantec has exercised a customary level of judgment or due diligence in the use of such information, Stantec assumes no responsibility for the consequences of any error or omission contained therein.

This Report is intended solely for use by the Client in accordance with Stantec's contract with the Client. While the Report may be provided to applicable authorities having jurisdiction and others for whom the Client is responsible, Stantec does not warrant the services to any third party. The report may not be relied upon by any other party without the express written consent of Stantec, which may be withheld at Stantec's discretion.

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Signature

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Signature

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Signature

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Printed Name

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Appendix B Monitoring Well Construction Details and Hydrographs

Appendix C Transient Calibration Hydrographs

Acronyms/Abbreviations

Alamos	Alamos Gold Inc.
amsl	above mean sea level
bgs	below ground surface
EIS	environmental impact statement
EPM	equivalent porous media
GHB	general head boundary
GMR	Groundwater Model Report
IAAC	Impact Assessment Agency of Canada
MAE	mean absolute error
ME	mean error
the Project	Lynn Lake Gold Project
MRSA	mine rock storage area
OSA	ore storage area
PAG	potentially acid generating
RMS	root mean squared
RQD	rock quality designation

1 Introduction

As part of the Lynn Lake Gold Project (the Project), Alamos Gold Inc. (Alamos) plans to operate the Gordon Gold Mine (hereinafter referred to as the 'Gordon site') 55 kilometers (km) east of the Town of Lynn Lake in northern Manitoba (Map 1). Alamos is seeking approval to proceed with alterations to the Gordon site as approved under *Environment Act* License No. 3390 and the conditions stipulated therein (March 6, 2023) and a Decision Statement issued under the *Canadian Environmental Assessment Act, 2012* as documented by the Impact Assessment Agency of Canada (IAAC), dated March 5, 2023. The proposed alterations to the Gordon site include modifications to the mine rock storage area (MRSA), open pit, ore storage area (OSA), overburden storage area, and the collection pond. The proposed alterations also include the addition of a stockpile borrow source area, topsoil storage area, generator set area, facility area, interceptor wells and pond, ditches, sumps, and detailed freshwater intake lines and effluent locations. The proposed mine plan is documented in the Feasibility Study Update (Alamos 2023).

This updated Groundwater Model Report (GMR) for the Gordon site has been prepared to assess the potential effects of the construction, operation, and closure phases of the Project (including proposed alterations to the Gordon site) on groundwater resources and the consequent indirect effects on surface water resources at the Gordon site. The GMR considers the Gordon site components of the Project, baseline data collected for the Project since 2015, and comments received from agencies, Indigenous Nations, and other stakeholders.

To evaluate the effects of the Project (including proposed alterations to the Gordon site) on groundwater quality and quantity, a three-dimensional groundwater flow model has been developed for the Gordon site to provide estimates of:

- Changes in groundwater levels (drawdown), including changes to water table elevation and groundwater flow directions, due to dewatering of the historical East and Wendy pits and the proposed open pit.
- The groundwater flow rate to the open pit over time for use as an input to the water balance modelling conducted for the Project (including proposed alterations for the Gordon site).
- Groundwater flow and discharge to wetlands, creeks, and lakes during baseline, operation, and closure.
- Groundwater recharge and flow pathways during operations and closure from historical south and north MRSAs, OSA, and a new MRSA to be developed during operation.
- Evaluation of mitigation options to control groundwater inflow to the open pit.

The groundwater flow model encompasses the groundwater Local Assessment Area and Regional Assessment Area as defined in the Environmental Impact Statement (EIS) for the Project (2020) (Stantec 2020d), referred to herein as the study area.

This GMR forms part of the supporting documentation Gordon Mine Plan Amendment Notice of Alteration / Notice of Change completed for the Project.

2 Site Setting

This section provides an overview of the existing conditions that were used as background for development of the GMR. More detailed information is presented in the following reports:

- Hydrogeology Baseline Technical Data Report (Stantec 2017c).
- Hydrology Baseline Technical Data Report (Stantec 2017b).
- Hydrogeology Technical Data Report: Validation Report (Stantec 2020b).
- Hydrology Baseline Technical Data Report: Validation Report (Stantec 2020c).
- Hydrogeology Assessment – Gordon Site Technical Modelling Report (Stantec 2020a)

2.1 Historical Mining Operations

Historical mining operations at the Gordon site consisted of the development of two primary open pits, the Wendy Pit and East Pit (Map 2). The following is a summary of the historical mining operations described by KGS (2014).

The open pits were active between 1996 and 1999 and produced 214,800 oz of gold from 1.7 Mt of ore. The ore was transported to Lynn Lake for processing and smelting. Overburden was placed in two overburden storage areas, one north of the Wendy Pit and one north of the East Pit. Mine rock and low-grade ore not transported to Lynn Lake were placed in two MRSAs, one to the north of Wendy Pit and one to the south of Wendy and East pits. The north MRSA contained mine rock from the East Pit and was not considered potentially acid generating (PAG). Mine rock and low-grade ore from Wendy Pit was placed in the south MRSA. KGS (2014) characterized this material as containing about 10.5% PAG rock.

The historical open pits are located between Gordon and Farley Lakes (Map 3), which were historically connected via Gordon Creek. To allow the development of the open pits, a diversion channel was constructed so that discharge from Gordon Lake was directed through the diversion channel into Farley Lake. The water levels in Gordon and Farley lakes were reduced by 0.9 m because of the diversion channel (KGS 2014). Wendy Pit and East Pit were not connected to the diversion channel; however, KGS (2014) concluded that the East Pit and Farley Lake may be hydraulically connected via a historical buried stream channel.

Dewatering for the Wendy and East pits was conducted through a series of wells located between the open pits. Inflow to the open pits was collected and discharged with water from the dewatering wells to adjacent settling ponds, which were ultimately discharged to the southeast corner of Gordon Lake through a drainage channel.

Operation of the mine ceased in 1999 and a mine closure plan was submitted to the Manitoba Mines Branch and received conditional approval in August 1999. At closure, some of the PAG material was placed into Wendy Pit. The open pits were allowed to fill with water, which reduced the potential for oxidation and generation of acidic conditions from the PAG rock.

Reclamation work was completed in 2007 and consisted of ditching and drainage upgrades, berm repairs, and general fill placement. The mine rock storage areas were sloped to maximize runoff and were covered with 0.3 meters (m) of overburden from the overburden stockpiles and then hydroseeded to increase evapotranspiration and minimize infiltration.

Additional reclamation work was completed in 2012 and included installation of rock riffle control structures at the outlets of Gordon and Farley lakes to maintain water levels at pre-development elevations, repair berms around each of the open pits, removal of buildings, and general site cleanup (KGS 2014).

2.2 Climate

The climate and meteorology of the Gordon site are detailed in the Climate and Meteorology Baseline Technical Data Report (Stantec 2017a). The Lynn Lake area has a climate typical of northern Manitoba. The nearest permanent weather monitoring stations are Environment and Climate Change Canada stations 5061645 and 5061649, located at the Lynn Lake Airport. The climate normal (1981 to 2010) average temperature, precipitation, and snow on ground statistics for the Lynn Lake Airport are summarized in Table 2.1. The climate normals for the period 1991 to 2020 are similar to the values presented in Table 2.1.

Table 2.1 Climate Normal (1981 to 2010) Statistics at Lynn Lake Airport

Month	Average Temperature (°C)	Average Total Precipitation (mm)	Average Total Rainfall (mm)	Average Total Snowfall (cm)
January	-24	20	0.2	28
February	-20	16	0.1	24
March	-13	20	1.4	25
April	-3.1	24	4.5	24
May	5.6	37	27	10
June	13	62	61	1.3
July	16	85	85	0.1
August	15	69	69	0.1
September	7.7	61	57	3.5
October	-0.6	38	12	31
November	-13	27	0.8	36
December	-21	19	0.1	26
Annual	-3.2	478	318	208

The average monthly temperature is normally above freezing from May to September. The annual total precipitation for the region is 478 mm using the 1981 to 2010 climate normal. July typically receives the most monthly precipitation and February the least.

2.3 Physiography and Topography

The Gordon site is surrounded by vegetated land, forest cover, scattered lakes, watercourses, and wetlands and is located within areas of discontinuous permafrost cover.

Regional topography around the Gordon site slopes from a high of 350 m above mean sea level (amsl) in the west and northwest to a low of 320 m amsl in the southeast (Map 4). The ground surface is characterized as hummocky with steeply sloping rocky ridges that may extend 30 m to 60 m above lakes and peat-filled depressions.

2.4 Surface Water Features

The Site is located within the Churchill River watershed. Drainage is generally to the east and southeast via a system of irregular bedrock-controlled stream systems. The landscape is dominated by lakes and rivers. The lakes range in size from less than 100 m length to greater than 2 km length.

Surface water in the study area includes several streams, lakes, wetlands, and peat deposits which generally occupy the topographic lows. Farley Lake and Gordon Lake are fed from surrounding creeks and lakes (Map 4). The historical and proposed open pits are located between Gordon and Farley lakes. To allow the development of the historical East and Wendy open pits, a diversion channel (FAR6) was constructed so that discharge from Gordon was directed through the diversion channel into Farley Lake. Flow in the diversion channel as well as out of Farley Lake has been influenced by beaver activity.

The surface area of Gordon Lake is 190,292 m^2 and the corresponding volume is 260,370 m^3 (Stantec 2020a). The maximum depth of the lake has been measured as 2.8 m, with an average depth of 1.4 m. In 2016, the water level in the lake fluctuated from 315.00 to 315.45 m amsl. The littoral substrate is composed of organics and detritus.

Gordon Lake flows into Farley Lake via the diversion channel. The surface area of Farley Lake is 773,944 m^2 and the corresponding volume is 724,960 m^3 (Stantec 2020a). The maximum depth of the lake has been measured as 10.8 m in the southwest end of the lake adjacent to the historical East pit. The average depth is 0.9 m. In 2016, the water level in the lake fluctuated from 313.35 to 313.88 m amsl. The littoral substrate is composed of sand, silt, organics, detritus, and boulders.

In 2021, a beaver dam that controlled the outflow of Farley Lake broke. Subsequently, the water level of Gordon and Farley lakes decreased, and groundwater discharge was observed along a portion of the southwest shoreline of Farley Lake, adjacent to East Pit.

2.5 Regional Geology

A summary of the regional geology is provided below. Additional information on the regional and local geology is provided in the Hydrogeology Baseline Technical Data Report (Stantec 2017c) and subsequent validation report (Stantec 2020a).

2.5.1 Overburden Geology

The regional surficial geology has been mapped by the Geological Survey of Canada as shown in Map 5 (Kaszycki et al. 2008). During the Late Wisconsinan period, the advance of the Keewatin ice centre (part of the Laurentide Ice Sheet) deposited glacial diamicton (diamicton) derived from the crystalline bedrock of the Canadian Shield. Meltwaters, resulting from the retreat of glacial ice, eroded and cut through the various glacial deposits and resulted in deposition of glaciofluvial sediments that are typically stratified and sorted to varying degrees. As the ice retreated, glacial Lake Agassiz was formed and resulted in the deposition of glaciolacustrine laminated silt and clay.

2.5.2 Bedrock Geology

The bedrock geology of the area has been described in detail by the Manitoba Geological Survey. The Gordon and MacLellan sites are located within part of the Lynn Lake greenstone belt, which is located in the Churchill Structural Province of the Canadian Shield. Map 6 presents the regional bedrock geology. The Lynn Lake greenstone belt is comprised of metamorphosed volcanic rocks of the Wasekwan Group, metamorphosed sedimentary rocks of the Sickle Group, and plutonic intrusions. The Lynn Lake greenstone belt trends west to east and extends 130 km from the La Ronge greenstone belt in Saskatchewan (MEM 1986). Structural processes altered the Lynn Lake greenstone belt into two belts (north belt and south belt), that are separated by felsic intrusions (Beaumont-Smith and Böhm 2003). The north and south belts differ by stratigraphic sequences, chemistry, and structure (MEM 1986).

The Gordon and MacLellan sites are located within the north belt, which is characterized as a north-dipping homocline comprised of rhyolite, overlain by andesite and sedimentary rocks, and an upper unit of basaltic rocks (MEM 1986). The north belt includes the unique stratigraphic sequence known as the Agassiz Metallotect (also termed “Rainbow Trend”) (Map 6), which consists of picritic flows, iron formation, and felsic volcanic rocks. The metallotect hosts the gold deposits of the Gordon and MacLellan sites. South of the sites lies the south belt, which consists of volcanic and sedimentary rocks and the east-west trending structural feature identified as the Johnson Shear Zone (Map 6). In some areas, these weathered shear zones may have been preferentially eroded because of the orientation of the shear zone relative to the direction of ice movement and the competence of the weathered bedrock in the shear zone relative to the surrounding bedrock units (Machibroda Engineering 1988).

The Gordon site has four zones of mineralization including the Wendy, East, Southeast, and the South zone (KGS 2014). The Wendy and East zones have been mined during historical mining activities. Two northwest trending parallel faults extend across the former Gordon pit areas from Gordon Lake in the west to south of Farley Lake in the east and are called the East and Wendy Faults (Map 4) (KGS 2014).

2.6 Hydrostratigraphy

The following hydrostratigraphic units are interpreted within the study area and are incorporated into the conceptual model.

- Historical Mine Rock
- Organics and Fill
- Glaciolacustrine (nearshore and offshore deposits)
- Diamicton
- Bedrock

Cross-sections depicting the geologic interpretation of the hydrostratigraphic units across the study area are shown on Map 7 and Map 8. The cross-section locations are presented on Map 4. Additional description of the hydrostratigraphic units is presented below, including references to monitoring well locations (Map 4), where appropriate.

2.6.1 Historical Mine Rock

Two historical MRSAs are present at the Gordon site, identified on Map 2 as the north rock storage area and south rock storage area. Both historical MRSAs are covered with native soils and contain surplus mine rock from historical mining operations at the Gordon site. Hydraulic testing of the mine rock was not completed due to the expected high hydraulic conductivity values and because the mine rock is stored on original ground surface, above the water table. Typical testing methods are difficult to perform under these conditions. Based on the grain size and material descriptions, hydraulic conductivity values for historical mine rock were estimated to vary between 1×10^{-3} and 1×10^{-2} meters per second (m/s) (Fetter 2000).

2.6.2 Organics and Fill

Organic deposits in the form of fibric peat and topsoil were observed at ground surface throughout the study area. Fibric peat is the least decomposed type of peat and generally consists of greater than 30% organic material or greater than 17% organic carbon. Topsoil was observed in upland portions of the landscape and was characterized as mineral soil with minor enrichment of organic material. Typical thicknesses were less than 1 m, but accumulations of up to approximately 3 m were observed in low lying areas such as at monitoring well GBHF-06 (Map 4). Organic deposits were found underlying surficial fill in boreholes completed along the access road.

Hydraulic testing of the organic deposits was not completed due to their shallow nature and thickness. Hydraulic conductivity values from literature cover a wide range and are dependent on the texture of the sediments composing the organic deposit. Based on the geology and material descriptions, hydraulic conductivity values for organic deposits were assumed to vary between 1×10^{-8} and 1×10^{-5} m/s (Fetter 2000).

2.6.3 Glaciolacustrine Deposits

Glaciolacustrine deposits were observed across the study area at either ground surface or underlying organic deposits. The glaciolacustrine deposits were discontinuous (Map 5, Map 7, and Map 8). The glaciolacustrine deposits consisted of nearshore coarse-grained deposits and offshore fine-grained deposits. Nearshore and offshore deposits were generally observed to grade laterally between the two units; however, in some areas the units were interlayered (Map 7 and Map 8). The lateral variations in thickness are interpreted to reflect changes to the water level of former glacial Lake Agassiz.

Both nearshore and offshore deposits were observed in areas south of the open pit, including at monitoring wells GBHF-13 and MWF-04 (Map 4). When both deposits were present, the offshore deposits overlaid the nearshore deposits; when only one deposit was observed at a borehole, it was typically the nearshore deposits.

2.6.3.1 Glaciolacustrine Offshore

Offshore glaciolacustrine deposits are described as sandy clayey silt to clay and range in thickness from 0.8 m at monitoring well GBHF-13 to 6.2 m at monitoring well GBHF-05 when present. In the area of the proposed open pit, glaciolacustrine offshore deposits were predominant and range in thickness from 0.46 m at monitoring well GBHF-02 to 6.2 m at monitoring well GBHF-05.

Hydraulic conductivity estimates from slug tests conducted in the glaciolacustrine offshore deposits range from 6×10^{-7} to 1×10^{-6} m/s.

2.6.3.2 Glaciolacustrine Nearshore

The nearshore deposits are described as loose, fine to coarse grained sand to silty sand and gravel and range in thickness from 1.1 m at monitoring well MWF-06 to 9.6 m at monitoring well MWF-02 when present. Nearshore deposits of silty sand were observed in boreholes located along the eastern edge of the proposed open pit associated with monitoring wells GBHF-03, GBHF-04, GBHF-06, GPW-01, and GPW-02 ranging in thickness from 0.6 m to 4.5 m.

Hydraulic conductivity estimates from slug tests conducted in the glaciolacustrine deposits range from 3×10^{-7} to 1×10^{-4} m/s.

2.6.4 Sand Diamicton

Sand diamicton was frequently observed throughout the Gordon site. Despite the frequency of encountering the sand diamicton, the unit was interpreted as discontinuous, having been eroded by meltwaters associated with the retreat of glacial ice (Map 7 and Map 8). When present, sand diamicton overlaid bedrock and was overlain by glaciolacustrine or organic deposits. The sand diamicton was generally observed south and east of the proposed open pit but thinned in the topographic and bedrock high located south of the Wendy and East pits. Sand diamicton was comprised of very dense sand to silty sand with trace to some gravel and at times contained trace cobbles and boulders. The thickness of the sand diamicton generally ranged from less than 1 m to approximately 4 m.

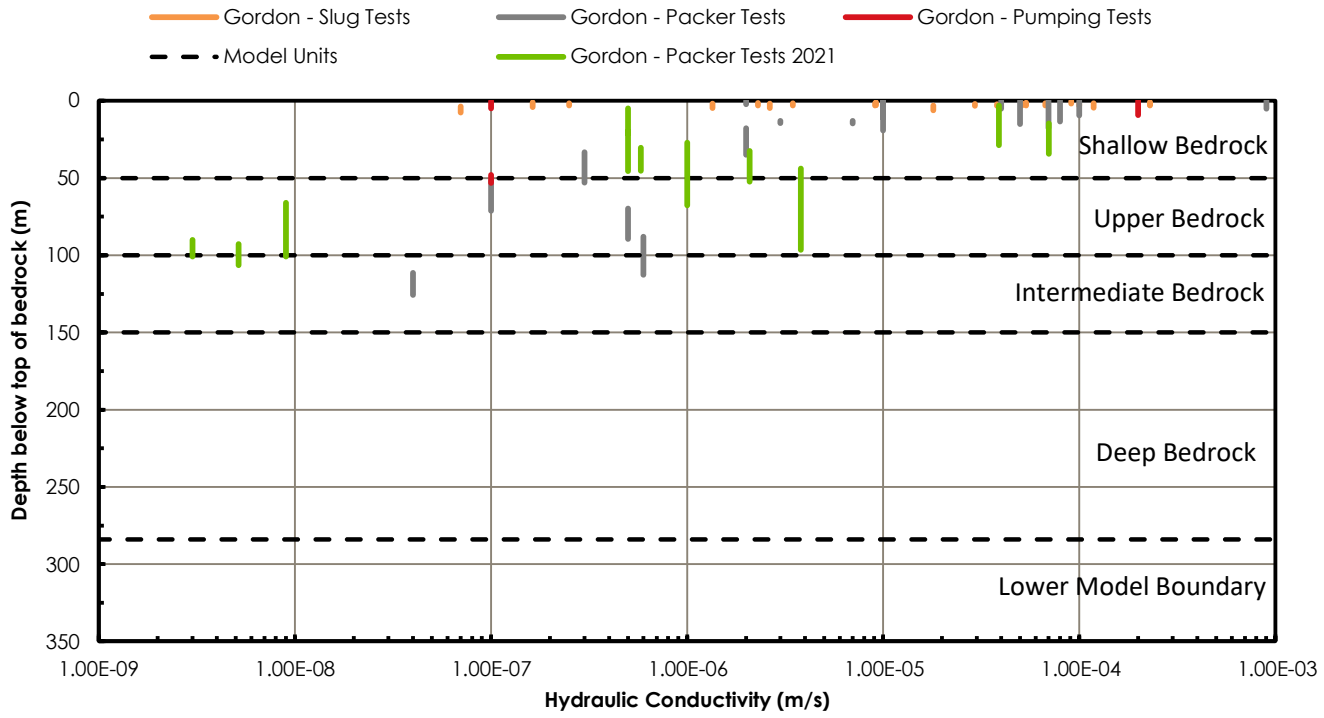
Hydraulic conductivity estimates from slug tests conducted in the sand diamicton deposits range from 2×10^{-7} to 3×10^{-5} m/s.

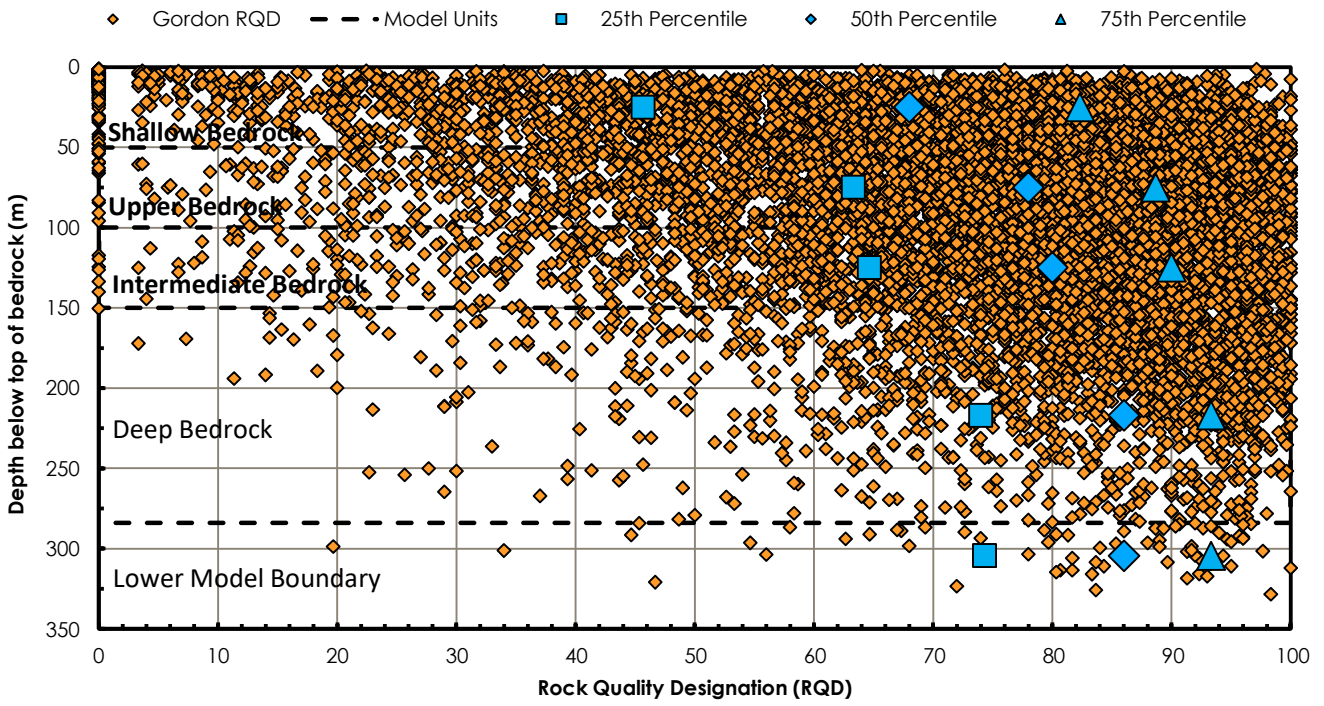
2.6.5 Bedrock

Bedrock was defined as a continuous unit throughout the study area. The top of bedrock surface described in Stantec (2017c) was interpreted from the boreholes and test pits installed at the Gordon site, including boreholes drilled for exploration and condemnation purposes. The bedrock topography was interpreted to follow a similar trend to ground surface topography, with a topographic high associated with the area south of the Wendy and East pits (monitoring well GBHF-13), which steeply slopes to the south towards Susan Lake (monitoring well MWF-04) and gradually slopes to the north toward the Wendy and East pits. Bedrock was observed near surface (less than 1 m below ground surface [bgs]) in areas associated with topographic highs and between 1 and 10 m bgs in areas associated with topographic lows. Local bedrock lows were observed at monitoring wells GBHF-12 and GBHF-09 (Map 4). These bedrock lows were interpreted to be local in extent. Across the Gordon site, the top of bedrock was encountered at elevations ranging from 298 m amsl at monitoring well GBHF-27 to 342 m amsl at monitoring well GBHF-13, with a relief of 44 m.

The hydraulic conductivity of the bedrock decreases with depth, with the upper portions being the most transmissive due to increased weathering and/or fracturing. Since Stantec (2017c) and Stantec (2020a), additional packer testing was completed in 2021 and two pumping tests were completed in 2022 (Stantec 2022). The results of the 2021 and 2022 hydraulic testing are incorporated into this description of bedrock hydrostratigraphy. The additional hydraulic conductivity estimates confirm the trend of decreasing hydraulic conductivity with depth below top of bedrock.

The bedrock was subdivided into four hydrostratigraphic units based on transmissivity data collected from hydraulic testing conducted in the study area (Stantec 2017c). These units include the shallow bedrock, upper bedrock, intermediate bedrock, and deep bedrock units. A comparison of the measured hydraulic conductivity in the bedrock for each of the hydrostratigraphic units is presented on Figure 2-1. The hydraulic conductivity was observed to be variable across each hydrostratigraphic unit, as described below.





Notes:

Pumping test represents fractured interval of borehole

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Title

Horizontal Hydraulic Conductivity and RQD with Depth

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2.6.5.1 Shallow Bedrock

The shallow bedrock unit consists of a zone of weathered and fractured bedrock underlying overburden deposits or exposed at ground surface. The shallow bedrock is estimated to be approximately 50 m thick, with hydraulic conductivity estimates ranging from 7×10^{-8} to 9×10^{-4} m/s (Figure 2-1).

Two northwest trending parallel faults, the East and Wendy fault, extend across the study area and intersect the historical East and Wendy open pits (Map 4). The hydraulic conductivity of shallow bedrock estimated from in situ hydraulic testing and pumping tests in the area of the East and Wendy Fault and historical East and Wendy open pits are assumed to be reflective of a zone of higher hydraulic conductivity associated with historical blasting and the presence of the fault zones. The interpreted faulted shallow bedrock zone relative to shallow bedrock is illustrated on Map 9.

Hydraulic conductivity estimates in the faulted shallow bedrock zone were estimated to be at the higher end of the estimates of hydraulic conductivity of the shallow bedrock. In 2021, two 72-hour pumping tests of the faulted shallow bedrock zone were completed. On the Farley Lake side of the East pit, the transmissivity of shallow bedrock was estimated at 125 m^2/d, with storativity of approximately $4x10^{-3}$ m/m. Assuming the active flow zone of bedrock is the upper 50 m, a hydraulic conductivity of $3x10^{-5}$ m/s was estimated. The radius of influence (drawdown > 1 m) resulting from 72 hours of pumping is estimated to be approximately 130 m. On the Gordon Lake side of the Wendy pit, the transmissivity of shallow bedrock was estimated at 60 m^2/d, with storativity of approximately $1x10^{-2}$ m/m. Assuming the active flow zone of bedrock is the upper 50 m, a hydraulic conductivity of $1x10^{-5}$ m/s was estimated. The radius of influence (drawdown > 1 m) resulting from 72 hours of pumping is estimated to be approximately 110 m.

In comparison, hydraulic conductivity of shallow bedrock outside the interpreted faulted bedrock zone ranged from $2x10^{-7}$ to $2x10^{-4}$ m/s with a geometric mean of $7x10^{-6}$ m/s. The hydraulic conductivity data with depth were consistent with the rock quality designation (RQD) data, which suggests the upper 50 m of bedrock had a lower RQD (i.e., less competent rock) and higher hydraulic conductivity than the RQD of bedrock greater than 50 m depth (Figure 2-1).

2.6.5.2 Upper Bedrock

The upper bedrock unit underlies the shallow bedrock unit and is estimated to be 50 m thick. The hydraulic conductivity for the upper bedrock is estimated to range from 3×10^{-9} to 4×10^{-6} m/s (Figure 2-1).

2.6.5.3 Intermediate Bedrock

The intermediate bedrock unit underlies the upper bedrock and is estimated to be 50 m thick. The hydraulic conductivity for the intermediate bedrock is estimated to range from 3×10^{-9} to 6×10^{-7} m/s (Figure 2-1)

2.6.5.4 Deep Bedrock

The deep bedrock unit is the deepest bedrock unit and is interpreted to be relatively impermeable, although discrete fractures may occur that locally increase the hydraulic conductivity. Figure 2-1 presents RQD with depth below top of bedrock and indicates that RQD increases with depth in the bedrock. RQD and hydraulic conductivity are generally correlated because competent rock with few fractures (i.e., a high RQD) is commonly associated with a lower hydraulic conductivity. The hydraulic conductivity of this unit is estimated to range from less than 3×10^{-9} m/s (based on the hydraulic conductivity of bedrock with limited to no interconnected fractures) to 6×10^{-7} m/s (where fractures are present).

2.7 Groundwater Levels and Flow

Groundwater level data across the study area and used for this GMR were measured from August 2015 to June 2021. As discussed in Section 2.4, a beaver dam which controlled the outflow from Farley Lake broke in 2021. Consequently, data measured after the dam break were not used for model calibration. This section presents a summary and interpretation of this dataset. Construction details for the monitoring wells and associated groundwater hydrographs are presented in Appendix B.

The average groundwater level in the area ranges from 313 m to 327 m amsl with generally lower water levels at lower topographic elevations and higher water levels at higher topographic elevations. The groundwater level in the vicinity of the pit is 313 m to 316 m amsl, whereas in the vicinity of the MRSA is 324 m to 327 m amsl. Groundwater generally flows from topographic highs and discharges to streams and lakes at lower elevations.

There is generally a water level response to precipitation events in wells completed in shallow bedrock and overburden. The similar water level responses at nested well pairs suggests that the overburden and shallow bedrock are hydraulically connected. The hydrographs also show that groundwater levels tend to peak in the summer or fall and decrease in the winter and spring. The magnitude of groundwater fluctuations from precipitation events and temporal trends ranges from approximately 0.5 to 2.5 m

In 2021, a beaver dam that controlled the outflow of Farley Lake broke. Subsequently, the water level of Gordon and Farley lakes decreased, and groundwater discharge was visually observed along a portion of the southwest shoreline of Farley Lake, adjacent to East Pit. Consequently, groundwater level data beyond December 2020 were not used for groundwater flow model calibration.

3 Description of Numerical Model

The numerical model code, domain, grid discretization, model boundaries, and simulation of hydrogeologic features are presented in this section.

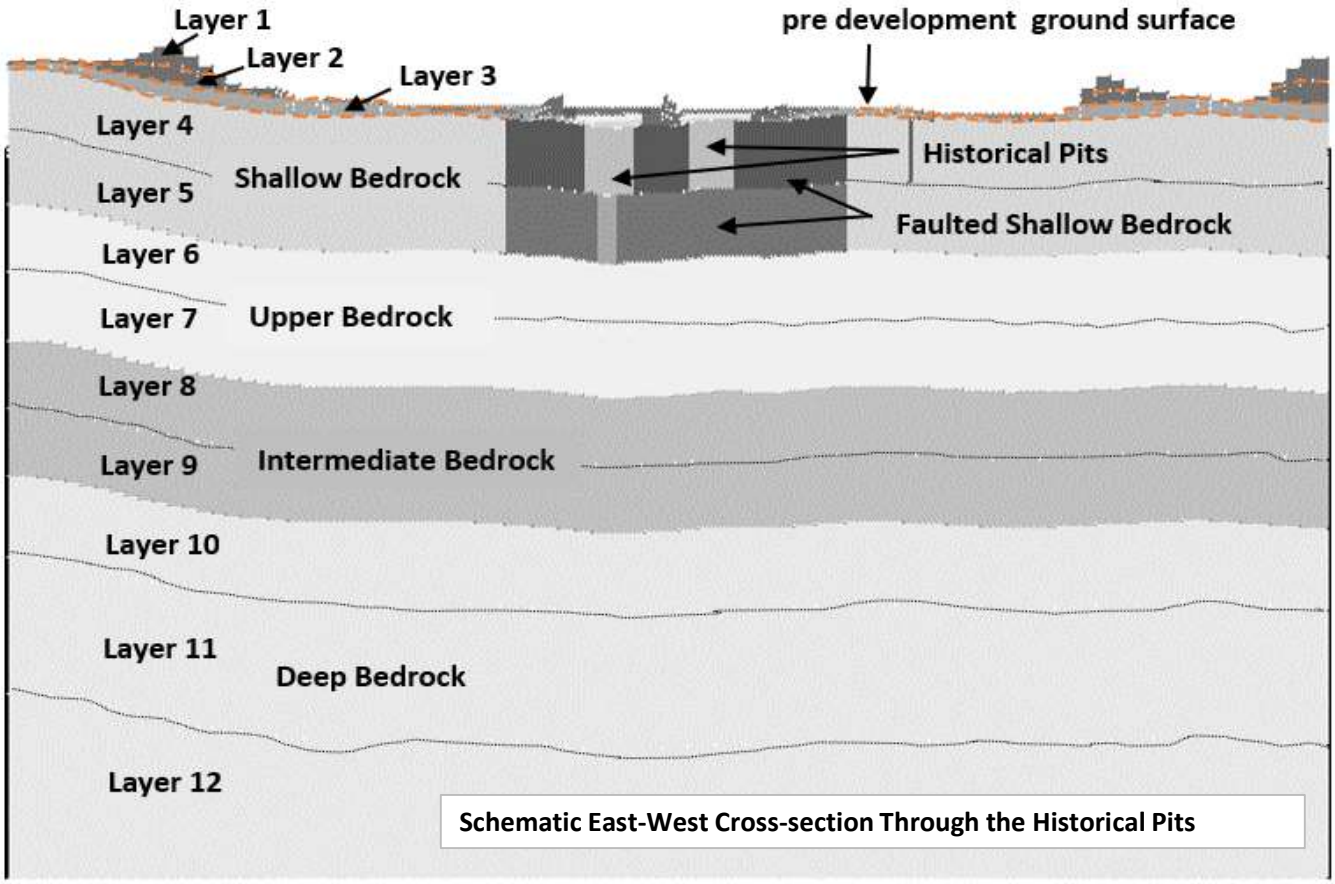
3.1 Model Code

The groundwater numerical models were developed using the three-dimensional finite difference groundwater flow computer code MODFLOW, MODFLOW-NWT, and MODFLOW-SURFACT in Groundwater Vistas Version 8 (Rumbaugh and Rumbaugh 2020). Groundwater Vistas is a pre-and post-processing software and was used to create standard format MODFLOW, MODFLOW-NWT, and MODFLOW-SURFACT files from graphical input data. The steady state and transient models used MODFLOW, the pumping test model used MODFLOW-SURFACT, while the predictive models used MODFLOW-SURFACT for models that simulate freezing of the open pit walls or MODFLOW-NWT for models that did not simulate freezing of the open pit walls. The packages used in the models include General Head Boundary (GHB), River, Recharge, Drain, Well, Multi-Node Well, Adaptive Time-Stepping and Output Control, and Time-Varying Material Property.

Model output was evaluated using Groundwater Vistas, ArcMap 10.6.1, and Microsoft Office programs.

3.2 Model Domain and Discretization

The same model domain used in the previous model (Stantec 2020a) was used in the current model. The model domain corresponds to natural hydrogeologic boundaries and beyond the area where potential effects from the model predictions may impact model boundaries. The model domain is approximately 33.14 km^2 in area (Map 10). The model was discretized into 12 model layers (Figure 3-1). The maximum elevation in the model is 360 m amsl, while the bottom of the model was assigned as 30 m amsl. As will be described in Section 5, the bottom of the open pit is expected to reach 116 m amsl. The thickness of layers 10 and 11 were assigned so the majority of the open pit is within layer 10 and above; a small portion of the open pit is within layer 11. The top of layer 11 at the deepest portion of the open pit ranges from 125 to 130 m amsl. Layer 11 is 50 m thick, consequently the bottom of layer 11 ranges from 75 to 80 m amsl while the bottom of the open pit is expected to reach 116 m amsl. Layer 12 is completely below the open pit and ranges from 35 to 40 m thick beneath the deepest portion of the pit. The approximate relationship of hydrostratigraphic units to model layers is presented in Figure 3-1.



Schematic East-West Cross-section Through the Historical Pits

Model Layer Hydrostratigraphic Unit Average Thickness (m)

1 2 3	Waste Rock Organics and Fill Glaciolacustrine Sand Diamicton	3.2 1.8 3.4
4 5	Shallow Bedrock	50
6 7	Upper Bedrock	50
8 9	Intermediate Bedrock	50
10 11 12	Deep Bedrock	30 50 54

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3-1

Title **Model Layers and Hydrostratigraphy**

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The model grid is coarser around the limits of the domain and grades to finer cells in the vicinity of the surface water features and the area of the proposed open pit (Map 10). The grid is composed of 570,228 active cells.

A geological model of hydrostratigraphic units described in Section 2.6 was constructed in Leapfrog Hydro ® software and the conceptual geological model grid was then saved in MODFLOW software format for direct transfer to the MODFLOW groundwater model. Where hydrostratigraphic units were observed to be discontinuous across the study area and “pinch out”, the model layer was assigned a minimum thickness of 1 m and the hydraulic properties of the underlying hydrostratigraphic unit were assigned.

An equivalent porous media (EPM) approach was selected to simulate the flow within the overburden and underlying bedrock. The EPM approach assumes that groundwater flow through fractured bedrock can be approximated by a porous medium with equivalent hydrogeologic properties of the bulk of the rock. The water level data within the shallow bedrock monitoring wells indicates a similar hydraulic response to the overburden system, indicating a high degree of connectivity. Cook (2003) demonstrates regional connectivity occurs within the shallow bedrock zone and decreases with depth due to a decrease in fracture frequency and permeability. Groundwater flow in the bedrock is therefore expected to occur dominantly through the upper portions of this shallow bedrock unit.

As shown in Section 2.6.5, the permeability and RQD of the bedrock decreases with increasing depth, due to more discrete fracturing of the bedrock. At the regional scale, the EPM approach remains appropriate for predicting the effective groundwater discharge rates from the deeper bedrock into the open pit but reduces the reliability of predicted travel times through discrete fractures (Wels et al. 2012). Travel times through the discrete fractures using the EPM approach could be under-predicted (due to lower effective fracture porosities in the bedrock) or over-predicted, if there is poor connectivity of fractures at depth. This is appropriate based on the regional scale of the modelling and considering that, based on measured hydraulic conductivity and RQD, flow was predicted to occur primarily through the shallow weathered bedrock.

3.3 Boundary Conditions

The model limits were assigned based on local watershed boundaries but were extended into neighboring watersheds based on anticipated effects from the presence of the open pit. In each case, the model was extended to natural hydrologic/hydrogeologic boundaries, including watershed boundaries (assumed to be coincident with groundwater flow divides) or surface water features (also assumed to be coincident with groundwater flow divides). The model domain and boundary conditions are presented on (Map 10).

3.3.1 No Flow Boundaries

No flow boundaries are used to simulate impermeable boundaries, groundwater divides, or streamlines. Along the model domain, no-flow boundaries occur by default when a boundary condition (e.g., a river or lake) is not defined. The no flow boundaries correspond with the model domain limits, except where a general head boundary or river boundary condition was assigned as presented in Map 10.

3.3.2 General Head Boundary

General head boundary (GHB) is a generic form of the head-dependent boundary condition (Rumbaugh and Rumbaugh 2020). Lakes were simulated as GHBs in the model. This type of boundary condition calculates the flow rate between the boundary condition and the aquifer based on the head assigned to the boundary condition. The depth of the lakes was estimated using available bathymetric data collected at the lakes and the reference head for each cell was estimated from the digital elevation model or measured water levels where available. The interaction between the surface water in the lakes and the groundwater in the underlying aquifers is defined by a “conductance” term. This term represents the presence of a layer of sediment on the lakebed that can affect the rate of water transferred between the lake and the underlying model layer. A review of sediment analyses from lakes and watercourses showed that the sediments are generally fine-grained (Stantec 2017b), and the initial conductance term was assigned to the model based on an assumed hydraulic conductivity of 1×10^{-7} m/s. The hydraulic conductivity of lakebed materials was used as a calibration parameter.

3.3.3 River Boundary

Watercourses were simulated as river boundaries. The river boundary is a head-dependent boundary condition which allows water to enter or exit the model cell based on the hydraulic head of the aquifer compared to the river stage (water level in the river). The river package requires inputs for the length, width, stage, and bottom of the river as well as the thickness and hydraulic conductivity of the riverbed to calculate the interaction between groundwater and surface water in the rivers. River widths were estimated to range from 0.46 m to 6 m based on field measurements and estimated from aerial photographs. Generally, rivers were wider in the lowlands with smaller widths estimated in the upper parts of the basins. River depths are based on field observations of stream depths during average summer conditions. The initial hydraulic conductivity of the riverbed material was assigned similar to lakebed material and was used as a calibration parameter. River stage was assigned based on water levels in the lakes to maintain water flow in the correct direction while river depths were estimated from field measurements. The rivers were divided into segments based on river width, stage, and depth.

3.3.4 Recharge

Precipitation is the primary source for groundwater recharge. Publicly available precipitation data from Environment and Climate Change Canada weather monitoring stations 5061645 and 5061649, located at the Lynn Lake Airport were used to assign recharge. A uniform recharge rate was applied to the uppermost active layer of the model domain in the steady state model. The groundwater recharge rate was adjusted during the model calibration process. Recharge applied represents average conditions based on recent measured precipitation (Section 2.2).

3.4 Hydrogeologic Properties

Hydrogeologic properties were assigned in the model based on the hydrostratigraphic units as described in Section 2.6. However, due to discontinuity in the glaciolacustrine offshore and nearshore deposits, the two units were combined in the groundwater model. This section describes the simulated aquifer properties including hydraulic conductivity, specific yield, and specific storage.

3.4.1 Hydraulic Conductivity

The initial hydraulic conductivity values assigned in the model were the geometric means from aquifer testing performed at the site (Stantec 2022) or standard values based on hydrostratigraphic unit as discussed in Section 2.6. The initial hydraulic conductivity values were adjusted during the calibration process for both steady-state and transient conditions (Sections 4.1 and 4.1.4).

The final horizontal hydraulic conductivity values are presented in Table 4.1 for each hydrostratigraphic unit. Anisotropy assigned for each hydrostratigraphic unit (based on literature values) is also presented in Table 4.1; anisotropy is presented as the ratio of horizontal hydraulic conductivity to vertical hydraulic conductivity.

3.4.2 Specific Storage and Specific Yield

Initial estimated specific yield for lithologic units ranged from 0.01 to 0.3 (dimensionless) for overburden units and 0.0001 to 0.001 for bedrock while specific storage for lithologic units in the study area ranged from $2x10^{-7}$ to $2x10^{-4}$ 1/m (Table 4.1). The specific storage and specific yield values initially assigned to the model were adjusted during the transient model calibration process (Section 4.1.4). The final storage values are presented in Table 4.1 for each hydrostratigraphic unit.

4 Model Calibration

The main objective of model calibration is to better simulate observed hydrogeologic conditions. The process of calibration involves adjusting aquifer properties and boundary conditions to improve simulation of observed conditions and reduce model error (difference between observed and simulated conditions). Model calibration was completed using an iterative approach for steady-state and transient conditions. This involved a process where a flow simulation was completed, the resulting groundwater levels and baseflow rates to watercourses were compared to measured values, and the model input parameters were adjusted to achieve better agreement with observed (field measured) conditions. A hybrid calibration approach was used that combined automated parameter estimation, facilitated using the Model-Independent Parameter Estimation and Uncertainty Analysis software package PEST (Doherty 2004) together with professional judgement and interpretation of the calibration results.

Generally, the transient calibrations using pumping test data were emphasized compared to the steady state calibration given the models will be used to assess impacts from pumping for mining operations. The calibrated model parameters are presented in Table 4.1 and a description of the steady-state and transient model calibration as well as sensitivity of the model calibration is presented in the following sections. The calibrated hydraulic conductivity and storage for the various hydrostratigraphic units are within the ranges expected for the materials based on measured and literature values (Fetter 2000; Schwartz and Zhang 2002), as the range was used to set upper and lower bounds as part of the calibration process.

Table 4.1 Calibrated Model Parameters

Hydrostratigraphic Unit	Horizontal Hydraulic Conductivity (m/s)	Anisotropy (-)	Specific Yield (-)	Specific Storage (1/m)
Mine Rock				n/a
Calibrated Value	1×10^{-3}	1	0.1	
Expected Range	1×10^{-3} to 1×10^{-2}	1 to 5	0.01 to 0.3	
Organics and Fill				n/a
Calibrated Value	1.4×10^{-6}	10	0.3	
Expected Range	1×10^{-8} to 1×10^{-5}	1 to 100	0.01 to 0.3	
Glaciolacustrine				n/a
Calibrated Value	4.4×10^{-5}	10	0.16	
Expected Range	3×10^{-7} to 1×10^{-4}	1 to 100	0.01 to 0.3	
Sand Diamicton				n/a
Calibrated Value	2.7×10^{-5}	1	0.015	
Expected Range	2×10^{-7} to 3×10^{-5}	1 to 50	0.01 to 0.3	

Hydrostratigraphic Unit	Horizontal Hydraulic Conductivity (m/s)	Anisotropy (-)	Specific Yield (-)	Specific Storage (1/m)
Shallow Bedrock				
Calibrated Value	1.5×10^{-7}	1.2	0.0003	6.8×10^{-4}
Expected Range	7×10^{-8} to 9×10^{-4}	1 to 100	0.0001 to 0.3	2×10^{-7} to 2×10^{-4}
Faulted Shallow BR				
Calibrated Value	2.3×10^{-5}	1.2	0.06	1.5×10^{-4} to 5.6×10^{-4}
Expected Range	7×10^{-8} to 9×10^{-4}	1 to 100	0.0001 to 0.3	2×10^{-7} to 2×10^{-4}
Upper Bedrock				
Calibrated Value	1×10^{-7}	10	0.0001	6.6×10^{-6}
Expected Range	3×10^{-9} to 4×10^{-6}	1 to 100	0.0001 to 0.001	2×10^{-7} to 2×10^{-5}
Intermediate Bedrock				
Calibrated Value	8.9×10^{-8}	10	0.0001	6.6×10^{-6}
Expected Range	3×10^{-9} to 6×10^{-7}	1 to 100	0.0001 to 0.001	2×10^{-7} to 2×10^{-5}
Deep bedrock				
Calibrated Value	7×10^{-8}	10	0.0001	6.6×10^{-6}
Expected Range	9×10^{-9} to 6×10^{-7}	1 to 100	0.0001 to 0.001	2×10^{-7} to 2×10^{-5}

4.1 Steady-State Model Calibration

Based on minimal changes to the hydrogeologic and hydrologic systems in the recent past, current conditions in the study area were assumed to generally represent steady-state conditions. Parameter values were adjusted across typical observed ranges to better simulate heads and flows in comparison with observed head and flow conditions throughout the steady-state calibration process

4.1.1 Steady-State Model Observation Targets

Groundwater elevation data measured from 31 observation wells were used as calibration targets for groundwater levels/pressure heads. Map 11 presents the location of calibration targets.

The average annual water level at each location was calculated as well as the average monthly water level for the period from 2015 through December 2020. Table 4.2 presents the average annual water level for each target as well as the simulated water level for the final calibrated model for steady state conditions.

Table 4.2 Steady State Model Hydraulic Head Calibration Targets and Residuals

Monitoring Location	Weighting Factor	Observed Head (m amsl)	Simulated Head (m amsl)	Weighted Residual (m)
MWF-02B	1	317.35	318.42	-1.07
GBHF-01B	1	314.81	314.98	-0.16
GBHF-04B	1	314.70	314.58	0.12
GBHF-16-02B	0.95	313.51	313.86	-0.34
MWF-03B	1	325.44	324.59	0.85
GBHF-05B	1	314.67	314.87	-0.20
GBHF-16-01B	0.95	312.52	314.98	-2.33
MWF-04B	1	313.72	312.12	1.60
GBHF-07B	1	317.88	319.29	-1.41
GBHF-09B	1	317.07	317.63	-0.55
GBHF-10B	0.1	326.70	323.57	0.31
GBHF-12B	1	323.98	324.36	-0.37
GBHF-01A	1	314.92	314.98	-0.06
GBHF-02A	1	315.58	314.13	1.45
GBHF-03	1	314.05	313.91	0.14
GBHF-04A	1	314.52	314.58	-0.06
GBHF-05A	1	314.71	314.87	-0.15
GBHF-07A	0.95	317.83	319.32	-1.41
GBHF-09A	1	317.24	317.68	-0.44
GBHF-10A	1	325.97	323.41	2.56
GBHF-12A	1	324.15	324.34	-0.19
GBHF-16-01A	1	312.50	314.98	-2.48
GBHF-16-02A	0.95	312.87	313.87	-0.95
MWF-01A	0.95	321.52	321.50	0.02
MWF-02A	1	317.65	318.46	-0.81
MWF-03A	1	325.44	324.63	0.81
MWF-04A	1	313.94	312.53	1.41
GPT21-02-50	0.5	315.59	314.84	0.37
GPT21-03-50	0.5	313.50	313.89	-0.20
GPT21-02-95	0.5	315.93	316.41	-0.24
GPT21-03-95	0.5	315.91	314.84	0.54



Weights were assigned based on the period of record at each location and the range in measurements. Assigned weights ranged from 0.1 to 1 and are listed in Table 4.2.

The water level calibration targets were assigned a weight of 1 except the following:

- The groundwater level target at GBHF-10B was assigned a weight of 0.1 because the groundwater levels were measured manually and consisted of only eight measurements.
- The groundwater level targets at GPT21-02-50, GPT21-03-50, GPT21-02-95, and GPT21-03-95 were assigned a weight of 0.5 because the periods of record were 14 to 15 months compared to 5 to 6 years for the remainder of the wells.
- The groundwater level targets at GBHF-07A, GBHF-16-01B, GBHF-16-02A, GBHF-16-02B, and MWF-01A were assigned a weight of 0.95 because the periods of record were less than 4 years compared to 5 to 6 years for the remainder of the wells.

The steady-state model calibration also included a baseflow target for a surface water monitoring location at the outlet of Farley Lake (QF05, Map 11). Streamflow was estimated from water level data and flow measurements completed between 2015 and 2016. The average annual streamflow rate at the outlet of Farley Lake is estimated to be approximately 0.06 cubic meters per second (m^3/s).

Baseflow to surface water features is provided primarily by groundwater discharge. However, a portion of the baseflow can also be attributed to the delayed drainage of precipitation storage in lakes and wetlands. This delayed release of surface water storage can be difficult to distinguish from groundwater contributions to baseflow. Therefore, the baseflow targets estimated from surface water hydrographs include both components. For calibration, baseflow to Farley Lake was estimated to range from 25 percent of the average annual streamflow rate to the minimum streamflow rate measured at QF05 when flow occurred (i.e., not frozen). Consequently, the range of baseflow is estimated from 0.008 to 0.015 m^3/s and was the range targeted for model calibration.

4.1.2 Statistical Methods to Evaluate the Steady-State Model Calibration

The purpose of the steady-state model is to establish baseline hydrogeologic conditions within the study area with an emphasis near the mine infrastructure. Parameter values such as recharge, lakebed and riverbed conductance, and hydraulic conductivity were adjusted to improve model calibration. The steady-state model was calibrated using a combination of manual and automated calibration methods. Automated calibration methods utilized the software package PEST, which adjusts model parameters using a weighted least square method (Doherty 2004). PEST utilizes the Gauss Levenberg Marquardt algorithm which optimizes the model parameters to improve the fit to observed targets and objectives (Doherty 2004).

$$\Phi = \sum_{i}^{m} (w_i r_i)^2$$

Where w_i is a weighting term applied to the measurement and r_i is the difference (residual) between the observation target and the model simulated outcome (Doherty 2004).

As a measure of calibration, plotting observed heads (average annual water level) versus simulated heads provides a visual assessment of how closely the model simulated observed conditions. Each point on a graph represents the observed head and the simulated (calculated) head at the same location. If there was no difference between observed heads and simulated heads, each point would align along a line with a 1:1 slope. The further away a point is from the line, the greater the residual at that location. Plotting measured groundwater levels versus the residual head is another visual method for understanding the behavior of the model. If there is no difference between observed and simulated water levels, the points would plot along the zero line. Points above the zero line indicate simulated heads were less than observed, while points below the zero line indicate simulated heads were greater than observed heads. In addition to these graphs, statistical methods of evaluating observed versus computed hydraulic heads were used to evaluate the quality of calibration. These analyses included mean error (ME), mean absolute error (MAE), and root mean square error (RMS). The ME was calculated as follows:

$$ME = \frac{1}{n}\sum_{i=1}^{n} w_i(h_m - h_s)_i$$

Where n equals the number of targets, h_m is the measured (observed) head, and h_s is the simulated head. The mean error calculation provides a comparison of measured and simulated heads by computing the difference. A limitation of this method is caused by sign cancellation. An example of sign cancellation would be when the difference between the measured and simulated value is a positive 30 m at one location and negative 30 m at another location. The average difference between these two wells is zero, which would be misleading, as there appears to be no error in the simulated heads.

The MAE calculation eliminates the problem of sign cancellation by using the average of the absolute value of the differences in heads:

$$MAE = \frac{\sum_{i=1}^{n} w_i|h_m - h_s|_i}{n}$$

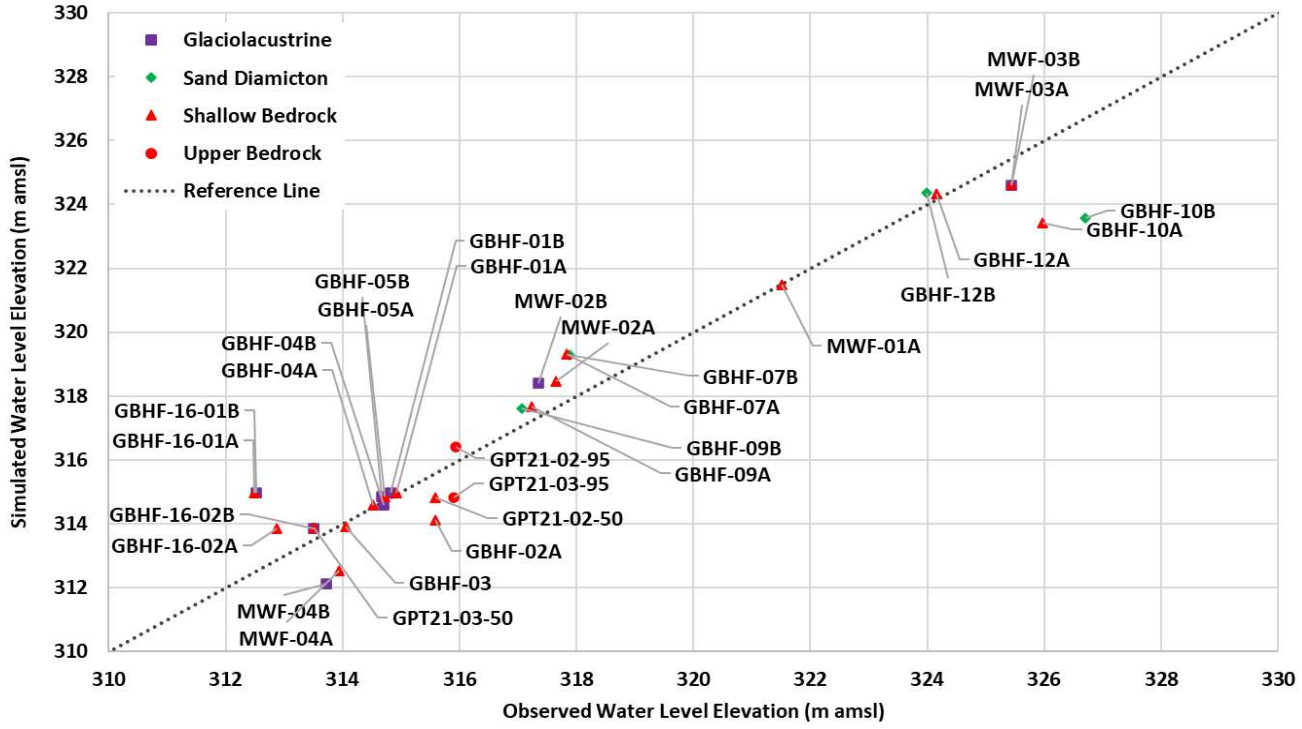
The RMS error, or the standard deviation, is the average of the squared differences in heads:

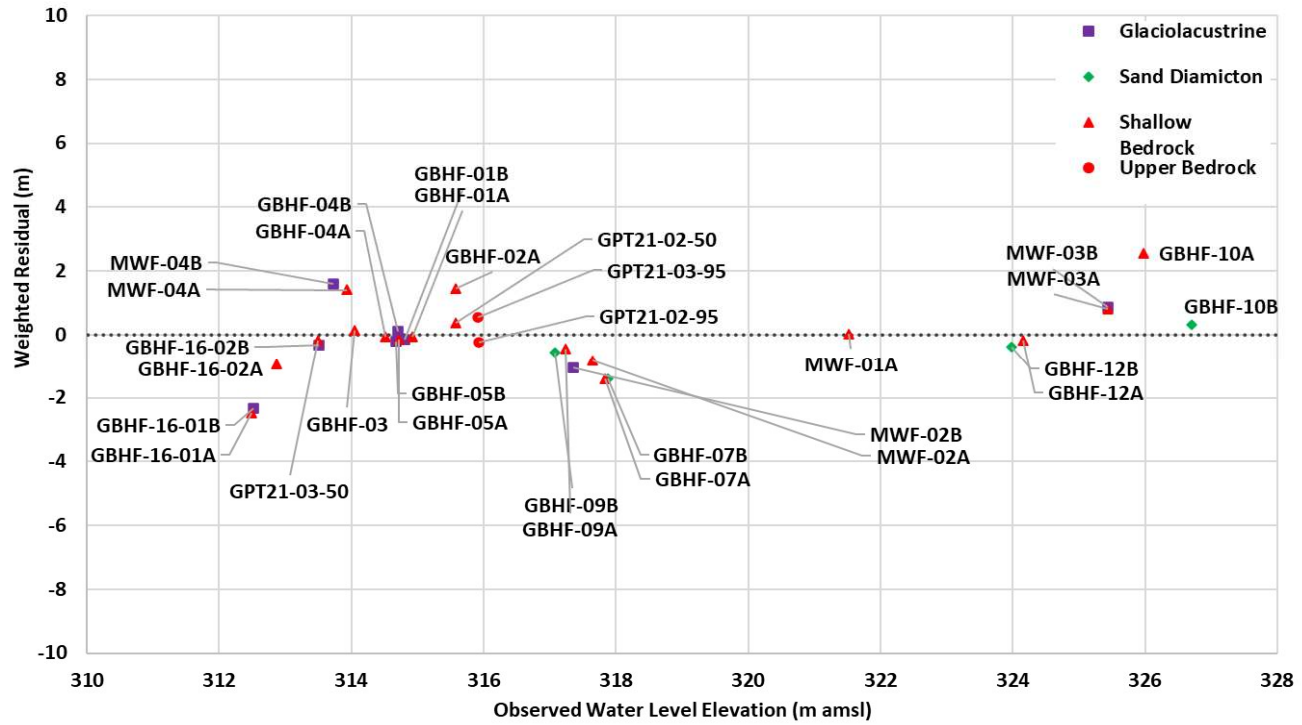
$$RMS = \sqrt{\frac{1}{n}\sum_{i=1}^{n}[w_i(h_m - h_s)_i]^2}$$

The RMS error tends to heavily weight the outlying points in the calculation. This occurs because of the squaring of the differences. When most of the differences are small, with few large differences, the error emphasizes the few rather than the many.

4.1.3 Results of Steady-State Calibration

The plot of observed head versus simulated head for the steady state model calibration and a graphical representation of residual errors are presented on Figure 4-1. The simulated water table contours and representative observed head values are presented on Map 12 and the weighted residual errors are presented on Map 13.





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GORDON SITE

Figure No.

4-1

Title

Steady State Calibration Targets and Weighted Residuals

Stantec

The calibration statistics for the steady-state model are provided in Table 4.3. The steady-state model simulated an acceptable fit to observed heads with a scaled MAE of 5.4 percent and scaled RMS error of 7.4 percent.

In evaluating the fit between the observed and the simulated water levels, the RMS error is usually regarded as the best measure (Anderson and Woessner 1991). If the ratio of the RMS error to the total water level differential (i.e., the scaled RMS error) over the model area is small (e.g., less than 10%; Wels et al. 2012 and Spitz and Moreno 1996), then the errors are only a small part of the overall hydraulic response of the model. The British Columbia Ministry of Environment guidance for groundwater modelling (Wels et al. 2012) states, “Generally, NRMSE (aka scaled RMS error) under 10 percent is good in many models, and under 5% is very good in terms of average residual fit.” In this simulation, the ratio of the RMS error to the total water level differential (7.4%) is less than the recommended 10% threshold. No systematic bias was observed in the residuals considering hydrostratigraphic units or proximity to boundary conditions.

Map 12 shows the simulated potentiometric surface from the calibrated steady state model compared to a snapshot of measured groundwater levels in 2018. The model provides a good representation of groundwater flow conditions around the open pit and mimics the ground surface contours (Map 4). Groundwater flow converges locally on Gordon and Farley lakes in the central portion of the model domain.

The model simulated average annual (i.e., steady state) groundwater discharge to Farley Lake is 0.009 m^3/s. The simulated average annual baseflow is within the estimated range of baseflow of 0.008 to 0.015 m^3/s. The calibration of the model to baseflow is considered acceptable.

Table 4.3 Steady State Calibrated Model Statistical Summary for Water Level Targets

Statistic	Result
Number of Targets	31
Mean Error (m)	-0.10
Mean Absolute Error (m)	0.76
Root Mean Square Error (m)	1.05
Range of Measured Water Levels (m)	14.21
Scaled MAE (-)	0.054
Scaled RMS Error (-)	0.074

4.1.4 Calibrated Hydrogeologic Properties

The calibrated horizontal hydraulic conductivities and anisotropy are presented in Table 4.1 for each hydrostratigraphic unit; anisotropy is presented as the ratio of horizontal hydraulic conductivity to vertical hydraulic conductivity. The calibrated specific yield and specific storage for each hydrostratigraphic unit is also presented in Table 4.1; the transient calibration is discussed in Section 4.2. Due to the limited extent of the mine rock within the project area, the hydraulic conductivity of the mine rock generally does not influence simulated water levels or groundwater/surface water interactions. Consequently, the horizontal and vertical hydraulic conductivities assigned to the mine rock are relatively high but not so high to contribute to model instability.

4.1.5 Recharge

A uniform recharge rate of 40 mm/yr or 8.4% of the annual average precipitation (478 mm/yr) was applied to the uppermost active layer of the model domain in the steady state model, the pumping test model, and the predictive models. For the transient model, 8.4% of the monthly average precipitation was applied.

4.1.6 Calibrated Hydraulic Conductivity for Boundary Conditions

The calibrated lakebed and riverbed hydraulic conductivities are 1.2×10^{-7} m/s. This is consistent with sediment analyses which demonstrated the sediments are generally fine-grained (Section 3.3.2).

4.2 Transient Model Calibration

The purpose of transient calibration is to assess groundwater contribution to/from streams and lakes and pumping from the open pit over time. Transient calibration was conducted using observed water level hydrographs and stress responses recorded during the pumping tests completed at the Gordon site in 2021. The transient models were calibrated by varying the hydraulic conductivity, specific storage, specific yield, and lakebed and riverbed hydraulic conductivity until a close visual match between the observed and simulated water levels, drawdown, and recovery was achieved.

4.2.1 Farley Lake Pumping Test

4.2.1.1 Observation Targets for Farley Lake Pumping Test

In August 2021, two pumping tests were conducted by Friesen under the observation of Stantec personnel. The first pumping test was a 72-hour test between East pit and Farley Lake using two 150 mm diameter test wells, TW1-21 and TW2-21. The pumping test was completed in two stages with no recovery between stages. The details of the pumping stages are provided in Table 4.4.

Stage 1 involved pumping one of the two test wells for a period of 24 hours with a pumping rate of 1,186 m^3/day, immediately followed by Stage 2 during which both wells were operated for a period of 48 hours with a combined pumping rate of 2,062 m^3/day. Following Stage 2, both pumps were shut down and groundwater level recovery was monitored. During the pumping test, water levels were monitored in 10 monitoring wells: GBHG-17-01, GBHG-17-02, GBHF-03, GPW-01, GPW-02, GBHF-16-02A, GBHF-16-02B, GBHF-04A, GBHF-04B, and GBHF-02A (Map 4).

The measured drawdown and recovery at the pumping and observation wells were used as calibration targets. The transient model included a steady state stress period prior to simulating the pumping test to enable calibration in steady state and transient conditions within the same model. Groundwater withdrawal from well TW1-21 and TW2-21 were simulated using the WEL package.

Table 4.4 Summary of the Pumping Test at Farley Lake

Date (2021)	Pumping Test Details
August 23	Start of TW1-21 pumping at 6:00 pm. Pumping rate was approximately 13.7 L/s (1,186 m^3/day). Pumped groundwater discharged to the diversion (FAR 6) located to the north of TW1-21 and TW2-21 (Map 4).
August 24	Start of TW2-21 pumping at 6:00 pm. The pumping rate of TW1-21 decreased slightly when TW2-21 was turned on. Collective pumping rate from TW1-21 and TW2-21 was approximately 23.9 L/s (2,062 m^3/day). Pumped groundwater discharged to the diversion (FAR 6) located to the north of TW1-21 and TW2-21 (Map 4).
August 26	Pumping from both TW1-21 and TW2-21 simultaneously terminated at 6:00 pm.

4.2.1.2 Results of Model Calibration to Farley Lake Pumping Test

The measured and simulated drawdown and recovery are presented in Appendix C. In general, the observed drawdown trends in groundwater levels matched well in the Farley Lake area. At the pumping wells, TW1-21 and TW2-21, the trends in drawdown and recovery are matched well. The magnitude is under-predicted, which is expected given the groundwater model cells are 15 meters wide, which would dampen the response to pumping within the model cell compared to the response measured within the pumping well. The trends and magnitude of drawdown and recovery are matched well at GPW-01 and GBHF-16-02B. The trends are well matched at GBHF-03, GBHF-16-02A, GBHG-17-01, GBHG-17-02, and GPW-02 although the magnitudes are under-predicted. The measured drawdown at GBHF-04A and GBHF-04B was minimal (less than 0.05 m) while the model simulated essentially no response at these locations. At GBHF-02A, no response was measured, and the model simulated nearly no response.

Generally, larger drawdown was measured and simulated for wells located closer to the pumping wells such as GBHG-17-01, GBHG-17-02, and GBHF-03 with maximum measured drawdown of 2.8 m.

4.2.2 Gordon Lake Pumping Test

4.2.2.1 Observation Targets for Gordon Lake Pumping Test

In August 2021, Friesen, under the observation of Stantec personnel, conducted a 72-hour pumping test between the Wendy pit and Gordon Lake. The pumping test on the Gordon Lake side of the proposed open pit was completed using two 150 mm diameter test wells, GPW-03 and GPW-04. The pumping test was completed in two stages with no recovery between stages. The details of the pumping stages are provided in Table 4.5.

Stage 1 involved pumping one of the two test wells for a period of 24 hours with a pumping rate of 458 m^3/day, immediately followed by Stage 2 during which both wells operated for a period of 48 hours with a combined pumping rate of 743 m^3/day. Following Stage 2, both pumps were terminated, and groundwater level recovery was monitored. During the pumping test, water levels were monitored in eight monitoring wells: GBHF-16-01A, GBHF-01A, GBHF-16-01B, GBHF-01B, GBHF-05A, GBHF-05B, GBHF-07A, and GBHF-07B (Map 4).

The measured drawdown and recovery at the pumping and observation wells were used as calibration targets. Groundwater withdrawal from well GPW-03 and GPW-04 were simulated using the WEL package. pumping test completed near Gordon Lake was simulated following the pumping test near Farley Lake according to the details and times provided in Table 4.4 and Table 4.5. Consequently, one model facilitated calibrating steady state conditions as well as both pumping tests.

Table 4.5 Summary of the Pumping Test at Gordon Lake

Date (2021)	Pumping Test Details
August 27	Start of GPW-03 pumping at 1:00 pm. Pumping was approximately 5.3 L/s (458 m3/day). Pumped groundwater discharged to the diversion (FAR 6) located to the north of GPW-03 and GPW-04 (Map 4).
August 28	Start of GPW-04 pumping at 1:00 pm. The pumping rate of GPW-03 decreased slightly when GPW.04 was turned on. Collective pumping rate from GPW-03 and GPW-04 was approximately 8.6 L/s (743 m3/day). Pumped groundwater discharged to the diversion (FAR 6) located to the north of GPW-03 and GPW-04 (Map 4).
August 30	Pumping from both GPW-03 and GPW-04 simultaneously terminated at 12:00 pm.

4.2.2.2 Results of Model Calibration to Gordon Lake Pumping Test

The measured and simulated drawdown and recovery are presented in Appendix C. In general, the observed drawdown trends in groundwater levels matched well in the Gordon Lake area. At the pumping wells, GPW-03 and GPW-04, the trends in drawdown and recovery are matched well. The magnitude is under-predicted, which is expected given the groundwater model cells are 15 meters wide, which would dampen the response to pumping within the model cell compared to the response measured within the pumping well. The trends and magnitude of drawdown and recovery are matched well at GBHF-16-01A, GBHF-01A, GBHF-05A, and GBHF-05B. The measured drawdown at GBHF-16-01B and GBHF-01B were negligible during the pumping stages of the test while the model simulated more than 1 m drawdown at GBHF-16-01B and nearly 0.5 m drawdown at GBHF-01B. The measured drawdown at these two locations may have been influenced by the discharge of water during the pumping stages. Finally, measured drawdown at GBHF-07A and GBHF-07B was less than 0.1 m and was sporadic. It is uncertain if the response measured was due to the pumping test. The model simulated essentially no response at these locations.

Generally, larger drawdown was measured and simulated for wells located closer to the pumping wells such as GBHF-16-01A and GBHF-01A with maximum measured drawdown of 1.2 m.

4.2.3 Results of the Transient Model Calibration

To evaluate the calibrated model, the same statistical methods discussed in Section 4.1.2 were used for the pumping test model. The calibration statistics for the pumping test model are provided in Table 4.6. The transient model simulated an acceptable fit to observed drawdown with a scaled MAE of 3.5 percent and scaled RMS error of 8.4 percent. The RMS is less than the 10 percent threshold for model calibration as defined in Spits and Moreno (1996) and Wells et al. (2012).

Table 4.6 Transient Calibrated Model Statistical Summary

Statistic	Result
Number of Observation Wells	18
Mean Error (m)	0.05
Mean Absolute Error (m)	0.10
Root Mean Square Error (m)	0.24
Range of Measured Drawdown (m)	2.9
Scaled MAE (-)	0.035
Scaled RMS Error (-)	0.084

4.3 Assessment of Model Calibration

For the steady state model, the error of the model was acceptable with a scaled MAE of 5.4 percent and scaled RMS error of 7.4 percent. No systematic bias was observed in the residuals considering hydrostratigraphic units or proximity to boundary conditions. For the transient model, simulated water level changes in observation wells match well with measured water level changes. The transient model simulated an acceptable fit to observed drawdown with a scaled MAE of 3.5 percent and scaled RMS error of 8.4 percent. The scaled RMS for the steady state and transient models were below the 10 percent threshold for model calibration as defined in Spits and Moreno (1996) and Wells et al. (2012). The steady state and transient model calibrations are suitable for the purpose of assessing potential impacts from mining operations in the study area.

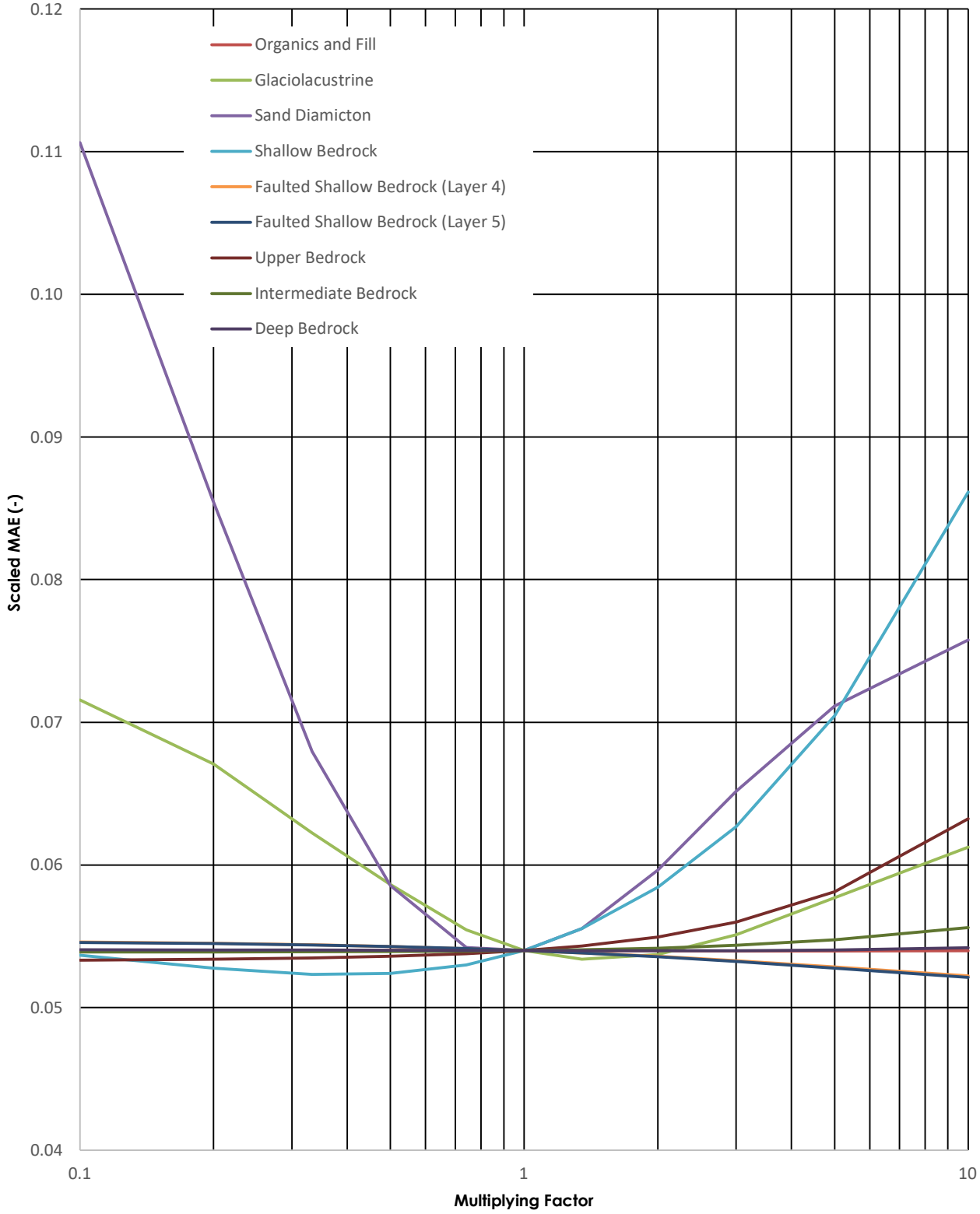
4.4 Calibrated Model Sensitivity Analyses

A sensitivity analysis was performed to assess the uncertainty in estimated parameters, hydraulic stresses, and boundary conditions used to develop the calibrated steady state groundwater flow model, consistent with the approach described in Anderson and Woessner (1991). For this sensitivity analysis, iterative changes were applied to the hydraulic conductivity of the hydrostratigraphic units, the hydraulic conductivity of lakebed and riverbed materials, and recharge. Modelled changes for each of these parameters were constrained to reasonable and foreseeable values for each parameter/condition; tests were not performed for parameters outside of expected ranges as described below.

4.4.1 Hydraulic Conductivity of Hydrostratigraphic Units

Multiple sensitivity simulations were performed for the hydraulic conductivity of the hydrostratigraphic units. The hydraulic conductivity of each hydrostratigraphic unit (except mine rock) was adjusted individually using factors between 0.1 and 10 to assess the sensitivity of the calibration to the hydraulic conductivity of each hydrostratigraphic unit

The scaled MAE for each sensitivity simulation is presented in Figure 4-2 which indicates the calibrated model is most sensitive to increases in the hydraulic conductivity of the sand diamicton, shallow bedrock, glaciolacustrine, and upper bedrock units and decreases in the hydraulic conductivity of the sand diamicton and glaciolacustrine units. The organics and fill, the faulted shallow bedrock, intermediate bedrock, and deep bedrock zones are fairly insensitive to an increase or decrease in hydraulic conductivity. Some of the sensitivity simulations as presented in Figure 4-2 show slight improvements in the scaled MAE. The sensitivity simulation with the lowest MAE was the 2-fold increase in hydraulic conductivity of the glaciolacustrine with a scaled MAE of 0.049 compared to 0.054 for the calibrated model, which is a small improvement. The results of the sensitivity analysis demonstrate the calibrated hydraulic conductivities simulate the measured water levels well and alternate values are not indicated.



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Figure No.

4-2

Title **Calibrated Model Sensitivity Analysis - Hydraulic Conductivity**

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The hydraulic conductivity of the hydrostratigraphic units also were adjusted simultaneously. Except for mine rock, each hydrostratigraphic unit was adjusted by an order of magnitude decrease and increase (factor of 10) from the calibrated baseline values. Table 4.7 presents the calibration statistics for the sensitivity scenarios and the baseline model for comparison.

Table 4.7 Calibration Statistics for the Sensitivity Analyses for Hydraulic Conductivity of Hydrostratigraphic Units

Statistic	Baseline	K / 10	K * 10
Mean Error (m)	-0.10	-4.93	1.34
Mean Absolute Error (m)	0.76	4.95	1.78
Root Mean Square Error (m)	1.05	7.91	2.77
Scaled MAE (-)	0.054	0.35	0.13
Scaled RMS Error (-)	0.074	0.56	0.20

Decreasing the hydraulic conductivity of the hydrostratigraphic units by an order of magnitude increases the error of the model significantly as indicated by the scaled RMS error of 56%. Increasing the hydraulic conductivity of the hydrostratigraphic units by an order of magnitude also increases the error of the model although to a lesser degree as the scaled RMS is 20%. Both scaled RMS errors are greater than the 10% threshold described in Section 4.1.3.

The effect of simultaneously varying the hydraulic conductivity for the hydrostratigraphic units on predicted baseflow to the rivers, lakes, and streams is discussed in Section 5.5.1

4.4.2 Hydraulic Conductivity of Lakebed and Riverbed Sediments

Two sensitivity simulations were performed whereby the hydraulic conductivity of riverbed material (as represented in the River boundary condition) and lake bed material (as represented in the General Head Boundary) was varied to evaluate model responsiveness. The hydraulic conductivity in both the River and General Head Boundaries was increased and decreased by a factor of ten. Table 4.8 presents the calibration statistics for the sensitivity scenarios and the baseline model.

Table 4.8 Calibration Statistics for the Sensitivity Analyses for Hydraulic Conductivity of Riverbed and Lakebed Sediments

Statistic	Baseline	Decreased K	Increased K
Mean Error (m)	-0.10	-1.31	0.06
Mean Absolute Error (m)	0.76	1.62	0.73
Root Mean Square Error (m)	1.05	1.87	1.05
Scaled MAE (-)	0.054	0.11	0.05
Scaled RMS Error (-)	0.074	0.13	0.074

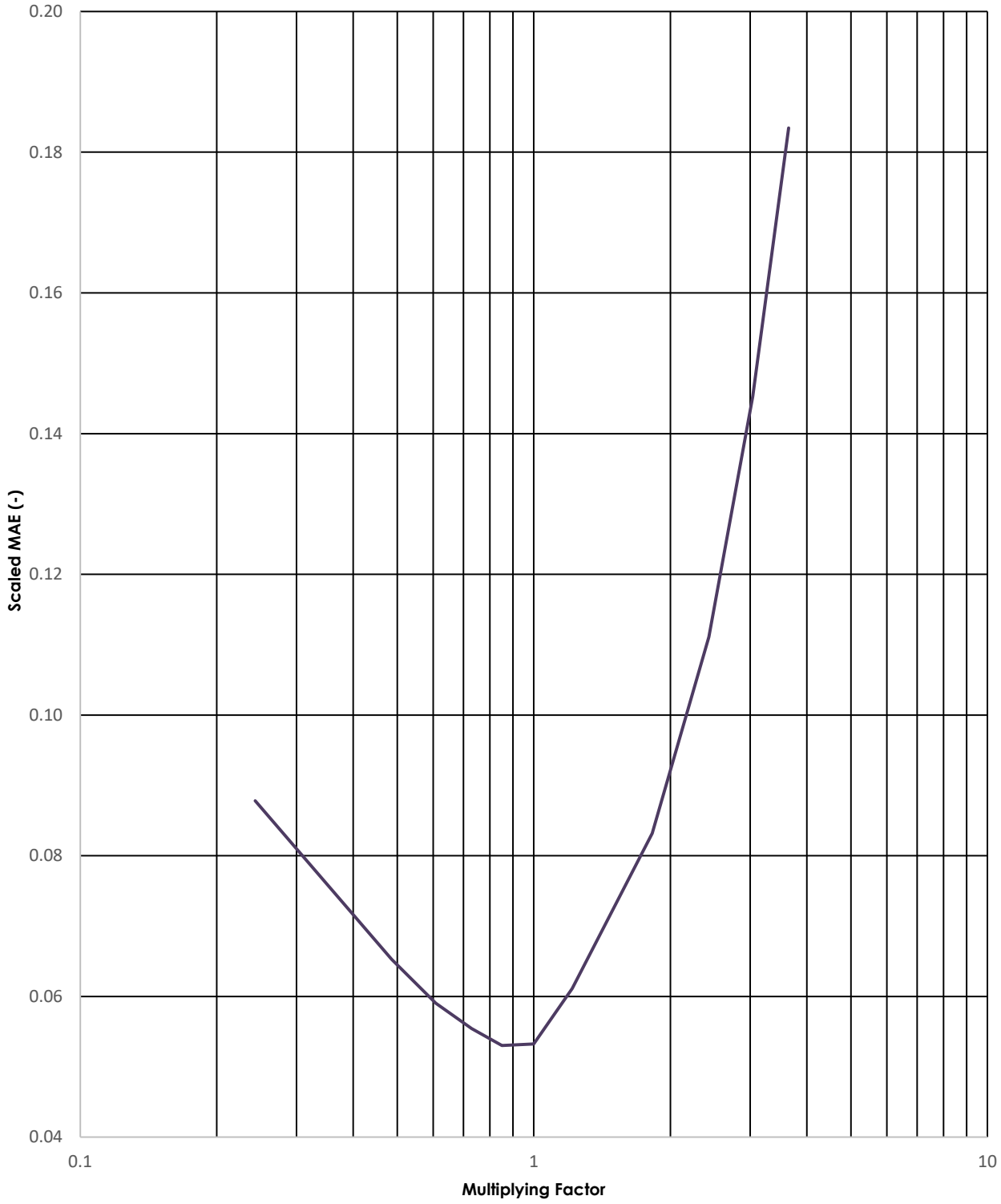
Decreasing river and lakebed hydraulic conductivity increases the error of the model as indicated by the scaled RMS error of 13%. Increasing the river and lakebed hydraulic conductivity has minimal effect on the error of the model as indicated by the scaled RMS error of 7.4%. This indicates the calibrated values for hydraulic conductivity of the river and lakebed materials simulate high hydraulic connection between surface water and groundwater and further increasing the hydraulic conductivity does not increase the hydraulic connection. This is conservative to assess impacts.

The effect of varying riverbed and lakebed hydraulic conductivity on predicted baseflow to the rivers, lakes, and streams is discussed in Section 5.5.4.

4.4.3 Recharge

Multiple sensitivity simulations were performed by adjusting the recharge rate using factors between 0.24 and 3.6 to assess the conceptual range of recharge which is assumed to be 4 to 146 mm/yr. The range in recharge rate used in this sensitivity scenario is considered conservative as climate change forecasts for Lynn Lake, Manitoba are in the range of 11% to 15% increase in precipitation for the next 20 to 50 years, respectively, under a high emissions scenario (ClimateData.ca 2024).

The scaled MAE for each sensitivity simulation is presented in Figure 4-3 which indicates that the model is generally equally sensitive to increases and decreases in the recharge rate. The results of the sensitivity analysis demonstrate water levels are highly sensitive to recharge rate, the calibrated recharge rate simulates the measured water levels well, and an alternate value is not indicated.



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4-3

Title **Calibrated Model Sensitivity Analysis - Recharge**

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Table 4.9 presents the calibration statistics for the sensitivity scenarios and the baseline model for comparison in which recharge was adjusted using a factor of 2.

Table 4.9 Calibration Statistics for the Sensitivity Analyses for Recharge

Statistic	Baseline	Recharge / 2	Recharge x 2
Mean Error (m)	-0.10	0.51	-1.06
Mean Absolute Error (m)	0.76	0.93	1.27
Root Mean Square Error (m)	1.05	1.48	1.85
Scaled MAE (-)	0.054	0.07	0.09
Scaled RMS Error (-)	0.074	0.10	0.13

Decreasing the recharge by a factor of two increases the error of the model as indicated by the scaled RMS error of 10%. Increasing the recharge by a factor of two also increases the error of the model as indicated by the scaled RMS error of 13%. The scaled RMS error for the simulation in which recharge was increased is greater than the 10% threshold described in Section 4.1.3.

The effect of varying recharge on predicted baseflow to the rivers, lakes, and streams is discussed in Section 5.5.3.

5 Model Applications

The calibrated groundwater flow model was used to quantify baseline groundwater levels and flow and groundwater discharge to the receiving environment under baseline conditions. The baseline model results were then used to compare to model predictions during construction, operation, and closure phases of the Project. Model modifications completed to allow simulation of the Project phases are as follows:

- Construction (Mine Years -1 to 0) – dewatering of the existing East and Wendy pits and initial dewatering of the starter pit.
- Operation (Mine Years 0 to 5) – dewatering of open pit and groundwater discharge and seepage collection associated with the historical and new MRSAs.
- Active reclamation/closure (after Mine Year 5) – filling the open pit and groundwater discharge associated with the MRSAs.

5.1 Baseline Conditions

5.1.1 Model Setup: Baseline

The calibrated groundwater flow model described in Section 4 was used to estimate the water table elevation (i.e., the top of the saturated water column) and groundwater flow under baseline conditions.

Recharge through the historical MRSAs (north and south) has the potential to affect groundwater quality and as a result the model was used to estimate the discharge location and flux of water recharging the groundwater flow system from beneath the MRSAs. A forward particle tracking approach was used, where a particle was released from each model node within the footprint of the historical MRSAs. The travel paths of the particles were simulated through the model domain until they arrived at a receptor, such as a lake or watercourse.

The groundwater flux associated with each particle track was then used to estimate the total discharge rate (Q) for the historical MRSAs to the environment. The groundwater discharge to a surface water feature that is contributed by the cell in the historical MRSA is conservatively assumed to be equal to the average annual recharge rate into that cell (e.g., $Q_{in} = Q_{out}$). It was assumed the groundwater recharge that enters a historical MRSA will ultimately discharge to receptors. As a result, the groundwater flow model may over-estimate groundwater discharge rates, as local seepage to intermittent surface water features or ditches that may be present in the area of a historical MRSA are not accounted for in the model.

The historical north MRSA and south MRSA received an average recharge rate of 40 mm/yr under baseline conditions.

5.1.2 Model Results: Baseline

The calibrated groundwater flow model was used to estimate the water table elevation, groundwater flow, and groundwater discharge to surface water under baseline conditions.

5.1.2.1 Groundwater Elevation

Map 14 shows the predicted average annual water table elevation contours under baseline conditions. The model provides a good representation of groundwater flow conditions in the area of the open pit and mimics the ground surface contours, with groundwater flowing regionally to the east in the southern portions of the model domain and to the north in the northern portion of the model domain. Groundwater flow converges locally on Gordon and Farley lakes in the central portion of the model domain.

5.1.2.2 Groundwater Discharge to Surface Water

Simulated groundwater discharge to the primary lakes and watercourses located in the model domain is presented in Table 5.1. The locations of surface water features are presented in Map 10. The baseline groundwater discharge rates were used to quantify changes to groundwater discharge during the construction, operation, and closure phases, as presented in subsequent sections.

In Table 5.1, a positive number for the net groundwater to receiver indicates groundwater discharge to the surface water feature (gaining river or lake) and a negative value indicates that the surface water feature is recharging the groundwater flow system (losing river or lake). Baseflow values presented in the table represent the groundwater contributions to the features, and do not include contributions from surface water storage.

Table 5.1 Estimated Groundwater Discharge to Surface Water Features for Baseline Conditions

Receiver	Net Groundwater Discharge to Receiver (m^3/s)[1]
Lakes	
Susan Lake	0.00236
Pump Lake	-0.00057
Marnie Lake	-0.00030
Marnie Lake North	0.00024
Gordon Lake	0.00340
Farley Lake	0.00893
Marie Lake	-0.00231
Lake 3	0.00050

Receiver	Net Groundwater Discharge to Receiver (m^3/s)[1]
Watercourses	
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00044
Tributary of Simpson Lake (FAR3-SIM2)	0.00115
Tributary of Swede Lake (FAR3-A1)	0.00059
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	0.00013
Tributary of Farley Lake (FAR5-A1)	0.00003
Southern Tributary of Gordon Lake (FAR7-A1)	0.00013
Diversion Channel (FAR6)	0.00006
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	0.00009
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	-0.00004
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00001

Notes

[1] Positive value represents flow from groundwater to receiver

5.1.2.3 Seepage from Mine Rock Storage Areas

The particle tracks from the historical MRSAs under baseline conditions are presented on Map 15, and the estimated discharge rates and travel time statistics to the receiving environment is presented in Table 5.2. As shown on Map 15 and Table 5.2, Seepage originating from the historical north MRSA discharges to East Pit and Wendy Pit with mean travel times of 70 and 116 years, respectively. Seepage originating from the historical south MRSA discharges to East Pit and Farley Lake with mean travel times of 188 and 1,036 years, respectively. The flow paths are long as they flow into the bedrock unit prior to discharge in surface water.

Table 5.2 Predicted Seepage from Historical Mine Rock Storage Areas for Baseline Conditions

Source	Receptor	Discharge (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical North MRSA	East Pit	4.6E-05	15	70	171
	Wendy Pit	4.5E-05	16	116	759
Historical South MRSA	East Pit	4.4E-05	61	188	500
	Farley Lake	1.1E-04	991	1,036	1,226

5.2 Construction

The primary activities that are anticipated to potentially influence groundwater levels and flow during construction include the initial dewatering of the historical East and Wendy pits and the starter pit, mitigation of pit inflows through the use of interceptor wells, the development of the MRSA, the removal of the historical North MRSA, and the alteration of the historical South MRSA. While these activities will continue into the initial operating years, they have been presented separately in the construction phase to document the potential changes to groundwater levels and flow in the early phases of Project development.

5.2.1 Model Setup: Construction

Starting with the calibrated groundwater flow model, the following modifications were completed to represent the dewatering of Wendy and East pits, the use of groundwater interception wells to mitigate pit inflow, and the fate of groundwater originating from the MRSA. The historical north MRSA was not simulated as the mine rock will be used in construction or relocated to the new MRSA. The size of the historical south MRSA was reduced to reflect development of the open pit. The modifications are discussed below for each Project component. The model was run in transient mode using four quarterly stress periods to simulate the one-year construction phase.

5.2.1.1 Dewatering East, Wendy, and Open Pits

To evaluate the effects of the dewatered historical East and Wendy pits on the groundwater level and groundwater discharge to surface water features, the calibrated groundwater flow model was modified to represent the extent and depth of each pit by removing the GHBs over the footprint of the historical pits and adding a well to remove water within each pit. The historical pits were simulated to be dewatered throughout the construction phase, although the pits may be dewatered faster to meet Project objectives. Wendy pit has a surface area of about 44,100 m^2, a volume of 573,930 m^3, and a depth of approximately 50 m. East pit has a surface area of about 58,460 m^2, a volume of 1,561,931 m^3, and a depth of approximately 80 m. The elevation of the ground surface in the area of the historical pits is 318 m amsl, meaning the elevation of the base of the Wendy pit and East pit is about 268 m amsl and 238 m amsl, respectively.

5.2.1.2 Groundwater Interceptor Wells

A high permeability zone was simulated in the shallow bedrock in the vicinity of the East and Wendy faults to reflect the results of pumping tests. Initial model runs identified that dewatering of the existing pits has a strong hydraulic connection between the pits and Gordon and Farley lakes due to this high permeability zone in shallow bedrock. Interceptor wells were simulated to capture seepage from Gordon and Farley lakes prior to entering the open pit and return the water to the lakes to mitigate potential for changes in lake level due to open pit dewatering. Capturing the water prior to entering the open pit is anticipated to limit effects of blasting residual and metal leaching on the chemistry of groundwater and therefore limit potential treatment prior to returning the water to the lakes.

Eleven (11) interceptor wells were simulated in the groundwater flow model between the pits and the lakes within the higher permeability zone. Six interceptor wells are located between Farley Lake and the open pit, and five interceptor wells are located between Gordon Lake and the open pit. Each interceptor well was assumed to extend from the top of rock to the base of the shallow bedrock layer (i.e., the top 50 m of bedrock). The number of pumping wells, and the pumping rate from each well was optimized to intercept groundwater originating from the lakes before it entered the open pit. The pumped water from the interceptor wells was assumed to be discharged to the nearest lake (Gordon or Farley). The interceptor wells were simulated using the MNW package. The pumping rate for each well assigned in the model was slightly higher than could be removed from the aquifer; the limiting function in the MNW package was used to reduce the pumping rate to prevent dry cells. Consequently, slight fluctuation in the pumping rate is possible in different models (e.g., sensitivity simulations).

5.2.1.3 Mine Rock Storage Areas

The Project includes an MRSA for the collection of surplus mine rock (Map 3). While there will be no rock mined in construction, rock from the historical north MRSA that is not used during construction will be relocated into the new MRSA and a portion of rock from the historical south MRSA will be removed or used in construction to allow development of the open pit. Therefore, for the construction phase groundwater model, the historical north MRSA was removed, the footprint of the historical south MRSA was reduced, and the new MRSA was added. Recharge through the MRSAs has the potential to affect groundwater quality and as a result the model was used to estimate the discharge locations and flux of water recharging the groundwater flow system from beneath the MRSA and historical south MRSA. The forward particle tracking approach presented in Section 5.1.1 was used to predict the fate of recharge from the MRSAs, where a particle was released from each model cell within the footprint of the MRSAs.

A portion of rock from the historical south MRSA needs to be relocated to the MRSA and/or used in construction to allow development of the open pit. The historical south MRSA footprint from baseline conditions was reduced by approximately 80%, from 129,499 m^2 to approximately 25,900 m^2 in construction. The recharge rate for the historical south MRSA from baseline conditions of 40 mm/year was applied through construction.

The MRSA was represented in the model by adjusting the groundwater recharge within the footprint of the MRSA. This footprint increases over time in the model to reflect the expansion of the MRSA over the construction phase. The groundwater recharge within the footprint of the MRSA was estimated using a MACRO model (Stantec 2020e). The average recharge rate to the groundwater flow system under the MRSA during the operations phase is predicted to be 8.4 mm/yr from the top surface of the MRSA and 39 mm/yr from the side slopes of the MRSA.

The footprint of the MRSA was added in the first model stress period and modified in subsequent stress periods to represent the expansion of the MRSA over time. In each stress period where a model cell first fell within the footprint of the expanding MRSA, a particle was added to the cell. The travel paths of the particles were evaluated for the 1-year construction period where they discharged to a receptor, such as a lake or watercourse, or the MRSA contact water collection ditch (which was represented by drain cells assigned 1 m bgs in cells where the collection ditch is present), or remained in groundwater.

The groundwater flux associated with each particle track was then used to estimate the total discharge rate (Q) for MRSAs to the environment using the method described in Section 5.1.1. The estimated groundwater flux represents the total discharge rate to the environment at the end of construction following one year of flow of the particles.

5.2.2 Model Results: Construction

5.2.2.1 Dewatering Volumes

The historical East and Wendy pits were dewatered throughout the construction period as a precursor to dewatering for the open pit. The dewatering rate in the model does not represent what will be the actual dewatering rate because the open pits will likely be dewatered over a short period of time within the construction period.

The time to dewater the historical open pits will be estimated as part of a separate scope of work based on a water balance that incorporates groundwater inflows, precipitation, surface water runoff, the volume of water already in the open pits as well as the capacity of the pumps that will be used to dewater the historical pits. For reference, the volumes of the East and Wendy pits are 1,561,931 m^3 and 573,930 m^3.

5.2.2.2 Groundwater Drawdown and Discharge

The predicted water table elevation and groundwater drawdown contours at the end of the construction period when the East and Wendy pits are fully dewatered are presented on Map 16 and Map 17, respectively. In the area of the East and Wendy pits, groundwater levels are lowered by 1 m or more within approximately 500 m of the pits, which includes the drawdown effect from the interceptor wells. An approximately 350 m wide area of drawdown that is 1 m or more is predicted at the north-western end of the MRSA due to the contact water collection ditch around the MRSA. The groundwater table is closest to ground surface in the northwestern portion of the MRSA which is why drawdown effects of the MRSA contact water collection ditch are predicted for the other portions of the ditch.

Table 5.3 presents the comparison of baseline groundwater discharge rates with effects of the dewatering at the end of the construction period. As shown in Table 5.3, the groundwater flow system responds to the dewatering of the existing pits at the end of the construction period. Gordon and Farley lakes are predicted to shift from gaining water from groundwater to losing water to groundwater, as is the diversion from Gordon to Farley Lake (FAR6). The water pumped from the interceptor wells (0.10 m^3/s) will be returned to Gordon and Farley lakes during construction to offset the increase in seepage from the two lakes (0.091 m^3/s). The changes to groundwater discharge rates for the remaining lakes and watercourses are relatively small (less than 0.001 m^3/s) compared to the overall anticipated flow rates in the surface water features.

Table 5.3 Estimated Groundwater Discharge to Receivers at End of Construction

Receiver	Net Groundwater Discharge to Receiver (m^3/s)		
	Baseline[1]	End of Construction[1]	Change From Baseline[2]
Lakes			
Susan Lake	0.00236	0.00240	0.00003
Pump Lake	-0.00057	-0.00054	0.00003
Marnie Lake	-0.00030	-0.00023	0.00007
Marnie Lake North	0.00024	0.00025	negligible
Gordon Lake	0.00340	-0.04167	-0.04506
Farley Lake	0.00893	-0.03667	-0.04559
Marie Lake	-0.00231	-0.00221	0.00010
Lake 3	0.00050	0.00021	-0.00029
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00044	0.00045	0.00001
Tributary of Simpson Lake (FAR3-SIM2)	0.00115	0.00115	negligible
Tributary of Swede Lake (FAR3-A1)	0.00059	0.00059	0.00001
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	0.00013	0.00013	0.00001
Tributary of Farley Lake (FAR5-A1)	0.00003	0.00002	-0.00001
Southern Tributary of Gordon Lake (FAR7-A1)	0.00013	0.00010	-0.00003
Diversion Channel (FAR6)	0.00006	-0.00013	-0.00019
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	0.00009	0.00009	negligible
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	-0.00004	-0.00004	0.00001
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00001	-0.00001	negligible
Water Management Features			
MRSA Contact Water Collection Ditch	N/A	0.00087	N/A
Interceptor Wells	N/A	0.10012	N/A

Notes:

[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

N/A – not applicable

5.2.2.3 Seepage From Mine Infrastructure

The particle tracks from the MRSAs at the end of the construction period are presented on Map 18, and the estimated discharge rates and travel time statistics to the receiving environment are presented in Table 5.4. The particles originating from the historical south MRSA are predicted to be captured by the interceptor wells with a mean advective travel time of approximately one year. The particles originating at the MRSA are predicted to discharge to the MRSA contact water collection ditch or be captured by the interceptor wells with a mean travel time of less than one year.

Table 5.4 Predicted Groundwater Discharge Rates and Travel Time from MRSAs to Receiving Environment at End of Construction

Source	Receptor	Discharge Arriving by End of Construction (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical South MRSA	Interceptor Wells	1.8E-07	1	1	>1
MRSA	MRSA Contact Water Collection Ditch	9.8E-05	<1	<1	>1
	Interceptor Wells	4.9E-06	1	1	>1

5.3 Operation

The groundwater model was subsequently modified from the construction phase to simulate the effects of the Project during operation on groundwater levels and flow and the fate of groundwater originating from the historical and new MRSAs and the OSA during operation. As part of these simulations, the model was used to predict groundwater inflows to the open pit and to evaluate the flow paths and groundwater discharge rates to receptors for recharge that originates from the MRSA and the OSA.

5.3.1 Model Setup: Operation

The transient groundwater flow model used for the prediction of effects in construction described in Section 5.2.1 was simulated for a further 5 years (20 quarterly stress periods) with the following modifications to model the predicted effects of the operations phase.

5.3.1.1 Open Pit Dewatering

To evaluate the effects of groundwater inflows to the open pit, the construction groundwater flow model was modified to include the extent and depth of the open pit. Drain cells were used to represent the extent and depth of the open pit over time in the transient model. The ultimate footprint of the open pit has an area of 367,200 m^2 and an ultimate depth of about 200 m which corresponds to 116 m amsl.

The conductance of the drain cells was specified based on the dimensions of each grid cell and the hydraulic conductivity of the drain cells was assigned a sufficiently high value to facilitate drainage within the pit but low enough to avoid model instability. Drain cells were assigned from the water table to the deepest portion of the open pit in layer 11. The in-pit drains were simulated using the drain package.

To assess the influence of freezing the open pit walls in the winter, the hydraulic conductivity of the cells within the pit was adjusted from October 15 to April 15 of each year to simulate reduced hydraulic conductivity. The period during which the hydraulic conductivity was reduced was based on previous modeling completed in FEFLOW (Stantec 2020a). The hydraulic conductivity was linearly reduced from the calibrated value for each hydrostratigraphic unit within the pit to the reduced value from October 15 to November 1 of each year. From November 1 to March 31, the hydraulic conductivity remained at the reduced value. From March 31 to April 15, the hydraulic conductivity was linearly increased from the reduced value to the calibrated value for each hydrostratigraphic unit. Given the uncertainty of the extent of freezing in the winter, the relative change in hydraulic conductivity was assigned based on two factors: the calibrated hydraulic conductivity of each hydrostratigraphic unit in the pit was reduced by either two orders of magnitude or three orders of magnitude. Simulations which included freezing were completed using MODFLOW-SURFACT version 4. The time-varying material properties were simulated using the TMP1 package.

5.3.1.2 Groundwater Interceptor Wells

The groundwater interceptor wells installed during construction, as presented in Section 5.2.1.2, remain in place during operation to reduce inflows to the open pit due to a high permeability zone in the shallow bedrock associated with the East and Wendy faults (Map 9). The pumped water from the interceptor wells was assumed to be discharged to the nearest lake (Gordon or Farley). The interceptor wells were simulated using the MNW package. Two interceptor well pumping rates were evaluated, one to offset seepage from Gordon and Farly Lakes and a second pumping rate to reduce groundwater inflow to the open pit.

5.3.1.3 Mine Rock Storage Areas and Ore Storage Area

The historical south MRSA will have a similar footprint as in the construction simulation and the same recharge rate of 40 mm/year from construction and baseline, was applied through operation.

The MRSA will have a similar footprint as in construction but the height of the MRSA will increase throughout operations as additional mine rock is placed in the MRSA. The average recharge rate into the groundwater flow system under the MRSA was consistent with the construction phase parameterization which was 8.4 mm/yr on the top of the MRSA and 39 mm/yr on the side slopes.

Ore will be temporarily stockpiled in the OSA as mining progresses. The ore would then be transferred to the MacLellan site for processing. Therefore, the OSA extent and height will vary over time as material is removed for processing. Thus, it is not considered an enhanced recharge feature, and the average recharge rate of 40 mm/yr used in the baseline model was retained within the OSA footprint.

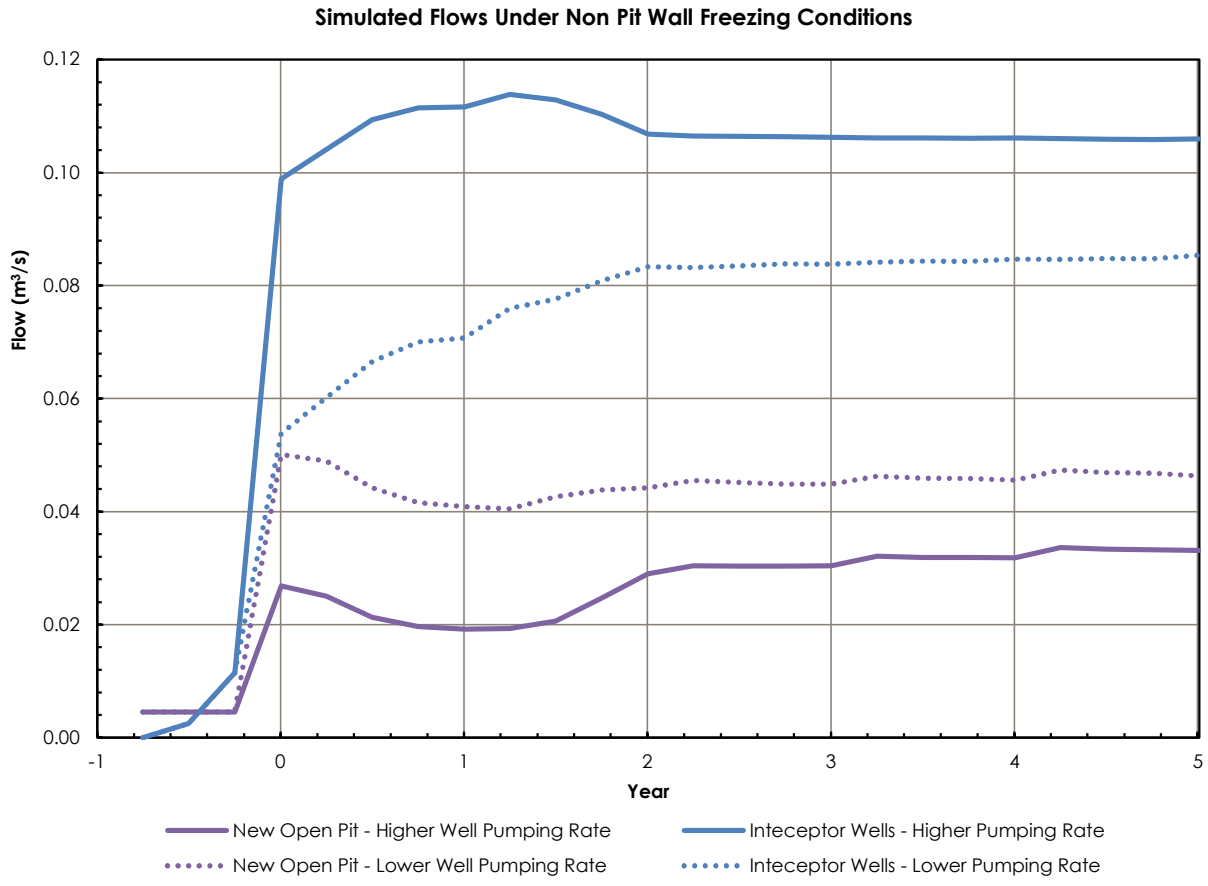
The forward particle tracking approach presented in Section 5.1.1 was used to predict the fate of recharge from the MRSAs and the OSA, where a particle was released from each model cell within the footprint of the MRSAs and OSA. The resulting predicted discharge rates to the environment from the MRSAs and OSA represent the end of operations when particles have been tracked for up to six years (one year of construction plus five years of operation).

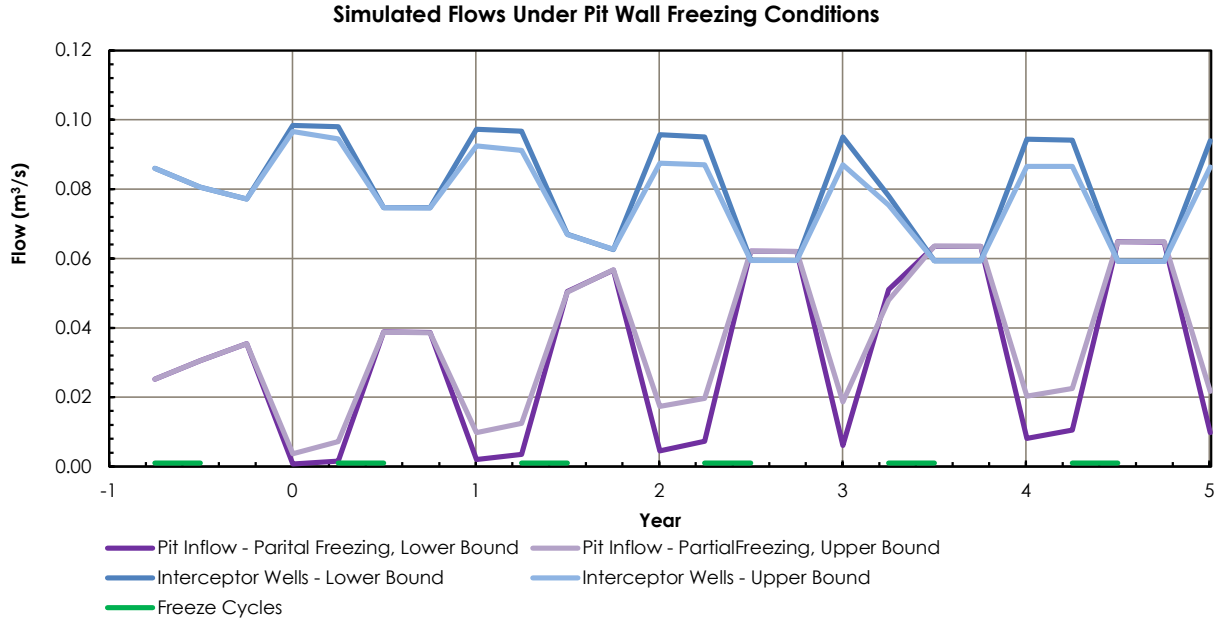
5.3.2 Model Results: Operation

5.3.2.1 Dewatering Volumes

The predicted groundwater inflow rate to the open pit and the combined pumping rate of the interceptor wells are presented in Figure 5-1. Two pumping rates for the interceptor wells are presented to assess the range of inflows expected for the open pit. After year 2, the combined pumping rate of the interceptor wells was simulated to stabilize at approximately 0.11 m^3/s at the higher rate and approximately 0.085 m^3/s at the lower rate. At the end of operations, when the open pit is excavated and dewatered to its full extent, flow into the new open pit is predicted to be approximately 0.033 m^3/s if the interceptor wells are pumping at the higher rate and approximately 0.047 m^3/s if the interceptor wells are pumping at the lower rate. Groundwater inflow to the open pit is mainly from the shallow bedrock. The open pit is mainly developed through the shallow flow system by year 1 of operations and therefore, groundwater inflow to the open pit does not vary significantly in the remaining three years of operations.

The predicted groundwater inflow rate to the open pit when partial pit wall freezing is simulated is presented in Figure 5-1. The partial pit wall freezing models were simulated with the interceptor wells pumping at the lower rate presented in the upper panel of Figure 5-1 (about 0.085 m^3/s). The partial pit wall freezing simulation is relevant for understanding the magnitude of the potential effect of pit wall freezing on groundwater inflow rates to the open pit. Predicted groundwater inflow to the open pit with partial pit wall freezing exhibits a cyclical pattern with lower inflow rates in the winter and higher inflow rates in non-freezing months. The extent of freezing is uncertain and may vary from year to year, consequently a lower and upper bound of flow rates are presented in Figure 5-1. While the majority of the pit walls may freeze in the winter, some inflow is expected to occur through fractures and faults associated with the blast zone along the pit wall. The minimum predicted inflow rate is generally less than 0.005 m^3/s in the first few years of operation in the winter and gradually increases later in operations to nearly 0.01 m^3/s. The maximum predicted inflow rate in the winter ranges from approximately 0.01 m^3/s to 0.02 m^3/s. In the spring and summer, the predicted inflow rates range from approximately 0.04 m^3/s in early operation to 0.065 m^3/s at the end of operation which is two to almost three times greater than the pit inflow rate in the winter months.





Notes:

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5-1

Title **Predicted Groundwater Inflow and Interceptor Well Pumping Rates During Construction and Operation**

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5.3.2.2 Groundwater Drawdown and Discharge to Surface Water

The predicted water table elevation and groundwater drawdown contours at the end of operations are presented on Map 19 and Map 20, respectively. The 1 m drawdown contour is predicted to extend approximately 500 m to the north and 1,000 m to the southwest of the open pit, increasing to more than 20 m of drawdown within 300 m of the open pit. The drawdown extent is limited to the east and west due to recharge to groundwater from Gordon and Farley lakes. The extent of drawdown related to the presence of the MRSA contact water collection ditch is masked by larger effects on the water table from pit dewatering and pumping from the interceptor wells.

Table 5.5 presents the comparison of baseline groundwater discharge rates with effects of dewatering at the end of the operation period. As shown in Table 5.5, Gordon and Farley lakes as well as the diversion channel (FAR6) are predicted to shift from gaining from groundwater to losing to groundwater, as was also predicted during construction. The lake north of the open pit (Lake 3) is also predicted to shift from gaining to losing during operations. The water pumped from the interceptor wells (0.11 m^3/s) will be returned to Gordon and Farley lakes during operations to offset the reduction in groundwater discharge in the two lakes (0.12 m^3/s). The changes to groundwater discharge rates for remaining lakes and watercourses are relatively small (less than 0.001 m^3/s) compared to the overall anticipated flow rates in the surface water features.

Table 5.5 Estimated Groundwater Discharge to Receivers at End of Operations

Receiver	Net Groundwater Discharge to Receiver (m^3/s)		
	Baseline[1]	End of Operations[1]	Change From Baseline[2]
Lakes			
Susan Lake	0.00236	0.00221	-0.00016
Pump Lake	-0.00057	-0.00057	0.00001
Marnie Lake	-0.00030	-0.00025	0.00005
Marnie Lake North	0.00024	0.00023	-0.00002
Gordon Lake	0.00340	-0.05496	-0.05836
Farley Lake	0.00893	-0.06016	-0.06909
Marie Lake	-0.00231	-0.00226	0.00005
Lake 3	0.00050	-0.00072	-0.00123
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00044	0.00045	0.00001
Tributary of Simpson Lake (FAR3-SIM2)	0.00115	0.00114	-0.00001
Tributary of Swede Lake (FAR3-A1)	0.00059	0.00059	0.00000
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	0.00013	0.00011	-0.00002

Receiver	Net Groundwater Discharge to Receiver (m^3/s)		
	Baseline[1]	**End of Operations[1]**	**Change From Baseline[2]**
Tributary of Farley Lake (FAR5-A1)	0.00003	-0.00003	-0.00006
Southern Tributary of Gordon Lake (FAR7-A1)	0.00013	0.00005	-0.00008
Diversion Channel (FAR6)	0.00006	-0.00013	-0.00019
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	0.00009	0.00009	negligible
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	-0.00004	-0.00005	-0.00001
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00001	-0.00001	negligible
Water Management Features			
MRSA Contact Water Collection Ditch	N/A	0.00049	N/A
Interceptor Wells	N/A	0.10601	N/A

Notes

[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

5.3.2.3 Seepage From Mine Infrastructure

The particle tracks from the MRSAs and the OSA at the end of the operations period (after six years of travel) are presented on Map 21, and the estimated discharge rates and travel time statistics to the receiving environment are presented in Table 5.6. The particles originating from the historical south MRSA are captured by the interceptor wells or discharge to the open pit with mean advective travel time of one and two years, respectively. Approximately 72% of the recharge from the MRSA discharges to the open pit or is captured by the interceptor wells or the MRSA contact water collection ditch with mean advective travel times of approximately two to four years. Approximately 0.8% of recharge ($3x10^{-6}$ m^3/s) from the MRSA is predicted to discharge to Susan Lake with a mean advective travel time of approximately five years. The annual volumes of recharge from the MRSA predicted to discharge to Susan Lake during the operations period represent 0.21% of the total predicted annual groundwater discharge to Susan Lake. The remaining recharge from the MRSA (28%), remains in the groundwater system during the operations period. Recharge from the OSA discharges to the open pit or is captured by the interceptor wells with mean advective travel times of two and three years, respectively.

Table 5.6 Predicted Groundwater Discharge Rates and Travel Time from MRSAs and OSA to Receiving Environment at the End of Operations

Source	Receptor	Discharge Arriving by End of Operations (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical South MRSA	Interceptor Wells	1.1E-06	1	1	1
	Open Pit	1.9E-05	1	2	3
MRSA	MRSA Contact Water Collection Ditch	1.5E-04	<1	1	4
	Interceptor Wells	6.9E-05	1	2	4
	Open Pit	2.3E-04	2	4	>6
	Susan Lake	4.6E-06	5	5	>6
Ore Storage Area	Interceptor Wells	4.2E-05	1	2	2
	Open Pit	6.4E-05	2	3	4

5.4 Closure

The groundwater model was subsequently modified from the operation phase to simulate the effects of the Project on groundwater levels and flow and the fate of groundwater originating from the MRSAs during closure. As part of these simulations the model was used to predict groundwater inflows to the open pit as the pit fills and to evaluate the flow paths and groundwater discharge rates to receptors for recharge that originates from the MRSAs.

5.4.1 Model Setup: Closure

Starting with the calibrated groundwater flow model and modifications completed for the end of operation, the following additional modifications were completed: filling of the open pit, decreased pumping from the interceptor wells, removal of the OSA, and change in recharge for the MRSA. The transient groundwater flow model was simulated using 24 stress periods over 230 years.

5.4.1.1 Open Pit Filling

In closure, the open pit will be allowed to fill through precipitation and groundwater inflow. The filling of the open pit during closure was simulated by removing the drain boundary conditions representing the open pit during operation and replacing them with the lake module (LAK3). The stage (water level) of the pit lake is calculated using the dynamic pit lake water balance as follows:

$$h_l^n = h_l^{n-1} + t\frac{(P_{inflow} + R_{inflow} - W_{out} - Evap_{out} - SP - Q_s)}{A_s}$$

Variables:

- h_l^n = Stage of the pit lake, current time step; previous time step is n-1 (ft or m)
- t = time step length (days)
- P_{inflow} = Precipitation on the lake (user input; ft^3/day or m^3/day)
- R_{inflow} = Surface water runoff to the lake (user input; ft^3/day or m^3/day)
- W_{out} = Water withdrawal from the pit lake (user input; ft^3/day or m^3/day)
- $Evap_{out}$ = Evaporation from the pit lake surface (user input; ft^3/day or m^3/day)
- SP = Net seepage between the lake and the aquifer (ft^3/day or m^3/day)
- Q_s = Net inflow and outflow from streams (ft^3/day or m^3/day)
- A_s = Surface area of the pit lake (ft^2 or m^2)

P_{inflow}, R_{inflow}, W_{out}, $Evap_{out}$, and Q_s were all set to zero. The only inflow to the pit lake in the groundwater model is groundwater seepage and there will be no outlet for the pit lake. The hydraulic conductivity of the pit walls and pit bottom was assigned as 0.12 m/s to allow full hydraulic connection between the pit lake and the aquifer. Precipitation to the pit surface was set to zero because the pit filling rate will be estimated as a part of surface water modeling which will include precipitation. The groundwater inflow rate predicted using the groundwater flow model will be used as input for the surface water model.

5.4.1.2 Groundwater Interceptor Wells

The groundwater interceptor wells were assumed to continue to operate during the first stages of closure. Pumping of the interceptor wells decreased with time as the pit level stage increased, so that seepage from Gordon and Farley lakes could be returned to the lakes. The pumped water from the interceptor wells was assumed to be discharged to the nearest lake (Gordon or Farley).

5.4.1.3 Mine Rock Storage Area and Ore Storage Area

The historical south MRSA footprint from construction and operation remains for the closure scenario. The recharge rate from baseline, construction, and operation conditions of 40 mm/year was applied through the closure scenario.

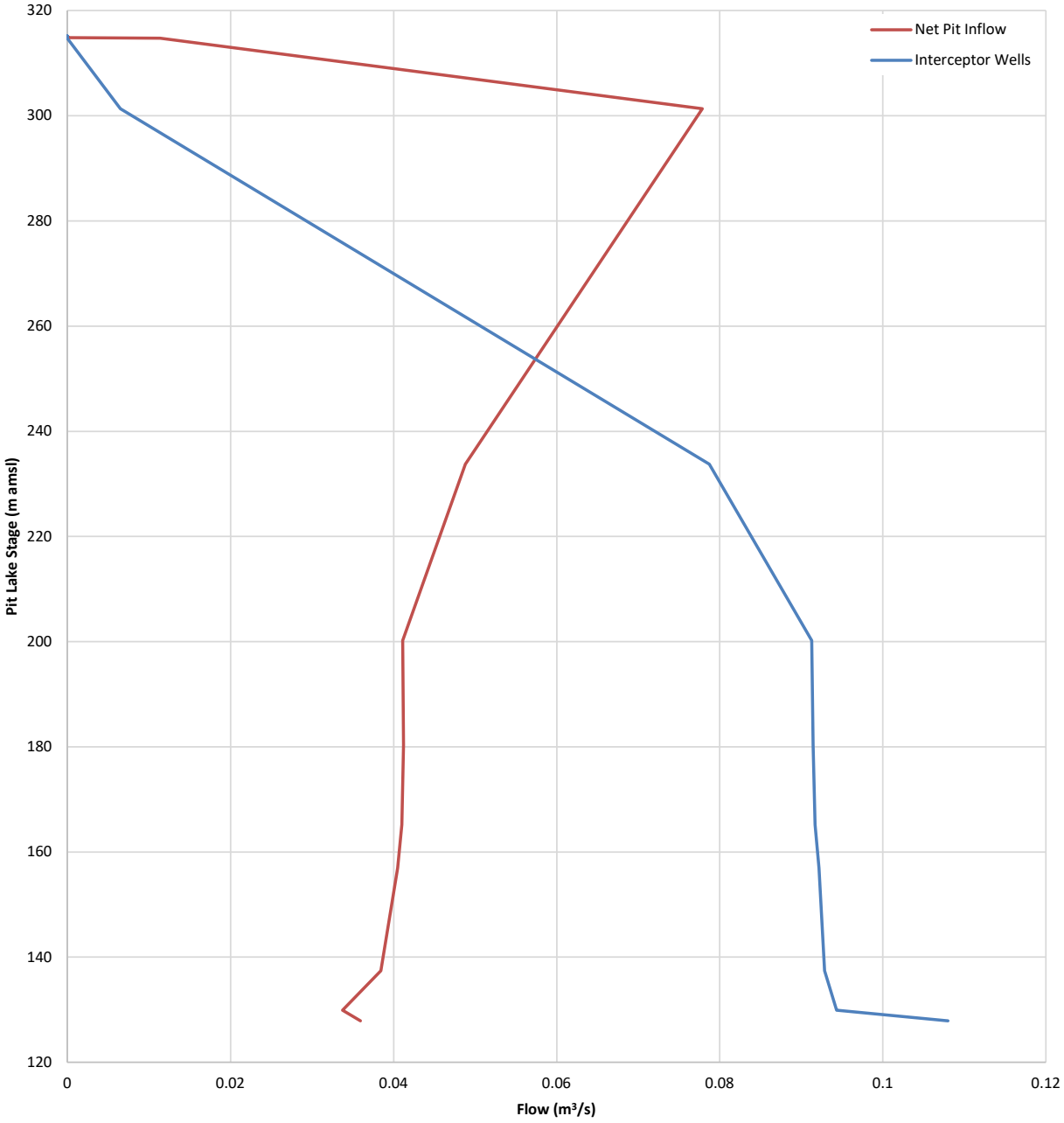
The MACRO model that was used to estimate recharge from the MRSA in operation was also used to estimate recharge from the MRSA once the MRSA has been covered, revegetated, and the rock has fully wetted up (Stantec 2020e). The wetting up time is the time to reach a steady-state saturation condition in the MRSA, where the volume of water infiltrating into the MRSA from precipitation will result in an equal amount of recharge from the base of the MRSA. The MRSA is predicted to wet up 19 years after the start of closure. Therefore, the recharge from the MRSA was increased in closure compared to operation. The average recharge rate to the groundwater flow system under the MRSA during the closure phase is predicted to be 35 mm/yr at the base of the MRSA and 39 mm/yr at the base of the side slopes of the MRSA. Applying these recharge rates for the full closure simulation is conservative as there are 19 years in closure where the recharge from the MRSA will be less than the wetted up recharge rates. These recharge rates account for a soil cover over the MRSA in closure. The contact water collection ditch around the MRSA remains in closure until contact water quality is suitable for discharge to the environment and so the contact water collection ditch was simulated in the closure model.

The OSA will be removed in closure as remaining ore will be processed at the end of operation. Therefore, seepage from the OSA (particle tracking) was not simulated in closure. Recharge through the rehabilitated footprint of the OSA was assumed to be consistent with baseline conditions which is 40 mm/yr.

5.4.2 Model Results: Closure

5.4.2.1 Open Pit Filling

The rate of groundwater inflow to the open pit after dewatering ceases is presented in Figure 5-2. After dewatering of the open pit ceases, the groundwater inflow rate is predicted to peak at approximately 0.1 m^3/s at a pit lake stage of 301 m amsl. At this pit lake stage, the pit lake will become a “flow-through” lake with groundwater flowing into the lake on the upgradient side, and out on the downgradient side. Near steady-state conditions are predicted to be reached at a stage of 315 m amsl at which point the net groundwater inflow to the pit nearly balances the net groundwater outflow. Groundwater flow into the interceptor wells will decrease from a rate of approximately 0.1 m^3/s at the start of closure to 0 m^3/s when the pit lake reaches a stage of approximately 301 m amsl.



Notes:

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LYNN LAKE GOLD PROJECT
GORDON SITE

Figure No.

5-2

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Title **Predicted Open Pit Filling Rate and Stage in Closure**

5.4.2.2 Groundwater Drawdown and Discharge

The predicted water table elevation and groundwater drawdown contours in closure are presented on Map 22 and Map 23, respectively. The water table is predicted to have returned to near baseline conditions in the vicinity of the open pit but remains drawn down below baseline conditions by up to 5 m in the vicinity of the MRSA contact water collection ditch. After removal of the MRSA contact water collection ditch, groundwater levels in the vicinity of the MRSA are anticipated to also return to near baseline conditions.

Table 5.7 presents the comparison of baseline groundwater discharge rates with effects of the pit lake on surface water flows at the end of closure (i.e., after the pit lake is full). As shown in Table 5.7, the groundwater flows to the receptors are predicted to return to near baseline rates (within 0.001 m^3/s of baseline conditions) once the pit is full except for Farley Lake. In closure, groundwater discharge to Farley Lake is predicted to increase by 0.002 m^3/s compared to baseline conditions. Given the area of Farley Lake is 773,944 m^2, a change in groundwater flux of 0.002 m^3/s represents a change in water level of less than 0.06 m over a year.

Table 5.7 Estimated Groundwater Discharge to Receivers in Closure

Receiver	Net Groundwater Discharge to Receiver (m^3/s)		
	Baseline[1]	Closure[1]	Change From Baseline[2]
Lakes			
Susan Lake	0.00236	0.00218	-0.00019
Pump Lake	-0.00057	-0.00055	0.00003
Marnie Lake	-0.00030	-0.00024	0.00006
Marnie Lake North	0.00024	0.00024	negligible
Gordon Lake	0.00340	0.00340	0.00001
Farley Lake	0.00893	0.01122	0.00229
Marie Lake	-0.00231	-0.00227	0.00004
Lake 3	0.00050	0.00062	0.00012
Watercourses			
Watercourse connecting Susan and Marrow Lakes (SUS3)	0.00044	0.00045	negligible
Tributary of Simpson Lake (FAR3-SIM2)	0.00115	0.00113	-0.00002
Tributary of Swede Lake (FAR3-A1)	0.00059	0.00058	negligible
Watercourse connecting Unnamed South Lake and Farley Lake (FAR5-MAN1)	0.00013	0.00013	negligible
Tributary of Farley Lake (FAR5-A1)	0.00003	0.00003	negligible
Southern Tributary of Gordon Lake (FAR7-A1)	0.00013	0.00007	-0.00006

Receiver	Net Groundwater Discharge to Receiver (m^3/s)		
	Baseline[1]	**Closure[1]**	**Change From Baseline[2]**
Diversion Channel (FAR6)	0.00006	0.00006	0.00001
Watercourse connecting Marie and Farley Lakes (FAR5-MAR1)	0.00009	0.00009	negligible
Watercourse connecting Marie and Farley Lakes (FAR5-MAR3)	-0.00004	-0.00005	negligible
Northern Tributary of Gordon Lake (FAR7-B1)	-0.00001	0.00000	negligible
Water Management Features			
MRSA Ditch	N/A	0.00063	N/A

Notes:

[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

5.4.2.3 Seepage from Mine Infrastructure

The particle tracks from the MRSA in closure are presented on Map 24, and the estimated discharge rates and travel time statistics to the receiving environment are presented in Table 5.8. The particles originating from the historical south MRSA discharge to the pit lake with a mean advective travel time of less than one year. Approximately 95% of the recharge from the MRSA discharges to the pit lake or the MRSA contact water collection ditch with mean advective travel times of approximately one and two years, respectively. Approximately three percent of recharge from the MRSA discharges to Simpson Lake with a mean advective travel time of 14 years. The annual volume of recharge from the MRSA predicted to discharge to Simpson Lake during the closure period represents 0.8% of the total predicted annual groundwater discharge to Simpson Lake. In comparison to operations, there is no predicted seepage from the MRSA to Susan Lake. In closure, the recharge rate of the MRSA increases due to steady state saturation of the MRSA (refer to Section 5.4.1.3). As a result of the increased recharge from the MRSA, the recharge is driven deeper into the groundwater flow system, bypassing Susan Lake in closure. The remaining recharge from the MRSA (6%), remains in storage in the groundwater system at the end of the closure period.

Table 5.8 Predicted Groundwater Discharge Rates and Travel Time from MRSAs to Receiving Environment in Closure

Source	Receptor	Discharge (m^3/s)	Travel Time (years)		
			Minimum	Mean	Maximum
Historical South MRSA	Pit Lake	1.8E-05	<1	<1	1
MRSA	MRSA Contact Water Collection Ditch	6.1E-05	<1	1	4
	Pit Lake	6.0E-04	<1	2	18
	Simpson Lake	2.2E-05	9	14	27

5.5 Predictive Scenarios Sensitivity Analysis

Sensitivity analyses were completed for several parameters: hydraulic conductivity of the hydrostratigraphic units, hydraulic conductivity of the lakebed and riverbed material, recharge, and storage. Parameter values were adjusted manually to higher and lower values in a symmetrical fashion (e.g., increased and decreased by a factor of ten) with one exception for hydraulic conductivity described below. The factor by which the parameters varied was based on the nature of the parameter (there is more uncertainty in hydraulic conductivity values than recharge values) and previous experience.

Sensitivities were evaluated by comparing discharge rates from groundwater to key receptors in the calibrated model to the discharge rates after varying the key parameters up and down.

5.5.1 Hydraulic Conductivity of Hydrostratigraphic Units

To evaluate model response to decreased hydraulic conductivity, all hydraulic conductivities for subsurface layers were reduced by a factor of ten. To evaluate higher hydraulic conductivities, most values were increased by a factor of ten except the glaciolacustrine and sand diamicton layers which were increased by a factor of five. The glaciolacustrine and sand diamicton layers were increased by a smaller factor because the calibrated values for these layers are already considered near the upper end for those lithologies. The change in net groundwater discharge to receivers compared to the base case for baseline, end of construction, end of operations, and end of closure is presented in Table 5.9. Only lakes and watercourses with a moderate or higher net groundwater discharge to receiver (> 0.001 m^3/s) are included in Table 5.9.

Table 5.9 Sensitivity Analysis Summary: Varying Hydraulic Conductivity (K) of Hydrostratigraphic Units

Receiver	Net Groundwater Discharge to Receiver (m^3/s)[1]											
	Baseline			End of Construction			End of Operations			End of Closure		
	Base Case	Reduced K	Increased K	Base Case	Reduced K	Increased K	Base Case	Reduced K	Increased K	Base Case	Reduced K	Increased K
Lakes												
Susan Lake	2.4E-03	2.3E-03	1.5E-03	2.4E-03	2.3E-03	1.4E-03	2.2E-03	2.3E-03	-4.9E-04	2.2E-03	2.0E-03	1.4E-03
Gordon Lake	3.4E-03	2.5E-03	7.9E-04	-4.2E-02	-3.4E-03	-1.1E-01	-5.5E-02	-8.1E-03	-1.4E-01	3.4E-03	2.6E-03	-1.2E-01
Farley Lake	8.9E-03	4.0E-03	2.3E-02	-3.7E-02	-2.7E-03	-1.2E-01	-6.0E-02	-7.4E-03	-1.7E-01	1.1E-02	4.5E-03	-1.3E-01
Marie Lake	-2.3E-03	1.5E-03	-1.9E-02	-2.2E-03	1.5E-03	-1.9E-02	-2.3E-03	1.5E-03	-2.0E-02	-2.3E-03	1.5E-03	-1.9E-02
Watercourses												
Tributary of Simpson Lake (FAR3-SIM2)	1.1E-03	2.0E-03	1.9E-03	1.2E-03	2.0E-03	1.9E-03	1.1E-03	2.0E-03	1.8E-03	1.1E-03	1.9E-03	1.9E-03
Water Management Features												
MRSA Contact Water Collection Ditch	N/A			8.7E-04	2.6E-03	0.0E+00	4.9E-04	1.5E-03	0.0E+00	N/A		
Interceptor Wells				1.0E-01	4.0E-02	1.0E-01	1.1E-01	2.0E-02	1.3E-01			
Open Pit				5.9E-02	2.6E-02	2.1E-01	3.3E-02	8.5E-03	2.4E-01			

Receiver	Change in Net Groundwater Discharge to Receiver Compared to Base Case (m^3/s)[2]							
	Baseline		End of Construction		End of Operations		End of Closure	
	Reduced K	Increased K	Reduced K	Increased K	Reduced K	Increased K	Reduced K	Increased K
Lakes								
Susan Lake	-1.7E-05	-8.3E-04	-5.4E-05	-9.9E-04	8.2E-05	-2.7E-03	-1.5E-04	-8.0E-04
Gordon Lake	-8.7E-04	-2.6E-03	3.8E-02	-6.7E-02	4.7E-02	-8.7E-02	-8.5E-04	-1.2E-01
Farley Lake	-5.0E-03	1.4E-02	3.4E-02	-8.1E-02	5.3E-02	-1.1E-01	-6.8E-03	-1.4E-01
Marie Lake	3.8E-03	-1.7E-02	3.7E-03	-1.7E-02	3.7E-03	-1.8E-02	3.7E-03	-1.7E-02
Watercourses								
Tributary of Simpson Lake (FAR3-SIM2)	8.5E-04	7.8E-04	8.5E-04	7.7E-04	8.6E-04	6.8E-04	8.1E-04	7.9E-04
Water Management Features								
MRSA Contact Water Collection Ditch	N/A		1.7E-03	-8.7E-04	1.0E-03	-4.9E-04	N/A	
Interceptor Wells			-6.0E-02	0.0E+00	-8.6E-02	2.7E-02		
Open Pit			-3.2E-02	1.5E-01	-2.5E-02	2.1E-01		

Notes:

[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

N/A – not applicable – feature not present in the modelled timeframe or at the end of the period indicated

Of the lakes and rivers assessed, net groundwater discharge to Farley Lake is most sensitive to changes in hydraulic conductivity of the hydrostratigraphic units with increases in hydraulic conductivity resulting in higher recharge from the lake to groundwater during construction, operations, and closure. While Marie Lake is not as sensitive to changes in hydraulic conductivity of the hydrostratigraphic units as Farley Lake, decreases in hydraulic conductivity change Marie Lake from a recharge feature to a discharge feature during baseline, end of construction, end of operations, and closure.

Net groundwater discharge to the tributary to Simpson Lake is sensitive to both decreases and increases in hydraulic conductivity, with both changes resulting in more discharge to the tributary. This may be due to an alteration of the groundwater divide for each sensitivity simulation or combined changes in discharge upgradient of the tributary.

Overall, net groundwater discharge to lakes and rivers is less sensitive to decreases in hydraulic conductivity of the hydrostratigraphic units than increases. The magnitude of the changes to net discharge to lakes and rivers with an increase in hydraulic conductivity of the hydrostratigraphic units may be more realistic than the magnitude of changes to net discharge to lakes and rivers with a decrease in hydraulic conductivity as the former has slightly better quality of calibration for the baseline model with a scaled RMS error of 56% with a decrease in hydraulic conductivity compared to 20% with an increase (Section 4.4.1).

Predicted groundwater discharge to the MRSA contact water collection ditch is very sensitive to changes in hydraulic conductivity of the hydrostratigraphic units. Increasing the hydraulic conductivity by a factor of ten reduces the net groundwater discharge to the MRSA contact water collection ditch to zero as the higher hydraulic conductivity promotes downward flow from the base of the MRSA, bypassing the shallow MRSA contact water collection ditch. Net groundwater discharge to the open pit is less sensitive to decreases in hydraulic conductivity of the hydrostratigraphic units than increases. Conversely, flow in the interceptor wells is less sensitive to increases in hydraulic conductivity of the hydrostratigraphic units than decreases. As hydraulic conductivity is directly proportional to groundwater flow rate, decreases in hydraulic conductivity of the hydrostratigraphic units results in decreases in flow to the open pit and the interceptor wells while increases in hydraulic conductivity of the hydrostratigraphic units results in increases in flow to the open pit and the interceptor wells.

5.5.2 Hydraulic Conductivity of Lakebed and Riverbed Material

To evaluate model response to changes in the hydraulic conductivity of the lakebed and riverbed materials, the hydraulic conductivity of riverbed material (as represented in the River boundary condition) and lake bed material (as represented in the General Head Boundary) was increased and decreased by a factor of ten. The change in net groundwater discharge to receivers compared to the base case for baseline, end of construction, end of operations, and end of closure is presented in Table 5.10. Only lakes and watercourses with a moderate or higher net groundwater discharge to receiver (> 0.001 m^3/s) are included in Table 5.10.

Table 5.10 Sensitivity Analysis Summary: Varying Riverbed and Lakebed Hydraulic Conductivity

Receiver	Net Groundwater Discharge to Receiver (m^3/s)[1]											
	Baseline			End of Construction			End of Operations			End of Closure		
	Base Case	Reduced K	Increased K	Base Case	Reduced K	Increased K	Base Case	Reduced K	Increased K	Base Case	Reduced K	Increased K
Lakes												
Susan Lake	2.4E-03	5.1E-03	1.7E-03	2.4E-03	5.1E-03	1.6E-03	2.2E-03	5.0E-03	1.5E-03	2.2E-03	4.8E-03	1.6E-03
Gordon Lake	3.4E-03	4.0E-03	2.3E-03	-4.2E-02	-8.3E-03	-6.1E-02	-5.5E-02	-1.2E-02	-8.6E-02	3.4E-03	4.0E-03	1.9E-03
Farley Lake	8.9E-03	9.3E-03	8.6E-03	-3.7E-02	-2.0E-03	-6.2E-02	-6.0E-02	-1.3E-02	-9.2E-02	1.1E-02	1.1E-02	1.1E-02
Marie Lake	-2.3E-03	-9.2E-04	-2.6E-03	-2.2E-03	-9.2E-04	-2.6E-03	-2.3E-03	-9.3E-04	-2.6E-03	-2.3E-03	-9.1E-04	-2.6E-03
Watercourses												
Tributary of Simpson Lake (FAR3-SIM2)	1.1E-03	7.8E-04	3.7E-04	1.2E-03	7.8E-04	3.6E-04	1.1E-03	7.7E-04	3.5E-04	1.1E-03	7.7E-04	3.6E-04
Water Management Features												
MRSA Contact Water Collection Ditch	N/A			8.7E-04	1.6E-03	5.7E-04	4.9E-04	8.4E-04	3.7E-04	N/A		
Interceptor Wells				1.0E-01	8.6E-02	1.0E-01	1.1E-01	3.1E-02	1.3E-01			
Open Pit				5.9E-02	4.3E-02	9.7E-02	3.3E-02	1.7E-02	9.2E-02			

Receiver	Change in Net Groundwater Discharge to Receiver Compared to Base Case (m^3/s)[2]							
	Baseline		End of Construction		End of Operations		End of Closure	
	Reduced K	Increased K	Reduced K	Increased K	Reduced K	Increased K	Reduced K	Increased K
Lakes								
Susan Lake	2.7E-03	-7.1E-04	2.7E-03	-7.5E-04	2.8E-03	-6.7E-04	2.6E-03	-8.0E-04
Gordon Lake	5.8E-04	-1.1E-03	3.3E-02	-2.0E-02	4.3E-02	-3.1E-02	6.2E-04	-1.5E-03
Farley Lake	3.2E-04	-2.9E-04	3.5E-02	-2.5E-02	4.7E-02	-3.2E-02	-6.6E-04	-5.8E-06
Marie Lake	1.4E-03	-2.5E-04	1.3E-03	-3.5E-04	1.3E-03	-3.1E-04	1.4E-03	-2.9E-04
Watercourses								
Tributary of Simpson Lake (FAR3-SIM2)	-3.7E-04	-7.8E-04	-3.8E-04	-7.9E-04	-3.6E-04	-7.9E-04	-3.6E-04	-7.7E-04
Water Management Features								
MRSA Contact Water Collection Ditch			7.7E-04	-3.1E-04	3.5E-04	-1.2E-04		
Interceptor Wells			-1.4E-02	0.0E+00	-7.5E-02	2.7E-02		
Open Pit			-1.5E-02	3.8E-02	-1.7E-02	5.9E-02		

Notes:

[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

N/A – not applicable – feature not present in the modelled timeframe or at the end of the period indicated

Of the lakes and rivers assessed, net groundwater discharge to Fairly Lake and Gordon Lake are most sensitive to changes in hydraulic conductivity of the riverbed and lakebed sediments. During construction and operations when the lakes recharge groundwater, decreasing the hydraulic conductivity decreases the recharge to groundwater and increasing the hydraulic conductivity increases the recharge to groundwater, as expected. The change in discharge to the tributary to Simpson Lake is small.

At the end of construction and operations, flow to the MRSA contact water collection ditch is higher for a decrease in hydraulic conductivity of the riverbed and lakebed sediments and lower for an increase in hydraulic conductivity of the riverbed and lakebed sediments. Groundwater removed by interceptor wells and flow to the pit decreases for a decrease in hydraulic conductivity of the riverbed and lakebed sediments and increases for an increase in hydraulic conductivity of the riverbed and lakebed sediments. Flow to the wells and pit is influenced more directly by flow from Gordon and Farley Lakes compared to the MRSA contact water collection ditch.

Confidence in the sensitivity analyses for increased and decreased hydraulic conductivity of the riverbed and lakebed sediments is similar as the calibration statistics for the models are generally similar (Section 4.4.1).

5.5.3 Recharge

Groundwater recharge was increased and decreased by a factor of two (i.e., doubled and halved) because this parameter is relatively well constrained by average yearly precipitation, which is known. The change in net groundwater discharge to receivers compared to the base case for baseline, end of construction, end of operations, and end of closure is presented in Table 5.11. Only lakes and watercourses with a moderate or higher net groundwater discharge to receiver (> 0.001 m^3/s) are included in Table 5.11. The range in recharge rate used in this sensitivity scenario is considered conservative as climate change forecasts for Lynn Lake, Manitoba are in the range of 11% to 15% increase in precipitation for the next 20 to 50 years, respectively, under a high emissions scenario (ClimateData.ca 2024).

Table 5.11 Sensitivity Analysis Summary: Varying Recharge

Receiver	Net Groundwater Discharge to Receiver (m^3/s)[1]											
	Baseline			End of Construction			End of Operations			End of Closure		
	Base Case	Reduced Recharge	Increased Recharge	Base Case	Reduced Recharge	Increased Recharge	Base Case	Reduced Recharge	Increased Recharge	Base Case	Reduced Recharge	Increased Recharge
Lakes												
Susan Lake	2.4E-03	4.9E-04	6.2E-03	2.4E-03	4.9E-04	6.1E-03	2.2E-03	4.4E-04	5.9E-03	2.2E-03	4.6E-04	5.6E-03
Gordon Lake	3.4E-03	1.4E-03	6.9E-03	-4.2E-02	-4.4E-02	-3.8E-02	-5.5E-02	-5.7E-02	-5.2E-02	3.4E-03	1.4E-03	6.8E-03
Farley Lake	8.9E-03	6.6E-03	1.3E-02	-3.7E-02	-3.9E-02	-3.2E-02	-6.0E-02	-6.2E-02	-5.6E-02	1.1E-02	8.5E-03	1.6E-02
Marie Lake	-2.3E-03	-3.1E-03	-4.2E-04	-2.2E-03	-3.1E-03	-4.2E-04	-2.3E-03	-3.1E-03	-4.3E-04	-2.3E-03	-3.1E-03	-4.2E-04
Watercourses												
Tributary of Simpson Lake (FAR3-SIM2)	1.1E-03	4.6E-04	2.5E-03	1.2E-03	4.6E-04	2.5E-03	1.1E-03	4.6E-04	2.5E-03	1.1E-03	4.6E-04	2.5E-03
Water Management Features												
MRSA Contact Water Collection Ditch	N/A			8.7E-04	1.1E-04	3.0E-03	4.9E-04	1.3E-05	1.9E-03	N/A		
Interceptor Wells				1.0E-01	1.0E-01	1.0E-01	1.1E-01	1.1E-01	1.1E-01			
Open Pit				5.9E-02	5.7E-02	6.1E-02	3.3E-02	3.2E-02	3.5E-02			

Receiver	Change in Net Groundwater Discharge to Receiver Compared to Base Case (m^3/s)[2]							
	Baseline		End of Construction		End of Operations		End of Closure	
	Reduced Recharge	Increased Recharge	Reduced Recharge	Increased Recharge	Reduced Recharge	Increased Recharge	Reduced Recharge	Increased Recharge
Lakes								
Susan Lake	-1.9E-03	3.8E-03	-1.9E-03	3.7E-03	-1.8E-03	3.7E-03	-1.7E-03	3.5E-03
Gordon Lake	-2.0E-03	3.5E-03	-2.0E-03	3.6E-03	-1.6E-03	2.8E-03	-2.0E-03	3.4E-03
Farley Lake	-2.3E-03	4.4E-03	-2.4E-03	4.4E-03	-2.1E-03	4.0E-03	-2.7E-03	4.8E-03
Marie Lake	-7.5E-04	1.9E-03	-8.5E-04	1.8E-03	-8.1E-04	1.8E-03	-7.9E-04	1.9E-03
Watercourses								
Tributary of Simpson Lake (FAR3-SIM2)	-6.8E-04	1.4E-03	-6.9E-04	1.4E-03	-6.8E-04	1.4E-03	-6.7E-04	1.4E-03
Water Management Features								
MRSA Contact Water Collection Ditch	N/A		-7.6E-04	2.1E-03	-4.8E-04	1.4E-03	N/A	
Interceptor Wells			0.0E+00	0.0E+00	-3.6E-04	7.5E-04		
Open Pit			-1.1E-03	2.3E-03	-8.3E-04	1.7E-03		

Notes:

[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

N/A – not applicable – feature not present in the modelled timeframe or at the end of the period indicated

Of the lakes and watercourses assessed, net groundwater discharge to Susan Lake, Gordon Lake, and Farley Lake are the most sensitive to changes in recharge. For each lake in each model/period, reducing recharge reduces the discharge from groundwater to receivers or reduces the recharge from the receiver (Marie Lake) while increasing recharge increases the discharge to receivers or increases the recharge from the receiver. This result is expected.

Net groundwater discharge to the open pit is more sensitive to changes in recharge than the net groundwater discharge to the MRSA contact water collection ditch and the interceptor wells. This is an expected result as the capture zone over which recharge is applied is larger for the open pit compared to the MRSA contact water collection ditch and the interceptor wells.

Confidence in the sensitivity analyses for increased and decreased recharge is similar as the calibration statistics for the baseline model with increased and decreased recharge are very similar to one another (Section 4.4.1).

5.5.4 Specific Yield and Specific Storage

Specific yield and specific storage were varied to evaluate model responsiveness to these parameters. Specific yield was increased and decreased by a factor of two (i.e., doubled and halved) while specific storage was increased and decreased by a factor of ten. The change in net groundwater discharge to receivers compared to the base case for end of construction, end of operations, and end of closure is presented in Table 5.12. Only lakes and watercourses with a moderate or higher net groundwater discharge to receiver (> 0.001 m^3/s) are included in Table 5.12; the table does not include a sensitivity analysis for baseline conditions because the baseline model is steady state, consequently, changes in aquifer storage properties do not influence results.

Table 5.12 Sensitivity Analysis Summary: Varying Specific Yield (Sy) and Specific Storage (S)

Receiver	Net Groundwater Discharge to Receiver (m^3/s)[1]								
	End of Construction			End of Operations			End of Closure		
	Base Case	Decreased Sy/S	Increased Sy/S	Base Case	Decreased Sy/S	Increased Sy/S	Base Case	Decreased Sy/S	Increased Sy/S
Lakes									
Susan Lake	2.4E-03	2.3E-03	2.4E-03	2.2E-03	2.1E-03	2.4E-03	2.2E-03	2.2E-03	2.2E-03
Farley Lake	-3.7E-02	-4.3E-02	-1.8E-02	-6.0E-02	-6.1E-02	-5.9E-02	1.1E-02	1.1E-02	1.1E-02
Marie Lake	-2.2E-03	-2.2E-03	-2.2E-03	-2.3E-03	-2.3E-03	-2.2E-03	-2.3E-03	-2.3E-03	-2.3E-03
Watercourses									
Tributary of Simpson Lake (FAR3-SIM2)	1.2E-03	1.1E-03	1.2E-03	1.1E-03	1.1E-03	1.2E-03	1.1E-03	1.1E-03	1.1E-03
Water Management Features									
MRSA Contact Water Collection Ditch	8.7E-04	5.8E-04	1.5E-03	4.9E-04	3.3E-04	9.6E-04	N/A		
Interceptor Wells	1.0E-01	9.9E-02	1.0E-01	1.1E-01	1.1E-01	1.1E-01			
Open Pit	5.9E-02	3.3E-02	1.5E-01	3.3E-02	3.3E-02	3.7E-02			

Receiver	Change in Net Groundwater Discharge to Receiver Compared to Base Case (m^3/s)[2]					
	End of Construction		End of Operations		End of Closure	
	Decreased Sy/S	Increased Sy/S	Decreased Sy/S	Increased Sy/S	Decreased Sy/S	Increased Sy/S
Lakes						
Susan Lake	-1.2E-04	3.2E-05	-1.5E-04	1.7E-04	4.7E-08	1.7E-08
Gordon Lake	-5.5E-03	1.8E-02	-3.8E-04	1.1E-03	-5.0E-05	-2.9E-05
Farley Lake	-6.8E-03	1.8E-02	-5.7E-04	1.7E-03	-8.1E-05	-4.2E-05
Marie Lake	-2.4E-05	2.8E-05	-2.0E-05	3.5E-05	8.1E-09	1.4E-07
Watercourses						
Tributary of Simpson Lake (FAR3-SIM2)	-5.1E-06	7.5E-07	-3.0E-05	1.4E-05	8.0E-09	-3.0E-09
Water Management Features						
MRSA Contact Water Collection Ditch	-3.0E-04	6.3E-04	-1.6E-04	4.7E-04	N/A	
Interceptor Wells	-1.1E-03	0.0E+00	-2.0E-04	1.2E-03		
Open Pit	-2.6E-02	8.9E-02	-4.7E-04	3.5E-03		

Notes:

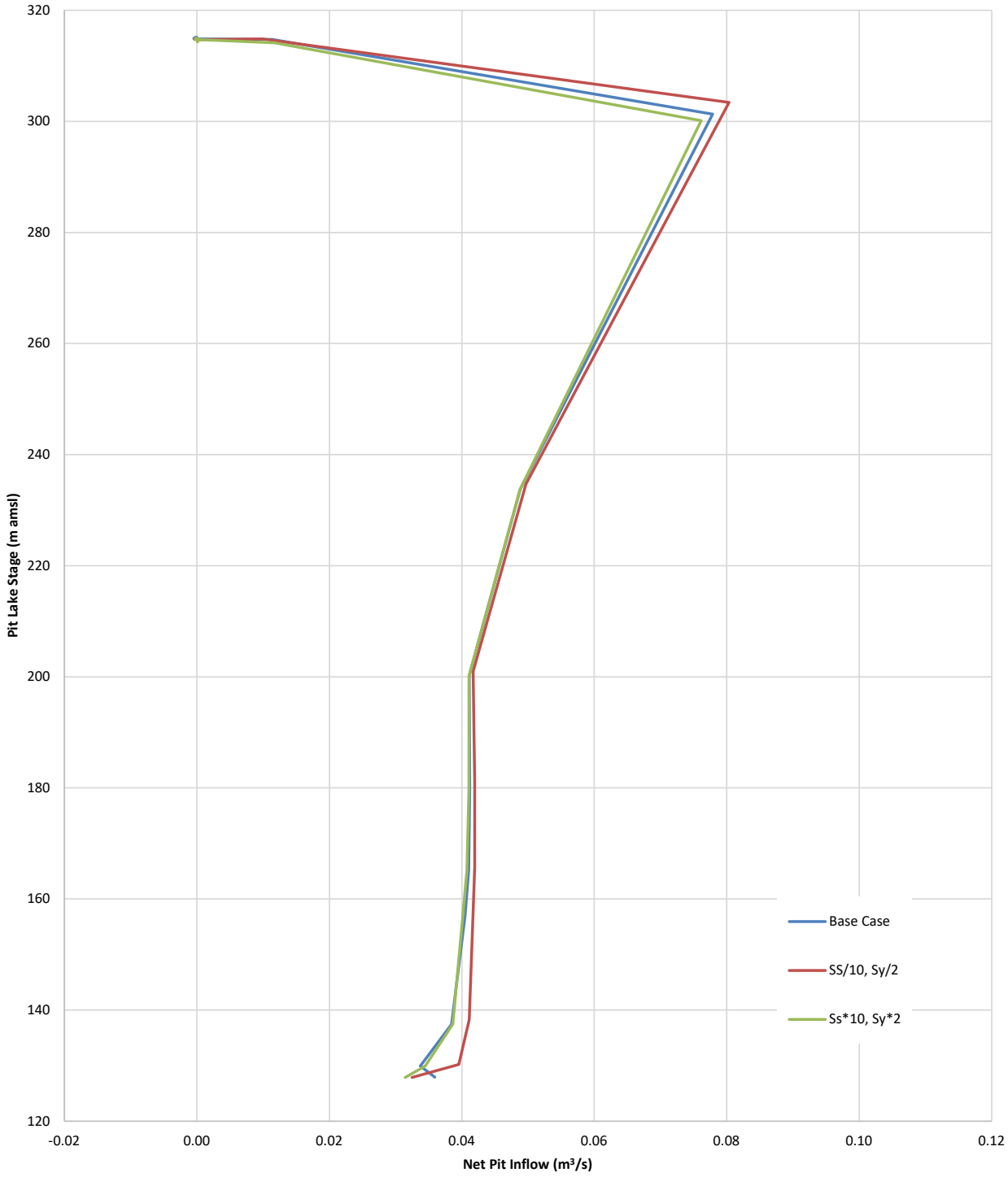
[1] Positive value represents flow from groundwater to receiver

[2] Change presented is predicted flow in the Mining Period minus flow simulated in Baseline

N/A – not applicable – feature not present in the modelled timeframe or at the end of the period indicated

Of the lakes and rivers assessed, net groundwater discharge to Farley Lake is most sensitive to changes in specific yield and specific storage. Overall, net groundwater discharge to lakes and rivers is less sensitive to decreases in specific yield and specific storage than increases.

Net groundwater discharge to the open pit is more sensitive to changes in specific yield and specific storage than the net groundwater discharge to the MRSA contact water collection ditch and the interceptor wells. This is an expected result as the capture zone over where groundwater is contained in storage is larger for the open pit compared to the MRSA contact water collection ditch and the interceptor wells. The sensitivity of predicted open pit filling rate and stage in closure to changes in specific yield and specific storage is presented on Figure 5-3. As indicated on Figure 5-3, the groundwater inflow rate to the pit is not very sensitive to changes in specific yield and specific storage and is more sensitive to reductions than increases. The maximum groundwater inflow to the pit for the base case, decreased specific yield and storage, and increased specific yield and storage simulations are 0.114, 0.117, and 0.112 m^3/s, respectively. Changes in specific yield and specific storage do not affect the predicted final stage of approximately 315 m amsl, as expected.



Notes:

Client/Project

Alamos Gold Inc.
Lynn Lake Gold Project
Gordon Site

Figure No.

5-3

Title

Sensitivity of Predicted Open Pit Filling Rate and Stage to Storage in Closure

Stantec

5.6 Comparison of Model Results to the EIS

The results of the model predictions for the current mine plan presented herein were compared with the predicted effects from the EIS (Stantec 2020a). A comparison of the current modelled mine plan, based on the Feasibility Study Update (Alamos 2023), with the EIS mine plan (Stantec 2020d) is presented in Table 5.13 for those mine features that have the potential to effect groundwater quantity or quality.

Table 5.13 Gordon Site Feature Footprint Layout Changes

Feature	Proposed Footprint Layout Area (ha)	EIS Footprint Layout Area (ha)
Mine Rock Storage Area	60.17	65.41
Open Pit	36.72	29.01
Ore Storage/Ore Stockpiles	8.80	3.38
Historical North MRSA	removed in construction	7.77
Historical South MRSA	2.59	12.95

The predicted groundwater inflow rate to the open pit at the end of operations is similar (within 10%) to that predicted for the EIS. Since the EIS, a pumping test and additional modelling was completed to support detailed design of the interceptor well system. The interceptor well system is designed to intercept seepage from Gordon and Farley lakes prior to entering the open pit and return the water to the lakes to mitigate potential changes in lake level due to open pit dewatering. Capturing the water prior to entering the open pit is anticipated to limit effects of blasting residual and metal leaching on quality of groundwater and therefore limit potential treatment prior to returning the water to the lakes. In the EIS, 14 interceptor wells were simulated whereas in this updated modelling 11 interceptor wells were simulated. The interceptor well locations were also shifted slightly to the south so more of the wells are located in the zone of fractured bedrock. As a result, the combined predicted pumping rate from the interceptor wells increased from approximately 0.014 m^3/s in the EIS to 0.085 m^3/s (to offset seepage from Farley and Gordon lakes) and 0.11 m^3/s (to offset lake seepage and reduce groundwater inflows to open pit) in this updated modelling.

The water table drawdown related to open pit dewatering is slightly smaller (the extent is about 200 to 500 m smaller) than that predicted in the EIS. The smaller drawdown cone is the result of increased seepage from Gordon and Farley lakes to the open pit compared to that in the EIS.

Similar to the EIS, the seepage from lakes and rivers remains consistent with baseline conditions throughout the various phases of mine life, except for Gordon and Farley Lakes. In both the EIS and this model update, Gordon and Farley lakes are predicted to shift from gaining from groundwater to losing to groundwater. The change in rate of seepage from Gordon and Farley lakes at the end of operation was predicted as 0.028 m^3/s in the EIS and 0.13 m^3/s in this updated modelling. The interceptor wells were optimized in terms of number of wells and pumping rate to offset the increased seepage from the lakes to the open pit which is why the pumping rate was increased to 0.11 m^3/s in this updated modelling. The

effect to water levels in Gordon and Farley lakes from the Project are predicted to be mitigated by the use of the interceptor wells in both the EIS and this updated modelling.

Receptors of groundwater seepage from mine infrastructure remained consistent with the EIS, except for Simpson Lake. A portion of seepage (2.2E-05 m^3/s or 3% of seepage from the MRSA) is predicted to discharge to Simpson Lake whereas in the EIS there was no predicted seepage from the MRSA to Simpson Lake. The rate of seepage from the MRSA to Simpson Lake represents 0.8% of the overall predicted groundwater discharge to Simpson Lake and therefore is not anticipated to affect the water quality of Simpson Lake. A full assessment of the effect of groundwater discharge on surface water quality is assessed in the water balance and water quality model update provided under separate cover.

Predictions of travel time of seepage from mine infrastructure also changed relative to the EIS. The porosity of the upper, intermediate, and deep bedrock in the EIS groundwater flow model was 0.2. In this model update, the porosity of the shallow bedrock and faulted shallow bedrock was set to 0.06 and 0.0003, respectively while the porosity for the upper, intermediate, and deep bedrock layers was set to 0.0001. The porosity of the shallow bedrock (faulted and unfaulted) was calibrated in the groundwater flow model to the results of pumping tests. These porosity values reflect discussions and sensitivity analysis completed through the Information Requests subsequent to the submission of the EIS (IR-IAAC-83, IR-IAAC-R2-72). The porosity does not affect the flux, or specific discharge, of groundwater through the rock, the porosity only affects the predicted timing of seepage from the mine infrastructure discharging to the receiver. As a result, the predicted travel times of seepage from mine infrastructure decreases from tens to thousands of years in the EIS to a few years to tens of years in this model update. The predictions of seepage rates and travel times from mine infrastructure is conservative in that processes along the groundwater flow path such as dispersion and geochemical reactions were not simulated and would serve to increase groundwater flow travel times and decrease concentrations along the groundwater flow path.

Compared with the results of the EIS (Stantec 2020a), the effects of the Project on groundwater remained similar and where they differed (i.e., Gordon and Farley Lake), mitigation measures were simulated to mitigate the potential effect. In conclusion, the results of the updated groundwater assessment do not change the characterization of residual effects, or the significance ratings summarized for groundwater as presented in the EIS (Stantec 2020d).

6 Prediction Confidence

The assessment of baseline conditions and the inferred conceptualization of groundwater processes are based on applying industry standards and practices under quality assurance and quality control programs.

The three-dimensional groundwater flow modelling was conducted using a model calibrated to within an acceptable range of error for groundwater levels and pumping tests to establish baseline conditions. Predictions made using the three-dimensional groundwater flow model are based on several conservatively protective assumptions to reduce the influence of uncertainty in the predictions. Therefore, the confidence in the predictions made using the three-dimensional groundwater flow model is considered high.

Groundwater recharge rates of the MRSA to the receiving environment is conservatively over predicted in closure. The recharge rate in closure is assumed to be the fully saturated recharge rate whereas the MRSA is predicted to take an additional 19 years in closure to reach a fully saturated recharge rate. Therefore, the recharge rate of the MRSA in closure is overestimated for 19 years of the closure simulation. As a result, the groundwater travel times from the MRSA to the receiving environment is predicted faster than likely to occur. In addition, the travel times of particles from the MRSAs to the receiving environments do not account for dispersion or geochemical reactions which will increase the travel times.



7 Conclusions

Hydrogeologic modelling was conducted to identify changes to groundwater levels and flow pathways to inform the assessment of potential effects of the Lynn Lake Gold Project on groundwater and surface water resources at the Gordon site. The modelling was conducted using MODLFOW and was calibrated to baseline conditions within acceptable industry standards.

The construction and operation of the open pit will require the open pit to be dewatered. This will also include dewatering from a series of interceptor wells installed between the pit and Gordon and Farley lakes that will be used to mitigate change in lake levels as a result of open pit dewatering. The dewatering of the open pit and pumping from the interceptor wells will result in the drawdown of the water table by up to 1 m over an area extending approximately 500 m to the north and 1,000 m to the southwest of the open pit. The extent of drawdown is limited to the east and west due to recharge to groundwater from Gordon and Farley lakes. The average annual groundwater inflow rate to the open pit at the end of operations is predicted as 0.033 m^3/s with the interceptor wells pumping at a combined rate of 0.11 m^3/s.

The dewatering of the open pit and interceptor wells will also result in changes to groundwater discharge conditions in lakes and watercourses located near the open pit. Changes in groundwater discharge to most surface water features will remain similar to baseline conditions throughout operations except for Gordon and Farley lakes. Gordon and Farley lakes shift from gaining to losing as a result of dewatering operations. However, these effects will be mitigated by using the groundwater interceptor wells to return water to the lakes.

Groundwater discharge to surface water features associated with the MRSA represents a minor component of the overall surface water flow systems. The modelling results will be considered in the assessment of potential effects on the receiving environment.

Compared with the results of the EIS (Stantec 2020a), the effects of the Project on groundwater remained similar and where they differed (i.e., Gordon and Farley lakes), mitigation measures were simulated to mitigate the potential effect. In conclusion, the results of the updated groundwater assessment do not change the characterization of residual effects, or the significance ratings summarized for groundwater as presented in the EIS (Stantec 2020d).

8 References

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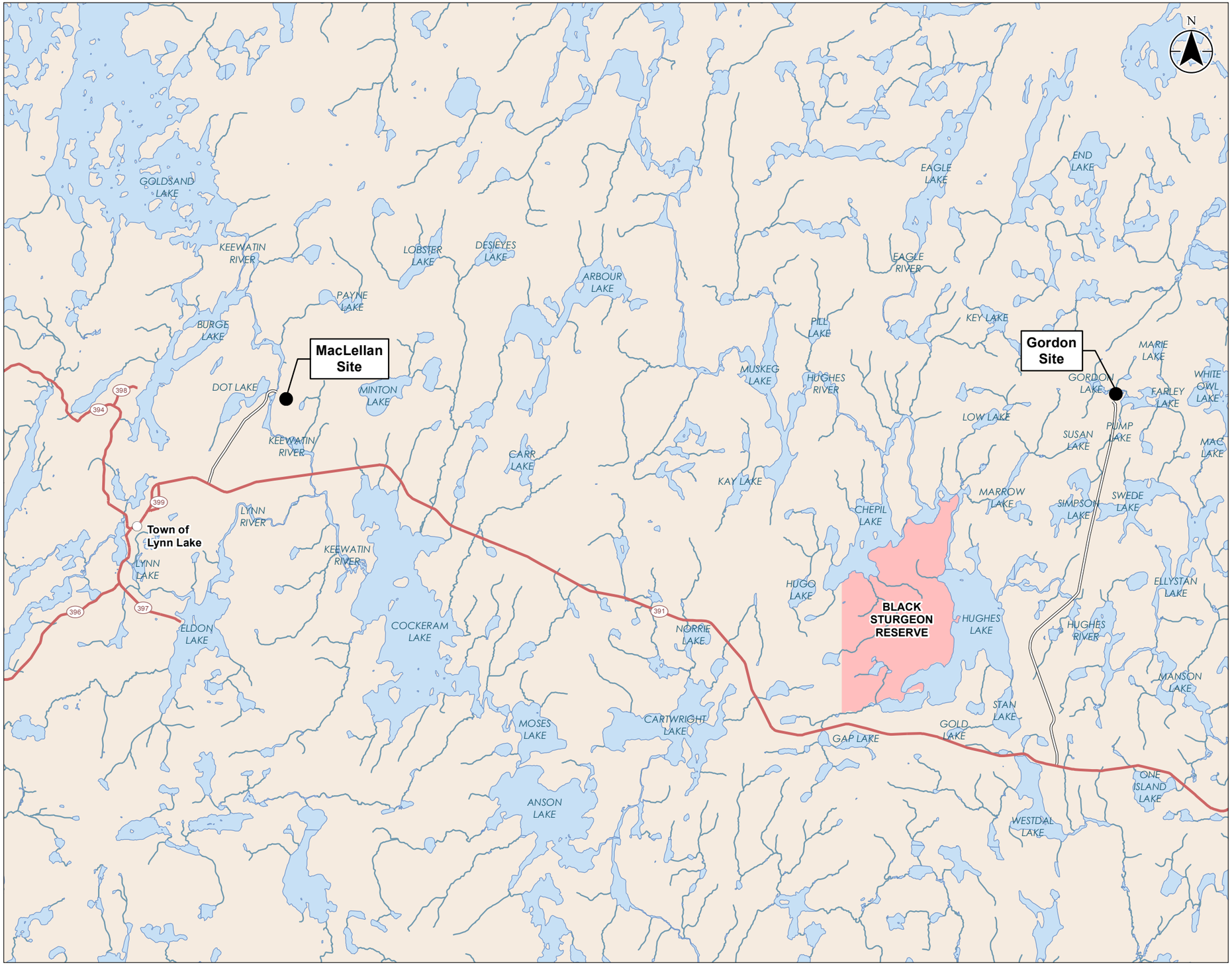
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Appendices

Appendix A Maps



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Landbase

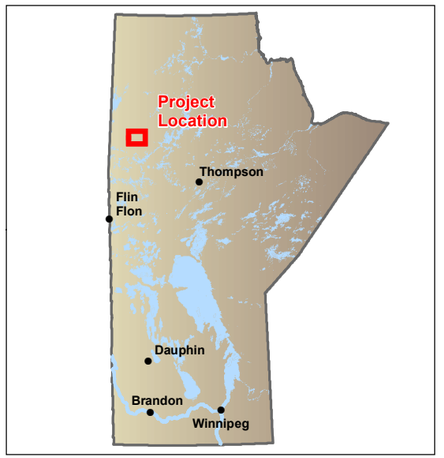
- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

0 4 8 Kilometres

1:150,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location
MacLellan and Gordon Site
Lynn Lake, Manitoba

111473003

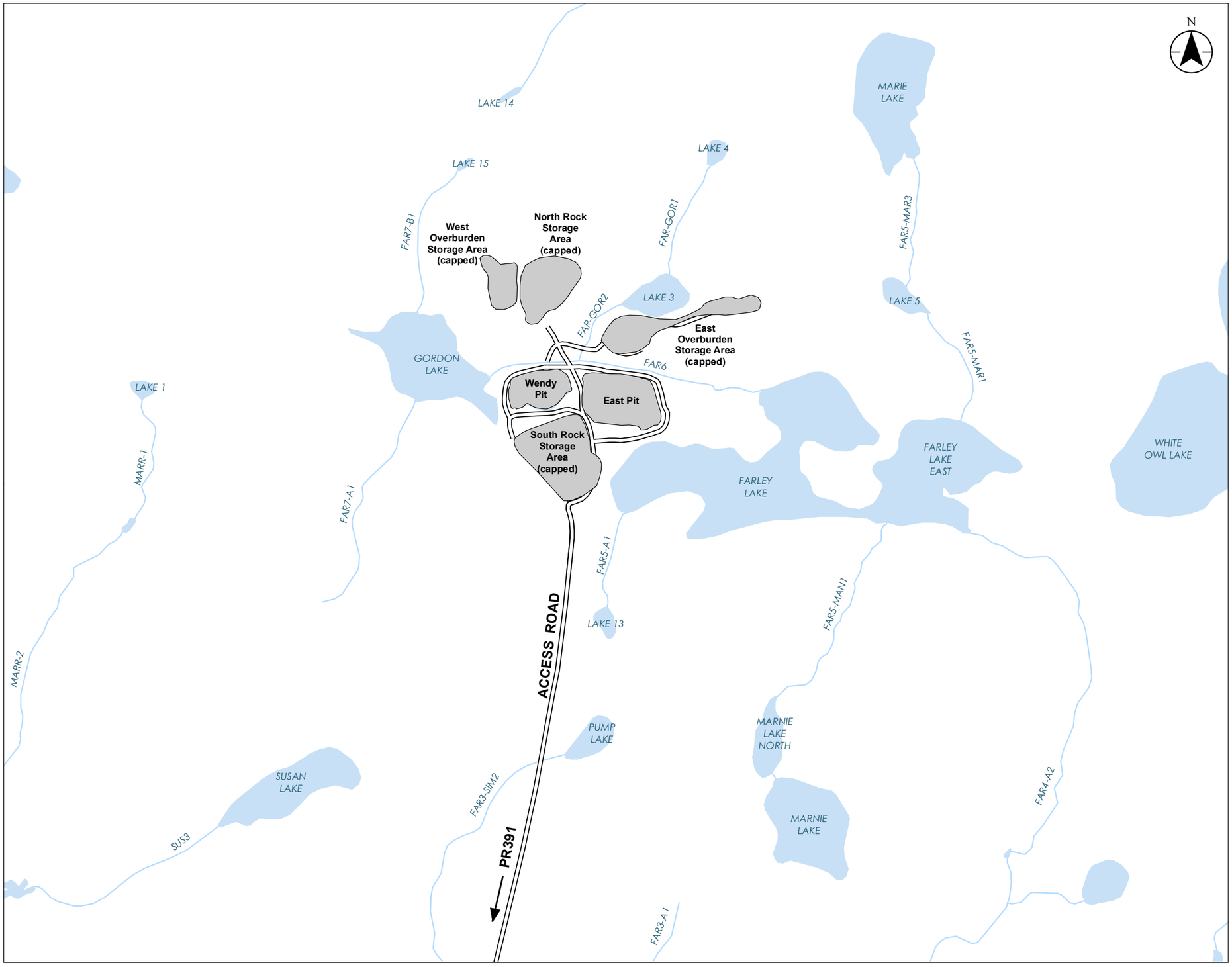
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Technical Review by MF on 2018-03-19

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
1

Title
Location of the Proposed MacLellan and Gordon Mine Sites in Northwestern Manitoba

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Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometre
1:20,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.



Project Location
Gordon Site
Lynn Lake, Manitoba

111473000

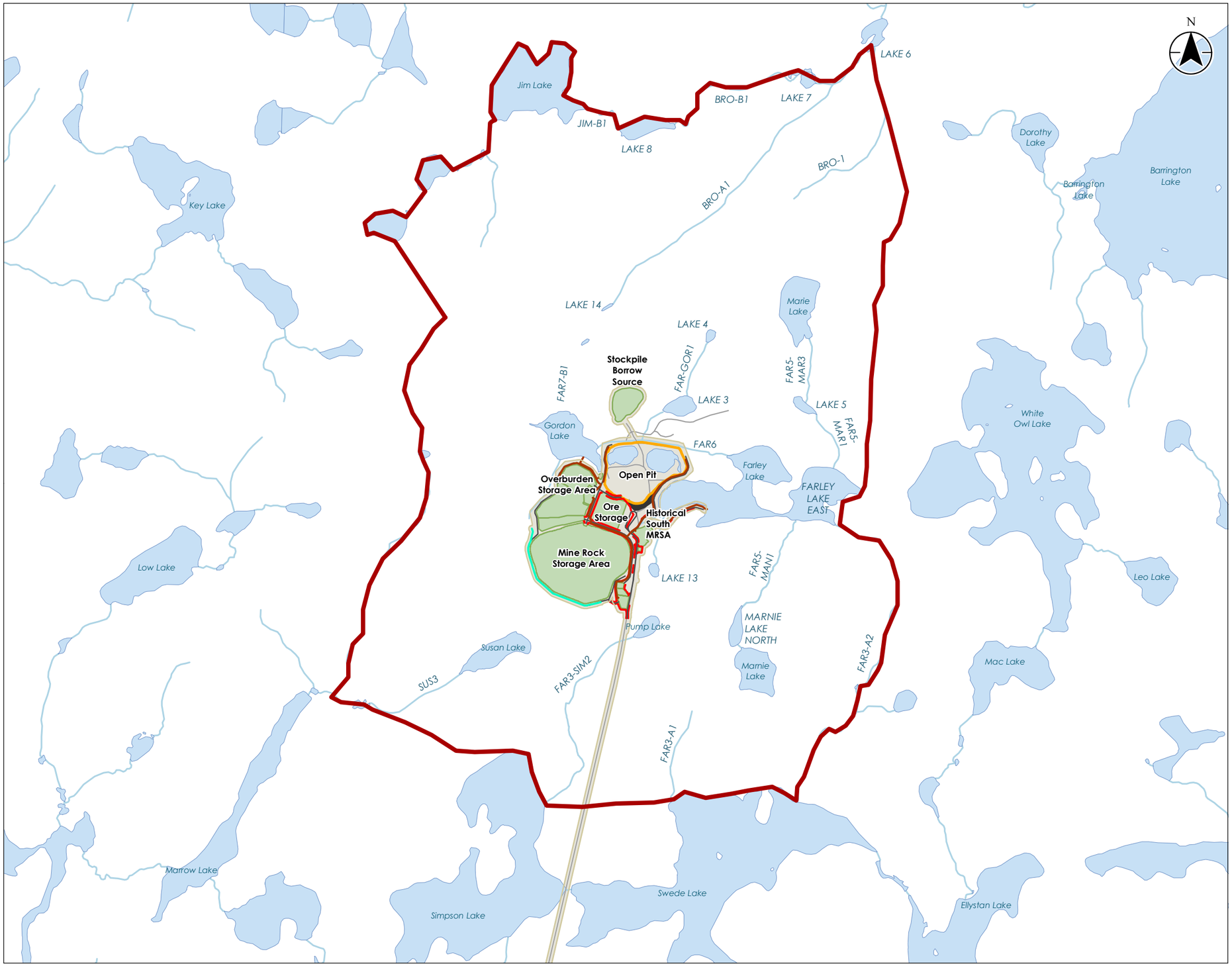
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Technical Review by MF on 2024-10-16

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
2

Title
Historical Project Infrastructure

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Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Proposed Infrastructure
- Contact Water Ditch
- Mine Site Road
- Diversion Ditch
- Discharge Pipeline

Study Area

- Study Area

Landbase

- Existing Access Road
- Watercourse
- Waterbody
- Remnant Historical Mine Rock Pile

0 0.5 1 Kilometres

1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

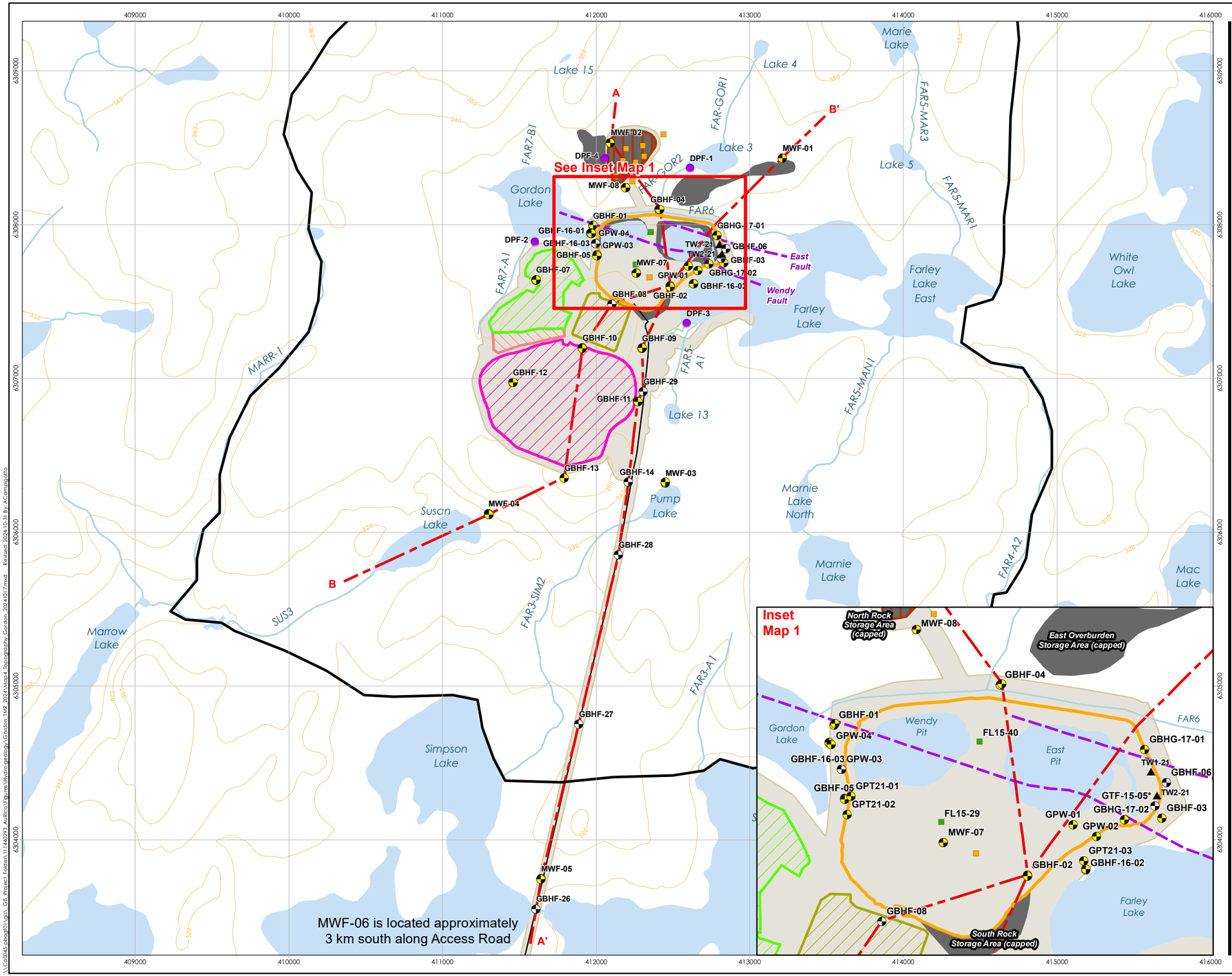
Prepared by AC on 2024-10-17
Technical Review by AD on 2024-10-17

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
3

Title
Site Plan

\\Cal045-pbsgl01.ugl\...GIS Project Folder\111442923 AuRico\Figures\Hydrogeology\Gordon_HydroGeo_2024\Map3_SitePlan_Gordon_20241017.mxd Revised: 2024-10-31 By: ACampagnolo



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Survey Locations
- Borehole
- Drive-Point Piezometers
- Monitoring Well
- Exploration Borehole
- Test Pit
- Test Well
- Cross Section Locations

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Landbase
- Existing Access Road
- Fault Zone
- Elevation Contours (m)
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by AC on 2024-10-17
Technical Review by AD on 2024-10-17

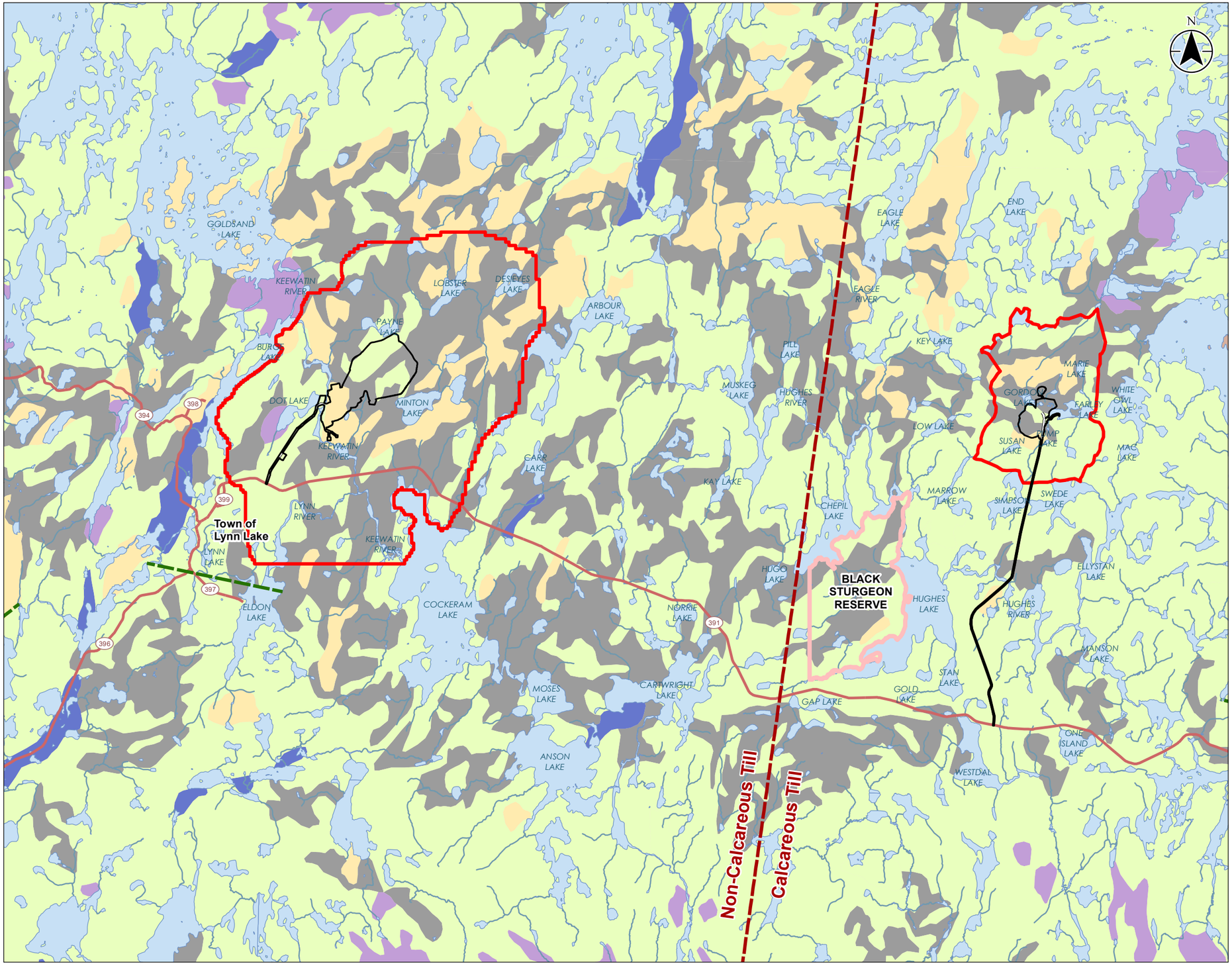
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
4

Title
Topography of Study Area and Monitoring Well Locations

\\Cc0245-pbsgfs01\gis_GIS_Project Folder\111473076 Alamos Gold Inc - Lynn Lake Gold Project\Figures\Hydrogeology\Gordon_TMR_2024\Maps\4_Topography_Gordon_20241017.mxd Revised: 2024-10-31 By: ACampagnolo



Stantec

Project Infrastructure
- Project Development Area

Study Area
- Study Area

Surficial Geology
- Organic Deposits
- Marginal Glaciolacustrine Sediments
- Offshore Glaciolacustrine Sediments
- Proximal Glaciofluvial Sediments
- Sand Diamicton
- Precambrian Terrane

Landbase
- Approximate Western Extent of Calcarious Till
- Approximate Locations of Eskers
- Existing Access Road
- Highway
- Watercourse
- Waterbody
- First Nation Reserve

0 5 10 Kilometres

1:175,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
MacLellan and Gordon Site
Lynn Lake, Manitoba

111473076

Prepared by ACampigotto on 2024-08-20
Technical Review by BAyumu on 2024-08-20

Client/Project

ALAMOS GOLD INC.
Lynn Lake Gold Project

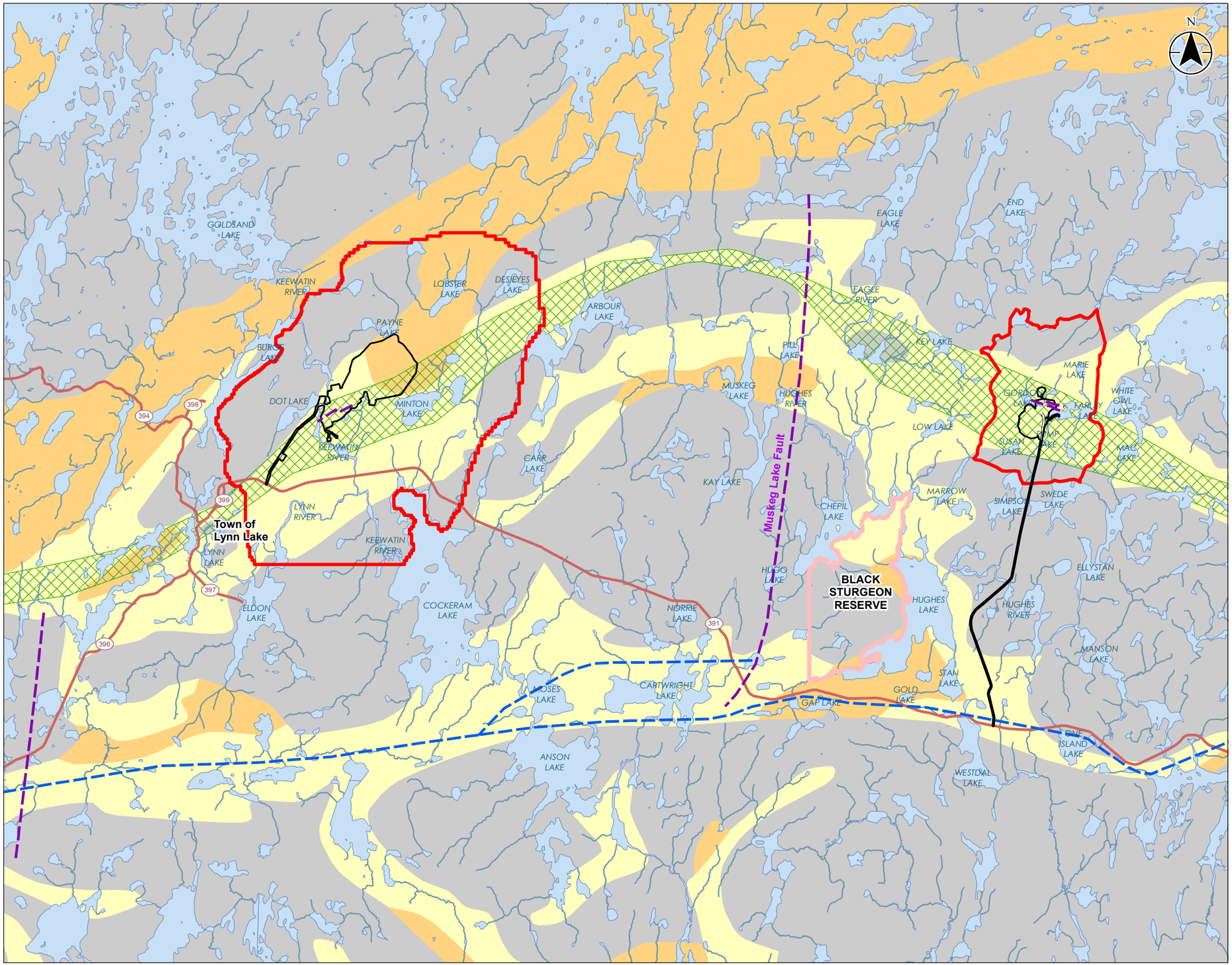
Map No.

5

Title

Surficial Geology

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Stantec

Project Infrastructure
- Project Development Area

Study Area
- Study Area

Bedrock Geology
- Intrusive Rocks
- Metamorphic and Metasedimentary Rocks
- Metavolcanic Rocks (includes Amisk and Wasekwan Groups and Great Island volcanic rocks)

Landbase
- Approximate Location of Fault
- Approximate Location of Johnson Shear Zone
- Existing Access Road
- Highway
- Watercourse
- Approximate Location of Agassiz Metallatect / Greenstone Belt
- Waterbody
- First Nation Reserve

0 5 10 Kilometres

1:175,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
MacLellan and Gordon Site
Lynn Lake, Manitoba

111473076

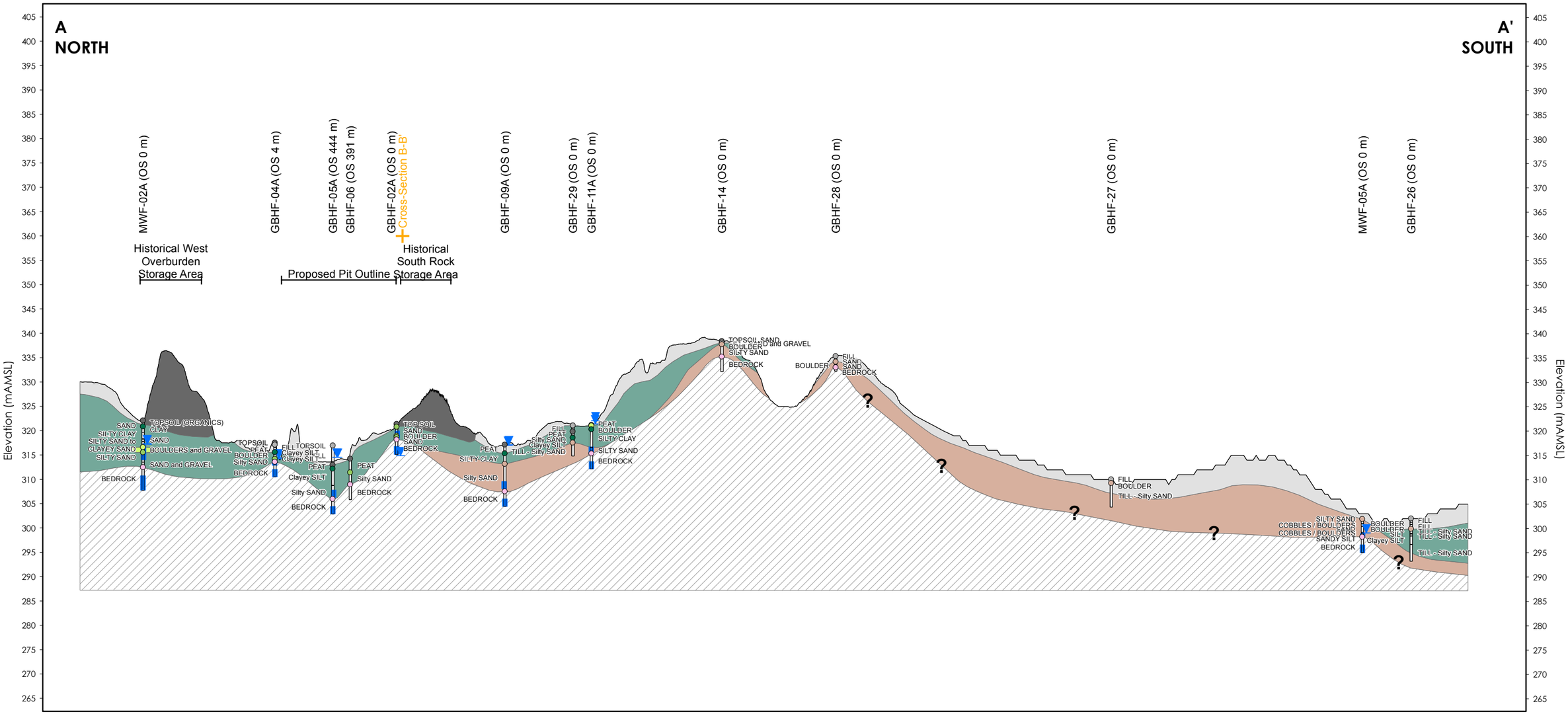
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Technical Review by AD on 2024-11-19

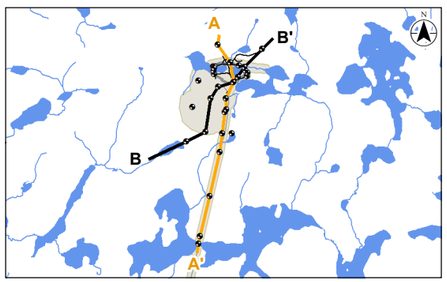
Client/Project
Alamos Gold Inc.
Lynn Lake Gold Project
Gordon Site

Map No.
6

Title
Bedrock Geology

X:\Cn\045-pbog01\gis_GIS Project Folder\111440293 AuRco\Figures\Hydrogeology\Gordon TM\ 2024\Map6_Bedrock Geology_20241203.mxd Revised: 2024-12-03 By: ACmcgaghs





MW1-15 (OS m)
Sand
Well ID (Offset)
Stratigraphy
Water Level (Sept. 25-29, 2015)
Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock
- Ground Surface

- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

20x Vertical Exaggeration

0 0.5 1 km

1:17,500 (At original document size of 11x17)

Notes

1. Manual water level measurements from September 25 to 29, 2015.

Stantec

Project Location
Farley Lake Site
Lynn Lake, Manitoba

111440293 REVA
Prepared by PRM on 2015-12-10

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
7

Title
Cross-Section A-A'

Figure 01 of 01

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B
SOUTHWEST

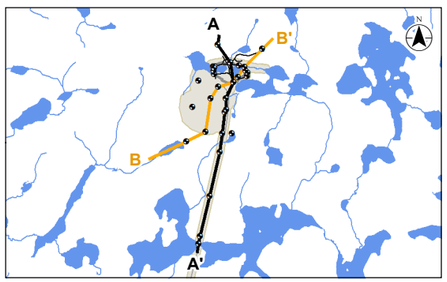
B'
NORTHEAST

Elevation (mAMSL)

MWF-04A (OS 6m)
GBHF-13 (OS 0m)
GBHF-12 (OS 418m)
GBHF-10A (OS 0m)
GBHF-08 (OS 0m)
GBHF-D03 (OS 475m)
GBHF-02A (OS 0m)
Cross-Section A-A'
GPW-01 (OS 18m)
GBHF-06 (OS 149m)
GBHF-D05 (OS 0m)
MWF-01A (OS 1m)

Susan Lake
Historical South Rock Storage Area
Proposed Pit Outline
Historical East Overburden Storage Area

PEAT
SAND and GRAVEL
BEDROCK
TOPSOIL SAND
FILL - SAND and GRAVEL
BOULDER
SILTY SAND
BEDROCK
ORGANICS and COBBLES and BOULDERS
SAND
SANDY CLAYEY SILT
SILT and SAND
BOULDER
SILT and SAND
SILTY SAND
BEDROCK
Sandy PEAT
SAND to Silty SAND
BEDROCK
TOPSOIL
FILL - SAND and GRAVEL
BEDROCK
TOPSOIL
ROCK FILL - SAND and GRAVEL
PEAT
Clayey SILT
Silty SAND
BEDROCK
TOP SOIL
SAND
BOULDER
SAND
BEDROCK
FILL
SILTY CLAY
SILTY SAND
BEDROCK
PEAT
Silty SAND
BEDROCK
GRAVEL
Fibrous PEAT/TOPSOIL
SILTY CLAY
SAND and GRAVEL
Sandy CLAY
BEDROCK
TOPSOIL
SAND
SILTY SAND
BEDROCK
BEDROCK



MW1-15 (OS m)
Well ID (Offset)
Sand
Stratigraphy
Water Level
(Sept. 25-29, 2015)
Well Screen

- Fill
- Organics
- Glaciofluvial
- Glaciolacustrine Nearshore
- Glaciolacustrine Offshore
- Diamicton
- Bedrock
- Ground Surface

- Rock Dump
- Fill/Organics
- Glaciolacustrine
- Glaciofluvial
- Diamicton
- Bedrock

20x Vertical Exaggeration
0 250 500 metres
1:15,000 (At original document size of 11x17)

Notes
1. Manual water level measurements from September 25 to 29, 2015.

Stantec

Project Location
Farley Lake Site
Lynn Lake, Manitoba

111440293 REVA
Prepared by PRM on 2015-12-10

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

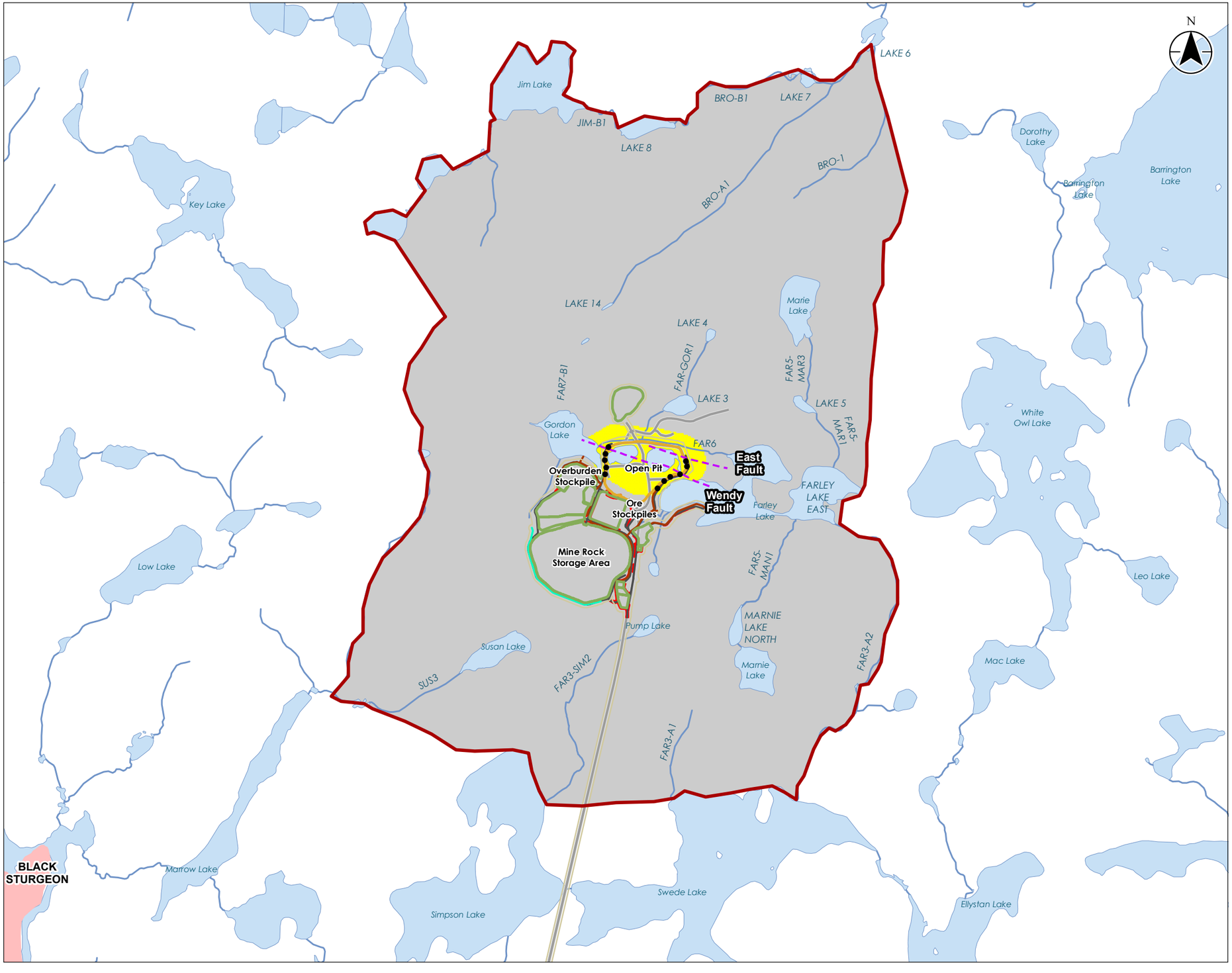
Map No.
8

Title
Cross-Section B-B'

Figure 01 of 01

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Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Proposed Infrastructure
- Contact Water Ditch
- Mine Site Road
- Diversion Ditch
- Discharge Pipeline

Study Area

- Study Area

Groundwater Wells and Collection Pond

- Groundwater Interceptor Wells

Bedrock Geology

- Approximate Location of Fault
- Faulted Shallow Bedrock
- Shallow Bedrock

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres
1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

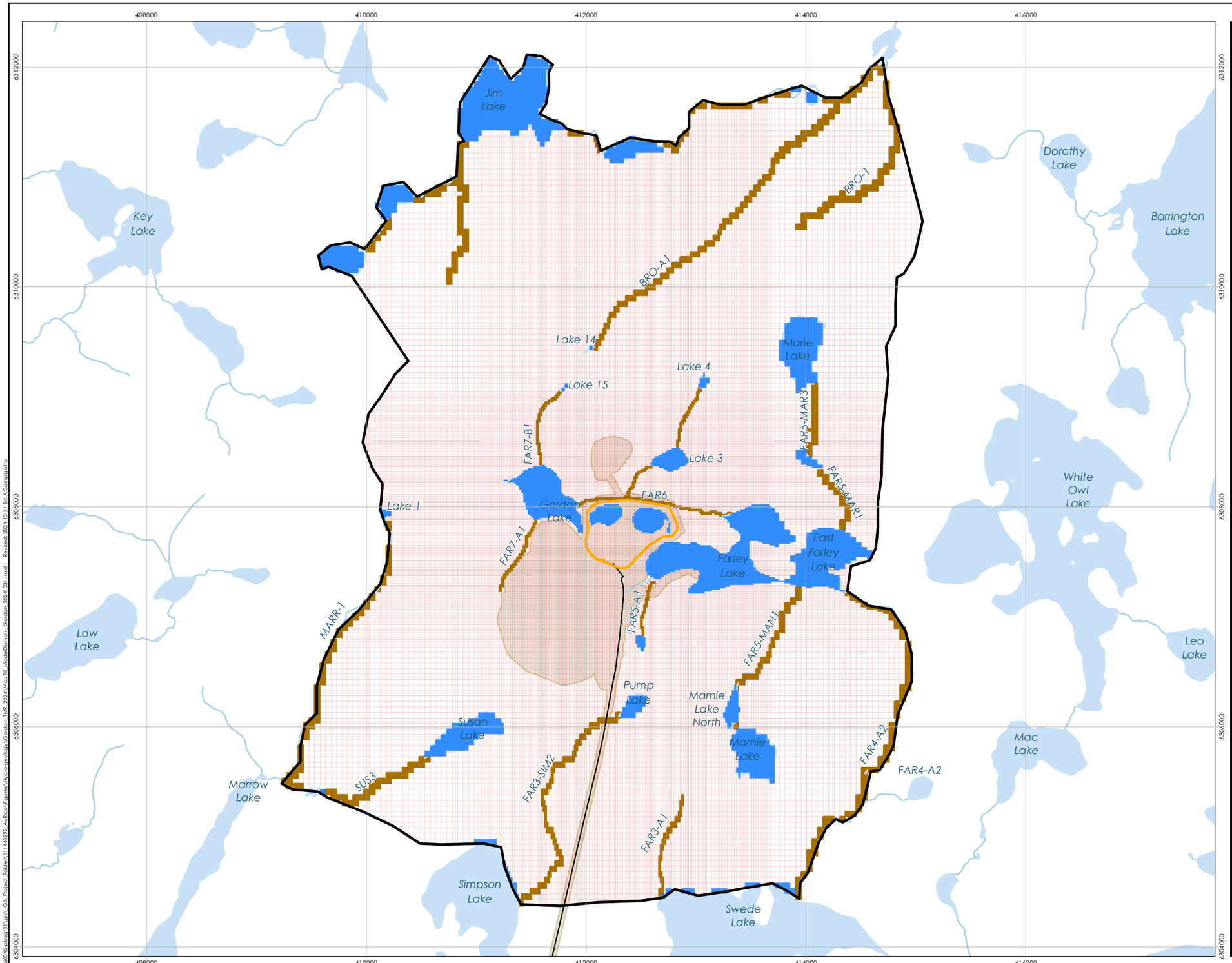
Prepared by ACampigotto on 2024-10-31
Technical Review by AD on 2024-10-31

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
9

Title
Shallow Bedrock Zones

\\Cor045-pfsvg01\Vgis_GIS_Project_Folder\111440293_AuRico\Reports\Hydrogeology\Gordon_1MR_2024\Map9_ShallowBedrock_Gordon_20241031.mxd Revised: 2024-10-31 By: ACampigotto



Stantec

Project Infrastructure
- Proposed Open Pit
- Project Development Area

Study Area
- Study Area
- Watercourses (River Boundary)
- Waterbodies (General Head Boundary)
- Model Grid

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 0.5 1 Kilometre
(At original document size of 11x17)
1:35,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by AC on 2024-10-17
Technical Review by AD on 2024-10-17

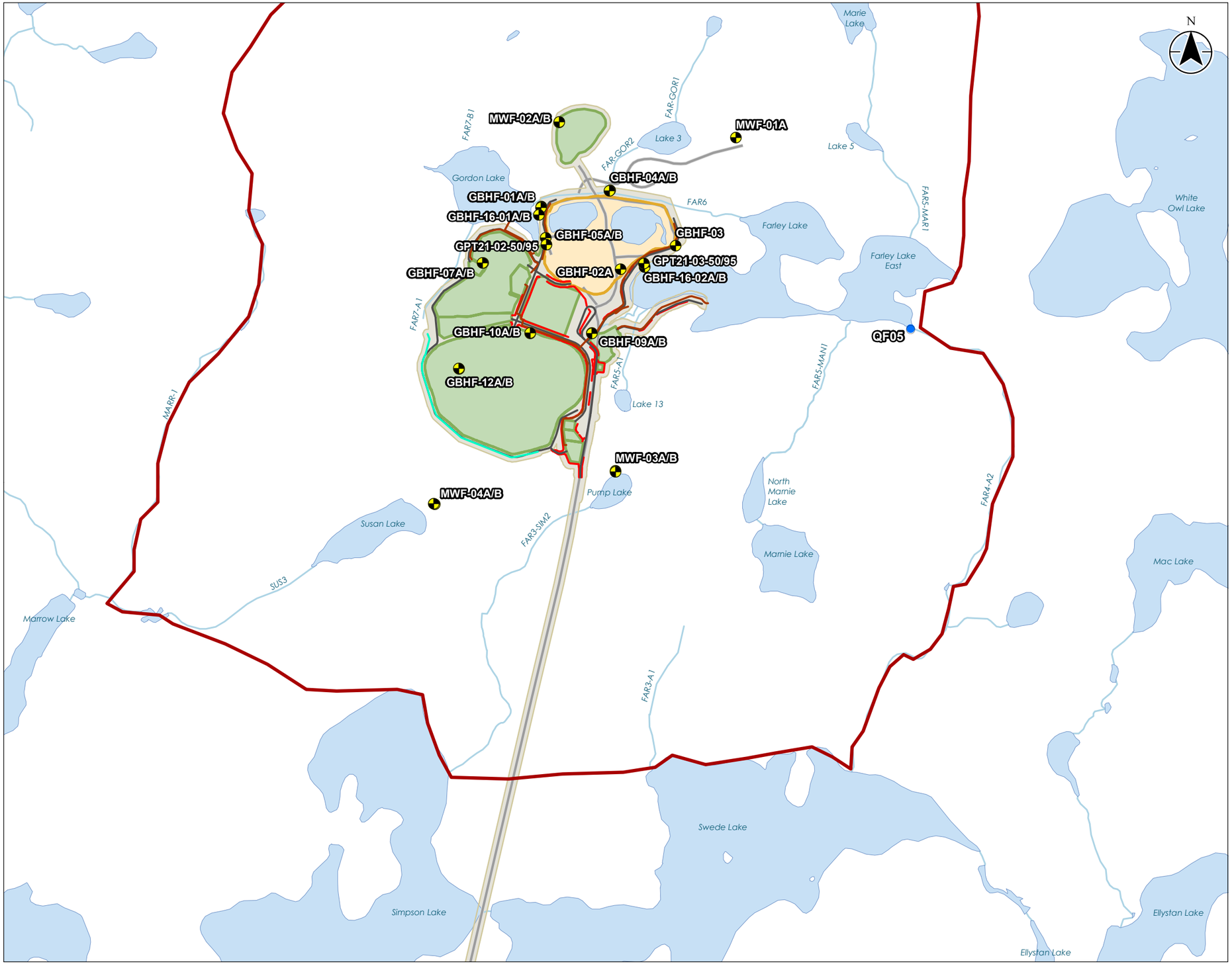
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
10

Title
Model Domain and Boundary Conditions - Baseline Model

\\Cn0045-pbsgfl01\gis_GIS_Project_Folder\111440293 Aulfeco\Figures\Hydro-geology\Gordon_1MB_2024\Map10 ModelDomain_Gordon_20241031.mxd Revised: 2024-10-31 By: ACampagatto



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure
- Contact Water Ditch
- Mine Site Road
- Diversion Ditch
- Discharge Pipeline

Study Area

- Groundwater Level Target
- Surface Water Calibration Target
- Study Area

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 500 1,000 Metres

1:25,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

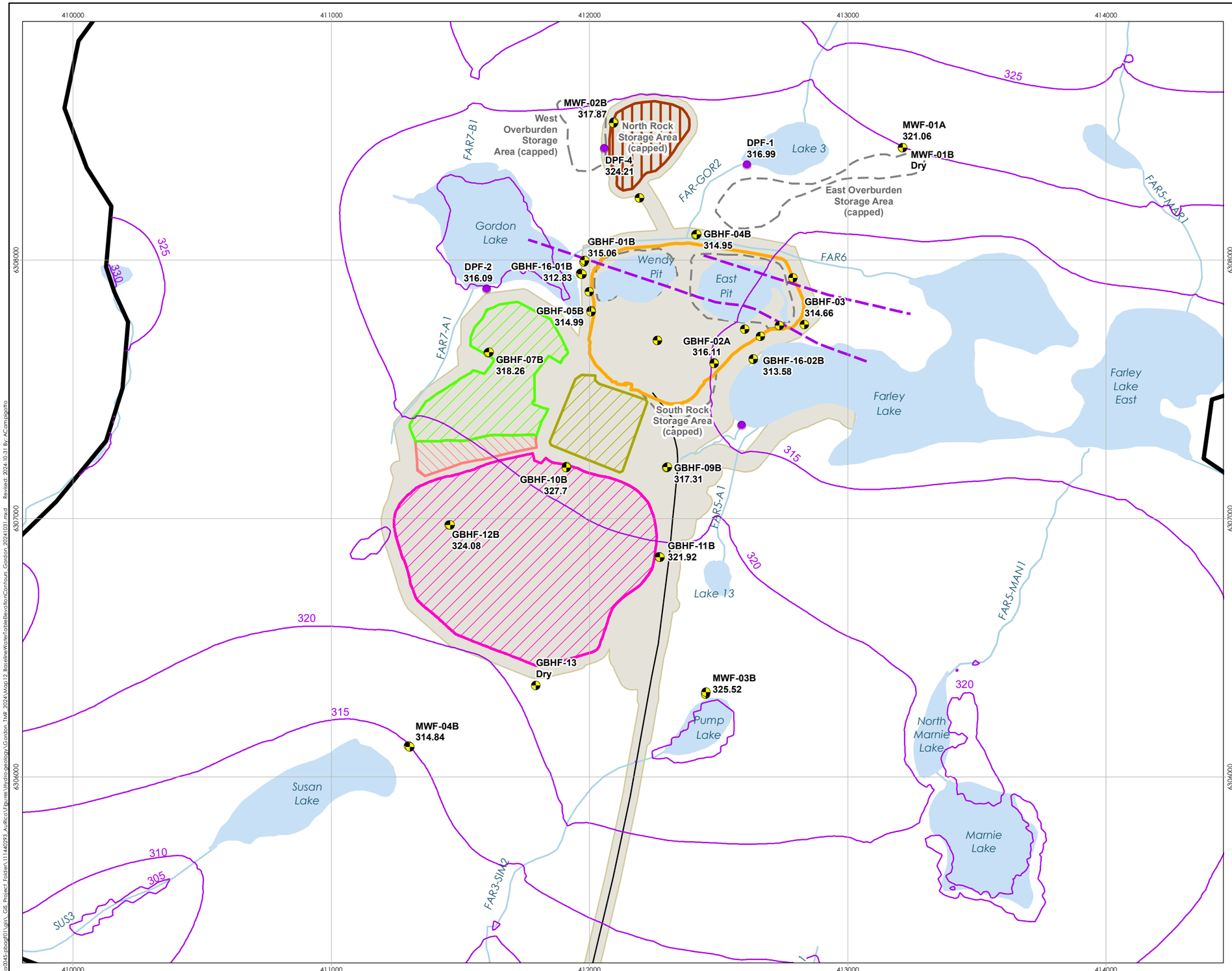
Prepared by AC on 2024-10-17
Technical Review by AD on 2024-10-17

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
11

Title
Location of Steady State Water Level and Baseflow Calibration Targets

\\Ca0245-pbag01.vgh.\ GIS_Project_Folder\111440293 AuRec\Figures\Hydrogeology\Gordon_TWR_2024\Map11_LocationOfSteadyStateWater_Gordon_20241031.mxd Revised: 2024-10-31 By: ACampagnolo



Stantec

Project Infrastructure

- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Stockpile Borrow Source
- Project Development Area

Study Area

- Study Area

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Survey Locations

- Monitoring Well with Groundwater Elevation (mAMSL) June 25 to July 4, 2018
- Drive-Point Piezometers with Groundwater Elevation (mAMSL) June 25 to July 4, 2018
- Simulated Baseline Water Table Elevations (5 m interval)

Landbase

- Existing Access Road
- Fault Zone
- Watercourse
- Waterbody

N

0 150 300 Metres
(At original document size of 11x17)
1:15,000

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

111473076

Project Location
Lynn Lake, Manitoba

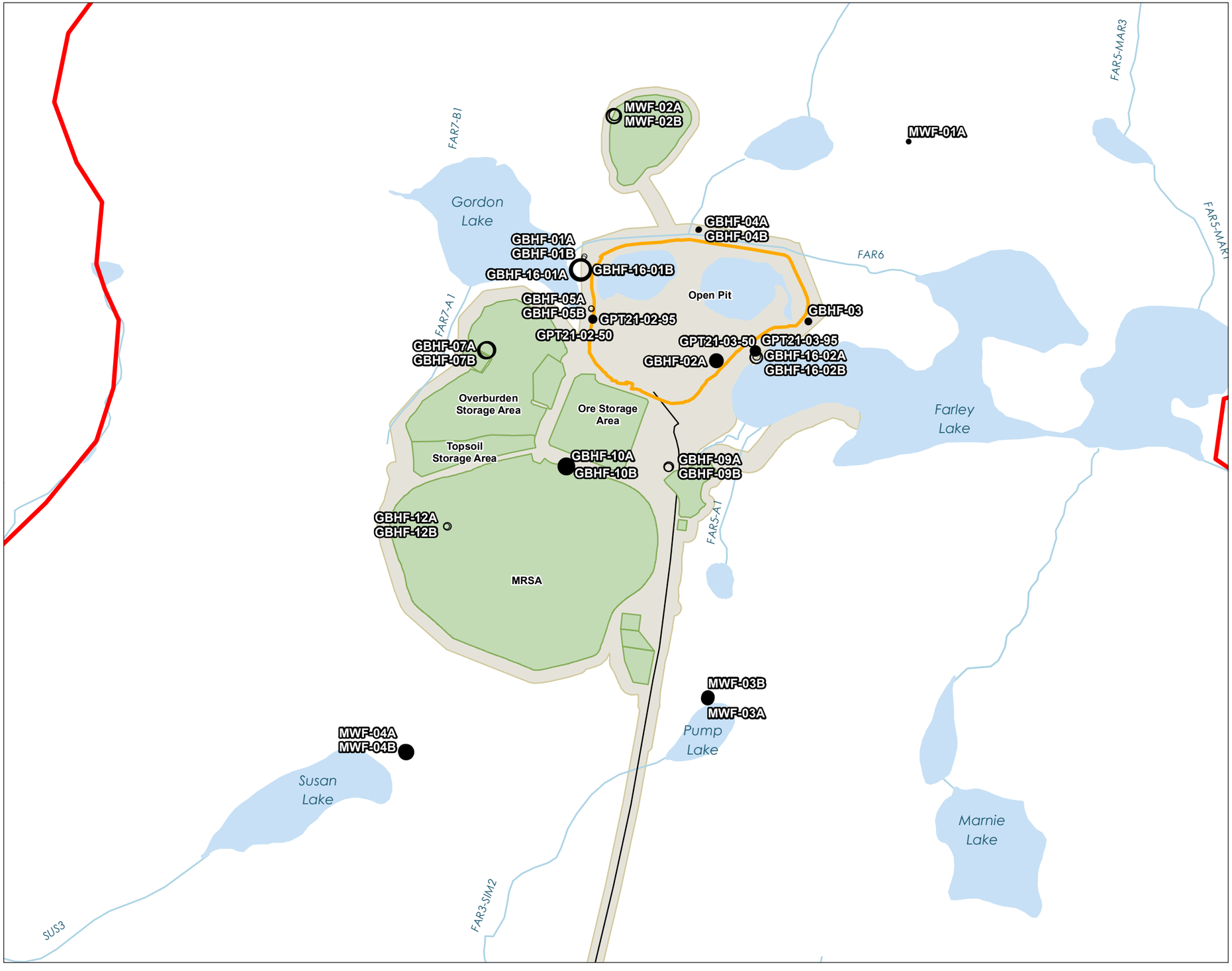
Prepared by AC on 2024-10-17
Technical Review by AD on 2024-10-17

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
12

Title
Simulated Baseline Water Table Contours and Measured Head Values

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Stantec

Project Infrastructure
- Open Pit
- Proposed Infrastructure
- Project Development Area

Study Area

Positive Weighted Residual Errors (m)
- 0 to 1
- 1 to 2
- > 2

Negative Weighted Residual Errors (m)
- 0 to -1
- -1 to -2
- > -2

- Study Area

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 200 400 Metres
(At original document size of 11x17)
1:15,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-04
Technical Review by KG on 2024-12-04

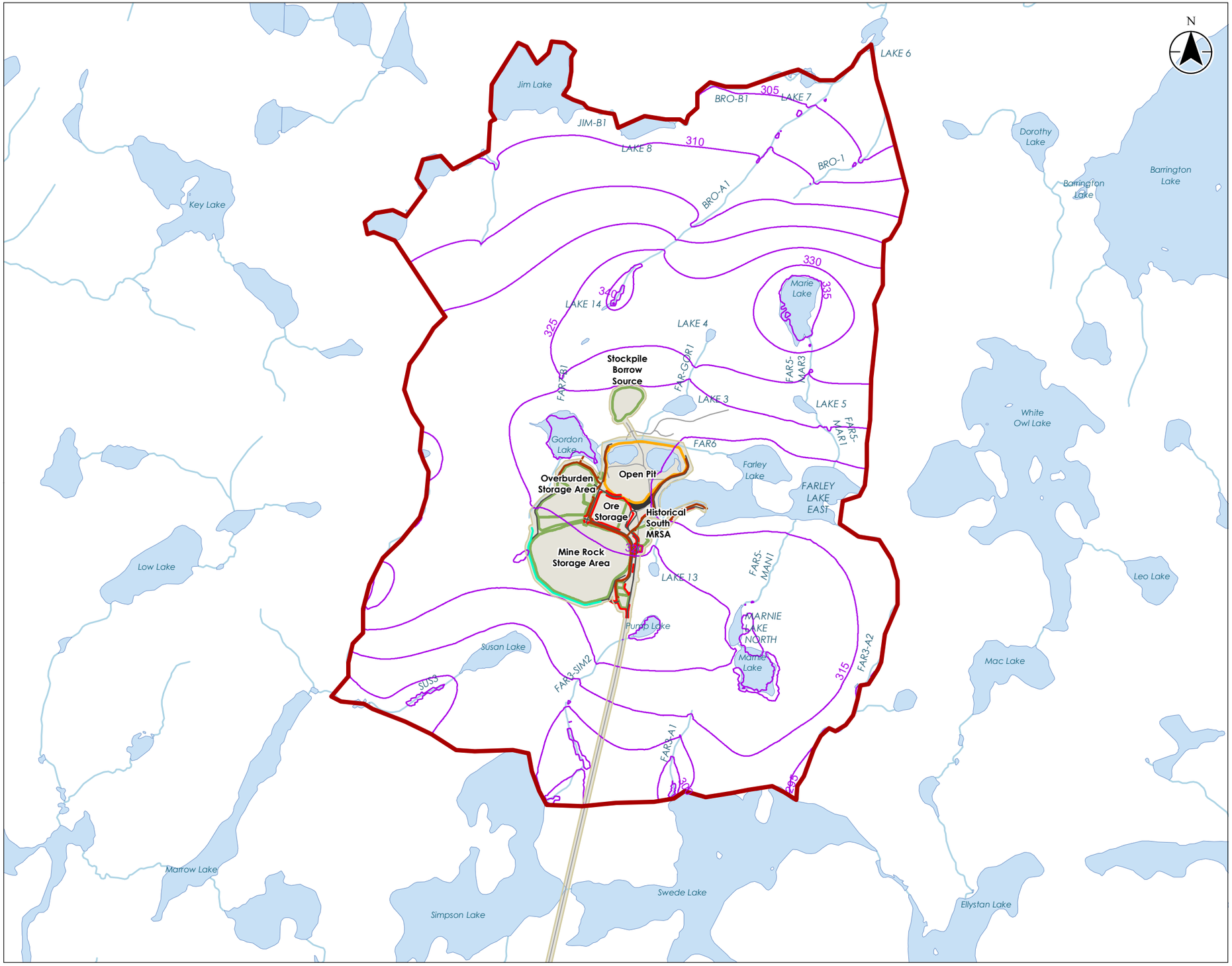
Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473076

Map No.
13

Title
Spatial Distribution of Weighted Residual Errors in the Model

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Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Proposed Infrastructure
- Contact Water Ditch
- Mine Site Road
- Diversion Ditch
- Discharge Pipeline

Study Area

- Simulated Baseline Water Table Elevations (5 m interval)
- Study Area

Landbase

- Existing Access Road
- Watercourse
- Waterbody
- Historical South MRSA

0 0.5 1 Kilometres
1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

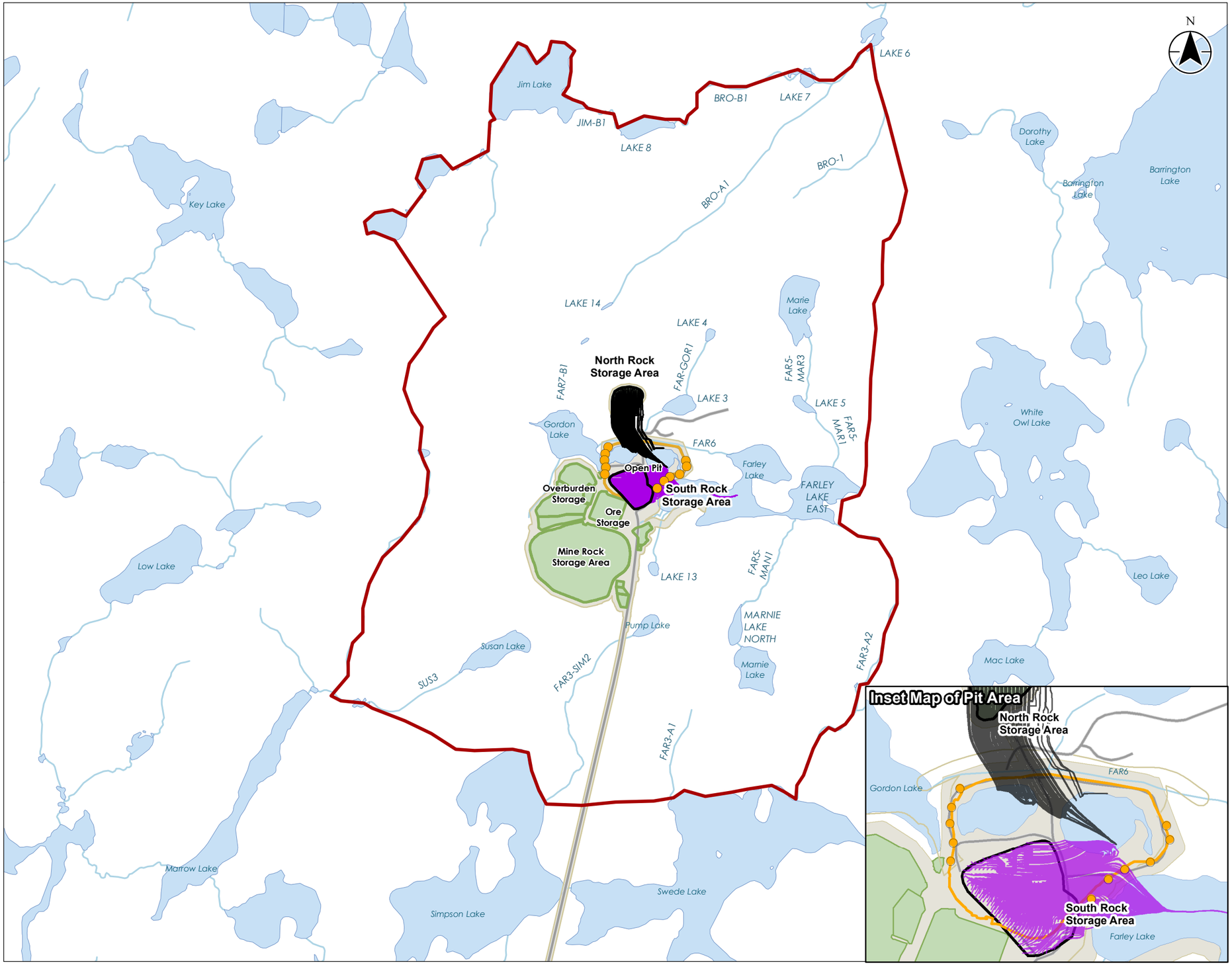
Prepared by AC on 2024-10-17
Technical Review by AD on 2024-10-17

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
14

Title
Simulated Baseline Water Table Elevation Contours

\\Cn0045-pbsgfl01\gis_GIS Project Folder\111440293_Audico\Figures\Hydrogeology\Gordon_TMF_2024\Map14_SimulatedWaterTableElevations_20241203.mxd Revised: 2024-12-03 By: ACampagnolo



Stantec

Project Infrastructure
- Project Development Area
- Proposed Open Pit
- Potential Infrastructure

Study Area
- Groundwater Interceptor Wells
- Study Area

Particle Traces by Source
- North Rock Storage Area
- South Rock Storage Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Landbase
- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres
1:40,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

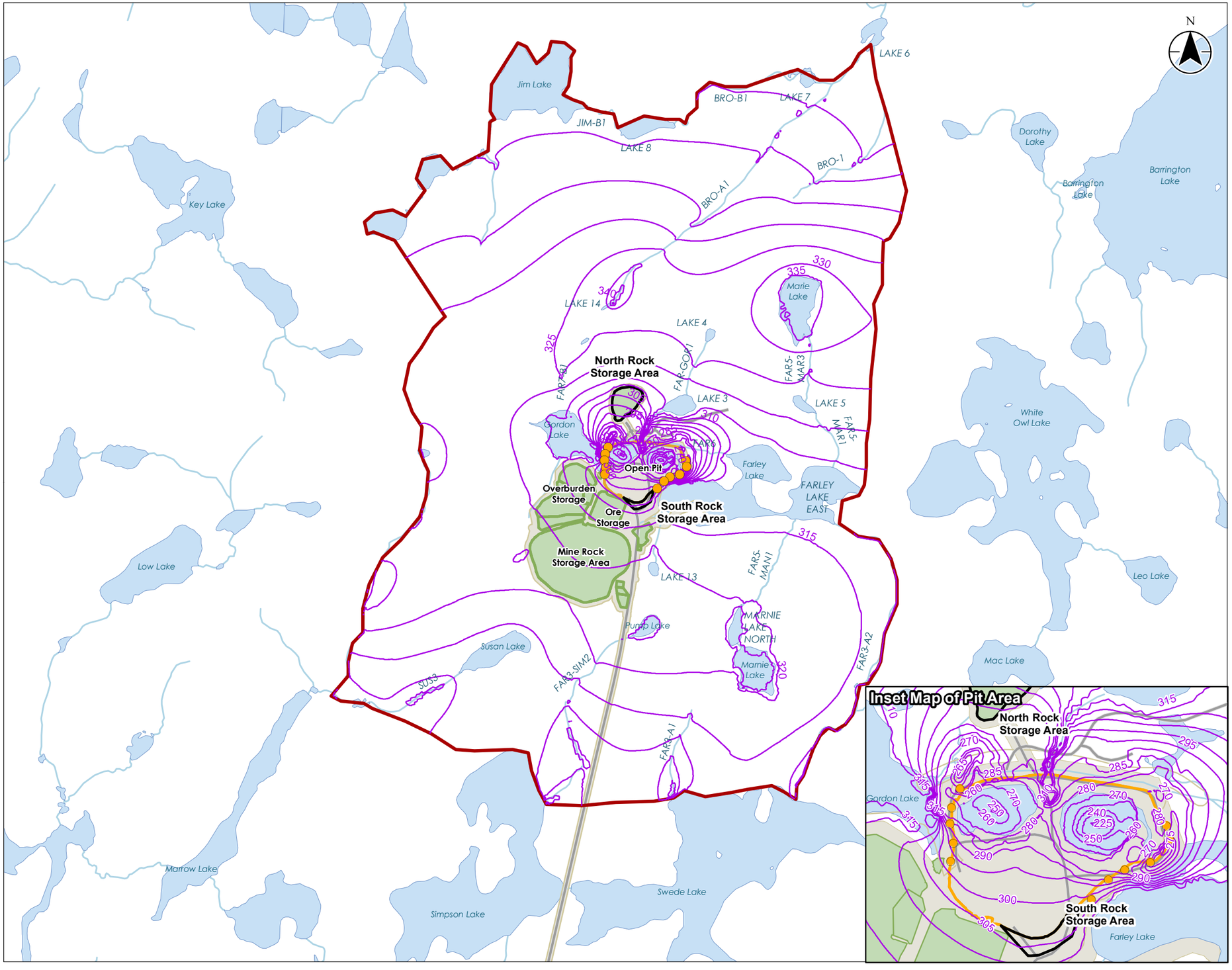
Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
15

Title
Simulated Baseline Particle Tracks

\\Cor045-pbsgfs01\gis_GIS Project Folder\111440293_Aulfico\Figures\Hydrogeology\Gordon_TMF_2024\Map15_BaselineParticles_Gordon_2024 1203.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure
- Project Development Area
- Proposed Open Pit
- Potential Infrastructure

Study Area
- Groundwater Interceptor Wells
- Water Table Elevation Contours
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Landbase
- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres
1:40,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

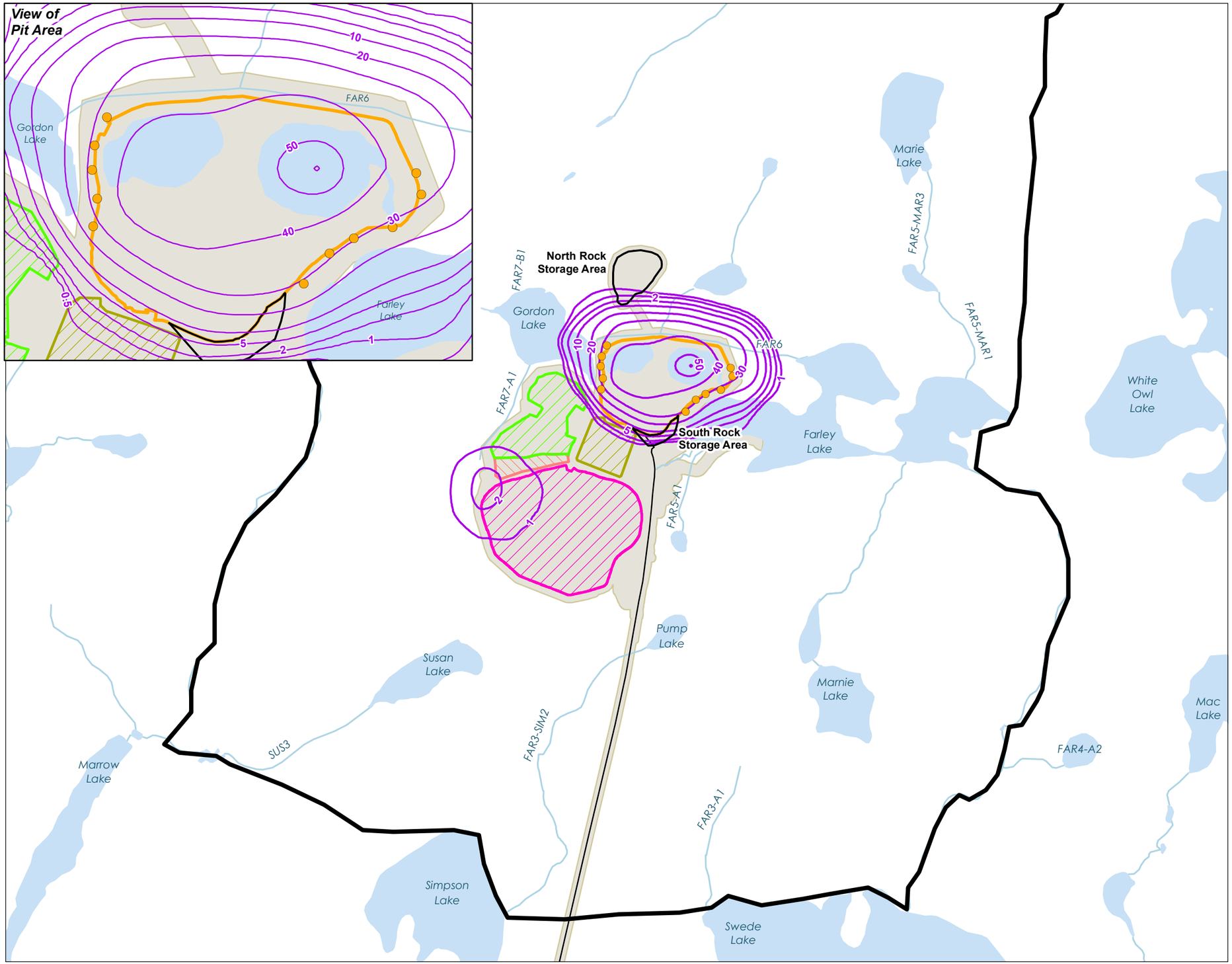
Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
16

Title
Predicted Water Table Elevation Contours at End of Construction

\\Cor045-pbogt01\gis_GIS Project Folders\111440293_AuRecon\Figures\Hydrogeology\Gordon_TMF_2024\Vsp16_WaterTableElevations_End_of_Construction_2024l203.mxd Revised: 2024-12-03 by ACampigotto



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

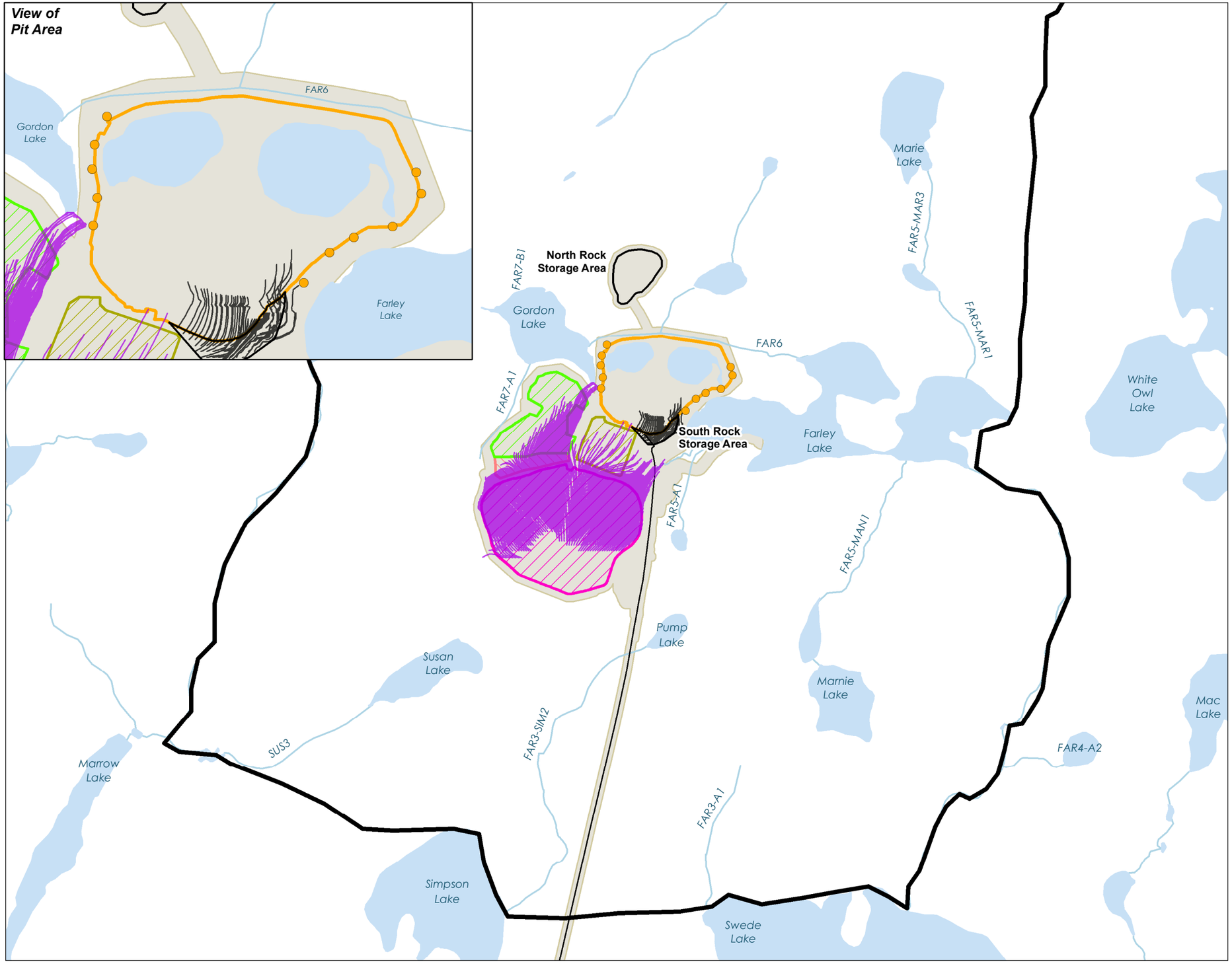
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
17

Title
Predicted Water Table Drawdown at End of Construction

\\Cor0045-pbsgfl01.ghl\...GIS_Project_Folder\111440293_AulReco\Figures\Hydrogeology\Gordon_TWI_2024\Map17_WaterTableDrawdown_EoC_Gordon_2024 03.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells

Particle Traces by Source
- Mine Rock Storage Area
- South Rock Storage Area

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
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Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

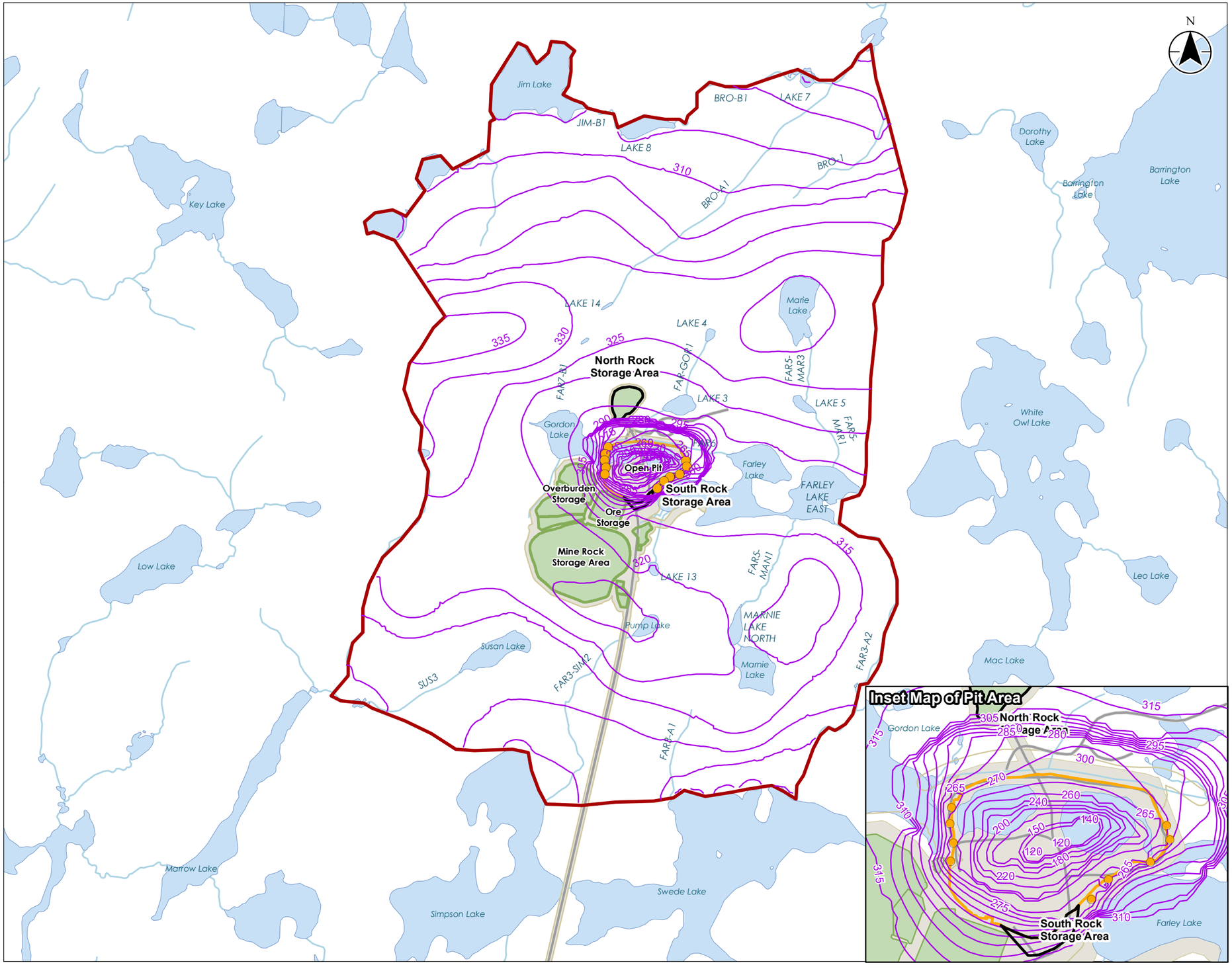
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
18

Title
Predicted Particle Traces from MRSAs at End of Construction

\\Cor1045-pbogl01\gis_GIS Project Folder\111440293_AuRico\Figures\Hydrogeology\Gordon_TMF_2024\Map18_ParticleTracks_EoC_Gordon_20241203.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure

Study Area

- Groundwater Interceptor Wells
- Water Table Elevation Contours
- Study Area

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

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Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

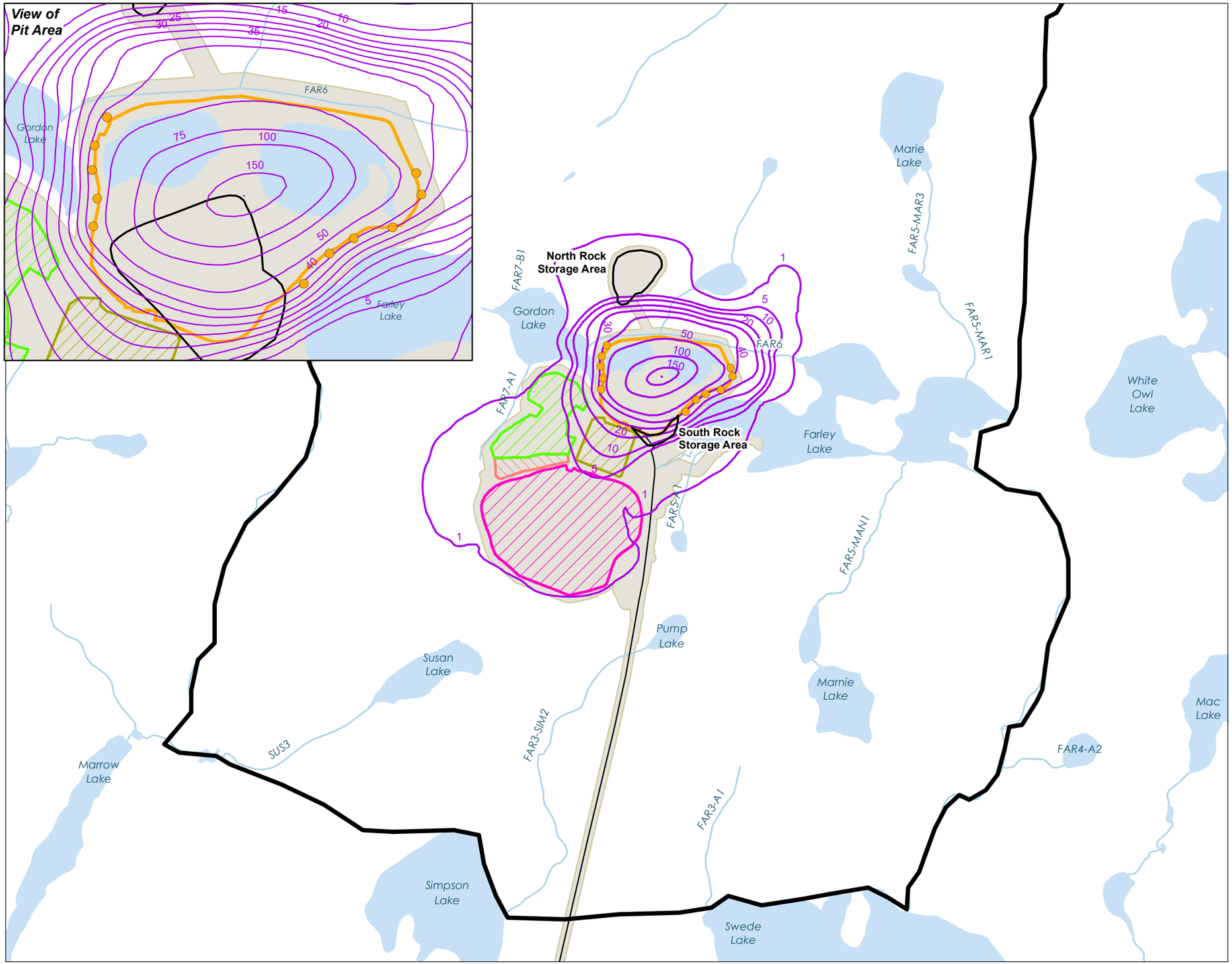
Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
19

Title
Predicted Water Table Elevation Contours at End of Operation

\\Cn0045-pbsag01.ngh\...\GIS_Project_Folder\111440293_AulRco\Figures\Hydrogeology\Gordon_1MR_2024\Map19_WaterTableElevations_End_of_Operation_Gordon_2024 1203.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

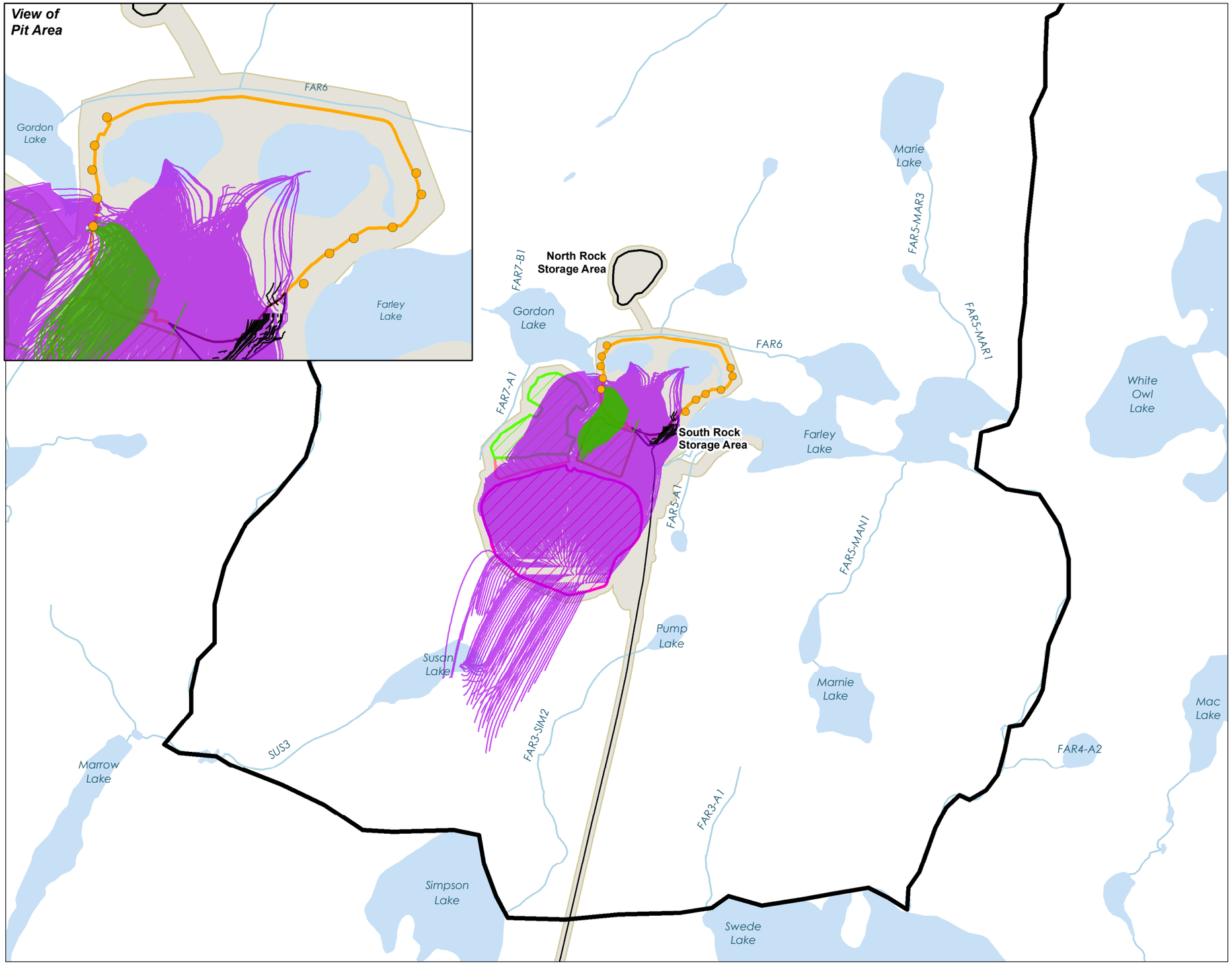
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
20

Title
Predicted Water Table Drawdown at End of Operation

\\Cor045-pbsgfl01\gis_GIS_Project_Folder\111440293_AuRec\Figures\Hydrogeology\Gordon_TWI_2024\Map20_WaterTableDrawdown_EndOfOperation_Gordon_20241203.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells

Particle Traces by Source
- Mine Rock Storage Area
- South Rock Storage Area
- Ore Storage Area

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

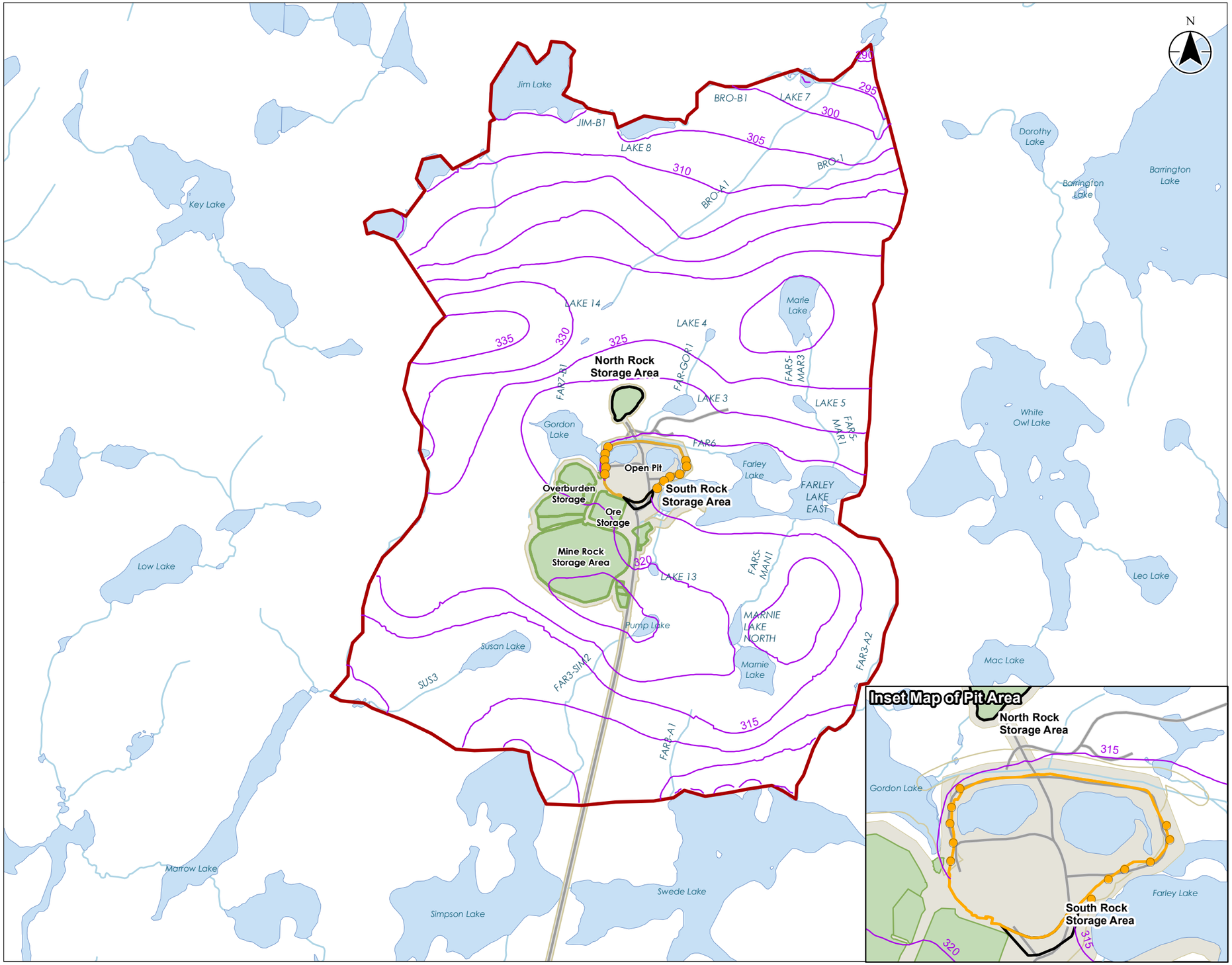
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
21

Title
Predicted Particle Traces from MRSAs and OSA at End of Operations

\\Cor045-pbsgfl01\gis_GIS_Project_Folder\111440293_AulRco\Figures\Hydrogeology\Gordon_TMF_2024\Map21_ParticleTracks_YearX_Gordon_20241203.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure

- Project Development Area
- Proposed Open Pit
- Potential Infrastructure

Study Area

- Groundwater Interceptor Wells
- Water Table Elevation Contours
- Study Area

Historical Mine Infrastructure

- Existing Infrastructure Associated with Historical Mine

Landbase

- Existing Access Road
- Watercourse
- Waterbody

0 0.5 1 Kilometres
1:40,000 (At original document size of 11x17)

Notes

1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base features provided by the Government of Manitoba and the Government of Canada.

Project Location
Gordon Site
Lynn Lake, Manitoba

111473076

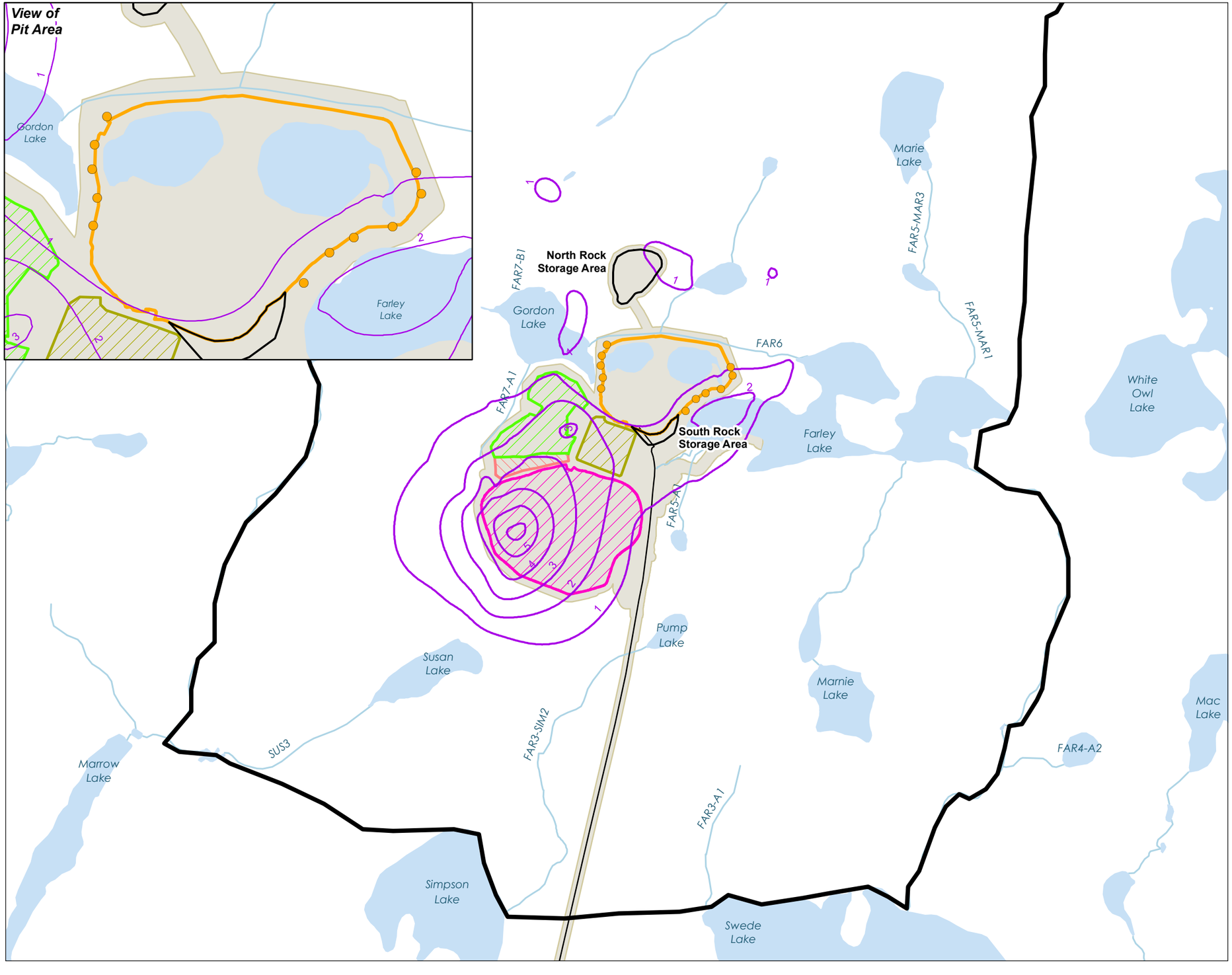
Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

Map No.
22

Title
Predicted Water Table Elevation Contours in Closure

\\Cor004S.pbogt01\Gis_GIS Project Folder\111440293 AuRico\Figures\Hydrogeology\Gordon_1MR_2024\Map22_WaterTableElevations_A1_Closure_Gordon_20241203.mxd Revised: 2024-12-03 By: ACampigotto



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells
- Simulated Water Table Drawdown

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

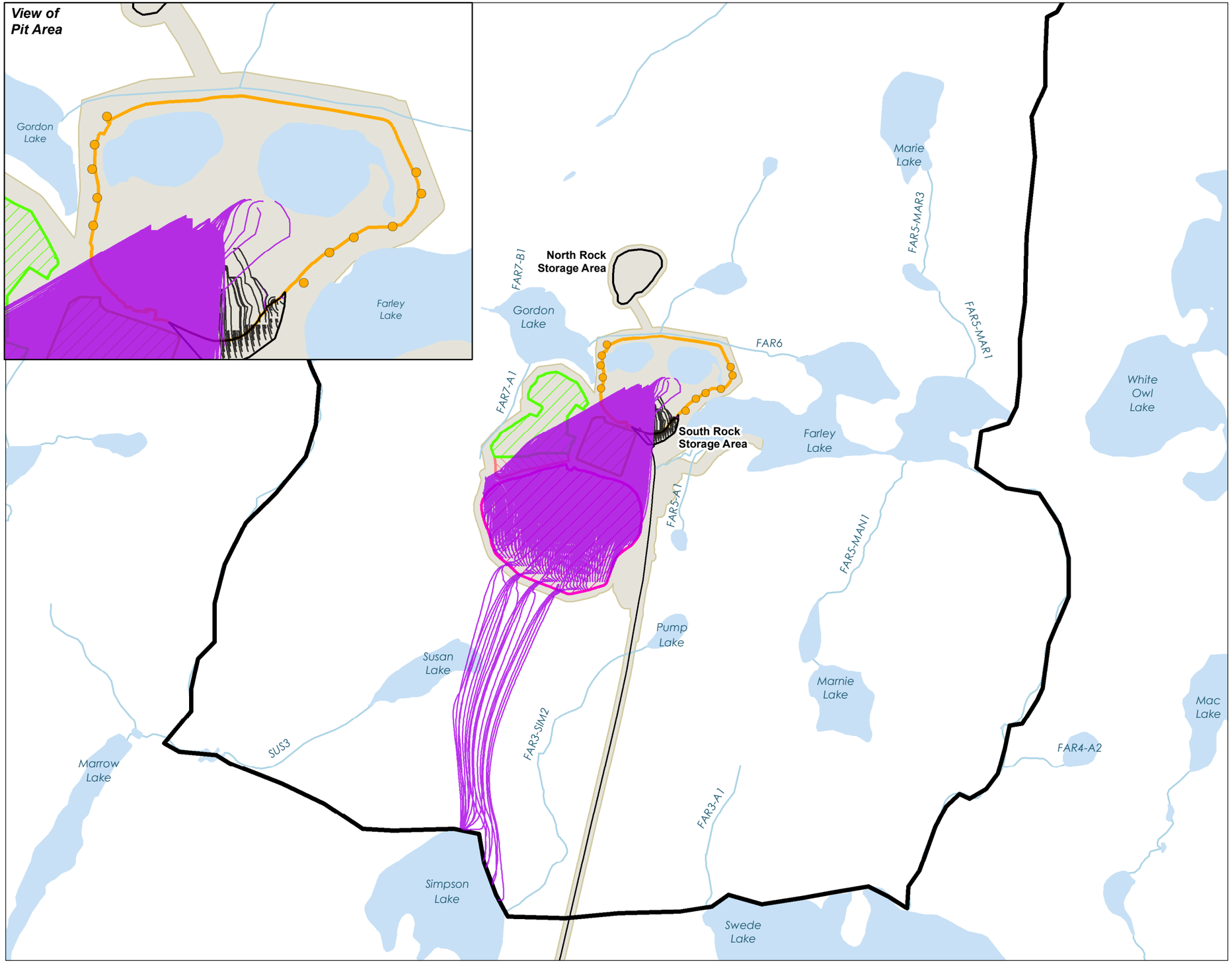
Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
23

Title
Predicted Water Table Drawdown in Closure

\\Cd045-fpsg01\gis_GIS_Project_Folder\111440293_AuRico\Figures\Hydrogeology\Gordon_TMF_2024\Map23_WaterTableDrawdown_Closure_Gordon_20241203.mxd Revised: 2024-12-03 by ACampigotto



Stantec

Project Infrastructure
- Open Pit
- Mine Rock Storage Area
- Ore Storage
- Overburden Storage
- Topsoil Storage Area
- Project Development Area

Study Area
- Study Area

Historical Mine Infrastructure
- Existing Infrastructure Associated with Historical Mine

Survey Locations
- Groundwater Interceptor Wells

Particle Traces by Source
- Mine Rock Storage Area
- South Rock Storage Area

Landbase
- Existing Access Road
- Watercourse
- Waterbody

N

0 250 500 Metres
(At original document size of 11x17)
1:25,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2024-12-03
Technical Review by AD on 2024-12-03

Client/Project
ALAMOS GOLD INC.
LYNN LAKE GOLD PROJECT
GORDON SITE

111473076

Map No.
24

Title
Particle Traces from MRSAs in Closure

\\Cn1045-pbsgis01\gis_GIS_Project_Folder\111440293_AuRico\Figures\Hydrogeology\Gordon_TMF_2024\Map24_ParticleTracks_End_of_Closure_Gordon_20241203.mxd Revised: 2024-12-03 By: ACampigotto

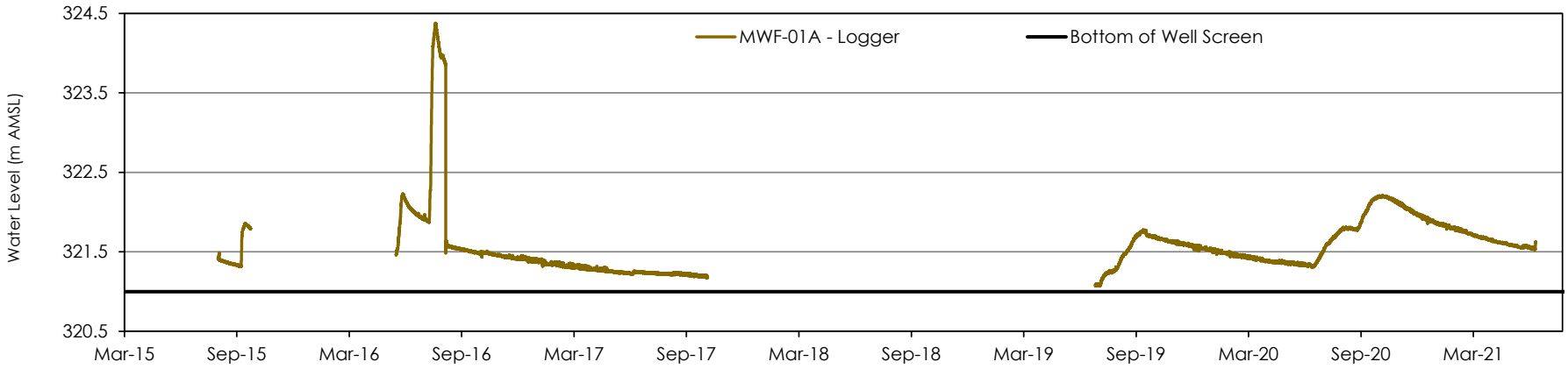
Appendix B Monitoring Well Construction Details and Hydrographs

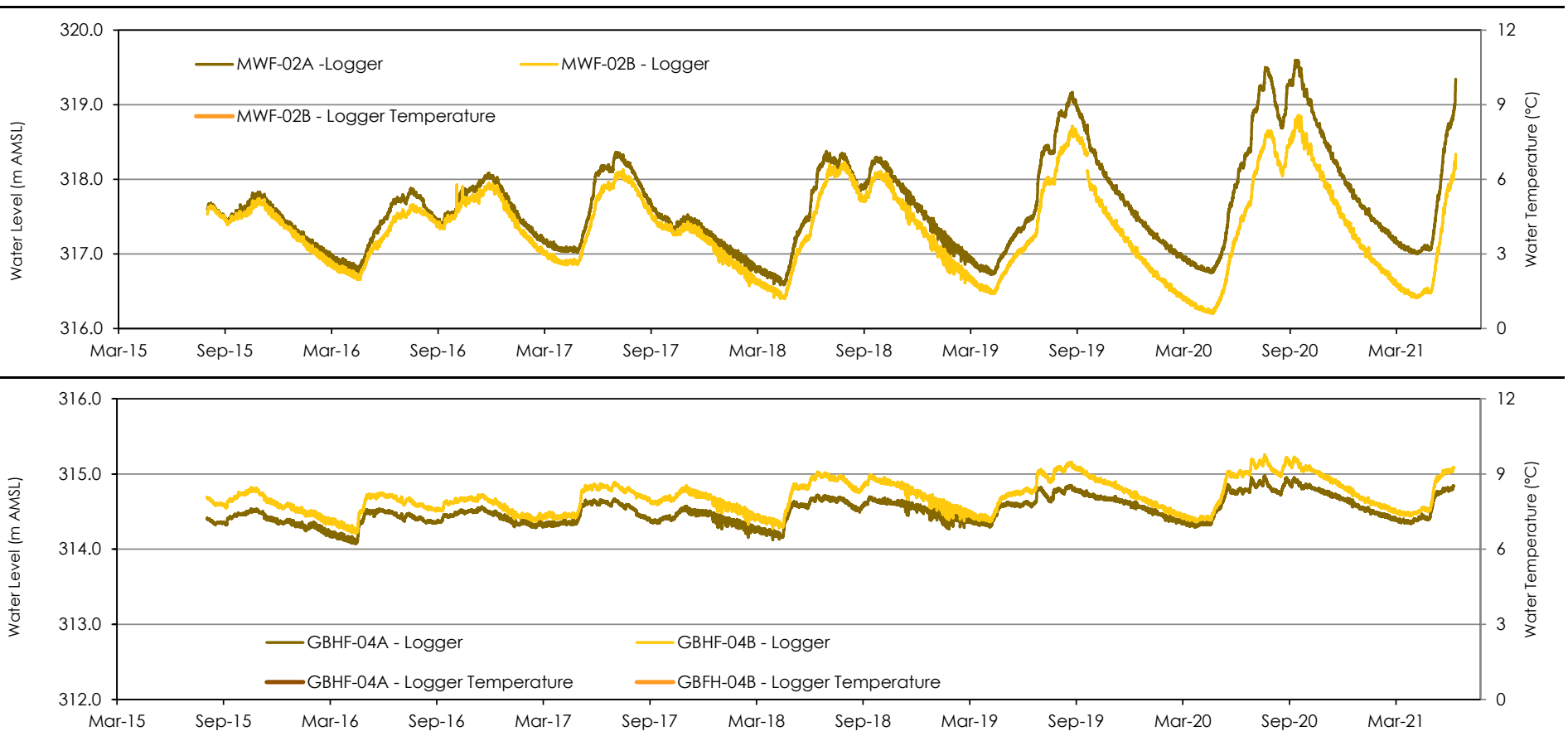
Table B1
Gordon Site Well Construction Details
Lynn Lake Gold Project (LLGP)

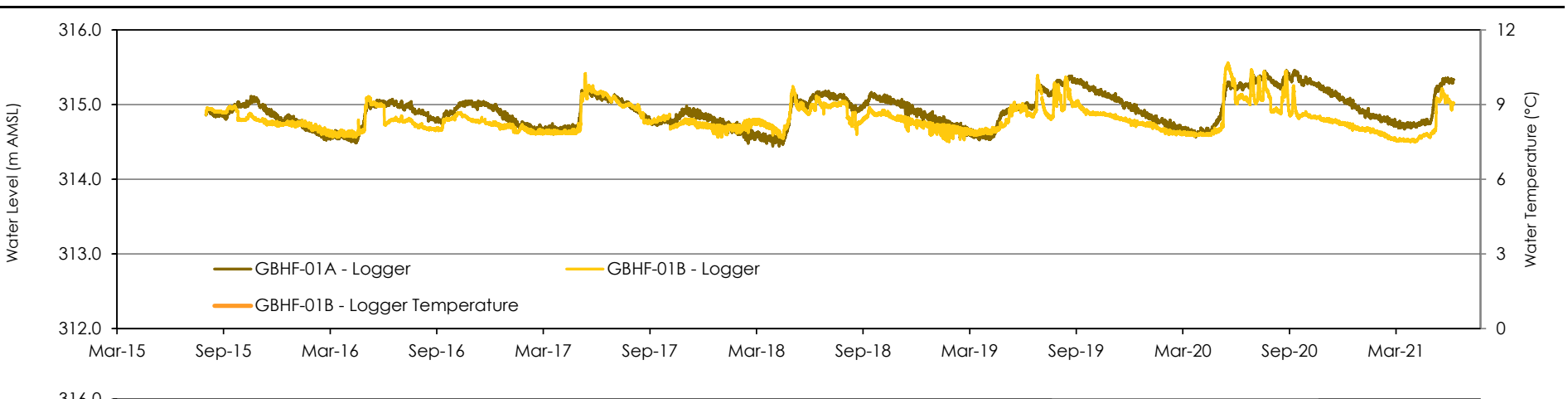
Well ID	Installation Date	Coordinates		Elevation		Borehole Depth	Well Diameter	Screened Interval				Screened Unit
								Top of Well Screen		Bottom of Well Screen		
		Northing	Easting	Ground Surface m AMSL	Top of Casing m AMSL	(m BGS)	(mm)	(m BGS)	(m AMSL)	(m BGS)	(m AMSL)	
MWF-01A	6-Jun-15	6308438	413213	327.70	328.65	6.7	51	3.60	324.10	6.70	321.00	Shallow Bedrock
MWF-01B	6-Jun-15	6308437	413214	327.78	328.64	2.3	51	1.40	326.38	2.30	325.48	Sand Diamicton
MWF-02A	8-Jun-15	6308537	412096	322.05	323.02	14.3	51	11.30	310.75	14.30	307.75	Shallow Bedrock
MWF-02B	8-Jun-15	6308534	412094	322.18	323.11	9.1	51	5.20	316.98	8.20	313.98	Glaciofluvial / Glaciolacustrine Nearshore
MWF-03A	9-Jun-15	6306322	412451	325.46	326.72	9.1	51	6.10	319.36	9.10	316.36	Shallow Bedrock
MWF-03B	9-Jun-15	6306330	412452	325.63	326.73	3.4	51	1.80	323.83	3.40	322.23	Glaciolacustrine Nearshore
MWF-04A	10-Jun-15	6306123	411300	315.04	316.12	11.9	51	8.80	306.24	11.90	303.14	Shallow Bedrock
MWF-04B	10-Jun-15	6306118	411305	314.92	315.83	6.7	51	3.70	311.22	6.70	308.22	Glaciolacustrine Offshore / Sand Diamicton
MWF-05A	5-Jun-15	6303751	411643	301.90	302.80	6.9	51	5.30	296.60	6.90	295.00	Shallow Bedrock
MWF-05B	5-Jun-15	6303750	411641	301.94	303.00	3.7	51	3.00	298.94	3.70	298.24	Sand Diamicton
MWF-06	4-Jun-15	6300569	410977	300.63	301.58	5.2	51	2.00	298.63	5.20	295.43	Shallow Bedrock
MWF-07R	24-Apr-17	6307691	412264	317.00	n/a	31.3	51	29.14	287.86	30.66	286.34	Shallow Bedrock
MWF-07S	24-Apr-17	6307691	412264	317.00	n/a	11.6	51	10.06	306.94	11.58	305.42	Sand Diamicton
MWF-08R	9-May-17	6308244	412194	314.08	n/a	15.4	51	13.72	300.36	15.24	298.84	Shallow Bedrock
MWF-08S	9-May-17	6308244	412194	314.08	n/a	10.4	51	8.84	305.24	10.36	303.72	Sand Diamicton
GBHF-01A	4-Jun-15	6307996	411979	316.04	317.02	8.8	51	5.79	310.25	7.32	308.73	Shallow Bedrock
GBHF-01B	4-Jun-15	6308001	411982	316.07	317.03	5.5	51	3.96	312.11	5.49	310.59	Glaciolacustrine Nearshore
GBHF-02A	9-Jun-15	6307605	412483	321.37	322.44	6.3	51	4.57	316.80	6.25	315.12	Shallow Bedrock
GBHF-02B	9-Jun-15	6307602	412483	321.58	322.46	3.2	51	1.62	319.95	3.15	318.43	Glaciolacustrine Nearshore
GBHF-03	13-Jun-15	6307753	412833	314.80	315.70	4.9	51	2.90	311.90	4.88	309.92	Shallow Bedrock
GBHF-04A	6-Jun-15	6308100	412412	317.52	318.47	7.0	51	5.49	312.03	7.01	310.51	Shallow Bedrock
GBHF-04B	7-Jun-15	6308102	412416	317.77	318.72	4.9	51	3.35	314.41	4.88	312.89	Glaciolacustrine Nearshore
GBHF-05A	5-Jun-15	6307806	412008	316.92	317.81	14.0	51	12.50	304.42	14.02	302.90	Shallow Bedrock
GBHF-05B	6-Jun-15	6307802	412008	316.95	318.05	10.7	51	9.14	307.81	10.67	306.28	Glaciolacustrine Offshore
GBHF-07A	10-Jun-15	6307644	411608	318.81	319.72	6.4	51	4.88	313.93	6.40	312.41	Shallow Bedrock
GBHF-07B	10-Jun-15	6307645	411612	318.88	319.80	3.3	51	1.72	317.16	3.25	315.63	Sand Diamicton
GBHF-09A	14-Jun-15	6307200	412300	317.11	318.11	12.7	51	11.13	305.98	12.65	304.46	Shallow Bedrock
GBHF-09B	14-Jun-15	6307202	412302	317.13	318.28 (Before Aug. 2017) 317.63 (After Aug. 2017) **	9.1	51	7.57	309.56	9.09	308.04	Sand Diamicton
GBHF-10A	17-Jun-15	6307203	411912	329.13	330.08	6.0	51	4.20	324.93	6.02	323.11	Shallow Bedrock
GBHF-10B	17-Jun-15	6307200	411911	329.12	330.02	3.0	51	1.52	327.60	3.05	326.07	Sand Diamicton
GBHF-11A	12-Jun-15	6306854	412270	321.18	322.38	9.0	51	7.49	313.69	9.02	312.16	Shallow Bedrock
GBHF-11B	12-Jun-15	6306853	412274	321.27	322.38	7.1	51	4.57	316.70	6.10	315.17	Glaciolacustrine Offshore
GBHF-12A	11-Jun-15	6306977	411458	324.54	325.81 (Before Aug. 2017) 325.17 ** (After Aug. 2017)	7.8	51	6.25	318.29	7.77	316.77	Shallow Bedrock
GBHF-12B	11-Jun-15	6306976	411461	324.50	325.73 (Before Aug. 2017) 325.13 **(After Aug. 2017)	4.6	51	2.13	322.37	3.66	320.84	Sand Diamicton
GBHF-13	16-Jun-15	6306357	411793	345.33	346.28	4.1	51	2.61	342.72	4.11	341.22	Shallow Bedrock
GBHF-16-01A	15-Jul-16	6307949	411967	314.33	315.58	10.7	51	7.62	306.71	9.14	305.19	Shallow Bedrock
GBHF-16-01B	15-Jul-16	6307951	411967	314.73	315.83	5.5	51	3.96	310.77	5.49	309.24	Glaciolacustrine Offshore / Diamicton
GBHF-16-02A	19-Jul-16	6307618	412635	313.19	314.29	15.2	51	9.14	304.05	10.67	302.52	Shallow Bedrock
GBHF-16-02B	19-Jul-16	6307621	412635	313.79	315.09	4.9	51	3.35	310.44	4.88	308.91	Glaciolacustrine Nearshore
GBHG-17-01	8-May-17	6307933	412788	296.56	n/a	38.1	51	33.40	263.16	34.92	261.64	Shallow Bedrock
GBHG-17-02	24-Apr-17	6307750	412736	309.73	n/a	26.9	51	24.31	285.42	25.83	283.90	Shallow Bedrock
GPT21-01*	n/a	6307811	412024	316.70	n/a	52.4	96	n/a	n/a	n/a	n/a	n/a
GPT21-02 (50)	n/a	6307763	412014	319.50	n/a	107.7	96	50.00	269.50	50.00	269.50	Shallow Bedrock
GPT21-02 (95)	n/a	6307763	412014	319.50	n/a	107.7	96	95.00	224.50	95.00	224.50	Intermediate Bedrock
GPT21-03 (50)	n/a	6307642	412630	314.80	n/a	100.5	96	50.00	264.80	50.00	264.80	Shallow Bedrock
GPT21-03 (95)	n/a	6307642	412630	314.8	n/a	100.5	96.00	95.00	219.80	95.00	219.80	Intermediate Bedrock
GPW-01	10-Aug-16	6307736	412602	316.83	317.58	82.3	152	6.90	309.93	82.30	234.53	Shallow Bedrock
GPW-02	18-Aug-16	6307707	412663	316.33	316.93	83.2	152	8.20	308.13	83.20	233.13	Shallow Bedrock
GPW-03	17-Aug-16	6307881	411999	316.11	316.67	84.1	152	9.10	307.01	84.10	232.01	Shallow Bedrock
GPW-04	17-Aug-16	6307946	411972	315.66	316.26	80.8	152	5.80	309.86	80.80	234.86	Shallow Bedrock
TW1-21	19-Aug-21	6307874	412806	316.11	316.72	58.2	203	7.62	308.49	58.22	257.89	Shallow Bedrock
TW2-21	21-Aug-21	6307812	412821	315.71	316.31	55.2	203	6.40	309.31	55.17	260.54	Shallow Bedrock

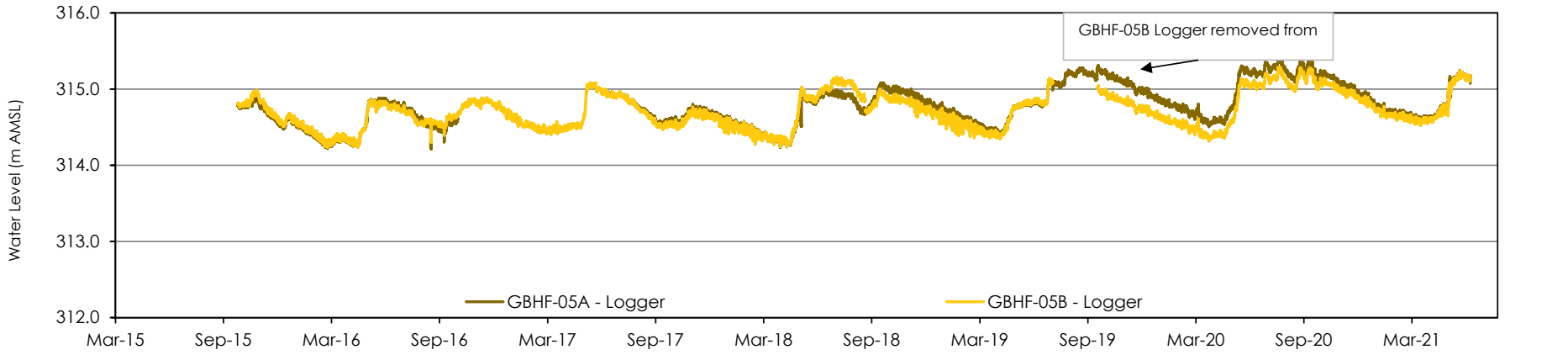
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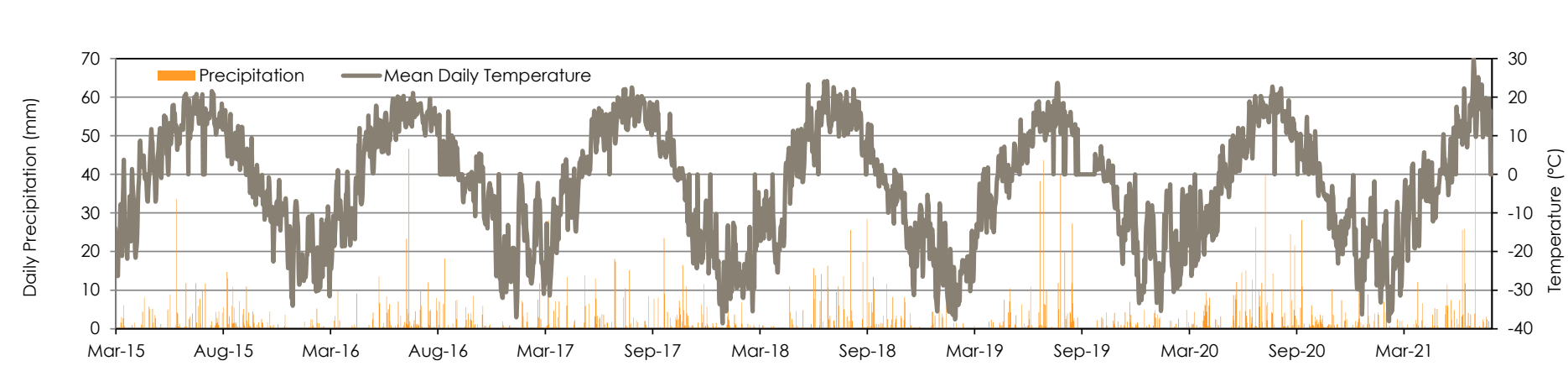
n/a	na: not available
m BGS	m BGS: metres below ground surface
m AMSL	m AMSL: metres above mean sea level
*	* Borehole inclination of -85 degrees and azimuth of 171.0 degrees, borehole depth provided in table is metres along borehole.
**	** Stick-up cut to accommodate groundwater sampling
	Northing and Easting Coordinates presented as UTM NAD 83 Zone 14











Notes:

Client/Project

Lynn Lake Gold Project (LLGP)
Hydrogeology Baseline Technical Data Report

Figure No.

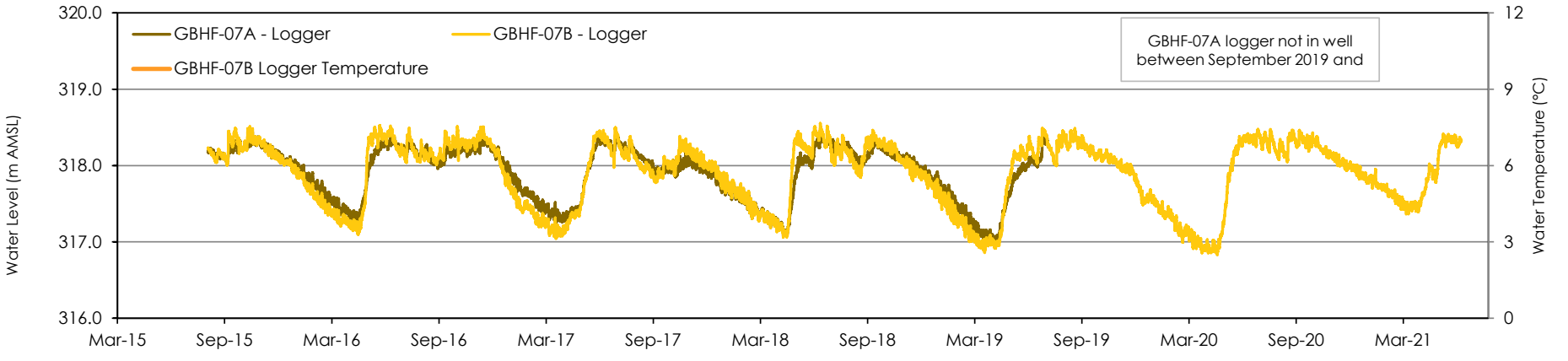
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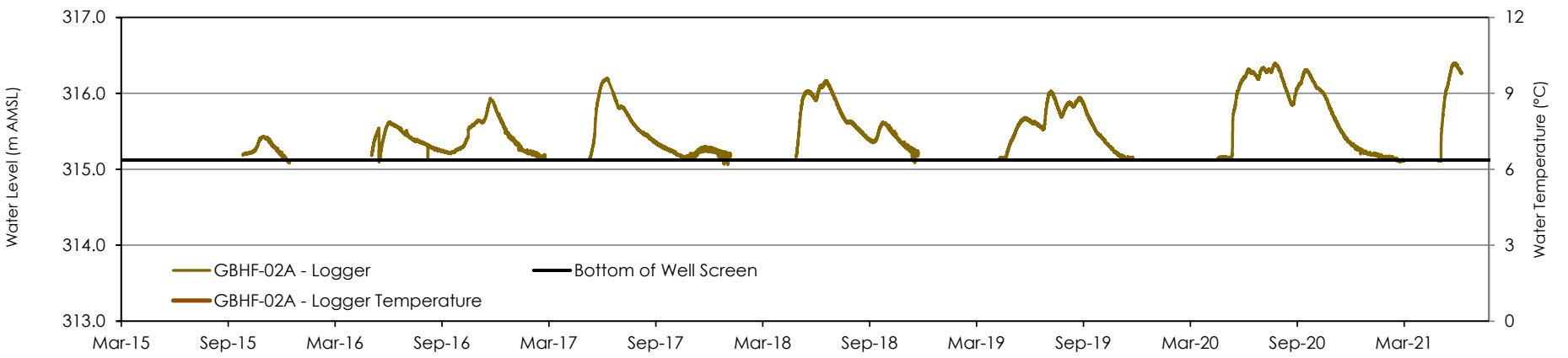
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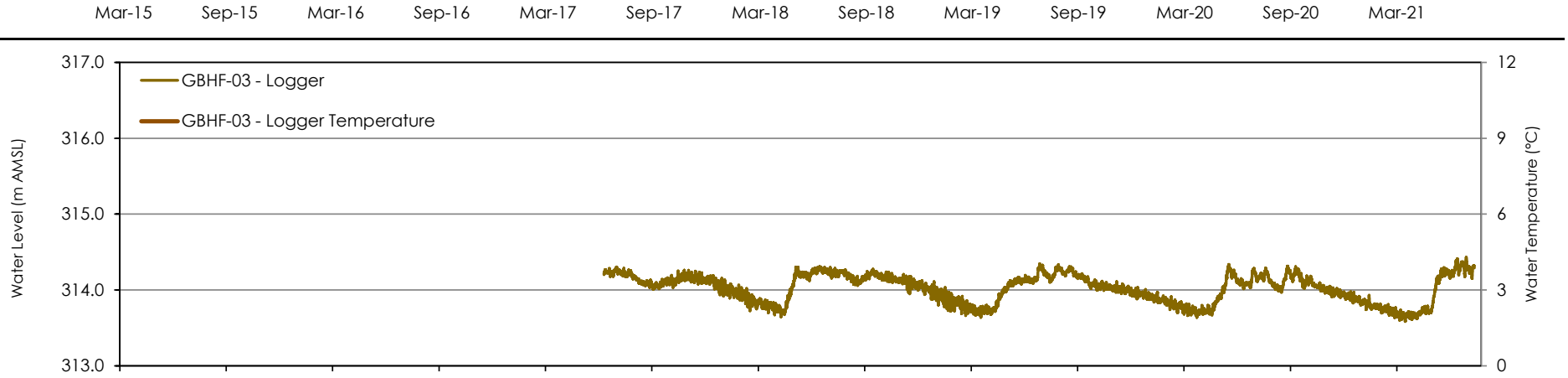
Hydrograph - Northern Portion of LSA
Gordon Site

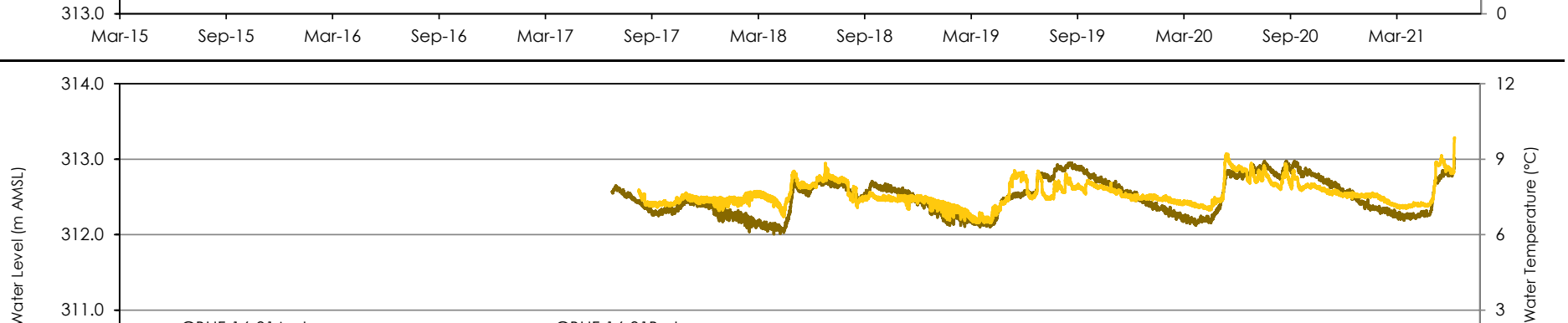
Stantec

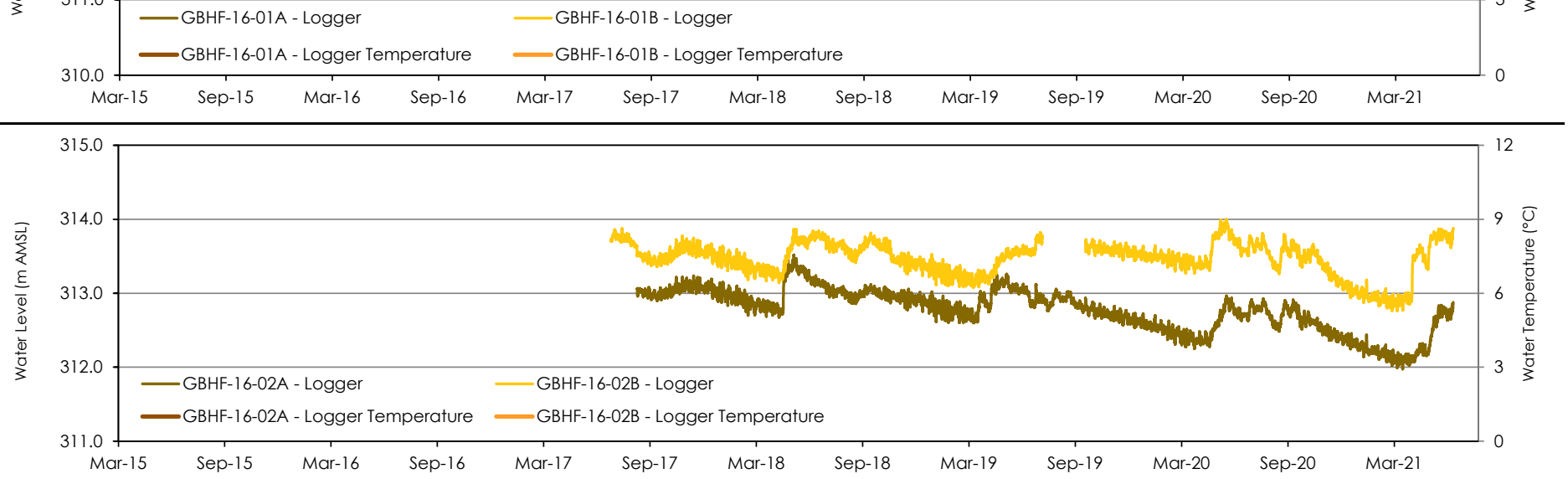
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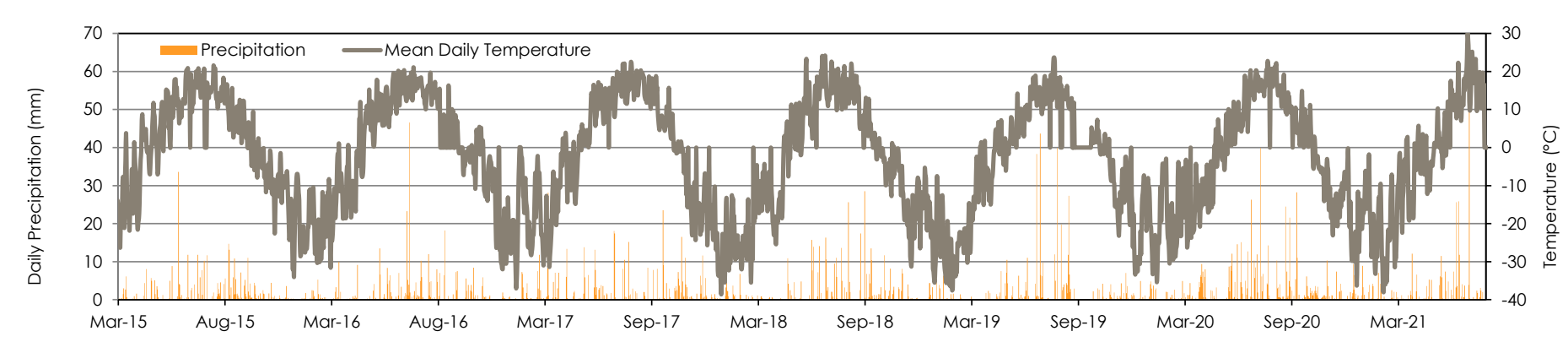












Notes:

Water level in GBHF-02A was below bottom of transducer between December 2015 and April 2016

Client/Project

Lynn Lake Gold Project (LLGP)
Hydrogeology Baseline Technical Data Report

Figure No.

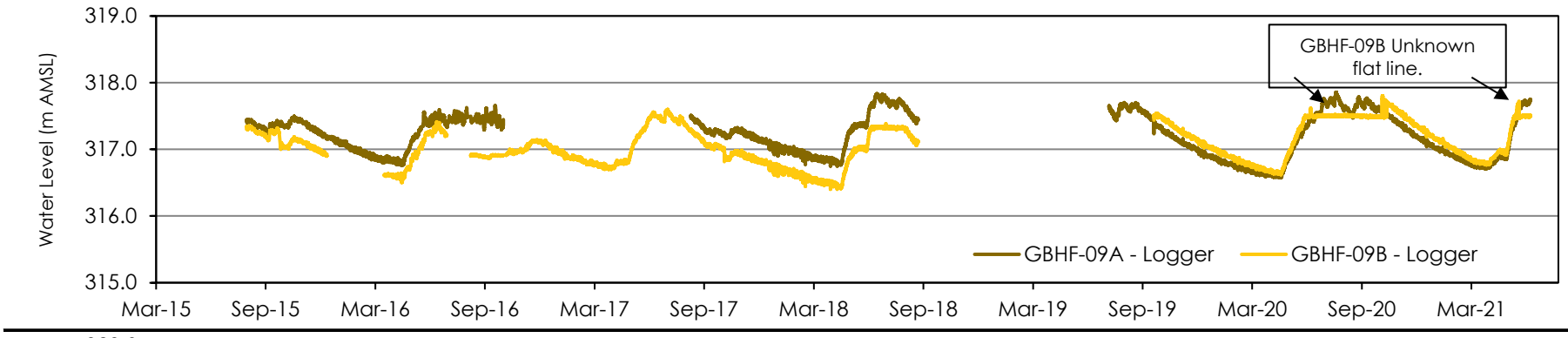
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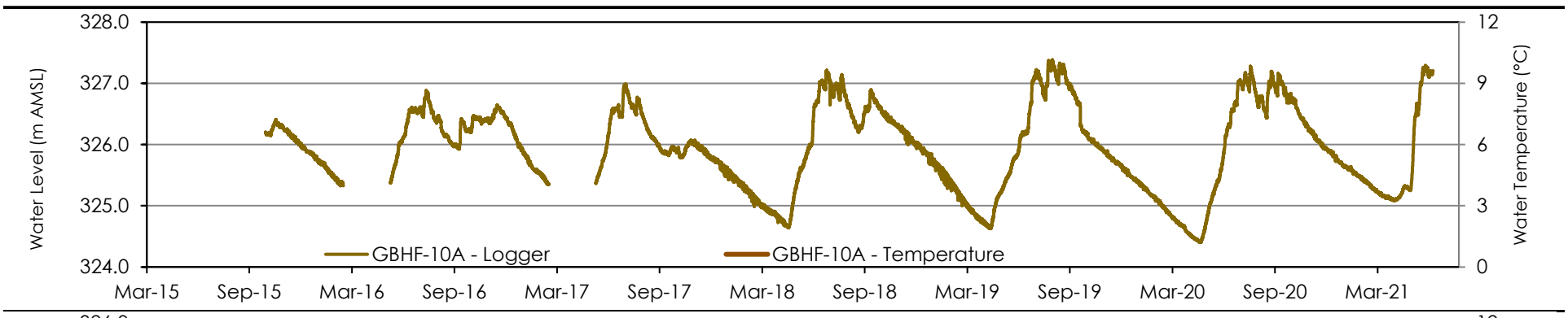
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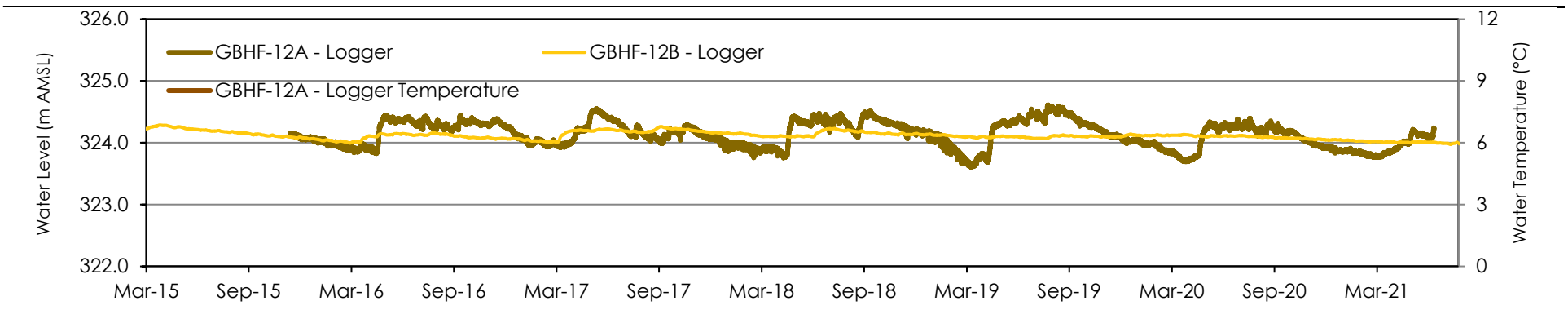
Hydrograph - Northern Portion of LSA
Gordon Site

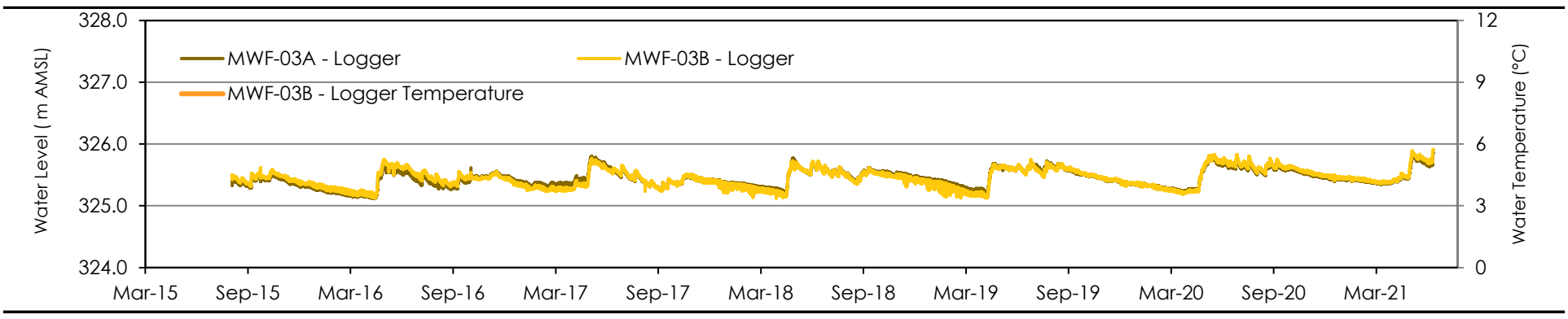
Stantec

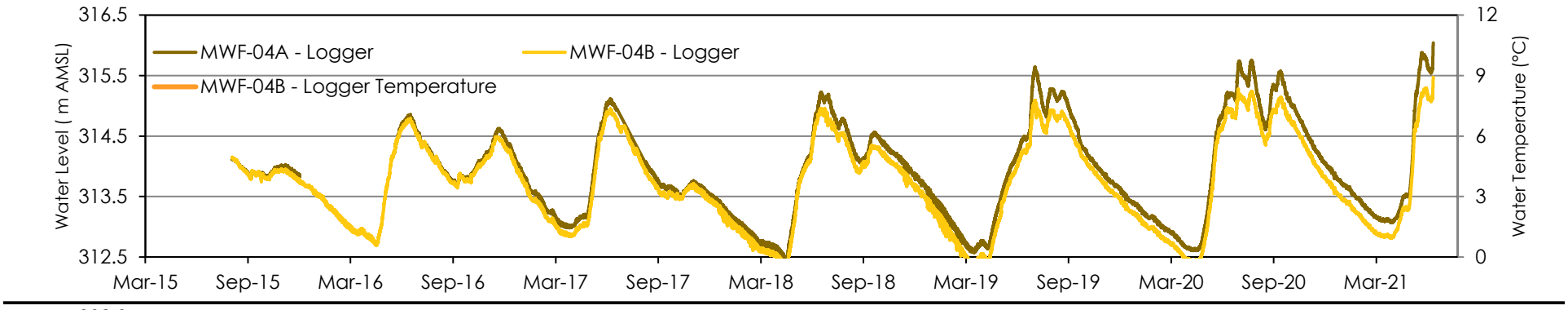
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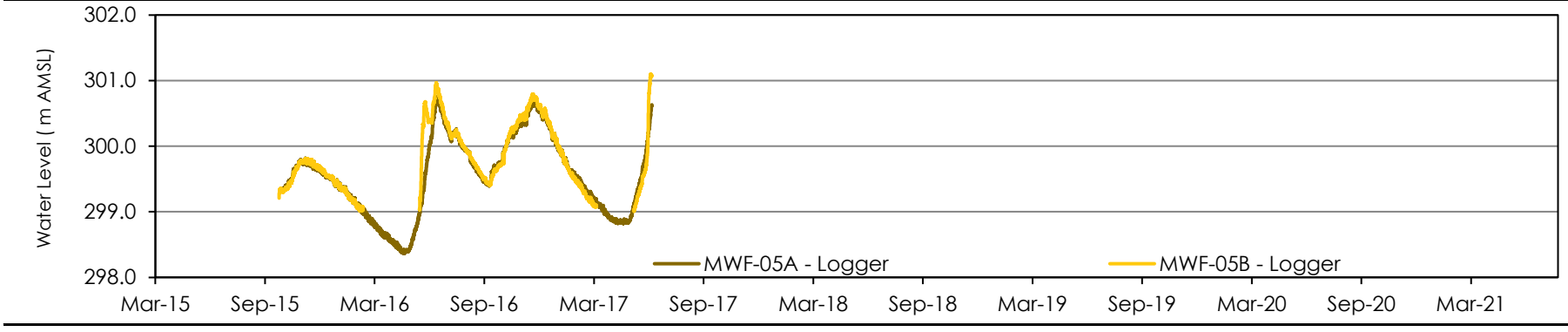


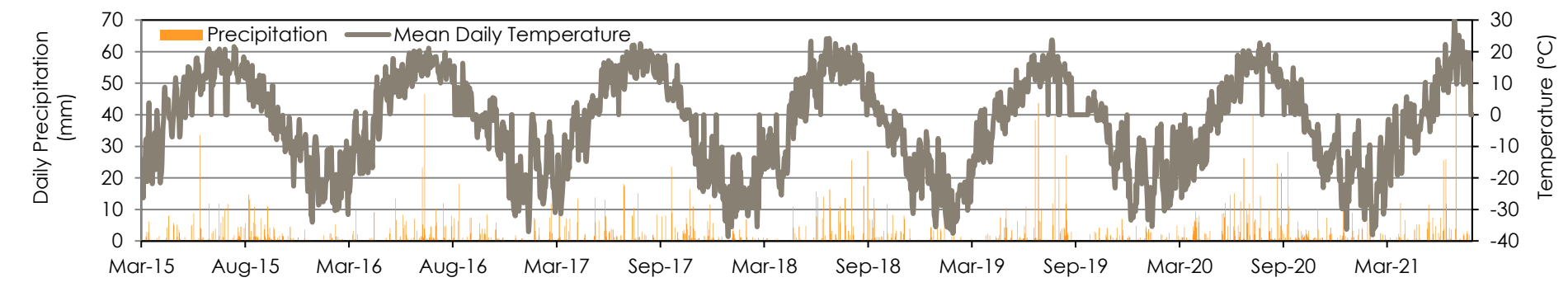












Notes:

1. The logger at GBHF-09B malfunctioned between December 2015 and March 2016 and July and August 2016. GBHF-09A and GBHF-09B frozen from October 2018 to July 2019.
2. Water level in GBHF-10A was below bottom of transducer between February 2016 and May 2016. Transducer lowered.
3. Pressure transducers removed from MWF-05A and MWF-05B in spring 2017.

Client/Project

Lynn Lake Gold Project (LLGP)
Hydrogeology Baseline Technical Data Report

Figure No.

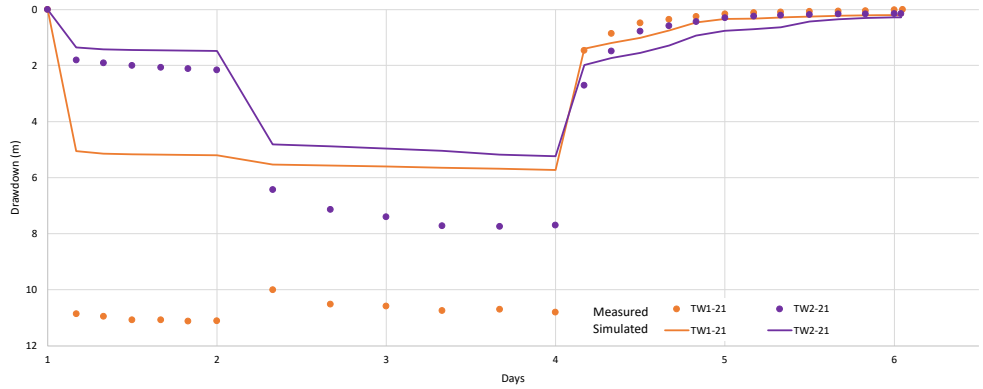
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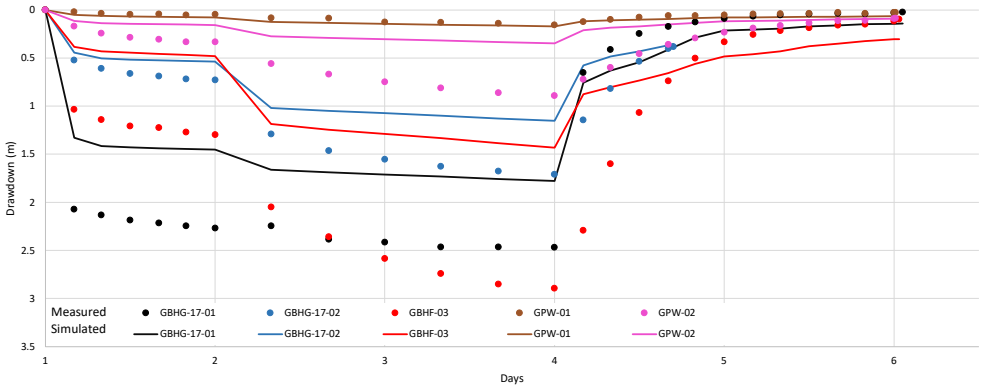
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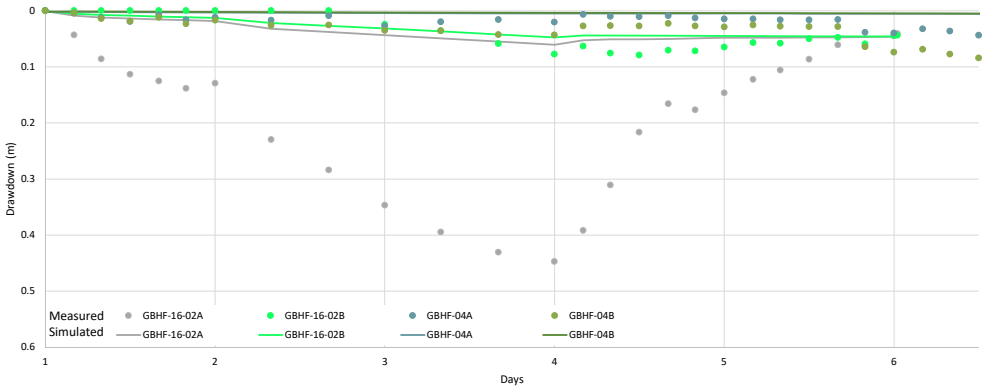
Hydrograph - Southern Portion of LSA Gordon Site

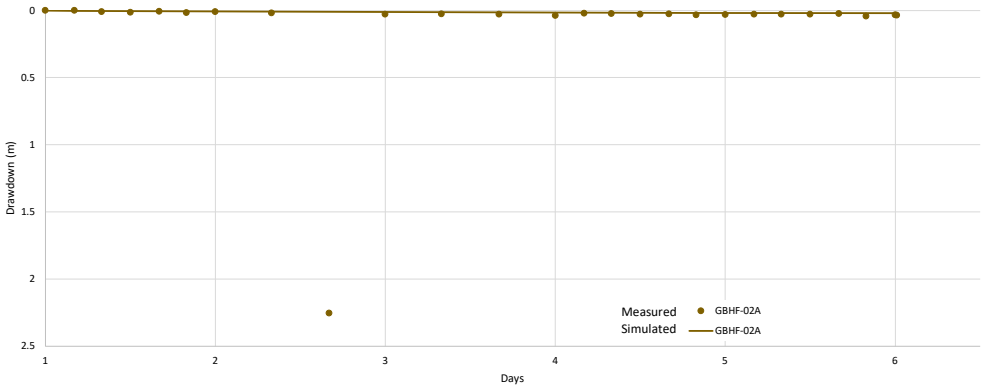
Stantec

Appendix C Transient Calibration Hydrographs









Notes:

Client/Project

Alamos Gold Inc.
Lynn Lake Gold Project
Gordon Site

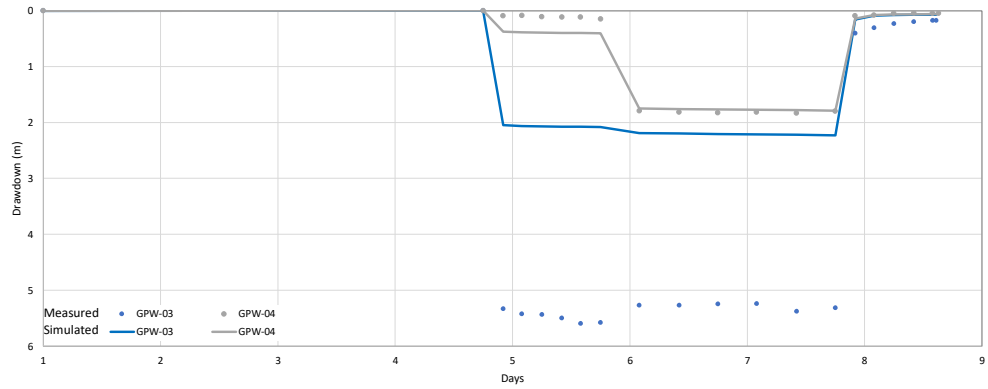
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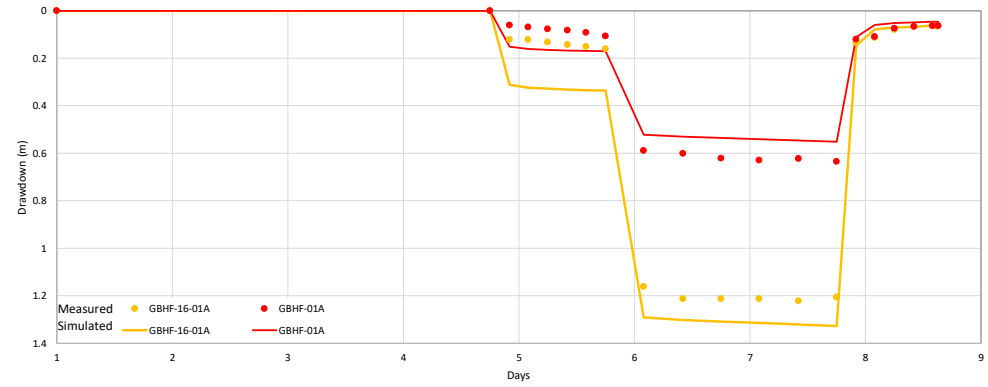
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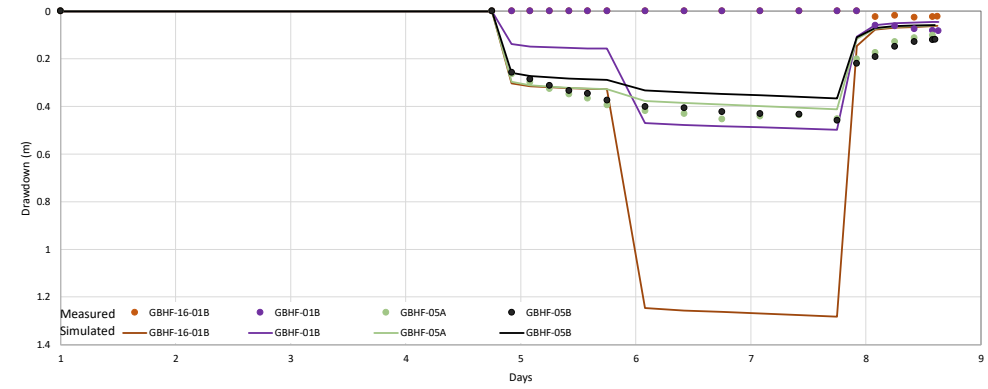
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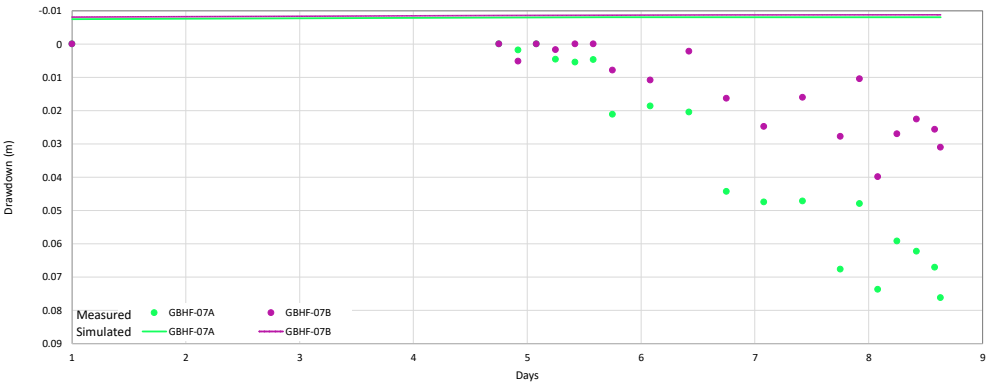
Hydrographs - Farley Lake Pumping Test

Stantec









Notes:

Client/Project
Alamos Gold Inc.
Lynn Lake Gold Project
Gordon Site

Figure No.
C2

Title
Hydrographs - Gordon Lake Pumping Test

Stantec

Stantec Document Classification: Stantec Internal

Appendix F Lynn Lake Gold Project: Gordon Water Balance and Water Quality Model Update for the Notice of Alteration / Notice of Change

Lynn Lake Gold Project: Gordon Water Balance and Water Quality Model Update for the Notice of Alteration / Notice of Change

Stantec

Prepared for:
Alamos Gold Inc.

July 11, 2025

Prepared by:
Stantec Consulting Ltd.

Project/File:
111473084

Stantec Consulting Ltd.

Limitations and Sign-off

This document entitled Lynn Lake Gold Project: Gordon Water Balance and Water Quality Model Update for Notice of Alteration / Notice of Change was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of Alamos Gold Inc. (the “Client”) for regulatory submission. Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

Water Balance Prepared by:



Signature

Ali Naghibi, Ph.D., P.Eng.
Printed Name

Water Quality Prepared by:



Signature

Thai Phan, Ph.D.
Printed Name

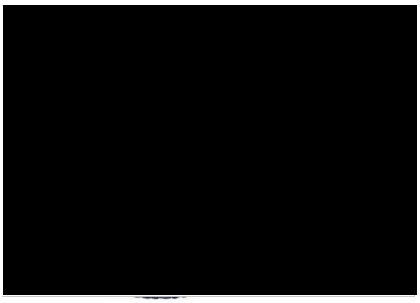
Water Balance Reviewed by:



Signature

Andrew Sinclair, Ph.D.
Printed Name

Water Quality Reviewed by:



Signature

Brenda Bailey, Ph.D., P.Geo.
Printed Name



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Appendix C Water Quality Results for the Upper Case Scenario – Summary Statistics
Appendix D Comparison of the Water Quality Results Between the Updated Model and the EIS Model for the Average Case

Acronyms / Abbreviations

%	percent
<	less than
>	greater than
Alamos; 'the proponent'	Alamos Gold Inc.
ARD	acid rock drainage
EIS	Environmental Impact Statement
Golder	Golder Associates Ltd.
IAAC	Impact Assessment Agency of Canada
km	kilometre
km^2	square kilometre
m	metre
m^3/hr	cubic metres per hour
m^3/s	cubic metres per second
Gordon site	Gordon Gold Mine
mg/L	milligrams per litre
mm	millimetre
Mm^3	million cubic metre
MRSA	mine rock stockpile area
Mt	million tonne(s)
NAG	Non-Acid Generating
NOA	Notice of Alteration
NOC	Notice of Change
NSE	Nash-Sutcliffe Efficiency
PAG	potentially acid generating
Stantec	Stantec Consulting Ltd.
STP	Sewage Treatment Plant
t/day	tonne per day
t/m^3	tonnes per cubic metre
t/yr	tonne per year

the Project	Lynn Lake Gold Project
TMF	tailings management facility
TSS	total suspended solids
WSC	Water Survey of Canada
WSP	WSP Inc. Canada

1 Introduction

As part of the Lynn Lake Gold Project (the Project) Alamos Gold Inc. (Alamos; 'the proponent') plans to operate the Gordon Gold Mine, (hereinafter referred to as the 'Gordon site') near the Town of Lynn Lake in northern Manitoba. Alamos is seeking approval to proceed with alterations to the Gordon site as approved under *Environment Act* License No. 3390 and the conditions stipulated therein (March 6, 2023) and a Decision Statement issued under the *Canadian Environmental Assessment Act, 2012* as documented by the Impact Assessment Agency of Canada (IAAC), dated March 5, 2023. The proposed alterations include, but are not limited to, modifications to the open pit, mine rock storage area (MRSA), ore and overburden stockpiles (including use of the historical north MRSA as a borrow source), facility area (including buildings), and water management structures (i.e., sumps, collections ponds, discharge pipeline). The proposed mine plan is documented in the Feasibility Study Update (Alamos 2023).

This updated water balance and water quality model report for the Gordon site has been prepared to incorporate the proposed alterations to the mine plan and support the assessment of potential effects of the construction, operation, and closure phases of the Project on surface water quantity and quality in the receiving environment. This report forms part of the supporting documentation for the Gordon Mine Plan Amendment Notice of Alteration (NOA) / Notice of Change (NOC) completed for the Project.

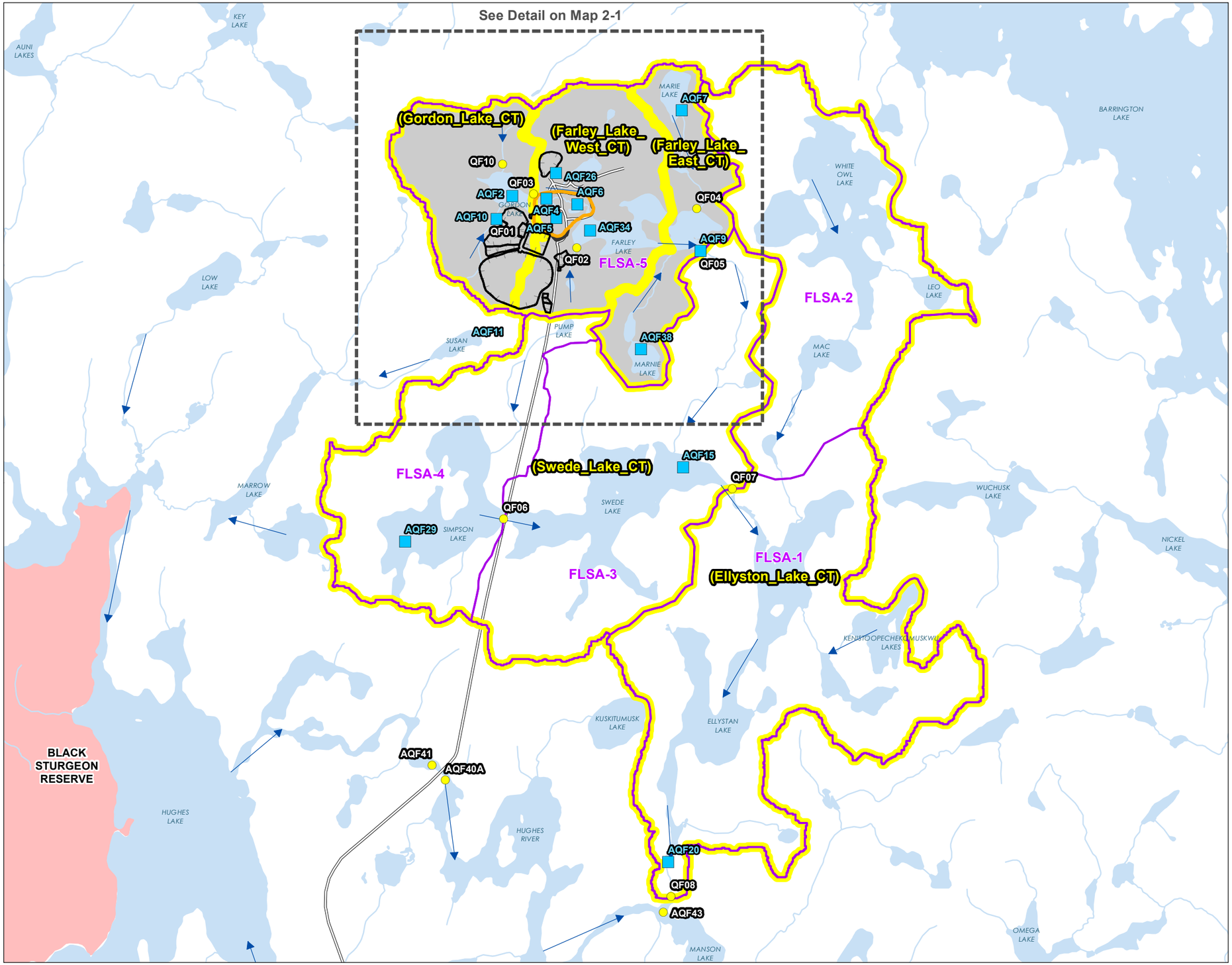
1.1 Previous Reports and Supporting Studies

Stantec Consulting Ltd. (Stantec; Stantec 2020a) developed a site-wide and receiving environment water balance and water quality model to support the Environmental Impact Statement (EIS; Stantec 2020b). The water balance and water quality model presented in Stantec (2020a and 2020b) is hereafter referred to as 'the EIS model'.

A site water balance was completed by Golder (2020). As part of the detailed design for the Project, WSP (2023) updated the assumptions and inputs to the site water balance.

1.2 Objectives

The objective of this water balance and water quality model update (hereafter referred to as 'the updated model') was to refine the EIS model with the proposed alterations in the Feasibility Study Update (Alamos 2023) and the site water balance update (WSP 2023) as described in the following sections. The updated model was then used to predict the effects of the Project on the receiving surface water quantity and quality in Section 3.3 of Gordon Mine Plan Amendment NOA/NOC. Hydrometric and water quality stations and catchment areas are unchanged from the EIS model (Figure 1.1).



Stantec

Project Infrastructure
- Proposed Open Pit
- Potential Infrastructure

Project Data
- Hydrology Model Subwatersheds (FLSA-2)
- Water Quality Model Catchments (Mixing Cells) (Swede_Lake_CT)
- Combined Subwatersheds
- Hydrology Monitoring Station
- Water Quality Station
- Local Study Area

Landbase
- Existing Access Road
- Surface Water Flow Direction
- Watercourse
- Waterbody
- First Nation Reserve
- Remnant Historical Mine Rock Pile

N

0 1 2 Kilometres

1:55,000 (At original document size of 11x17)

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. Project Infrastructure features provided by QPit and Ausenco.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-05-12
Technical Review by ANaghibi on 2025-05-12

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

Map No.
1-1

Title
Hydrometric and Water Quality Monitoring Stations and Catchment Areas at Gordon Site

G:_GIS Project Folder\111473008 LLGP EA\admin\data_out\STANTEC\20250224 Catchments for AIN\111473084_LLGP_Gordon Modelled Watersheds_20250512.mxd Revised: 2025-05-27 By: ACampigotto

2 Water Balance Model Updates

2.1 Inputs

The following sections present updates to the EIS water balance model inputs resulting from the proposed alterations. All other water balance model inputs remain unchanged from the EIS model (e.g., the average, 1:25-year dry, and 1:25-year wet annual precipitation of 478 millimetres (mm), 344 mm, and 655 mm, respectively).

2.1.1 Project Components

The proposed alterations involve adjusting the footprints of several of the Project components and adding several new components in comparison to the description of the Gordon site originally included in the EIS model. The components included in the proposed alterations are presented in Figure 2.1, with footprint areas summarized in Table 2.2.

Table 2.1 Footprint area of Project Components at Gordon Site

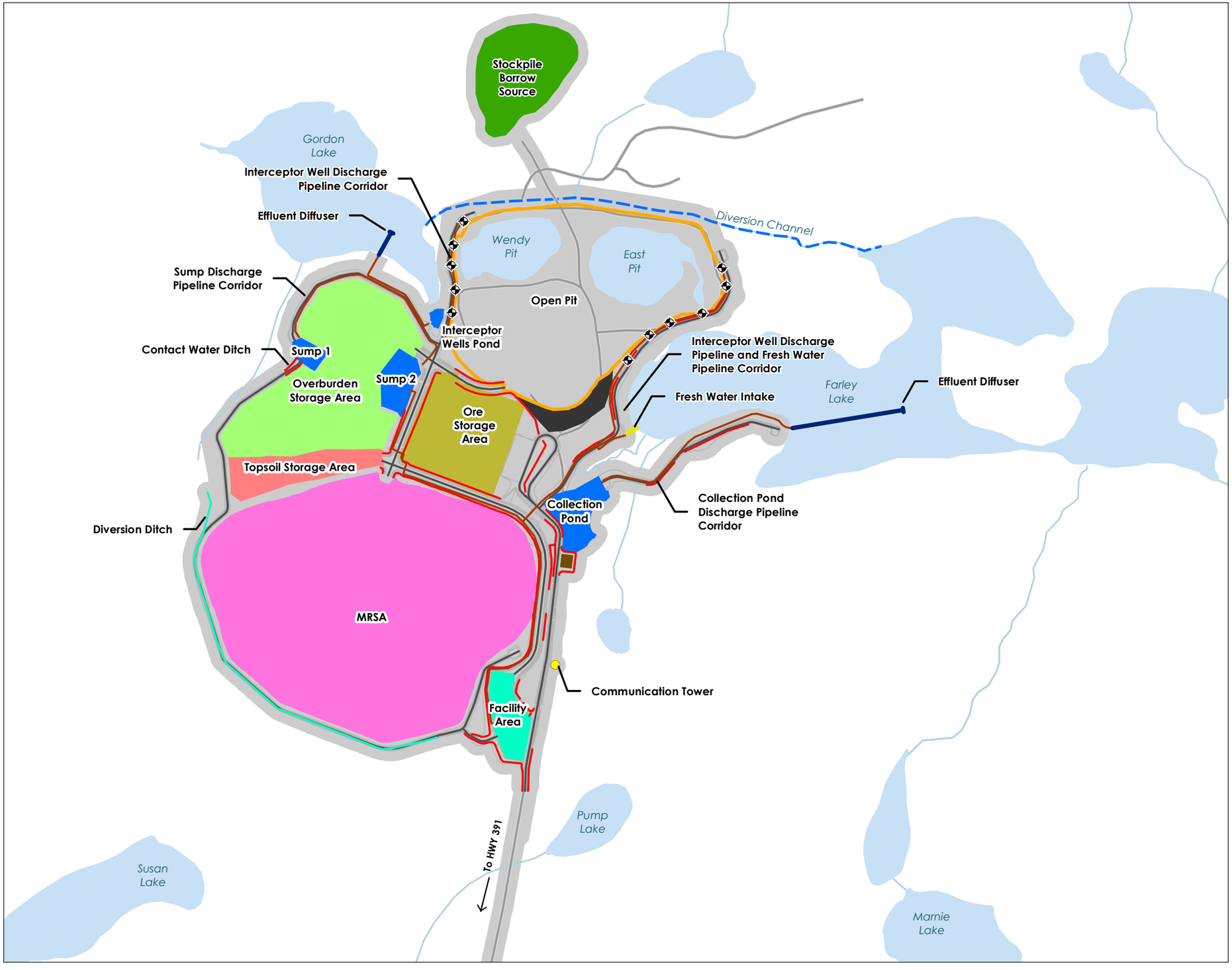
Project Component	Area (ha)	
	EIS Model[1] (Stantec 2020a)	Updated Model (this report)
Mine Rock Storage Area (MRSA) (modified by detailed design)	77	60.2
Open Pit (enlarged during detailed design to access additional resources)[2]	29.0	36.7
Ore Storage/Ore Stockpiles (modified by detailed design)	5	8.8
Overburden Storage/Stockpile (modified by detailed design)	17	17.8
Collection Pond/Ponds/ Discharge Pipeline (modified by detailed design with sumps also sited)	1.3	2.3
Sump 1 (sited during detailed design)	n/a	0.6
Sump 2 (sited during detailed design)	n/a	1.7
Facility Area (sited during detailed design)	n/a	2.3
Gen Set Area (sited during detailed design)	n/a	0.1
Interceptor Wells Pond (sited during detailed design)	n/a	0.2
Stockpile Borrow Source (new addition)	n/a	7.3
Topsoil Storage Area (sited during detailed design)	n/a	4.1
Adjusted Diversion Ditch (removed during detailed design as no longer required)	6.8	n/a

Notes:

1 The EIS model (Stantec 2020a) had slight variances in the mine infrastructure areas compared to the EIS Project description and the variance was not interpreted to alter the interpretation or conclusions of the EIS.

2 The open pit volume changed slightly between the EIS model (21.1 million cubic metres, Mm^3) and the updated model (22.7 Mm^3).

n/a – not applicable, ha – hectares



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Project Infrastructure (NOA)

- Interceptor Well
- Communication Tower
- Contact Water Ditch
- Mine Site Road
- Diversion Ditch
- Discharge Pipeline
- Fresh Water Intake
- Effluent Diffuser
- Collection Pond/Sumps
- Facility
- Gen Set
- Mine Rock Storage Area
- Open Pit
- Ore Storage
- Overburden Storage
- Topsoil Storage
- Stockpile Borrow Source
- NOA Project Development Area (PDA)

Landbase

- Existing Access
- Existing Diversion Channel
- Watercourse
- Waterbody
- Remnant Historical Mine Rock Pile

N

0 250 500 Metres

(At original document size of 11x17)
1:12,000

Notes
1. Coordinate System: NAD 1983 UTM Zone 14N
2. Base Data Sources: Government of Manitoba and Government of Canada.
3. NOA Project Infrastructure features provided by Worley via Alamos.

Project Location
Lynn Lake, Manitoba

Prepared by ACampigotto on 2025-04-02
Technical Review by KMathers on 2025-04-02

Client/Project
ALAMOS GOLD INC.
Lynn Lake Gold Project

111473084

Map No.
2-1

Title
NOA Footprint Files - Gordon site

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2.1.2 Water Management

Water management, during different phases of the Gordon site is illustrated in Figure 2.2 to Figure 2.5. In the EIS model, historical pits (i.e., Wendy and East pits) were assumed to be dewatered into Farley Lake during construction. Based on detailed engineering design for the proposed alterations, these historical pits will be dewatered into Hughes River. Modelling nodes on Hughes River, upstream of the dewatering effluent (Hughes-us), downstream of the dewatering effluent (Hughes-mid), and downstream of confluence with Ellystan Lake outflow (Hughes-ds) were added to the model to evaluate the potential effects of the Project on Hughes River water quantity and quality.

Figure 2.2 Conceptual Water Management at the End of Construction

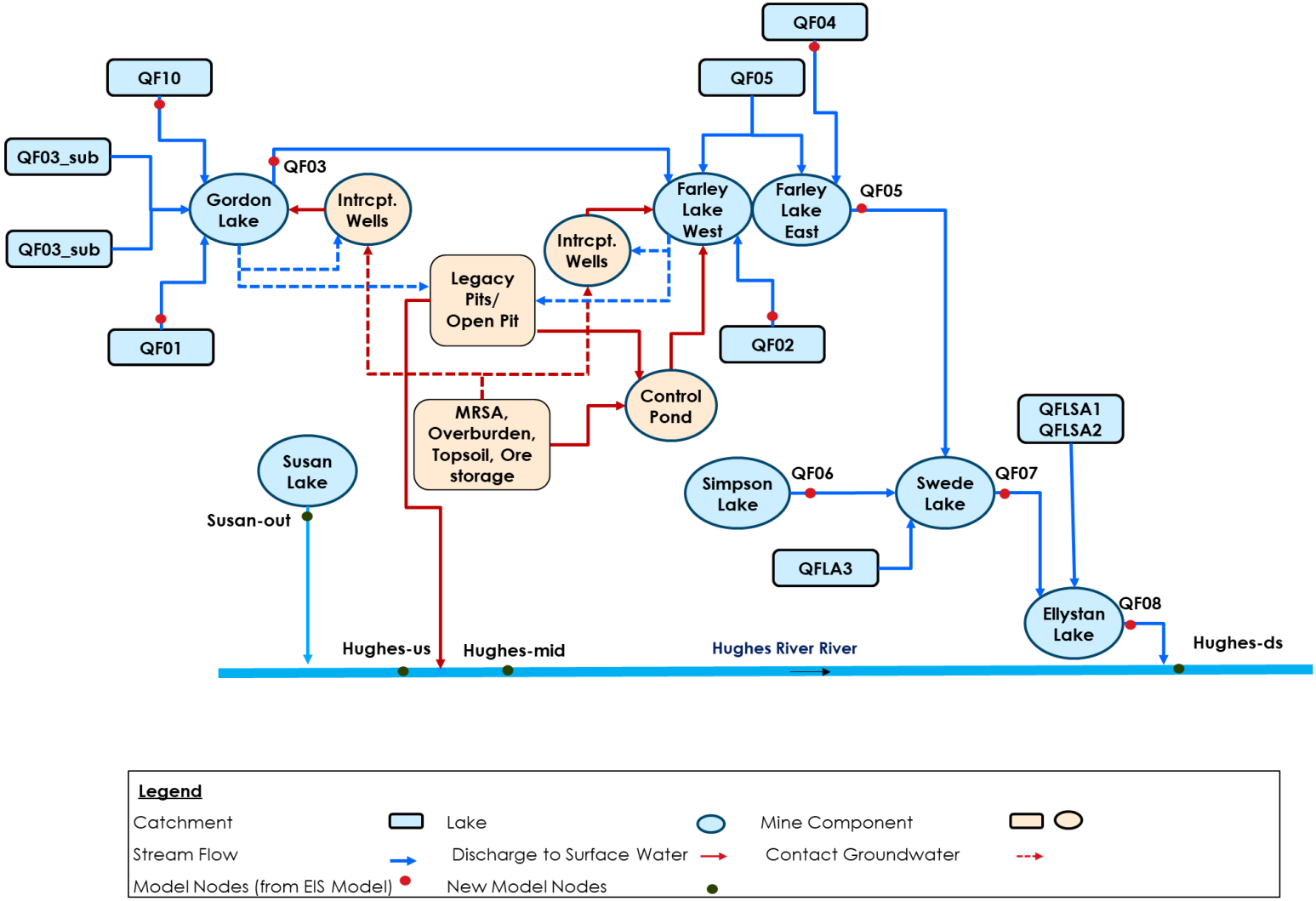


Figure 2.3 Conceptual Water Management during Operation

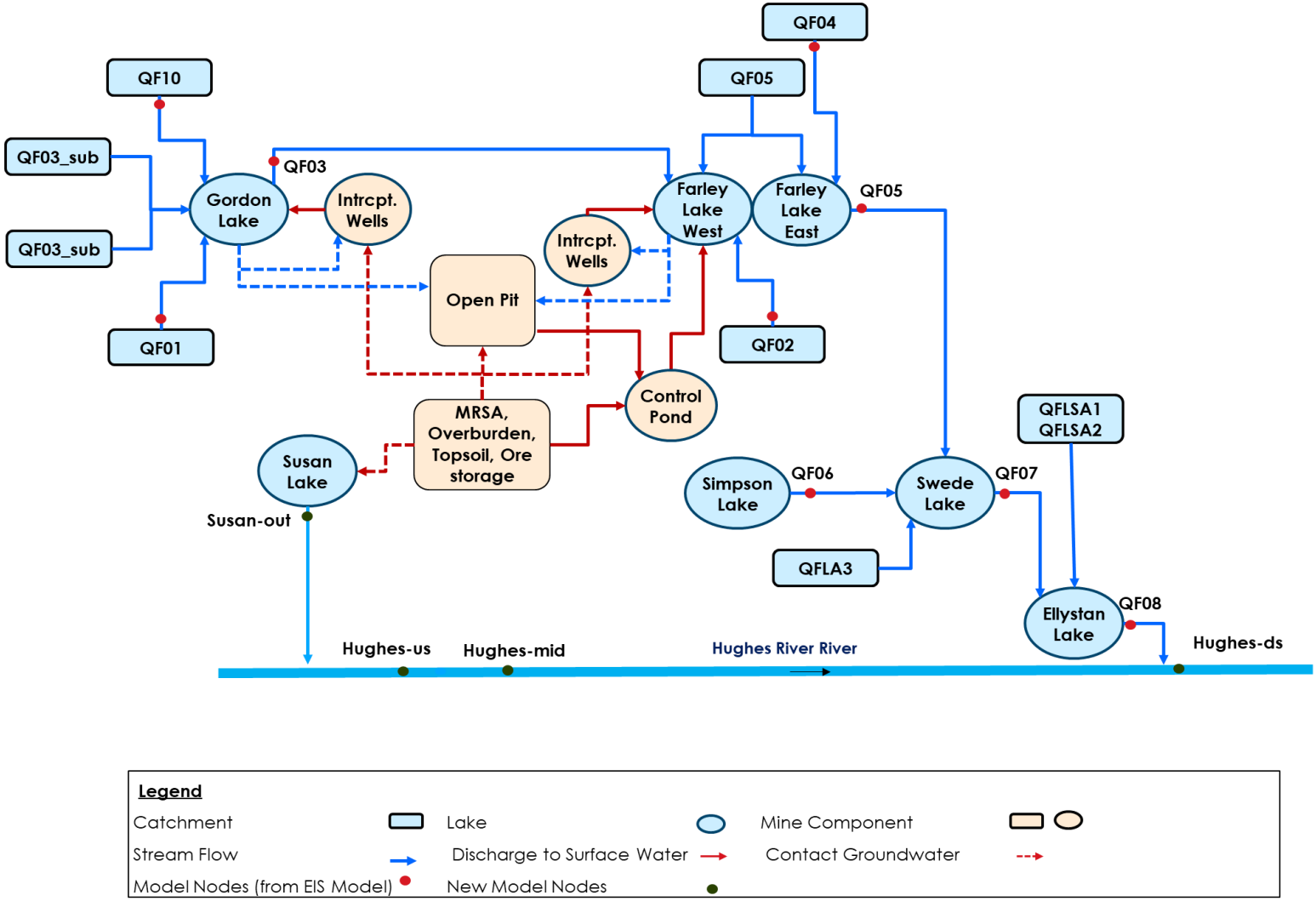


Figure 2.4 Conceptual Water Management during Closure (Pit Filling)

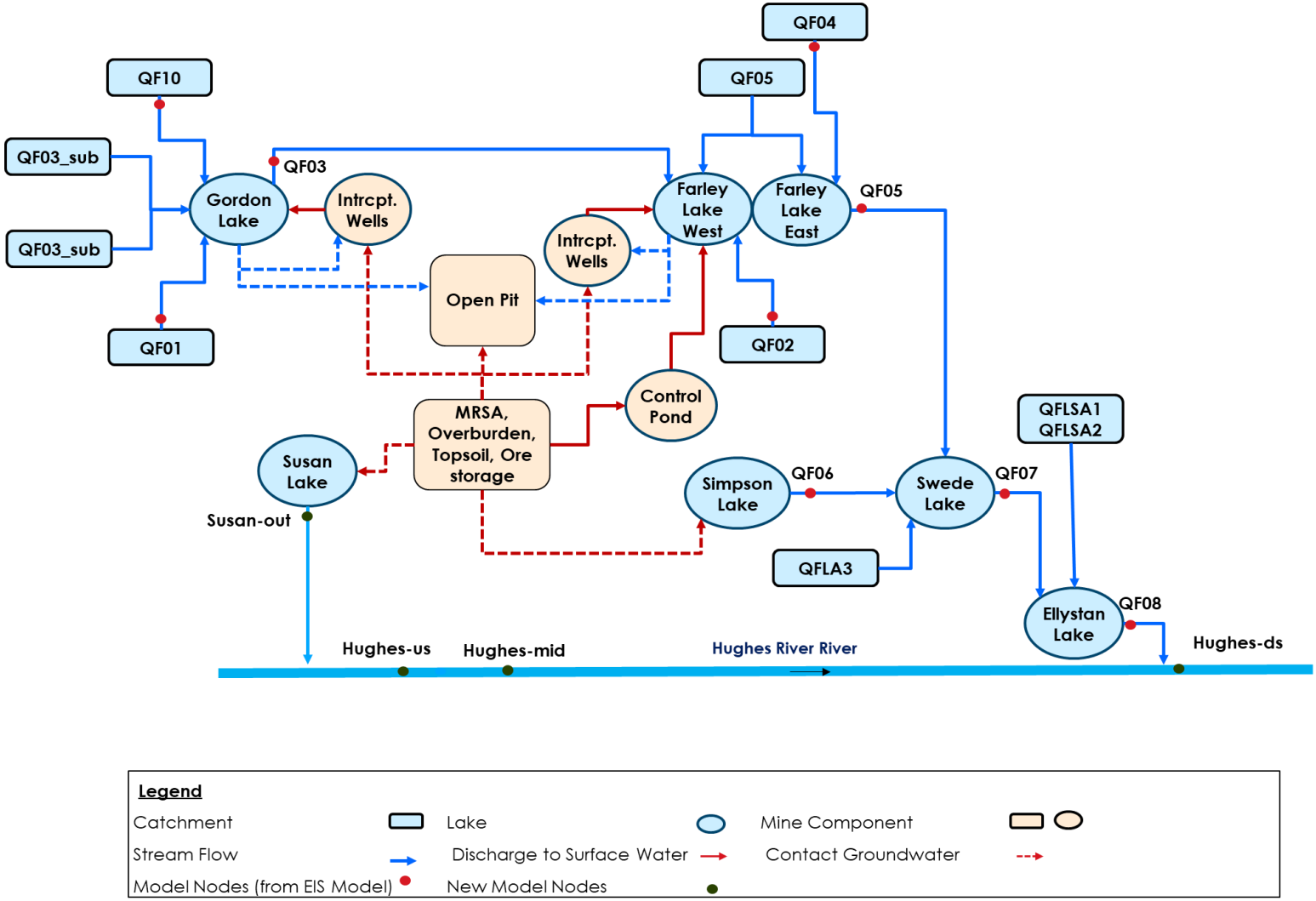
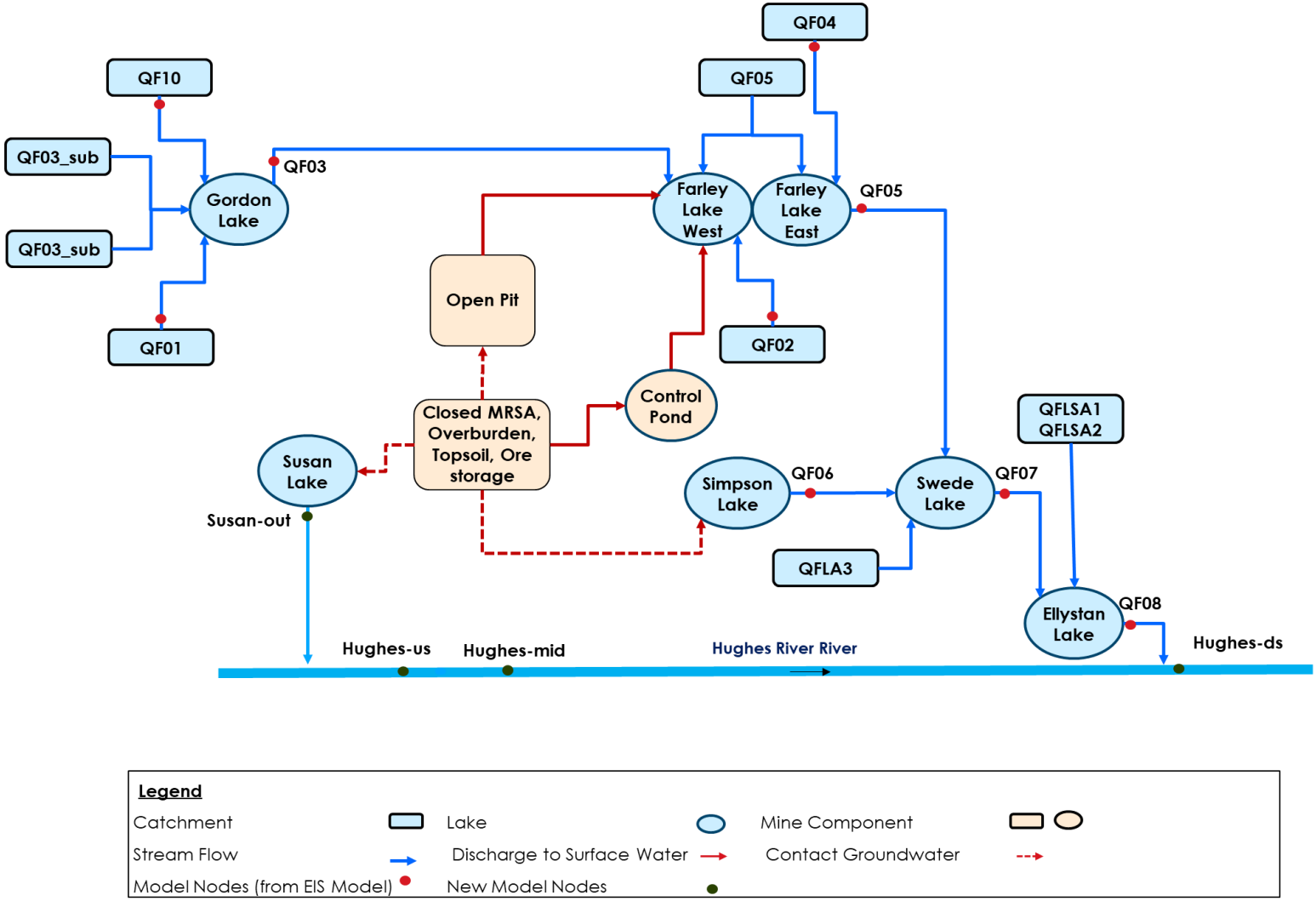


Figure 2.5 Conceptual Water Management at Post-Closure (after Pit Filling)



2.1.3 Runoff Coefficients

Monthly runoff coefficients, used to transform precipitation into site runoff, were updated based on estimates provided by WSP (2023) and are summarized in Table 2.2.

Table 2.2 Runoff Coefficients for Site Runoff

Month	Runoff Coefficient					
	Natural Ground	**Prepared Ground**	**Ponds**	**Mine Rock**	**Overburden**	**Pit Walls**
Jan	0.40	0.90	1.00	0.60	0.50	0.95
Feb	0.40	0.90	1.00	0.60	0.50	0.95
Mar	0.40	0.90	1.00	0.60	0.50	0.95
Apr	0.35	0.85	1.00	0.60	0.50	0.95
May	0.35	0.85	1.00	0.50	0.40	0.95
Jun	0.30	0.85	1.00	0.50	0.40	0.95
Jul	0.30	0.85	1.00	0.50	0.40	0.95
Aug	0.30	0.85	1.00	0.50	0.40	0.95
Sep	0.30	0.85	1.00	0.50	0.40	0.95
Oct	0.40	0.85	1.00	0.60	0.50	0.95
Nov	0.40	0.90	1.00	0.60	0.50	0.95
Dec	0.40	0.90	1.00	0.60	0.50	0.95

Source: WSP (2023)

2.1.4 Groundwater

Groundwater inputs to the water balance model including groundwater inflow to the historical open pits and new open pit, lake baseflow changes, and contact groundwater inflow into the lakes were updated based on Figure 5.1 and Tables 5.3 to 5.8 in the updated groundwater model report (Appendix E of the Gordon Mine Plan NOA/NOC). Seepage flows from the historical south and north MRSAs were not included in the water balance model as the recharge applied to the historical north and south MRSAs were consistent with recharge across the remainder of the groundwater flow model domain (except for Mine infrastructure) and therefore do not alter the results of the water balance model. The seepage rates for the historical north and south MRSAs were added as part of the water quality modelling, described in Section 3.1.3.

2.2 Methods

Like the EIS model, the updated model was run for the average, 1:25-year dry, and 1:25-year wet scenarios. The method for estimating receiving environment streamflow was improved using a combination of site-specific and long-term regional data, as described below. Other methods, as well as the use of the GoldSim software package with monthly time steps, remain unchanged from the EIS model.

2.2.1 Receiving Environment Streamflow

To develop long-term runoff estimates for the Gordon site watersheds, site-specific streamflow data collected from 2015 to 2022 from a representative station was supplemented with long-term data from the most relevant regional hydrometric station. From on-site hydrometric stations, QF08 was selected due to its relatively long record of data (2015 to 2022) and quality of the collected hydrometric data. The Water Survey of Canada (WSC) station on Footprint River above Footprint Lake (0705TF002; 150 km from the Project; drainage area = 643 km^2) was deemed most reliable for pairing local and regional hydrometric data. This selection was based on proximity, drainage area, elevation, as well as timing of freshet at WSC05TF002 and Gordon site watersheds during their concurrent period of record.

Two regression analysis methods were used to estimate long-term monthly and annual average runoff in the Gordon site watersheds:

- Chronological Regression: A linear regression analysis was conducted between the monthly flows measured at QF08 from 2015 to 2022 with corresponding monthly flows at WSC05TF002. The modelled monthly streamflow at QF08 during this period shows a good Nash-Sutcliffe Efficiency (NSE) of 0.84. However, modelled streamflows using the linear regression method underestimate the high flows (see 2018 high flows in Figure 2.6) and overestimate winter low flows (see 2017 low flows in Figure 2.6).
- Ranked Pairing: This method, frequently used by water resource practitioners in Canada, involves ranking concurrent monthly streamflow data at QF08 and WSC05TF002 (2015 to 2022) from lowest to highest. For historical streamflow at WSC05TF002, the modelled streamflow at QF08 was estimated by interpolation between (and extrapolation beyond) the ranked pairs. The modelled monthly streamflow at QF08 from 2015 to 2022 shows a reasonable NSE of 0.78 (Figure 2.6).

Both the chronological and ranked paring methods demonstrate reasonable NSE values; however, the ranked pairing was selected (due to its better visual match with observed high and low flows) to generate a synthetic long-term time-series of monthly flows in the receiving environment for the Gordon site. A 46-year time-series was generated for the Gordon site based on available monthly streamflows at WSC05TF002 from 1977 to 2022.The average, 1:25-year dry, and 1:25-year wet statistics from this long-term time-series were incorporated into the water balance model (Table 2.3).

Figure 2.6 Modelled and Observed Streamflows at QF08 during Concurrent Period of Record with Regional Hydrometric Station (WSC05TF002)

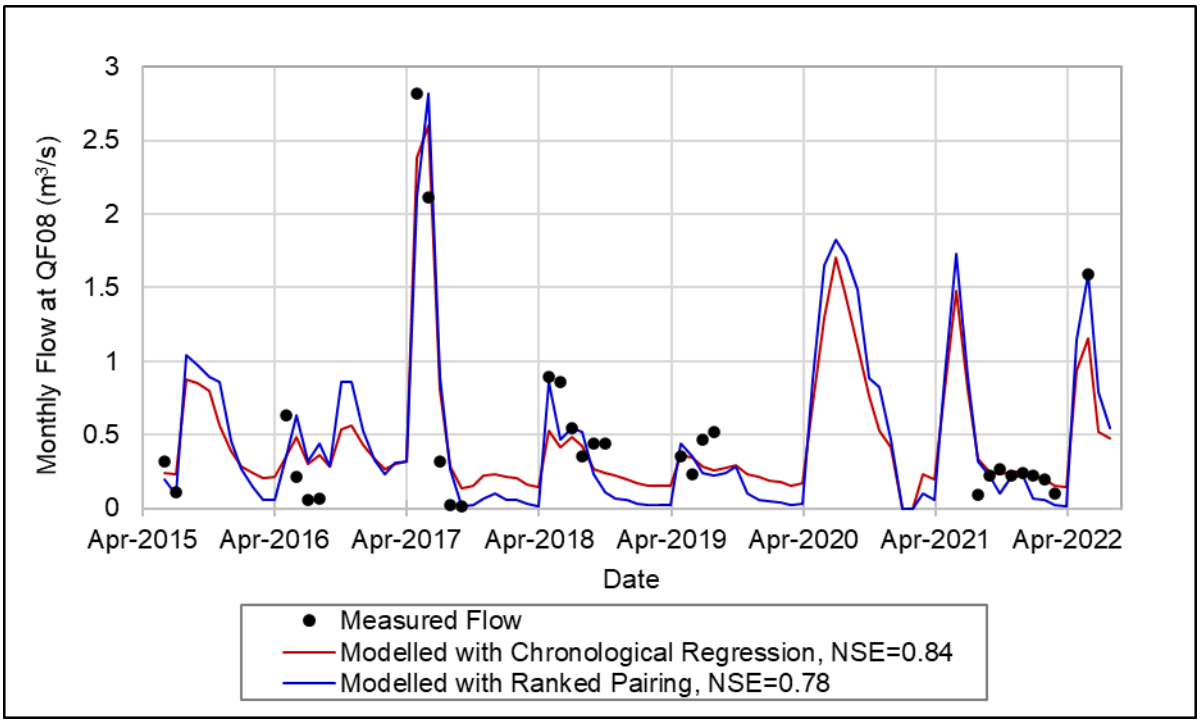


Table 2.3 Long-Term Estimates for Receiving Environment Runoff

Month	Runoff (mm)		
	Average	1:25-Year Dry	1:25-Year Wet
Jan	5.6	0.7	9.4
Feb	3.3	0.6	6.2
Mar	2.0	0.6	5.2
Apr	3.4	0.6	5.0
May	34.1	12.5	66.8
Jun	34.0	9.4	88.3
Jul	19.8	2.7	53.1
Aug	16.4	6.9	36.8
Sep	18.0	6.5	25.8
Oct	19.2	3.6	20.1
Nov	17.0	1.6	23.8
Dec	10.9	1.2	15.6
Annual	**184**	**47**	**356**

2.3 Results

Using updated inputs (described in Section 2.1) and the improved method for estimate receiving environment flows (described in Section 2.2.1), the updated model was run to simulate both existing conditions and projection-affected flows. Predicted monthly streamflows for the average scenario at model nodes QF01, QF02, QF03, QF05, QF06, QF07, QF08, Susan Outflow, Hughes-us, Hughes-mid, and Hughes-ds, as well as predicted water levels at Gordon, Farley, Simpson, Swede, and Ellystan lakes, are shown in Table 2.4 to Table 2.19 for each Project phase. These results are compared to those of the EIS model in Section 2.4.

Further assessment of these results (i.e., surface water quantity effects assessment) is provided in Section 3.3 of Gordon Mine Plan Amendment NOA/NOC. Detailed results at these model nodes, including the results for the 1:25-year dry and 1:25-year wet scenarios, as well as the variation of flow during each project phase, are provided in Appendix A.

Results at model nodes QF04 and QF10 are not provided because streamflow at these nodes is predicted to remain unchanged from existing conditions (i.e., unaffected by the Project).

Table 2.4 Simulated Average Monthly and Annual Streamflows at Model Node QF01 (Gordon Lake Inflow from South)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.003	0.003	0.000	0%	0.003	-0.001	-19%	0.002	-0.001	-44%	0.002	-0.001	-44%
Feb	0.002	0.002	0.000	0%	0.002	0.000	-20%	0.001	-0.001	-44%	0.001	-0.001	-44%
Mar	0.001	0.001	0.000	-1%	0.001	0.000	-20%	0.001	0.000	-44%	0.001	0.000	-44%
Apr	0.002	0.002	0.000	-1%	0.002	0.000	-21%	0.001	-0.001	-44%	0.001	-0.001	-44%
May	0.019	0.019	0.000	-1%	0.015	-0.004	-21%	0.011	-0.008	-44%	0.011	-0.008	-44%
Jun	0.020	0.019	0.000	-1%	0.015	-0.004	-22%	0.011	-0.009	-44%	0.011	-0.009	-44%
Jul	0.011	0.011	0.000	-2%	0.009	-0.002	-22%	0.006	-0.005	-44%	0.006	-0.005	-44%
Aug	0.009	0.009	0.000	-2%	0.007	-0.002	-23%	0.005	-0.004	-44%	0.005	-0.004	-44%
Sep	0.010	0.010	0.000	-2%	0.008	-0.002	-23%	0.006	-0.005	-44%	0.006	-0.005	-44%
Oct	0.011	0.010	0.000	-3%	0.008	-0.003	-24%	0.006	-0.005	-44%	0.006	-0.005	-44%
Nov	0.010	0.010	0.000	-3%	0.007	-0.002	-24%	0.005	-0.004	-44%	0.005	-0.004	-44%
Dec	0.006	0.006	0.000	-3%	0.005	-0.002	-25%	0.003	-0.003	-44%	0.003	-0.003	-44%
Annual	**0.009**	**0.009**	**0.000**	**-2%**	**0.007**	**-0.002**	**-22%**	**0.005**	**-0.004**	**-44%**	**0.005**	**-0.004**	**-44%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.5 Simulated Average Monthly and Annual Streamflows at Model Node QF02 (Farley Lake Inflow from South)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.002	0.002	0.000	-1%	0.002	0.000	-22%	0.001	-0.001	-44%	0.001	-0.001	-45%
Feb	0.002	0.001	0.000	-2%	0.001	0.000	-22%	0.001	-0.001	-44%	0.001	-0.001	-45%
Mar	0.001	0.001	0.000	-2%	0.001	0.000	-23%	0.000	0.000	-44%	0.000	0.000	-45%
Apr	0.001	0.001	0.000	-2%	0.001	0.000	-23%	0.001	-0.001	-44%	0.001	-0.001	-45%
May	0.014	0.014	0.000	-2%	0.011	-0.003	-24%	0.008	-0.006	-44%	0.008	-0.006	-45%
Jun	0.014	0.014	0.000	-3%	0.011	-0.003	-24%	0.008	-0.006	-44%	0.008	-0.006	-45%
Jul	0.008	0.008	0.000	-3%	0.006	-0.002	-25%	0.005	-0.004	-45%	0.005	-0.004	-45%
Aug	0.007	0.006	0.000	-4%	0.005	-0.002	-25%	0.004	-0.003	-45%	0.004	-0.003	-45%
Sep	0.008	0.007	0.000	-4%	0.006	-0.002	-26%	0.004	-0.003	-45%	0.004	-0.003	-45%
Oct	0.008	0.008	0.000	-5%	0.006	-0.002	-26%	0.004	-0.004	-45%	0.004	-0.004	-45%
Nov	0.007	0.007	0.000	-5%	0.005	-0.002	-27%	0.004	-0.003	-45%	0.004	-0.003	-45%
Dec	0.004	0.004	0.000	-6%	0.003	-0.001	-27%	0.002	-0.002	-45%	0.002	-0.002	-45%
Annual	**0.006**	**0.006**	**0.000**	**-3%**	**0.005**	**-0.002**	**-24%**	**0.004**	**-0.003**	**-44%**	**0.004**	**-0.003**	**-45%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.6 Simulated Average Monthly and Annual Streamflows at Model Node QF03 (Gordon Lake Outflow)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.009	0.009	0.000	0%	0.008	-0.001	-9%	0.007	-0.002	-21%	0.007	-0.002	-21%
Feb	0.006	0.006	0.000	0%	0.005	-0.001	-9%	0.005	-0.001	-21%	0.005	-0.001	-21%
Mar	0.003	0.003	0.000	0%	0.003	0.000	-10%	0.002	-0.001	-21%	0.002	-0.001	-21%
Apr	0.006	0.006	0.000	0%	0.005	-0.001	-10%	0.004	-0.001	-21%	0.004	-0.001	-21%
May	0.055	0.055	0.000	-1%	0.049	-0.006	-10%	0.043	-0.012	-21%	0.043	-0.012	-21%
Jun	0.056	0.056	0.000	-1%	0.050	-0.006	-10%	0.044	-0.012	-21%	0.044	-0.012	-21%
Jul	0.032	0.032	0.000	-1%	0.028	-0.003	-11%	0.025	-0.007	-21%	0.025	-0.007	-21%
Aug	0.026	0.026	0.000	-1%	0.023	-0.003	-11%	0.021	-0.006	-21%	0.021	-0.006	-21%
Sep	0.030	0.030	0.000	-1%	0.026	-0.003	-11%	0.024	-0.006	-21%	0.024	-0.006	-21%
Oct	0.031	0.030	0.000	-1%	0.027	-0.004	-11%	0.024	-0.007	-21%	0.024	-0.007	-21%
Nov	0.028	0.028	0.000	-1%	0.025	-0.003	-12%	0.022	-0.006	-21%	0.022	-0.006	-21%
Dec	0.018	0.017	0.000	-1%	0.015	-0.002	-12%	0.014	-0.004	-21%	0.014	-0.004	-21%
Annual	**0.025**	**0.025**	**0.000**	**-1%**	**0.022**	**-0.003**	**-11%**	**0.020**	**-0.005**	**-21%**	**0.020**	**-0.005**	**-21%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.7 Simulated Average Monthly and Annual Streamflows at Model Node QF05 (Farley Lake Outflow)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.038	0.038	0.000	0%	0.052	0.015	39%	0.029	-0.009	-23%	0.056	0.019	50%
Feb	0.025	0.025	0.000	0%	0.040	0.015	60%	0.018	-0.007	-30%	0.045	0.020	79%
Mar	0.013	0.015	0.002	11%	0.029	0.016	120%	0.008	-0.006	-43%	0.034	0.021	159%
Apr	0.024	0.026	0.003	11%	0.047	0.024	99%	0.016	-0.007	-30%	0.057	0.033	139%
May	0.232	0.234	0.002	1%	0.248	0.016	7%	0.206	-0.026	-11%	0.248	0.016	7%
Jun	0.239	0.240	0.001	1%	0.244	0.006	2%	0.212	-0.026	-11%	0.238	0.000	0%
Jul	0.135	0.136	0.002	1%	0.146	0.012	9%	0.118	-0.017	-13%	0.145	0.011	8%
Aug	0.111	0.115	0.004	3%	0.123	0.012	11%	0.096	-0.015	-13%	0.123	0.011	10%
Sep	0.126	0.130	0.004	3%	0.141	0.014	11%	0.110	-0.016	-13%	0.142	0.016	12%
Oct	0.131	0.135	0.005	4%	0.144	0.013	10%	0.114	-0.016	-13%	0.146	0.015	12%
Nov	0.119	0.125	0.006	5%	0.131	0.012	10%	0.104	-0.015	-13%	0.132	0.013	11%
Dec	0.074	0.083	0.008	11%	0.088	0.013	18%	0.063	-0.011	-15%	0.090	0.015	21%
Annual	**0.106**	**0.109**	**0.003**	**4%**	**0.120**	**0.014**	**33%**	**0.092**	**-0.014**	**-19%**	**0.122**	**0.016**	**42%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.8 Simulated Average Monthly and Annual Streamflows at Model Node QF06 (Simpson Lake Outflow)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.017	0.017	0.000	0%	0.017	0.000	0%	0.017	0.000	0%	0.017	0.000	0%
Feb	0.011	0.011	0.000	0%	0.011	0.000	0%	0.011	0.000	0%	0.011	0.000	0%
Mar	0.006	0.006	0.000	0%	0.006	0.000	0%	0.006	0.000	0%	0.006	0.000	0%
Apr	0.010	0.010	0.000	0%	0.010	0.000	0%	0.010	0.000	0%	0.010	0.000	0%
May	0.102	0.102	0.000	0%	0.102	0.000	0%	0.102	0.000	0%	0.102	0.000	0%
Jun	0.105	0.105	0.000	0%	0.105	0.000	0%	0.105	0.000	0%	0.105	0.000	0%
Jul	0.059	0.059	0.000	0%	0.059	0.000	0%	0.059	0.000	0%	0.059	0.000	0%
Aug	0.049	0.049	0.000	0%	0.049	0.000	0%	0.049	0.000	0%	0.049	0.000	0%
Sep	0.056	0.056	0.000	0%	0.056	0.000	0%	0.056	0.000	0%	0.056	0.000	0%
Oct	0.057	0.057	0.000	0%	0.057	0.000	0%	0.057	0.000	0%	0.057	0.000	0%
Nov	0.052	0.052	0.000	0%	0.052	0.000	0%	0.052	0.000	0%	0.052	0.000	0%
Dec	0.033	0.033	0.000	0%	0.033	0.000	0%	0.033	0.000	0%	0.033	0.000	0%
Annual	**0.047**	**0.047**	**0.000**	**0%**	**0.047**	**0.000**	**0%**	**0.047**	**0.000**	**0%**	**0.047**	**0.000**	**0%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.9 Simulated Average Monthly and Annual Streamflows at Model Node QF07 (Swede Lake Outflow)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.081	0.081	0.000	0%	0.096	0.015	18%	0.072	-0.009	-11%	0.100	0.019	23%
Feb	0.054	0.054	0.000	0%	0.069	0.015	28%	0.047	-0.007	-14%	0.074	0.020	37%
Mar	0.029	0.030	0.002	5%	0.045	0.016	56%	0.023	-0.006	-20%	0.050	0.021	74%
Apr	0.051	0.054	0.003	5%	0.074	0.024	46%	0.044	-0.007	-14%	0.084	0.033	65%
May	0.500	0.502	0.002	0%	0.516	0.016	3%	0.474	-0.026	-5%	0.516	0.016	3%
Jun	0.514	0.515	0.001	0%	0.520	0.006	1%	0.487	-0.026	-5%	0.514	0.000	0%
Jul	0.291	0.292	0.002	1%	0.302	0.012	4%	0.274	-0.017	-6%	0.301	0.010	4%
Aug	0.240	0.243	0.004	1%	0.251	0.012	5%	0.225	-0.015	-6%	0.251	0.011	5%
Sep	0.272	0.276	0.004	1%	0.286	0.014	5%	0.256	-0.016	-6%	0.288	0.016	6%
Oct	0.281	0.286	0.005	2%	0.294	0.013	5%	0.265	-0.016	-6%	0.297	0.015	5%
Nov	0.256	0.263	0.006	2%	0.268	0.012	5%	0.241	-0.015	-6%	0.269	0.013	5%
Dec	0.160	0.169	0.009	5%	0.174	0.013	8%	0.149	-0.011	-7%	0.176	0.016	10%
Annual	**0.228**	**0.231**	**0.003**	**2%**	**0.242**	**0.014**	**15%**	**0.214**	**-0.014**	**-9%**	**0.244**	**0.016**	**20%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.10 Simulated Average Monthly and Annual Streamflows at Model Node QF08 (Ellystan Lake Outflow)

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.137	0.137	0.000	0%	0.152	0.015	11%	0.128	-0.009	-6%	0.156	0.019	14%
Feb	0.091	0.091	0.000	0%	0.107	0.015	17%	0.084	-0.007	-8%	0.111	0.020	22%
Mar	0.048	0.050	0.002	3%	0.064	0.016	33%	0.043	-0.006	-12%	0.070	0.021	44%
Apr	0.086	0.089	0.003	3%	0.110	0.023	27%	0.079	-0.007	-8%	0.119	0.033	38%
May	0.844	0.846	0.002	0%	0.860	0.016	2%	0.818	-0.026	-3%	0.861	0.017	2%
Jun	0.868	0.869	0.001	0%	0.874	0.006	1%	0.841	-0.026	-3%	0.868	0.000	0%
Jul	0.491	0.492	0.002	0%	0.502	0.012	2%	0.474	-0.017	-3%	0.501	0.011	2%
Aug	0.405	0.408	0.004	1%	0.416	0.012	3%	0.390	-0.015	-4%	0.416	0.011	3%
Sep	0.459	0.463	0.004	1%	0.474	0.014	3%	0.443	-0.016	-3%	0.475	0.016	3%
Oct	0.475	0.479	0.005	1%	0.488	0.013	3%	0.458	-0.016	-3%	0.490	0.015	3%
Nov	0.433	0.439	0.006	1%	0.445	0.012	3%	0.418	-0.015	-3%	0.446	0.013	3%
Dec	0.271	0.279	0.008	3%	0.284	0.013	5%	0.260	-0.011	-4%	0.286	0.015	6%
Annual	**0.386**	**0.388**	**0.003**	**1%**	**0.399**	**0.014**	**9%**	**0.371**	**-0.014**	**-5%**	**0.401**	**0.016**	**12%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.11 Simulated Average Monthly and Annual Streamflows at Model Node Susan Outflow

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	0.002	0.002	0.000	0%	0.002	0.000	0%	0.002	0.000	0%	0.002	0.000	0%
Feb	0.001	0.001	0.000	0%	0.001	0.000	0%	0.001	0.000	0%	0.001	0.000	0%
Mar	0.001	0.001	0.000	0%	0.001	0.000	0%	0.001	0.000	1%	0.001	0.000	1%
Apr	0.001	0.001	0.000	0%	0.001	0.000	0%	0.001	0.000	0%	0.001	0.000	0%
May	0.013	0.013	0.000	0%	0.013	0.000	0%	0.013	0.000	0%	0.013	0.000	0%
Jun	0.014	0.014	0.000	0%	0.014	0.000	0%	0.014	0.000	0%	0.014	0.000	0%
Jul	0.008	0.008	0.000	0%	0.008	0.000	0%	0.008	0.000	0%	0.008	0.000	0%
Aug	0.006	0.006	0.000	0%	0.006	0.000	0%	0.006	0.000	0%	0.006	0.000	0%
Sep	0.007	0.007	0.000	0%	0.007	0.000	0%	0.007	0.000	0%	0.007	0.000	0%
Oct	0.007	0.007	0.000	0%	0.007	0.000	0%	0.007	0.000	0%	0.007	0.000	0%
Nov	0.007	0.007	0.000	0%	0.007	0.000	0%	0.007	0.000	0%	0.007	0.000	0%
Dec	0.004	0.004	0.000	0%	0.004	0.000	0%	0.004	0.000	0%	0.004	0.000	0%
Annual	**0.006**	**0.006**	**0.000**	**0%**	**0.006**	**0.000**	**0%**	**0.006**	**0.000**	**0%**	**0.006**	**0.000**	**0%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.12 Simulated Average Monthly and Annual Streamflows at Model Node Hughes-us

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	6.543	6.543	0.000	0%	6.543	0.000	0%	6.543	0.000	0%	6.543	0.000	0%
Feb	4.362	4.362	0.000	0%	4.362	0.000	0%	4.362	0.000	0%	4.362	0.000	0%
Mar	2.308	2.308	0.000	0%	2.308	0.000	0%	2.308	0.000	0%	2.308	0.000	0%
Apr	4.109	4.109	0.000	0%	4.109	0.000	0%	4.109	0.000	0%	4.109	0.000	0%
May	40.300	40.300	0.000	0%	40.300	0.000	0%	40.300	0.000	0%	40.300	0.000	0%
Jun	41.440	41.440	0.000	0%	41.440	0.000	0%	41.440	0.000	0%	41.440	0.000	0%
Jul	23.420	23.420	0.000	0%	23.420	0.000	0%	23.420	0.000	0%	23.420	0.000	0%
Aug	19.310	19.310	0.000	0%	19.310	0.000	0%	19.310	0.000	0%	19.310	0.000	0%
Sep	21.940	21.940	0.000	0%	21.940	0.000	0%	21.940	0.000	0%	21.940	0.000	0%
Oct	22.660	22.660	0.000	0%	22.660	0.000	0%	22.660	0.000	0%	22.660	0.000	0%
Nov	20.670	20.670	0.000	0%	20.670	0.000	0%	20.670	0.000	0%	20.670	0.000	0%
Dec	12.930	12.930	0.000	0%	12.930	0.000	0%	12.930	0.000	0%	12.930	0.000	0%
Annual	**18.407**	**18.407**	**0.000**	**0%**	**18.407**	**0.000**	**0%**	**18.407**	**0.000**	**0%**	**18.407**	**0.000**	**0%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.13 Simulated Average Monthly and Annual Streamflows at Model Node Hughes-mid

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	6.543	6.543	0.000	0%	6.543	0.000	0%	6.543	0.000	0%	6.543	0.000	0%
Feb	4.362	4.362	0.000	0%	4.362	0.000	0%	4.362	0.000	0%	4.362	0.000	0%
Mar	2.308	2.308	0.000	0%	2.308	0.000	0%	2.308	0.000	0%	2.308	0.000	0%
Apr	4.109	4.109	0.000	0%	4.109	0.000	0%	4.109	0.000	0%	4.109	0.000	0%
May	40.300	40.490	0.190	0%	40.300	0.000	0%	40.300	0.000	0%	40.300	0.000	0%
Jun	41.440	41.615	0.175	0%	41.440	0.000	0%	41.440	0.000	0%	41.440	0.000	0%
Jul	23.420	23.455	0.035	0%	23.420	0.000	0%	23.420	0.000	0%	23.420	0.000	0%
Aug	19.310	19.310	0.000	0%	19.310	0.000	0%	19.310	0.000	0%	19.310	0.000	0%
Sep	21.940	21.940	0.000	0%	21.940	0.000	0%	21.940	0.000	0%	21.940	0.000	0%
Oct	22.660	22.660	0.000	0%	22.660	0.000	0%	22.660	0.000	0%	22.660	0.000	0%
Nov	20.670	20.670	0.000	0%	20.670	0.000	0%	20.670	0.000	0%	20.670	0.000	0%
Dec	12.930	12.930	0.000	0%	12.930	0.000	0%	12.930	0.000	0%	12.930	0.000	0%
Annual	**18.407**	**18.440**	**0.033**	**0%**	**18.407**	**0.000**	**0%**	**18.407**	**0.000**	**0%**	**18.407**	**0.000**	**0%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.14 Simulated Average Monthly and Annual Streamflows at Model Node Hughes-ds

Month	Existing Condition	Construction			Operation			Closure (Pit Filling)			Post-Closure		
	Flow (m^3/s)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (m^3/s)	Change from Existing (%)
Jan	6.680	6.680	0.000	0%	6.695	0.015	0%	6.672	-0.009	0%	6.699	0.019	0%
Feb	4.454	4.454	0.000	0%	4.469	0.015	0%	4.446	-0.008	0%	4.473	0.019	0%
Mar	2.356	2.358	0.002	0%	2.372	0.016	1%	2.350	-0.006	0%	2.377	0.021	1%
Apr	4.195	4.198	0.003	0%	4.219	0.024	1%	4.188	-0.007	0%	4.228	0.033	1%
May	41.150	41.335	0.185	0%	41.164	0.014	0%	41.123	-0.027	0%	41.160	0.010	0%
Jun	42.310	42.485	0.175	0%	42.316	0.006	0%	42.283	-0.027	0%	42.310	0.000	0%
Jul	23.910	23.950	0.040	0%	23.926	0.016	0%	23.896	-0.014	0%	23.920	0.010	0%
Aug	19.720	19.720	0.000	0%	19.728	0.008	0%	19.704	-0.016	0%	19.730	0.010	0%
Sep	22.400	22.400	0.000	0%	22.412	0.012	0%	22.383	-0.018	0%	22.410	0.010	0%
Oct	23.140	23.140	0.000	0%	23.154	0.014	0%	23.124	-0.016	0%	23.150	0.010	0%
Nov	21.110	21.110	0.000	0%	21.118	0.008	0%	21.092	-0.018	0%	21.120	0.010	0%
Dec	13.200	13.205	0.005	0%	13.212	0.012	0%	13.187	-0.013	0%	13.210	0.010	0%
Annual	**18.795**	**18.829**	**0.034**	**0%**	**18.808**	**0.013**	**0%**	**18.780**	**-0.015**	**0%**	**18.808**	**0.013**	**0%**

Notes:

m^3/s – cubic metres per second; % - percent

0.0% and 0.000 m^3/s in the Table represent < 0.1% and <0.001 m^3/s, respectively.

Table 2.15 Simulated Average Monthly and Annual Water Levels at Gordon Lake

Month	Existing Condition	Construction		Operation		Closure (Pit Filling)		Post-Closure	
	Level (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)
Jan	315.18	315.18	0.00	315.17	-0.01	315.15	-0.03	315.15	-0.03
Feb	315.13	315.13	0.00	315.12	-0.01	315.11	-0.02	315.11	-0.02
Mar	315.07	315.07	0.00	315.06	-0.01	315.05	-0.02	315.05	-0.02
Apr	315.13	315.13	0.00	315.12	-0.01	315.10	-0.03	315.10	-0.03
May	315.47	315.47	0.00	315.45	-0.02	315.42	-0.05	315.42	-0.05
Jun	315.48	315.48	0.00	315.45	-0.03	315.43	-0.05	315.43	-0.05
Jul	315.37	315.37	0.00	315.35	-0.02	315.33	-0.04	315.33	-0.04
Aug	315.33	315.33	0.00	315.32	-0.01	315.30	-0.03	315.30	-0.03
Sep	315.36	315.36	0.00	315.34	-0.02	315.32	-0.04	315.32	-0.04
Oct	315.36	315.36	0.00	315.34	-0.02	315.32	-0.04	315.32	-0.04
Nov	315.35	315.35	0.00	315.33	-0.02	315.31	-0.04	315.31	-0.04
Dec	315.27	315.27	0.00	315.25	-0.02	315.24	-0.03	315.24	-0.03
Annual	**315.29**	**315.29**	**0.00**	**315.27**	**-0.02**	**315.26**	**-0.03**	**315.26**	**-0.04**

Notes:

m – metres

0.00 m in the Table represents < 0.01 m.

Table 2.16 Simulated Average Monthly and Annual Water Levels at Farley Lake

Month	Existing Condition	Construction		Operation		Closure (Pit Filling)		Post-Closure	
	Level (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)
Jan	313.55	313.55	0.00	313.57	0.02	313.53	-0.02	313.57	0.02
Feb	313.52	313.52	0.00	313.55	0.03	313.50	-0.02	313.56	0.04
Mar	313.48	313.49	0.00	313.53	0.05	313.44	-0.04	313.54	0.06
Apr	313.52	313.53	0.00	313.56	0.04	313.49	-0.03	313.57	0.05
May	313.68	313.69	0.00	313.69	0.01	313.67	-0.01	313.69	0.01
Jun	313.69	313.69	0.00	313.69	0.00	313.68	-0.01	313.69	0.00
Jul	313.64	313.64	0.00	313.65	0.01	313.63	-0.01	313.65	0.01
Aug	313.62	313.63	0.01	313.63	0.01	313.61	-0.01	313.63	0.01
Sep	313.63	313.64	0.01	313.64	0.01	313.62	-0.01	313.64	0.01
Oct	313.64	313.64	0.00	313.65	0.01	313.63	-0.01	313.65	0.01
Nov	313.63	313.63	0.00	313.64	0.01	313.62	-0.01	313.64	0.01
Dec	313.59	313.61	0.02	313.61	0.02	313.58	-0.01	313.61	0.02
Annual	**313.60**	**313.60**	**0.00**	**313.62**	**0.02**	**313.58**	**-0.02**	**313.62**	**0.02**

Notes:

m – metres

0.00 m in the Table represents < 0.01 m.

Table 2.17 Simulated Average Monthly and Annual Water Levels at Simpson Lake

Month	Existing Condition	Construction		Operation		Closure (Pit Filling)		Post-Closure	
	Level (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)
Jan	297.21	297.21	0.00	297.21	0.00	297.21	0.00	297.21	0.00
Feb	297.17	297.17	0.00	297.17	0.00	297.17	0.00	297.17	0.00
Mar	297.13	297.13	0.00	297.13	0.00	297.13	0.00	297.13	0.00
Apr	297.17	297.17	0.00	297.17	0.00	297.17	0.00	297.17	0.00
May	297.40	297.40	0.00	297.40	0.00	297.40	0.00	297.40	0.00
Jun	297.41	297.41	0.00	297.41	0.00	297.41	0.00	297.41	0.00
Jul	297.33	297.33	0.00	297.33	0.00	297.33	0.00	297.33	0.00
Aug	297.31	297.31	0.00	297.31	0.00	297.31	0.00	297.31	0.00
Sep	297.33	297.33	0.00	297.33	0.00	297.33	0.00	297.33	0.00
Oct	297.33	297.33	0.00	297.33	0.00	297.33	0.00	297.33	0.00
Nov	297.32	297.32	0.00	297.32	0.00	297.32	0.00	297.32	0.00
Dec	297.27	297.27	0.00	297.27	0.00	297.27	0.00	297.27	0.00
Annual	**297.28**	**297.28**	**0.00**	**297.28**	**0.00**	**297.28**	**0.00**	**297.28**	**0.00**

Notes:

m – metres

0.00 m in the Table represents < 0.01 m.

Table 2.18 Simulated Average Monthly and Annual Water Levels at Swede Lake

Month	Existing Condition	Construction		Operation		Closure (Pit Filling)		Post-Closure	
	Level (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)
Jan	297.15	297.15	0.00	297.17	0.02	297.14	-0.01	297.18	0.03
Feb	297.12	297.12	0.00	297.14	0.02	297.11	-0.01	297.15	0.03
Mar	297.08	297.08	0.00	297.10	0.02	297.07	-0.01	297.11	0.03
Apr	297.11	297.12	0.00	297.14	0.03	297.10	-0.01	297.16	0.05
May	297.46	297.46	0.00	297.47	0.01	297.45	-0.01	297.47	0.01
Jun	297.47	297.47	0.00	297.47	0.00	297.45	-0.02	297.47	0.00
Jul	297.34	297.34	0.00	297.35	0.01	297.32	-0.02	297.34	0.00
Aug	297.30	297.30	0.00	297.31	0.01	297.29	-0.01	297.31	0.01
Sep	297.32	297.33	0.00	297.33	0.01	297.31	-0.01	297.33	0.01
Oct	297.33	297.33	0.00	297.34	0.01	297.32	-0.01	297.34	0.01
Nov	297.31	297.32	0.01	297.32	0.01	297.30	-0.01	297.32	0.01
Dec	297.24	297.25	0.00	297.25	0.01	297.23	-0.01	297.25	0.01
Annual	**297.27**	**297.27**	**0.00**	**297.28**	**0.01**	**297.26**	**-0.01**	**297.29**	**0.02**

Notes:

m – metres

0.00 m in the Table represents < 0.01 m.

Table 2.19 Simulated Average Monthly and Annual Water Levels at Ellystan Lake

Month	Existing Condition	Construction		Operation		Closure (Pit Filling)		Post-Closure	
	Level (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)	Level (m)	Change from Existing (m)
Jan	282.88	282.88	0.00	282.89	0.01	282.88	0.00	282.89	0.01
Feb	282.85	282.85	0.00	282.86	0.01	282.84	-0.01	282.86	0.01
Mar	282.80	282.80	0.00	282.82	0.02	282.79	-0.01	282.82	0.02
Apr	282.84	282.85	0.01	282.86	0.02	282.84	0.00	282.87	0.03
May	283.06	283.06	0.00	283.07	0.01	283.06	0.00	283.07	0.01
Jun	283.07	283.07	0.00	283.07	0.00	283.06	-0.01	283.07	0.00
Jul	283.01	283.01	0.00	283.01	0.00	283.00	-0.01	283.01	0.00
Aug	282.99	282.99	0.00	282.99	0.00	282.98	-0.01	282.99	0.00
Sep	283.00	283.00	0.00	283.00	0.00	283.00	0.00	283.00	0.00
Oct	283.00	283.00	0.00	283.01	0.01	283.00	0.00	283.01	0.01
Nov	282.99	282.99	0.00	283.00	0.01	282.99	0.00	283.00	0.01
Dec	282.95	282.95	0.00	282.95	0.00	282.94	-0.01	282.95	0.00
Annual	**282.95**	**282.95**	**0.00**	**282.96**	**0.01**	**282.95**	**-0.01**	**282.96**	**0.01**

Notes:

m – metres

0.00 m in the Table represents < 0.01 m.

2.4 Comparison with EIS Model Results

Both the EIS model and updated model predicted a 12-year pit filling period. The EIS model results (Stantec 2020a and 2020b) and updated model results (Table 2.4 to Table 2.19) indicate the following effects (Table 2.20 and Table 2.21):

- QF01 and QF02:
    - Both the EIS and updated models predict reductions in average monthly streamflows under project-affected conditions.
- QF03:
    - The EIS model predicted monthly flow increases of over 100% during construction and operation compared to existing conditions. The updated model predicts small reductions (-1% to -12%) in flow instead, primarily due to optimization of the interceptor well placements and pumping rates.
    - Both the EIS and updated models predict reductions in average monthly streamflows during closure and post-closure compared to existing conditions.
- QF05:
    - The EIS model predicted flow increases of greater than 300% during construction and operation compared to existing conditions. The updated model predicts a flow increase of up to 120% in March but less than <120% in the other months (0% to 99%) during construction and operation compared to existing conditions. The difference in predicted increase in flow due to the Project is attributed to dewatering historical open pits into Hughes River (instead of dewatering into Farley Lake) and optimization of the interceptor well pumping system.
    - At closure, the updated model predicts flow reductions of up to 43% in winter (December through April) and 13% during the open water season (May through November; Table 2.7) compared to existing conditions. These reductions are predicted as the pit fills. Note that the maximum 43% winter flow reduction corresponds to a decrease of only 0.006 cubic metres per second (m3/s) from an average annual flow of 0.092 m3/s. The EIS model did not predict such a high percentage of winter flow reduction, due to its different surface water and groundwater inputs.
    - At post-closure, the updated model predicts flow increases of up to 159% during the winter months (equivalent to only 0.02 m3/s increase in flow, due to increased baseflows and disturbed areas) and 12% during the open water season compared to existing conditions (Table 2.7). The predicted increase in flow for post-closure compared to existing conditions in the EIS model was less than the predicted increase in flow in the updated model.
- QF06: Both the EIS and updated models predict less than 1% changes in flow between existing conditions and each Project phase.

- QF07 and QF08: These downstream nodes observed similar flow change patterns to QF05 between the EIS model and updated model.
- Susan Outflow, Hughes-us, Hughes-mid, and Hughes-ds: The updated model predicts less than 1% change in flow for each Project phase compared to existing conditions. Streamflows at these locations were not assessed in the EIS model.
- Gordon Lake, Farley Lake, Swede Lake and Ellystan Lake: Both the EIS model and updated model predict average monthly water level changes of less than 0.10 metre (m) for each Project phase compared to existing conditions.
- Simpson Lake: The updated model predicts changes of less than 0.01 m in average monthly water levels for each project phase compared to existing conditions. The water levels at this lake were not assessed in the EIS model.

Table 2.20 Comparison of Updated Water Balance Model Results with EIS Results – Monthly Streamflows

Model Node	Source	Construction		Operation		Closure (Pit Filling)		Post-Closure		Maximum of All Phases[3]	
		Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[3]	Increase[3]
QF01	EIS[4]	-31%	0%	-31%	0%	-31%	0%	-31%	0%	-31%	0%
	Updated[5]	-3%	0%	-25%	0%	-44%	0%	-44%	0%	-44%	0%
QF02	EIS[4]	-33%	0%	-33%	0%	-33%	0%	-33%	0%	-33%	0%
	Updated[5]	-6%	0%	-27%	0%	-45%	0%	-45%	0%	-45%	0%
QF03	EIS[4]	-3%	133%	-3%	133%	-18%	0%	-21%	0%	-21%	133%
	Updated[5]	-1%	0%	-12%	0%	-21%	0%	-21%	0%	-21%	0%
QF05	EIS[4]	0%	378%	0%	342%	-8%	10%	-3%	28%	-8%	378%
	Updated[5]	0%	11%	0%	120%	-43%	0%	0%	159%	-43%	159%
QF06	EIS[4]	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Updated[5]	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
QF07	EIS[4]	0%	139%	0%	136%	-3%	4%	-1%	9%	-3%	139%
	Updated[5]	0%	5%	0%	56%	-20%	0%	0%	74%	-20%	74%
QF08	EIS[4]	0%	76%	0%	84%	-3%	3%	-1%	4%	-3%	84%
	Updated[5]	0%	3%	0%	33%	-12%	0%	0%	44%	-12%	44%
Susan Outflow	EIS[4]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Updated[5]	0%	0%	0%	0%	0%	1%	0%	1%	0%	1%
Hughes-us	EIS[4]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Updated[5]	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Model Node	Source	Construction		Operation		Closure (Pit Filling)		Post-Closure		Maximum of All Phases[3]	
		Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[3]	Increase[3]
Hughes-mid	EIS[4]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Updated[5]	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Hughes-ds	EIS[4]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Updated[5]	0%	0%	0%	1%	0%	0%	0%	1%	0%	1%

Notes:

1 maximum decrease of monthly flows during each Project phase. For example, in Table 2.10 (for QF08), during construction, maximum increase of average monthly flows is 3% which occurs in March, April, and December. This 3% flow change is shown in this Table, for 'updated' results for 'QF08' flow decrease during 'construction'.

2 maximum increase of monthly flows during each Project phase.

3 maximum of percent decrease and increase values for individual phases, as provided in the construction, operation, closure (pit filling) and post-closure columns of this table.

4 EIS model results (Stantec 2020a and 2020b)

5 Updated model results (Table 2.4 to Table 2.14)

0%: Lower than 1% change in streamflow

n/a: not assessed in the EIS model

Table 2.21 Comparison of Updated Water Balance Model Results with EIS Results – Monthly Lake Levels

Model Node	Source	Construction		Operation		Closure (Pit Filling)		Post-Closure		Maximum of All Phases[3]	
		Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[1]	Increase[2]	Decrease[3]	Increase[3]
Gordon Lake	EIS[4]	0.00	0.08	0.00	0.08	-0.03	0.00	-0.04	0.00	-0.04	0.08
	Updated[5]	0.00	0.00	-0.03	0.00	-0.05	0.00	-0.05	0.00	-0.05	0.00
Farley Lake	EIS[4]	0.00	0.26	0.00	0.25	-0.02	0.01	-0.01	0.03	-0.02	0.26
	Updated[5]	0.00	0.02	0.00	0.05	-0.04	0.00	0.00	0.06	-0.04	0.06
Simpson Lake	EIS[4]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Updated[5]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Swede Lake	EIS[4]	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03	0.00	0.03
	Updated[5]	0.00	0.01	0.00	0.03	-0.02	0.00	0.00	0.05	-0.02	0.05
Ellystan Lake	EIS[4]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Updated[5]	0.00	0.01	0.00	0.02	-0.01	0.00	0.00	0.03	-0.01	0.03

Notes:

1 maximum decrease of monthly water level during each Project phase. For example, in Table 2.15 (for Gordon Lake), during operation, maximum reduction of average monthly lake level is 0.03 m which occurs in June. This -0.03 m level change is shown in this Table, for 'updated' results for Gordon Lake' water level decrease during 'operation'.

2 maximum increase of monthly water level during each Project phase.

4 EIS results (Stantec 2020a and 2020b)

5 Updated Results (Table 2.15 to Table 2.19)

0.00: Lower than 0.01m in lake level

n/a: not assessed in the EIS model

3 Water Quality Model Updates

3.1 Inputs

The following sections present updates to the water quality model inputs resulting from the proposed alterations for the expected case and upper case source terms. Water quality model inputs remain unchanged from the EIS model (Stantec 2020a) except for changes presented in this section.

3.1.1 Mine Rock and Ore Production Schedule

The EIS model was based on older estimated quantities of mine rock and ore of approximately 50.1 Mt and 8 Mt, respectively (Table 3.1), with an estimate of 22% of the total mine rock mass as potentially acid generating (PAG). The updated estimate of mine rock tonnage in the Feasibility Study Update (Alamos 2023) is 51.9 Mt which is about 4% higher than the mine rock mass used in the EIS model. The updated ore tonnage is 7.9 Mt which is comparable to the estimate of ore tonnage of 8 Mt in the EIS model. Likewise, the percentage of PAG mine rock in the updated water quality model is like the EIS model (Table 3.1).

Table 3.1 Mine Rock and Ore Production Rates

Mine Year	Updated Model		EIS Model	
	Mine Rock (t/yr)[1]	Ore (t/yr)	Mine Rock (t/yr)[1]	Ore (t/yr)
-1	2,046,260	6,001	1,784,000	29,000
1	11,152,452	790,164	11,902,000	1,246,000
2	14,369,304	1,630,663	13,406,000	2,256,000
3	13,053,964	2,946,036	11,957,000	1,775,000
4	8,622,912	1,678,571	8,730,000	1,769,000
5	2,595,824	817,362	2,294,000	930,000
6	0	0	0	0
Total	51,873,365	7,868,798	50,073,000	8,005,000

Note:

[1]PAG proportion was estimated to be 22% in the EIS model and in the updated model

3.1.2 Surface Water Quality for Model Nodes at Hughes River

Water quality at the model node upstream of the dewatering effluent (Hughes_Us_CT) is represented by the water quality at AQF41 monitoring station whereas runoff to the model node downstream of the confluence with Ellystan Lake outflow (Hughes_Ds_CT) is represented by the water quality at AQF40 and AFQ40a. The model node downstream of the dewatering effluent is a mix of water coming from model node Hughes_Us_CT and dewatering effluent from the historical pits in the construction phase.

3.1.3 Historical Mine Features

In the EIS model, the historical north MRSA and a portion of the historical south MRSA remained during each Project phase. In the updated model, the historical north MRSA will be used as a borrow source and/or relocated to the new MRSA and therefore is only modelled under existing conditions and not modelled in construction, operation, closure, or post-closure. The majority (about 80%) of the historical south MRSA will be moved to the new MRSA to accommodate the pit and ore stockpiles area. A portion of the historical south MRSA (about 20%) remains throughout the life of mine (Figure 1.1). In the EIS model, seepage from the north and south MRSA was captured by the open pit and interceptor wells during operation. In closure, Gordon Lake received groundwater seepage from the south (0.02 m^3/day) and north (1 m^3/day) MRSAs (Stantec 2020a) whereas Farley Lake West received groundwater seepage from the south MRSA (3.17 m^3/day). In the updated model, groundwater seepage from the south and north MRSA to the receivers were updated based on Tables 5.2 to 5.8 in the updated groundwater model report (Appendix E of the Gordon Mine Plan NOA/NOC). Due to the removal of the north MRSA and the majority of the south MRSA, seepage from these MRSAs to the receiving environment are reduced in the updated model compared to the EIS. Specifically, the Wendy and East pits receive seepage from the historical north MRSA before the start of the construction phase. East pit also receives seepage from the historical south MRSA before the start of the construction phase. The Farley Interceptor Wells receive seepage from the historical south MRSA in the construction and operation phases. In the operation and closure phases, the open pit receives seepage from the historical south MRSA.

The use of the non-PAG rock from the existing north MRSA as a borrow source material during construction is proposed in the Gordon Mine Plan NOA/NOC. In the updated model, it was assumed that the construction mine rock from the north MRSA contributes no load to the updated model.

3.1.4 Source Terms for Nitrogen Species

The mass rate of nitrogen from blasting residuals was calculated using the same approach as in the EIS model. However, the percentage of total nitrogen loss used for the expected case source term in the updated model was 0.5%. This estimate is higher than the 0.2% value used in the EIS model and is half of the maximum value of 1% reported for dry open pit mines (Ferguson and Leask 1988; Golder 2008). For the upper case in the updated model 1.5% was used, in comparison to the 1% for the upper case in the EIS model.

3.1.5 Open Pit Assumptions

Assumptions for the open pit in the EIS model were also applied in the updated model except for the updated open pit volume increased by approximately 9.2% as compared to the estimate of pit volume in the EIS model. Thus, the 3D surface of the ultimate open pit was assumed to increase 9.2% over the pit surface of 436,100 square metres in the EIS model. The updated pit surface was used to calculate the exposed rock mass that was subjected to elemental leaching. In addition, groundwater discharge into the open pit is represented by bedrock groundwater quality in the updated model based on the updated groundwater model report (Appendix E of the Gordon Mine Plan NOA/NOC) whereas groundwater quality in the EIS model was represented by 80% bedrock groundwater and 20% overburden groundwater.

3.1.6 MRSA Seepage Assumptions

Assumptions for the seepages from the MRSA in the EIS model are also applied in the updated model except for the following:

- Particulate in the groundwater seepage is not anticipated to transport through the aquifer. Thus, the total concentration in groundwater seepage discharging to surface water is set to be equal to the dissolved concentration in the updated model whereas this assumption was not applied in the EIS model.
- In the EIS model, uncertainty related to seepage travel time was captured by using the mean travel time for the expected source term and minimum travel time for the upper case source term (i.e., it took the seepage a minimal travel time to reach the receptor at the predicted flow rate). In the updated model, uncertainty related to the travel time was captured by interpolating the predicted flow rate. The seepage flow rate arriving at different receiving environment nodes was set to increase linearly from 0 (m3/s) through the predicted flow rate at the end of construction, operation, and closure phases (presented in Tables 5.4, 5.6, and 5.8 of the Groundwater Model Report). This approach was used for both expected case and upper case source terms of the updated model.

3.1.7 Mass Addition and Removal

In the EIS model, mass addition and removal rates were applied to lake reservoirs based on observed data to simulate seasonal water quality changes within the lake. Mass addition and removal rates were developed for the expected case and upper case source terms. In the updated model, the mass addition and removal rates for the upper case source term are the same as the expected case source term. This is a more conservative approach that the EIS model approach because the removal rates for the upper case source term are either the same or higher than those for the expected case source term and the mass additions for the upper case source term are either the same or lower than those for the expected case source term.

3.2 Model Scenarios

The updated model was completed for the expected case and upper case source term scenarios as in the EIS model. For the expected case source term, average and geometric mean concentrations for surface water and groundwater, respectively, were used. Average leaching rates of mine rock were used for the post-closure phase, representing neutral leaching conditions due to successful management of PAG materials. For the upper case source term, 95th percentile and log_{10} of 95th percentile concentrations for surface water and groundwater, respectively, were used, with the exception that average concentrations for baseline water quality for model nodes at Hughes River (Hughes_Us_CT and Hughes_Ds_CT) were used due to limited availability of the monitoring data. Elevated leaching rates compared to the average leaching rates of mine rock were used for the post-closure phase, representing acidic leaching conditions. This report presents the water quality model results for two scenarios: expected case - average climate and expected case source term scenario, upper case average climate and upper case source term scenario. A comparison to the EIS model water quality results is also provided.

3.3 Results

3.3.1 Updated Model Results

Summary statistics of the updated model water quality results for the expected case and the upper case scenarios are presented in Appendix B and Appendix C, respectively. Water quality results are reported for mine site components and receiving environment model nodes. The respective model node name is shown in the parentheses.

- Open Pit Discharge (Upper_OP_Dis_CT)
- Collection Pond Discharge (Collection_Pond_Dis_CT)
- Farley Dewatering Wells (Farley_Wells_CT)
- Gordon Dewatering Wells (Gordon_Wells_CT)
- Gordon Lake (Gordon_Lake_CT)
- Farley Lake West (Farley_Lake_West_CT)
- Simpson Lake (Simpson_Lake_CT)
- Swede Lake (Swede_Lake_CT)
- Ellystan Lake (Ellystan_Lake_CT)
- Susan Lake (Susan_Lake_CT)
- Hughes River, upstream of the dewatering effluent (Hughes_Us_CT)
- Hughes River, downstream of the dewatering effluent (Hughes_Mid_CT)
- Hughes River, downstream of confluence of Ellystan Lake outflow (Hughes_Ds_CT)

3.3.2 Comparison with EIS Model Results

Summary statistics of the updated model water quality results for the expected case (average – expected scenario) are compared to the summary statistics of the EIS model (Stantec 2020a). The comparison is completed by calculating the percentage changes to the summary statistics values (minimum, mean, median, and max) of the updated model expected case results to the EIS model expected case results (Stantec 2020a) for the following locations, either mine components or model nodes receiving discharges or seepages from the Project:

- Open Pit Discharge (Upper_OP_Dis_CT)
- Collection Pond Discharge (Collection_Pond_Dis_CT)
- Gordon Lake (Gordon_Lake_CT)
- Farley Lake West (Farley_Lake_West_CT)
- Susan Lake (Susan_Lake_CT)

The Hughes_Mid_CT model node receives dewatering effluent from the historical pits (i.e., Wendy and East pits). This model node was not included in the EIS model because dewatering effluent was previously assumed to discharge to Farley Lake West. Therefore, the comparison of the updated model to the EIS model was not made from this node. Hughes_Mid_CT model node was included in the updated model to evaluate the potential effects of the Project on Hughes River water quantity and quality.

The Simpson_Lake_CT model node receives seepage from the MRSA based on the updated groundwater model results (Appendix E of the Gordon Mine Plan NOA/NOC). This model was included in the EIS model but was not predicted for water quality because it did not receive seepage from the MRSA or other Project contact water. Therefore, the comparison of updated model to EIS model was not completed.

The comparison of results is shown in Appendix D and summarized for the open pit discharge and the collection pond discharge below.

Open Pit Discharge:

- Median and maximum concentrations predicted by the updated model for the post-closure phase were between half and two times (2x) the respective concentrations predicted by the EIS model except for the median and maximum concentrations of nitrite and maximum concentration of fluoride (> 2x). The following parameters are predicted by the updated model for the post-closure phase and are less than half of the respective maximum concentrations predicted by the EIS model:
    - Median and maximum concentrations of total and dissolved antimony, total and dissolved boron, total and dissolved molybdenum, dissolved potassium, total and dissolved selenium, total and dissolved sodium, and sulfate.
    - Median concentration of dissolved arsenic, total and dissolved copper, dissolved nickel, total phosphorus, radium-226, and total and dissolved uranium.



- The increase in the predicted nitrite concentration in the updated model for the open pit discharge in comparison to the EIS model is due to the increase in the assumed percentage of the total nitrogen loss from the explosives used in the updated model, as outlined in Section 3.1.4. In contrast, the decrease in the predicted concentrations of most parameters is primarily reflective of the increase in runoff to the open pit due to the increase in the open pit footprint area (Table 2.1). The increase in the maximum predicted fluoride concentration at the start of the post-closure phase (2.1 times greater than the maximum predicted concentration in the EIS model) is primarily attributed to increased mass load from the pit walls and bedrock groundwater during the pit filling period.

Collection Pond Discharge:

- Median and maximum concentrations predicted by the updated model for the operation phase were between half and two times (2x) the respective concentrations predicted by the EIS model except for the maximum concentrations of nitrite and total ammonia (> 2x). For the construction phase, median and maximum concentrations predicted by the updated model for modelled parameters were greater than two times (2x) the respective concentrations predicted by the EIS model except for the following which were between half and two times (2x) the respective concentrations predicted by the EIS model:
    - Maximum concentrations of total aluminum, total and dissolved cobalt, cyanide species, total and dissolved iron, total lead, total and dissolved manganese, total mercury, total nickel, total vanadium, and total zinc.
    - Median concentrations of bromide, chloride, total cadmium, total chromium, total cobalt, cyanide species, total and dissolved iron, total lead, total and dissolved manganese, total mercury, radium-226, total vanadium, and total zinc.
- The increase in the predicted nitrite and total ammonia concentration in the updated model for the collection pond discharge in comparison to the EIS model for the operation phase is due to the increase in the assumed percentage of the total nitrogen loss from the explosives used in the updated model, as outlined in Section 3.1.4. The increase in the predicted concentrations of most parameters in the construction phase is primarily attributed to dewatering discharge from the open pit which primarily receives an increased mass load from the pit walls.



4 Closing

Stantec has prepared this water balance and water quality model update in support of the Gordon Mine Plan Amendment NOA/NOC with respect to *Environment Act* License No. 3390 for the Lynn Lake Gold Project. The results of this model are assessed in Section 3.3.4 (Surface Water) of the Gordon Mine Plan Amendment NOA/NOC.

5 References

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Appendices

Appendix A Water Balance Results

Table A.1 Simulated Monthly Streamflows at Model Node QF01

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.003	0.003	-0.1%	0.003	-0.3%	0.003	0.0%	0.003	-19.2%	0.002	-31.8%	0.003	-6.6%	0.002	-43.7%	0.002	-44.2%	0.002	-38.1%	0.002	-44.2%	0.002	-44.2%	0.002	-44.2%
	Feb	0.002	0.002	-0.4%	0.002	-0.8%	0.002	0.0%	0.002	-19.7%	0.001	-32.3%	0.002	-7.1%	0.001	-43.7%	0.001	-44.2%	0.001	-38.6%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%
	Mar	0.001	0.001	-0.6%	0.001	-1.3%	0.001	0.0%	0.001	-20.2%	0.001	-32.8%	0.001	-7.6%	0.001	-43.8%	0.001	-44.2%	0.001	-39.2%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%
	Apr	0.002	0.002	-0.9%	0.002	-1.8%	0.002	0.0%	0.002	-20.8%	0.001	-33.4%	0.002	-8.1%	0.001	-43.8%	0.001	-44.2%	0.001	-39.7%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%
	May	0.019	0.019	-1.2%	0.019	-2.3%	0.019	0.0%	0.015	-21.3%	0.013	-33.9%	0.017	-8.6%	0.011	-43.8%	0.011	-44.1%	0.011	-40.2%	0.011	-44.1%	0.011	-44.1%	0.011	-44.1%
	Jun	0.020	0.019	-1.4%	0.019	-2.8%	0.020	0.0%	0.015	-21.8%	0.013	-34.4%	0.018	-9.2%	0.011	-43.9%	0.011	-44.2%	0.012	-40.7%	0.011	-44.2%	0.011	-44.2%	0.011	-44.2%
	Jul	0.011	0.011	-1.7%	0.011	-3.3%	0.011	0.0%	0.009	-22.3%	0.007	-34.9%	0.010	-9.6%	0.006	-43.9%	0.006	-44.2%	0.007	-41.3%	0.006	-44.2%	0.006	-44.2%	0.006	-44.2%
	Aug	0.009	0.009	-2.0%	0.009	-3.9%	0.009	0.0%	0.007	-22.9%	0.006	-35.5%	0.008	-10.2%	0.005	-44.0%	0.005	-44.2%	0.005	-41.8%	0.005	-44.2%	0.005	-44.2%	0.005	-44.2%
	Sep	0.010	0.010	-2.2%	0.010	-4.5%	0.010	0.0%	0.008	-23.4%	0.007	-36.0%	0.009	-10.8%	0.006	-44.0%	0.006	-44.2%	0.006	-42.3%	0.006	-44.2%	0.006	-44.2%	0.006	-44.2%
	Oct	0.011	0.010	-2.5%	0.010	-5.0%	0.011	0.0%	0.008	-24.0%	0.007	-36.6%	0.010	-11.3%	0.006	-44.1%	0.006	-44.2%	0.006	-42.9%	0.006	-44.2%	0.006	-44.2%	0.006	-44.2%
	Nov	0.010	0.010	-2.8%	0.009	-5.5%	0.010	0.0%	0.007	-24.4%	0.006	-37.1%	0.009	-11.8%	0.005	-44.1%	0.005	-44.2%	0.006	-43.4%	0.005	-44.2%	0.005	-44.2%	0.005	-44.2%
	Dec	0.006	0.006	-3.0%	0.006	-6.0%	0.006	0.0%	0.005	-25.0%	0.004	-37.6%	0.005	-12.3%	0.003	-44.2%	0.003	-44.2%	0.003	-43.9%	0.003	-44.2%	0.003	-44.2%	0.003	-44.2%
	Annual	0.009	0.009	-1.8%	0.008	-3.6%	0.009	0.0%	0.007	-22.5%	0.006	-35.1%	0.008	-9.9%	0.005	-43.9%	0.005	-44.2%	0.005	-41.5%	0.005	-44.2%	0.005	-44.2%	0.005	-44.2%
1:25-Year Dry	Jan	0.000	0.000	-0.1%	0.000	-0.3%	0.000	0.0%	0.000	-19.2%	0.000	-31.8%	0.000	-6.6%	0.000	-43.7%	0.000	-44.2%	0.000	-38.1%	0.000	-44.2%	0.000	-44.2%	0.000	-44.2%
	Feb	0.000	0.000	-0.4%	0.000	-0.8%	0.000	0.0%	0.000	-19.7%	0.000	-32.3%	0.000	-7.1%	0.000	-43.7%	0.000	-44.2%	0.000	-38.6%	0.000	-44.2%	0.000	-44.2%	0.000	-44.2%
	Mar	0.000	0.000	-0.6%	0.000	-1.3%	0.000	0.0%	0.000	-20.2%	0.000	-32.8%	0.000	-7.6%	0.000	-43.8%	0.000	-44.2%	0.000	-39.2%	0.000	-44.2%	0.000	-44.2%	0.000	-44.2%
	Apr	0.000	0.000	-0.9%	0.000	-1.8%	0.000	0.0%	0.000	-20.7%	0.000	-33.4%	0.000	-8.1%	0.000	-43.8%	0.000	-44.2%	0.000	-39.7%	0.000	-44.2%	0.000	-44.2%	0.000	-44.2%
	May	0.007	0.007	-1.2%	0.007	-2.3%	0.007	0.0%	0.006	-21.3%	0.005	-33.9%	0.006	-8.6%	0.004	-43.8%	0.004	-44.2%	0.004	-40.2%	0.004	-44.2%	0.004	-44.2%	0.004	-44.2%
	Jun	0.005	0.005	-1.4%	0.005	-2.9%	0.005	0.0%	0.004	-21.8%	0.004	-34.4%	0.005	-9.2%	0.003	-43.9%	0.003	-44.2%	0.003	-40.8%	0.003	-44.2%	0.003	-44.2%	0.003	-44.2%
	Jul	0.002	0.001	-1.7%	0.001	-3.4%	0.002	0.0%	0.001	-22.3%	0.001	-35.0%	0.001	-9.7%	0.001	-43.9%	0.001	-44.2%	0.001	-41.3%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%
	Aug	0.004	0.004	-2.0%	0.004	-3.9%	0.004	0.0%	0.003	-22.9%	0.002	-35.5%	0.003	-10.2%	0.002	-44.0%	0.002	-44.2%	0.002	-41.8%	0.002	-44.2%	0.002	-44.2%	0.002	-44.2%
	Sep	0.004	0.004	-2.2%	0.004	-4.5%	0.004	0.0%	0.003	-23.4%	0.002	-36.0%	0.003	-10.8%	0.002	-44.0%	0.002	-44.2%	0.002	-42.3%	0.002	-44.2%	0.002	-44.2%	0.002	-44.2%
	Oct	0.002	0.002	-2.5%	0.002	-5.0%	0.002	0.0%	0.002	-23.9%	0.001	-36.5%	0.002	-11.3%	0.001	-44.1%	0.001	-44.2%	0.001	-42.9%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%
	Nov	0.001	0.001	-2.8%	0.001	-5.5%	0.001	0.0%	0.001	-24.4%	0.001	-37.1%	0.001	-11.8%	0.001	-44.1%	0.001	-44.2%	0.001	-43.4%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%
	Dec	0.001	0.001	-3.0%	0.001	-6.0%	0.001	0.0%	0.001	-25.0%	0.000	-37.6%	0.001	-12.3%	0.000	-44.2%	0.000	-44.2%	0.000	-43.9%	0.000	-44.2%	0.000	-44.2%	0.000	-44.2%
	Annual	0.002	0.002	-1.7%	0.002	-3.4%	0.002	0.0%	0.002	-22.3%	0.001	-34.9%	0.002	-9.7%	0.001	-43.9%	0.001	-44.2%	0.001	-41.2%	0.001	-44.2%	0.001	-44.2%	0.001	-44.2%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.005	0.005	-0.1%	0.005	-0.3%	0.005	0.0%	0.004	-19.2%	0.004	-31.8%	0.005	-6.6%	0.003	-43.7%	0.003	-44.2%	0.003	-38.1%	0.003	-44.2%	0.003	-44.2%	0.003	-44.2%
	Feb	0.004	0.004	-0.4%	0.004	-0.8%	0.004	0.0%	0.003	-19.7%	0.003	-32.3%	0.004	-7.1%	0.002	-43.7%	0.002	-44.2%	0.002	-38.6%	0.002	-44.2%	0.002	-44.2%	0.002	-44.2%
	Mar	0.003	0.003	-0.6%	0.003	-1.3%	0.003	0.0%	0.002	-20.2%	0.002	-32.9%	0.003	-7.6%	0.002	-43.8%	0.002	-44.2%	0.002	-39.2%	0.002	-44.2%	0.002	-44.2%	0.002	-44.2%
	Apr	0.003	0.003	-0.9%	0.003	-1.8%	0.003	0.0%	0.002	-20.7%	0.002	-33.4%	0.003	-8.1%	0.002	-43.8%	0.002	-44.2%	0.002	-39.7%	0.002	-44.2%	0.002	-44.2%	0.002	-44.2%
	May	0.037	0.037	-1.2%	0.037	-2.3%	0.037	0.0%	0.029	-21.3%	0.025	-33.9%	0.034	-8.6%	0.021	-43.8%	0.021	-44.2%	0.022	-40.2%	0.021	-44.2%	0.021	-44.2%	0.021	-44.2%
	Jun	0.051	0.050	-1.4%	0.050	-2.9%	0.051	0.0%	0.040	-21.8%	0.034	-34.4%	0.046	-9.2%	0.029	-43.9%	0.029	-44.2%	0.030	-40.7%	0.029	-44.2%	0.029	-44.2%	0.029	-44.2%
	Jul	0.030	0.029	-1.7%	0.029	-3.4%	0.030	0.0%	0.023	-22.3%	0.019	-34.9%	0.027	-9.7%	0.017	-44.0%	0.017	-44.2%	0.017	-41.3%	0.017	-44.2%	0.017	-44.2%	0.017	-44.2%
	Aug	0.021	0.020	-2.0%	0.020	-3.9%	0.021	0.0%	0.016	-22.9%	0.013	-35.5%	0.018	-10.2%	0.012	-44.0%	0.012	-44.2%	0.012	-41.8%	0.012	-44.2%	0.012	-44.2%	0.012	-44.2%
	Sep	0.015	0.015	-2.2%	0.014	-4.5%	0.015	0.0%	0.011	-23.4%	0.010	-36.0%	0.013	-10.8%	0.008	-44.0%	0.008	-44.2%	0.009	-42.3%	0.008	-44.2%	0.008	-44.2%	0.008	-44.2%
	Oct	0.011	0.011	-2.5%	0.011	-5.0%	0.011	0.0%	0.009	-23.9%	0.007	-36.5%	0.010	-11.3%	0.006	-44.1%	0.006	-44.2%	0.006	-42.9%	0.006	-44.2%	0.006	-44.2%	0.006	-44.2%
	Nov	0.014	0.013	-2.7%	0.013	-5.5%	0.014	0.0%	0.010	-24.4%	0.009	-37.0%	0.012	-11.8%	0.008	-44.1%	0.008	-44.2%	0.008	-43.4%	0.008	-44.2%	0.008	-44.2%	0.008	-44.2%
	Dec	0.009	0.008	-3.0%	0.008	-6.0%	0.009	0.0%	0.007	-25.0%	0.005	-37.6%	0.008	-12.3%	0.005	-44.2%	0.005	-44.2%	0.005	-43.9%	0.005	-44.2%	0.005	-44.2%	0.005	-44.2%
	Annual	0.017	0.017	-1.7%	0.016	-3.4%	0.017	0.0%	0.013	-22.3%	0.011	-34.9%	0.015	-9.7%	0.009	-43.9%	0.009	-44.2%	0.010	-41.2%	0.009	-44.2%	0.009	-44.2%	0.009	-44.2%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.2 Simulated Monthly Streamflows at Model Node QF02

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.002	0.002	-1.2%	0.002	-2.4%	0.002	0.0%	0.002	-21.8%	0.002	-33.4%	0.002	-10.2%	0.001	-44.3%	0.001	-44.8%	0.001	-39.2%	0.001	-44.8%	0.001	-44.8%	0.001	-44.8%
	Feb	0.002	0.001	-1.5%	0.001	-3.0%	0.002	0.0%	0.001	-22.3%	0.001	-33.9%	0.001	-10.7%	0.001	-44.3%	0.001	-44.7%	0.001	-39.7%	0.001	-44.7%	0.001	-44.7%	0.001	-44.7%
	Mar	0.001	0.001	-1.8%	0.001	-3.7%	0.001	0.0%	0.001	-22.7%	0.001	-34.3%	0.001	-11.1%	0.000	-44.4%	0.000	-44.7%	0.000	-40.1%	0.000	-44.7%	0.000	-44.7%	0.000	-44.7%
	Apr	0.001	0.001	-2.2%	0.001	-4.3%	0.001	0.0%	0.001	-23.2%	0.001	-34.8%	0.001	-11.6%	0.001	-44.4%	0.001	-44.7%	0.001	-40.6%	0.001	-44.7%	0.001	-44.7%	0.001	-44.7%
	May	0.014	0.014	-2.5%	0.013	-4.9%	0.014	0.0%	0.011	-23.7%	0.009	-35.3%	0.012	-12.1%	0.008	-44.4%	0.008	-44.7%	0.008	-41.1%	0.008	-44.7%	0.008	-44.7%	0.008	-44.7%
	Jun	0.014	0.014	-2.8%	0.014	-5.6%	0.014	0.0%	0.011	-24.2%	0.009	-35.8%	0.013	-12.6%	0.008	-44.5%	0.008	-44.7%	0.008	-41.6%	0.008	-44.7%	0.008	-44.7%	0.008	-44.7%
	Jul	0.008	0.008	-3.2%	0.008	-6.3%	0.008	-0.2%	0.006	-24.7%	0.005	-36.3%	0.007	-13.1%	0.005	-44.5%	0.005	-44.7%	0.005	-42.1%	0.005	-44.7%	0.005	-44.7%	0.005	-44.7%
	Aug	0.007	0.006	-3.7%	0.006	-7.0%	0.007	-0.5%	0.005	-25.2%	0.004	-36.8%	0.006	-13.5%	0.004	-44.6%	0.004	-44.7%	0.004	-42.6%	0.004	-44.7%	0.004	-44.7%	0.004	-44.7%
	Sep	0.008	0.007	-4.2%	0.007	-7.6%	0.008	-0.9%	0.006	-25.6%	0.005	-37.2%	0.007	-14.0%	0.004	-44.6%	0.004	-44.7%	0.004	-43.0%	0.004	-44.7%	0.004	-44.7%	0.004	-44.7%
	Oct	0.008	0.008	-4.7%	0.007	-8.3%	0.008	-1.2%	0.006	-26.1%	0.005	-37.7%	0.007	-14.5%	0.004	-44.6%	0.004	-44.7%	0.004	-43.5%	0.004	-44.7%	0.004	-44.7%	0.004	-44.7%
	Nov	0.007	0.007	-5.2%	0.007	-8.9%	0.007	-1.6%	0.005	-26.6%	0.004	-38.2%	0.006	-15.0%	0.004	-44.7%	0.004	-44.7%	0.004	-44.0%	0.004	-44.7%	0.004	-44.7%	0.004	-44.7%
	Dec	0.004	0.004	-5.7%	0.004	-9.6%	0.004	-1.9%	0.003	-27.1%	0.003	-38.7%	0.004	-15.5%	0.002	-44.7%	0.002	-44.7%	0.002	-44.5%	0.002	-44.7%	0.002	-44.7%	0.002	-44.7%
	Annual	0.006	0.006	-3.5%	0.006	-6.5%	0.006	-0.5%	0.005	-24.8%	0.004	-36.4%	0.006	-13.2%	0.004	-44.5%	0.004	-44.7%	0.004	-42.2%	0.004	-44.7%	0.004	-44.7%	0.004	-44.7%
1:25-Year Dry	Jan	0.000	0.000	-1.2%	0.000	-2.4%	0.000	0.0%	0.000	-21.8%	0.000	-33.4%	0.000	-10.2%	0.000	-44.3%	0.000	-44.7%	0.000	-39.2%	0.000	-44.7%	0.000	-44.7%	0.000	-44.7%
	Feb	0.000	0.000	-1.5%	0.000	-3.0%	0.000	0.0%	0.000	-22.3%	0.000	-33.8%	0.000	-10.6%	0.000	-44.3%	0.000	-44.8%	0.000	-39.7%	0.000	-44.8%	0.000	-44.8%	0.000	-44.8%
	Mar	0.000	0.000	-1.8%	0.000	-3.7%	0.000	0.0%	0.000	-22.7%	0.000	-34.3%	0.000	-11.1%	0.000	-44.4%	0.000	-44.8%	0.000	-40.1%	0.000	-44.8%	0.000	-44.8%	0.000	-44.8%
	Apr	0.000	0.000	-2.2%	0.000	-4.3%	0.000	0.0%	0.000	-23.2%	0.000	-34.8%	0.000	-11.6%	0.000	-44.4%	0.000	-44.7%	0.000	-40.6%	0.000	-44.7%	0.000	-44.7%	0.000	-44.7%
	May	0.005	0.005	-2.5%	0.005	-5.0%	0.005	0.0%	0.004	-23.7%	0.003	-35.3%	0.005	-12.1%	0.003	-44.4%	0.003	-44.7%	0.003	-41.1%	0.003	-44.7%	0.003	-44.7%	0.003	-44.7%
	Jun	0.004	0.004	-2.8%	0.004	-5.6%	0.004	0.0%	0.003	-24.2%	0.003	-35.8%	0.003	-12.6%	0.002	-44.5%	0.002	-44.7%	0.002	-41.6%	0.002	-44.7%	0.002	-44.7%	0.002	-44.7%
	Jul	0.001	0.001	-3.2%	0.001	-6.3%	0.001	-0.2%	0.001	-24.7%	0.001	-36.3%	0.001	-13.1%	0.001	-44.5%	0.001	-44.7%	0.001	-42.1%	0.001	-44.7%	0.001	-44.7%	0.001	-44.7%
	Aug	0.003	0.003	-3.7%	0.003	-7.0%	0.003	-0.5%	0.002	-25.2%	0.002	-36.8%	0.002	-13.5%	0.002	-44.6%	0.002	-44.7%	0.002	-42.6%	0.002	-44.7%	0.002	-44.7%	0.002	-44.7%
	Sep	0.003	0.003	-4.2%	0.003	-7.6%	0.003	-0.9%	0.002	-25.6%	0.002	-37.2%	0.002	-14.0%	0.002	-44.6%	0.002	-44.7%	0.002	-43.0%	0.002	-44.7%	0.002	-44.7%	0.002	-44.7%
	Oct	0.001	0.001	-4.7%	0.001	-8.3%	0.001	-1.2%	0.001	-26.1%	0.001	-37.7%	0.001	-14.5%	0.001	-44.6%	0.001	-44.7%	0.001	-43.5%	0.001	-44.7%	0.001	-44.7%	0.001	-44.7%
	Nov	0.001	0.001	-5.2%	0.001	-8.9%	0.001	-1.5%	0.000	-26.6%	0.000	-38.2%	0.001	-15.0%	0.000	-44.7%	0.000	-44.7%	0.000	-44.0%	0.000	-44.7%	0.000	-44.7%	0.000	-44.7%
	Dec	0.001	0.000	-5.7%	0.000	-9.6%	0.000	-1.9%	0.000	-27.1%	0.000	-38.7%	0.000	-15.5%	0.000	-44.7%	0.000	-44.7%	0.000	-44.5%	0.000	-44.7%	0.000	-44.7%	0.000	-44.7%
	Annual	0.002	0.002	-3.3%	0.002	-6.3%	0.002	-0.4%	0.001	-24.6%	0.001	-36.2%	0.001	-13.0%	0.001	-44.5%	0.001	-44.7%	0.001	-42.0%	0.001	-44.7%	0.001	-44.7%	0.001	-44.7%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.004	0.004	-1.2%	0.004	-2.4%	0.004	0.0%	0.003	-21.8%	0.003	-33.4%	0.003	-10.2%	0.002	-44.3%	0.002	-44.7%	0.002	-39.2%	0.002	-44.7%	0.002	-44.7%	0.002	-44.7%
	Feb	0.003	0.003	-1.5%	0.003	-3.1%	0.003	0.0%	0.002	-22.3%	0.002	-33.8%	0.003	-10.7%	0.002	-44.3%	0.002	-44.7%	0.002	-39.7%	0.002	-44.7%	0.002	-44.7%	0.002	-44.7%
	Mar	0.002	0.002	-1.8%	0.002	-3.7%	0.002	0.0%	0.002	-22.7%	0.001	-34.3%	0.002	-11.1%	0.001	-44.4%	0.001	-44.8%	0.001	-40.1%	0.001	-44.8%	0.001	-44.8%	0.001	-44.8%
	Apr	0.002	0.002	-2.2%	0.002	-4.3%	0.002	0.0%	0.002	-23.2%	0.001	-34.8%	0.002	-11.6%	0.001	-44.4%	0.001	-44.8%	0.001	-40.6%	0.001	-44.8%	0.001	-44.8%	0.001	-44.8%
	May	0.027	0.027	-2.5%	0.026	-5.0%	0.027	0.0%	0.021	-23.7%	0.018	-35.3%	0.024	-12.1%	0.015	-44.4%	0.015	-44.7%	0.016	-41.1%	0.015	-44.7%	0.015	-44.7%	0.015	-44.7%
	Jun	0.037	0.036	-2.8%	0.035	-5.7%	0.037	0.0%	0.028	-24.2%	0.024	-35.8%	0.033	-12.6%	0.021	-44.5%	0.021	-44.7%	0.022	-41.6%	0.021	-44.7%	0.021	-44.7%	0.021	-44.7%
	Jul	0.022	0.021	-3.2%	0.020	-6.3%	0.022	-0.1%	0.016	-24.6%	0.014	-36.2%	0.019	-13.0%	0.012	-44.5%	0.012	-44.7%	0.013	-42.1%	0.012	-44.7%	0.012	-44.7%	0.012	-44.7%
	Aug	0.015	0.015	-3.7%	0.014	-7.0%	0.015	-0.5%	0.011	-25.1%	0.010	-36.7%	0.013	-13.5%	0.008	-44.5%	0.008	-44.7%	0.009	-42.5%	0.008	-44.7%	0.008	-44.7%	0.008	-44.7%
	Sep	0.011	0.010	-4.3%	0.010	-7.7%	0.011	-0.9%	0.008	-25.7%	0.007	-37.3%	0.009	-14.1%	0.006	-44.6%	0.006	-44.8%	0.006	-43.1%	0.006	-44.8%	0.006	-44.8%	0.006	-44.8%
	Oct	0.008	0.008	-4.7%	0.008	-8.3%	0.008	-1.2%	0.006	-26.1%	0.005	-37.7%	0.007	-14.5%	0.005	-44.6%	0.005	-44.7%	0.005	-43.5%	0.005	-44.7%	0.005	-44.7%	0.005	-44.7%
	Nov	0.010	0.010	-5.3%	0.009	-9.0%	0.010	-1.6%	0.007	-26.6%	0.006	-38.2%	0.009	-15.0%	0.006	-44.7%	0.006	-44.8%	0.006	-44.0%	0.006	-44.8%	0.006	-44.8%	0.006	-44.8%
	Dec	0.006	0.006	-5.7%	0.006	-9.6%	0.006	-1.9%	0.005	-27.1%	0.004	-38.7%	0.005	-15.5%	0.004	-44.7%	0.004	-44.7%	0.004	-44.5%	0.004	-44.7%	0.004	-44.7%	0.004	-44.7%
	Annual	0.012	0.012	-3.3%	0.012	-6.3%	0.012	-0.4%	0.009	-24.6%	0.008	-36.2%	0.011	-13.0%	0.007	-44.5%	0.007	-44.7%	0.007	-42.0%	0.007	-44.7%	0.007	-44.7%	0.007	-44.7%

Note:

Changes lower than 0.1% are shown as 0.0%.

Table A.3 Simulated Monthly Streamflows at Model Node QF03

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.009	0.009	-0.1%	0.009	-0.1%	0.009	0.0%	0.008	-9.2%	0.008	-15.3%	0.009	-3.2%	0.007	-21.0%	0.007	-21.2%	0.007	-18.3%	0.007	-21.2%	0.007	-21.2%	0.007	-21.2%
	Feb	0.006	0.006	-0.2%	0.006	-0.4%	0.006	0.0%	0.005	-9.5%	0.005	-15.5%	0.006	-3.4%	0.005	-21.0%	0.005	-21.2%	0.005	-18.6%	0.005	-21.2%	0.005	-21.2%	0.005	-21.2%
	Mar	0.003	0.003	-0.3%	0.003	-0.6%	0.003	0.0%	0.003	-9.7%	0.003	-15.8%	0.003	-3.7%	0.002	-21.0%	0.002	-21.2%	0.003	-18.8%	0.002	-21.2%	0.002	-21.2%	0.002	-21.2%
	Apr	0.006	0.006	-0.4%	0.006	-0.9%	0.006	0.0%	0.005	-10.0%	0.005	-16.0%	0.005	-3.9%	0.004	-21.1%	0.004	-21.2%	0.005	-19.1%	0.004	-21.2%	0.004	-21.2%	0.004	-21.2%
	May	0.055	0.055	-0.6%	0.054	-1.1%	0.055	0.0%	0.049	-10.2%	0.046	-16.3%	0.053	-4.1%	0.043	-21.1%	0.043	-21.2%	0.044	-19.3%	0.043	-21.2%	0.043	-21.2%	0.043	-21.2%
	Jun	0.056	0.056	-0.7%	0.056	-1.4%	0.056	0.0%	0.050	-10.5%	0.047	-16.5%	0.054	-4.4%	0.044	-21.1%	0.044	-21.2%	0.045	-19.6%	0.044	-21.2%	0.044	-21.2%	0.044	-21.2%
	Jul	0.032	0.032	-0.8%	0.031	-1.6%	0.032	0.0%	0.028	-10.7%	0.027	-16.8%	0.030	-4.6%	0.025	-21.1%	0.025	-21.2%	0.026	-19.8%	0.025	-21.2%	0.025	-21.2%	0.025	-21.2%
	Aug	0.026	0.026	-0.9%	0.026	-1.9%	0.026	0.0%	0.023	-11.0%	0.022	-17.1%	0.025	-4.9%	0.021	-21.1%	0.021	-21.2%	0.021	-20.1%	0.021	-21.2%	0.021	-21.2%	0.021	-21.2%
	Sep	0.030	0.030	-1.1%	0.029	-2.1%	0.030	0.0%	0.026	-11.2%	0.025	-17.3%	0.028	-5.2%	0.024	-21.2%	0.024	-21.2%	0.024	-20.3%	0.024	-21.2%	0.024	-21.2%	0.024	-21.2%
	Oct	0.031	0.030	-1.2%	0.030	-2.4%	0.031	0.0%	0.027	-11.5%	0.025	-17.5%	0.029	-5.4%	0.024	-21.2%	0.024	-21.2%	0.024	-20.6%	0.024	-21.2%	0.024	-21.2%	0.024	-21.2%
	Nov	0.028	0.028	-1.3%	0.027	-2.6%	0.028	0.0%	0.025	-11.7%	0.023	-17.8%	0.027	-5.7%	0.022	-21.2%	0.022	-21.2%	0.022	-20.8%	0.022	-21.2%	0.022	-21.2%	0.022	-21.2%
	Dec	0.018	0.017	-1.4%	0.017	-2.9%	0.018	0.0%	0.015	-12.0%	0.014	-18.1%	0.017	-6.0%	0.014	-21.3%	0.014	-21.3%	0.014	-21.1%	0.014	-21.3%	0.014	-21.3%	0.014	-21.3%
	Annual	0.025	0.025	-0.9%	0.025	-1.7%	0.025	0.0%	0.022	-10.8%	0.021	-16.9%	0.024	-4.7%	0.020	-21.1%	0.020	-21.2%	0.020	-19.9%	0.020	-21.2%	0.020	-21.2%	0.020	-21.2%
1:25-Year Dry	Jan	0.001	0.001	-0.1%	0.001	-0.2%	0.001	0.0%	0.001	-9.2%	0.001	-15.3%	0.001	-3.2%	0.001	-21.0%	0.001	-21.2%	0.001	-18.3%	0.001	-21.2%	0.001	-21.2%	0.001	-21.2%
	Feb	0.001	0.001	-0.2%	0.001	-0.4%	0.001	0.0%	0.001	-9.5%	0.001	-15.5%	0.001	-3.4%	0.001	-21.0%	0.001	-21.2%	0.001	-18.6%	0.001	-21.2%	0.001	-21.2%	0.001	-21.2%
	Mar	0.001	0.001	-0.3%	0.001	-0.6%	0.001	0.0%	0.001	-9.7%	0.001	-15.8%	0.001	-3.6%	0.001	-21.0%	0.001	-21.2%	0.001	-18.8%	0.001	-21.2%	0.001	-21.2%	0.001	-21.2%
	Apr	0.001	0.001	-0.4%	0.001	-0.9%	0.001	0.0%	0.001	-10.0%	0.001	-16.0%	0.001	-3.9%	0.001	-21.1%	0.001	-21.2%	0.001	-19.1%	0.001	-21.2%	0.001	-21.2%	0.001	-21.2%
	May	0.020	0.020	-0.6%	0.020	-1.1%	0.020	0.0%	0.018	-10.2%	0.017	-16.3%	0.019	-4.1%	0.016	-21.1%	0.016	-21.3%	0.016	-19.4%	0.016	-21.3%	0.016	-21.3%	0.016	-21.3%
	Jun	0.016	0.016	-0.7%	0.015	-1.4%	0.016	0.0%	0.014	-10.5%	0.013	-16.5%	0.015	-4.4%	0.012	-21.1%	0.012	-21.3%	0.013	-19.6%	0.012	-21.3%	0.012	-21.3%	0.012	-21.3%
	Jul	0.004	0.004	-0.8%	0.004	-1.6%	0.004	0.0%	0.004	-10.7%	0.004	-16.8%	0.004	-4.7%	0.003	-21.1%	0.003	-21.2%	0.003	-19.8%	0.003	-21.2%	0.003	-21.2%	0.003	-21.2%
	Aug	0.011	0.011	-1.0%	0.011	-1.9%	0.011	0.0%	0.010	-11.0%	0.009	-17.0%	0.011	-4.9%	0.009	-21.1%	0.009	-21.2%	0.009	-20.1%	0.009	-21.2%	0.009	-21.2%	0.009	-21.2%
	Sep	0.011	0.011	-1.1%	0.011	-2.1%	0.011	0.0%	0.010	-11.2%	0.009	-17.3%	0.010	-5.1%	0.009	-21.2%	0.009	-21.2%	0.009	-20.4%	0.009	-21.2%	0.009	-21.2%	0.009	-21.2%
	Oct	0.006	0.006	-1.2%	0.006	-2.4%	0.006	0.0%	0.005	-11.5%	0.005	-17.6%	0.005	-5.4%	0.005	-21.2%	0.005	-21.2%	0.005	-20.6%	0.005	-21.2%	0.005	-21.2%	0.005	-21.2%
	Nov	0.003	0.003	-1.3%	0.003	-2.6%	0.003	0.0%	0.002	-11.8%	0.002	-17.8%	0.002	-5.7%	0.002	-21.2%	0.002	-21.2%	0.002	-20.9%	0.002	-21.2%	0.002	-21.2%	0.002	-21.2%
	Dec	0.002	0.002	-1.4%	0.002	-2.9%	0.002	0.0%	0.002	-12.0%	0.002	-18.0%	0.002	-5.9%	0.002	-21.2%	0.002	-21.2%	0.002	-21.1%	0.002	-21.2%	0.002	-21.2%	0.002	-21.2%
	Annual	0.006	0.006	-0.8%	0.006	-1.6%	0.006	0.0%	0.006	-10.7%	0.005	-16.8%	0.006	-4.6%	0.005	-21.1%	0.005	-21.2%	0.005	-19.8%	0.005	-21.2%	0.005	-21.2%	0.005	-21.2%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.015	0.015	-0.1%	0.015	-0.1%	0.015	0.0%	0.014	-9.2%	0.013	-15.3%	0.015	-3.2%	0.012	-21.0%	0.012	-21.3%	0.012	-18.3%	0.012	-21.3%	0.012	-21.3%	0.012	-21.3%
	Feb	0.011	0.011	-0.2%	0.011	-0.4%	0.011	0.0%	0.010	-9.5%	0.009	-15.6%	0.011	-3.5%	0.009	-21.0%	0.009	-21.3%	0.009	-18.6%	0.009	-21.3%	0.009	-21.3%	0.009	-21.3%
	Mar	0.008	0.008	-0.3%	0.008	-0.6%	0.008	0.0%	0.008	-9.7%	0.007	-15.8%	0.008	-3.6%	0.007	-21.0%	0.007	-21.2%	0.007	-18.8%	0.007	-21.2%	0.007	-21.2%	0.007	-21.2%
	Apr	0.008	0.008	-0.4%	0.008	-0.9%	0.008	0.0%	0.008	-10.0%	0.007	-16.0%	0.008	-3.9%	0.007	-21.1%	0.007	-21.2%	0.007	-19.1%	0.007	-21.2%	0.007	-21.2%	0.007	-21.2%
	May	0.107	0.107	-0.6%	0.106	-1.1%	0.107	0.0%	0.096	-10.3%	0.090	-16.3%	0.103	-4.2%	0.085	-21.1%	0.084	-21.3%	0.086	-19.4%	0.084	-21.3%	0.084	-21.3%	0.084	-21.3%
	Jun	0.147	0.146	-0.7%	0.145	-1.4%	0.147	0.0%	0.131	-10.5%	0.122	-16.5%	0.140	-4.4%	0.116	-21.1%	0.115	-21.2%	0.118	-19.6%	0.115	-21.2%	0.115	-21.2%	0.115	-21.2%
	Jul	0.085	0.085	-0.8%	0.084	-1.6%	0.085	0.0%	0.076	-10.7%	0.071	-16.8%	0.081	-4.7%	0.067	-21.1%	0.067	-21.2%	0.068	-19.8%	0.067	-21.2%	0.067	-21.2%	0.067	-21.2%
	Aug	0.059	0.058	-0.9%	0.058	-1.9%	0.059	0.0%	0.053	-11.0%	0.049	-17.1%	0.056	-4.9%	0.047	-21.1%	0.047	-21.2%	0.047	-20.1%	0.047	-21.2%	0.047	-21.2%	0.047	-21.2%
	Sep	0.043	0.042	-1.1%	0.042	-2.1%	0.043	0.0%	0.038	-11.3%	0.035	-17.3%	0.041	-5.2%	0.034	-21.2%	0.034	-21.2%	0.034	-20.4%	0.034	-21.2%	0.034	-21.2%	0.034	-21.2%
	Oct	0.032	0.032	-1.2%	0.031	-2.4%	0.032	0.0%	0.029	-11.5%	0.027	-17.6%	0.031	-5.4%	0.025	-21.2%	0.025	-21.2%	0.026	-20.6%	0.025	-21.2%	0.025	-21.2%	0.025	-21.2%
	Nov	0.039	0.039	-1.3%	0.038	-2.6%	0.039	0.0%	0.035	-11.7%	0.032	-17.8%	0.037	-5.7%	0.031	-21.2%	0.031	-21.2%	0.031	-20.8%	0.031	-21.2%	0.031	-21.2%	0.031	-21.2%
	Dec	0.025	0.025	-1.4%	0.024	-2.9%	0.025	0.0%	0.022	-12.0%	0.020	-18.1%	0.024	-5.9%	0.020	-21.2%	0.020	-21.2%	0.020	-21.1%	0.020	-21.2%	0.020	-21.2%	0.020	-21.2%
	Annual	0.049	0.048	-0.8%	0.048	-1.6%	0.049	0.0%	0.043	-10.7%	0.040	-16.8%	0.046	-4.6%	0.038	-21.1%	0.038	-21.2%	0.039	-19.8%	0.038	-21.2%	0.038	-21.2%	0.038	-21.2%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.4 Simulated Monthly Streamflows at Model Node QF05

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.038	0.038	-0.1%	0.038	-0.2%	0.038	0.0%	0.052	39.0%	0.043	15.2%	0.057	50.6%	0.029	-23.4%	0.022	-41.8%	0.036	-4.3%	0.056	50.0%	0.036	-3.8%	0.057	50.5%
	Feb	0.025	0.025	-0.2%	0.025	-0.3%	0.025	0.0%	0.040	60.5%	0.031	23.6%	0.045	80.7%	0.018	-29.8%	0.012	-52.6%	0.025	-1.8%	0.045	78.8%	0.040	59.7%	0.045	79.0%
	Mar	0.013	0.015	11.4%	0.013	0.0%	0.016	22.8%	0.029	120.3%	0.020	47.6%	0.035	164.6%	0.008	-42.9%	0.004	-72.9%	0.014	4.8%	0.034	159.4%	0.034	159.4%	0.034	159.4%
	Apr	0.024	0.026	11.3%	0.024	0.0%	0.029	22.6%	0.047	99.4%	0.036	50.8%	0.058	144.4%	0.016	-30.4%	0.011	-54.8%	0.023	-1.2%	0.057	139.4%	0.057	139.4%	0.057	139.4%
	May	0.232	0.234	0.9%	0.232	0.0%	0.236	1.8%	0.248	6.8%	0.239	3.1%	0.255	9.7%	0.206	-11.2%	0.200	-13.7%	0.213	-8.3%	0.248	7.0%	0.248	7.0%	0.248	7.0%
	Jun	0.239	0.240	0.5%	0.239	0.0%	0.241	1.0%	0.244	2.4%	0.239	0.1%	0.247	3.6%	0.212	-11.1%	0.206	-13.6%	0.219	-8.3%	0.238	-0.1%	0.238	-0.1%	0.238	-0.1%
	Jul	0.135	0.136	1.1%	0.135	0.1%	0.138	2.1%	0.146	8.6%	0.141	4.2%	0.151	12.1%	0.118	-12.6%	0.112	-17.0%	0.125	-7.7%	0.145	7.8%	0.145	7.8%	0.145	7.8%
	Aug	0.111	0.115	3.1%	0.114	2.3%	0.116	4.0%	0.123	10.5%	0.116	4.6%	0.127	14.6%	0.096	-13.3%	0.090	-18.6%	0.103	-7.4%	0.123	10.2%	0.123	10.2%	0.123	10.2%
	Sep	0.126	0.130	2.9%	0.129	2.3%	0.131	3.5%	0.141	11.2%	0.132	4.5%	0.146	15.5%	0.110	-12.7%	0.104	-17.5%	0.117	-7.6%	0.142	12.4%	0.142	12.4%	0.142	12.4%
	Oct	0.131	0.135	3.5%	0.135	3.5%	0.135	3.5%	0.144	10.2%	0.136	3.9%	0.148	13.6%	0.114	-12.5%	0.108	-17.2%	0.121	-7.6%	0.146	11.8%	0.146	11.8%	0.146	11.8%
	Nov	0.119	0.125	5.3%	0.124	3.9%	0.127	6.8%	0.131	9.8%	0.123	3.5%	0.134	12.4%	0.104	-12.8%	0.098	-18.0%	0.110	-7.4%	0.132	10.8%	0.132	10.8%	0.132	10.8%
	Dec	0.074	0.083	11.4%	0.079	6.2%	0.087	16.6%	0.088	18.0%	0.079	6.4%	0.091	22.9%	0.063	-14.9%	0.057	-23.5%	0.070	-6.4%	0.090	20.8%	0.090	20.8%	0.090	20.8%
	Annual	0.106	0.109	2.8%	0.108	1.5%	0.110	4.1%	0.120	13.1%	0.112	5.3%	0.125	17.9%	0.092	-13.6%	0.086	-19.1%	0.098	-7.3%	0.122	14.9%	0.120	12.9%	0.122	14.9%
1:25-Year Dry	Jan	0.005	0.005	-0.1%	0.005	-0.2%	0.005	0.0%	0.021	306.6%	0.011	125.3%	0.026	404.3%	0.002	-56.2%	0.001	-72.8%	0.006	17.2%	0.026	407.6%	0.006	24.7%	0.026	415.7%
	Feb	0.005	0.005	-0.1%	0.005	-0.3%	0.005	0.0%	0.020	331.8%	0.011	132.5%	0.026	445.4%	0.002	-55.8%	0.001	-72.8%	0.006	20.2%	0.025	434.7%	0.006	27.8%	0.026	443.3%
	Mar	0.004	0.005	36.2%	0.004	0.0%	0.007	72.4%	0.020	399.8%	0.010	158.0%	0.026	547.4%	0.002	-55.5%	0.001	-72.9%	0.005	26.5%	0.025	520.1%	0.005	35.0%	0.025	530.4%
	Apr	0.004	0.007	59.1%	0.004	0.0%	0.010	118.3%	0.026	497.6%	0.015	245.5%	0.036	717.8%	0.002	-54.5%	0.001	-72.8%	0.005	24.5%	0.034	682.0%	0.006	31.9%	0.035	695.8%
	May	0.085	0.087	2.6%	0.085	0.0%	0.089	5.1%	0.102	20.5%	0.093	9.8%	0.110	29.5%	0.071	-15.8%	0.066	-21.7%	0.079	-7.3%	0.105	24.2%	0.079	-7.0%	0.106	24.9%
	Jun	0.066	0.067	1.6%	0.066	0.0%	0.068	3.3%	0.072	9.7%	0.067	1.1%	0.075	14.2%	0.054	-17.6%	0.049	-25.2%	0.062	-6.8%	0.068	3.1%	0.062	-6.4%	0.068	3.3%
	Jul	0.018	0.020	11.2%	0.020	10.0%	0.021	12.3%	0.026	40.9%	0.021	13.6%	0.029	57.7%	0.011	-39.3%	0.006	-67.9%	0.018	-0.5%	0.022	21.3%	0.019	0.9%	0.022	21.7%
	Aug	0.047	0.050	5.9%	0.048	2.8%	0.051	9.1%	0.053	14.3%	0.049	5.8%	0.056	20.5%	0.037	-20.8%	0.032	-31.9%	0.044	-5.7%	0.050	6.0%	0.044	-5.2%	0.050	6.3%
	Sep	0.046	0.049	7.2%	0.048	5.0%	0.050	9.3%	0.058	26.4%	0.051	10.3%	0.063	36.1%	0.036	-20.8%	0.031	-32.3%	0.043	-5.6%	0.059	27.2%	0.044	-5.1%	0.059	27.9%
	Oct	0.024	0.029	20.5%	0.029	18.8%	0.030	22.2%	0.041	69.2%	0.031	28.6%	0.048	94.9%	0.017	-30.8%	0.011	-53.2%	0.024	-2.4%	0.046	89.1%	0.024	-1.4%	0.046	90.6%
	Nov	0.011	0.018	64.0%	0.016	42.6%	0.020	85.3%	0.027	151.7%	0.018	61.3%	0.033	202.8%	0.006	-46.1%	0.003	-72.8%	0.012	6.2%	0.032	194.9%	0.012	8.3%	0.032	196.9%
	Dec	0.008	0.017	106.2%	0.013	55.3%	0.022	157.0%	0.025	196.4%	0.015	75.6%	0.030	257.1%	0.004	-47.3%	0.002	-72.8%	0.009	11.2%	0.029	245.2%	0.010	13.8%	0.029	247.6%
	Annual	0.027	0.030	11.2%	0.029	6.0%	0.032	16.5%	0.041	51.9%	0.033	21.1%	0.047	71.5%	0.021	-24.1%	0.017	-36.3%	0.026	-3.4%	0.044	60.5%	0.026	-2.4%	0.044	61.7%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.065	0.064	-0.9%	0.064	-1.8%	0.065	0.0%	0.078	20.2%	0.069	6.6%	0.082	26.4%	0.055	-15.2%	0.046	-29.1%	0.081	25.8%	0.081	25.8%	0.081	25.8%	0.081	25.8%
	Feb	0.048	0.047	-1.1%	0.046	-2.3%	0.048	0.0%	0.061	29.1%	0.052	9.8%	0.066	39.1%	0.040	-16.9%	0.032	-33.4%	0.065	37.7%	0.065	37.7%	0.065	37.7%	0.065	37.7%
	Mar	0.036	0.037	2.9%	0.036	0.0%	0.038	5.9%	0.051	40.0%	0.041	13.7%	0.056	55.4%	0.029	-19.2%	0.021	-41.2%	0.056	52.8%	0.056	52.8%	0.056	52.8%	0.056	52.8%
	Apr	0.037	0.039	5.9%	0.037	0.0%	0.041	11.8%	0.062	68.8%	0.050	35.3%	0.074	102.6%	0.031	-15.6%	0.021	-41.6%	0.073	99.5%	0.073	99.5%	0.073	99.5%	0.073	99.5%
	May	0.455	0.455	0.2%	0.454	-0.2%	0.457	0.6%	0.465	2.3%	0.458	0.7%	0.469	3.2%	0.412	-9.4%	0.402	-11.7%	0.459	1.0%	0.459	1.0%	0.459	1.0%	0.459	1.0%
	Jun	0.620	0.621	0.0%	0.620	0.0%	0.621	0.1%	0.614	-1.0%	0.609	-1.9%	0.619	-0.2%	0.562	-9.4%	0.553	-10.8%	0.595	-4.0%	0.595	-4.0%	0.595	-4.0%	0.595	-4.0%
	Jul	0.361	0.362	0.4%	0.361	0.0%	0.363	0.7%	0.369	2.4%	0.364	1.0%	0.373	3.3%	0.327	-9.4%	0.317	-12.1%	0.364	0.8%	0.364	0.8%	0.364	0.8%	0.364	0.8%
	Aug	0.250	0.253	1.4%	0.253	1.0%	0.254	1.8%	0.261	4.5%	0.255	2.0%	0.265	6.2%	0.226	-9.7%	0.217	-13.4%	0.259	3.8%	0.259	3.8%	0.259	3.8%	0.259	3.8%
	Sep	0.182	0.185	1.6%	0.185	1.4%	0.186	1.9%	0.198	8.6%	0.188	3.2%	0.205	12.2%	0.164	-10.2%	0.154	-15.4%	0.201	10.0%	0.201	10.0%	0.201	10.0%	0.201	10.0%
	Oct	0.138	0.141	2.2%	0.141	2.1%	0.142	2.3%	0.152	9.6%	0.143	3.0%	0.157	13.4%	0.123	-11.3%	0.114	-17.9%	0.155	11.9%	0.155	11.9%	0.155	11.9%	0.155	11.9%
	Nov	0.168	0.173	2.8%	0.172	1.9%	0.175	3.7%	0.177	5.1%	0.170	1.2%	0.179	6.5%	0.152	-9.8%	0.141	-16.1%	0.177	5.1%	0.177	5.1%	0.177	5.1%	0.177	5.1%
	Dec	0.107	0.114	6.9%	0.110	3.5%	0.118	10.4%	0.118	10.7%	0.110	3.1%	0.121	13.6%	0.096	-10.1%	0.085	-20.0%	0.119	11.9%	0.119	11.9%	0.119	11.9%	0.119	11.9%
	Annual	0.206	0.209	1.1%	0.207	0.5%	0.210	1.7%	0.218	5.6%	0.210	1.7%	0.223	8.1%	0.185	-10.2%	0.176	-14.7%	0.218	5.6%	0.218	5.6%	0.218	5.6%	0.218	5.6%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.5 Simulated Monthly Streamflows at Model Node QF06

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.017	0.017	0.0%	0.017	0.0%	0.017	0.0%	0.017	0.0%	0.017	0.0%	0.017	0.0%	0.017	0.1%	0.017	0.0%	0.017	0.1%	0.017	0.1%	0.017	0.1%	0.017	0.1%
	Feb	0.011	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.1%	0.011	0.0%	0.011	0.2%	0.011	0.2%	0.011	0.2%	0.011	0.2%
	Mar	0.006	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.2%	0.006	0.0%	0.006	0.4%	0.006	0.4%	0.006	0.4%	0.006	0.4%
	Apr	0.010	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.1%	0.010	0.0%	0.010	0.2%	0.010	0.2%	0.010	0.2%	0.010	0.2%
	May	0.102	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%	0.102	0.0%
	Jun	0.105	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%	0.105	0.0%
	Jul	0.059	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%	0.059	0.0%
	Aug	0.049	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%	0.049	0.0%
	Sep	0.056	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%	0.056	0.0%
	Oct	0.057	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%	0.057	0.0%
	Nov	0.052	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%	0.052	0.0%
	Dec	0.033	0.033	0.0%	0.033	0.0%	0.033	0.0%	0.033	0.0%	0.033	0.0%	0.033	0.0%	0.033	0.0%	0.033	0.0%	0.033	0.1%	0.033	0.1%	0.033	0.1%	0.033	0.1%
	Annual	0.047	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%
1:25-Year Dry	Jan	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.6%	0.002	0.0%	0.002	1.0%	0.002	1.0%	0.002	1.0%	0.002	1.0%
	Feb	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.6%	0.002	0.0%	0.002	1.1%	0.002	1.1%	0.002	1.1%	0.002	1.1%
	Mar	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.8%	0.002	0.1%	0.002	1.2%	0.002	1.3%	0.002	1.2%	0.002	1.2%
	Apr	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.7%	0.002	0.1%	0.002	1.1%	0.002	1.1%	0.002	1.1%	0.002	1.1%
	May	0.037	0.037	0.0%	0.037	0.0%	0.037	0.0%	0.037	0.0%	0.037	0.0%	0.037	0.0%	0.037	0.0%	0.037	0.0%	0.037	0.1%	0.037	0.1%	0.037	0.1%	0.037	0.1%
	Jun	0.029	0.029	0.0%	0.029	0.0%	0.029	0.0%	0.029	0.0%	0.029	0.0%	0.029	0.0%	0.029	0.0%	0.029	0.0%	0.029	0.1%	0.029	0.1%	0.029	0.1%	0.029	0.1%
	Jul	0.008	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.2%	0.008	0.0%	0.008	0.3%	0.008	0.3%	0.008	0.3%	0.008	0.3%
	Aug	0.021	0.021	0.0%	0.021	0.0%	0.021	0.0%	0.021	0.0%	0.021	0.0%	0.021	0.0%	0.021	0.1%	0.021	0.0%	0.021	0.1%	0.021	0.1%	0.021	0.1%	0.021	0.1%
	Sep	0.020	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.1%	0.020	0.0%	0.020	0.1%	0.020	0.1%	0.020	0.1%	0.020	0.1%
	Oct	0.011	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.0%	0.011	0.1%	0.011	0.0%	0.011	0.2%	0.011	0.2%	0.011	0.2%	0.011	0.2%
	Nov	0.005	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.3%	0.005	0.0%	0.005	0.5%	0.005	0.5%	0.005	0.5%	0.005	0.5%
	Dec	0.004	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.4%	0.004	0.1%	0.004	0.6%	0.004	0.6%	0.004	0.6%	0.004	0.6%
	Annual	0.012	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.1%	0.012	0.0%	0.012	0.2%	0.012	0.2%	0.012	0.2%	0.012	0.2%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.028	0.028	0.0%	0.028	0.0%	0.028	0.0%	0.028	0.0%	0.028	0.0%	0.028	0.0%	0.028	0.0%	0.028	0.0%	0.028	0.1%	0.028	0.1%	0.028	0.1%	0.028	0.1%
	Feb	0.020	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.1%	0.020	0.0%	0.021	0.1%	0.021	0.1%	0.021	0.1%	0.021	0.1%
	Mar	0.016	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.1%	0.016	0.0%	0.016	0.1%	0.016	0.1%	0.016	0.1%	0.016	0.1%
	Apr	0.016	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.0%	0.016	0.1%	0.016	0.0%	0.016	0.1%	0.016	0.1%	0.016	0.1%	0.016	0.1%
	May	0.199	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%	0.199	0.0%
	Jun	0.273	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%	0.273	0.0%
	Jul	0.159	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%	0.159	0.0%
	Aug	0.110	0.110	0.0%	0.110	0.0%	0.110	0.0%	0.110	0.0%	0.110	0.0%	0.110	0.0%	0.110	0.1%	0.110	0.0%	0.110	0.1%	0.110	0.1%	0.110	0.1%	0.110	0.1%
	Sep	0.080	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%	0.080	0.0%
	Oct	0.060	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%	0.060	0.0%
	Nov	0.073	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%	0.073	0.0%
	Dec	0.046	0.046	0.0%	0.046	0.0%	0.046	0.0%	0.046	0.0%	0.046	0.0%	0.046	0.0%	0.046	0.0%	0.046	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%	0.047	0.0%
	Annual	0.090	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%	0.090	0.0%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.6 Simulated Monthly Streamflows at Model Node QF07

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.081	0.081	0.0%	0.081	-0.1%	0.081	0.0%	0.096	18.1%	0.087	7.1%	0.100	23.5%	0.072	-10.9%	0.065	-19.4%	0.080	-2.0%	0.100	23.2%	0.080	-1.7%	0.100	23.5%
	Feb	0.054	0.054	-0.1%	0.054	-0.1%	0.054	0.0%	0.069	28.1%	0.060	10.9%	0.074	37.4%	0.047	-13.8%	0.041	-24.4%	0.054	-0.8%	0.074	36.6%	0.069	27.7%	0.074	36.7%
	Mar	0.029	0.030	5.3%	0.029	0.0%	0.032	10.6%	0.045	55.9%	0.035	22.1%	0.051	76.5%	0.023	-19.9%	0.019	-33.8%	0.029	2.3%	0.050	74.1%	0.050	74.1%	0.050	74.1%
	Apr	0.051	0.054	5.2%	0.051	0.0%	0.056	10.5%	0.074	46.1%	0.063	23.6%	0.085	67.1%	0.044	-14.1%	0.038	-25.5%	0.051	-0.5%	0.084	64.8%	0.084	64.8%	0.084	64.8%
	May	0.500	0.502	0.4%	0.500	0.0%	0.504	0.8%	0.516	3.2%	0.507	1.5%	0.522	4.5%	0.474	-5.2%	0.468	-6.4%	0.481	-3.9%	0.516	3.3%	0.516	3.3%	0.516	3.3%
	Jun	0.514	0.515	0.2%	0.514	0.0%	0.516	0.5%	0.520	1.1%	0.514	0.1%	0.523	1.7%	0.487	-5.1%	0.482	-6.3%	0.494	-3.9%	0.514	0.0%	0.514	0.0%	0.514	0.0%
	Jul	0.291	0.292	0.5%	0.291	0.1%	0.293	1.0%	0.302	4.0%	0.296	1.9%	0.307	5.6%	0.274	-5.8%	0.268	-7.9%	0.280	-3.6%	0.301	3.6%	0.301	3.6%	0.301	3.6%
	Aug	0.240	0.243	1.5%	0.242	1.1%	0.244	1.8%	0.251	4.9%	0.245	2.1%	0.256	6.8%	0.225	-6.1%	0.219	-8.6%	0.231	-3.4%	0.251	4.8%	0.251	4.8%	0.251	4.8%
	Sep	0.272	0.276	1.4%	0.275	1.1%	0.277	1.7%	0.286	5.2%	0.278	2.1%	0.292	7.2%	0.256	-5.9%	0.250	-8.1%	0.263	-3.5%	0.288	5.8%	0.288	5.8%	0.288	5.8%
	Oct	0.281	0.286	1.6%	0.286	1.6%	0.286	1.6%	0.294	4.7%	0.286	1.8%	0.299	6.3%	0.265	-5.8%	0.259	-8.0%	0.271	-3.5%	0.297	5.5%	0.297	5.5%	0.297	5.5%
	Nov	0.256	0.263	2.5%	0.261	1.8%	0.264	3.1%	0.268	4.5%	0.261	1.6%	0.271	5.8%	0.241	-5.9%	0.235	-8.4%	0.248	-3.5%	0.269	5.0%	0.269	5.0%	0.269	5.0%
	Dec	0.160	0.169	5.3%	0.165	2.9%	0.173	7.7%	0.174	8.4%	0.165	3.0%	0.177	10.7%	0.149	-6.9%	0.143	-10.9%	0.156	-2.9%	0.176	9.7%	0.176	9.7%	0.176	9.7%
	Annual	0.228	0.231	1.3%	0.230	0.7%	0.233	1.9%	0.242	6.1%	0.234	2.5%	0.247	8.3%	0.214	-6.3%	0.208	-8.9%	0.221	-3.4%	0.244	6.9%	0.242	6.0%	0.244	6.9%
1:25-Year Dry	Jan	0.011	0.011	0.0%	0.011	-0.1%	0.011	0.0%	0.027	142.2%	0.017	58.1%	0.032	187.6%	0.008	-26.0%	0.007	-33.8%	0.012	8.2%	0.032	189.3%	0.012	11.7%	0.032	193.1%
	Feb	0.010	0.010	0.0%	0.010	-0.1%	0.010	0.0%	0.026	154.1%	0.016	61.5%	0.031	206.9%	0.008	-25.8%	0.007	-33.8%	0.011	9.6%	0.031	202.1%	0.012	13.2%	0.031	206.1%
	Mar	0.009	0.010	16.8%	0.009	0.0%	0.012	33.6%	0.025	185.6%	0.015	73.4%	0.031	254.1%	0.006	-25.6%	0.006	-33.8%	0.010	12.6%	0.029	241.7%	0.010	16.5%	0.030	246.5%
	Apr	0.009	0.012	27.4%	0.009	0.0%	0.015	54.9%	0.031	231.0%	0.020	114.0%	0.041	333.2%	0.007	-25.2%	0.006	-33.8%	0.011	11.6%	0.039	316.9%	0.011	15.0%	0.040	323.3%
	May	0.183	0.185	1.2%	0.183	0.0%	0.187	2.4%	0.200	9.5%	0.191	4.5%	0.208	13.6%	0.169	-7.3%	0.164	-10.1%	0.177	-3.4%	0.203	11.2%	0.177	-3.2%	0.204	11.5%
	Jun	0.142	0.143	0.8%	0.142	0.0%	0.145	1.5%	0.149	4.5%	0.143	0.5%	0.152	6.6%	0.131	-8.2%	0.126	-11.7%	0.138	-3.2%	0.144	1.5%	0.138	-3.0%	0.145	1.5%
	Jul	0.040	0.042	5.2%	0.041	4.6%	0.042	5.7%	0.047	19.0%	0.042	6.3%	0.050	26.8%	0.032	-18.2%	0.027	-31.5%	0.040	-0.2%	0.044	10.0%	0.040	0.5%	0.044	10.2%
	Aug	0.101	0.104	2.8%	0.102	1.3%	0.105	4.3%	0.107	6.7%	0.103	2.7%	0.110	9.6%	0.091	-9.6%	0.086	-14.8%	0.098	-2.6%	0.104	2.9%	0.098	-2.3%	0.104	3.0%
	Sep	0.099	0.103	3.3%	0.102	2.3%	0.104	4.4%	0.111	12.3%	0.104	4.8%	0.116	16.8%	0.090	-9.6%	0.084	-15.0%	0.097	-2.6%	0.112	12.6%	0.097	-2.3%	0.112	12.9%
	Oct	0.053	0.058	9.5%	0.057	8.7%	0.058	10.3%	0.069	32.1%	0.060	13.3%	0.076	44.1%	0.045	-14.3%	0.040	-24.7%	0.052	-1.1%	0.074	41.4%	0.052	-0.6%	0.075	42.1%
	Nov	0.024	0.031	29.7%	0.028	19.8%	0.033	39.6%	0.040	70.4%	0.030	28.4%	0.046	94.2%	0.019	-21.3%	0.016	-33.8%	0.024	3.0%	0.045	90.6%	0.024	4.0%	0.045	91.5%
	Dec	0.018	0.027	49.3%	0.023	25.7%	0.031	72.9%	0.034	91.2%	0.024	35.1%	0.040	119.4%	0.014	-21.9%	0.012	-33.8%	0.019	5.3%	0.039	114.0%	0.019	6.5%	0.039	115.1%
	Annual	0.058	0.061	5.2%	0.060	2.8%	0.063	7.7%	0.073	24.1%	0.064	9.8%	0.078	33.2%	0.052	-11.2%	0.049	-16.8%	0.058	-1.6%	0.075	28.1%	0.058	-1.1%	0.075	28.7%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.138	0.138	-0.4%	0.137	-0.9%	0.138	0.0%	0.151	9.4%	0.143	3.1%	0.155	12.3%	0.128	-7.1%	0.119	-13.7%	0.155	12.1%	0.155	12.1%	0.155	12.1%	0.155	12.1%
	Feb	0.101	0.101	-0.5%	0.100	-1.1%	0.101	0.0%	0.115	13.6%	0.106	4.6%	0.120	18.4%	0.093	-7.9%	0.085	-15.7%	0.119	17.8%	0.119	17.8%	0.119	17.8%	0.119	17.8%
	Mar	0.077	0.078	1.4%	0.077	0.0%	0.079	2.8%	0.092	18.8%	0.082	6.5%	0.097	26.1%	0.070	-9.0%	0.062	-19.4%	0.096	24.9%	0.096	24.9%	0.096	24.9%	0.096	24.9%
	Apr	0.077	0.080	2.8%	0.077	0.0%	0.082	5.6%	0.103	32.5%	0.090	16.7%	0.115	48.5%	0.072	-7.3%	0.062	-19.7%	0.114	47.1%	0.114	47.1%	0.114	47.1%	0.114	47.1%
	May	0.978	0.979	0.1%	0.977	-0.1%	0.980	0.3%	0.988	1.1%	0.981	0.3%	0.993	1.5%	0.935	-4.4%	0.925	-5.4%	0.982	0.5%	0.982	0.5%	0.982	0.5%	0.982	0.5%
	Jun	1.336	1.336	0.0%	1.336	0.0%	1.336	0.0%	1.330	-0.5%	1.324	-0.9%	1.335	-0.1%	1.278	-4.4%	1.269	-5.0%	1.311	-1.9%	1.311	-1.9%	1.311	-1.9%	1.311	-1.9%
	Jul	0.777	0.778	0.2%	0.777	0.0%	0.780	0.3%	0.785	1.1%	0.781	0.5%	0.789	1.5%	0.743	-4.4%	0.733	-5.6%	0.780	0.4%	0.780	0.4%	0.780	0.4%	0.780	0.4%
	Aug	0.538	0.542	0.7%	0.541	0.5%	0.543	0.8%	0.550	2.1%	0.543	0.9%	0.554	2.9%	0.514	-4.5%	0.505	-6.2%	0.548	1.8%	0.548	1.8%	0.548	1.8%	0.548	1.8%
	Sep	0.392	0.395	0.8%	0.394	0.6%	0.395	0.9%	0.407	4.0%	0.397	1.5%	0.414	5.7%	0.373	-4.8%	0.363	-7.2%	0.410	4.7%	0.410	4.7%	0.410	4.7%	0.410	4.7%
	Oct	0.296	0.299	1.0%	0.299	1.0%	0.299	1.1%	0.309	4.5%	0.300	1.4%	0.314	6.3%	0.280	-5.3%	0.271	-8.4%	0.312	5.6%	0.312	5.6%	0.312	5.6%	0.312	5.6%
	Nov	0.361	0.366	1.3%	0.364	0.9%	0.367	1.7%	0.370	2.4%	0.363	0.6%	0.372	3.0%	0.344	-4.6%	0.334	-7.5%	0.369	2.4%	0.369	2.4%	0.369	2.4%	0.369	2.4%
	Dec	0.229	0.236	3.2%	0.232	1.6%	0.240	4.9%	0.240	5.0%	0.232	1.4%	0.243	6.3%	0.218	-4.7%	0.207	-9.3%	0.241	5.6%	0.241	5.6%	0.241	5.6%	0.241	5.6%
	Annual	0.443	0.446	0.5%	0.444	0.2%	0.447	0.8%	0.455	2.6%	0.447	0.8%	0.460	3.8%	0.422	-4.7%	0.413	-6.8%	0.455	2.6%	0.455	2.6%	0.455	2.6%	0.455	2.6%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.7 Simulated Monthly Streamflows at Model Node QF08

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.137	0.137	0.0%	0.137	0.0%	0.137	0.0%	0.152	10.7%	0.143	4.2%	0.156	13.9%	0.128	-6.4%	0.121	-11.5%	0.135	-1.2%	0.156	13.8%	0.136	-1.0%	0.156	13.9%
	Feb	0.091	0.091	0.0%	0.091	-0.1%	0.091	0.0%	0.107	16.6%	0.097	6.5%	0.112	22.2%	0.084	-8.2%	0.078	-14.5%	0.091	-0.5%	0.111	21.7%	0.106	16.5%	0.111	21.7%
	Mar	0.048	0.050	3.1%	0.048	0.0%	0.051	6.3%	0.064	33.1%	0.055	13.1%	0.070	45.3%	0.043	-11.8%	0.039	-20.0%	0.049	1.4%	0.070	43.9%	0.070	43.9%	0.070	43.9%
	Apr	0.086	0.089	3.1%	0.086	0.0%	0.091	6.2%	0.110	27.3%	0.098	14.0%	0.120	39.7%	0.079	-8.3%	0.073	-15.1%	0.086	-0.3%	0.119	38.4%	0.119	38.4%	0.119	38.4%
	May	0.844	0.846	0.2%	0.844	0.0%	0.848	0.5%	0.860	1.9%	0.851	0.9%	0.867	2.7%	0.818	-3.1%	0.812	-3.8%	0.825	-2.3%	0.861	2.0%	0.861	2.0%	0.861	2.0%
	Jun	0.868	0.869	0.1%	0.868	0.0%	0.870	0.3%	0.874	0.6%	0.868	0.0%	0.877	1.0%	0.841	-3.1%	0.836	-3.7%	0.848	-2.3%	0.868	0.0%	0.868	0.0%	0.868	0.0%
	Jul	0.491	0.492	0.3%	0.491	0.1%	0.494	0.6%	0.502	2.4%	0.496	1.2%	0.507	3.3%	0.474	-3.5%	0.468	-4.7%	0.480	-2.1%	0.501	2.2%	0.501	2.2%	0.501	2.2%
	Aug	0.405	0.408	0.9%	0.407	0.6%	0.409	1.1%	0.416	2.9%	0.410	1.3%	0.421	4.0%	0.390	-3.6%	0.384	-5.1%	0.396	-2.0%	0.416	2.8%	0.416	2.8%	0.416	2.8%
	Sep	0.459	0.463	0.8%	0.462	0.6%	0.464	1.0%	0.474	3.1%	0.465	1.2%	0.479	4.3%	0.443	-3.5%	0.437	-4.8%	0.450	-2.1%	0.475	3.4%	0.475	3.4%	0.475	3.4%
	Oct	0.475	0.479	0.9%	0.479	0.9%	0.479	0.9%	0.488	2.8%	0.480	1.1%	0.492	3.7%	0.458	-3.4%	0.452	-4.7%	0.465	-2.1%	0.490	3.2%	0.490	3.2%	0.490	3.2%
	Nov	0.433	0.439	1.5%	0.438	1.1%	0.441	1.9%	0.445	2.7%	0.437	1.0%	0.448	3.4%	0.418	-3.5%	0.412	-4.9%	0.424	-2.0%	0.446	3.0%	0.446	3.0%	0.446	3.0%
	Dec	0.271	0.279	3.1%	0.275	1.7%	0.283	4.5%	0.284	4.9%	0.276	1.7%	0.288	6.3%	0.260	-4.1%	0.253	-6.5%	0.266	-1.8%	0.286	5.7%	0.286	5.7%	0.286	5.7%
	Annual	0.386	0.388	0.8%	0.387	0.4%	0.390	1.1%	0.399	3.6%	0.391	1.5%	0.405	4.9%	0.371	-3.7%	0.365	-5.3%	0.378	-2.0%	0.401	4.1%	0.399	3.6%	0.401	4.1%
1:25-Year Dry	Jan	0.019	0.019	0.0%	0.019	-0.1%	0.019	0.0%	0.034	84.2%	0.025	34.4%	0.039	111.1%	0.016	-15.4%	0.015	-20.1%	0.019	4.9%	0.039	112.1%	0.020	6.9%	0.040	114.3%
	Feb	0.017	0.017	0.0%	0.017	-0.1%	0.017	0.0%	0.033	91.2%	0.023	36.4%	0.038	122.5%	0.015	-15.3%	0.014	-20.0%	0.018	5.7%	0.038	119.7%	0.019	7.8%	0.038	122.0%
	Mar	0.015	0.016	10.0%	0.015	0.0%	0.017	19.9%	0.031	110.0%	0.021	43.5%	0.036	150.5%	0.012	-15.1%	0.012	-20.0%	0.016	7.5%	0.035	143.2%	0.016	9.8%	0.036	146.0%
	Apr	0.016	0.018	16.2%	0.016	0.0%	0.021	32.5%	0.038	136.8%	0.027	67.5%	0.047	197.3%	0.014	-14.9%	0.013	-20.0%	0.017	6.9%	0.046	187.6%	0.017	8.9%	0.046	191.4%
	May	0.309	0.311	0.7%	0.309	0.0%	0.313	1.4%	0.326	5.6%	0.317	2.7%	0.333	8.1%	0.295	-4.3%	0.290	-6.0%	0.302	-2.0%	0.329	6.7%	0.303	-1.9%	0.330	6.8%
	Jun	0.240	0.241	0.5%	0.240	0.0%	0.243	0.9%	0.247	2.7%	0.241	0.3%	0.250	3.9%	0.229	-4.8%	0.224	-6.9%	0.236	-1.9%	0.242	0.9%	0.236	-1.7%	0.243	0.9%
	Jul	0.067	0.069	3.1%	0.069	2.8%	0.069	3.4%	0.074	11.2%	0.069	3.7%	0.077	15.9%	0.060	-10.8%	0.054	-18.7%	0.067	-0.1%	0.071	5.9%	0.067	0.3%	0.071	6.0%
	Aug	0.170	0.173	1.6%	0.171	0.8%	0.174	2.5%	0.177	4.0%	0.173	1.6%	0.180	5.6%	0.160	-5.7%	0.155	-8.8%	0.168	-1.5%	0.173	1.7%	0.168	-1.4%	0.173	1.8%
	Sep	0.168	0.171	2.0%	0.170	1.4%	0.172	2.6%	0.180	7.2%	0.172	2.8%	0.184	9.9%	0.158	-5.7%	0.153	-8.9%	0.165	-1.6%	0.180	7.5%	0.165	-1.4%	0.180	7.7%
	Oct	0.089	0.094	5.6%	0.093	5.2%	0.094	6.1%	0.106	19.1%	0.096	7.9%	0.112	26.1%	0.081	-8.5%	0.076	-14.6%	0.088	-0.6%	0.110	24.5%	0.088	-0.4%	0.111	24.9%
	Nov	0.040	0.047	17.6%	0.044	11.7%	0.049	23.5%	0.056	41.7%	0.046	16.8%	0.062	55.8%	0.035	-12.6%	0.032	-20.0%	0.040	1.8%	0.061	53.7%	0.041	2.3%	0.061	54.2%
	Dec	0.030	0.039	29.2%	0.035	15.2%	0.044	43.2%	0.047	54.0%	0.037	20.8%	0.052	70.7%	0.027	-12.9%	0.024	-20.0%	0.031	3.2%	0.051	67.5%	0.032	3.9%	0.051	68.1%
	Annual	0.099	0.102	3.1%	0.100	1.6%	0.103	4.5%	0.113	14.3%	0.104	5.8%	0.118	19.7%	0.092	-6.6%	0.089	-10.0%	0.098	-0.9%	0.115	16.7%	0.098	-0.6%	0.115	17.0%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.233	0.232	-0.3%	0.232	-0.5%	0.233	0.0%	0.246	5.6%	0.237	1.8%	0.250	7.3%	0.223	-4.2%	0.214	-8.1%	0.250	7.2%	0.250	7.2%	0.250	7.2%	0.250	7.2%
	Feb	0.170	0.170	-0.3%	0.169	-0.6%	0.170	0.0%	0.184	8.1%	0.175	2.8%	0.189	10.9%	0.162	-4.7%	0.155	-9.3%	0.188	10.6%	0.188	10.6%	0.188	10.6%	0.188	10.6%
	Mar	0.130	0.131	0.8%	0.130	0.0%	0.132	1.6%	0.144	11.2%	0.135	3.9%	0.150	15.5%	0.123	-5.4%	0.115	-11.6%	0.149	14.8%	0.149	14.8%	0.149	14.8%	0.149	14.8%
	Apr	0.130	0.132	1.7%	0.130	0.0%	0.134	3.4%	0.155	19.4%	0.143	9.9%	0.167	29.0%	0.124	-4.4%	0.115	-11.7%	0.166	28.1%	0.166	28.1%	0.166	28.1%	0.166	28.1%
	May	1.651	1.652	0.0%	1.650	-0.1%	1.653	0.1%	1.661	0.6%	1.654	0.2%	1.665	0.8%	1.608	-2.6%	1.598	-3.2%	1.655	0.2%	1.655	0.2%	1.655	0.2%	1.655	0.2%
	Jun	2.256	2.257	0.0%	2.256	0.0%	2.257	0.0%	2.250	-0.3%	2.244	-0.5%	2.255	0.0%	2.198	-2.6%	2.189	-3.0%	2.231	-1.1%	2.231	-1.1%	2.231	-1.1%	2.231	-1.1%
	Jul	1.312	1.314	0.1%	1.312	0.0%	1.315	0.2%	1.321	0.7%	1.316	0.3%	1.324	0.9%	1.278	-2.6%	1.269	-3.3%	1.315	0.2%	1.315	0.2%	1.315	0.2%	1.315	0.2%
	Aug	0.909	0.913	0.4%	0.912	0.3%	0.913	0.5%	0.920	1.3%	0.914	0.5%	0.925	1.7%	0.885	-2.7%	0.876	-3.7%	0.918	1.0%	0.918	1.0%	0.918	1.0%	0.918	1.0%
	Sep	0.660	0.663	0.5%	0.663	0.4%	0.664	0.5%	0.676	2.4%	0.666	0.9%	0.683	3.4%	0.642	-2.8%	0.632	-4.3%	0.679	2.8%	0.679	2.8%	0.679	2.8%	0.679	2.8%
	Oct	0.498	0.501	0.6%	0.501	0.6%	0.502	0.6%	0.512	2.7%	0.503	0.8%	0.517	3.7%	0.483	-3.1%	0.474	-5.0%	0.515	3.3%	0.515	3.3%	0.515	3.3%	0.515	3.3%
	Nov	0.609	0.613	0.8%	0.612	0.5%	0.615	1.0%	0.617	1.4%	0.611	0.3%	0.619	1.8%	0.592	-2.7%	0.581	-4.5%	0.617	1.4%	0.617	1.4%	0.617	1.4%	0.617	1.4%
	Dec	0.386	0.393	1.9%	0.389	0.9%	0.397	2.9%	0.397	3.0%	0.389	0.9%	0.400	3.8%	0.375	-2.8%	0.364	-5.5%	0.398	3.3%	0.398	3.3%	0.398	3.3%	0.398	3.3%
	Annual	0.748	0.750	0.3%	0.749	0.1%	0.752	0.5%	0.760	1.6%	0.752	0.5%	0.765	2.2%	0.727	-2.8%	0.718	-4.1%	0.760	1.5%	0.760	1.5%	0.760	1.5%	0.760	1.5%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.8 Simulated Monthly Streamflows at Model Node Susan Outflow

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.1%	0.002	0.0%	0.002	0.2%	0.002	0.2%	0.002	0.2%	0.002	0.2%	0.002	0.2%	0.002	0.2%	0.002	0.2%
	Feb	0.001	0.001	0.0%	0.001	0.0%	0.001	0.0%	0.001	0.2%	0.001	0.1%	0.001	0.3%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%
	Mar	0.001	0.001	0.0%	0.001	0.0%	0.001	0.0%	0.001	0.3%	0.001	0.0%	0.001	0.5%	0.001	0.6%	0.001	0.6%	0.001	0.6%	0.001	0.6%	0.001	0.6%	0.001	0.6%
	Apr	0.001	0.001	0.0%	0.001	0.0%	0.001	0.0%	0.001	0.1%	0.001	0.0%	0.001	0.3%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%
	May	0.013	0.013	0.0%	0.013	0.0%	0.013	0.0%	0.013	0.0%	0.013	0.0%	0.013	0.1%	0.013	0.1%	0.013	0.1%	0.013	0.1%	0.013	0.1%	0.013	0.1%	0.013	0.1%
	Jun	0.014	0.014	0.0%	0.014	0.0%	0.014	0.0%	0.014	0.0%	0.014	0.0%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%
	Jul	0.008	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%
	Aug	0.006	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%
	Sep	0.007	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%
	Oct	0.007	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%
	Nov	0.007	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.0%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%	0.007	0.1%
	Dec	0.004	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.1%	0.004	0.0%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%
	Annual	0.006	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%
1:25-Year Dry	Jan	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.7%	0.000	0.0%	0.000	1.3%	0.000	1.6%	0.000	1.6%	0.000	1.6%	0.000	1.6%	0.000	1.6%	0.000	1.6%
	Feb	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.7%	0.000	0.0%	0.000	1.4%	0.000	1.7%	0.000	1.7%	0.000	1.7%	0.000	1.7%	0.000	1.7%	0.000	1.7%
	Mar	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.9%	0.000	0.1%	0.000	1.7%	0.000	2.0%	0.000	2.0%	0.000	2.0%	0.000	2.0%	0.000	2.0%	0.000	2.0%
	Apr	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.8%	0.000	0.1%	0.000	1.6%	0.000	1.9%	0.000	1.9%	0.000	1.9%	0.000	1.9%	0.000	1.9%	0.000	1.9%
	May	0.005	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.0%	0.005	0.1%	0.005	0.1%	0.005	0.1%	0.005	0.1%	0.005	0.1%	0.005	0.1%	0.005	0.1%
	Jun	0.004	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.1%	0.004	0.0%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%
	Jul	0.001	0.001	0.0%	0.001	0.0%	0.001	0.0%	0.001	0.3%	0.001	0.1%	0.001	0.4%	0.001	0.5%	0.001	0.5%	0.001	0.5%	0.001	0.5%	0.001	0.5%	0.001	0.5%
	Aug	0.003	0.003	0.0%	0.003	0.0%	0.003	0.0%	0.003	0.1%	0.003	0.0%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%
	Sep	0.003	0.003	0.0%	0.003	0.0%	0.003	0.0%	0.003	0.1%	0.003	0.0%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%
	Oct	0.001	0.001	0.0%	0.001	0.0%	0.001	0.0%	0.001	0.2%	0.001	0.1%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%	0.001	0.4%
	Nov	0.001	0.001	0.0%	0.001	0.0%	0.001	0.0%	0.001	0.4%	0.001	0.1%	0.001	0.7%	0.001	0.7%	0.001	0.7%	0.001	0.7%	0.001	0.7%	0.001	0.7%	0.001	0.7%
	Dec	0.000	0.000	0.0%	0.000	0.0%	0.000	0.0%	0.000	0.6%	0.000	0.2%	0.000	1.0%	0.000	1.0%	0.000	1.0%	0.000	1.0%	0.000	1.0%	0.000	1.0%	0.000	1.0%
	Annual	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.2%	0.002	0.0%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	0.004	0.004	0.0%	0.004	0.0%	0.004	0.0%	0.004	0.1%	0.004	0.0%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%	0.004	0.1%
	Feb	0.003	0.003	0.0%	0.003	0.0%	0.003	0.0%	0.003	0.1%	0.003	0.0%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%	0.003	0.2%
	Mar	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.1%	0.002	0.0%	0.002	0.2%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%
	Apr	0.002	0.002	0.0%	0.002	0.0%	0.002	0.0%	0.002	0.1%	0.002	0.0%	0.002	0.2%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%	0.002	0.3%
	May	0.026	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%	0.026	0.0%
	Jun	0.035	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%	0.035	0.0%
	Jul	0.020	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%	0.020	0.0%
	Aug	0.014	0.014	0.0%	0.014	0.0%	0.014	0.0%	0.014	0.0%	0.014	0.0%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%	0.014	0.1%
	Sep	0.010	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%	0.010	0.0%
	Oct	0.008	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.0%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%	0.008	0.1%
	Nov	0.009	0.009	0.0%	0.009	0.0%	0.009	0.0%	0.009	0.0%	0.009	0.0%	0.009	0.1%	0.009	0.1%	0.009	0.1%	0.009	0.1%	0.009	0.1%	0.009	0.1%	0.009	0.1%
	Dec	0.006	0.006	0.0%	0.006	0.0%	0.006	0.0%	0.006	0.1%	0.006	0.0%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%	0.006	0.1%
	Annual	0.012	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%	0.012	0.0%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.9 Simulated Monthly Streamflows at Model Node Hughes-us

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	6.54	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%
	Feb	4.36	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%
	Mar	2.31	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%
	Apr	4.11	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%
	May	40.30	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%
	Jun	41.44	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%
	Jul	23.42	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%
	Aug	19.31	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%
	Sep	21.94	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%
	Oct	22.66	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%
	Nov	20.67	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%
	Dec	12.93	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%
	Annual	18.41	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%
1:25-Year Dry	Jan	0.89	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%
	Feb	0.82	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%
	Mar	0.70	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%
	Apr	0.76	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%
	May	14.73	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%
	Jun	11.47	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%
	Jul	3.19	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%
	Aug	8.12	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%
	Sep	8.00	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%
	Oct	4.24	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%
	Nov	1.90	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%
	Dec	1.45	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%
	Annual	4.71	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	11.06	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%
	Feb	8.09	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%
	Mar	6.13	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%
	Apr	6.13	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%
	May	78.77	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%
	Jun	107.7	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%
	Jul	62.65	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%
	Aug	43.40	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%
	Sep	31.48	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%
	Oct	23.71	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%
	Nov	28.99	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%
	Dec	18.37	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%
	Annual	35.68	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.10 Simulated Monthly Streamflows at Model Node Hughes-mid

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	6.54	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%	6.54	0.0%
	Feb	4.36	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%	4.36	0.0%
	Mar	2.31	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%	2.31	0.0%
	Apr	4.11	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%	4.11	0.0%
	May	40.30	40.49	19.0%	40.30	0.0%	40.68	38.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%	40.30	0.0%
	Jun	41.44	41.62	17.5%	41.44	0.0%	41.79	35.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%	41.44	0.0%
	Jul	23.42	23.46	3.5%	23.42	0.0%	23.49	7.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%	23.42	0.0%
	Aug	19.31	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%	19.31	0.0%
	Sep	21.94	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%	21.94	0.0%
	Oct	22.66	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%	22.66	0.0%
	Nov	20.67	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%	20.67	0.0%
	Dec	12.93	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%	12.93	0.0%
	Annual	18.41	18.44	3.3%	18.41	0.0%	18.47	6.7%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%	18.41	0.0%
1:25-Year Dry	Jan	0.89	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%	0.89	0.0%
	Feb	0.82	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%	0.82	0.0%
	Mar	0.70	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%	0.70	0.0%
	Apr	0.76	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%	0.76	0.0%
	May	14.73	14.92	19.0%	14.73	0.0%	15.11	38.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%	14.73	0.0%
	Jun	11.47	11.63	15.5%	11.47	0.0%	11.78	31.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%	11.47	0.0%
	Jul	3.19	3.21	1.8%	3.19	0.0%	3.23	3.6%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%	3.19	0.0%
	Aug	8.12	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%	8.12	0.0%
	Sep	8.00	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%	8.00	0.0%
	Oct	4.24	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%	4.24	0.0%
	Nov	1.90	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%	1.90	0.0%
	Dec	1.45	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%	1.45	0.0%
	Annual	4.71	4.74	3.0%	4.71	0.0%	4.77	6.1%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%	4.71	0.0%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	11.06	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%	11.06	0.0%
	Feb	8.09	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%	8.09	0.0%
	Mar	6.13	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%
	Apr	6.13	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%	6.13	0.0%
	May	78.77	78.96	19.0%	78.77	0.0%	79.15	38.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%	78.77	0.0%
	Jun	107.7	107.9	20.0%	107.7	0.0%	108.1	40.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%	107.7	0.0%
	Jul	62.65	62.69	3.5%	62.65	0.0%	62.72	7.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%	62.65	0.0%
	Aug	43.40	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%	43.40	0.0%
	Sep	31.48	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%	31.48	0.0%
	Oct	23.71	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%	23.71	0.0%
	Nov	28.99	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%	28.99	0.0%
	Dec	18.37	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%	18.37	0.0%
	Annual	35.68	35.71	3.6%	35.68	0.0%	35.75	7.1%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%	35.68	0.0%

Note:
Changes lower than 0.1% are shown as 0.0%.

Table A.11 Simulated Monthly Streamflows at Model Node Hughes-ds

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
Average	Jan	6.68	6.68	0.0%	6.68	0.0%	6.68	0.0%	6.70	0.2%	6.69	0.1%	6.70	0.3%	6.67	-0.1%	6.67	-0.2%	6.68	0.0%	6.70	0.3%	6.68	0.0%	6.70	0.3%
	Feb	4.45	4.45	0.0%	4.45	0.0%	4.45	0.0%	4.47	0.3%	4.46	0.1%	4.47	0.4%	4.45	-0.2%	4.44	-0.3%	4.45	0.0%	4.47	0.4%	4.47	0.3%	4.47	0.4%
	Mar	2.36	2.36	0.1%	2.36	0.0%	2.36	0.1%	2.37	0.7%	2.36	0.3%	2.38	0.9%	2.35	-0.2%	2.35	-0.4%	2.36	0.0%	2.38	0.9%	2.38	0.9%	2.38	0.9%
	Apr	4.20	4.20	0.1%	4.20	0.0%	4.20	0.1%	4.22	0.6%	4.21	0.3%	4.23	0.8%	4.19	-0.2%	4.18	-0.3%	4.20	0.0%	4.23	0.8%	4.23	0.8%	4.23	0.8%
	May	41.15	41.34	0.4%	41.15	0.0%	41.52	0.9%	41.16	0.0%	41.15	0.0%	41.17	0.0%	41.12	-0.1%	41.12	-0.1%	41.13	0.0%	41.16	0.0%	41.16	0.0%	41.16	0.0%
	Jun	42.31	42.49	0.4%	42.31	0.0%	42.66	0.8%	42.32	0.0%	42.31	0.0%	42.32	0.0%	42.28	-0.1%	42.28	-0.1%	42.29	0.0%	42.31	0.0%	42.31	0.0%	42.31	0.0%
	Jul	23.91	23.95	0.2%	23.92	0.0%	23.98	0.3%	23.93	0.1%	23.92	0.0%	23.93	0.1%	23.90	-0.1%	23.89	-0.1%	23.90	0.0%	23.92	0.0%	23.92	0.0%	23.92	0.0%
	Aug	19.72	19.72	0.0%	19.72	0.0%	19.72	0.0%	19.73	0.0%	19.72	0.0%	19.73	0.1%	19.70	-0.1%	19.70	-0.1%	19.71	-0.1%	19.73	0.1%	19.73	0.1%	19.73	0.1%
	Sep	22.40	22.40	0.0%	22.40	0.0%	22.40	0.0%	22.41	0.1%	22.40	0.0%	22.42	0.1%	22.38	-0.1%	22.37	-0.1%	22.39	0.0%	22.41	0.0%	22.41	0.0%	22.41	0.0%
	Oct	23.14	23.14	0.0%	23.14	0.0%	23.14	0.0%	23.15	0.1%	23.14	0.0%	23.16	0.1%	23.12	-0.1%	23.12	-0.1%	23.13	0.0%	23.15	0.0%	23.15	0.0%	23.15	0.0%
	Nov	21.11	21.11	0.0%	21.11	0.0%	21.11	0.0%	21.12	0.0%	21.11	0.0%	21.12	0.0%	21.09	-0.1%	21.08	-0.1%	21.10	0.0%	21.12	0.0%	21.12	0.0%	21.12	0.0%
	Dec	13.20	13.21	0.0%	13.20	0.0%	13.21	0.1%	13.21	0.1%	13.20	0.0%	13.22	0.2%	13.19	-0.1%	13.18	-0.2%	13.19	-0.1%	13.21	0.1%	13.21	0.1%	13.21	0.1%
	Annual	18.79	18.83	0.2%	18.80	0.0%	18.86	0.4%	18.81	0.1%	18.80	0.0%	18.81	0.1%	18.78	-0.1%	18.77	-0.1%	18.79	0.0%	18.81	0.1%	18.81	0.1%	18.81	0.1%
1:25-Year Dry	Jan	0.90	0.90	0.0%	0.90	0.0%	0.90	0.0%	0.92	1.7%	0.91	0.7%	0.92	2.3%	0.90	-0.3%	0.90	-0.4%	0.90	0.1%	0.92	2.3%	0.90	0.1%	0.92	2.3%
	Feb	0.84	0.84	0.0%	0.84	0.0%	0.84	0.0%	0.85	1.9%	0.85	0.8%	0.86	2.5%	0.84	-0.3%	0.84	-0.4%	0.84	0.1%	0.86	2.5%	0.84	0.2%	0.86	2.5%
	Mar	0.71	0.71	0.2%	0.71	0.0%	0.71	0.4%	0.73	2.3%	0.72	0.9%	0.73	3.1%	0.71	-0.3%	0.71	-0.4%	0.71	0.2%	0.73	2.9%	0.71	0.2%	0.73	3.0%
	Apr	0.77	0.78	0.3%	0.77	0.0%	0.78	0.7%	0.80	2.8%	0.79	1.4%	0.81	4.1%	0.77	-0.3%	0.77	-0.4%	0.78	0.1%	0.80	3.8%	0.78	0.2%	0.80	3.9%
	May	15.04	15.23	1.2%	15.04	0.0%	15.41	2.5%	15.06	0.1%	15.05	0.1%	15.06	0.1%	15.03	-0.1%	15.02	-0.1%	15.03	-0.1%	15.06	0.1%	15.03	-0.1%	15.06	0.1%
	Jun	11.71	11.87	1.4%	11.72	0.1%	12.02	2.6%	11.72	0.1%	11.72	0.1%	11.72	0.1%	11.70	-0.1%	11.70	-0.1%	11.71	0.0%	11.72	0.1%	11.71	0.0%	11.72	0.1%
	Jul	3.26	3.28	0.6%	3.26	0.0%	3.30	1.2%	3.27	0.2%	3.26	0.1%	3.27	0.3%	3.25	-0.2%	3.25	-0.4%	3.26	0.0%	3.26	0.1%	3.26	0.0%	3.26	0.1%
	Aug	8.29	8.30	0.0%	8.30	0.0%	8.30	0.0%	8.30	0.1%	8.30	0.0%	8.30	0.1%	8.28	-0.1%	8.28	-0.2%	8.29	0.0%	8.30	0.0%	8.29	0.0%	8.30	0.0%
	Sep	8.17	8.17	0.0%	8.17	0.0%	8.17	0.0%	8.18	0.2%	8.17	0.1%	8.18	0.2%	8.16	-0.1%	8.15	-0.2%	8.16	0.0%	8.18	0.2%	8.16	0.0%	8.18	0.2%
	Oct	4.32	4.33	0.1%	4.33	0.1%	4.33	0.1%	4.34	0.4%	4.33	0.2%	4.35	0.6%	4.32	-0.2%	4.31	-0.3%	4.32	0.0%	4.35	0.5%	4.32	0.0%	4.35	0.5%
	Nov	1.94	1.94	0.4%	1.94	0.3%	1.95	0.5%	1.95	0.9%	1.94	0.4%	1.96	1.1%	1.93	-0.2%	1.93	-0.4%	1.94	0.1%	1.96	1.1%	1.94	0.1%	1.96	1.1%
	Dec	1.49	1.49	0.6%	1.49	0.3%	1.50	0.9%	1.50	1.1%	1.49	0.4%	1.51	1.4%	1.48	-0.3%	1.48	-0.5%	1.49	0.0%	1.50	1.3%	1.49	0.1%	1.51	1.3%
	Annual	4.81	4.84	0.7%	4.81	0.0%	4.87	1.3%	4.82	0.3%	4.82	0.1%	4.83	0.4%	4.80	-0.1%	4.80	-0.2%	4.81	0.0%	4.83	0.4%	4.81	0.0%	4.83	0.4%

Climate Scenario	Month	Existing Condition	Construction						Operation						Closure (Pit Filling)						Post-Closure (after Pit Filling)					
			Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum		Average		Minimum		Maximum	
		Flow (m^3/s)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)	Flow (m^3/s)	Change from Existing (%)
1:25-Year Wet	Jan	11.30	11.30	0.0%	11.30	0.0%	11.30	0.0%	11.31	0.1%	11.30	0.0%	11.31	0.1%	11.29	-0.1%	11.28	-0.2%	11.31	0.1%	11.31	0.1%	11.31	0.1%	11.31	0.1%
	Feb	8.26	8.26	0.0%	8.26	0.0%	8.26	0.0%	8.28	0.2%	8.27	0.0%	8.28	0.2%	8.25	-0.1%	8.25	-0.2%	8.28	0.2%	8.28	0.2%	8.28	0.2%	8.28	0.2%
	Mar	6.26	6.26	0.0%	6.26	0.0%	6.26	0.0%	6.28	0.2%	6.27	0.1%	6.28	0.3%	6.25	-0.1%	6.25	-0.2%	6.28	0.3%	6.28	0.3%	6.28	0.3%	6.28	0.3%
	Apr	6.26	6.26	0.0%	6.26	0.0%	6.27	0.1%	6.29	0.4%	6.28	0.2%	6.30	0.6%	6.26	-0.1%	6.25	-0.2%	6.30	0.6%	6.30	0.6%	6.30	0.6%	6.30	0.6%
	May	80.42	80.62	0.2%	80.43	0.0%	80.80	0.5%	80.44	0.0%	80.43	0.0%	80.44	0.0%	80.38	0.0%	80.37	-0.1%	80.43	0.0%	80.43	0.0%	80.43	0.0%	80.43	0.0%
	Jun	110.0	110.2	0.1%	110.0	0.0%	110.3	0.3%	110.0	0.0%	110.0	0.0%	110.0	0.0%	109.9	-0.1%	109.9	-0.1%	110.0	0.0%	110.0	0.0%	110.0	0.0%	110.0	0.0%
	Jul	63.96	64.01	0.1%	63.97	0.0%	64.04	0.1%	63.98	0.0%	63.97	0.0%	63.98	0.0%	63.93	0.0%	63.92	-0.1%	63.97	0.0%	63.97	0.0%	63.97	0.0%	63.97	0.0%
	Aug	44.31	44.31	0.0%	44.31	0.0%	44.31	0.0%	44.32	0.0%	44.31	0.0%	44.33	0.0%	44.29	-0.1%	44.28	-0.1%	44.32	0.0%	44.32	0.0%	44.32	0.0%	44.32	0.0%
	Sep	32.14	32.15	0.0%	32.15	0.0%	32.15	0.0%	32.16	0.1%	32.15	0.0%	32.17	0.1%	32.13	0.0%	32.12	-0.1%	32.16	0.1%	32.16	0.1%	32.16	0.1%	32.16	0.1%
	Oct	24.21	24.21	0.0%	24.21	0.0%	24.21	0.0%	24.22	0.0%	24.21	0.0%	24.22	0.0%	24.19	-0.1%	24.18	-0.1%	24.22	0.0%	24.22	0.0%	24.22	0.0%	24.22	0.0%
	Nov	29.60	29.60	0.0%	29.60	0.0%	29.60	0.0%	29.61	0.0%	29.60	0.0%	29.61	0.0%	29.58	-0.1%	29.57	-0.1%	29.60	0.0%	29.60	0.0%	29.60	0.0%	29.60	0.0%
	Dec	18.75	18.76	0.0%	18.75	0.0%	18.76	0.1%	18.76	0.1%	18.75	0.0%	18.77	0.1%	18.74	-0.1%	18.73	-0.1%	18.76	0.1%	18.76	0.1%	18.76	0.1%	18.76	0.1%
	Annual	36.43	36.46	0.1%	36.43	0.0%	36.50	0.2%	36.44	0.0%	36.43	0.0%	36.45	0.0%	36.41	-0.1%	36.40	-0.1%	36.44	0.0%	36.44	0.0%	36.44	0.0%	36.44	0.0%

Note:
Changes lower than 0.1% are shown as 0.0%.

Appendix B Water Quality Results for the Expected Case Scenario – Summary Statistics

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Open Pit Discharge

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	na	na	na	na	na	na	5.0	5.1	5.2	5.3	5.6	6.7
Alkalinity_T	na	na	na	na	na	na	120	120	120	120	120	190
Aluminum_D	na	na	na	na	na	na	0.011	0.021	0.022	0.022	0.024	0.025
Aluminum_T	na	na	na	na	na	na	0.013	0.024	0.025	0.025	0.028	0.029
Antimony_D	na	na	na	na	na	na	0.00022	0.00037	0.00039	0.00039	0.00042	0.00044
Antimony_T	na	na	na	na	na	na	0.00022	0.00037	0.00039	0.00039	0.00043	0.00045
Arsenic_D	na	na	na	na	na	na	0.0021	0.0022	0.0023	0.0024	0.0026	0.0042
Arsenic_T	na	na	na	na	na	na	0.0023	0.0024	0.0025	0.0026	0.0028	0.0043
Barium_D	na	na	na	na	na	na	0.024	0.029	0.030	0.030	0.031	0.032
Barium_T	na	na	na	na	na	na	0.025	0.030	0.031	0.031	0.032	0.033
Beryllium_T	na	na	na	na	na	na	0.00010	0.00017	0.00018	0.00018	0.00019	0.00019
Boron_D	na	na	na	na	na	na	0.016	0.016	0.017	0.018	0.020	0.021
Boron_T	na	na	na	na	na	na	0.016	0.016	0.017	0.018	0.020	0.021
Bromide	na	na	na	na	na	na	0.027	0.028	0.029	0.030	0.029	0.061
Cadmium_D	na	na	na	na	na	na	0.0000049	0.0000049	0.0000050	0.0000052	0.0000051	0.000010
Cadmium_T	na	na	na	na	na	na	0.0000082	0.0000082	0.0000085	0.0000085	0.0000087	0.000012
Calcium_D	na	na	na	na	na	na	53	63	64	65	68	70
Chloride	na	na	na	na	na	na	0.48	0.48	0.50	0.53	0.60	0.96
Chromium_D	na	na	na	na	na	na	0.00018	0.00022	0.00022	0.00022	0.00023	0.00024
Chromium_D_Hex	na	na	na	na	na	na	0.00018	0.00022	0.00022	0.00022	0.00023	0.00024
Chromium_T	na	na	na	na	na	na	0.00029	0.00058	0.00061	0.00060	0.00064	0.00066
Cobalt_D	na	na	na	na	na	na	0.00011	0.00011	0.00011	0.00011	0.00012	0.00017
Cobalt_T	na	na	na	na	na	na	0.00015	0.00015	0.00016	0.00016	0.00017	0.00020
Copper_D	na	na	na	na	na	na	0.00043	0.00043	0.00046	0.00046	0.00048	0.00084
Copper_T	na	na	na	na	na	na	0.00048	0.00049	0.00052	0.00052	0.00055	0.00090
Cyanide_F	na	na	na	na	na	na	0.00034	0.00035	0.00036	0.00037	0.00036	0.00069
Cyanide_T	na	na	na	na	na	na	0.00047	0.00047	0.00047	0.00048	0.00048	0.00069
Cyanide_WAD	na	na	na	na	na	na	0.00034	0.00034	0.00035	0.00036	0.00035	0.00068
Fluoride	na	na	na	na	na	na	0.14	0.15	0.16	0.18	0.24	0.37
Hardness	na	na	na	na	na	na	130	130	130	140	140	210
Iron_D	na	na	na	na	na	na	0.21	0.22	0.23	0.23	0.25	0.28
Iron_T	na	na	na	na	na	na	0.22	0.24	0.24	0.25	0.28	0.30
Lead_D	na	na	na	na	na	na	0.000063	0.000095	0.000098	0.000098	0.00010	0.00011
Lead_T	na	na	na	na	na	na	0.000081	0.00015	0.00016	0.00016	0.00017	0.00018
Magnesium_D	na	na	na	na	na	na	11	11	11	11	12	15
Manganese_D	na	na	na	na	na	na	0.036	0.036	0.038	0.040	0.041	0.12
Manganese_T	na	na	na	na	na	na	0.040	0.040	0.042	0.045	0.046	0.12
Mercury_D	na	na	na	na	na	na	0.0000013	0.0000016	0.0000017	0.0000017	0.0000017	0.0000017
Mercury_T	na	na	na	na	na	na	0.0000013	0.0000018	0.0000018	0.0000019	0.0000019	0.0000020
Molybdenum_D	na	na	na	na	na	na	0.0025	0.0033	0.0034	0.0034	0.0035	0.0036
Molybdenum_T	na	na	na	na	na	na	0.0025	0.0033	0.0034	0.0034	0.0035	0.0036
N_Ammonia	na	na	na	na	na	na	0.054	0.055	0.055	0.057	0.056	0.12
N_Nitrate_Nitrite	na	na	na	na	na	na	0.047	0.047	0.048	0.053	0.052	0.21
N_Nitrite	na	na	na	na	na	na	0.036	0.059	0.061	0.061	0.065	0.068
Nickel_D	na	na	na	na	na	na	0.00035	0.00036	0.00037	0.00037	0.00039	0.00056
Nickel_T	na	na	na	na	na	na	0.00051	0.00051	0.00054	0.00054	0.00057	0.00068
Phosphorus_T	na	na	na	na	na	na	0.00028	0.00039	0.00072	0.00083	0.0014	0.0063
Potassium_D	na	na	na	na	na	na	4.9	8.1	8.4	8.5	9.1	9.5
Proton	na	na	na	na	na	na	0.00047	0.0016	0.0016	0.0016	0.0018	0.0018
Radium_226	na	na	na	na	na	na	0.0013	0.0018	0.0023	0.0026	0.0031	0.021
Selenium_D	na	na	na	na	na	na	0.00012	0.00013	0.00014	0.00014	0.00015	0.00016
Selenium_T	na	na	na	na	na	na	0.00013	0.00014	0.00014	0.00014	0.00015	0.00017
Silicon_D	na	na	na	na	na	na	6.8	6.8	6.9	6.9	7.0	8.9
Silicon_T	na	na	na	na	na	na	6.8	6.9	7.0	7.0	7.1	9.0
Silver_D	na	na	na	na	na	na	0.0000085	0.000011	0.000012	0.000012	0.000012	0.000012
Silver_T	na	na	na	na	na	na	0.0000085	0.000011	0.000012	0.000012	0.000012	0.000012
Sodium_D	na	na	na	na	na	na	11	13	13	13	14	15
Sodium_T	na	na	na	na	na	na	11	13	13	13	14	15
Strontium_D	na	na	na	na	na	na	0.13	0.16	0.17	0.17	0.18	0.18
Strontium_T	na	na	na	na	na	na	0.13	0.16	0.17	0.17	0.18	0.18
Sulfate	na	na	na	na	na	na	13	13	14	16	19	35
Thallium_D	na	na	na	na	na	na	0.000040	0.000066	0.000068	0.000068	0.000072	0.000075
Thallium_T	na	na	na	na	na	na	0.000042	0.000072	0.000074	0.000074	0.000079	0.000082
TSS	na	na	na	na	na	na	11	15	15	15	15	15
Uranium_D	na	na	na	na	na	na	0.0015	0.0016	0.0016	0.0016	0.0017	0.0024
Uranium_T	na	na	na	na	na	na	0.0015	0.0016	0.0016	0.0016	0.0017	0.0024
Vanadium_T	na	na	na	na	na	na	0.00040	0.00071	0.00074	0.00074	0.00078	0.00080
Zinc_D	na	na	na	na	na	na	0.0011	0.0011	0.0012	0.0012	0.0012	0.0029
Zinc_T	na	na	na	na	na	na	0.0014	0.0015	0.0015	0.0015	0.0015	0.0032

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Collection Pond Discharge

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	4.1	4.2	4.4	4.6	5.4	6.0	5.3	6.3	6.9	6.9	7.7	7.7
Alkalinity_T	150	150	170	210	320	420	27	31	33	34	38	42
Aluminum_D	0.0064	0.0066	0.014	0.015	0.026	0.029	0.068	0.070	0.073	0.074	0.082	0.083
Aluminum_T	0.0064	0.0066	0.019	0.021	0.041	0.047	0.086	0.086	0.086	0.086	0.086	0.086
Antimony_D	0.00012	0.00012	0.00040	0.0011	0.0027	0.0048	0.00090	0.0013	0.0014	0.0015	0.0020	0.0020
Antimony_T	0.00012	0.00012	0.00040	0.0011	0.0028	0.0048	0.00092	0.0013	0.0014	0.0016	0.0020	0.0021
Arsenic_D	0.0012	0.0013	0.0037	0.0044	0.0088	0.0098	0.018	0.018	0.019	0.019	0.020	0.025
Arsenic_T	0.0012	0.0013	0.0038	0.0045	0.0092	0.010	0.019	0.020	0.021	0.021	0.022	0.026
Barium_D	0.021	0.021	0.026	0.035	0.061	0.088	0.030	0.041	0.045	0.049	0.060	0.065
Barium_T	0.021	0.021	0.026	0.036	0.062	0.090	0.031	0.044	0.048	0.052	0.065	0.071
Beryllium_T	0.000068	0.000070	0.00010	0.00016	0.00032	0.00050	0.00027	0.00038	0.00041	0.00044	0.00055	0.00057
Boron_D	0.012	0.012	0.025	0.054	0.13	0.22	0.020	0.029	0.031	0.034	0.042	0.043
Boron_T	0.012	0.012	0.025	0.054	0.13	0.22	0.020	0.029	0.031	0.034	0.042	0.043
Bromide	0.042	0.045	0.047	0.048	0.053	0.054	0.031	0.036	0.037	0.038	0.040	0.040
Cadmium_D	0.0000070	0.0000072	0.0000089	0.000012	0.000021	0.000030	0.000012	0.000016	0.000017	0.000019	0.000023	0.000023
Cadmium_T	0.0000071	0.0000072	0.000010	0.000014	0.000025	0.000036	0.000027	0.000040	0.000044	0.000045	0.000050	0.000053
Calcium_D	45	46	54	68	110	150	62	88	96	100	130	140
Chloride	0.46	0.49	0.54	0.53	0.56	0.58	0.16	0.18	0.21	0.21	0.24	0.29
Chromium_D	0.00018	0.00018	0.00020	0.00023	0.00032	0.00038	0.00021	0.00028	0.00030	0.00032	0.00038	0.00038
Chromium_D_Hex	0.00018	0.00018	0.00020	0.00023	0.00032	0.00038	0.00021	0.00028	0.00030	0.00032	0.00038	0.00038
Chromium_T	0.00018	0.00018	0.00028	0.00034	0.00057	0.00081	0.00093	0.0014	0.0015	0.0016	0.0019	0.0023
Cobalt_D	0.000077	0.000078	0.00012	0.00019	0.00037	0.00056	0.00042	0.00055	0.00060	0.00062	0.00068	0.00083
Cobalt_T	0.000077	0.000078	0.00015	0.00022	0.00044	0.00068	0.00062	0.00083	0.00090	0.00095	0.0011	0.0013
Copper_D	0.00041	0.00042	0.00073	0.0015	0.0033	0.0055	0.0021	0.0031	0.0034	0.0037	0.0047	0.0048
Copper_T	0.00041	0.00042	0.00078	0.0015	0.0034	0.0057	0.0024	0.0035	0.0039	0.0042	0.0053	0.0057
Cyanide_F	0.00050	0.00052	0.00054	0.00056	0.00063	0.00066	0.00053	0.00056	0.00071	0.00069	0.00076	0.00076
Cyanide_T	0.00049	0.00050	0.00053	0.00054	0.00062	0.00065	0.00053	0.00057	0.00073	0.00071	0.00078	0.00078
Cyanide_WAD	0.00049	0.00050	0.00053	0.00054	0.00061	0.00065	0.00053	0.00056	0.00071	0.00069	0.00076	0.00076
Fluoride	0.13	0.13	0.14	0.15	0.18	0.19	0.14	0.15	0.15	0.16	0.17	0.19
Hardness	120	140	150	150	160	160	30	35	37	38	43	48
Iron_D	0.15	0.15	0.18	0.18	0.24	0.26	0.30	0.35	0.38	0.39	0.44	0.47
Iron_T	0.15	0.15	0.27	0.29	0.48	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Lead_D	0.000048	0.000049	0.000065	0.000093	0.00017	0.00026	0.00013	0.00018	0.00020	0.00022	0.00027	0.00028
Lead_T	0.000048	0.000049	0.000078	0.00011	0.00022	0.00034	0.00023	0.00034	0.00037	0.00041	0.00052	0.00061
Magnesium_D	9.8	10.0	11	14	21	28	7.0	9.6	10	11	14	15
Manganese_D	0.053	0.054	0.058	0.062	0.079	0.091	0.046	0.055	0.066	0.078	0.12	0.18
Manganese_T	0.054	0.055	0.060	0.065	0.084	0.099	0.071	0.083	0.091	0.11	0.16	0.22
Mercury_D	0.0000011	0.0000011	0.0000014	0.0000017	0.0000027	0.0000037	0.0000018	0.0000024	0.0000026	0.0000028	0.0000035	0.0000035
Mercury_T	0.0000011	0.0000011	0.0000015	0.0000018	0.0000028	0.0000040	0.0000019	0.0000026	0.0000030	0.0000033	0.0000043	0.0000049
Molybdenum_D	0.0023	0.0023	0.0034	0.0061	0.013	0.021	0.0035	0.0051	0.0056	0.0061	0.0077	0.0080
Molybdenum_T	0.0023	0.0023	0.0034	0.0061	0.013	0.021	0.0036	0.0051	0.0056	0.0061	0.0078	0.0081
N_Ammonia	0.096	0.13	0.33	0.50	1.2	1.6	0.0075	0.0097	0.013	0.016	0.024	0.037
N_Nitrate_Nitrite	0.20	0.50	2.1	3.5	9.1	13	0.017	0.020	0.021	0.021	0.022	0.022
N_Nitrite	0.015	0.022	0.059	0.090	0.22	0.29	0.16	0.22	0.25	0.27	0.34	0.35
Nickel_D	0.00029	0.00030	0.00050	0.00092	0.0020	0.0033	0.0011	0.0015	0.0016	0.0017	0.0021	0.0022
Nickel_T	0.00029	0.00030	0.00058	0.0010	0.0022	0.0036	0.0017	0.0024	0.0026	0.0028	0.0034	0.0037
Phosphorus_T	0.021	0.022	0.023	0.024	0.028	0.029	0.0084	0.0099	0.011	0.011	0.014	0.014
Potassium_D	3.1	3.2	6.8	15	36	61	13	19	20	22	29	30
Proton	0.000000030	0.000000031	0.000000043	0.000000054	0.000000097	0.00000012	0.0032	0.0046	0.0051	0.0056	0.0071	0.0074
Radium_226	0.021	0.024	0.027	0.026	0.028	0.028	0.0027	0.0031	0.0036	0.0039	0.0049	0.0058
Selenium_D	0.000091	0.000094	0.00021	0.00048	0.0012	0.0020	0.00035	0.00050	0.00055	0.00060	0.00076	0.00078
Selenium_T	0.000091	0.000094	0.00022	0.00049	0.0012	0.0020	0.00037	0.00053	0.00058	0.00063	0.00080	0.00081
Silicon_D	6.7	6.8	7.5	8.3	11	13	4.9	6.0	6.3	6.4	6.7	7.3
Silicon_T	6.7	6.8	7.5	8.3	11	13	5.0	6.1	6.6	6.6	7.1	8.1
Silver_D	0.0000072	0.0000074	0.0000095	0.000012	0.000022	0.000031	0.000012	0.000017	0.000019	0.000021	0.000027	0.000029
Silver_T	0.0000072	0.0000074	0.0000096	0.000012	0.000022	0.000031	0.000013	0.000018	0.000019	0.000022	0.000028	0.000029
Sodium_D	8.5	8.7	16	35	81	140	16	23	25	27	34	36
Sodium_T	8.5	8.7	16	35	81	140	16	23	25	27	34	36
Strontium_D	0.099	0.10	0.13	0.19	0.36	0.55	0.19	0.27	0.29	0.32	0.40	0.42
Strontium_T	0.099	0.10	0.13	0.19	0.36	0.55	0.19	0.27	0.29	0.32	0.40	0.42
Sulfate	21	21	46	100	240	400	1.5	1.6	1.7	2.4	3.6	5.2
Thallium_D	0.000028	0.000028	0.000045	0.000077	0.00016	0.00026	0.00010	0.00014	0.00015	0.00017	0.00021	0.00022
Thallium_T	0.000028	0.000028	0.000046	0.000079	0.00017	0.00027	0.00012	0.00016	0.00018	0.00019	0.00024	0.00024
TSS	12	13	15	14	15	15	8.9	9.9	12	12	15	15
Uranium_D	0.0013	0.0014	0.0023	0.0046	0.010	0.017	0.0041	0.0059	0.0065	0.0071	0.0090	0.0094
Uranium_T	0.0013	0.0014	0.0023	0.0046	0.010	0.017	0.0041	0.0059	0.0065	0.0071	0.0091	0.0094
Vanadium_T	0.00027	0.00028	0.00046	0.00072	0.0015	0.0024	0.0011	0.0015	0.0017	0.0018	0.0022	0.0026
Zinc_D	0.0023	0.0024	0.0026	0.0031	0.0045	0.0056	0.0016	0.0021	0.0023	0.0025	0.0032	0.0032
Zinc_T	0.0023	0.0024	0.0028	0.0033	0.0049	0.0063	0.0032	0.0042	0.0047	0.0048	0.0052	0.0063

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Gordon Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.96	1.4	4.8	4.4	7.0	8.3	3.2	3.7	5.5	5.9	7.9	8.6
Alkalinity_T	48	48	61	62	74	83	48	48	50	62	74	84
Aluminum_D	0.000032	0.000065	0.00058	0.0028	0.0086	0.013	0.0038	0.0039	0.0069	0.0074	0.012	0.014
Aluminum_T	0.000056	0.00015	0.0031	0.014	0.041	0.058	0.016	0.017	0.030	0.033	0.055	0.059
Antimony_D	0.000023	0.000027	0.000054	0.000049	0.000064	0.000074	0.000059	0.000070	0.000073	0.000079	0.000094	0.000099
Antimony_T	0.000032	0.000035	0.000065	0.000060	0.000076	0.000094	0.000063	0.000073	0.000078	0.000085	0.00010	0.00011
Arsenic_D	0.00015	0.00015	0.00023	0.00022	0.00026	0.00031	0.00024	0.00027	0.00028	0.00032	0.00039	0.00039
Arsenic_T	0.00016	0.00017	0.00026	0.00025	0.00030	0.00036	0.00026	0.00029	0.00031	0.00034	0.00042	0.00043
Barium_D	0.0055	0.0064	0.0091	0.0097	0.013	0.015	0.0078	0.0083	0.0094	0.011	0.014	0.015
Barium_T	0.0072	0.0078	0.011	0.011	0.014	0.016	0.0089	0.0093	0.010	0.012	0.014	0.016
Beryllium_T	0.000026	0.000031	0.000062	0.000056	0.000072	0.000087	0.000062	0.000072	0.000077	0.000083	0.000099	0.00011
Boron_D	0.0018	0.0019	0.0039	0.0044	0.0075	0.0085	0.0033	0.0034	0.0047	0.0056	0.0078	0.0086
Boron_T	0.0025	0.0028	0.0063	0.0064	0.010	0.012	0.0041	0.0044	0.0062	0.0075	0.011	0.012
Bromide	0.012	0.014	0.029	0.028	0.039	0.042	0.030	0.036	0.040	0.041	0.047	0.052
Cadmium_D	0.00000013	0.00000017	0.00000078	0.00000065	0.00000099	0.0000010	0.0000013	0.0000015	0.0000018	0.0000018	0.0000021	0.0000024
Cadmium_T	0.00000015	0.00000024	0.0000015	0.0000015	0.0000025	0.0000026	0.0000024	0.0000029	0.0000033	0.0000034	0.0000038	0.0000046
Calcium_D	7.9	10.0	12	12	15	17	13	13	15	17	20	22
Chloride	0.012	0.018	0.061	0.069	0.15	0.17	0.11	0.11	0.17	0.16	0.21	0.25
Chromium_D	0.0000039	0.0000056	0.000013	0.000015	0.000037	0.000041	0.000024	0.000029	0.000038	0.000038	0.000047	0.000055
Chromium_D_Hex	0.0000042	0.0000063	0.000028	0.000026	0.000047	0.000053	0.000027	0.000032	0.000047	0.000047	0.000059	0.000062
Chromium_T	0.000031	0.000040	0.000096	0.000090	0.00012	0.00015	0.00013	0.00015	0.00016	0.00017	0.00020	0.00023
Cobalt_D	0.000016	0.000025	0.000078	0.000071	0.00011	0.00013	0.000060	0.000070	0.000098	0.00011	0.00014	0.00015
Cobalt_T	0.000019	0.000028	0.000086	0.000079	0.00012	0.00015	0.000068	0.000079	0.00011	0.00012	0.00016	0.00017
Copper_D	0.0000058	0.0000077	0.000030	0.000036	0.000074	0.000079	0.000067	0.000084	0.000100	0.000096	0.00011	0.00012
Copper_T	0.000018	0.000025	0.000077	0.000069	0.00011	0.00013	0.00012	0.00013	0.00016	0.00017	0.00021	0.00023
Cyanide_F	0.000020	0.000030	0.00020	0.00023	0.00042	0.00045	0.00033	0.00038	0.00052	0.00054	0.00064	0.00081
Cyanide_T	0.00010	0.00012	0.00031	0.00029	0.00041	0.00047	0.00043	0.00047	0.00057	0.00060	0.00074	0.00079
Cyanide_WAD	0.000025	0.000033	0.00020	0.00021	0.00037	0.00039	0.00031	0.00036	0.00046	0.00048	0.00057	0.00070
Fluoride	0.036	0.039	0.048	0.049	0.061	0.064	0.039	0.040	0.045	0.052	0.063	0.067
Hardness	25	30	37	38	48	54	42	43	47	56	66	73
Iron_D	0.055	0.084	0.16	0.16	0.25	0.27	0.19	0.22	0.31	0.29	0.33	0.37
Iron_T	0.16	0.25	0.43	0.53	0.99	1.2	0.52	0.63	0.75	0.80	1.1	1.3
Lead_D	0.00000059	0.00000084	0.0000037	0.0000031	0.0000047	0.0000052	0.0000068	0.0000078	0.0000096	0.000010	0.000012	0.000013
Lead_T	0.0000062	0.0000083	0.000024	0.000022	0.000039	0.000041	0.000031	0.000031	0.000048	0.000048	0.000058	0.000063
Magnesium_D	1.3	1.5	1.7	2.0	2.5	3.0	2.5	2.5	2.6	3.2	3.9	4.4
Manganese_D	0.013	0.025	0.14	0.13	0.23	0.25	0.065	0.082	0.15	0.17	0.25	0.27
Manganese_T	0.024	0.046	0.17	0.16	0.27	0.30	0.089	0.11	0.18	0.20	0.30	0.32
Mercury_D	0.00000011	0.00000014	0.00000035	0.00000042	0.00000082	0.00000088	0.00000077	0.00000081	0.00000095	0.00000094	0.0000011	0.0000011
Mercury_T	0.00000047	0.00000072	0.0000010	0.0000010	0.0000015	0.0000017	0.0000011	0.0000012	0.0000015	0.0000015	0.0000016	0.0000017
Molybdenum_D	0.0000070	0.0000093	0.000017	0.000018	0.000031	0.000033	0.000037	0.000039	0.000042	0.000053	0.000066	0.000073
Molybdenum_T	0.0000080	0.000010	0.000020	0.000021	0.000037	0.000041	0.000042	0.000044	0.000050	0.000061	0.000078	0.000085
N_Ammonia	0.0091	0.017	0.048	0.045	0.072	0.075	0.020	0.024	0.042	0.054	0.083	0.088
N_Nitrate_Nitrite	0.0015	0.0022	0.012	0.012	0.023	0.024	0.016	0.020	0.022	0.024	0.028	0.034
N_Nitrite	0.00046	0.00066	0.0026	0.0025	0.0048	0.0056	0.0041	0.0042	0.0058	0.0058	0.0072	0.0085
Nickel_D	0.000016	0.000020	0.000047	0.000042	0.000060	0.000067	0.000082	0.000083	0.00010	0.00011	0.00014	0.00015
Nickel_T	0.000022	0.000030	0.000097	0.000094	0.00017	0.00018	0.00013	0.00014	0.00022	0.00021	0.00026	0.00030
Phosphorus_T	0.013	0.014	0.020	0.021	0.031	0.035	0.021	0.022	0.026	0.027	0.033	0.038
Potassium_D	0.36	0.39	0.54	0.50	0.58	0.70	0.58	0.61	0.71	0.75	0.84	0.96
Proton	0.0000000024	0.0000000028	0.0000000060	0.0000000079	0.000000016	0.000000020	0.000000019	0.000000022	0.000000024	0.000000025	0.000000031	0.000000031
Radium_226	0.00027	0.00037	0.0012	0.0010	0.0016	0.0019	0.0018	0.0020	0.0025	0.0026	0.0033	0.0035
Selenium_D	0.0000018	0.0000023	0.000010	0.000018	0.000053	0.000064	0.000030	0.000031	0.000038	0.000043	0.000064	0.000065
Selenium_T	0.0000019	0.0000024	0.000011	0.000019	0.000053	0.000064	0.000031	0.000032	0.000039	0.000044	0.000065	0.000066
Silicon_D	0.91	0.99	1.4	1.4	1.8	2.1	2.1	2.1	2.3	2.6	3.1	3.4
Silicon_T	0.93	1.0	1.5	1.5	1.9	2.2	2.1	2.2	2.3	2.7	3.2	3.5
Silver_D	0.00000010	0.00000014	0.00000089	0.0000017	0.0000052	0.0000064	0.0000027	0.0000028	0.0000037	0.0000042	0.0000064	0.0000065
Silver_T	0.00000014	0.00000018	0.0000011	0.0000018	0.0000053	0.0000064	0.0000030	0.0000031	0.0000039	0.0000044	0.0000065	0.0000066
Sodium_D	0.32	0.39	0.62	0.63	0.94	1.0	0.85	0.88	0.99	1.2	1.5	1.6
Sodium_T	0.32	0.40	0.64	0.65	0.96	1.0	0.86	0.89	1.0	1.2	1.5	1.7
Strontium_D	0.0076	0.0089	0.014	0.013	0.018	0.020	0.018	0.018	0.020	0.024	0.028	0.031
Strontium_T	0.015	0.017	0.022	0.024	0.032	0.035	0.022	0.022	0.024	0.030	0.036	0.040
Sulfate	0.83	1.1	1.9	1.8	2.4	2.7	1.4	1.5	1.7	2.1	2.5	2.8
Thallium_D	0.000011	0.000012	0.000025	0.000023	0.000030	0.000034	0.000027	0.000032	0.000034	0.000036	0.000043	0.000045
Thallium_T	0.000034	0.000037	0.000043	0.000044	0.000053	0.000055	0.000033	0.000036	0.000037	0.000043	0.000052	0.000054
TSS	0.35	0.45	0.74	0.87	1.5	1.9	1.7	1.7	2.0	2.0	2.3	2.4
Uranium_D	0.00000020	0.00000027	0.0000013	0.0000011	0.0000016	0.0000018	0.0000027	0.0000030	0.0000036	0.0000039	0.0000048	0.0000051
Uranium_T	0.0000013	0.0000016	0.0000023	0.0000037	0.0000070	0.0000091	0.0000053	0.0000054	0.0000082	0.0000100	0.000015	0.000017
Vanadium_T	0.000011	0.000017	0.000079	0.000074	0.00013	0.00015	0.00012	0.00014	0.00015	0.00016	0.00019	0.00024
Zinc_D	0.000032	0.000043	0.00013	0.00013	0.00022	0.00027	0.00024	0.00025	0.00039	0.00037	0.00045	0.00046
Zinc_T	0.000040	0.000056	0.00018	0.00019	0.00035	0.00043	0.00033	0.00034	0.00056	0.00055	0.00065	0.00071

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Farley Lake West

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.1	3.4	7.4	7.6	12	12	3.6	3.7	7.0	8.4	13	15
Alkalinity_T	67	79	150	150	210	290	62	63	110	120	190	280
Aluminum_D	0.00091	0.00099	0.0023	0.0028	0.0051	0.0069	0.0028	0.0034	0.0040	0.0046	0.0069	0.0081
Aluminum_T	0.0017	0.0018	0.0039	0.0046	0.0089	0.011	0.0049	0.0058	0.0070	0.0076	0.011	0.012
Antimony_D	0.00010	0.00011	0.00026	0.00033	0.00072	0.00094	0.000098	0.00013	0.00015	0.00016	0.00021	0.00024
Antimony_T	0.00011	0.00014	0.00030	0.00038	0.00078	0.00095	0.00012	0.00014	0.00018	0.00018	0.00023	0.00026
Arsenic_D	0.00080	0.0010	0.0019	0.0020	0.0028	0.0041	0.00072	0.00077	0.0016	0.0014	0.0021	0.0035
Arsenic_T	0.00082	0.0011	0.0020	0.0020	0.0029	0.0042	0.00076	0.00081	0.0016	0.0015	0.0022	0.0035
Barium_D	0.012	0.015	0.026	0.025	0.034	0.046	0.013	0.014	0.019	0.024	0.035	0.044
Barium_T	0.013	0.016	0.027	0.026	0.035	0.047	0.014	0.014	0.019	0.025	0.036	0.045
Beryllium_T	0.000060	0.000072	0.000088	0.000094	0.00013	0.00014	0.000076	0.000086	0.000097	0.00010	0.00013	0.00014
Boron_D	0.010	0.012	0.025	0.027	0.044	0.054	0.0099	0.010	0.013	0.018	0.027	0.039
Boron_T	0.010	0.012	0.025	0.028	0.045	0.055	0.010	0.010	0.014	0.018	0.028	0.040
Bromide	0.029	0.036	0.041	0.041	0.045	0.053	0.030	0.036	0.041	0.041	0.047	0.059
Cadmium_D	0.0000024	0.0000028	0.0000035	0.0000038	0.0000057	0.0000069	0.0000026	0.0000028	0.0000032	0.0000032	0.0000035	0.0000048
Cadmium_T	0.0000027	0.0000036	0.0000044	0.0000047	0.0000068	0.0000081	0.0000033	0.0000036	0.0000046	0.0000045	0.0000054	0.0000065
Calcium_D	27	31	52	52	71	98	31	31	41	53	76	98
Chloride	0.41	0.41	0.58	0.70	1.1	1.5	0.43	0.44	0.64	0.75	1.2	1.7
Chromium_D	0.000023	0.000028	0.000034	0.000042	0.000068	0.000082	0.000039	0.000047	0.000057	0.000058	0.000076	0.000084
Chromium_D_Hex	0.000034	0.000040	0.000055	0.000058	0.000085	0.00010	0.000063	0.000069	0.000073	0.000078	0.000092	0.00011
Chromium_T	0.000036	0.000052	0.000080	0.000080	0.00010	0.00012	0.000064	0.000094	0.00013	0.00013	0.00017	0.00018
Cobalt_D	0.000042	0.000061	0.000088	0.000085	0.00010	0.00012	0.000054	0.000060	0.000089	0.000092	0.00013	0.00015
Cobalt_T	0.000047	0.000068	0.00011	0.00011	0.00014	0.00017	0.000063	0.000069	0.00011	0.00012	0.00018	0.00020
Copper_D	0.00027	0.00031	0.00058	0.00064	0.0011	0.0012	0.00025	0.00027	0.00036	0.00037	0.00050	0.00086
Copper_T	0.00032	0.00036	0.00069	0.00076	0.0012	0.0014	0.00031	0.00031	0.00046	0.00050	0.00072	0.0011
Cyanide_F	0.00013	0.00015	0.00022	0.00023	0.00032	0.00034	0.00019	0.00023	0.00029	0.00029	0.00036	0.00045
Cyanide_T	0.00026	0.00030	0.00041	0.00041	0.00052	0.00054	0.00035	0.00041	0.00049	0.00049	0.00054	0.00066
Cyanide_WAD	0.00017	0.00019	0.00029	0.00031	0.00045	0.00046	0.00024	0.00028	0.00037	0.00037	0.00046	0.00056
Fluoride	0.064	0.073	0.098	0.098	0.12	0.14	0.069	0.073	0.11	0.11	0.14	0.22
Hardness	94	97	150	160	250	320	99	100	140	170	260	350
Iron_D	0.0077	0.0090	0.012	0.012	0.014	0.017	0.015	0.016	0.020	0.020	0.025	0.026
Iron_T	0.016	0.017	0.026	0.048	0.090	0.23	0.035	0.039	0.046	0.074	0.13	0.28
Lead_D	0.000011	0.000013	0.000020	0.000024	0.000046	0.000056	0.000019	0.000026	0.000029	0.000029	0.000035	0.000037
Lead_T	0.000024	0.000026	0.000038	0.000044	0.000074	0.000087	0.000037	0.000051	0.000058	0.000057	0.000063	0.000065
Magnesium_D	7.8	8.5	13	14	19	25	8.4	8.5	11	14	20	26
Manganese_D	0.036	0.046	0.19	0.22	0.44	0.54	0.041	0.049	0.18	0.23	0.45	0.59
Manganese_T	0.049	0.061	0.19	0.23	0.43	0.55	0.055	0.064	0.19	0.24	0.45	0.60
Mercury_D	0.00000037	0.00000042	0.00000057	0.00000073	0.0000013	0.0000015	0.00000073	0.00000075	0.00000081	0.00000092	0.0000013	0.0000013
Mercury_T	0.00000059	0.00000063	0.00000078	0.00000098	0.0000017	0.0000020	0.00000087	0.0000011	0.0000011	0.0000012	0.0000017	0.0000018
Molybdenum_D	0.00070	0.00091	0.0017	0.0020	0.0035	0.0042	0.00056	0.00083	0.0012	0.0012	0.0017	0.0019
Molybdenum_T	0.00071	0.00092	0.0018	0.0020	0.0035	0.0042	0.00059	0.00085	0.0012	0.0012	0.0017	0.0020
N_Ammonia	0.038	0.048	0.12	0.12	0.18	0.23	0.012	0.014	0.053	0.046	0.076	0.10
N_Nitrate_Nitrite	0.19	0.37	0.76	0.99	1.9	2.3	0.030	0.033	0.061	0.068	0.10	0.17
N_Nitrite	0.017	0.019	0.034	0.038	0.067	0.088	0.013	0.022	0.032	0.033	0.040	0.055
Nickel_D	0.00027	0.00034	0.00050	0.00055	0.00079	0.00093	0.00027	0.00029	0.00039	0.00042	0.00056	0.00075
Nickel_T	0.00031	0.00039	0.00065	0.00067	0.00093	0.0012	0.00034	0.00034	0.00047	0.00057	0.00081	0.0011
Phosphorus_T	0.0092	0.010	0.013	0.014	0.019	0.025	0.0080	0.0089	0.012	0.013	0.017	0.025
Potassium_D	2.8	3.1	6.7	7.4	12	14	3.0	3.4	4.6	5.8	8.2	11
Proton	0000000079	0.000000010	0.000000043	.000000040	0.000000062	00000067	0.000025	0.00012	0.00028	0.00034	0.00066	0.00081
Radium_226	0.0060	0.0063	0.0080	0.0083	0.011	0.011	0.0030	0.0032	0.0038	0.0038	0.0041	0.0086
Selenium_D	0.000042	0.000065	0.00013	0.00014	0.00021	0.00030	0.000049	0.000050	0.000086	0.000098	0.00015	0.00016
Selenium_T	0.000049	0.000059	0.00011	0.00012	0.00023	0.00034	0.000054	0.000055	0.000068	0.000071	0.000088	0.000097
Silicon_D	2.5	2.7	4.5	4.5	5.9	6.4	2.6	2.6	4.3	4.1	5.8	6.9
Silicon_T	2.5	2.7	4.7	4.5	6.0	6.5	2.6	2.7	4.3	4.2	6.0	7.0
Silver_D	0.0000025	0.0000029	0.0000044	0.0000051	0.0000090	0.000011	0.0000040	0.0000048	0.0000056	0.0000062	0.0000089	0.0000099
Silver_T	0.0000031	0.0000035	0.0000054	0.0000061	0.000010	0.000013	0.0000047	0.0000056	0.0000064	0.0000071	0.000010	0.000011
Sodium_D	5.8	6.8	14	16	26	29	5.9	6.1	7.9	9.8	13	17
Sodium_T	5.8	6.7	14	16	26	29	5.9	6.1	7.8	9.8	13	18
Strontium_D	0.055	0.068	0.12	0.12	0.17	0.25	0.067	0.069	0.094	0.12	0.17	0.23
Strontium_T	0.057	0.070	0.13	0.13	0.17	0.26	0.068	0.070	0.094	0.12	0.18	0.24
Sulfate	42	47	78	80	110	140	38	40	49	62	93	120
Thallium_D	0.000019	0.000030	0.000035	0.000039	0.000058	0.000079	0.000025	0.000032	0.000043	0.000042	0.000051	0.000054
Thallium_T	0.000021	0.000033	0.000039	0.000043	0.000062	0.000083	0.000027	0.000034	0.000045	0.000045	0.000056	0.000059
TSS	0.24	0.27	0.49	0.46	0.61	0.67	0.76	0.79	1.1	1.2	1.7	1.8
Uranium_D	0.00050	0.00067	0.0014	0.0016	0.0028	0.0034	0.00045	0.00046	0.00088	0.00075	0.0011	0.0015
Uranium_T	0.00050	0.00064	0.0013	0.0016	0.0028	0.0034	0.00045	0.00046	0.00079	0.00072	0.00100	0.0014
Vanadium_T	0.000099	0.00012	0.00019	0.00020	0.00029	0.00032	0.00015	0.00018	0.00023	0.00024	0.00030	0.00031
Zinc_D	0.00044	0.00052	0.00065	0.00068	0.00092	0.0011	0.00044	0.00046	0.00060	0.00060	0.00071	0.0010
Zinc_T	0.00054	0.00072	0.00096	0.00095	0.0012	0.0013	0.00058	0.00063	0.00099	0.00093	0.0011	0.0014

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Farley Lake East

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.0	3.3	6.8	7.1	11	12	3.3	3.5	5.5	7.7	12	14
Alkalinity_T	56	63	120	120	180	230	53	53	76	110	170	200
Aluminum_D	0.00082	0.0012	0.0023	0.0029	0.0051	0.0080	0.0015	0.0020	0.0029	0.0036	0.0056	0.0088
Aluminum_T	0.0026	0.0035	0.0076	0.0077	0.011	0.015	0.0048	0.0061	0.0095	0.0095	0.012	0.016
Antimony_D	0.000078	0.00011	0.00021	0.00028	0.00056	0.00073	0.000089	0.00012	0.00014	0.00015	0.00019	0.00021
Antimony_T	0.000085	0.00012	0.00025	0.00032	0.00066	0.00074	0.000096	0.00013	0.00015	0.00016	0.00022	0.00023
Arsenic_D	0.00050	0.00060	0.0011	0.0011	0.0016	0.0024	0.00045	0.00047	0.00091	0.00081	0.0012	0.0017
Arsenic_T	0.00056	0.00069	0.0011	0.0012	0.0019	0.0026	0.00054	0.00056	0.00095	0.00088	0.0012	0.0018
Barium_D	0.011	0.012	0.023	0.022	0.031	0.039	0.012	0.012	0.014	0.022	0.032	0.035
Barium_T	0.012	0.013	0.024	0.023	0.033	0.041	0.012	0.013	0.015	0.023	0.034	0.036
Beryllium_T	0.000053	0.000075	0.000090	0.000095	0.00012	0.00014	0.000065	0.000086	0.000093	0.00010	0.00013	0.00014
Boron_D	0.0078	0.0089	0.017	0.019	0.031	0.039	0.0080	0.0082	0.0094	0.012	0.018	0.022
Boron_T	0.0091	0.012	0.023	0.024	0.035	0.050	0.0089	0.0091	0.013	0.017	0.026	0.030
Bromide	0.027	0.037	0.044	0.044	0.051	0.068	0.027	0.038	0.043	0.044	0.049	0.072
Cadmium_D	0.0000020	0.0000023	0.0000030	0.0000033	0.0000046	0.0000061	0.0000021	0.0000023	0.0000027	0.0000028	0.0000033	0.0000042
Cadmium_T	0.0000031	0.0000041	0.0000049	0.0000052	0.0000071	0.0000085	0.0000036	0.0000037	0.0000051	0.0000050	0.0000060	0.0000078
Calcium_D	21	23	43	43	63	78	25	25	29	45	67	73
Chloride	0.22	0.23	0.52	0.56	0.96	1.0	0.23	0.24	0.47	0.60	1.0	1.2
Chromium_D	0.000021	0.000023	0.000032	0.000038	0.000066	0.000087	0.000032	0.000036	0.000043	0.000047	0.000068	0.000089
Chromium_D_Hex	0.000026	0.000029	0.000045	0.000049	0.000077	0.00010	0.000041	0.000046	0.000052	0.000059	0.000079	0.00010
Chromium_T	0.000060	0.000073	0.000093	0.000094	0.00012	0.00014	0.000081	0.00010	0.00014	0.00013	0.00017	0.00017
Cobalt_D	0.000057	0.000065	0.000093	0.000089	0.00011	0.00013	0.000065	0.000067	0.000085	0.000094	0.00013	0.00014
Cobalt_T	0.000061	0.000072	0.00011	0.00011	0.00014	0.00017	0.000072	0.000076	0.000095	0.00012	0.00017	0.00019
Copper_D	0.000055	0.000065	0.00016	0.00021	0.00048	0.00068	0.000054	0.000060	0.00012	0.00011	0.00016	0.00023
Copper_T	0.00017	0.00018	0.00030	0.00038	0.00068	0.00091	0.00016	0.00017	0.00022	0.00023	0.00028	0.00042
Cyanide_F	0.00019	0.00019	0.00031	0.00035	0.00055	0.00074	0.00022	0.00027	0.00036	0.00039	0.00057	0.00081
Cyanide_T	0.00027	0.00036	0.00046	0.00047	0.00054	0.00085	0.00032	0.00044	0.00051	0.00053	0.00058	0.00093
Cyanide_WAD	0.00021	0.00024	0.00037	0.00038	0.00046	0.00071	0.00025	0.00032	0.00042	0.00042	0.00046	0.00080
Fluoride	0.057	0.062	0.090	0.092	0.12	0.14	0.062	0.066	0.10	0.098	0.13	0.20
Hardness	75	77	130	140	210	240	79	80	100	150	220	260
Iron_D	0.013	0.014	0.023	0.025	0.030	0.064	0.018	0.019	0.030	0.031	0.035	0.070
Iron_T	0.043	0.046	0.16	0.14	0.26	0.27	0.058	0.064	0.17	0.16	0.24	0.31
Lead_D	0.0000061	0.0000070	0.000019	0.000021	0.000044	0.000050	0.0000086	0.000012	0.000020	0.000022	0.000036	0.000037
Lead_T	0.000012	0.000014	0.000029	0.000035	0.000070	0.000078	0.000019	0.000025	0.000034	0.000039	0.000060	0.000062
Magnesium_D	6.1	6.4	11	11	16	20	6.7	6.7	7.8	12	17	20
Manganese_D	0.033	0.042	0.18	0.19	0.35	0.37	0.036	0.043	0.14	0.20	0.37	0.46
Manganese_T	0.051	0.060	0.18	0.20	0.35	0.38	0.054	0.062	0.15	0.21	0.38	0.47
Mercury_D	0.00000051	0.00000057	0.00000071	0.00000083	0.0000012	0.0000014	0.00000073	0.00000078	0.00000095	.00000098	0.0000012	0.0000013
Mercury_T	0.00000078	0.00000091	0.0000012	0.0000012	0.0000016	0.0000018	0.00000098	0.0000011	0.0000014	0.0000014	0.0000016	0.0000018
Molybdenum_D	0.00029	0.00031	0.00065	0.00092	0.0017	0.0030	0.00019	0.00038	0.00046	0.00051	0.00075	0.00081
Molybdenum_T	0.00039	0.00042	0.00073	0.0010	0.0018	0.0030	0.00026	0.00049	0.00056	0.00059	0.00079	0.00084
N_Ammonia	0.033	0.056	0.15	0.16	0.26	0.33	0.013	0.016	0.046	0.100	0.18	0.22
N_Nitrate_Nitrite	0.025	0.062	0.25	0.33	0.75	0.91	0.0086	0.010	0.016	0.023	0.050	0.065
N_Nitrite	0.0019	0.0030	0.0052	0.0088	0.020	0.026	0.0016	0.0028	0.0061	0.0073	0.014	0.014
Nickel_D	0.00019	0.00021	0.00026	0.00030	0.00046	0.00051	0.00020	0.00021	0.00022	0.00023	0.00025	0.00034
Nickel_T	0.00023	0.00026	0.00035	0.00039	0.00055	0.00068	0.00026	0.00026	0.00029	0.00032	0.00037	0.00049
Phosphorus_T	0.011	0.012	0.017	0.017	0.024	0.026	0.011	0.012	0.016	0.016	0.023	0.026
Potassium_D	2.1	2.3	5.7	6.1	9.2	13	2.4	2.7	3.2	4.9	7.2	8.4
Proton	0.000000020	0.000000025	0.000000060	.000000055	0.000000080	0.000000088	0.0000056	0.000092	0.00023	0.00026	0.00050	0.00064
Radium_226	0.0047	0.0057	0.0073	0.0078	0.011	0.011	0.0026	0.0037	0.0042	0.0043	0.0054	0.0090
Selenium_D	0.000044	0.000069	0.00012	0.00012	0.00019	0.00025	0.000048	0.000050	0.000078	0.000093	0.00014	0.00016
Selenium_T	0.000048	0.000062	0.000093	0.00011	0.00020	0.00028	0.000052	0.000053	0.000074	0.000072	0.000091	0.000099
Silicon_D	1.0	1.4	3.4	3.3	5.3	5.6	1.1	1.3	3.0	3.2	5.3	6.1
Silicon_T	1.1	1.5	3.5	3.5	5.4	5.7	1.2	1.5	3.1	3.3	5.4	6.2
Silver_D	0.0000031	0.0000034	0.0000050	0.0000056	0.0000089	0.000010	0.0000044	0.0000051	0.0000055	0.0000064	0.0000090	0.0000093
Silver_T	0.0000036	0.0000040	0.0000057	0.0000064	0.000010	0.000012	0.0000050	0.0000058	0.0000061	0.0000071	0.000010	0.000010
Sodium_D	4.2	5.1	10	11	19	23	4.4	4.6	5.4	7.1	9.5	11
Sodium_T	4.4	5.1	12	13	20	27	4.7	4.8	5.5	8.2	12	14
Strontium_D	0.045	0.049	0.11	0.10	0.15	0.20	0.054	0.055	0.067	0.10	0.15	0.17
Strontium_T	0.046	0.050	0.11	0.11	0.16	0.21	0.055	0.056	0.067	0.10	0.16	0.18
Sulfate	23	27	42	44	62	82	21	23	30	33	46	58
Thallium_D	0.000025	0.000032	0.000038	0.000040	0.000054	0.000067	0.000030	0.000033	0.000042	0.000042	0.000050	0.000052
Thallium_T	0.000028	0.000035	0.000041	0.000044	0.000057	0.000071	0.000031	0.000035	0.000045	0.000045	0.000054	0.000056
TSS	0.062	0.074	0.14	0.14	0.19	0.21	0.090	0.11	0.21	0.19	0.23	0.28
Uranium_D	0.00010	0.00018	0.00035	0.00040	0.00069	0.0010	0.000092	0.000093	0.00024	0.00019	0.00027	0.00034
Uranium_T	0.00012	0.00022	0.00038	0.00048	0.00092	0.0013	0.00010	0.00012	0.00024	0.00021	0.00028	0.00037
Vanadium_T	0.000085	0.00012	0.00019	0.00019	0.00026	0.00036	0.00013	0.00015	0.00020	0.00023	0.00031	0.00034
Zinc_D	0.00026	0.00028	0.00041	0.00047	0.00073	0.00090	0.00025	0.00026	0.00040	0.00042	0.00060	0.00074
Zinc_T	0.00047	0.00055	0.0010	0.00096	0.0013	0.0015	0.00049	0.00055	0.0010	0.00092	0.0011	0.0016

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Swede Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.7	3.8	4.4	4.6	5.4	5.7	3.9	4.1	4.7	4.8	5.7	5.9
Alkalinity_T	55	58	73	73	89	96	56	57	67	68	81	89
Aluminum_D	0.0053	0.0057	0.0063	0.0063	0.0068	0.0072	0.0055	0.0060	0.0065	0.0065	0.0068	0.0075
Aluminum_T	0.025	0.025	0.027	0.027	0.029	0.030	0.025	0.026	0.027	0.027	0.028	0.031
Antimony_D	0.000088	0.000090	0.00015	0.00017	0.00027	0.00033	0.000081	0.00010	0.00011	0.00012	0.00013	0.00014
Antimony_T	0.00010	0.00011	0.00018	0.00020	0.00031	0.00037	0.000100	0.00012	0.00013	0.00013	0.00015	0.00016
Arsenic_D	0.00042	0.00045	0.00068	0.00067	0.00087	0.00096	0.00040	0.00046	0.00053	0.00053	0.00061	0.00073
Arsenic_T	0.00045	0.00047	0.00073	0.00072	0.00095	0.0010	0.00042	0.00049	0.00057	0.00057	0.00066	0.00078
Barium_D	0.010	0.011	0.014	0.014	0.016	0.018	0.011	0.012	0.013	0.014	0.016	0.016
Barium_T	0.011	0.012	0.014	0.014	0.017	0.019	0.011	0.012	0.014	0.014	0.017	0.017
Beryllium_T	0.000077	0.000077	0.000091	0.000091	0.00010	0.00011	0.000078	0.000085	0.000087	0.000094	0.00011	0.00011
Boron_D	0.0071	0.0078	0.011	0.012	0.016	0.018	0.0072	0.0074	0.0084	0.0087	0.010	0.011
Boron_T	0.0097	0.011	0.014	0.015	0.020	0.023	0.0098	0.010	0.012	0.012	0.014	0.015
Bromide	0.041	0.041	0.046	0.046	0.052	0.053	0.040	0.040	0.043	0.045	0.051	0.055
Cadmium_D	0.0000033	0.0000034	0.0000040	0.0000039	0.0000045	0.0000047	0.0000033	0.0000033	0.0000036	0.0000037	0.0000041	0.0000044
Cadmium_T	0.0000041	0.0000042	0.0000050	0.0000049	0.0000056	0.0000059	0.0000042	0.0000043	0.0000046	0.0000048	0.0000054	0.0000056
Calcium_D	18	19	24	24	30	32	20	22	25	26	30	31
Chloride	0.35	0.36	0.42	0.43	0.51	0.52	0.37	0.38	0.44	0.45	0.53	0.57
Chromium_D	0.000056	0.000061	0.000066	0.000065	0.000070	0.000071	0.000060	0.000065	0.000070	0.000069	0.000073	0.000074
Chromium_D_Hex	0.000061	0.000066	0.000072	0.000071	0.000076	0.000078	0.000065	0.000071	0.000077	0.000075	0.000080	0.000081
Chromium_T	0.00013	0.00013	0.00014	0.00014	0.00015	0.00016	0.00014	0.00015	0.00016	0.00016	0.00017	0.00017
Cobalt_D	0.000076	0.000077	0.000087	0.000088	0.000100	0.00010	0.000078	0.000079	0.000083	0.000087	0.000099	0.00010
Cobalt_T	0.000082	0.000084	0.000093	0.000095	0.00011	0.00011	0.000085	0.000086	0.000091	0.000096	0.00011	0.00011
Copper_D	0.00031	0.00034	0.00037	0.00038	0.00044	0.00049	0.00030	0.00031	0.00034	0.00033	0.00035	0.00037
Copper_T	0.00045	0.00050	0.00057	0.00057	0.00066	0.00071	0.00044	0.00046	0.00051	0.00050	0.00053	0.00058
Cyanide_F	0.00048	0.00049	0.00058	0.00058	0.00067	0.00070	0.00050	0.00050	0.00057	0.00059	0.00066	0.00072
Cyanide_T	0.00047	0.00048	0.00054	0.00054	0.00062	0.00065	0.00050	0.00050	0.00052	0.00056	0.00063	0.00065
Cyanide_WAD	0.00041	0.00041	0.00047	0.00047	0.00054	0.00057	0.00042	0.00043	0.00045	0.00048	0.00054	0.00057
Fluoride	0.070	0.072	0.082	0.082	0.094	0.096	0.074	0.075	0.088	0.087	0.098	0.12
Hardness	67	69	80	82	97	100	71	73	86	86	100	110
Iron_D	0.026	0.027	0.031	0.030	0.034	0.036	0.028	0.029	0.032	0.032	0.035	0.036
Iron_T	0.095	0.100	0.11	0.12	0.13	0.14	0.11	0.11	0.13	0.12	0.13	0.15
Lead_D	0.000027	0.000029	0.000034	0.000033	0.000037	0.000039	0.000028	0.000030	0.000032	0.000033	0.000037	0.000037
Lead_T	0.000052	0.000054	0.000062	0.000061	0.000068	0.000071	0.000053	0.000057	0.000060	0.000063	0.000069	0.000070
Magnesium_D	5.4	5.6	6.7	6.8	8.1	8.6	5.8	5.9	6.9	7.0	8.3	8.7
Manganese_D	0.058	0.062	0.079	0.080	0.098	0.11	0.062	0.067	0.084	0.084	0.10	0.12
Manganese_T	0.071	0.076	0.092	0.095	0.11	0.13	0.076	0.080	0.098	0.098	0.12	0.13
Mercury_D	0.00000077	0.00000081	0.00000091	0.00000091	0.00000100	0.0000010	0.00000083	0.00000086	0.00000091	0.00000096	0.0000010	0.0000011
Mercury_T	0.00000095	0.00000099	0.0000011	0.0000011	0.0000012	0.0000013	0.0000010	0.0000011	0.0000011	0.0000012	0.0000013	0.0000013
Molybdenum_D	0.00071	0.00077	0.00098	0.0010	0.0013	0.0015	0.00071	0.00079	0.00087	0.00085	0.00089	0.00091
Molybdenum_T	0.00075	0.00082	0.0010	0.0011	0.0014	0.0016	0.00076	0.00084	0.00093	0.00091	0.00096	0.00097
N_Ammonia	0.038	0.046	0.067	0.067	0.090	0.097	0.030	0.031	0.042	0.041	0.052	0.059
N_Nitrate_Nitrite	0.066	0.083	0.25	0.23	0.34	0.37	0.044	0.045	0.051	0.050	0.056	0.063
N_Nitrite	0.0066	0.0073	0.0093	0.0097	0.012	0.013	0.0067	0.0073	0.0084	0.0089	0.010	0.010
Nickel_D	0.00019	0.00019	0.00025	0.00025	0.00031	0.00034	0.00019	0.00020	0.00021	0.00022	0.00024	0.00026
Nickel_T	0.00023	0.00023	0.00029	0.00030	0.00037	0.00040	0.00023	0.00024	0.00025	0.00026	0.00030	0.00031
Phosphorus_T	0.016	0.017	0.018	0.018	0.020	0.021	0.016	0.016	0.018	0.018	0.019	0.021
Potassium_D	1.8	2.1	3.0	3.2	4.7	5.3	1.9	2.3	2.7	2.7	3.2	3.4
Proton	0.000000047	0.000000050	0.000000056	0.000000056	0.000000062	.000000065	0.0000027	0.00010	0.00011	0.00011	0.00013	0.00015
Radium_226	0.0047	0.0049	0.0058	0.0059	0.0070	0.0073	0.0040	0.0041	0.0048	0.0046	0.0052	0.0063
Selenium_D	0.000052	0.000055	0.000072	0.000078	0.00010	0.00012	0.000053	0.000056	0.000061	0.000063	0.000072	0.000075
Selenium_T	0.000049	0.000050	0.000072	0.000077	0.00011	0.00012	0.000048	0.000052	0.000054	0.000058	0.000065	0.000067
Silicon_D	1.4	1.5	1.9	1.9	2.3	2.5	1.4	1.6	1.9	1.9	2.2	2.4
Silicon_T	1.5	1.6	2.0	2.0	2.4	2.6	1.5	1.7	2.0	2.0	2.3	2.5
Silver_D	0.0000058	0.0000062	0.0000069	0.0000068	0.0000073	0.0000077	0.0000061	0.0000066	0.0000070	0.0000071	0.0000076	0.0000076
Silver_T	0.0000061	0.0000066	0.0000073	0.0000072	0.0000078	0.0000082	0.0000063	0.0000070	0.0000074	0.0000075	0.0000080	0.0000081
Sodium_D	3.3	3.5	5.7	6.1	9.2	11	3.3	3.7	4.2	4.3	5.0	5.2
Sodium_T	3.5	3.9	6.0	6.5	9.8	11	3.5	4.0	4.6	4.7	5.6	5.8
Strontium_D	0.042	0.045	0.058	0.059	0.075	0.080	0.044	0.051	0.059	0.060	0.071	0.073
Strontium_T	0.043	0.046	0.060	0.060	0.077	0.082	0.045	0.051	0.060	0.061	0.073	0.075
Sulfate	16	17	22	23	31	34	15	15	18	18	21	23
Thallium_D	0.000035	0.000036	0.000042	0.000041	0.000047	0.000049	0.000036	0.000038	0.000039	0.000042	0.000047	0.000047
Thallium_T	0.000036	0.000037	0.000043	0.000043	0.000049	0.000051	0.000036	0.000039	0.000040	0.000043	0.000048	0.000049
TSS	0.82	0.84	0.95	0.95	1.1	1.1	0.86	0.87	0.93	0.96	1.1	1.2
Uranium_D	0.000082	0.000087	0.00018	0.00020	0.00033	0.00039	0.000074	0.00010	0.00012	0.00012	0.00013	0.00016
Uranium_T	0.000091	0.000100	0.00021	0.00024	0.00041	0.00048	0.000079	0.00012	0.00013	0.00013	0.00015	0.00018
Vanadium_T	0.00017	0.00017	0.00020	0.00020	0.00023	0.00024	0.00018	0.00019	0.00022	0.00022	0.00024	0.00024
Zinc_D	0.00077	0.00080	0.00088	0.00087	0.00093	0.00095	0.00075	0.00078	0.00085	0.00084	0.00089	0.00096
Zinc_T	0.0026	0.0026	0.0030	0.0030	0.0032	0.0037	0.0026	0.0026	0.0029	0.0029	0.0031	0.0037

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Ellystan Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	4.4	4.6	5.3	5.3	5.8	6.4	4.5	4.8	5.4	5.4	5.8	6.5
Alkalinity_T	40	42	51	51	62	66	40	43	49	50	58	62
Aluminum_D	0.010	0.010	0.011	0.011	0.012	0.013	0.010	0.010	0.011	0.011	0.012	0.013
Aluminum_T	0.029	0.031	0.041	0.049	0.079	0.092	0.030	0.031	0.041	0.048	0.077	0.093
Antimony_D	0.000080	0.000083	0.00011	0.00012	0.00017	0.00020	0.000076	0.000091	0.000095	0.000100	0.00011	0.00011
Antimony_T	0.000080	0.000084	0.00011	0.00012	0.00017	0.00020	0.000076	0.000091	0.000096	0.000099	0.00011	0.00011
Arsenic_D	0.00033	0.00034	0.00046	0.00047	0.00059	0.00063	0.00030	0.00037	0.00042	0.00041	0.00046	0.00053
Arsenic_T	0.00036	0.00038	0.00051	0.00051	0.00066	0.00071	0.00033	0.00041	0.00048	0.00046	0.00051	0.00058
Barium_D	0.0094	0.0095	0.011	0.011	0.013	0.014	0.0094	0.010	0.011	0.011	0.013	0.013
Barium_T	0.010	0.011	0.012	0.012	0.014	0.015	0.010	0.011	0.012	0.013	0.014	0.014
Beryllium_T	0.000075	0.000076	0.000085	0.000085	0.000093	0.000096	0.000075	0.000080	0.000082	0.000087	0.000096	0.000097
Boron_D	0.0054	0.0057	0.0077	0.0078	0.010	0.011	0.0054	0.0057	0.0066	0.0068	0.0080	0.0083
Boron_T	0.0096	0.010	0.012	0.013	0.016	0.017	0.0096	0.010	0.012	0.012	0.013	0.013
Bromide	0.041	0.041	0.045	0.046	0.050	0.051	0.041	0.041	0.043	0.045	0.049	0.051
Cadmium_D	0.0000035	0.0000035	0.0000039	0.0000039	0.0000043	0.0000044	0.0000034	0.0000035	0.0000037	0.0000038	0.0000042	0.0000043
Cadmium_T	0.0000039	0.0000041	0.0000045	0.0000045	0.0000049	0.0000050	0.0000039	0.0000041	0.0000044	0.0000044	0.0000047	0.0000049
Calcium_D	13	13	16	16	19	21	13	15	16	17	20	21
Chloride	0.38	0.39	0.44	0.43	0.46	0.47	0.39	0.40	0.45	0.44	0.48	0.50
Chromium_D	0.000074	0.000078	0.000080	0.000081	0.000084	0.000086	0.000077	0.000080	0.000082	0.000082	0.000085	0.000087
Chromium_D_Hex	0.000054	0.000055	0.000062	0.000061	0.000068	0.000069	0.000056	0.000057	0.000060	0.000064	0.000071	0.000071
Chromium_T	0.00017	0.00017	0.00018	0.00018	0.00021	0.00022	0.00017	0.00018	0.00019	0.00019	0.00021	0.00022
Cobalt_D	0.000074	0.000076	0.000083	0.000083	0.000092	0.000094	0.000075	0.000076	0.000080	0.000083	0.000091	0.000093
Cobalt_T	0.000084	0.000086	0.000094	0.000094	0.00010	0.00011	0.000085	0.000087	0.000090	0.000095	0.00010	0.00010
Copper_D	0.00030	0.00032	0.00036	0.00036	0.00041	0.00044	0.00030	0.00031	0.00034	0.00034	0.00036	0.00038
Copper_T	0.00035	0.00038	0.00042	0.00042	0.00047	0.00050	0.00035	0.00037	0.00040	0.00039	0.00041	0.00043
Cyanide_F	0.00058	0.00059	0.00067	0.00065	0.00071	0.00072	0.00059	0.00060	0.00067	0.00065	0.00070	0.00073
Cyanide_T	0.00075	0.00077	0.00083	0.00085	0.00096	0.0011	0.00076	0.00078	0.00084	0.00086	0.00094	0.0011
Cyanide_WAD	0.00053	0.00054	0.00060	0.00059	0.00064	0.00065	0.00054	0.00054	0.00061	0.00059	0.00063	0.00065
Fluoride	0.064	0.066	0.073	0.074	0.083	0.085	0.065	0.069	0.080	0.077	0.086	0.097
Hardness	48	49	56	57	66	68	49	52	59	59	69	73
Iron_D	0.12	0.12	0.14	0.17	0.26	0.33	0.12	0.13	0.14	0.17	0.26	0.33
Iron_T	0.14	0.14	0.16	0.19	0.30	0.36	0.14	0.14	0.16	0.20	0.30	0.36
Lead_D	0.000030	0.000030	0.000033	0.000033	0.000036	0.000037	0.000030	0.000031	0.000032	0.000034	0.000037	0.000037
Lead_T	0.000047	0.000049	0.000053	0.000053	0.000060	0.000061	0.000047	0.000050	0.000054	0.000054	0.000060	0.000061
Magnesium_D	3.8	3.9	4.7	4.7	5.4	5.8	3.9	4.2	4.6	4.8	5.6	5.8
Manganese_D	0.057	0.061	0.067	0.069	0.080	0.088	0.061	0.065	0.070	0.070	0.078	0.089
Manganese_T	0.077	0.082	0.089	0.090	0.10	0.11	0.081	0.085	0.090	0.091	0.10	0.11
Mercury_D	0.00000072	0.00000081	0.00000085	0.00000084	0.00000088	0.00000092	0.00000074	0.00000084	0.00000087	0.00000086	0.00000089	0.00000093
Mercury_T	0.0000011	0.0000011	0.0000012	0.0000012	0.0000013	0.0000013	0.0000011	0.0000012	0.0000013	0.0000013	0.0000013	0.0000013
Molybdenum_D	0.00037	0.00040	0.00051	0.00053	0.00069	0.00077	0.00037	0.00042	0.00046	0.00049	0.00055	0.00055
Molybdenum_T	0.00040	0.00044	0.00055	0.00058	0.00075	0.00084	0.00040	0.00046	0.00051	0.00053	0.00059	0.00060
N_Ammonia	0.030	0.033	0.046	0.045	0.058	0.061	0.027	0.028	0.032	0.031	0.034	0.037
N_Nitrate_Nitrite	0.084	0.092	0.19	0.18	0.25	0.26	0.066	0.071	0.083	0.083	0.094	0.11
N_Nitrite	0.0058	0.0061	0.0073	0.0073	0.0087	0.0089	0.0058	0.0065	0.0068	0.0071	0.0078	0.0079
Nickel_D	0.00018	0.00019	0.00022	0.00022	0.00025	0.00027	0.00018	0.00018	0.00020	0.00020	0.00022	0.00023
Nickel_T	0.00025	0.00026	0.00029	0.00029	0.00032	0.00034	0.00025	0.00026	0.00028	0.00028	0.00029	0.00030
Phosphorus_T	0.015	0.016	0.019	0.019	0.021	0.022	0.015	0.015	0.019	0.018	0.020	0.023
Potassium_D	1.3	1.3	1.7	1.9	2.6	2.9	1.3	1.5	1.7	1.7	2.0	2.1
Proton	0.000000060	0.000000065	0.000000074	0.000000074	0.000000084	0.000000093	0.0000015	0.000065	0.000072	0.000070	0.000080	0.000086
Radium_226	0.0040	0.0043	0.0049	0.0049	0.0056	0.0058	0.0038	0.0039	0.0044	0.0043	0.0047	0.0053
Selenium_D	0.000069	0.000072	0.000081	0.000083	0.000097	0.00011	0.000069	0.000073	0.000075	0.000076	0.000081	0.000085
Selenium_T	0.000066	0.000069	0.000080	0.000081	0.000098	0.00011	0.000065	0.000070	0.000072	0.000073	0.000078	0.000082
Silicon_D	0.91	0.97	1.2	1.2	1.4	1.5	0.88	1.0	1.2	1.2	1.4	1.5
Silicon_T	1.1	1.1	1.3	1.3	1.6	1.7	1.0	1.2	1.4	1.4	1.6	1.7
Silver_D	0.0000073	0.0000076	0.0000079	0.0000079	0.0000083	0.0000084	0.0000075	0.0000078	0.0000081	0.0000081	0.0000084	0.0000085
Silver_T	0.0000075	0.0000078	0.0000082	0.0000082	0.0000085	0.0000087	0.0000077	0.0000081	0.0000084	0.0000083	0.0000087	0.0000088
Sodium_D	2.4	2.5	3.4	3.8	5.5	6.3	2.3	2.7	2.9	3.1	3.6	3.7
Sodium_T	2.5	2.6	3.6	4.0	5.8	6.7	2.4	2.9	3.2	3.3	3.8	3.9
Strontium_D	0.029	0.030	0.038	0.038	0.047	0.051	0.030	0.035	0.038	0.040	0.047	0.048
Strontium_T	0.032	0.032	0.041	0.041	0.050	0.054	0.032	0.037	0.040	0.043	0.049	0.050
Sulfate	7.6	7.9	10	11	14	16	7.4	7.6	8.7	8.8	10	11
Thallium_D	0.000033	0.000034	0.000038	0.000038	0.000042	0.000043	0.000034	0.000035	0.000037	0.000039	0.000043	0.000043
Thallium_T	0.000034	0.000035	0.000039	0.000039	0.000043	0.000045	0.000034	0.000036	0.000037	0.000039	0.000043	0.000044
TSS	2.5	2.5	2.8	3.0	3.8	4.4	2.5	2.5	2.9	3.0	3.8	4.5
Uranium_D	0.000055	0.000062	0.000098	0.00011	0.00019	0.00022	0.000052	0.000077	0.000087	0.000084	0.000091	0.00010
Uranium_T	0.000060	0.000069	0.00011	0.00014	0.00023	0.00028	0.000055	0.000086	0.000098	0.000095	0.00010	0.00012
Vanadium_T	0.00023	0.00024	0.00025	0.00026	0.00029	0.00031	0.00023	0.00025	0.00026	0.00027	0.00029	0.00031
Zinc_D	0.00085	0.00087	0.00097	0.00099	0.0011	0.0011	0.00083	0.00085	0.00094	0.00097	0.0011	0.0011
Zinc_T	0.0011	0.0012	0.0015	0.0015	0.0019	0.0020	0.0011	0.0011	0.0015	0.0015	0.0019	0.0020

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Simpson Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	2.6	2.7	3.3	3.4	4.1	4.6	2.6	2.7	2.8	3.4	4.1	4.6
Alkalinity_T	31	31	38	38	45	51	31	31	31	38	45	51
Aluminum_D	0.0070	0.0076	0.0090	0.0091	0.011	0.011	0.0071	0.0077	0.0082	0.0091	0.011	0.011
Aluminum_T	0.031	0.033	0.040	0.040	0.049	0.051	0.031	0.033	0.035	0.040	0.049	0.051
Antimony_D	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000092	0.000094	0.000096	0.00012	0.00014	0.00015
Antimony_T	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000092	0.000094	0.000096	0.00012	0.00014	0.00015
Arsenic_D	0.00026	0.00026	0.00033	0.00033	0.00039	0.00044	0.00030	0.00030	0.00031	0.00038	0.00045	0.00050
Arsenic_T	0.00027	0.00027	0.00034	0.00035	0.00041	0.00046	0.00031	0.00031	0.00032	0.00039	0.00046	0.00052
Barium_D	0.0064	0.0064	0.0079	0.0080	0.0093	0.011	0.0064	0.0065	0.0066	0.0081	0.0095	0.011
Barium_T	0.0068	0.0069	0.0085	0.0086	0.010	0.011	0.0069	0.0070	0.0071	0.0087	0.010	0.012
Beryllium_T	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000089	0.000091	0.000093	0.00011	0.00013	0.00015
Boron_D	0.0050	0.0050	0.0061	0.0062	0.0073	0.0083	0.0051	0.0051	0.0051	0.0063	0.0074	0.0084
Boron_T	0.0096	0.0098	0.013	0.013	0.017	0.019	0.0096	0.0099	0.012	0.014	0.017	0.019
Bromide	0.044	0.045	0.055	0.056	0.066	0.073	0.044	0.045	0.046	0.056	0.066	0.073
Cadmium_D	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000045	0.0000046	0.0000056	0.0000066	0.0000074
Cadmium_T	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000045	0.0000046	0.0000056	0.0000066	0.0000074
Calcium_D	7.7	7.7	9.5	9.6	11	13	7.9	8.0	8.1	9.9	12	13
Chloride	0.33	0.33	0.42	0.43	0.52	0.58	0.33	0.33	0.35	0.43	0.52	0.58
Chromium_D	0.000055	0.000056	0.000072	0.000072	0.000086	0.000094	0.000055	0.000056	0.000062	0.000072	0.000087	0.000094
Chromium_D_Hex	0.000055	0.000056	0.000072	0.000072	0.000086	0.000094	0.000055	0.000056	0.000062	0.000072	0.000087	0.000094
Chromium_T	0.000077	0.000077	0.000098	0.000098	0.00012	0.00013	0.000077	0.000077	0.000085	0.000099	0.00012	0.00013
Cobalt_D	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000089	0.000091	0.000093	0.00011	0.00013	0.00015
Cobalt_T	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000089	0.000091	0.000093	0.00011	0.00013	0.00015
Copper_D	0.00038	0.00038	0.00048	0.00048	0.00057	0.00064	0.00039	0.00039	0.00041	0.00049	0.00059	0.00065
Copper_T	0.00041	0.00041	0.00052	0.00052	0.00061	0.00069	0.00041	0.00042	0.00043	0.00053	0.00063	0.00070
Cyanide_F	0.00068	0.00069	0.00091	0.00090	0.0011	0.0012	0.00068	0.00069	0.00078	0.00090	0.0011	0.0012
Cyanide_T	0.00055	0.00056	0.00070	0.00071	0.00084	0.00094	0.00055	0.00056	0.00057	0.00071	0.00084	0.00094
Cyanide_WAD	0.00050	0.00050	0.00063	0.00064	0.00077	0.00084	0.00050	0.00050	0.00053	0.00064	0.00077	0.00084
Fluoride	0.070	0.070	0.086	0.087	0.10	0.12	0.070	0.070	0.072	0.088	0.10	0.12
Hardness	30	30	37	38	44	50	30	30	31	38	44	50
Iron_D	0.021	0.022	0.026	0.027	0.032	0.034	0.021	0.022	0.023	0.027	0.032	0.034
Iron_T	0.075	0.078	0.097	0.097	0.12	0.13	0.075	0.078	0.085	0.097	0.12	0.13
Lead_D	0.000040	0.000040	0.000050	0.000050	0.000059	0.000066	0.000040	0.000041	0.000042	0.000051	0.000060	0.000067
Lead_T	0.00011	0.00012	0.00014	0.00014	0.00017	0.00018	0.00011	0.00012	0.00013	0.00015	0.00017	0.00018
Magnesium_D	2.7	2.7	3.4	3.4	4.0	4.5	2.7	2.8	2.8	3.4	4.0	4.5
Manganese_D	0.0024	0.0025	0.0030	0.0030	0.0034	0.0036	0.0024	0.0025	0.0028	0.0030	0.0035	0.0036
Manganese_T	0.018	0.018	0.023	0.024	0.029	0.030	0.018	0.018	0.021	0.024	0.029	0.030
Mercury_D	0.00000062	0.00000065	0.00000078	0.00000078	0.00000092	0.0000010	0.00000062	0.00000065	0.00000067	0.00000079	0.00000093	0.0000010
Mercury_T	0.00000063	0.00000066	0.00000078	0.00000079	0.00000093	0.0000010	0.00000063	0.00000066	0.00000068	0.00000080	0.00000094	0.0000010
Molybdenum_D	0.00083	0.00083	0.0010	0.0011	0.0012	0.0014	0.00084	0.00085	0.00088	0.0011	0.0013	0.0014
Molybdenum_T	0.00087	0.00088	0.0011	0.0011	0.0013	0.0015	0.00089	0.00089	0.00092	0.0011	0.0013	0.0015
N_Ammonia	0.0072	0.0072	0.0089	0.0091	0.011	0.012	0.0072	0.0072	0.0074	0.0091	0.011	0.012
N_Nitrate_Nitrite	0.034	0.035	0.044	0.046	0.056	0.063	0.034	0.035	0.038	0.046	0.056	0.063
N_Nitrite	0.0077	0.0080	0.010	0.011	0.013	0.015	0.0082	0.0086	0.0097	0.011	0.014	0.016
Nickel_D	0.00018	0.00018	0.00022	0.00022	0.00026	0.00029	0.00018	0.00018	0.00019	0.00023	0.00027	0.00030
Nickel_T	0.00018	0.00018	0.00022	0.00022	0.00026	0.00029	0.00018	0.00018	0.00019	0.00023	0.00027	0.00030
Phosphorus_T	0.015	0.016	0.019	0.020	0.023	0.026	0.015	0.016	0.016	0.020	0.023	0.026
Potassium_D	0.73	0.73	0.90	0.91	1.1	1.2	0.77	0.79	0.80	0.98	1.2	1.3
Proton	0.000000035	0.000000036	0.000000045	0.000000047	0.000000056	0.000000063	0.000010	0.000014	0.000017	0.000018	0.000024	0.000024
Radium_226	0.0047	0.0047	0.0058	0.0059	0.0070	0.0077	0.0047	0.0047	0.0049	0.0059	0.0070	0.0077
Selenium_D	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000046	0.000046	0.000047	0.000058	0.000068	0.000076
Selenium_T	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000046	0.000046	0.000047	0.000058	0.000068	0.000076
Silicon_D	0.69	0.70	0.86	0.87	1.0	1.1	0.70	0.71	0.72	0.88	1.0	1.2
Silicon_T	0.75	0.76	0.93	0.94	1.1	1.2	0.75	0.76	0.78	0.95	1.1	1.2
Silver_D	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000045	0.0000046	0.0000056	0.0000066	0.0000074
Silver_T	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000045	0.0000046	0.0000056	0.0000066	0.0000074
Sodium_D	1.5	1.5	1.9	1.9	2.2	2.5	1.6	1.6	1.6	2.0	2.3	2.6
Sodium_T	1.5	1.5	1.9	1.9	2.2	2.5	1.6	1.6	1.6	2.0	2.3	2.6
Strontium_D	0.022	0.022	0.028	0.028	0.033	0.037	0.023	0.023	0.024	0.029	0.034	0.038
Strontium_T	0.022	0.022	0.028	0.028	0.033	0.037	0.023	0.023	0.024	0.029	0.034	0.038
Sulfate	0.61	0.61	0.75	0.76	0.89	1.0	0.61	0.61	0.62	0.76	0.89	1.0
Thallium_D	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000045	0.000045	0.000046	0.000056	0.000066	0.000074
Thallium_T	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000045	0.000045	0.000046	0.000056	0.000066	0.000074
TSS	2.0	2.0	2.5	2.5	3.1	3.3	2.0	2.0	2.2	2.5	3.1	3.3
Uranium_D	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000059	0.000064	0.000065	0.000079	0.000095	0.00010
Uranium_T	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000059	0.000064	0.000065	0.000079	0.000095	0.00010
Vanadium_T	0.00011	0.00011	0.00014	0.00014	0.00018	0.00019	0.00011	0.00011	0.00012	0.00015	0.00018	0.00019
Zinc_D	0.00053	0.00053	0.00066	0.00067	0.00080	0.00090	0.00054	0.00054	0.00055	0.00068	0.00081	0.00091
Zinc_T	0.00073	0.00073	0.00092	0.00094	0.0011	0.0013	0.00073	0.00073	0.00076	0.00094	0.0011	0.0013

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Susan Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.6	3.6	4.0	4.0	4.4	4.6	3.6	3.6	3.8	4.0	4.4	4.6
Alkalinity_T	44	44	48	48	52	54	43	44	44	47	51	53
Aluminum_D	0.014	0.015	0.016	0.016	0.017	0.017	0.015	0.015	0.016	0.016	0.017	0.017
Aluminum_T	0.027	0.028	0.030	0.030	0.032	0.032	0.027	0.028	0.029	0.030	0.032	0.032
Antimony_D	0.000084	0.000084	0.000098	0.000098	0.00011	0.00012	0.000089	0.000091	0.000091	0.000098	0.00011	0.00011
Antimony_T	0.000084	0.000084	0.000098	0.000098	0.00011	0.00012	0.000089	0.000091	0.000091	0.000098	0.00011	0.00011
Arsenic_D	0.00024	0.00024	0.00028	0.00028	0.00031	0.00033	0.00030	0.00030	0.00031	0.00033	0.00036	0.00037
Arsenic_T	0.00025	0.00026	0.00029	0.00029	0.00033	0.00034	0.00032	0.00032	0.00032	0.00035	0.00038	0.00039
Barium_D	0.0077	0.0078	0.0085	0.0085	0.0094	0.0097	0.0078	0.0079	0.0080	0.0086	0.0093	0.0097
Barium_T	0.0080	0.0080	0.0088	0.0088	0.0096	0.0100	0.0081	0.0082	0.0083	0.0089	0.0096	0.0099
Beryllium_T	0.000084	0.000084	0.000091	0.000091	0.000099	0.00010	0.000085	0.000085	0.000086	0.000093	0.000099	0.00010
Boron_D	0.0048	0.0048	0.0056	0.0055	0.0062	0.0066	0.0049	0.0049	0.0050	0.0054	0.0057	0.0060
Boron_T	0.0090	0.0094	0.011	0.011	0.012	0.012	0.0091	0.0094	0.010	0.011	0.012	0.012
Bromide	0.048	0.048	0.052	0.052	0.056	0.058	0.048	0.048	0.048	0.052	0.056	0.058
Cadmium_D	0.0000042	0.0000042	0.0000046	0.0000046	0.0000050	0.0000052	0.0000042	0.0000043	0.0000043	0.0000046	0.0000049	0.0000052
Cadmium_T	0.0000048	0.0000048	0.0000053	0.0000053	0.0000058	0.0000059	0.0000048	0.0000049	0.0000051	0.0000053	0.0000057	0.0000059
Calcium_D	12	12	13	13	15	15	12	13	13	14	15	15
Chloride	0.24	0.24	0.26	0.26	0.28	0.29	0.24	0.24	0.24	0.26	0.28	0.29
Chromium_D	0.000082	0.000083	0.000093	0.000093	0.00010	0.00010	0.000083	0.000084	0.000090	0.000093	0.00010	0.00010
Chromium_D_Hex	0.000082	0.000083	0.000093	0.000093	0.00010	0.00010	0.000083	0.000084	0.000090	0.000093	0.00010	0.00010
Chromium_T	0.00013	0.00013	0.00015	0.00015	0.00016	0.00016	0.00013	0.00013	0.00014	0.00015	0.00016	0.00016
Cobalt_D	0.000084	0.000084	0.000091	0.000091	0.000099	0.00010	0.000085	0.000085	0.000086	0.000093	0.000099	0.00010
Cobalt_T	0.000084	0.000084	0.000091	0.000091	0.000099	0.00010	0.000085	0.000085	0.000086	0.000093	0.000099	0.00010
Copper_D	0.00036	0.00037	0.00040	0.00040	0.00044	0.00046	0.00037	0.00038	0.00038	0.00041	0.00044	0.00046
Copper_T	0.00039	0.00040	0.00044	0.00044	0.00049	0.00050	0.00040	0.00041	0.00042	0.00045	0.00049	0.00050
Cyanide_F	0.00076	0.00076	0.00088	0.00087	0.00096	0.00097	0.00076	0.00076	0.00083	0.00087	0.00096	0.00097
Cyanide_T	0.00076	0.00076	0.00088	0.00087	0.00096	0.00097	0.00076	0.00076	0.00083	0.00087	0.00096	0.00097
Cyanide_WAD	0.00076	0.00076	0.00088	0.00087	0.00096	0.00097	0.00076	0.00076	0.00083	0.00087	0.00096	0.00097
Fluoride	0.077	0.077	0.084	0.084	0.090	0.094	0.077	0.077	0.078	0.084	0.091	0.094
Hardness	44	44	48	48	51	54	44	44	44	48	51	54
Iron_D	0.13	0.13	0.14	0.14	0.15	0.15	0.13	0.13	0.14	0.14	0.15	0.15
Iron_T	0.19	0.20	0.21	0.21	0.23	0.23	0.19	0.20	0.21	0.21	0.23	0.23
Lead_D	0.000038	0.000038	0.000042	0.000042	0.000045	0.000047	0.000039	0.000039	0.000039	0.000042	0.000045	0.000047
Lead_T	0.00012	0.00013	0.00014	0.00014	0.00014	0.00014	0.00012	0.00013	0.00014	0.00014	0.00014	0.00014
Magnesium_D	3.2	3.2	3.5	3.6	3.9	4.0	3.3	3.3	3.3	3.6	3.8	4.0
Manganese_D	0.020	0.020	0.022	0.022	0.023	0.024	0.020	0.020	0.022	0.022	0.023	0.024
Manganese_T	0.041	0.041	0.045	0.045	0.047	0.048	0.041	0.041	0.045	0.045	0.047	0.048
Mercury_D	0.0000012	0.0000012	0.0000013	0.0000013	0.0000014	0.0000014	0.0000012	0.0000012	0.0000013	0.0000013	0.0000014	0.0000014
Mercury_T	0.0000013	0.0000013	0.0000014	0.0000014	0.0000015	0.0000016	0.0000013	0.0000013	0.0000014	0.0000014	0.0000015	0.0000016
Molybdenum_D	0.0012	0.0012	0.0013	0.0013	0.0014	0.0015	0.0012	0.0012	0.0012	0.0013	0.0014	0.0015
Molybdenum_T	0.0013	0.0013	0.0014	0.0014	0.0016	0.0016	0.0013	0.0013	0.0013	0.0014	0.0015	0.0016
N_Ammonia	0.010	0.011	0.013	0.013	0.016	0.017	0.0100	0.010	0.011	0.011	0.012	0.013
N_Nitrate_Nitrite	0.050	0.055	0.071	0.072	0.091	0.097	0.048	0.049	0.053	0.056	0.063	0.064
N_Nitrite	0.0084	0.0086	0.0095	0.0096	0.011	0.011	0.0093	0.0097	0.0098	0.011	0.011	0.012
Nickel_D	0.00021	0.00022	0.00024	0.00024	0.00026	0.00027	0.00022	0.00022	0.00022	0.00024	0.00026	0.00027
Nickel_T	0.00025	0.00025	0.00028	0.00028	0.00031	0.00032	0.00025	0.00026	0.00027	0.00028	0.00031	0.00032
Phosphorus_T	0.019	0.019	0.021	0.021	0.023	0.023	0.019	0.019	0.019	0.021	0.023	0.023
Potassium_D	0.86	0.87	1.0	1.0	1.2	1.3	0.93	0.96	0.97	1.0	1.1	1.2
Proton	0.000000060	0.000000061	0.000000068	0.000000069	0.000000076	0.000000078	0.000018	0.000024	0.000027	0.000027	0.000031	0.000033
Radium_226	0.0062	0.0062	0.0070	0.0070	0.0077	0.0080	0.0062	0.0062	0.0065	0.0070	0.0077	0.0080
Selenium_D	0.000047	0.000048	0.000055	0.000054	0.000061	0.000065	0.000049	0.000050	0.000050	0.000054	0.000058	0.000061
Selenium_T	0.000049	0.000050	0.000057	0.000056	0.000063	0.000067	0.000051	0.000052	0.000052	0.000056	0.000060	0.000063
Silicon_D	1.6	1.6	1.7	1.7	1.9	2.0	1.6	1.6	1.6	1.7	1.9	2.0
Silicon_T	1.7	1.7	1.8	1.8	2.0	2.1	1.7	1.7	1.7	1.8	2.0	2.0
Silver_D	0.0000061	0.0000062	0.0000070	0.0000069	0.0000076	0.0000078	0.0000062	0.0000063	0.0000067	0.0000070	0.0000076	0.0000077
Silver_T	0.0000061	0.0000062	0.0000070	0.0000069	0.0000076	0.0000078	0.0000062	0.0000063	0.0000067	0.0000070	0.0000076	0.0000077
Sodium_D	1.6	1.7	2.0	2.0	2.3	2.5	1.7	1.8	1.8	1.9	2.1	2.2
Sodium_T	1.7	1.7	2.0	2.0	2.3	2.5	1.7	1.8	1.8	1.9	2.1	2.2
Strontium_D	0.025	0.025	0.028	0.028	0.031	0.033	0.026	0.027	0.027	0.029	0.031	0.033
Strontium_T	0.026	0.026	0.029	0.029	0.032	0.033	0.027	0.027	0.027	0.029	0.032	0.033
Sulfate	0.90	0.91	1.3	1.5	2.4	2.8	0.88	0.89	0.90	0.96	1.0	1.1
Thallium_D	0.000037	0.000037	0.000040	0.000040	0.000044	0.000045	0.000037	0.000038	0.000038	0.000041	0.000044	0.000045
Thallium_T	0.000037	0.000037	0.000040	0.000040	0.000044	0.000045	0.000037	0.000038	0.000038	0.000041	0.000044	0.000045
TSS	1.7	1.7	1.8	1.9	2.0	2.0	1.7	1.7	1.8	1.9	2.0	2.0
Uranium_D	0.000058	0.000061	0.000077	0.000088	0.00012	0.00014	0.000082	0.000091	0.000094	0.000099	0.00011	0.00011
Uranium_T	0.000068	0.000071	0.000088	0.000099	0.00013	0.00015	0.000093	0.00010	0.00010	0.00011	0.00012	0.00012
Vanadium_T	0.00014	0.00015	0.00016	0.00016	0.00018	0.00018	0.00015	0.00015	0.00015	0.00016	0.00017	0.00018
Zinc_D	0.00088	0.00089	0.00096	0.00096	0.0010	0.0011	0.00088	0.00089	0.00090	0.00097	0.0010	0.0011
Zinc_T	0.0010	0.0010	0.0011	0.0011	0.0012	0.0013	0.0010	0.0010	0.0010	0.0011	0.0012	0.0013

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Hughes River - Upstream of Dewatering Effluent Discharge from Legacy Pits (Hughes_Us_CT)

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.50	1.0	1.0	1.3	2.2	2.2	0.50	1.0	1.0	1.3	2.2	2.2
Alkalinity_T	6.2	9.0	12	11	12	12	6.2	9.0	12	11	12	12
Aluminum_D	0.0025	0.0068	0.014	0.014	0.018	0.033	0.0025	0.0068	0.014	0.014	0.018	0.033
Aluminum_T	0.012	0.017	0.024	0.042	0.091	0.17	0.012	0.017	0.025	0.042	0.091	0.17
Antimony_D	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Antimony_T	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Arsenic_D	0.000065	0.00011	0.00016	0.00036	0.00021	0.0027	0.000065	0.00011	0.00015	0.00036	0.00021	0.0027
Arsenic_T	0.000050	0.000075	0.00016	0.00042	0.00018	0.0035	0.000050	0.000075	0.00015	0.00042	0.00018	0.0035
Barium_D	0.0026	0.0038	0.0048	0.0065	0.0052	0.030	0.0026	0.0038	0.0048	0.0065	0.0052	0.030
Barium_T	0.0030	0.0042	0.0050	0.0072	0.0073	0.031	0.0030	0.0042	0.0049	0.0072	0.0073	0.031
Beryllium_T	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011
Boron_D	0.0050	0.0050	0.0050	0.0093	0.0050	0.057	0.0050	0.0050	0.0050	0.0093	0.0050	0.057
Boron_T	0.0050	0.0050	0.0050	0.0090	0.0050	0.053	0.0050	0.0050	0.0050	0.0090	0.0050	0.053
Bromide	0.000016	0.050	0.050	0.046	0.050	0.050	0.000016	0.050	0.050	0.046	0.050	0.050
Cadmium_D	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025
Cadmium_T	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090
Calcium_D	1.4	2.2	2.9	11	3.1	99	1.4	2.2	2.9	11	3.1	99
Chloride	0.25	0.25	0.25	0.65	0.25	5.0	0.25	0.25	0.25	0.65	0.25	5.0
Chromium_D	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025
Chromium_D_Hex	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057
Chromium_T	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025
Cobalt_D	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012
Cobalt_T	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028
Copper_D	0.00014	0.00022	0.00081	0.00091	0.0014	0.0027	0.00014	0.00022	0.00077	0.00091	0.0014	0.0027
Copper_T	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056
Cyanide_F	0.00050	0.00050	0.00050	0.00054	0.00050	0.00100	0.00050	0.00050	0.00050	0.00054	0.00050	0.00100
Cyanide_T	0.00025	0.00050	0.00050	0.00054	0.00075	0.00100	0.00025	0.00050	0.00050	0.00054	0.00075	0.00100
Cyanide_WAD	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012
Fluoride	0.038	0.050	0.063	0.065	0.074	0.11	0.038	0.050	0.062	0.065	0.074	0.11
Hardness	5.3	8.3	11	10	11	12	5.3	8.3	11	10	11	12
Iron_D	0.043	0.047	0.068	0.12	0.17	0.67	0.043	0.047	0.066	0.12	0.17	0.67
Iron_T	0.070	0.084	0.13	0.22	0.18	1.2	0.070	0.084	0.13	0.22	0.18	1.2
Lead_D	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030
Lead_T	0.000018	0.000025	0.000025	0.000054	0.00020	0.00021	0.000018	0.000025	0.000025	0.000055	0.00020	0.00021
Magnesium_D	0.43	0.64	0.86	3.3	0.88	31	0.43	0.64	0.86	3.3	0.88	31
Manganese_D	0.0014	0.0017	0.0030	0.065	0.021	0.72	0.0014	0.0017	0.0030	0.065	0.021	0.72
Manganese_T	0.0048	0.0076	0.012	0.078	0.027	0.80	0.0048	0.0076	0.013	0.078	0.027	0.80
Mercury_D	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Mercury_T	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Molybdenum_D	0.000034	0.000067	0.000087	0.00014	0.00011	0.00073	0.000034	0.000067	0.000088	0.00014	0.00011	0.00073
Molybdenum_T	0.000028	0.000058	0.000091	0.00017	0.00017	0.0011	0.000028	0.000058	0.000090	0.00017	0.00017	0.0011
N_Ammonia	0.0025	0.0043	0.0082	0.013	0.031	0.047	0.0025	0.0043	0.0079	0.013	0.031	0.047
N_Nitrate_Nitrite	0.011	0.011	0.023	0.028	0.052	0.080	0.011	0.011	0.019	0.028	0.052	0.080
N_Nitrite	0.00050	0.0050	0.0050	0.0046	0.0050	0.0050	0.00050	0.0050	0.0050	0.0046	0.0050	0.0050
Nickel_D	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051
Nickel_T	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094
Phosphorus_T	0.0000063	0.0051	0.011	0.013	0.016	0.043	0.0000063	0.0051	0.012	0.013	0.016	0.043
Potassium_D	0.25	0.38	0.54	1.1	0.58	7.7	0.25	0.38	0.53	1.1	0.58	7.7
Proton	0.23	0.0046	0.00012	0.00041	0.000080	0.000070	0.23	0.0046	0.00016	0.00041	0.000080	0.000070
Radium_226	0.0000020	0.0000020	0.0000023	0.0000023	0.0000025	0.0000026	0.0000020	0.0000020	0.0000021	0.0000023	0.0000025	0.0000026
Selenium_D	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014
Selenium_T	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016
Silicon_D	1.2	1.5	1.8	2.1	2.3	5.8	1.2	1.5	1.8	2.1	2.3	5.8
Silicon_T	1.3	1.5	1.9	2.2	2.6	6.2	1.3	1.5	1.8	2.2	2.6	6.2
Silver_D	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Silver_T	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Sodium_D	0.60	0.86	1.1	2.9	1.3	23	0.60	0.86	1.1	2.9	1.3	23
Sodium_T	0.65	0.91	1.2	3.0	1.4	23	0.65	0.91	1.2	3.0	1.4	23
Strontium_D	0.0067	0.0094	0.013	0.036	0.013	0.30	0.0067	0.0094	0.013	0.036	0.013	0.30
Strontium_T	0.0072	0.0100	0.013	0.036	0.014	0.30	0.0072	0.0100	0.013	0.036	0.014	0.30
Sulfate	0.25	0.34	0.56	18	0.72	210	0.25	0.34	0.56	18	0.72	210
Thallium_D	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
Thallium_T	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
TSS	0.50	0.50	0.69	1.3	1.5	6.9	0.50	0.50	0.87	1.3	1.5	6.9
Uranium_D	0.0000065	0.000012	0.000017	0.00038	0.000021	0.0044	0.0000065	0.000012	0.000017	0.00038	0.000021	0.0044
Uranium_T	0.0000090	0.000015	0.000018	0.00043	0.000028	0.0049	0.0000090	0.000015	0.000018	0.00043	0.000028	0.0049
Vanadium_T	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025
Zinc_D	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017
Zinc_T	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Hughes River - Downstream of Dewatering Effluent Discharge from Legacy Pit (Hughes_Mid_CT)

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.50	1.0	1.0	1.3	2.2	2.2	0.50	1.0	1.0	1.3	2.2	2.2
Alkalinity_T	6.2	9.0	12	11	12	12	6.2	9.0	12	11	12	12
Aluminum_D	0.0025	0.0068	0.014	0.014	0.018	0.033	0.0025	0.0068	0.014	0.014	0.018	0.033
Aluminum_T	0.012	0.017	0.024	0.042	0.091	0.17	0.012	0.017	0.025	0.042	0.091	0.17
Antimony_D	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Antimony_T	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Arsenic_D	0.000065	0.00011	0.00016	0.00036	0.00021	0.0027	0.000065	0.00011	0.00015	0.00036	0.00021	0.0027
Arsenic_T	0.000050	0.000075	0.00016	0.00042	0.00018	0.0035	0.000050	0.000075	0.00015	0.00042	0.00018	0.0035
Barium_D	0.0026	0.0038	0.0048	0.0065	0.0052	0.030	0.0026	0.0038	0.0048	0.0065	0.0052	0.030
Barium_T	0.0030	0.0042	0.0050	0.0072	0.0073	0.031	0.0030	0.0042	0.0049	0.0072	0.0073	0.031
Beryllium_T	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011
Boron_D	0.0050	0.0050	0.0050	0.0093	0.0050	0.057	0.0050	0.0050	0.0050	0.0093	0.0050	0.057
Boron_T	0.0050	0.0050	0.0050	0.0090	0.0050	0.053	0.0050	0.0050	0.0050	0.0090	0.0050	0.053
Bromide	0.000016	0.050	0.050	0.046	0.050	0.050	0.000016	0.050	0.050	0.046	0.050	0.050
Cadmium_D	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025
Cadmium_T	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090
Calcium_D	1.4	2.2	2.9	11	3.1	99	1.4	2.2	2.9	11	3.1	99
Chloride	0.25	0.25	0.25	0.65	0.25	5.0	0.25	0.25	0.25	0.65	0.25	5.0
Chromium_D	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025
Chromium_D_Hex	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057
Chromium_T	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025
Cobalt_D	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012
Cobalt_T	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028
Copper_D	0.00014	0.00022	0.00081	0.00091	0.0014	0.0027	0.00014	0.00022	0.00077	0.00091	0.0014	0.0027
Copper_T	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056
Cyanide_F	0.00050	0.00050	0.00050	0.00054	0.00050	0.00100	0.00050	0.00050	0.00050	0.00054	0.00050	0.00100
Cyanide_T	0.00025	0.00050	0.00050	0.00054	0.00075	0.00100	0.00025	0.00050	0.00050	0.00054	0.00075	0.00100
Cyanide_WAD	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012
Fluoride	0.038	0.050	0.063	0.065	0.074	0.11	0.038	0.050	0.062	0.065	0.074	0.11
Hardness	5.3	8.3	11	10	11	12	5.3	8.3	11	10	11	12
Iron_D	0.043	0.047	0.068	0.12	0.17	0.67	0.043	0.047	0.066	0.12	0.17	0.67
Iron_T	0.070	0.084	0.13	0.22	0.18	1.2	0.070	0.084	0.13	0.22	0.18	1.2
Lead_D	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030
Lead_T	0.000018	0.000025	0.000025	0.000054	0.00020	0.00021	0.000018	0.000025	0.000025	0.000055	0.00020	0.00021
Magnesium_D	0.43	0.64	0.86	3.3	0.88	31	0.43	0.64	0.86	3.3	0.88	31
Manganese_D	0.0014	0.0017	0.0030	0.065	0.021	0.72	0.0014	0.0017	0.0030	0.065	0.021	0.72
Manganese_T	0.0048	0.0076	0.012	0.078	0.027	0.80	0.0048	0.0076	0.013	0.078	0.027	0.80
Mercury_D	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Mercury_T	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Molybdenum_D	0.000034	0.000067	0.000087	0.00014	0.00011	0.00073	0.000034	0.000067	0.000088	0.00014	0.00011	0.00073
Molybdenum_T	0.000028	0.000058	0.000091	0.00017	0.00017	0.0011	0.000028	0.000058	0.000090	0.00017	0.00017	0.0011
N_Ammonia	0.0025	0.0043	0.0082	0.013	0.031	0.047	0.0025	0.0043	0.0079	0.013	0.031	0.047
N_Nitrate_Nitrite	0.011	0.011	0.023	0.028	0.052	0.080	0.011	0.011	0.019	0.028	0.052	0.080
N_Nitrite	0.00050	0.0050	0.0050	0.0046	0.0050	0.0050	0.00050	0.0050	0.0050	0.0046	0.0050	0.0050
Nickel_D	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051
Nickel_T	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094
Phosphorus_T	0.0000063	0.0051	0.011	0.013	0.016	0.043	0.0000063	0.0051	0.012	0.013	0.016	0.043
Potassium_D	0.25	0.38	0.54	1.1	0.58	7.7	0.25	0.38	0.53	1.1	0.58	7.7
Proton	0.23	0.0046	0.00012	0.00041	0.000080	0.000070	0.23	0.0046	0.00016	0.00041	0.000080	0.000070
Radium_226	0.0000020	0.0000020	0.0000023	0.0000023	0.0000025	0.0000026	0.0000020	0.0000020	0.0000021	0.0000023	0.0000025	0.0000026
Selenium_D	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014
Selenium_T	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016
Silicon_D	1.2	1.5	1.8	2.1	2.3	5.8	1.2	1.5	1.8	2.1	2.3	5.8
Silicon_T	1.3	1.5	1.9	2.2	2.6	6.2	1.3	1.5	1.8	2.2	2.6	6.2
Silver_D	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Silver_T	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Sodium_D	0.60	0.86	1.1	2.9	1.3	23	0.60	0.86	1.1	2.9	1.3	23
Sodium_T	0.65	0.91	1.2	3.0	1.4	23	0.65	0.91	1.2	3.0	1.4	23
Strontium_D	0.0067	0.0094	0.013	0.036	0.013	0.30	0.0067	0.0094	0.013	0.036	0.013	0.30
Strontium_T	0.0072	0.0100	0.013	0.036	0.014	0.30	0.0072	0.0100	0.013	0.036	0.014	0.30
Sulfate	0.25	0.34	0.56	18	0.72	210	0.25	0.34	0.56	18	0.72	210
Thallium_D	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
Thallium_T	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
TSS	0.50	0.50	0.69	1.3	1.5	6.9	0.50	0.50	0.87	1.3	1.5	6.9
Uranium_D	0.0000065	0.000012	0.000017	0.00038	0.000021	0.0044	0.0000065	0.000012	0.000017	0.00038	0.000021	0.0044
Uranium_T	0.0000090	0.000015	0.000018	0.00043	0.000028	0.0049	0.0000090	0.000015	0.000018	0.00043	0.000028	0.0049
Vanadium_T	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025
Zinc_D	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017
Zinc_T	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Hughes River - Downstream of Confluence of Susan Lake Outflow (Hughes_Ds_CT)

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.58	1.1	1.1	1.3	2.3	2.3	0.59	1.1	1.1	1.3	2.3	2.3
Alkalinity_T	7.3	9.8	12	12	13	13	7.5	9.8	12	12	13	13
Aluminum_D	0.0027	0.0068	0.014	0.014	0.018	0.032	0.0027	0.0069	0.014	0.014	0.018	0.032
Aluminum_T	0.012	0.017	0.025	0.042	0.091	0.17	0.012	0.017	0.025	0.042	0.090	0.17
Antimony_D	0.000012	0.000051	0.000051	0.000048	0.000053	0.000054	0.000011	0.000051	0.000051	0.000048	0.000052	0.000052
Antimony_T	0.000012	0.000051	0.000051	0.000048	0.000053	0.000054	0.000011	0.000051	0.000051	0.000048	0.000052	0.000052
Arsenic_D	0.000073	0.00011	0.00016	0.00036	0.00022	0.0026	0.000074	0.00011	0.00016	0.00036	0.00022	0.0026
Arsenic_T	0.000058	0.000084	0.00016	0.00042	0.00019	0.0035	0.000059	0.000087	0.00016	0.00042	0.00019	0.0035
Barium_D	0.0028	0.0039	0.0049	0.0066	0.0054	0.029	0.0029	0.0039	0.0049	0.0066	0.0054	0.029
Barium_T	0.0033	0.0044	0.0051	0.0073	0.0074	0.031	0.0033	0.0044	0.0050	0.0073	0.0073	0.031
Beryllium_T	0.000011	0.000011	0.000012	0.000012	0.000012	0.000013	0.000011	0.000011	0.000012	0.000012	0.000012	0.000013
Boron_D	0.0050	0.0050	0.0051	0.0093	0.0052	0.056	0.0050	0.0050	0.0050	0.0093	0.0051	0.056
Boron_T	0.0051	0.0051	0.0052	0.0091	0.0053	0.052	0.0051	0.0051	0.0051	0.0091	0.0052	0.052
Bromide	0.00090	0.050	0.050	0.046	0.050	0.050	0.00090	0.050	0.050	0.046	0.050	0.050
Cadmium_D	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000026	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000026
Cadmium_T	0.0000025	0.0000025	0.0000025	0.0000031	0.0000026	0.0000089	0.0000025	0.0000025	0.0000025	0.0000031	0.0000026	0.0000089
Calcium_D	1.8	2.5	3.2	11	3.3	97	1.9	2.5	3.2	11	3.3	97
Chloride	0.25	0.25	0.25	0.64	0.26	4.9	0.25	0.25	0.25	0.64	0.26	4.9
Chromium_D	0.000051	0.00024	0.00025	0.00023	0.00025	0.00025	0.000051	0.00025	0.00025	0.00023	0.00025	0.00025
Chromium_D_Hex	0.00024	0.00025	0.00025	0.00029	0.00049	0.00056	0.00024	0.00024	0.00025	0.00029	0.00049	0.00056
Chromium_T	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025
Cobalt_D	0.000034	0.000051	0.000051	0.000055	0.000051	0.00012	0.000035	0.000051	0.000051	0.000055	0.000051	0.00012
Cobalt_T	0.000026	0.000051	0.000051	0.000068	0.000052	0.00028	0.000026	0.000051	0.000051	0.000068	0.000052	0.00028
Copper_D	0.00015	0.00022	0.00080	0.00090	0.0014	0.0027	0.00015	0.00022	0.00076	0.00090	0.0014	0.0027
Copper_T	0.00024	0.00025	0.00025	0.00028	0.00026	0.00056	0.00024	0.00025	0.00025	0.00028	0.00025	0.00056
Cyanide_F	0.00050	0.00050	0.00050	0.00054	0.00051	0.00099	0.00050	0.00050	0.00050	0.00054	0.00051	0.00099
Cyanide_T	0.00026	0.00051	0.00051	0.00055	0.00075	0.00100	0.00026	0.00051	0.00051	0.00055	0.00075	0.00100
Cyanide_WAD	0.00026	0.00050	0.00050	0.00057	0.00084	0.0012	0.00026	0.00050	0.00050	0.00057	0.00084	0.0012
Fluoride	0.039	0.050	0.063	0.065	0.074	0.11	0.039	0.050	0.063	0.065	0.074	0.11
Hardness	6.7	9.2	12	11	12	13	7.0	9.3	12	11	12	13
Iron_D	0.045	0.050	0.072	0.13	0.17	0.66	0.045	0.050	0.072	0.13	0.17	0.66
Iron_T	0.073	0.086	0.13	0.22	0.18	1.2	0.073	0.086	0.13	0.22	0.18	1.2
Lead_D	0.000025	0.000025	0.000025	0.000026	0.000025	0.000030	0.000025	0.000025	0.000025	0.000026	0.000025	0.000030
Lead_T	0.000018	0.000026	0.000026	0.000054	0.00020	0.00020	0.000018	0.000026	0.000026	0.000054	0.00020	0.00020
Magnesium_D	0.54	0.72	0.93	3.3	0.97	30	0.57	0.73	0.93	3.3	0.97	30
Manganese_D	0.0029	0.0030	0.0045	0.065	0.022	0.71	0.0030	0.0031	0.0045	0.065	0.022	0.71
Manganese_T	0.0068	0.0094	0.014	0.078	0.028	0.78	0.0073	0.0095	0.014	0.078	0.028	0.78
Mercury_D	0.00000095	0.0000025	0.0000025	0.0000023	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000023	0.0000025	0.0000025
Mercury_T	0.00000095	0.0000025	0.0000025	0.0000023	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000023	0.0000025	0.0000025
Molybdenum_D	0.000045	0.000076	0.000097	0.00014	0.00011	0.00073	0.000047	0.000077	0.000096	0.00014	0.00011	0.00073
Molybdenum_T	0.000040	0.000066	0.00010	0.00018	0.00018	0.0011	0.000042	0.000067	0.000099	0.00018	0.00017	0.0011
N_Ammonia	0.0031	0.0049	0.0088	0.014	0.032	0.047	0.0031	0.0049	0.0084	0.014	0.031	0.047
N_Nitrate_Nitrite	0.013	0.013	0.026	0.031	0.055	0.084	0.013	0.013	0.020	0.029	0.052	0.080
N_Nitrite	0.00061	0.0050	0.0051	0.0047	0.0051	0.0051	0.00062	0.0050	0.0050	0.0047	0.0051	0.0051
Nickel_D	0.00019	0.00025	0.00025	0.00027	0.00025	0.00050	0.00019	0.00025	0.00025	0.00026	0.00025	0.00050
Nickel_T	0.00022	0.00025	0.00025	0.00030	0.00025	0.00093	0.00022	0.00025	0.00025	0.00030	0.00025	0.00092
Phosphorus_T	0.00041	0.0053	0.012	0.013	0.016	0.043	0.00040	0.0053	0.012	0.013	0.016	0.043
Potassium_D	0.29	0.40	0.56	1.1	0.62	7.6	0.29	0.40	0.56	1.1	0.60	7.5
Proton	0.29	0.0065	0.00017	0.00057	0.00011	0.000098	0.29	0.0065	0.00023	0.00058	0.00011	0.000099
Radium_226	0.000086	0.000090	0.00011	0.00011	0.00015	0.00017	0.000081	0.000083	0.000095	0.00010	0.00013	0.00016
Selenium_D	0.000021	0.000026	0.000026	0.000035	0.000027	0.00014	0.000021	0.000026	0.000026	0.000035	0.000026	0.00014
Selenium_T	0.000021	0.000026	0.000026	0.000054	0.00012	0.00016	0.000021	0.000026	0.000026	0.000054	0.00012	0.00016
Silicon_D	1.2	1.5	1.8	2.1	2.3	5.7	1.2	1.5	1.8	2.1	2.3	5.7
Silicon_T	1.3	1.5	1.9	2.2	2.5	6.1	1.3	1.5	1.8	2.2	2.5	6.1
Silver_D	0.0000026	0.0000051	0.0000051	0.0000049	0.0000051	0.0000051	0.0000026	0.0000051	0.0000051	0.0000049	0.0000051	0.0000051
Silver_T	0.0000026	0.0000051	0.0000051	0.0000049	0.0000051	0.0000051	0.0000026	0.0000051	0.0000051	0.0000049	0.0000051	0.0000051
Sodium_D	0.66	0.89	1.2	2.9	1.4	23	0.67	0.90	1.2	2.9	1.4	23
Sodium_T	0.71	0.95	1.2	3.0	1.5	23	0.72	0.96	1.2	3.0	1.4	23
Strontium_D	0.0074	0.0098	0.013	0.036	0.014	0.30	0.0076	0.0100	0.013	0.036	0.014	0.30
Strontium_T	0.0080	0.010	0.014	0.036	0.015	0.29	0.0082	0.011	0.014	0.036	0.015	0.29
Sulfate	0.41	0.57	0.76	18	0.97	210	0.41	0.61	0.72	18	0.87	210
Thallium_D	0.0000017	0.0000056	0.0000057	0.0000054	0.0000060	0.0000061	0.0000017	0.0000057	0.0000057	0.0000055	0.0000061	0.0000061
Thallium_T	0.0000017	0.0000056	0.0000057	0.0000054	0.0000060	0.0000062	0.0000017	0.0000057	0.0000057	0.0000055	0.0000061	0.0000061
TSS	0.55	0.55	0.73	1.3	1.5	6.8	0.55	0.55	0.91	1.3	1.5	6.8
Uranium_D	0.0000080	0.000013	0.000018	0.00037	0.000024	0.0043	0.0000081	0.000013	0.000018	0.00037	0.000022	0.0043
Uranium_T	0.000011	0.000016	0.000021	0.00042	0.000032	0.0048	0.000011	0.000017	0.000019	0.00042	0.000029	0.0048
Vanadium_T	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025
Zinc_D	0.00051	0.00051	0.00080	0.00085	0.0012	0.0017	0.00051	0.00051	0.00080	0.00084	0.0012	0.0017
Zinc_T	0.00028	0.0015	0.0015	0.0014	0.0015	0.0015	0.00028	0.0015	0.0015	0.0014	0.0015	0.0015

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Farley Dewatering Wells

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.1	3.4	7.5	7.6	12	12	3.6	3.8	7.2	8.4	13	15
Alkalinity_T	67	79	150	150	210	290	62	63	110	120	190	270
Aluminum_D	0.00091	0.00099	0.0023	0.0028	0.0052	0.0068	0.0028	0.0034	0.0040	0.0046	0.0070	0.0081
Aluminum_T	0.0017	0.0018	0.0039	0.0046	0.0090	0.010	0.0049	0.0059	0.0069	0.0076	0.011	0.012
Antimony_D	0.00010	0.00011	0.00026	0.00033	0.00072	0.00095	0.000097	0.00013	0.00016	0.00016	0.00021	0.00024
Antimony_T	0.00011	0.00013	0.00030	0.00038	0.00078	0.00096	0.00012	0.00014	0.00018	0.00018	0.00023	0.00026
Arsenic_D	0.00081	0.0010	0.0019	0.0020	0.0028	0.0041	0.00072	0.00076	0.0016	0.0014	0.0022	0.0034
Arsenic_T	0.00082	0.0011	0.0019	0.0020	0.0029	0.0042	0.00076	0.00080	0.0016	0.0015	0.0022	0.0035
Barium_D	0.012	0.015	0.026	0.025	0.034	0.045	0.013	0.014	0.019	0.024	0.035	0.043
Barium_T	0.013	0.016	0.027	0.026	0.035	0.047	0.014	0.014	0.020	0.025	0.037	0.044
Beryllium_T	0.000060	0.000072	0.000088	0.000094	0.00013	0.00014	0.000076	0.000087	0.000099	0.00010	0.00013	0.00014
Boron_D	0.010	0.012	0.025	0.027	0.044	0.053	0.0098	0.010	0.014	0.018	0.027	0.038
Boron_T	0.010	0.012	0.025	0.028	0.045	0.055	0.010	0.010	0.014	0.018	0.028	0.040
Bromide	0.029	0.036	0.041	0.041	0.045	0.053	0.030	0.037	0.041	0.041	0.047	0.059
Cadmium_D	0.0000024	0.0000028	0.0000035	0.0000038	0.0000057	0.0000069	0.0000026	0.0000028	0.0000032	0.0000032	0.0000035	0.0000048
Cadmium_T	0.0000028	0.0000036	0.0000044	0.0000047	0.0000068	0.0000082	0.0000034	0.0000036	0.0000045	0.0000045	0.0000053	0.0000065
Calcium_D	27	31	52	52	72	97	31	31	42	53	77	96
Chloride	0.41	0.41	0.58	0.70	1.1	1.5	0.43	0.44	0.65	0.75	1.2	1.7
Chromium_D	0.000023	0.000029	0.000034	0.000042	0.000067	0.000082	0.000040	0.000047	0.000057	0.000058	0.000077	0.000084
Chromium_D_Hex	0.000034	0.000040	0.000055	0.000058	0.000086	0.00010	0.000063	0.000069	0.000073	0.000078	0.000093	0.00011
Chromium_T	0.000036	0.000052	0.000081	0.000080	0.00010	0.00012	0.000065	0.000095	0.00013	0.00013	0.00017	0.00018
Cobalt_D	0.000042	0.000061	0.000087	0.000085	0.00010	0.00012	0.000054	0.000060	0.000088	0.000092	0.00013	0.00014
Cobalt_T	0.000048	0.000068	0.00011	0.00011	0.00014	0.00017	0.000063	0.000069	0.00011	0.00012	0.00018	0.00020
Copper_D	0.00027	0.00031	0.00058	0.00063	0.0011	0.0012	0.00025	0.00027	0.00036	0.00037	0.00050	0.00085
Copper_T	0.00032	0.00037	0.00070	0.00076	0.0012	0.0014	0.00031	0.00031	0.00046	0.00050	0.00073	0.0011
Cyanide_F	0.00013	0.00015	0.00022	0.00023	0.00032	0.00034	0.00019	0.00023	0.00029	0.00029	0.00036	0.00045
Cyanide_T	0.00026	0.00030	0.00041	0.00041	0.00052	0.00054	0.00035	0.00040	0.00049	0.00049	0.00054	0.00066
Cyanide_WAD	0.00017	0.00019	0.00030	0.00031	0.00045	0.00046	0.00024	0.00028	0.00036	0.00037	0.00046	0.00056
Fluoride	0.064	0.073	0.098	0.098	0.12	0.13	0.068	0.073	0.11	0.11	0.14	0.22
Hardness	94	97	150	160	250	310	99	100	140	170	260	340
Iron_D	0.0077	0.0091	0.012	0.012	0.014	0.017	0.015	0.016	0.020	0.020	0.024	0.026
Iron_T	0.016	0.017	0.026	0.048	0.092	0.23	0.036	0.039	0.046	0.074	0.13	0.27
Lead_D	0.000011	0.000013	0.000020	0.000024	0.000046	0.000056	0.000019	0.000026	0.000029	0.000029	0.000035	0.000036
Lead_T	0.000024	0.000026	0.000038	0.000044	0.000074	0.000087	0.000037	0.000051	0.000058	0.000057	0.000063	0.000065
Magnesium_D	7.8	8.6	13	14	19	25	8.4	8.5	11	14	20	26
Manganese_D	0.036	0.046	0.19	0.22	0.44	0.53	0.041	0.049	0.19	0.23	0.45	0.57
Manganese_T	0.050	0.061	0.19	0.23	0.44	0.54	0.055	0.064	0.20	0.24	0.45	0.58
Mercury_D	0.00000037	0.00000042	0.00000057	0.00000073	0.0000013	0.0000015	0.00000073	0.00000075	0.00000081	.00000092	0.0000013	0.0000013
Mercury_T	0.00000059	0.00000063	0.00000077	0.00000098	0.0000017	0.0000020	0.00000088	0.0000011	0.0000011	0.0000012	0.0000017	0.0000018
Molybdenum_D	0.00070	0.00093	0.0017	0.0020	0.0035	0.0042	0.00055	0.00083	0.0012	0.0012	0.0017	0.0019
Molybdenum_T	0.00071	0.00095	0.0018	0.0020	0.0035	0.0042	0.00058	0.00085	0.0012	0.0012	0.0017	0.0020
N_Ammonia	0.038	0.047	0.11	0.12	0.18	0.22	0.012	0.014	0.055	0.046	0.075	0.10
N_Nitrate_Nitrite	0.19	0.37	0.76	0.99	1.9	2.3	0.030	0.033	0.062	0.068	0.10	0.17
N_Nitrite	0.017	0.019	0.033	0.038	0.067	0.088	0.014	0.023	0.032	0.033	0.040	0.055
Nickel_D	0.00027	0.00034	0.00051	0.00055	0.00079	0.00092	0.00027	0.00029	0.00039	0.00042	0.00057	0.00074
Nickel_T	0.00031	0.00039	0.00065	0.00067	0.00094	0.0012	0.00034	0.00034	0.00048	0.00057	0.00081	0.0010
Phosphorus_T	0.0092	0.010	0.013	0.014	0.019	0.024	0.0080	0.0090	0.012	0.013	0.017	0.024
Potassium_D	2.8	3.2	6.7	7.4	12	14	3.0	3.4	4.7	5.8	8.3	11
Proton	0.0000000079	0.000000010	0.000000044	0.000000040	0.000000062	0.000000067	0.000023	0.00012	0.00028	0.00034	0.00065	0.00081
Radium_226	0.0060	0.0063	0.0080	0.0083	0.011	0.011	0.0030	0.0032	0.0038	0.0038	0.0041	0.0086
Selenium_D	0.000042	0.000066	0.00013	0.00014	0.00022	0.00030	0.000049	0.000050	0.000088	0.000098	0.00015	0.00016
Selenium_T	0.000049	0.000059	0.00011	0.00012	0.00023	0.00034	0.000054	0.000055	0.000068	0.000071	0.000088	0.000097
Silicon_D	2.5	2.7	4.5	4.5	5.9	6.4	2.6	2.6	4.4	4.1	5.8	6.9
Silicon_T	2.5	2.7	4.6	4.5	6.0	6.5	2.6	2.7	4.4	4.2	6.0	7.0
Silver_D	0.0000025	0.0000029	0.0000044	0.0000051	0.0000089	0.000011	0.0000040	0.0000048	0.0000055	0.0000062	0.0000089	0.0000099
Silver_T	0.0000031	0.0000035	0.0000054	0.0000061	0.000010	0.000013	0.0000047	0.0000056	0.0000064	0.0000071	0.000010	0.000011
Sodium_D	5.7	6.9	14	16	26	29	5.8	6.1	8.1	9.8	13	17
Sodium_T	5.8	6.8	14	16	26	29	5.9	6.1	8.0	9.7	13	17
Strontium_D	0.055	0.070	0.12	0.12	0.17	0.24	0.067	0.069	0.096	0.12	0.18	0.23
Strontium_T	0.057	0.071	0.13	0.13	0.17	0.25	0.068	0.070	0.097	0.12	0.18	0.24
Sulfate	42	47	77	80	110	140	39	40	50	62	93	120
Thallium_D	0.000019	0.000030	0.000035	0.000039	0.000058	0.000079	0.000025	0.000032	0.000043	0.000042	0.000051	0.000054
Thallium_T	0.000021	0.000033	0.000039	0.000043	0.000062	0.000084	0.000027	0.000034	0.000046	0.000045	0.000056	0.000059
TSS	0.24	0.28	0.50	0.47	0.61	0.68	0.76	0.79	1.1	1.2	1.7	1.8
Uranium_D	0.00050	0.00069	0.0014	0.0016	0.0028	0.0035	0.00045	0.00046	0.00088	0.00075	0.0011	0.0015
Uranium_T	0.00050	0.00066	0.0014	0.0016	0.0028	0.0035	0.00046	0.00046	0.00079	0.00072	0.00099	0.0014
Vanadium_T	0.000100	0.00013	0.00019	0.00020	0.00029	0.00033	0.00015	0.00017	0.00023	0.00024	0.00029	0.00030
Zinc_D	0.00044	0.00052	0.00065	0.00068	0.00091	0.0011	0.00044	0.00046	0.00060	0.00060	0.00071	0.0010
Zinc_T	0.00054	0.00072	0.00096	0.00095	0.0012	0.0013	0.00058	0.00065	0.00099	0.00093	0.0011	0.0014

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Expected Case Scenario - Gordon Dewatering Wells

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.97	1.4	4.9	4.4	7.0	8.3	3.2	3.8	5.5	5.9	7.9	8.6
Alkalinity_T	48	49	61	62	74	83	48	49	50	62	74	83
Aluminum_D	0.000032	0.000066	0.00059	0.0028	0.0081	0.013	0.0038	0.0039	0.0068	0.0074	0.012	0.014
Aluminum_T	0.000058	0.00015	0.0032	0.014	0.043	0.058	0.017	0.017	0.030	0.033	0.056	0.059
Antimony_D	0.000023	0.000027	0.000054	0.000049	0.000064	0.000074	0.000060	0.000069	0.000073	0.000079	0.000093	0.000099
Antimony_T	0.000032	0.000035	0.000065	0.000060	0.000076	0.000094	0.000064	0.000072	0.000078	0.000085	0.00010	0.00011
Arsenic_D	0.00015	0.00015	0.00023	0.00022	0.00026	0.00031	0.00025	0.00027	0.00028	0.00032	0.00038	0.00039
Arsenic_T	0.00016	0.00017	0.00026	0.00025	0.00030	0.00036	0.00026	0.00029	0.00031	0.00034	0.00042	0.00043
Barium_D	0.0056	0.0064	0.0090	0.0097	0.013	0.015	0.0078	0.0083	0.0094	0.011	0.014	0.015
Barium_T	0.0072	0.0078	0.011	0.011	0.014	0.016	0.0089	0.0093	0.010	0.012	0.014	0.016
Beryllium_T	0.000026	0.000031	0.000062	0.000056	0.000072	0.000087	0.000062	0.000071	0.000077	0.000083	0.000099	0.00010
Boron_D	0.0018	0.0019	0.0039	0.0044	0.0074	0.0085	0.0033	0.0034	0.0048	0.0056	0.0078	0.0086
Boron_T	0.0025	0.0028	0.0063	0.0064	0.010	0.012	0.0041	0.0043	0.0064	0.0075	0.011	0.012
Bromide	0.012	0.014	0.029	0.028	0.039	0.042	0.030	0.036	0.040	0.041	0.047	0.052
Cadmium_D	0.00000013	0.00000018	0.00000078	0.00000065	0.00000100	0.0000010	0.0000013	0.0000015	0.0000018	0.0000018	0.0000021	0.0000024
Cadmium_T	0.00000015	0.00000024	0.0000015	0.0000015	0.0000025	0.0000026	0.0000024	0.0000029	0.0000033	0.0000034	0.0000038	0.0000046
Calcium_D	8.0	10.0	12	12	15	17	13	13	15	17	20	22
Chloride	0.012	0.019	0.061	0.069	0.15	0.17	0.11	0.11	0.17	0.16	0.21	0.25
Chromium_D	0.0000040	0.0000057	0.000014	0.000015	0.000035	0.000042	0.000024	0.000029	0.000038	0.000038	0.000046	0.000056
Chromium_D_Hex	0.0000043	0.0000064	0.000028	0.000026	0.000047	0.000052	0.000027	0.000033	0.000047	0.000047	0.000059	0.000063
Chromium_T	0.000031	0.000040	0.000095	0.000090	0.00012	0.00015	0.00013	0.00015	0.00016	0.00017	0.00020	0.00023
Cobalt_D	0.000017	0.000025	0.000077	0.000071	0.00011	0.00013	0.000060	0.000071	0.000098	0.00011	0.00014	0.00015
Cobalt_T	0.000019	0.000029	0.000085	0.000079	0.00012	0.00015	0.000068	0.000080	0.00011	0.00012	0.00015	0.00017
Copper_D	0.0000058	0.0000078	0.000030	0.000036	0.000074	0.000079	0.000067	0.000085	0.000100	0.000096	0.00011	0.00012
Copper_T	0.000018	0.000025	0.000077	0.000069	0.00011	0.00013	0.00012	0.00013	0.00016	0.00017	0.00021	0.00023
Cyanide_F	0.000021	0.000030	0.00020	0.00023	0.00043	0.00045	0.00034	0.00038	0.00052	0.00054	0.00065	0.00080
Cyanide_T	0.00010	0.00012	0.00031	0.00029	0.00041	0.00047	0.00044	0.00047	0.00057	0.00060	0.00074	0.00078
Cyanide_WAD	0.000025	0.000034	0.00020	0.00021	0.00037	0.00039	0.00032	0.00036	0.00046	0.00048	0.00057	0.00069
Fluoride	0.037	0.039	0.048	0.049	0.061	0.064	0.040	0.040	0.045	0.052	0.063	0.066
Hardness	25	30	37	38	47	54	43	43	47	56	65	73
Iron_D	0.056	0.086	0.16	0.16	0.25	0.26	0.19	0.22	0.31	0.29	0.33	0.37
Iron_T	0.17	0.25	0.44	0.53	0.99	1.2	0.52	0.63	0.75	0.80	1.1	1.3
Lead_D	0.00000059	0.00000086	0.0000036	0.0000031	0.0000047	0.0000052	0.0000069	0.0000077	0.0000095	0.000010	0.000012	0.000013
Lead_T	0.0000063	0.0000081	0.000025	0.000022	0.000039	0.000041	0.000031	0.000032	0.000048	0.000048	0.000058	0.000063
Magnesium_D	1.3	1.5	1.7	2.0	2.5	3.0	2.5	2.5	2.6	3.2	3.9	4.4
Manganese_D	0.013	0.026	0.14	0.13	0.23	0.25	0.066	0.083	0.15	0.17	0.25	0.27
Manganese_T	0.024	0.047	0.17	0.16	0.27	0.30	0.089	0.11	0.18	0.20	0.29	0.32
Mercury_D	0.00000011	0.00000014	0.00000035	0.00000042	0.00000082	0.00000087	0.00000076	0.00000081	0.00000095	0.00000094	0.0000011	0.0000011
Mercury_T	0.00000047	0.00000070	0.0000010	0.0000010	0.0000015	0.0000017	0.0000011	0.0000013	0.0000015	0.0000015	0.0000017	0.0000017
Molybdenum_D	0.0000071	0.0000091	0.000017	0.000018	0.000031	0.000033	0.000037	0.000038	0.000042	0.000053	0.000066	0.000073
Molybdenum_T	0.0000080	0.000010	0.000020	0.000021	0.000038	0.000040	0.000042	0.000044	0.000050	0.000061	0.000077	0.000084
N_Ammonia	0.0093	0.018	0.048	0.045	0.071	0.073	0.020	0.024	0.043	0.054	0.083	0.086
N_Nitrate_Nitrite	0.0015	0.0023	0.013	0.012	0.023	0.024	0.017	0.020	0.023	0.024	0.028	0.034
N_Nitrite	0.00046	0.00067	0.0026	0.0025	0.0048	0.0056	0.0042	0.0042	0.0058	0.0058	0.0072	0.0085
Nickel_D	0.000016	0.000021	0.000047	0.000042	0.000061	0.000067	0.000082	0.000084	0.00010	0.00011	0.00014	0.00015
Nickel_T	0.000022	0.000029	0.000095	0.000094	0.00017	0.00018	0.00013	0.00014	0.00022	0.00021	0.00026	0.00030
Phosphorus_T	0.013	0.014	0.020	0.021	0.031	0.035	0.021	0.022	0.026	0.027	0.033	0.037
Potassium_D	0.36	0.39	0.53	0.50	0.58	0.70	0.58	0.61	0.71	0.75	0.84	0.95
Proton	0.0000000024	0.0000000028	0.0000000061	0.0000000079	0.000000017	0.000000020	0.000000019	0.000000022	0.000000024	0.000000025	0.000000031	0.000000031
Radium_226	0.00027	0.00038	0.0012	0.0010	0.0016	0.0019	0.0019	0.0020	0.0025	0.0026	0.0033	0.0035
Selenium_D	0.0000018	0.0000023	0.000011	0.000018	0.000054	0.000063	0.000030	0.000031	0.000038	0.000043	0.000064	0.000066
Selenium_T	0.0000019	0.0000024	0.000011	0.000019	0.000055	0.000063	0.000031	0.000032	0.000039	0.000044	0.000065	0.000067
Silicon_D	0.91	0.98	1.4	1.4	1.8	2.2	2.1	2.1	2.2	2.6	3.0	3.4
Silicon_T	0.93	1.0	1.5	1.5	1.9	2.2	2.1	2.2	2.3	2.7	3.2	3.5
Silver_D	0.00000010	0.00000014	0.00000090	0.0000017	0.0000053	0.0000063	0.0000027	0.0000029	0.0000037	0.0000042	0.0000063	0.0000066
Silver_T	0.00000014	0.00000018	0.0000011	0.0000018	0.0000055	0.0000063	0.0000030	0.0000031	0.0000039	0.0000044	0.0000064	0.0000067
Sodium_D	0.32	0.40	0.62	0.63	0.93	1.0	0.85	0.88	0.99	1.2	1.5	1.6
Sodium_T	0.32	0.41	0.64	0.65	0.95	1.1	0.86	0.89	1.0	1.2	1.5	1.6
Strontium_D	0.0076	0.0090	0.014	0.013	0.018	0.020	0.018	0.018	0.020	0.024	0.028	0.031
Strontium_T	0.016	0.017	0.022	0.024	0.032	0.035	0.022	0.023	0.024	0.030	0.036	0.040
Sulfate	0.83	1.1	1.9	1.8	2.4	2.7	1.4	1.5	1.7	2.1	2.5	2.8
Thallium_D	0.000011	0.000012	0.000025	0.000023	0.000030	0.000034	0.000028	0.000032	0.000034	0.000036	0.000042	0.000044
Thallium_T	0.000034	0.000037	0.000043	0.000044	0.000053	0.000055	0.000033	0.000036	0.000037	0.000043	0.000051	0.000054
TSS	0.35	0.45	0.74	0.87	1.5	1.9	1.7	1.7	2.0	2.0	2.3	2.4
Uranium_D	0.00000020	0.00000028	0.0000013	0.0000011	0.0000016	0.0000018	0.0000027	0.0000030	0.0000036	0.0000039	0.0000048	0.0000051
Uranium_T	0.0000013	0.0000016	0.0000023	0.0000037	0.0000070	0.0000092	0.0000053	0.0000055	0.0000084	0.0000100	0.000015	0.000017
Vanadium_T	0.000012	0.000018	0.000080	0.000074	0.00013	0.00015	0.00012	0.00014	0.00015	0.00016	0.00020	0.00024
Zinc_D	0.000032	0.000044	0.00013	0.00013	0.00023	0.00027	0.00024	0.00025	0.00038	0.00037	0.00045	0.00046
Zinc_T	0.000040	0.000057	0.00018	0.00019	0.00036	0.00043	0.00033	0.00035	0.00056	0.00055	0.00065	0.00071

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Appendix C Water Quality Results for the Upper Case Scenario – Summary Statistics

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Open Pit Discharge

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	na	na	na	na	na	na	5.1	5.1	5.2	5.4	6.3	7.3
Alkalinity_T	na	na	na	na	na	na	180	240	240	240	240	240
Aluminum_D	na	na	na	na	na	na	0.012	0.018	0.021	0.021	0.022	0.022
Aluminum_T	na	na	na	na	na	na	0.014	0.021	0.024	0.023	0.024	0.024
Antimony_D	na	na	na	na	na	na	0.00046	0.00079	0.00095	0.00091	0.00096	0.00096
Antimony_T	na	na	na	na	na	na	0.00047	0.00079	0.00095	0.00091	0.00096	0.00096
Arsenic_D	na	na	na	na	na	na	0.0022	0.0022	0.0023	0.0024	0.0028	0.0046
Arsenic_T	na	na	na	na	na	na	0.0024	0.0024	0.0024	0.0026	0.0030	0.0047
Barium_D	na	na	na	na	na	na	0.031	0.044	0.048	0.047	0.049	0.049
Barium_T	na	na	na	na	na	na	0.031	0.045	0.049	0.048	0.050	0.050
Beryllium_T	na	na	na	na	na	na	0.00013	0.00021	0.00026	0.00025	0.00026	0.00026
Boron_D	na	na	na	na	na	na	0.037	0.062	0.076	0.073	0.078	0.078
Boron_T	na	na	na	na	na	na	0.037	0.062	0.076	0.073	0.078	0.078
Bromide	na	na	na	na	na	na	0.029	0.029	0.029	0.033	0.042	0.063
Cadmium_D	na	na	na	na	na	na	0.0000086	0.0000086	0.0000086	0.0000090	0.000010	0.000013
Cadmium_T	na	na	na	na	na	na	0.000012	0.000012	0.000012	0.000012	0.000013	0.000016
Calcium_D	na	na	na	na	na	na	69	99	110	110	110	110
Chloride	na	na	na	na	na	na	0.48	0.48	0.51	0.58	0.82	1.1
Chromium_D	na	na	na	na	na	na	0.00023	0.00033	0.00036	0.00035	0.00036	0.00036
Chromium_D_Hex	na	na	na	na	na	na	0.00023	0.00033	0.00036	0.00035	0.00036	0.00036
Chromium_T	na	na	na	na	na	na	0.00034	0.00058	0.00072	0.00069	0.00073	0.00074
Cobalt_D	na	na	na	na	na	na	0.00015	0.00015	0.00015	0.00016	0.00017	0.00022
Cobalt_T	na	na	na	na	na	na	0.00020	0.00020	0.00020	0.00020	0.00022	0.00026
Copper_D	na	na	na	na	na	na	0.00087	0.00087	0.00089	0.00091	0.00097	0.0014
Copper_T	na	na	na	na	na	na	0.00093	0.00093	0.00094	0.00097	0.0010	0.0014
Cyanide_F	na	na	na	na	na	na	0.00036	0.00036	0.00036	0.00039	0.00049	0.00069
Cyanide_T	na	na	na	na	na	na	0.00047	0.00047	0.00048	0.00050	0.00058	0.00070
Cyanide_WAD	na	na	na	na	na	na	0.00035	0.00035	0.00035	0.00039	0.00048	0.00068
Fluoride	na	na	na	na	na	na	0.14	0.15	0.18	0.27	0.57	0.89
Hardness	na	na	na	na	na	na	130	130	140	150	180	210
Iron_D	na	na	na	na	na	na	0.23	0.23	0.23	0.24	0.28	0.32
Iron_T	na	na	na	na	na	na	0.24	0.24	0.24	0.26	0.30	0.35
Lead_D	na	na	na	na	na	na	0.000079	0.00012	0.00014	0.00013	0.00014	0.00014
Lead_T	na	na	na	na	na	na	0.00010	0.00016	0.00020	0.00019	0.00020	0.00020
Magnesium_D	na	na	na	na	na	na	14	18	18	18	18	19
Manganese_D	na	na	na	na	na	na	0.037	0.037	0.038	0.049	0.082	0.17
Manganese_T	na	na	na	na	na	na	0.041	0.041	0.042	0.053	0.086	0.18
Mercury_D	na	na	na	na	na	na	0.0000015	0.0000021	0.0000023	0.0000023	0.0000023	0.0000023
Mercury_T	na	na	na	na	na	na	0.0000016	0.0000023	0.0000025	0.0000024	0.0000025	0.0000025
Molybdenum_D	na	na	na	na	na	na	0.0043	0.0071	0.0087	0.0083	0.0089	0.0089
Molybdenum_T	na	na	na	na	na	na	0.0043	0.0071	0.0087	0.0083	0.0089	0.0089
N_Ammonia	na	na	na	na	na	na	0.056	0.056	0.058	0.065	0.090	0.13
N_Nitrate_Nitrite	na	na	na	na	na	na	0.047	0.048	0.062	0.11	0.28	0.50
N_Nitrite	na	na	na	na	na	na	0.058	0.092	0.10	0.100	0.10	0.10
Nickel_D	na	na	na	na	na	na	0.00065	0.00070	0.00071	0.00072	0.00075	0.00085
Nickel_T	na	na	na	na	na	na	0.00073	0.00086	0.00087	0.00087	0.00090	0.00097
Phosphorus_T	na	na	na	na	na	na	0.00058	0.00059	0.00070	0.00073	0.00082	0.0065
Potassium_D	na	na	na	na	na	na	12	22	29	28	30	30
Proton	na	na	na	na	na	na	0.0011	0.0026	0.0037	0.0035	0.0039	0.0039
Radium_226	na	na	na	na	na	na	0.0024	0.0024	0.0025	0.0028	0.0026	0.021
Selenium_D	na	na	na	na	na	na	0.00026	0.00037	0.00039	0.00039	0.00039	0.00039
Selenium_T	na	na	na	na	na	na	0.00026	0.00037	0.00039	0.00039	0.00040	0.00040
Silicon_D	na	na	na	na	na	na	7.6	9.1	9.1	9.2	9.6	10.0
Silicon_T	na	na	na	na	na	na	7.6	9.2	9.2	9.3	9.6	10
Silver_D	na	na	na	na	na	na	0.000011	0.000016	0.000018	0.000018	0.000019	0.000019
Silver_T	na	na	na	na	na	na	0.000011	0.000016	0.000019	0.000018	0.000019	0.000019
Sodium_D	na	na	na	na	na	na	21	35	44	42	45	45
Sodium_T	na	na	na	na	na	na	21	36	44	42	45	45
Strontium_D	na	na	na	na	na	na	0.20	0.31	0.36	0.35	0.37	0.37
Strontium_T	na	na	na	na	na	na	0.20	0.31	0.36	0.35	0.37	0.37
Sulfate	na	na	na	na	na	na	13	13	15	18	29	42
Thallium_D	na	na	na	na	na	na	0.000062	0.00010	0.00013	0.00012	0.00013	0.00013
Thallium_T	na	na	na	na	na	na	0.000064	0.00011	0.00014	0.00013	0.00014	0.00014
TSS	na	na	na	na	na	na	11	15	15	15	15	15
Uranium_D	na	na	na	na	na	na	0.0029	0.0033	0.0033	0.0033	0.0035	0.0038
Uranium_T	na	na	na	na	na	na	0.0029	0.0033	0.0033	0.0033	0.0035	0.0038
Vanadium_T	na	na	na	na	na	na	0.00049	0.00078	0.00093	0.00090	0.00095	0.00095
Zinc_D	na	na	na	na	na	na	0.0016	0.0016	0.0016	0.0018	0.0021	0.0033
Zinc_T	na	na	na	na	na	na	0.0019	0.0019	0.0019	0.0021	0.0024	0.0036

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Collection Pond Discharge

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	4.1	4.2	4.4	4.6	5.4	6.0	5.3	6.3	6.9	6.9	7.7	7.7
Alkalinity_T	150	150	180	240	410	590	270	380	420	450	550	580
Aluminum_D	0.0078	0.0081	0.016	0.017	0.028	0.031	0.068	0.070	0.073	0.074	0.082	0.083
Aluminum_T	0.0078	0.0081	0.021	0.023	0.042	0.048	0.086	0.086	0.086	0.086	0.086	0.086
Antimony_D	0.00015	0.00016	0.00059	0.0016	0.0042	0.0074	0.0025	0.0035	0.0039	0.0042	0.0052	0.0054
Antimony_T	0.00015	0.00016	0.00059	0.0016	0.0042	0.0074	0.0025	0.0036	0.0039	0.0042	0.0052	0.0055
Arsenic_D	0.0016	0.0017	0.0042	0.0049	0.0093	0.010	0.018	0.018	0.019	0.019	0.020	0.025
Arsenic_T	0.0016	0.0017	0.0043	0.0050	0.0096	0.011	0.019	0.020	0.021	0.021	0.022	0.026
Barium_D	0.021	0.022	0.030	0.044	0.084	0.13	0.071	0.10	0.11	0.12	0.15	0.15
Barium_T	0.021	0.022	0.030	0.045	0.085	0.13	0.073	0.10	0.11	0.12	0.15	0.16
Beryllium_T	0.000072	0.000073	0.00012	0.00021	0.00046	0.00074	0.00046	0.00065	0.00071	0.00076	0.00094	0.00097
Boron_D	0.013	0.014	0.034	0.079	0.19	0.33	0.15	0.21	0.23	0.25	0.31	0.33
Boron_T	0.013	0.014	0.034	0.079	0.19	0.33	0.15	0.21	0.23	0.25	0.31	0.33
Bromide	0.042	0.045	0.047	0.048	0.053	0.054	0.031	0.036	0.037	0.038	0.040	0.040
Cadmium_D	0.0000072	0.0000074	0.0000100	0.000015	0.000028	0.000043	0.000027	0.000038	0.000042	0.000045	0.000055	0.000057
Cadmium_T	0.0000073	0.0000074	0.000011	0.000017	0.000033	0.000049	0.000043	0.000062	0.000068	0.000071	0.000083	0.000086
Calcium_D	46	47	60	83	150	210	160	230	250	270	340	350
Chloride	0.46	0.49	0.54	0.53	0.56	0.58	0.16	0.18	0.21	0.21	0.24	0.29
Chromium_D	0.00018	0.00018	0.00021	0.00025	0.00039	0.00050	0.00051	0.00070	0.00077	0.00082	0.0010	0.0010
Chromium_D_Hex	0.00018	0.00018	0.00021	0.00025	0.00039	0.00050	0.00051	0.00070	0.00077	0.00082	0.0010	0.0010
Chromium_T	0.00018	0.00018	0.00030	0.00036	0.00064	0.00093	0.0012	0.0018	0.0019	0.0021	0.0025	0.0029
Cobalt_D	0.000080	0.000082	0.00015	0.00024	0.00050	0.00080	0.00061	0.00082	0.00089	0.00094	0.0011	0.0012
Cobalt_T	0.000080	0.000082	0.00017	0.00027	0.00058	0.00092	0.00082	0.0011	0.0012	0.0013	0.0014	0.0017
Copper_D	0.00044	0.00046	0.00096	0.0021	0.0049	0.0083	0.0048	0.0068	0.0074	0.0080	0.010	0.010
Copper_T	0.00044	0.00046	0.00100	0.0021	0.0050	0.0085	0.0051	0.0073	0.0079	0.0086	0.011	0.011
Cyanide_F	0.00050	0.00052	0.00054	0.00056	0.00063	0.00066	0.00053	0.00056	0.00071	0.00069	0.00076	0.00076
Cyanide_T	0.00049	0.00050	0.00053	0.00054	0.00062	0.00065	0.00053	0.00057	0.00073	0.00071	0.00078	0.00078
Cyanide_WAD	0.00049	0.00050	0.00053	0.00054	0.00061	0.00065	0.00053	0.00056	0.00071	0.00069	0.00076	0.00076
Fluoride	0.13	0.13	0.14	0.15	0.18	0.20	0.14	0.15	0.15	0.16	0.17	0.19
Hardness	120	140	150	150	160	160	30	35	37	38	43	48
Iron_D	0.15	0.15	0.18	0.19	0.26	0.27	0.32	0.38	0.42	0.42	0.47	0.47
Iron_T	0.15	0.15	0.27	0.29	0.48	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Lead_D	0.000050	0.000051	0.000074	0.00012	0.00024	0.00038	0.00023	0.00032	0.00035	0.00037	0.00046	0.00048
Lead_T	0.000050	0.000051	0.000087	0.00014	0.00029	0.00045	0.00033	0.00047	0.00052	0.00057	0.00071	0.00081
Magnesium_D	9.9	10	12	16	28	39	23	33	35	38	47	50
Manganese_D	0.053	0.055	0.059	0.064	0.084	0.094	0.048	0.058	0.069	0.082	0.13	0.18
Manganese_T	0.054	0.055	0.062	0.067	0.089	0.10	0.073	0.086	0.094	0.11	0.16	0.22
Mercury_D	0.0000011	0.0000012	0.0000015	0.0000020	0.0000035	0.0000050	0.0000033	0.0000044	0.0000048	0.0000052	0.0000065	0.0000066
Mercury_T	0.0000011	0.0000012	0.0000016	0.0000020	0.0000036	0.0000053	0.0000034	0.0000046	0.0000051	0.0000057	0.0000073	0.0000080
Molybdenum_D	0.0024	0.0025	0.0042	0.0083	0.019	0.031	0.015	0.022	0.024	0.026	0.032	0.034
Molybdenum_T	0.0024	0.0025	0.0042	0.0083	0.019	0.031	0.015	0.022	0.024	0.026	0.032	0.034
N_Ammonia	0.097	0.14	0.36	0.54	1.3	1.8	0.0075	0.0097	0.013	0.016	0.024	0.037
N_Nitrate_Nitrite	0.51	1.5	6.7	11	29	41	0.017	0.020	0.021	0.021	0.022	0.022
N_Nitrite	0.017	0.027	0.082	0.13	0.32	0.43	0.29	0.41	0.45	0.49	0.61	0.63
Nickel_D	0.00032	0.00032	0.00064	0.0013	0.0030	0.0049	0.0024	0.0034	0.0038	0.0040	0.0050	0.0052
Nickel_T	0.00032	0.00032	0.00071	0.0014	0.0032	0.0053	0.0031	0.0044	0.0048	0.0051	0.0062	0.0067
Phosphorus_T	0.022	0.022	0.023	0.025	0.031	0.032	0.0084	0.0099	0.011	0.011	0.014	0.014
Potassium_D	3.5	3.6	9.4	22	54	93	60	85	93	100	130	130
Proton	0.000000030	0.000000031	0.000000044	0.000000055	0.00000010	0.00000012	0.0081	0.012	0.013	0.014	0.017	0.018
Radium_226	0.021	0.024	0.027	0.026	0.028	0.028	0.0027	0.0031	0.0036	0.0039	0.0049	0.0058
Selenium_D	0.00011	0.00011	0.00030	0.00072	0.0018	0.0031	0.0013	0.0018	0.0019	0.0021	0.0026	0.0027
Selenium_T	0.00011	0.00011	0.00030	0.00072	0.0018	0.0031	0.0013	0.0018	0.0020	0.0021	0.0027	0.0028
Silicon_D	6.8	6.9	7.8	9.2	14	17	9.7	13	14	14	16	18
Silicon_T	6.8	6.9	7.8	9.2	14	17	9.8	13	14	15	17	18
Silver_D	0.0000074	0.0000076	0.000011	0.000015	0.000029	0.000044	0.000028	0.000039	0.000043	0.000047	0.000060	0.000061
Silver_T	0.0000074	0.0000076	0.000011	0.000015	0.000030	0.000044	0.000028	0.000040	0.000044	0.000048	0.000061	0.000061
Sodium_D	9.4	9.7	22	51	120	210	84	120	130	140	180	180
Sodium_T	9.4	9.7	22	51	120	210	84	120	130	140	180	190
Strontium_D	0.10	0.10	0.15	0.25	0.52	0.81	0.63	0.89	0.97	1.0	1.3	1.4
Strontium_T	0.10	0.10	0.15	0.25	0.52	0.81	0.63	0.89	0.97	1.0	1.3	1.4
Sulfate	23	24	67	150	370	620	1.5	1.6	1.7	2.4	3.6	5.2
Thallium_D	0.000029	0.000030	0.000055	0.00011	0.00024	0.00039	0.00024	0.00034	0.00037	0.00040	0.00050	0.00052
Thallium_T	0.000029	0.000030	0.000057	0.00011	0.00024	0.00040	0.00026	0.00037	0.00040	0.00043	0.00053	0.00055
TSS	12	13	15	14	15	15	8.9	9.9	12	12	15	15
Uranium_D	0.0015	0.0015	0.0030	0.0065	0.015	0.026	0.011	0.015	0.017	0.018	0.023	0.024
Uranium_T	0.0015	0.0015	0.0030	0.0065	0.015	0.026	0.011	0.015	0.017	0.018	0.023	0.024
Vanadium_T	0.00029	0.00029	0.00053	0.00093	0.0020	0.0033	0.0016	0.0022	0.0024	0.0026	0.0032	0.0037
Zinc_D	0.0024	0.0024	0.0028	0.0035	0.0056	0.0076	0.0035	0.0048	0.0053	0.0057	0.0070	0.0073
Zinc_T	0.0024	0.0024	0.0030	0.0037	0.0061	0.0083	0.0051	0.0069	0.0076	0.0079	0.0089	0.010

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Gordon Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	1.1	1.7	5.8	5.3	8.4	9.9	3.9	4.6	6.7	7.2	9.5	10
Alkalinity_T	50	51	65	66	79	89	51	52	53	66	79	90
Aluminum_D	0.00014	0.00022	0.0011	0.0035	0.010	0.015	0.0053	0.0055	0.0093	0.0096	0.015	0.017
Aluminum_T	0.00019	0.00037	0.0042	0.014	0.045	0.057	0.019	0.020	0.030	0.034	0.057	0.058
Antimony_D	0.000024	0.000029	0.000058	0.000053	0.000067	0.000081	0.000064	0.000074	0.000079	0.000086	0.00010	0.00011
Antimony_T	0.000034	0.000037	0.000069	0.000065	0.000084	0.00010	0.000068	0.000077	0.000086	0.000092	0.00011	0.00012
Arsenic_D	0.00016	0.00017	0.00025	0.00024	0.00029	0.00035	0.00027	0.00031	0.00033	0.00036	0.00043	0.00043
Arsenic_T	0.00018	0.00019	0.00030	0.00028	0.00033	0.00040	0.00029	0.00033	0.00035	0.00039	0.00047	0.00047
Barium_D	0.0063	0.0074	0.011	0.011	0.015	0.017	0.0090	0.0097	0.011	0.013	0.016	0.018
Barium_T	0.0082	0.0090	0.012	0.013	0.016	0.018	0.010	0.011	0.012	0.014	0.017	0.019
Beryllium_T	0.000027	0.000033	0.000066	0.000060	0.000079	0.000095	0.000066	0.000076	0.000085	0.000090	0.00011	0.00012
Boron_D	0.0020	0.0022	0.0066	0.0077	0.014	0.016	0.0042	0.0045	0.0085	0.0095	0.015	0.016
Boron_T	0.0031	0.0038	0.011	0.011	0.019	0.021	0.0058	0.0064	0.011	0.013	0.019	0.021
Bromide	0.012	0.014	0.029	0.028	0.039	0.042	0.030	0.036	0.040	0.041	0.047	0.052
Cadmium_D	0.00000013	0.00000018	0.00000082	0.00000070	0.0000011	0.0000012	0.0000014	0.0000016	0.0000019	0.0000020	0.0000023	0.0000027
Cadmium_T	0.00000017	0.00000029	0.0000022	0.0000021	0.0000038	0.0000040	0.0000036	0.0000042	0.0000051	0.0000050	0.0000056	0.0000069
Calcium_D	8.5	11	13	13	16	18	14	15	16	18	22	24
Chloride	0.014	0.022	0.064	0.088	0.21	0.25	0.13	0.13	0.22	0.21	0.29	0.36
Chromium_D	0.0000045	0.0000053	0.0000097	0.000020	0.000062	0.000073	0.000041	0.000043	0.000050	0.000057	0.000075	0.000098
Chromium_D_Hex	0.0000045	0.0000062	0.0000099	0.000022	0.000068	0.000078	0.000043	0.000044	0.000052	0.000059	0.000080	0.00010
Chromium_T	0.000051	0.000066	0.00015	0.00014	0.00020	0.00025	0.00021	0.00022	0.00026	0.00028	0.00033	0.00037
Cobalt_D	0.000021	0.000034	0.00011	0.00010	0.00016	0.00019	0.000085	0.00010	0.00014	0.00015	0.00020	0.00022
Cobalt_T	0.000024	0.000038	0.00012	0.00011	0.00017	0.00021	0.000096	0.00011	0.00016	0.00017	0.00023	0.00025
Copper_D	0.0000071	0.0000093	0.000036	0.000043	0.000089	0.000096	0.000081	0.00010	0.00012	0.00012	0.00014	0.00014
Copper_T	0.000023	0.000033	0.000092	0.000086	0.00013	0.00016	0.00015	0.00016	0.00020	0.00021	0.00027	0.00029
Cyanide_F	0.000023	0.000036	0.00027	0.00033	0.00064	0.00067	0.00047	0.00052	0.00078	0.00080	0.00097	0.0012
Cyanide_T	0.00012	0.00014	0.00038	0.00035	0.00051	0.00055	0.00053	0.00060	0.00069	0.00074	0.00089	0.00096
Cyanide_WAD	0.000025	0.000036	0.00024	0.00025	0.00044	0.00046	0.00037	0.00046	0.00057	0.00058	0.00067	0.00084
Fluoride	0.039	0.042	0.052	0.053	0.065	0.069	0.042	0.044	0.048	0.055	0.067	0.072
Hardness	26	32	41	41	51	58	46	46	52	60	71	79
Iron_D	0.084	0.14	0.23	0.24	0.39	0.46	0.30	0.36	0.44	0.44	0.52	0.53
Iron_T	0.19	0.28	1.1	0.98	1.5	1.8	0.59	0.70	1.1	1.3	1.8	2.2
Lead_D	0.00000061	0.00000089	0.0000038	0.0000034	0.0000050	0.0000057	0.0000073	0.0000082	0.000010	0.000011	0.000013	0.000015
Lead_T	0.000013	0.000014	0.000046	0.000044	0.000078	0.000082	0.000055	0.000061	0.000100	0.000096	0.00012	0.00013
Magnesium_D	1.3	1.6	1.9	2.1	2.7	3.2	2.6	2.7	2.8	3.5	4.2	4.8
Manganese_D	0.021	0.048	0.62	0.54	0.93	0.98	0.20	0.26	0.56	0.70	1.1	1.2
Manganese_T	0.058	0.12	0.69	0.61	1.0	1.0	0.24	0.31	0.62	0.77	1.2	1.3
Mercury_D	0.00000015	0.00000018	0.00000042	0.00000049	0.00000093	0.00000099	0.00000091	0.00000094	0.0000011	0.0000011	0.0000012	0.0000013
Mercury_T	0.00000057	0.00000093	0.0000014	0.0000014	0.0000020	0.0000022	0.0000014	0.0000017	0.0000021	0.0000020	0.0000022	0.0000024
Molybdenum_D	0.0000096	0.000013	0.000023	0.000024	0.000042	0.000044	0.000049	0.000050	0.000056	0.000071	0.000089	0.000100
Molybdenum_T	0.000010	0.000014	0.000027	0.000029	0.000049	0.000054	0.000056	0.000059	0.000068	0.000082	0.00011	0.00011
N_Ammonia	0.017	0.033	0.065	0.062	0.087	0.096	0.037	0.046	0.060	0.077	0.11	0.11
N_Nitrate_Nitrite	0.0017	0.0027	0.016	0.016	0.032	0.033	0.022	0.026	0.030	0.032	0.039	0.048
N_Nitrite	0.00073	0.0011	0.0052	0.0050	0.0089	0.010	0.0084	0.0094	0.011	0.011	0.013	0.016
Nickel_D	0.000019	0.000024	0.000050	0.000046	0.000068	0.000073	0.000091	0.000093	0.00011	0.00013	0.00016	0.00017
Nickel_T	0.000027	0.000034	0.00012	0.00012	0.00023	0.00024	0.00015	0.00017	0.00029	0.00028	0.00035	0.00041
Phosphorus_T	0.0018	0.0024	0.0076	0.010	0.027	0.027	0.017	0.017	0.021	0.023	0.033	0.035
Potassium_D	0.40	0.43	0.60	0.56	0.66	0.79	0.65	0.68	0.78	0.85	0.96	1.1
Proton	.0000000015	0.0000000017	0.0000000043	0.0000000067	0.000000015	0.000000019	0.000000017	0.000000017	0.000000020	0.000000021	0.000000027	0.000000027
Radium_226	0.00028	0.00038	0.0012	0.0011	0.0016	0.0020	0.0019	0.0021	0.0026	0.0027	0.0034	0.0037
Selenium_D	0.0000020	0.0000026	0.000018	0.000037	0.00011	0.00013	0.000053	0.000056	0.000077	0.000087	0.00014	0.00014
Selenium_T	0.0000020	0.0000027	0.000018	0.000037	0.00011	0.00013	0.000054	0.000057	0.000078	0.000088	0.00014	0.00014
Silicon_D	0.93	1.1	1.5	1.5	2.0	2.3	2.3	2.4	2.6	2.9	3.4	3.7
Silicon_T	0.95	1.1	1.5	1.6	2.0	2.3	2.3	2.4	2.6	2.9	3.5	3.7
Silver_D	0.00000011	0.00000015	0.0000015	0.0000035	0.000011	0.000013	0.0000049	0.0000052	0.0000075	0.0000085	0.000014	0.000014
Silver_T	0.00000014	0.00000020	0.0000017	0.0000036	0.000011	0.000013	0.0000051	0.0000055	0.0000077	0.0000087	0.000014	0.000014
Sodium_D	0.33	0.41	0.65	0.66	0.98	1.1	0.89	0.92	1.0	1.2	1.5	1.7
Sodium_T	0.34	0.42	0.66	0.67	1.00	1.1	0.90	0.93	1.1	1.3	1.6	1.7
Strontium_D	0.0081	0.0096	0.014	0.014	0.019	0.021	0.019	0.019	0.021	0.025	0.030	0.034
Strontium_T	0.016	0.018	0.024	0.026	0.035	0.038	0.023	0.024	0.026	0.032	0.039	0.044
Sulfate	0.053	0.068	0.12	0.13	0.23	0.23	0.31	0.32	0.37	0.47	0.60	0.68
Thallium_D	0.000012	0.000014	0.000028	0.000026	0.000033	0.000040	0.000031	0.000036	0.000039	0.000042	0.000050	0.000054
Thallium_T	0.000017	0.000018	0.000034	0.000032	0.000041	0.000050	0.000033	0.000038	0.000042	0.000045	0.000054	0.000058
TSS	0.72	0.91	1.3	1.5	2.1	2.7	2.7	2.8	3.7	3.5	4.2	4.3
Uranium_D	0.00000021	0.00000028	0.0000014	0.0000012	0.0000017	0.0000020	0.0000029	0.0000032	0.0000041	0.0000042	0.0000053	0.0000058
Uranium_T	0.00000022	0.00000031	0.0000015	0.0000013	0.0000020	0.0000024	0.0000032	0.0000035	0.0000046	0.0000048	0.0000060	0.0000066
Vanadium_T	0.000016	0.000025	0.00011	0.00010	0.00021	0.00024	0.00016	0.00018	0.00023	0.00024	0.00030	0.00037
Zinc_D	0.000046	0.000064	0.00019	0.00019	0.00034	0.00041	0.00034	0.00036	0.00058	0.00056	0.00068	0.00071
Zinc_T	0.000055	0.000077	0.00024	0.00026	0.00049	0.00060	0.00043	0.00046	0.00077	0.00075	0.00090	0.00098

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Farley Lake West

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	1.1	1.5	6.7	6.3	10	11	1.8	2.2	7.0	7.2	11	14
Alkalinity_T	68	85	130	130	150	170	81	84	110	120	170	180
Aluminum_D	0.00038	0.00041	0.0010	0.0031	0.0094	0.012	0.0012	0.0014	0.0023	0.0045	0.0098	0.013
Aluminum_T	0.00068	0.00072	0.0017	0.0048	0.013	0.019	0.0021	0.0024	0.0038	0.0069	0.014	0.020
Antimony_D	0.000098	0.00011	0.00033	0.00045	0.0011	0.0014	0.000097	0.00022	0.00026	0.00027	0.00035	0.00039
Antimony_T	0.00014	0.00016	0.00042	0.00053	0.0012	0.0014	0.00013	0.00024	0.00032	0.00032	0.00046	0.00051
Arsenic_D	0.00092	0.0012	0.0020	0.0021	0.0028	0.0039	0.00073	0.00076	0.0016	0.0014	0.0021	0.0032
Arsenic_T	0.00094	0.0012	0.0021	0.0021	0.0029	0.0040	0.00077	0.00080	0.0017	0.0014	0.0022	0.0032
Barium_D	0.013	0.015	0.024	0.023	0.030	0.033	0.015	0.017	0.023	0.024	0.034	0.036
Barium_T	0.014	0.016	0.025	0.025	0.030	0.034	0.016	0.017	0.024	0.025	0.036	0.037
Beryllium_T	0.000048	0.000053	0.000079	0.000091	0.00015	0.00017	0.000075	0.000095	0.00010	0.00011	0.00013	0.00013
Boron_D	0.012	0.013	0.025	0.030	0.057	0.068	0.016	0.021	0.028	0.029	0.041	0.045
Boron_T	0.012	0.013	0.026	0.031	0.057	0.068	0.016	0.021	0.029	0.029	0.042	0.046
Bromide	0.027	0.029	0.038	0.038	0.043	0.048	0.029	0.033	0.040	0.039	0.045	0.054
Cadmium_D	0.00000090	0.0000011	0.0000021	0.0000028	0.0000065	0.0000098	0.0000017	0.0000020	0.0000023	0.0000026	0.0000038	0.0000049
Cadmium_T	0.0000010	0.0000012	0.0000019	0.0000021	0.0000033	0.0000035	0.0000020	0.0000020	0.0000023	0.0000025	0.0000032	0.0000041
Calcium_D	27	31	49	47	57	59	35	38	51	54	75	79
Chloride	0.40	0.41	0.52	0.52	0.65	0.67	0.43	0.44	0.62	0.57	0.71	0.92
Chromium_D	0.000013	0.000016	0.000032	0.000033	0.000055	0.000074	0.000034	0.000045	0.000050	0.000054	0.000066	0.000077
Chromium_D_Hex	0.000058	0.000080	0.00012	0.00013	0.00020	0.00025	0.000094	0.00013	0.00017	0.00017	0.00022	0.00023
Chromium_T	0.000028	0.000048	0.000086	0.000084	0.00011	0.00013	0.000059	0.000097	0.00015	0.00015	0.00020	0.00020
Cobalt_D	0.000030	0.000036	0.000049	0.000051	0.000070	0.000080	0.000045	0.000047	0.000057	0.000062	0.000079	0.000088
Cobalt_T	0.000031	0.000039	0.000058	0.000057	0.000072	0.000080	0.000047	0.000050	0.000065	0.000073	0.000100	0.00011
Copper_D	0.000096	0.00011	0.00022	0.00034	0.00082	0.0011	0.00011	0.00018	0.00023	0.00022	0.00026	0.00037
Copper_T	0.00012	0.00026	0.00045	0.00056	0.0010	0.0016	0.00018	0.00023	0.00041	0.00040	0.00061	0.00084
Cyanide_F	0.000048	0.000060	0.00010	0.00012	0.00020	0.00021	0.00010	0.00012	0.00018	0.00017	0.00024	0.00026
Cyanide_T	0.00017	0.00019	0.00030	0.00030	0.00039	0.00041	0.00026	0.00026	0.00042	0.00039	0.00046	0.00053
Cyanide_WAD	0.000074	0.000089	0.00015	0.00018	0.00030	0.00033	0.00013	0.00016	0.00024	0.00024	0.00033	0.00037
Fluoride	0.066	0.075	0.096	0.095	0.12	0.12	0.070	0.076	0.11	0.13	0.21	0.47
Hardness	92	96	120	130	170	170	98	100	130	130	170	200
Iron_D	0.011	0.016	0.029	0.041	0.095	0.12	0.026	0.037	0.054	0.066	0.12	0.16
Iron_T	0.011	0.012	0.020	0.040	0.11	0.16	0.025	0.029	0.035	0.058	0.14	0.18
Lead_D	0.0000034	0.0000041	0.0000064	0.0000078	0.000014	0.000016	0.0000072	0.000010	0.000011	0.000012	0.000013	0.000014
Lead_T	0.0000054	0.0000061	0.000022	0.000033	0.000082	0.00010	0.000018	0.000022	0.000035	0.000039	0.000063	0.000073
Magnesium_D	7.8	8.4	13	12	14	14	9.6	9.9	11	13	17	17
Manganese_D	0.050	0.068	0.20	0.22	0.39	0.43	0.083	0.097	0.19	0.25	0.42	0.56
Manganese_T	0.077	0.10	0.25	0.25	0.40	0.44	0.11	0.13	0.27	0.28	0.43	0.57
Mercury_D	0.00000024	0.00000028	0.00000069	0.00000080	0.0000015	0.0000019	0.00000066	0.00000070	0.00000096	0.0000010	0.0000014	0.0000016
Mercury_T	0.00000037	0.00000041	0.00000059	0.00000099	0.0000022	0.0000025	0.00000080	0.00000088	0.00000094	0.0000013	0.0000022	0.0000024
Molybdenum_D	0.00033	0.00040	0.00087	0.0011	0.0024	0.0026	0.00030	0.00088	0.0013	0.0013	0.0019	0.0021
Molybdenum_T	0.00034	0.00040	0.00087	0.0011	0.0023	0.0027	0.00031	0.00089	0.0013	0.0013	0.0019	0.0021
N_Ammonia	0.033	0.043	0.11	0.11	0.19	0.24	0.014	0.015	0.039	0.044	0.074	0.10
N_Nitrate_Nitrite	0.49	0.99	2.1	2.6	4.8	5.6	0.027	0.030	0.060	0.066	0.11	0.26
N_Nitrite	0.00067	0.0012	0.012	0.025	0.067	0.094	0.0041	0.0052	0.016	0.022	0.043	0.049
Nickel_D	0.00029	0.00035	0.00053	0.00059	0.00098	0.0012	0.00035	0.00035	0.00045	0.00045	0.00056	0.00063
Nickel_T	0.00035	0.00039	0.00062	0.00069	0.0011	0.0012	0.00042	0.00042	0.00053	0.00056	0.00072	0.00077
Phosphorus_T	0.00024	0.00035	0.0053	0.0063	0.017	0.021	0.00099	0.0013	0.0064	0.0069	0.016	0.021
Potassium_D	3.1	3.5	6.9	8.3	16	19	4.2	6.9	9.7	9.9	15	17
Proton	0.0000000090	0.000000012	0.000000044	0.000000042	0.000000065	0.000000069	0.000061	0.00026	0.00062	0.00074	0.0015	0.0018
Radium_226	0.0023	0.0028	0.0035	0.0035	0.0041	0.0043	0.0015	0.0017	0.0019	0.0019	0.0022	0.0041
Selenium_D	0.000028	0.000070	0.00017	0.00016	0.00024	0.00037	0.000050	0.000056	0.00014	0.00016	0.00029	0.00030
Selenium_T	0.000021	0.000025	0.000056	0.000079	0.00017	0.00023	0.000041	0.000055	0.000062	0.000066	0.000080	0.000085
Silicon_D	1.5	2.1	3.5	3.5	4.7	5.3	2.1	2.2	3.6	3.9	5.9	6.4
Silicon_T	1.5	2.2	3.7	3.6	4.9	5.5	2.2	2.3	3.8	4.0	6.1	6.5
Silver_D	0.00000071	0.00000085	0.0000016	0.0000019	0.0000034	0.0000046	0.0000018	0.0000025	0.0000028	0.0000030	0.0000039	0.0000043
Silver_T	0.00000086	0.0000010	0.0000020	0.0000024	0.0000043	0.0000057	0.0000022	0.0000030	0.0000035	0.0000037	0.0000050	0.0000053
Sodium_D	6.4	7.6	16	19	35	42	8.2	11	16	16	24	26
Sodium_T	6.4	7.5	15	18	35	42	8.2	11	16	16	23	26
Strontium_D	0.058	0.067	0.11	0.12	0.17	0.19	0.081	0.10	0.14	0.14	0.21	0.23
Strontium_T	0.059	0.068	0.11	0.12	0.17	0.19	0.082	0.10	0.14	0.14	0.21	0.22
Sulfate	38	47	73	80	130	140	34	38	47	49	61	78
Thallium_D	0.000024	0.000026	0.000039	0.000047	0.000082	0.000098	0.000039	0.000049	0.000055	0.000055	0.000064	0.000068
Thallium_T	0.000027	0.000028	0.000043	0.000051	0.000087	0.00010	0.000042	0.000053	0.000058	0.000059	0.000069	0.000074
TSS	0.25	0.30	0.52	0.49	0.62	0.69	0.80	0.84	1.2	1.2	1.7	1.8
Uranium_D	0.00023	0.00034	0.00073	0.00095	0.0019	0.0025	0.00037	0.00041	0.00064	0.00068	0.0011	0.0013
Uranium_T	0.00022	0.00033	0.00071	0.00095	0.0020	0.0029	0.00029	0.00041	0.00060	0.00065	0.00100	0.0012
Vanadium_T	0.000095	0.00011	0.00017	0.00018	0.00028	0.00031	0.00015	0.00018	0.00020	0.00023	0.00030	0.00030
Zinc_D	0.00024	0.00028	0.00036	0.00045	0.00075	0.0010	0.00034	0.00035	0.00043	0.00044	0.00057	0.00077
Zinc_T	0.00020	0.00030	0.00041	0.00040	0.00050	0.00054	0.00027	0.00031	0.00048	0.00047	0.00059	0.00074

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Farley Lake East

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	1.6	2.1	6.3	6.3	10	11	2.2	2.6	5.4	7.1	11	12
Alkalinity_T	52	60	100	97	120	150	61	64	79	95	130	150
Aluminum_D	0.00015	0.00021	0.00075	0.0021	0.0049	0.0096	0.00024	0.00029	0.00096	0.0023	0.0055	0.010
Aluminum_T	0.0025	0.0034	0.011	0.011	0.019	0.024	0.0039	0.0046	0.013	0.012	0.021	0.024
Antimony_D	0.000069	0.000088	0.00020	0.00030	0.00067	0.00076	0.000074	0.00014	0.00017	0.00018	0.00024	0.00029
Antimony_T	0.00010	0.00015	0.00033	0.00044	0.00095	0.0011	0.00012	0.00020	0.00024	0.00028	0.00039	0.00043
Arsenic_D	0.00063	0.00075	0.0013	0.0013	0.0018	0.0029	0.00047	0.00052	0.00097	0.00090	0.0014	0.0021
Arsenic_T	0.00067	0.00080	0.0013	0.0014	0.0020	0.0032	0.00052	0.00057	0.0010	0.00098	0.0015	0.0022
Barium_D	0.011	0.012	0.022	0.021	0.025	0.031	0.013	0.015	0.017	0.021	0.031	0.032
Barium_T	0.012	0.013	0.023	0.022	0.027	0.033	0.014	0.015	0.018	0.023	0.033	0.034
Beryllium_T	0.000043	0.000048	0.000070	0.000081	0.00013	0.00015	0.000059	0.000075	0.000090	0.000089	0.000096	0.00012
Boron_D	0.0071	0.0094	0.017	0.021	0.036	0.044	0.0094	0.012	0.019	0.020	0.028	0.032
Boron_T	0.010	0.013	0.022	0.026	0.047	0.056	0.014	0.018	0.023	0.025	0.036	0.040
Bromide	0.024	0.029	0.036	0.037	0.042	0.053	0.025	0.031	0.037	0.037	0.043	0.056
Cadmium_D	0.00000039	0.00000045	0.0000016	0.0000019	0.0000043	0.0000079	0.00000056	0.00000062	0.0000016	0.0000016	0.0000031	0.0000045
Cadmium_T	0.0000018	0.0000021	0.0000029	0.0000035	0.0000041	0.000011	0.0000023	0.0000026	0.0000032	0.0000039	0.0000043	0.000011
Calcium_D	19	22	34	33	41	50	25	27	34	38	50	55
Chloride	0.14	0.15	0.35	0.35	0.52	0.57	0.15	0.15	0.37	0.38	0.59	0.74
Chromium_D	0.000011	0.000013	0.000020	0.000027	0.000048	0.000081	0.000020	0.000024	0.000030	0.000037	0.000052	0.000084
Chromium_D_Hex	0.000034	0.000044	0.000061	0.000075	0.00013	0.00020	0.000046	0.000057	0.000083	0.000094	0.00012	0.00019
Chromium_T	0.000057	0.000071	0.000093	0.000096	0.00012	0.00015	0.000082	0.00011	0.00014	0.00014	0.00019	0.00019
Cobalt_D	0.000032	0.000042	0.000056	0.000055	0.000070	0.000079	0.000043	0.000045	0.000055	0.000063	0.000081	0.000092
Cobalt_T	0.000040	0.000050	0.000068	0.000067	0.000083	0.000091	0.000055	0.000058	0.000066	0.000078	0.00010	0.00011
Copper_D	0.000016	0.000020	0.000076	0.00013	0.00034	0.00063	0.000020	0.000029	0.000052	0.000070	0.00013	0.00020
Copper_T	0.00010	0.00011	0.00016	0.00026	0.00051	0.00091	0.00010	0.00012	0.00017	0.00017	0.00021	0.00030
Cyanide_F	0.00011	0.00014	0.00022	0.00025	0.00045	0.00055	0.00017	0.00017	0.00025	0.00029	0.00047	0.00060
Cyanide_T	0.00022	0.00029	0.00038	0.00038	0.00046	0.00070	0.00028	0.00035	0.00044	0.00045	0.00053	0.00080
Cyanide_WAD	0.00014	0.00016	0.00025	0.00027	0.00035	0.00049	0.00019	0.00021	0.00030	0.00031	0.00037	0.00057
Fluoride	0.056	0.062	0.077	0.080	0.10	0.11	0.059	0.068	0.091	0.10	0.16	0.32
Hardness	65	66	92	95	130	130	68	69	93	99	130	150
Iron_D	0.0092	0.014	0.035	0.040	0.078	0.097	0.016	0.023	0.055	0.057	0.095	0.12
Iron_T	0.019	0.022	0.042	0.053	0.11	0.15	0.025	0.030	0.053	0.064	0.12	0.17
Lead_D	0.00000093	0.0000011	0.0000050	0.0000067	0.000016	0.000020	0.0000013	0.0000018	0.0000053	0.0000070	0.000015	0.000017
Lead_T	0.0000015	0.0000020	0.000012	0.000022	0.000056	0.000084	0.0000027	0.0000035	0.000014	0.000022	0.000052	0.000061
Magnesium_D	5.4	5.8	9.0	8.6	10	13	7.0	7.0	7.7	9.4	12	12
Manganese_D	0.035	0.047	0.18	0.22	0.42	0.53	0.044	0.059	0.10	0.24	0.42	0.57
Manganese_T	0.078	0.098	0.22	0.26	0.44	0.55	0.099	0.12	0.20	0.28	0.44	0.58
Mercury_D	0.00000036	0.00000041	0.00000082	0.00000087	0.0000014	0.0000016	0.00000070	0.00000076	0.0000011	0.0000010	0.0000013	0.0000013
Mercury_T	0.00000047	0.00000054	0.00000084	0.0000012	0.0000022	0.0000028	0.00000087	0.00000090	0.0000012	0.0000014	0.0000021	0.0000029
Molybdenum_D	0.000096	0.00012	0.00027	0.00043	0.00095	0.0014	0.000089	0.00029	0.00036	0.00040	0.00059	0.00061
Molybdenum_T	0.00014	0.00016	0.00033	0.00050	0.0010	0.0015	0.00013	0.00039	0.00045	0.00049	0.00065	0.00071
N_Ammonia	0.037	0.065	0.13	0.15	0.22	0.33	0.015	0.019	0.070	0.090	0.17	0.24
N_Nitrate_Nitrite	0.098	0.21	0.71	1.0	2.3	2.7	0.013	0.015	0.019	0.023	0.036	0.072
N_Nitrite	0.00066	0.00098	0.0035	0.011	0.030	0.042	0.00086	0.0012	0.0053	0.0088	0.020	0.022
Nickel_D	0.00012	0.00015	0.00021	0.00027	0.00048	0.00053	0.00016	0.00018	0.00020	0.00020	0.00022	0.00027
Nickel_T	0.00016	0.00026	0.00033	0.00040	0.00070	0.00083	0.00021	0.00021	0.00033	0.00032	0.00038	0.00043
Phosphorus_T	0.0019	0.0027	0.0074	0.0079	0.013	0.018	0.0027	0.0035	0.0081	0.0083	0.013	0.017
Potassium_D	2.0	2.7	5.5	6.7	13	14	3.4	5.3	7.2	7.9	12	14
Proton	0.000000020	0.000000025	0.000000061	0.000000057	0.000000083	0.000000092	0.000014	0.00021	0.00050	0.00057	0.0011	0.0014
Radium_226	0.0023	0.0030	0.0040	0.0040	0.0051	0.0061	0.0018	0.0024	0.0026	0.0028	0.0034	0.0056
Selenium_D	0.000034	0.000069	0.00014	0.00014	0.00019	0.00024	0.000050	0.000055	0.00011	0.00014	0.00025	0.00026
Selenium_T	0.000032	0.000035	0.000059	0.000078	0.00015	0.00020	0.000047	0.000054	0.000066	0.000067	0.000079	0.000088
Silicon_D	1.3	1.8	2.9	2.9	4.3	4.5	1.8	1.9	2.9	3.3	5.2	5.6
Silicon_T	1.4	1.9	3.1	3.1	4.5	4.7	1.9	2.0	2.9	3.4	5.4	5.8
Silver_D	0.00000068	0.00000075	0.0000017	0.0000019	0.0000036	0.0000058	0.0000011	0.0000014	0.0000020	0.0000024	0.0000036	0.0000056
Silver_T	0.00000076	0.00000083	0.0000020	0.0000022	0.0000042	0.0000066	0.0000013	0.0000017	0.0000024	0.0000028	0.0000041	0.0000062
Sodium_D	4.6	5.8	13	15	29	32	6.4	8.7	11	13	20	22
Sodium_T	4.5	5.8	12	15	29	32	6.4	8.7	11	13	19	22
Strontium_D	0.040	0.044	0.078	0.081	0.12	0.14	0.056	0.069	0.094	0.098	0.13	0.15
Strontium_T	0.041	0.046	0.081	0.084	0.12	0.15	0.057	0.071	0.095	0.10	0.14	0.15
Sulfate	16	23	40	44	69	80	15	19	24	26	36	41
Thallium_D	0.000022	0.000025	0.000036	0.000042	0.000071	0.000081	0.000031	0.000040	0.000047	0.000047	0.000054	0.000058
Thallium_T	0.000023	0.000027	0.000038	0.000046	0.000075	0.000084	0.000032	0.000042	0.000051	0.000050	0.000059	0.000063
TSS	0.068	0.10	0.26	0.24	0.32	0.45	0.10	0.15	0.36	0.34	0.46	0.62
Uranium_D	0.000036	0.000073	0.00015	0.00018	0.00034	0.00060	0.000057	0.000059	0.00014	0.00013	0.00018	0.00021
Uranium_T	0.000037	0.000081	0.00015	0.00020	0.00039	0.00071	0.000049	0.000066	0.00014	0.00014	0.00019	0.00022
Vanadium_T	0.000081	0.00011	0.00018	0.00018	0.00026	0.00032	0.00013	0.00015	0.00018	0.00022	0.00030	0.00031
Zinc_D	0.00011	0.00013	0.00022	0.00028	0.00055	0.00074	0.00012	0.00013	0.00023	0.00026	0.00044	0.00058
Zinc_T	0.00018	0.00023	0.00045	0.00047	0.00075	0.00083	0.00020	0.00025	0.00048	0.00048	0.00068	0.00088

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Swede Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.4	3.6	4.1	4.2	5.0	5.4	3.7	3.8	4.4	4.5	5.3	5.5
Alkalinity_T	47	48	62	63	79	85	46	58	61	65	74	75
Aluminum_D	0.0049	0.0055	0.0060	0.0060	0.0064	0.0066	0.0050	0.0057	0.0061	0.0060	0.0063	0.0069
Aluminum_T	0.020	0.022	0.025	0.025	0.027	0.029	0.021	0.022	0.025	0.025	0.027	0.030
Antimony_D	0.000081	0.000084	0.00016	0.00018	0.00030	0.00037	0.000076	0.00012	0.00013	0.00014	0.00016	0.00016
Antimony_T	0.00013	0.00014	0.00023	0.00027	0.00044	0.00052	0.00013	0.00018	0.00020	0.00020	0.00023	0.00023
Arsenic_D	0.00049	0.00053	0.00076	0.00076	0.00099	0.0011	0.00042	0.00048	0.00056	0.00057	0.00065	0.00083
Arsenic_T	0.00052	0.00056	0.00081	0.00081	0.0011	0.0012	0.00044	0.00051	0.00060	0.00061	0.00070	0.00088
Barium_D	0.0096	0.0099	0.013	0.013	0.016	0.018	0.0097	0.012	0.013	0.014	0.016	0.016
Barium_T	0.010	0.011	0.014	0.014	0.017	0.018	0.010	0.013	0.014	0.015	0.017	0.017
Beryllium_T	0.000070	0.000072	0.000088	0.000087	0.00010	0.00011	0.000072	0.000081	0.000084	0.000090	0.00010	0.00010
Boron_D	0.0065	0.0068	0.011	0.012	0.019	0.022	0.0066	0.011	0.012	0.012	0.014	0.015
Boron_T	0.0093	0.0096	0.015	0.016	0.024	0.028	0.0094	0.014	0.016	0.016	0.019	0.019
Bromide	0.038	0.038	0.043	0.043	0.049	0.050	0.038	0.038	0.042	0.043	0.048	0.051
Cadmium_D	0.0000028	0.0000030	0.0000035	0.0000035	0.0000039	0.0000042	0.0000028	0.0000030	0.0000032	0.0000033	0.0000036	0.0000037
Cadmium_T	0.0000036	0.0000037	0.0000042	0.0000042	0.0000048	0.0000049	0.0000037	0.0000038	0.0000040	0.0000043	0.0000049	0.0000050
Calcium_D	16	16	20	21	26	28	16	21	23	24	27	28
Chloride	0.28	0.28	0.32	0.33	0.38	0.38	0.28	0.29	0.33	0.34	0.39	0.44
Chromium_D	0.000051	0.000056	0.000061	0.000060	0.000063	0.000065	0.000055	0.000060	0.000065	0.000064	0.000068	0.000068
Chromium_D_Hex	0.000072	0.000079	0.000087	0.000086	0.000092	0.000096	0.000074	0.000088	0.000096	0.000095	0.000099	0.000100
Chromium_T	0.00012	0.00013	0.00013	0.00013	0.00014	0.00015	0.00013	0.00014	0.00015	0.00015	0.00016	0.00016
Cobalt_D	0.000063	0.000064	0.000071	0.000072	0.000081	0.000084	0.000066	0.000066	0.000069	0.000073	0.000083	0.000085
Cobalt_T	0.000068	0.000069	0.000077	0.000078	0.000088	0.000093	0.000072	0.000072	0.000075	0.000080	0.000091	0.000093
Copper_D	0.00022	0.00023	0.00027	0.00028	0.00033	0.00036	0.00022	0.00023	0.00025	0.00025	0.00028	0.00028
Copper_T	0.00047	0.00051	0.00057	0.00058	0.00066	0.00071	0.00047	0.00049	0.00053	0.00053	0.00058	0.00064
Cyanide_F	0.00044	0.00045	0.00054	0.00053	0.00061	0.00064	0.00046	0.00046	0.00052	0.00054	0.00061	0.00066
Cyanide_T	0.00043	0.00044	0.00050	0.00050	0.00057	0.00060	0.00046	0.00046	0.00048	0.00052	0.00058	0.00060
Cyanide_WAD	0.00036	0.00036	0.00042	0.00042	0.00048	0.00050	0.00038	0.00038	0.00041	0.00043	0.00048	0.00051
Fluoride	0.062	0.063	0.071	0.073	0.084	0.086	0.066	0.067	0.081	0.085	0.11	0.15
Hardness	56	57	64	65	75	78	59	60	69	69	78	85
Iron_D	0.035	0.038	0.042	0.042	0.047	0.051	0.042	0.044	0.049	0.048	0.051	0.053
Iron_T	0.066	0.073	0.080	0.080	0.086	0.092	0.072	0.078	0.085	0.083	0.087	0.094
Lead_D	0.000022	0.000022	0.000025	0.000025	0.000027	0.000028	0.000022	0.000022	0.000024	0.000025	0.000027	0.000029
Lead_T	0.000046	0.000047	0.000056	0.000055	0.000060	0.000064	0.000046	0.000048	0.000053	0.000054	0.000060	0.000061
Magnesium_D	4.6	4.8	5.9	5.8	6.9	7.3	4.9	5.6	5.9	6.3	7.2	7.3
Manganese_D	0.060	0.064	0.085	0.086	0.11	0.13	0.070	0.074	0.096	0.096	0.12	0.14
Manganese_T	0.094	0.10	0.12	0.12	0.15	0.17	0.10	0.11	0.13	0.13	0.16	0.17
Mercury_D	0.00000079	0.00000083	0.00000096	0.00000094	0.0000011	0.0000011	0.00000085	0.00000089	0.00000094	0.00000100	0.0000011	0.0000011
Mercury_T	0.0000011	0.0000011	0.0000012	0.0000012	0.0000013	0.0000014	0.0000011	0.0000012	0.0000013	0.0000013	0.0000014	0.0000014
Molybdenum_D	0.00061	0.00066	0.00076	0.00079	0.00093	0.0010	0.00065	0.00074	0.00082	0.00081	0.00086	0.00086
Molybdenum_T	0.00066	0.00072	0.00083	0.00085	0.0010	0.0011	0.00070	0.00081	0.00090	0.00088	0.00094	0.00094
N_Ammonia	0.040	0.046	0.070	0.069	0.092	0.096	0.031	0.032	0.043	0.043	0.053	0.059
N_Nitrate_Nitrite	0.097	0.15	0.68	0.61	0.96	1.0	0.038	0.040	0.046	0.047	0.055	0.067
N_Nitrite	0.0069	0.0077	0.011	0.011	0.015	0.015	0.0071	0.0080	0.0095	0.010	0.012	0.012
Nickel_D	0.00016	0.00017	0.00023	0.00023	0.00031	0.00034	0.00017	0.00018	0.00019	0.00020	0.00023	0.00023
Nickel_T	0.00021	0.00021	0.00029	0.00030	0.00040	0.00044	0.00021	0.00023	0.00025	0.00026	0.00030	0.00031
Phosphorus_T	0.012	0.012	0.014	0.014	0.015	0.016	0.012	0.012	0.014	0.014	0.015	0.017
Potassium_D	1.7	1.7	3.2	3.5	5.7	6.7	1.6	3.5	4.2	4.2	5.0	5.2
Proton	0.000000045	0.000000047	0.000000054	0.000000054	0.000000060	.000000064	0.0000064	0.00018	0.00026	0.00025	0.00029	0.00032
Radium_226	0.0040	0.0040	0.0045	0.0046	0.0052	0.0053	0.0036	0.0037	0.0043	0.0041	0.0046	0.0051
Selenium_D	0.000053	0.000058	0.000073	0.000079	0.00010	0.00012	0.000058	0.000071	0.000079	0.000080	0.000092	0.000095
Selenium_T	0.000040	0.000042	0.000058	0.000062	0.000085	0.000098	0.000042	0.000051	0.000052	0.000057	0.000064	0.000065
Silicon_D	1.4	1.4	1.8	1.8	2.1	2.3	1.4	1.8	1.9	2.0	2.3	2.4
Silicon_T	1.4	1.5	1.9	1.8	2.2	2.4	1.4	1.8	2.0	2.1	2.4	2.5
Silver_D	0.0000042	0.0000045	0.0000049	0.0000049	0.0000051	0.0000053	0.0000043	0.0000047	0.0000051	0.0000050	0.0000053	0.0000055
Silver_T	0.0000043	0.0000047	0.0000051	0.0000050	0.0000053	0.0000055	0.0000045	0.0000049	0.0000053	0.0000052	0.0000055	0.0000057
Sodium_D	3.4	3.5	6.8	7.6	13	15	3.2	6.1	6.9	7.1	8.3	8.6
Sodium_T	3.4	3.4	6.8	7.5	13	15	3.2	6.1	6.9	7.0	8.3	8.6
Strontium_D	0.034	0.034	0.048	0.051	0.069	0.076	0.034	0.054	0.059	0.061	0.071	0.073
Strontium_T	0.035	0.035	0.050	0.052	0.071	0.078	0.035	0.056	0.061	0.063	0.073	0.075
Sulfate	13	14	21	22	32	36	12	12	14	14	17	18
Thallium_D	0.000034	0.000035	0.000043	0.000043	0.000052	0.000056	0.000035	0.000041	0.000042	0.000045	0.000051	0.000051
Thallium_T	0.000035	0.000036	0.000045	0.000045	0.000055	0.000058	0.000036	0.000042	0.000043	0.000047	0.000053	0.000053
TSS	0.87	0.90	1.0	1.0	1.1	1.2	0.93	0.95	1.0	1.0	1.2	1.3
Uranium_D	0.000046	0.000049	0.000092	0.00010	0.00017	0.00020	0.000048	0.000083	0.000091	0.000092	0.00011	0.00011
Uranium_T	0.000047	0.000051	0.00010	0.00011	0.00020	0.00023	0.000048	0.000088	0.000096	0.000097	0.00011	0.00012
Vanadium_T	0.00017	0.00017	0.00020	0.00020	0.00023	0.00025	0.00018	0.00019	0.00022	0.00021	0.00023	0.00024
Zinc_D	0.00071	0.00073	0.00080	0.00079	0.00083	0.00088	0.00070	0.00072	0.00078	0.00077	0.00081	0.00090
Zinc_T	0.0044	0.0045	0.0048	0.0051	0.0063	0.0074	0.0044	0.0045	0.0047	0.0050	0.0061	0.0076

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Ellystan Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	3.9	4.1	5.9	5.6	6.9	7.0	4.1	4.3	5.4	5.7	6.9	7.0
Alkalinity_T	35	37	46	46	57	61	35	43	45	49	56	57
Aluminum_D	0.018	0.020	0.031	0.035	0.053	0.061	0.019	0.021	0.032	0.035	0.052	0.062
Aluminum_T	0.032	0.034	0.044	0.050	0.071	0.080	0.033	0.034	0.045	0.049	0.070	0.080
Antimony_D	0.000050	0.000053	0.000075	0.000084	0.00013	0.00015	0.000048	0.000068	0.000072	0.000075	0.000083	0.000084
Antimony_T	0.000067	0.000072	0.00010	0.00012	0.00018	0.00021	0.000064	0.000093	0.000099	0.00010	0.00011	0.00011
Arsenic_D	0.00033	0.00036	0.00046	0.00046	0.00058	0.00061	0.00028	0.00035	0.00039	0.00039	0.00042	0.00051
Arsenic_T	0.00038	0.00040	0.00053	0.00053	0.00067	0.00072	0.00033	0.00041	0.00047	0.00046	0.00050	0.00060
Barium_D	0.0087	0.0088	0.011	0.011	0.013	0.014	0.0086	0.010	0.011	0.012	0.013	0.013
Barium_T	0.0097	0.010	0.013	0.013	0.016	0.016	0.0097	0.012	0.012	0.013	0.015	0.015
Beryllium_T	0.000070	0.000072	0.000082	0.000081	0.000091	0.000095	0.000070	0.000076	0.000079	0.000084	0.000092	0.000092
Boron_D	0.0060	0.0065	0.0087	0.0093	0.013	0.015	0.0061	0.0088	0.0097	0.010	0.012	0.012
Boron_T	0.010	0.011	0.018	0.018	0.025	0.028	0.010	0.013	0.018	0.019	0.023	0.024
Bromide	0.038	0.039	0.042	0.042	0.046	0.047	0.038	0.038	0.041	0.042	0.046	0.047
Cadmium_D	0.0000031	0.0000032	0.0000036	0.0000036	0.0000040	0.0000041	0.0000031	0.0000032	0.0000034	0.0000035	0.0000038	0.0000039
Cadmium_T	0.0000041	0.0000041	0.0000046	0.0000046	0.0000051	0.0000051	0.0000042	0.0000042	0.0000044	0.0000047	0.0000051	0.0000052
Calcium_D	11	12	14	14	17	19	11	15	15	16	19	19
Chloride	0.31	0.32	0.43	0.41	0.49	0.50	0.32	0.32	0.41	0.42	0.51	0.53
Chromium_D	0.000050	0.000051	0.000058	0.000057	0.000062	0.000064	0.000052	0.000053	0.000060	0.000059	0.000064	0.000065
Chromium_D_Hex	0.000053	0.000055	0.000068	0.000066	0.000076	0.000077	0.000053	0.000059	0.000067	0.000071	0.000082	0.000082
Chromium_T	0.00014	0.00015	0.00015	0.00017	0.00021	0.00023	0.00015	0.00015	0.00016	0.00018	0.00021	0.00023
Cobalt_D	0.000065	0.000067	0.000073	0.000074	0.000080	0.000083	0.000067	0.000069	0.000071	0.000075	0.000081	0.000082
Cobalt_T	0.000077	0.000078	0.000088	0.000088	0.000098	0.00010	0.000079	0.000080	0.000083	0.000089	0.000099	0.000100
Copper_D	0.00017	0.00018	0.00020	0.00020	0.00023	0.00024	0.00017	0.00018	0.00019	0.00019	0.00021	0.00021
Copper_T	0.00030	0.00031	0.00034	0.00034	0.00038	0.00040	0.00030	0.00031	0.00034	0.00033	0.00035	0.00035
Cyanide_F	0.00049	0.00050	0.00058	0.00058	0.00065	0.00066	0.00050	0.00051	0.00056	0.00058	0.00064	0.00067
Cyanide_T	0.00096	0.0010	0.0021	0.0020	0.0028	0.0032	0.00098	0.0011	0.0019	0.0020	0.0028	0.0032
Cyanide_WAD	0.00043	0.00044	0.00052	0.00051	0.00057	0.00058	0.00044	0.00045	0.00050	0.00051	0.00057	0.00059
Fluoride	0.057	0.058	0.064	0.065	0.073	0.075	0.057	0.061	0.072	0.073	0.089	0.11
Hardness	41	41	46	47	53	55	41	43	48	49	55	59
Iron_D	0.054	0.058	0.085	0.081	0.099	0.10	0.058	0.062	0.078	0.084	0.10	0.10
Iron_T	0.13	0.13	0.17	0.17	0.19	0.20	0.13	0.14	0.18	0.17	0.18	0.20
Lead_D	0.000015	0.000016	0.000017	0.000017	0.000019	0.000019	0.000015	0.000016	0.000017	0.000017	0.000019	0.000019
Lead_T	0.000038	0.000041	0.000042	0.000044	0.000052	0.000053	0.000038	0.000041	0.000042	0.000044	0.000052	0.000053
Magnesium_D	3.3	3.3	4.0	4.0	4.7	5.0	3.3	3.8	4.0	4.3	5.0	5.0
Manganese_D	0.060	0.064	0.10	0.096	0.12	0.13	0.066	0.070	0.098	0.10	0.13	0.14
Manganese_T	0.095	0.10	0.16	0.15	0.19	0.20	0.10	0.11	0.14	0.15	0.19	0.21
Mercury_D	0.00000065	0.00000072	0.00000076	0.00000076	0.00000083	0.00000085	0.00000067	0.00000075	0.00000077	0.00000078	0.00000085	0.00000087
Mercury_T	0.00000085	0.00000090	0.00000095	0.00000097	0.0000011	0.0000011	0.00000088	0.00000093	0.00000097	0.00000099	0.0000011	0.0000011
Molybdenum_D	0.00032	0.00033	0.00039	0.00039	0.00046	0.00049	0.00032	0.00037	0.00039	0.00041	0.00045	0.00045
Molybdenum_T	0.00034	0.00036	0.00042	0.00042	0.00050	0.00054	0.00035	0.00040	0.00043	0.00044	0.00048	0.00048
N_Ammonia	0.019	0.021	0.045	0.042	0.062	0.064	0.018	0.018	0.034	0.033	0.045	0.046
N_Nitrate_Nitrite	0.099	0.11	0.43	0.39	0.65	0.68	0.054	0.057	0.092	0.089	0.11	0.12
N_Nitrite	0.0042	0.0046	0.0061	0.0061	0.0081	0.0083	0.0042	0.0048	0.0057	0.0059	0.0072	0.0072
Nickel_D	0.00016	0.00017	0.00020	0.00020	0.00024	0.00027	0.00016	0.00018	0.00018	0.00019	0.00021	0.00022
Nickel_T	0.00025	0.00027	0.00039	0.00038	0.00049	0.00055	0.00025	0.00027	0.00033	0.00037	0.00045	0.00048
Phosphorus_T	0.0093	0.0098	0.013	0.013	0.017	0.018	0.0093	0.0096	0.013	0.013	0.017	0.018
Potassium_D	1.1	1.2	1.7	1.9	3.0	3.5	1.1	2.2	2.5	2.6	3.0	3.1
Proton	0.000000047	0.000000049	0.000000057	0.000000058	0.000000068	0.000000070	0.0000036	0.00011	0.00016	0.00015	0.00019	0.00019
Radium_226	0.0027	0.0028	0.0031	0.0031	0.0034	0.0034	0.0026	0.0026	0.0029	0.0029	0.0032	0.0034
Selenium_D	0.000085	0.000097	0.00016	0.00015	0.00021	0.00024	0.000087	0.00010	0.00014	0.00015	0.00020	0.00022
Selenium_T	0.000076	0.000087	0.00015	0.00014	0.00020	0.00022	0.000077	0.000088	0.00012	0.00014	0.00018	0.00020
Silicon_D	0.90	0.94	1.1	1.1	1.3	1.4	0.88	1.1	1.3	1.3	1.4	1.5
Silicon_T	1.0	1.1	1.3	1.3	1.5	1.6	1.0	1.3	1.4	1.4	1.6	1.6
Silver_D	0.0000071	0.0000075	0.000011	0.000011	0.000014	0.000015	0.0000072	0.0000077	0.0000100	0.000011	0.000014	0.000016
Silver_T	0.0000072	0.0000076	0.000011	0.000011	0.000014	0.000016	0.0000073	0.0000078	0.000010	0.000011	0.000014	0.000016
Sodium_D	2.2	2.3	3.6	4.1	6.5	7.8	2.1	3.8	4.2	4.4	5.1	5.2
Sodium_T	2.3	2.4	3.7	4.2	6.8	8.1	2.2	3.9	4.4	4.5	5.3	5.4
Strontium_D	0.023	0.024	0.031	0.032	0.042	0.046	0.023	0.035	0.037	0.039	0.045	0.046
Strontium_T	0.026	0.027	0.034	0.035	0.046	0.050	0.026	0.038	0.041	0.043	0.050	0.051
Sulfate	6.6	6.7	8.8	9.7	14	16	6.3	6.3	7.1	7.1	8.0	8.7
Thallium_D	0.000034	0.000035	0.000040	0.000039	0.000045	0.000047	0.000034	0.000037	0.000039	0.000041	0.000045	0.000045
Thallium_T	0.000034	0.000036	0.000041	0.000040	0.000046	0.000048	0.000034	0.000038	0.000040	0.000042	0.000046	0.000046
TSS	3.0	3.3	6.3	6.0	8.4	9.5	3.0	3.3	5.6	6.0	8.3	9.6
Uranium_D	0.000036	0.000041	0.000057	0.000065	0.00010	0.00012	0.000038	0.000061	0.000065	0.000066	0.000072	0.000074
Uranium_T	0.000038	0.000043	0.000061	0.000071	0.00011	0.00013	0.000038	0.000064	0.000069	0.000070	0.000076	0.000079
Vanadium_T	0.00023	0.00025	0.00036	0.00035	0.00045	0.00050	0.00024	0.00026	0.00032	0.00036	0.00045	0.00049
Zinc_D	0.00022	0.00024	0.00035	0.00036	0.00049	0.00050	0.00022	0.00023	0.00032	0.00035	0.00048	0.00051
Zinc_T	0.00088	0.00094	0.0013	0.0013	0.0018	0.0018	0.00088	0.00094	0.0013	0.0013	0.0017	0.0018

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Simpson Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	2.6	2.7	3.3	3.4	4.1	4.6	2.6	2.7	2.8	3.4	4.1	4.6
Alkalinity_T	31	31	38	38	45	51	31	32	32	40	47	53
Aluminum_D	0.0070	0.0076	0.0090	0.0091	0.011	0.011	0.0071	0.0077	0.0082	0.0091	0.011	0.011
Aluminum_T	0.031	0.033	0.040	0.040	0.049	0.051	0.031	0.033	0.035	0.040	0.049	0.051
Antimony_D	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000097	0.00010	0.00010	0.00012	0.00015	0.00016
Antimony_T	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000097	0.00010	0.00010	0.00012	0.00015	0.00016
Arsenic_D	0.00026	0.00026	0.00033	0.00033	0.00039	0.00044	0.00030	0.00030	0.00031	0.00038	0.00045	0.00050
Arsenic_T	0.00027	0.00027	0.00034	0.00035	0.00041	0.00046	0.00031	0.00031	0.00032	0.00039	0.00046	0.00052
Barium_D	0.0064	0.0064	0.0079	0.0080	0.0093	0.011	0.0066	0.0067	0.0067	0.0083	0.0098	0.011
Barium_T	0.0068	0.0069	0.0085	0.0086	0.010	0.011	0.0071	0.0072	0.0073	0.0089	0.010	0.012
Beryllium_T	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000090	0.000092	0.000094	0.00011	0.00013	0.00015
Boron_D	0.0050	0.0050	0.0061	0.0062	0.0073	0.0083	0.0055	0.0056	0.0058	0.0070	0.0084	0.0094
Boron_T	0.0096	0.0098	0.013	0.013	0.017	0.019	0.010	0.010	0.012	0.014	0.018	0.020
Bromide	0.044	0.045	0.055	0.056	0.066	0.073	0.044	0.045	0.046	0.056	0.066	0.073
Cadmium_D	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000046	0.0000047	0.0000057	0.0000067	0.0000075
Cadmium_T	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000046	0.0000047	0.0000057	0.0000067	0.0000075
Calcium_D	7.7	7.7	9.5	9.6	11	13	8.2	8.5	8.5	10	12	14
Chloride	0.33	0.33	0.42	0.43	0.52	0.58	0.33	0.33	0.35	0.43	0.52	0.58
Chromium_D	0.000055	0.000056	0.000072	0.000072	0.000086	0.000094	0.000056	0.000058	0.000063	0.000074	0.000088	0.000096
Chromium_D_Hex	0.000055	0.000056	0.000072	0.000072	0.000086	0.000094	0.000056	0.000058	0.000063	0.000074	0.000088	0.000096
Chromium_T	0.000077	0.000077	0.000098	0.000098	0.00012	0.00013	0.000078	0.000078	0.000086	0.00010	0.00012	0.00013
Cobalt_D	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000090	0.000092	0.000094	0.00011	0.00013	0.00015
Cobalt_T	0.000089	0.000090	0.00011	0.00011	0.00013	0.00015	0.000090	0.000092	0.000094	0.00011	0.00013	0.00015
Copper_D	0.00038	0.00038	0.00048	0.00048	0.00057	0.00064	0.00040	0.00041	0.00042	0.00051	0.00060	0.00067
Copper_T	0.00041	0.00041	0.00052	0.00052	0.00061	0.00069	0.00042	0.00043	0.00045	0.00054	0.00064	0.00072
Cyanide_F	0.00068	0.00069	0.00091	0.00090	0.0011	0.0012	0.00068	0.00069	0.00078	0.00090	0.0011	0.0012
Cyanide_T	0.00055	0.00056	0.00070	0.00071	0.00084	0.00095	0.00055	0.00056	0.00057	0.00071	0.00084	0.00094
Cyanide_WAD	0.00050	0.00050	0.00063	0.00064	0.00077	0.00084	0.00050	0.00050	0.00053	0.00064	0.00077	0.00084
Fluoride	0.070	0.070	0.086	0.087	0.10	0.12	0.070	0.070	0.072	0.088	0.10	0.12
Hardness	30	30	37	38	44	50	30	30	31	38	44	50
Iron_D	0.021	0.022	0.026	0.027	0.032	0.034	0.021	0.022	0.023	0.027	0.032	0.034
Iron_T	0.075	0.078	0.097	0.097	0.12	0.13	0.075	0.078	0.085	0.098	0.12	0.13
Lead_D	0.000040	0.000040	0.000050	0.000050	0.000059	0.000066	0.000041	0.000041	0.000042	0.000051	0.000061	0.000067
Lead_T	0.00011	0.00012	0.00014	0.00014	0.00017	0.00018	0.00011	0.00012	0.00013	0.00015	0.00017	0.00018
Magnesium_D	2.7	2.7	3.4	3.4	4.0	4.5	2.8	2.8	2.9	3.5	4.1	4.7
Manganese_D	0.0024	0.0025	0.0030	0.0030	0.0034	0.0036	0.0024	0.0025	0.0028	0.0030	0.0035	0.0037
Manganese_T	0.018	0.018	0.023	0.024	0.029	0.030	0.018	0.018	0.021	0.024	0.029	0.030
Mercury_D	0.00000062	0.00000065	0.00000078	0.00000078	0.00000092	0.0000010	0.00000063	0.00000066	0.00000068	0.00000080	0.00000094	0.0000010
Mercury_T	0.00000063	0.00000066	0.00000078	0.00000079	0.00000093	0.0000010	0.00000063	0.00000067	0.00000068	0.00000080	0.00000094	0.0000010
Molybdenum_D	0.00083	0.00083	0.0010	0.0011	0.0012	0.0014	0.00088	0.00090	0.00093	0.0011	0.0013	0.0015
Molybdenum_T	0.00087	0.00088	0.0011	0.0011	0.0013	0.0015	0.00092	0.00094	0.00097	0.0012	0.0014	0.0016
N_Ammonia	0.0072	0.0072	0.0089	0.0091	0.011	0.012	0.0072	0.0072	0.0074	0.0091	0.011	0.012
N_Nitrate_Nitrite	0.034	0.035	0.044	0.046	0.056	0.063	0.034	0.035	0.038	0.046	0.056	0.063
N_Nitrite	0.0077	0.0080	0.010	0.011	0.013	0.015	0.0086	0.0092	0.010	0.012	0.015	0.017
Nickel_D	0.00018	0.00018	0.00022	0.00022	0.00026	0.00029	0.00019	0.00019	0.00019	0.00024	0.00028	0.00031
Nickel_T	0.00018	0.00018	0.00022	0.00022	0.00026	0.00029	0.00019	0.00019	0.00019	0.00024	0.00028	0.00031
Phosphorus_T	0.015	0.016	0.019	0.020	0.023	0.026	0.015	0.016	0.016	0.020	0.023	0.026
Potassium_D	0.73	0.73	0.90	0.91	1.1	1.2	0.92	0.99	1.0	1.2	1.5	1.6
Proton	0.000000035	0.000000036	0.000000045	0.00000047	0.000000056	0.000000063	0.000025	0.000035	0.000041	0.000045	0.000059	0.000059
Radium_226	0.0047	0.0047	0.0058	0.0059	0.0070	0.0077	0.0047	0.0047	0.0049	0.0059	0.0070	0.0077
Selenium_D	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000049	0.000051	0.000051	0.000062	0.000073	0.000082
Selenium_T	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000049	0.000051	0.000051	0.000062	0.000073	0.000082
Silicon_D	0.69	0.70	0.86	0.87	1.0	1.1	0.72	0.73	0.74	0.90	1.1	1.2
Silicon_T	0.75	0.76	0.93	0.94	1.1	1.2	0.77	0.79	0.80	0.97	1.1	1.3
Silver_D	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000046	0.0000047	0.0000057	0.0000067	0.0000075
Silver_T	0.0000044	0.0000045	0.0000055	0.0000056	0.0000066	0.0000073	0.0000045	0.0000046	0.0000047	0.0000057	0.0000067	0.0000075
Sodium_D	1.5	1.5	1.9	1.9	2.2	2.5	1.8	1.9	1.9	2.4	2.8	3.1
Sodium_T	1.5	1.5	1.9	1.9	2.2	2.5	1.8	1.9	1.9	2.4	2.8	3.1
Strontium_D	0.022	0.022	0.028	0.028	0.033	0.037	0.024	0.025	0.025	0.031	0.037	0.041
Strontium_T	0.022	0.022	0.028	0.028	0.033	0.037	0.024	0.025	0.025	0.031	0.037	0.041
Sulfate	0.61	0.61	0.75	0.76	0.89	1.0	0.61	0.61	0.62	0.76	0.89	1.0
Thallium_D	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000045	0.000046	0.000047	0.000057	0.000067	0.000075
Thallium_T	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000045	0.000046	0.000047	0.000057	0.000067	0.000075
TSS	2.0	2.0	2.5	2.5	3.1	3.3	2.0	2.0	2.2	2.5	3.1	3.3
Uranium_D	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000079	0.000092	0.000098	0.00011	0.00014	0.00015
Uranium_T	0.000044	0.000045	0.000055	0.000056	0.000066	0.000073	0.000079	0.000092	0.000098	0.00011	0.00014	0.00015
Vanadium_T	0.00011	0.00011	0.00014	0.00014	0.00018	0.00019	0.00011	0.00012	0.00012	0.00015	0.00018	0.00020
Zinc_D	0.00053	0.00053	0.00066	0.00067	0.00080	0.00090	0.00054	0.00055	0.00056	0.00069	0.00082	0.00092
Zinc_T	0.00073	0.00073	0.00092	0.00094	0.0011	0.0013	0.00074	0.00074	0.00077	0.00095	0.0011	0.0013

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Susan Lake

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	5.5	5.5	6.2	6.2	6.7	7.0	5.5	5.5	5.8	6.2	6.7	7.0
Alkalinity_T	46	46	51	51	56	58	48	48	49	52	57	59
Aluminum_D	0.022	0.023	0.024	0.024	0.026	0.026	0.022	0.023	0.023	0.024	0.026	0.026
Aluminum_T	0.035	0.037	0.039	0.039	0.042	0.042	0.035	0.037	0.038	0.039	0.042	0.042
Antimony_D	0.000096	0.000097	0.00011	0.00012	0.00013	0.00014	0.00011	0.00011	0.00012	0.00012	0.00014	0.00014
Antimony_T	0.000096	0.000097	0.00011	0.00012	0.00013	0.00014	0.00011	0.00011	0.00012	0.00012	0.00014	0.00014
Arsenic_D	0.00026	0.00026	0.00030	0.00030	0.00034	0.00035	0.00033	0.00033	0.00033	0.00035	0.00038	0.00040
Arsenic_T	0.00031	0.00031	0.00035	0.00035	0.00039	0.00041	0.00038	0.00038	0.00038	0.00041	0.00044	0.00045
Barium_D	0.0083	0.0083	0.0092	0.0092	0.010	0.010	0.0086	0.0088	0.0089	0.0096	0.010	0.011
Barium_T	0.0085	0.0086	0.0095	0.0094	0.010	0.011	0.0089	0.0091	0.0092	0.0098	0.011	0.011
Beryllium_T	0.000096	0.000096	0.00011	0.00011	0.00011	0.00012	0.000098	0.000099	0.000100	0.00011	0.00012	0.00012
Boron_D	0.0048	0.0049	0.0056	0.0057	0.0066	0.0070	0.0056	0.0059	0.0060	0.0064	0.0070	0.0072
Boron_T	0.023	0.025	0.030	0.029	0.032	0.033	0.024	0.026	0.030	0.030	0.033	0.033
Bromide	0.048	0.048	0.052	0.052	0.056	0.058	0.048	0.048	0.048	0.052	0.056	0.058
Cadmium_D	0.0000048	0.0000048	0.0000053	0.0000053	0.0000058	0.0000060	0.0000049	0.0000050	0.0000050	0.0000054	0.0000058	0.0000060
Cadmium_T	0.0000071	0.0000073	0.0000084	0.0000082	0.0000091	0.0000092	0.0000072	0.0000075	0.0000082	0.0000084	0.0000092	0.0000093
Calcium_D	14	14	15	15	17	17	14	15	15	16	17	18
Chloride	0.24	0.24	0.26	0.26	0.28	0.29	0.24	0.24	0.24	0.26	0.28	0.29
Chromium_D	0.00015	0.00015	0.00018	0.00017	0.00019	0.00019	0.00015	0.00016	0.00017	0.00018	0.00019	0.00020
Chromium_D_Hex	0.00015	0.00015	0.00018	0.00017	0.00019	0.00019	0.00015	0.00016	0.00017	0.00018	0.00019	0.00020
Chromium_T	0.00024	0.00024	0.00027	0.00027	0.00029	0.00029	0.00024	0.00024	0.00026	0.00027	0.00029	0.00029
Cobalt_D	0.000096	0.000096	0.00011	0.00011	0.00011	0.00012	0.000098	0.000099	0.000100	0.00011	0.00012	0.00012
Cobalt_T	0.000096	0.000096	0.00011	0.00011	0.00011	0.00012	0.000098	0.000099	0.000100	0.00011	0.00012	0.00012
Copper_D	0.00049	0.00049	0.00054	0.00054	0.00060	0.00062	0.00051	0.00053	0.00053	0.00057	0.00061	0.00063
Copper_T	0.00062	0.00064	0.00070	0.00070	0.00078	0.00080	0.00065	0.00067	0.00068	0.00073	0.00079	0.00082
Cyanide_F	0.0012	0.0012	0.0014	0.0014	0.0016	0.0016	0.0012	0.0012	0.0014	0.0014	0.0016	0.0016
Cyanide_T	0.0012	0.0012	0.0014	0.0014	0.0016	0.0016	0.0012	0.0012	0.0013	0.0014	0.0016	0.0016
Cyanide_WAD	0.0012	0.0012	0.0014	0.0014	0.0016	0.0016	0.0012	0.0012	0.0014	0.0014	0.0016	0.0016
Fluoride	0.081	0.082	0.089	0.089	0.096	0.100	0.082	0.082	0.082	0.089	0.096	0.10
Hardness	48	48	52	53	57	59	48	48	49	53	57	59
Iron_D	0.20	0.21	0.22	0.22	0.23	0.24	0.20	0.21	0.22	0.22	0.23	0.24
Iron_T	0.28	0.29	0.31	0.31	0.33	0.33	0.28	0.29	0.31	0.31	0.33	0.33
Lead_D	0.000043	0.000043	0.000047	0.000047	0.000052	0.000054	0.000044	0.000045	0.000045	0.000049	0.000052	0.000054
Lead_T	0.00038	0.00040	0.00042	0.00042	0.00044	0.00045	0.00038	0.00040	0.00043	0.00042	0.00044	0.00045
Magnesium_D	3.5	3.5	3.9	3.9	4.3	4.4	3.6	3.7	3.7	4.0	4.4	4.5
Manganese_D	0.049	0.050	0.055	0.054	0.056	0.058	0.049	0.050	0.055	0.054	0.056	0.058
Manganese_T	0.082	0.084	0.091	0.090	0.095	0.095	0.082	0.084	0.091	0.090	0.095	0.095
Mercury_D	0.0000015	0.0000015	0.0000017	0.0000017	0.0000018	0.0000018	0.0000015	0.0000016	0.0000016	0.0000017	0.0000018	0.0000018
Mercury_T	0.0000018	0.0000019	0.0000020	0.0000020	0.0000021	0.0000022	0.0000018	0.0000019	0.0000019	0.0000020	0.0000021	0.0000022
Molybdenum_D	0.0013	0.0013	0.0015	0.0015	0.0017	0.0017	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018
Molybdenum_T	0.0013	0.0013	0.0015	0.0015	0.0017	0.0017	0.0014	0.0014	0.0015	0.0016	0.0017	0.0018
N_Ammonia	0.020	0.021	0.025	0.025	0.029	0.031	0.020	0.020	0.022	0.023	0.025	0.026
N_Nitrate_Nitrite	0.074	0.078	0.13	0.13	0.18	0.20	0.068	0.069	0.075	0.078	0.088	0.091
N_Nitrite	0.024	0.025	0.027	0.027	0.030	0.030	0.026	0.027	0.027	0.029	0.032	0.032
Nickel_D	0.00027	0.00027	0.00030	0.00030	0.00033	0.00035	0.00028	0.00029	0.00030	0.00031	0.00034	0.00035
Nickel_T	0.00039	0.00040	0.00046	0.00046	0.00050	0.00052	0.00040	0.00041	0.00045	0.00047	0.00052	0.00052
Phosphorus_T	0.026	0.026	0.028	0.028	0.031	0.032	0.026	0.026	0.027	0.028	0.031	0.032
Potassium_D	0.92	0.92	1.1	1.1	1.3	1.5	1.2	1.4	1.4	1.5	1.7	1.7
Proton	0.000000028	0.000000029	0.000000033	0.000000034	0.000000038	0.000000039	0.000043	0.000060	0.000068	0.000067	0.000076	0.000080
Radium_226	0.010	0.010	0.012	0.012	0.013	0.014	0.010	0.010	0.011	0.012	0.013	0.014
Selenium_D	0.000055	0.000056	0.000065	0.000065	0.000074	0.000079	0.000062	0.000064	0.000066	0.000070	0.000077	0.000079
Selenium_T	0.000056	0.000056	0.000066	0.000065	0.000075	0.000079	0.000062	0.000065	0.000067	0.000071	0.000078	0.000080
Silicon_D	2.0	2.0	2.2	2.2	2.4	2.5	2.0	2.0	2.1	2.2	2.4	2.5
Silicon_T	2.1	2.1	2.3	2.3	2.4	2.5	2.1	2.1	2.1	2.3	2.5	2.6
Silver_D	0.000010	0.000011	0.000013	0.000012	0.000014	0.000014	0.000011	0.000011	0.000013	0.000013	0.000014	0.000014
Silver_T	0.000010	0.000011	0.000013	0.000012	0.000014	0.000014	0.000011	0.000011	0.000013	0.000013	0.000014	0.000014
Sodium_D	1.8	1.8	2.2	2.2	2.7	3.0	2.2	2.4	2.5	2.6	2.9	2.9
Sodium_T	1.8	1.8	2.2	2.2	2.7	3.0	2.2	2.4	2.5	2.6	2.9	2.9
Strontium_D	0.027	0.027	0.031	0.031	0.035	0.036	0.031	0.032	0.033	0.035	0.038	0.039
Strontium_T	0.027	0.027	0.031	0.031	0.035	0.036	0.031	0.032	0.033	0.035	0.038	0.039
Sulfate	0.99	1.0	1.6	1.9	3.3	3.8	0.97	0.97	0.99	1.1	1.1	1.2
Thallium_D	0.000048	0.000048	0.000053	0.000053	0.000058	0.000060	0.000049	0.000050	0.000050	0.000054	0.000058	0.000060
Thallium_T	0.000048	0.000048	0.000053	0.000053	0.000058	0.000060	0.000049	0.000050	0.000050	0.000054	0.000058	0.000060
TSS	2.7	2.8	3.0	3.0	3.2	3.3	2.7	2.8	2.9	3.0	3.3	3.3
Uranium_D	0.000078	0.000081	0.00011	0.00012	0.00018	0.00020	0.00014	0.00016	0.00017	0.00017	0.00020	0.00020
Uranium_T	0.000093	0.000097	0.00012	0.00014	0.00019	0.00022	0.00015	0.00018	0.00018	0.00019	0.00021	0.00021
Vanadium_T	0.00023	0.00023	0.00025	0.00025	0.00028	0.00028	0.00023	0.00023	0.00024	0.00025	0.00027	0.00028
Zinc_D	0.0014	0.0014	0.0015	0.0015	0.0016	0.0017	0.0014	0.0014	0.0014	0.0015	0.0016	0.0017
Zinc_T	0.0016	0.0017	0.0019	0.0018	0.0020	0.0021	0.0017	0.0017	0.0017	0.0019	0.0020	0.0021

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Hughes River - Upstream of Dewatering Effluent Discharge from Legacy Pits (Hughes_Us_CT)

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.50	1.0	1.0	1.3	2.2	2.2	0.50	1.0	1.0	1.3	2.2	2.2
Alkalinity_T	6.2	9.0	12	11	12	12	6.2	9.0	12	11	12	12
Aluminum_D	0.0025	0.0068	0.014	0.014	0.018	0.033	0.0025	0.0068	0.014	0.014	0.018	0.033
Aluminum_T	0.012	0.017	0.024	0.042	0.091	0.17	0.012	0.017	0.025	0.042	0.091	0.17
Antimony_D	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Antimony_T	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Arsenic_D	0.000065	0.00011	0.00016	0.00036	0.00021	0.0027	0.000065	0.00011	0.00015	0.00036	0.00021	0.0027
Arsenic_T	0.000050	0.000075	0.00016	0.00042	0.00018	0.0035	0.000050	0.000075	0.00015	0.00042	0.00018	0.0035
Barium_D	0.0026	0.0038	0.0048	0.0065	0.0052	0.030	0.0026	0.0038	0.0048	0.0065	0.0052	0.030
Barium_T	0.0030	0.0042	0.0050	0.0072	0.0073	0.031	0.0030	0.0042	0.0049	0.0072	0.0073	0.031
Beryllium_T	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011
Boron_D	0.0050	0.0050	0.0050	0.0093	0.0050	0.057	0.0050	0.0050	0.0050	0.0093	0.0050	0.057
Boron_T	0.0050	0.0050	0.0050	0.0090	0.0050	0.053	0.0050	0.0050	0.0050	0.0090	0.0050	0.053
Bromide	0.000016	0.050	0.050	0.046	0.050	0.050	0.000016	0.050	0.050	0.046	0.050	0.050
Cadmium_D	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025
Cadmium_T	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090
Calcium_D	1.4	2.2	2.9	11	3.1	99	1.4	2.2	2.9	11	3.1	99
Chloride	0.25	0.25	0.25	0.65	0.25	5.0	0.25	0.25	0.25	0.65	0.25	5.0
Chromium_D	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025
Chromium_D_Hex	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057
Chromium_T	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025
Cobalt_D	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012
Cobalt_T	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028
Copper_D	0.00014	0.00022	0.00081	0.00091	0.0014	0.0027	0.00014	0.00022	0.00077	0.00091	0.0014	0.0027
Copper_T	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056
Cyanide_F	0.00050	0.00050	0.00050	0.00054	0.00050	0.0010	0.00050	0.00050	0.00050	0.00054	0.00050	0.0010
Cyanide_T	0.00025	0.00050	0.00050	0.00054	0.00075	0.0010	0.00025	0.00050	0.00050	0.00054	0.00075	0.0010
Cyanide_WAD	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012
Fluoride	0.038	0.050	0.063	0.065	0.074	0.11	0.038	0.050	0.062	0.065	0.074	0.11
Hardness	5.3	8.3	11	10	11	12	5.3	8.3	11	10	11	12
Iron_D	0.043	0.047	0.068	0.12	0.17	0.67	0.043	0.047	0.066	0.12	0.17	0.67
Iron_T	0.070	0.084	0.13	0.22	0.18	1.2	0.070	0.084	0.13	0.22	0.18	1.2
Lead_D	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030
Lead_T	0.000018	0.000025	0.000025	0.000055	0.00021	0.00021	0.000018	0.000025	0.000025	0.000055	0.00021	0.00021
Magnesium_D	0.43	0.64	0.86	3.3	0.88	31	0.43	0.65	0.86	3.3	0.88	31
Manganese_D	0.0014	0.0017	0.0030	0.065	0.021	0.72	0.0014	0.0017	0.0030	0.065	0.021	0.72
Manganese_T	0.0048	0.0077	0.012	0.078	0.027	0.80	0.0048	0.0077	0.013	0.078	0.027	0.80
Mercury_D	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Mercury_T	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Molybdenum_D	0.000034	0.000067	0.000087	0.00014	0.00011	0.00073	0.000034	0.000068	0.000089	0.00014	0.00011	0.00073
Molybdenum_T	0.000028	0.000058	0.000091	0.00017	0.00017	0.0011	0.000028	0.000058	0.000090	0.00017	0.00017	0.0011
N_Ammonia	0.0025	0.0043	0.0082	0.013	0.031	0.047	0.0025	0.0043	0.0079	0.013	0.031	0.047
N_Nitrate_Nitrite	0.011	0.011	0.023	0.028	0.052	0.080	0.011	0.011	0.019	0.028	0.052	0.080
N_Nitrite	0.00051	0.0050	0.0050	0.0046	0.0050	0.0050	0.00051	0.0050	0.0050	0.0046	0.0050	0.0050
Nickel_D	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051
Nickel_T	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094
Phosphorus_T	0.0000087	0.0051	0.011	0.013	0.016	0.043	0.0000087	0.0051	0.012	0.013	0.016	0.043
Potassium_D	0.25	0.38	0.54	1.1	0.58	7.7	0.25	0.38	0.53	1.1	0.58	7.7
Proton	0.23	0.0046	0.00012	0.00041	0.000080	0.000070	0.23	0.0046	0.00016	0.00041	0.000080	0.000070
Radium_226	0.0000033	0.0000034	0.0000039	0.0000039	0.0000044	0.0000046	0.0000033	0.0000034	0.0000037	0.0000039	0.0000044	0.0000046
Selenium_D	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014
Selenium_T	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016
Silicon_D	1.2	1.5	1.8	2.1	2.3	5.8	1.2	1.5	1.8	2.1	2.3	5.8
Silicon_T	1.3	1.5	1.9	2.2	2.6	6.2	1.3	1.5	1.8	2.2	2.6	6.2
Silver_D	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Silver_T	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Sodium_D	0.60	0.86	1.1	2.9	1.3	23	0.60	0.86	1.1	2.9	1.3	23
Sodium_T	0.65	0.91	1.2	3.0	1.4	23	0.65	0.91	1.2	3.0	1.4	23
Strontium_D	0.0067	0.0094	0.013	0.036	0.013	0.30	0.0067	0.0094	0.013	0.036	0.013	0.30
Strontium_T	0.0072	0.0100	0.013	0.036	0.014	0.30	0.0072	0.0100	0.013	0.036	0.014	0.30
Sulfate	0.25	0.34	0.56	18	0.72	210	0.25	0.34	0.56	18	0.72	210
Thallium_D	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
Thallium_T	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
TSS	0.50	0.50	0.69	1.3	1.5	6.9	0.50	0.50	0.87	1.3	1.5	6.9
Uranium_D	0.0000065	0.000012	0.000017	0.00038	0.000021	0.0044	0.0000066	0.000012	0.000017	0.00038	0.000021	0.0044
Uranium_T	0.0000090	0.000015	0.000018	0.00043	0.000028	0.0049	0.0000091	0.000015	0.000018	0.00043	0.000028	0.0049
Vanadium_T	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025
Zinc_D	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017
Zinc_T	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Hughes River - Downstream of Dewatering Effluent Discharge from Legacy Pit (Hughes_Mid_CT)

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.50	1.0	1.0	1.3	2.2	2.2	0.50	1.0	1.0	1.3	2.2	2.2
Alkalinity_T	6.2	9.0	12	11	12	12	6.2	9.0	12	11	12	12
Aluminum_D	0.0025	0.0068	0.014	0.014	0.018	0.033	0.0025	0.0068	0.014	0.014	0.018	0.033
Aluminum_T	0.012	0.017	0.024	0.042	0.091	0.17	0.012	0.017	0.025	0.042	0.091	0.17
Antimony_D	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Antimony_T	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050	0.000010	0.000050	0.000050	0.000047	0.000050	0.000050
Arsenic_D	0.000065	0.00011	0.00016	0.00036	0.00021	0.0027	0.000065	0.00011	0.00015	0.00036	0.00021	0.0027
Arsenic_T	0.000050	0.000075	0.00016	0.00042	0.00018	0.0035	0.000050	0.000075	0.00015	0.00042	0.00018	0.0035
Barium_D	0.0026	0.0038	0.0048	0.0065	0.0052	0.030	0.0026	0.0038	0.0048	0.0065	0.0052	0.030
Barium_T	0.0030	0.0042	0.0050	0.0072	0.0073	0.031	0.0030	0.0042	0.0049	0.0072	0.0073	0.031
Beryllium_T	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011	0.000010	0.000010	0.000010	0.000010	0.000010	0.000011
Boron_D	0.0050	0.0050	0.0050	0.0093	0.0050	0.057	0.0050	0.0050	0.0050	0.0093	0.0050	0.057
Boron_T	0.0050	0.0050	0.0050	0.0090	0.0050	0.053	0.0050	0.0050	0.0050	0.0090	0.0050	0.053
Bromide	0.000016	0.050	0.050	0.046	0.050	0.050	0.000016	0.050	0.050	0.046	0.050	0.050
Cadmium_D	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025
Cadmium_T	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090	0.0000025	0.0000025	0.0000025	0.0000030	0.0000025	0.0000090
Calcium_D	1.4	2.2	2.9	11	3.1	99	1.4	2.2	2.9	11	3.1	99
Chloride	0.25	0.25	0.25	0.65	0.25	5.0	0.25	0.25	0.25	0.65	0.25	5.0
Chromium_D	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025	0.000050	0.00025	0.00025	0.00023	0.00025	0.00025
Chromium_D_Hex	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057	0.00025	0.00025	0.00025	0.00030	0.00049	0.00057
Chromium_T	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025
Cobalt_D	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012	0.000034	0.000050	0.000050	0.000054	0.000050	0.00012
Cobalt_T	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028	0.000025	0.000050	0.000050	0.000067	0.000050	0.00028
Copper_D	0.00014	0.00022	0.00081	0.00091	0.0014	0.0027	0.00014	0.00022	0.00077	0.00091	0.0014	0.0027
Copper_T	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056	0.00024	0.00025	0.00025	0.00027	0.00025	0.00056
Cyanide_F	0.00050	0.00050	0.00050	0.00054	0.00050	0.0010	0.00050	0.00050	0.00050	0.00054	0.00050	0.0010
Cyanide_T	0.00025	0.00050	0.00050	0.00054	0.00075	0.0010	0.00025	0.00050	0.00050	0.00054	0.00075	0.0010
Cyanide_WAD	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012	0.00025	0.00050	0.00050	0.00057	0.00085	0.0012
Fluoride	0.038	0.050	0.063	0.065	0.074	0.11	0.038	0.050	0.062	0.065	0.074	0.11
Hardness	5.3	8.3	11	10	11	12	5.3	8.3	11	10	11	12
Iron_D	0.043	0.047	0.068	0.12	0.17	0.67	0.043	0.047	0.066	0.12	0.17	0.67
Iron_T	0.070	0.084	0.13	0.22	0.18	1.2	0.070	0.084	0.13	0.22	0.18	1.2
Lead_D	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030
Lead_T	0.000018	0.000025	0.000025	0.000055	0.00021	0.00021	0.000018	0.000025	0.000025	0.000055	0.00021	0.00021
Magnesium_D	0.43	0.64	0.86	3.3	0.88	31	0.43	0.65	0.86	3.3	0.88	31
Manganese_D	0.0014	0.0017	0.0030	0.065	0.021	0.72	0.0014	0.0017	0.0030	0.065	0.021	0.72
Manganese_T	0.0048	0.0077	0.012	0.078	0.027	0.80	0.0048	0.0077	0.013	0.078	0.027	0.80
Mercury_D	.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Mercury_T	.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000024	0.0000025	0.0000025
Molybdenum_D	0.000034	0.000067	0.000087	0.00014	0.00011	0.00073	0.000034	0.000068	0.000089	0.00014	0.00011	0.00073
Molybdenum_T	0.000028	0.000058	0.000091	0.00017	0.00017	0.0011	0.000028	0.000058	0.000090	0.00017	0.00017	0.0011
N_Ammonia	0.0025	0.0043	0.0082	0.013	0.031	0.047	0.0025	0.0043	0.0079	0.013	0.031	0.047
N_Nitrate_Nitrite	0.011	0.011	0.023	0.028	0.052	0.080	0.011	0.011	0.019	0.028	0.052	0.080
N_Nitrite	0.00051	0.0050	0.0050	0.0046	0.0050	0.0050	0.00051	0.0050	0.0050	0.0046	0.0050	0.0050
Nickel_D	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051	0.00019	0.00025	0.00025	0.00027	0.00025	0.00051
Nickel_T	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094	0.00022	0.00025	0.00025	0.00030	0.00025	0.00094
Phosphorus_T	0.0000087	0.0051	0.011	0.013	0.016	0.043	0.0000087	0.0051	0.012	0.013	0.016	0.043
Potassium_D	0.25	0.38	0.54	1.1	0.58	7.7	0.25	0.38	0.53	1.1	0.58	7.7
Proton	0.23	0.0046	0.00012	0.00041	0.000080	0.000070	0.23	0.0046	0.00016	0.00041	0.000080	0.000070
Radium_226	0.0000033	0.0000034	0.0000039	0.0000039	0.0000044	0.0000046	0.0000033	0.0000034	0.0000037	0.0000039	0.0000044	0.0000046
Selenium_D	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014	0.000020	0.000025	0.000025	0.000034	0.000025	0.00014
Selenium_T	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016	0.000020	0.000025	0.000025	0.000054	0.00012	0.00016
Silicon_D	1.2	1.5	1.8	2.1	2.3	5.8	1.2	1.5	1.8	2.1	2.3	5.8
Silicon_T	1.3	1.5	1.9	2.2	2.6	6.2	1.3	1.5	1.8	2.2	2.6	6.2
Silver_D	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Silver_T	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050	0.0000025	0.0000050	0.0000050	0.0000048	0.0000050	0.0000050
Sodium_D	0.60	0.86	1.1	2.9	1.3	23	0.60	0.86	1.1	2.9	1.3	23
Sodium_T	0.65	0.91	1.2	3.0	1.4	23	0.65	0.91	1.2	3.0	1.4	23
Strontium_D	0.0067	0.0094	0.013	0.036	0.013	0.30	0.0067	0.0094	0.013	0.036	0.013	0.30
Strontium_T	0.0072	0.0100	0.013	0.036	0.014	0.30	0.0072	0.0100	0.013	0.036	0.014	0.30
Sulfate	0.25	0.34	0.56	18	0.72	210	0.25	0.34	0.56	18	0.72	210
Thallium_D	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
Thallium_T	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050	0.0000010	0.0000050	0.0000050	0.0000047	0.0000050	0.0000050
TSS	0.50	0.50	0.69	1.3	1.5	6.9	0.50	0.50	0.87	1.3	1.5	6.9
Uranium_D	0.0000065	0.000012	0.000017	0.00038	0.000021	0.0044	0.0000066	0.000012	0.000017	0.00038	0.000021	0.0044
Uranium_T	0.0000090	0.000015	0.000018	0.00043	0.000028	0.0049	0.0000091	0.000015	0.000018	0.00043	0.000028	0.0049
Vanadium_T	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025	0.00010	0.00025	0.00025	0.00024	0.00025	0.00025
Zinc_D	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017	0.00050	0.00050	0.00080	0.00084	0.0012	0.0017
Zinc_T	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015	0.00026	0.0015	0.0015	0.0014	0.0015	0.0015

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Hughes River - Downstream of Confluence of Susan Lake Outflow (Hughes_Ds_CT)

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	0.57	1.1	1.1	1.4	2.3	2.3	0.58	1.1	1.1	1.4	2.3	2.3
Alkalinity_T	7.1	9.6	12	12	13	13	7.3	9.8	12	12	13	13
Aluminum_D	0.0031	0.0073	0.014	0.014	0.018	0.033	0.0032	0.0074	0.014	0.014	0.018	0.033
Aluminum_T	0.012	0.018	0.025	0.042	0.091	0.17	0.012	0.018	0.025	0.042	0.091	0.17
Antimony_D	0.000011	0.000050	0.000050	0.000048	0.000052	0.000052	0.000011	0.000050	0.000050	0.000047	0.000051	0.000051
Antimony_T	0.000011	0.000050	0.000051	0.000048	0.000053	0.000054	0.000011	0.000051	0.000051	0.000048	0.000052	0.000052
Arsenic_D	0.000073	0.00011	0.00016	0.00036	0.00022	0.0026	0.000073	0.00011	0.00016	0.00036	0.00021	0.0026
Arsenic_T	0.000059	0.000085	0.00016	0.00042	0.00019	0.0035	0.000058	0.000088	0.00016	0.00042	0.00019	0.0035
Barium_D	0.0028	0.0039	0.0049	0.0066	0.0054	0.029	0.0028	0.0039	0.0049	0.0067	0.0054	0.029
Barium_T	0.0033	0.0044	0.0051	0.0073	0.0074	0.031	0.0033	0.0044	0.0051	0.0073	0.0073	0.031
Beryllium_T	0.000011	0.000011	0.000012	0.000012	0.000012	0.000013	0.000011	0.000011	0.000012	0.000012	0.000012	0.000012
Boron_D	0.0050	0.0050	0.0051	0.0093	0.0053	0.056	0.0050	0.0051	0.0051	0.0093	0.0052	0.056
Boron_T	0.0051	0.0051	0.0053	0.0092	0.0056	0.052	0.0051	0.0052	0.0053	0.0092	0.0055	0.052
Bromide	0.00085	0.050	0.050	0.046	0.050	0.050	0.00085	0.050	0.050	0.046	0.050	0.050
Cadmium_D	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025	0.0000025
Cadmium_T	0.0000025	0.0000025	0.0000026	0.0000031	0.0000026	0.0000089	0.0000025	0.0000025	0.0000026	0.0000031	0.0000026	0.0000089
Calcium_D	1.7	2.4	3.2	11	3.3	97	1.8	2.5	3.2	11	3.3	97
Chloride	0.25	0.25	0.25	0.64	0.26	4.9	0.25	0.25	0.25	0.64	0.26	4.9
Chromium_D	0.000050	0.00024	0.00025	0.00023	0.00025	0.00025	0.000050	0.00024	0.00025	0.00023	0.00025	0.00025
Chromium_D_Hex	0.00024	0.00025	0.00025	0.00029	0.00049	0.00056	0.00024	0.00025	0.00025	0.00029	0.00049	0.00056
Chromium_T	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025	0.00016	0.00025	0.00025	0.00024	0.00025	0.00025
Cobalt_D	0.000034	0.000050	0.000051	0.000055	0.000051	0.00012	0.000034	0.000050	0.000050	0.000055	0.000051	0.00012
Cobalt_T	0.000026	0.000051	0.000051	0.000068	0.000051	0.00028	0.000026	0.000051	0.000051	0.000068	0.000051	0.00028
Copper_D	0.00014	0.00022	0.00080	0.00089	0.0014	0.0027	0.00014	0.00022	0.00076	0.00089	0.0014	0.0027
Copper_T	0.00024	0.00025	0.00025	0.00028	0.00025	0.00056	0.00024	0.00025	0.00025	0.00028	0.00025	0.00056
Cyanide_F	0.00050	0.00050	0.00050	0.00054	0.00050	0.00099	0.00050	0.00050	0.00050	0.00054	0.00050	0.00099
Cyanide_T	0.00027	0.00051	0.00055	0.00058	0.00076	0.0010	0.00027	0.00051	0.00055	0.00058	0.00076	0.0010
Cyanide_WAD	0.00026	0.00050	0.00050	0.00057	0.00084	0.0012	0.00026	0.00050	0.00050	0.00057	0.00084	0.0012
Fluoride	0.039	0.050	0.063	0.065	0.074	0.11	0.039	0.050	0.063	0.065	0.074	0.11
Hardness	6.4	9.0	12	11	12	13	6.6	9.0	12	11	12	13
Iron_D	0.043	0.047	0.069	0.12	0.16	0.66	0.043	0.047	0.067	0.12	0.16	0.66
Iron_T	0.072	0.086	0.13	0.22	0.18	1.2	0.072	0.087	0.13	0.22	0.18	1.2
Lead_D	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030	0.000025	0.000025	0.000025	0.000025	0.000025	0.000030
Lead_T	0.000018	0.000025	0.000026	0.000054	0.00020	0.00020	0.000018	0.000025	0.000026	0.000054	0.00020	0.00020
Magnesium_D	0.52	0.70	0.92	3.3	0.96	30	0.54	0.72	0.92	3.3	0.96	30
Manganese_D	0.0030	0.0040	0.0055	0.065	0.022	0.71	0.0031	0.0042	0.0057	0.065	0.022	0.71
Manganese_T	0.0089	0.011	0.015	0.079	0.029	0.78	0.0099	0.012	0.015	0.080	0.029	0.78
Mercury_D	.00000095	0.0000024	0.0000025	0.0000023	0.0000025	0.0000025	0.00000095	0.0000024	0.0000025	0.0000023	0.0000025	0.0000025
Mercury_T	.00000095	0.0000025	0.0000025	0.0000023	0.0000025	0.0000025	0.00000095	0.0000025	0.0000025	0.0000023	0.0000025	0.0000025
Molybdenum_D	0.000042	0.000074	0.000095	0.00014	0.00011	0.00073	0.000044	0.000076	0.000095	0.00014	0.00011	0.00073
Molybdenum_T	0.000037	0.000064	0.000098	0.00018	0.00017	0.0011	0.000039	0.000065	0.000097	0.00018	0.00017	0.0011
N_Ammonia	0.0030	0.0049	0.0085	0.014	0.032	0.047	0.0030	0.0049	0.0082	0.014	0.031	0.047
N_Nitrate_Nitrite	0.013	0.015	0.029	0.036	0.062	0.093	0.012	0.012	0.020	0.029	0.052	0.081
N_Nitrite	0.00058	0.0050	0.0050	0.0047	0.0051	0.0051	0.00059	0.0050	0.0050	0.0047	0.0051	0.0051
Nickel_D	0.00019	0.00025	0.00025	0.00026	0.00025	0.00050	0.00019	0.00025	0.00025	0.00026	0.00025	0.00050
Nickel_T	0.00022	0.00025	0.00025	0.00031	0.00026	0.00093	0.00022	0.00025	0.00025	0.00031	0.00026	0.00093
Phosphorus_T	0.00028	0.0052	0.011	0.013	0.016	0.043	0.00028	0.0052	0.012	0.013	0.016	0.043
Potassium_D	0.28	0.39	0.57	1.1	0.63	7.6	0.28	0.42	0.57	1.1	0.62	7.6
Proton	0.29	0.0065	0.00017	0.00057	0.00011	0.000098	0.29	0.0065	0.00023	0.00058	0.00011	0.000099
Radium_226	0.000060	0.000062	0.000069	0.000073	0.000093	0.00010	0.000058	0.000059	0.000065	0.000071	0.000093	0.00010
Selenium_D	0.000021	0.000026	0.000028	0.000037	0.000030	0.00014	0.000021	0.000027	0.000027	0.000037	0.000030	0.00014
Selenium_T	0.000021	0.000027	0.000029	0.000056	0.00012	0.00016	0.000021	0.000027	0.000029	0.000056	0.00012	0.00016
Silicon_D	1.2	1.5	1.8	2.1	2.3	5.7	1.2	1.5	1.8	2.1	2.3	5.7
Silicon_T	1.3	1.5	1.9	2.2	2.5	6.1	1.2	1.5	1.8	2.2	2.5	6.1
Silver_D	0.0000026	0.0000051	0.0000051	0.0000049	0.0000052	0.0000052	0.0000026	0.0000051	0.0000051	0.0000049	0.0000052	0.0000052
Silver_T	0.0000026	0.0000051	0.0000051	0.0000049	0.0000052	0.0000052	0.0000026	0.0000051	0.0000051	0.0000049	0.0000052	0.0000053
Sodium_D	0.66	0.89	1.2	2.9	1.4	23	0.66	0.93	1.2	2.9	1.4	23
Sodium_T	0.71	0.94	1.3	3.0	1.5	23	0.71	0.98	1.2	3.0	1.5	23
Strontium_D	0.0072	0.0097	0.013	0.036	0.014	0.30	0.0073	0.0099	0.013	0.036	0.014	0.30
Strontium_T	0.0078	0.010	0.014	0.036	0.015	0.29	0.0079	0.011	0.014	0.036	0.015	0.29
Sulfate	0.38	0.52	0.76	18	0.98	210	0.38	0.55	0.68	18	0.84	210
Thallium_D	0.0000017	0.0000056	0.0000058	0.0000055	0.0000060	0.0000062	0.0000017	0.0000057	0.0000057	0.0000055	0.0000061	0.0000062
Thallium_T	0.0000017	0.0000056	0.0000058	0.0000055	0.0000060	0.0000062	0.0000018	0.0000057	0.0000058	0.0000055	0.0000062	0.0000062
TSS	0.57	0.66	0.81	1.4	1.6	6.8	0.57	0.67	0.92	1.4	1.6	6.8
Uranium_D	0.0000075	0.000012	0.000017	0.00037	0.000023	0.0043	0.0000077	0.000013	0.000018	0.00037	0.000022	0.0043
Uranium_T	0.0000100	0.000016	0.000019	0.00042	0.000030	0.0048	0.000010	0.000016	0.000019	0.00042	0.000029	0.0048
Vanadium_T	0.00010	0.00025	0.00025	0.00024	0.00025	0.00026	0.00010	0.00025	0.00025	0.00024	0.00026	0.00026
Zinc_D	0.00049	0.00050	0.00079	0.00083	0.0012	0.0017	0.00049	0.00050	0.00079	0.00083	0.0012	0.0017
Zinc_T	0.00027	0.0015	0.0015	0.0014	0.0015	0.0015	0.00027	0.0015	0.0015	0.0014	0.0015	0.0015

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Farley Dewatering Wells

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	1.1	1.5	6.7	6.3	10	11	1.9	2.3	7.2	7.2	11	14
Alkalinity_T	68	86	130	130	150	170	81	84	120	120	170	180
Aluminum_D	0.00038	0.00041	0.0010	0.0031	0.0089	0.012	0.0012	0.0014	0.0023	0.0045	0.0093	0.014
Aluminum_T	0.00068	0.00071	0.0017	0.0048	0.013	0.019	0.0021	0.0024	0.0039	0.0069	0.015	0.020
Antimony_D	0.000098	0.00011	0.00033	0.00045	0.0011	0.0014	0.000095	0.00022	0.00026	0.00027	0.00035	0.00039
Antimony_T	0.00014	0.00016	0.00042	0.00053	0.0012	0.0014	0.00013	0.00024	0.00032	0.00032	0.00046	0.00051
Arsenic_D	0.00093	0.0012	0.0020	0.0021	0.0028	0.0039	0.00073	0.00076	0.0016	0.0014	0.0021	0.0031
Arsenic_T	0.00095	0.0012	0.0021	0.0021	0.0029	0.0040	0.00077	0.00080	0.0017	0.0014	0.0022	0.0032
Barium_D	0.013	0.015	0.024	0.023	0.029	0.033	0.015	0.017	0.023	0.024	0.034	0.036
Barium_T	0.013	0.016	0.025	0.025	0.030	0.034	0.016	0.017	0.024	0.025	0.036	0.037
Beryllium_T	0.000048	0.000054	0.000078	0.000091	0.00015	0.00017	0.000076	0.000095	0.00010	0.00011	0.00013	0.00013
Boron_D	0.012	0.013	0.025	0.030	0.057	0.068	0.015	0.021	0.028	0.029	0.041	0.045
Boron_T	0.012	0.013	0.025	0.031	0.057	0.069	0.016	0.021	0.029	0.029	0.042	0.046
Bromide	0.026	0.030	0.038	0.038	0.043	0.048	0.029	0.033	0.040	0.039	0.045	0.054
Cadmium_D	0.00000091	0.0000011	0.0000021	0.0000028	0.0000062	0.0000099	0.0000017	0.0000020	0.0000023	0.0000026	0.0000038	0.0000049
Cadmium_T	0.0000010	0.0000012	0.0000019	0.0000021	0.0000033	0.0000035	0.0000020	0.0000020	0.0000023	0.0000025	0.0000032	0.0000040
Calcium_D	27	32	48	47	56	60	35	38	52	54	75	79
Chloride	0.40	0.41	0.52	0.52	0.65	0.67	0.43	0.44	0.62	0.57	0.71	0.92
Chromium_D	0.000013	0.000016	0.000032	0.000033	0.000055	0.000073	0.000034	0.000045	0.000051	0.000054	0.000067	0.000077
Chromium_D_Hex	0.000058	0.000081	0.00012	0.00013	0.00020	0.00025	0.000095	0.00013	0.00018	0.00017	0.00021	0.00023
Chromium_T	0.000029	0.000049	0.000086	0.000084	0.00011	0.00013	0.000060	0.000098	0.00015	0.00015	0.00020	0.00020
Cobalt_D	0.000031	0.000036	0.000049	0.000051	0.000070	0.000080	0.000045	0.000048	0.000057	0.000062	0.000079	0.000088
Cobalt_T	0.000031	0.000039	0.000058	0.000057	0.000072	0.000081	0.000047	0.000050	0.000066	0.000073	0.000100	0.00011
Copper_D	0.000096	0.00011	0.00022	0.00034	0.00082	0.0011	0.00011	0.00018	0.00022	0.00022	0.00026	0.00036
Copper_T	0.00012	0.00027	0.00045	0.00056	0.0010	0.0016	0.00018	0.00023	0.00041	0.00040	0.00061	0.00083
Cyanide_F	0.000048	0.000060	0.00010	0.00012	0.00020	0.00021	0.00010	0.00012	0.00017	0.00017	0.00024	0.00026
Cyanide_T	0.00017	0.00019	0.00030	0.00030	0.00039	0.00041	0.00026	0.00027	0.00042	0.00039	0.00046	0.00053
Cyanide_WAD	0.000074	0.000089	0.00015	0.00018	0.00031	0.00032	0.00013	0.00016	0.00024	0.00024	0.00033	0.00037
Fluoride	0.066	0.075	0.096	0.095	0.12	0.12	0.069	0.076	0.11	0.13	0.21	0.46
Hardness	92	96	120	130	170	170	98	100	130	130	170	200
Iron_D	0.011	0.017	0.029	0.041	0.096	0.12	0.026	0.037	0.054	0.066	0.13	0.15
Iron_T	0.011	0.012	0.019	0.040	0.12	0.16	0.025	0.029	0.035	0.058	0.14	0.18
Lead_D	0.0000034	0.0000041	0.0000063	0.0000078	0.000014	0.000016	0.0000072	0.000010	0.000011	0.000012	0.000013	0.000014
Lead_T	0.0000054	0.0000061	0.000021	0.000033	0.000082	0.00010	0.000018	0.000022	0.000035	0.000039	0.000063	0.000072
Magnesium_D	7.8	8.5	13	12	14	14	9.6	9.9	11	13	17	17
Manganese_D	0.051	0.068	0.21	0.22	0.39	0.43	0.083	0.098	0.20	0.25	0.42	0.56
Manganese_T	0.077	0.10	0.25	0.25	0.40	0.44	0.11	0.13	0.28	0.28	0.43	0.57
Mercury_D	0.00000024	0.00000028	0.00000070	0.00000080	0.0000015	0.0000019	0.00000066	0.00000071	0.00000096	0.0000010	0.0000014	0.0000016
Mercury_T	0.00000037	0.00000041	0.00000059	0.00000099	0.0000021	0.0000025	0.00000081	0.00000088	0.00000094	0.0000013	0.0000023	0.0000024
Molybdenum_D	0.00033	0.00041	0.00086	0.0011	0.0024	0.0027	0.00029	0.00088	0.0013	0.0013	0.0019	0.0021
Molybdenum_T	0.00034	0.00040	0.00086	0.0011	0.0024	0.0028	0.00030	0.00089	0.0013	0.0013	0.0019	0.0021
N_Ammonia	0.033	0.044	0.11	0.11	0.18	0.24	0.014	0.015	0.040	0.044	0.074	0.10
N_Nitrate_Nitrite	0.48	1.0	2.1	2.6	4.9	5.6	0.027	0.030	0.060	0.065	0.11	0.26
N_Nitrite	0.00068	0.0012	0.013	0.025	0.067	0.094	0.0040	0.0052	0.016	0.022	0.042	0.049
Nickel_D	0.00029	0.00035	0.00053	0.00059	0.00098	0.0012	0.00035	0.00035	0.00046	0.00045	0.00056	0.00063
Nickel_T	0.00035	0.00039	0.00062	0.00069	0.0011	0.0012	0.00042	0.00042	0.00054	0.00056	0.00072	0.00077
Phosphorus_T	0.00024	0.00035	0.0053	0.0063	0.017	0.021	0.0010	0.0013	0.0065	0.0069	0.016	0.021
Potassium_D	3.1	3.5	6.8	8.3	16	19	4.2	6.9	9.7	9.9	15	16
Proton	0.0000000091	0.000000012	0.000000044	0.000000042	0.000000065	0.000000069	0.000056	0.00026	0.00063	0.00074	0.0015	0.0018
Radium_226	0.0023	0.0028	0.0035	0.0035	0.0041	0.0043	0.0015	0.0017	0.0019	0.0019	0.0021	0.0041
Selenium_D	0.000028	0.000071	0.00017	0.00016	0.00024	0.00038	0.000050	0.000056	0.00013	0.00016	0.00029	0.00030
Selenium_T	0.000021	0.000025	0.000057	0.000079	0.00017	0.00023	0.000041	0.000055	0.000062	0.000066	0.000080	0.000084
Silicon_D	1.5	2.1	3.5	3.5	4.7	5.3	2.1	2.2	3.6	3.9	5.9	6.4
Silicon_T	1.5	2.2	3.7	3.6	4.9	5.4	2.2	2.3	3.7	4.0	6.1	6.5
Silver_D	0.00000071	0.00000085	0.0000016	0.0000019	0.0000034	0.0000046	0.0000018	0.0000025	0.0000029	0.0000030	0.0000040	0.0000043
Silver_T	0.00000087	0.0000010	0.0000020	0.0000024	0.0000044	0.0000057	0.0000022	0.0000030	0.0000034	0.0000037	0.0000050	0.0000052
Sodium_D	6.5	7.6	16	19	35	42	8.2	11	16	16	24	26
Sodium_T	6.4	7.5	15	18	35	42	8.2	11	16	16	23	26
Strontium_D	0.057	0.068	0.11	0.12	0.17	0.19	0.080	0.10	0.15	0.14	0.21	0.22
Strontium_T	0.059	0.069	0.11	0.12	0.17	0.19	0.082	0.10	0.15	0.14	0.21	0.22
Sulfate	38	47	73	80	130	140	34	38	47	49	61	78
Thallium_D	0.000025	0.000026	0.000039	0.000047	0.000082	0.000099	0.000039	0.000049	0.000055	0.000055	0.000064	0.000068
Thallium_T	0.000027	0.000028	0.000042	0.000051	0.000087	0.00010	0.000042	0.000053	0.000058	0.000059	0.000069	0.000074
TSS	0.27	0.32	0.54	0.51	0.65	0.72	0.80	0.84	1.2	1.2	1.7	1.8
Uranium_D	0.00024	0.00034	0.00073	0.00095	0.0019	0.0026	0.00036	0.00041	0.00064	0.00068	0.0011	0.0013
Uranium_T	0.00023	0.00033	0.00071	0.00095	0.0020	0.0029	0.00028	0.00041	0.00059	0.00065	0.00099	0.0012
Vanadium_T	0.000095	0.00011	0.00017	0.00018	0.00028	0.00032	0.00015	0.00018	0.00021	0.00023	0.00030	0.00030
Zinc_D	0.00024	0.00028	0.00036	0.00045	0.00076	0.0010	0.00034	0.00035	0.00043	0.00044	0.00058	0.00076
Zinc_T	0.00020	0.00030	0.00041	0.00040	0.00050	0.00053	0.00027	0.00031	0.00048	0.00047	0.00059	0.00074

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Summary Statistics of the Updated Model Results (mg/L) for the Upper Case Scenario - Gordon Dewatering Wells

Parameters	Operations (Mine Years 1 - 5)						Post-closure (Mine Years 18 - 194)					
	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum	Minimum	10th Percentile	Median	Mean	90th Percentile	Maximum
Acidity_T	1.1	1.7	5.8	5.3	8.3	9.9	3.9	4.6	6.8	7.2	9.5	10
Alkalinity_T	50	51	65	66	78	88	51	51	53	66	79	89
Aluminum_D	0.00014	0.00022	0.0011	0.0035	0.0095	0.015	0.0053	0.0056	0.0093	0.0096	0.015	0.018
Aluminum_T	0.00019	0.00037	0.0043	0.014	0.046	0.056	0.019	0.019	0.030	0.034	0.056	0.059
Antimony_D	0.000024	0.000029	0.000059	0.000053	0.000067	0.000081	0.000064	0.000074	0.000079	0.000086	0.00010	0.00011
Antimony_T	0.000034	0.000037	0.000069	0.000065	0.000084	0.00010	0.000069	0.000077	0.000086	0.000092	0.00011	0.00012
Arsenic_D	0.00016	0.00017	0.00025	0.00024	0.00029	0.00034	0.00028	0.00031	0.00033	0.00036	0.00043	0.00043
Arsenic_T	0.00018	0.00019	0.00030	0.00028	0.00033	0.00040	0.00030	0.00033	0.00035	0.00039	0.00047	0.00047
Barium_D	0.0063	0.0074	0.011	0.011	0.015	0.017	0.0090	0.0097	0.011	0.013	0.016	0.018
Barium_T	0.0083	0.0090	0.012	0.013	0.016	0.018	0.010	0.011	0.012	0.014	0.017	0.019
Beryllium_T	0.000027	0.000032	0.000067	0.000060	0.000079	0.000095	0.000067	0.000076	0.000085	0.000090	0.00011	0.00012
Boron_D	0.0020	0.0022	0.0066	0.0077	0.014	0.016	0.0042	0.0045	0.0083	0.0095	0.015	0.016
Boron_T	0.0031	0.0038	0.011	0.011	0.019	0.021	0.0059	0.0063	0.011	0.013	0.019	0.021
Bromide	0.012	0.014	0.029	0.028	0.039	0.042	0.030	0.036	0.040	0.041	0.047	0.052
Cadmium_D	0.00000013	0.00000019	0.00000082	0.00000070	0.0000011	0.0000012	0.0000014	0.0000016	0.0000019	0.0000020	0.0000023	0.0000026
Cadmium_T	0.00000018	0.00000030	0.0000022	0.0000021	0.0000038	0.0000039	0.0000035	0.0000042	0.0000050	0.0000050	0.0000056	0.0000069
Calcium_D	8.5	11	14	13	16	18	14	15	16	18	22	24
Chloride	0.014	0.022	0.064	0.088	0.21	0.25	0.13	0.13	0.22	0.21	0.29	0.36
Chromium_D	0.0000046	0.0000052	0.0000097	0.000020	0.000059	0.000075	0.000042	0.000043	0.000050	0.000057	0.000075	0.000099
Chromium_D_Hex	0.0000046	0.0000063	0.000010	0.000022	0.000064	0.000080	0.000043	0.000045	0.000053	0.000059	0.000079	0.00010
Chromium_T	0.000051	0.000067	0.00015	0.00014	0.00020	0.00025	0.00021	0.00022	0.00026	0.00028	0.00033	0.00037
Cobalt_D	0.000022	0.000034	0.00011	0.00010	0.00016	0.00019	0.000085	0.00010	0.00014	0.00015	0.00020	0.00022
Cobalt_T	0.000025	0.000039	0.00012	0.00011	0.00017	0.00021	0.000097	0.00012	0.00016	0.00017	0.00023	0.00025
Copper_D	0.0000071	0.0000095	0.000036	0.000043	0.000089	0.000096	0.000082	0.00010	0.00012	0.00012	0.00014	0.00014
Copper_T	0.000023	0.000034	0.000092	0.000086	0.00013	0.00016	0.00015	0.00016	0.00020	0.00021	0.00027	0.00029
Cyanide_F	0.000023	0.000037	0.00027	0.00033	0.00064	0.00067	0.00048	0.00052	0.00078	0.00080	0.00097	0.0012
Cyanide_T	0.00012	0.00015	0.00038	0.00035	0.00051	0.00055	0.00054	0.00059	0.00069	0.00074	0.00089	0.00095
Cyanide_WAD	0.000025	0.000036	0.00024	0.00025	0.00044	0.00046	0.00038	0.00045	0.00057	0.00058	0.00068	0.00083
Fluoride	0.040	0.042	0.052	0.053	0.065	0.068	0.043	0.044	0.048	0.055	0.067	0.071
Hardness	26	32	41	41	51	58	46	47	52	60	70	79
Iron_D	0.085	0.14	0.23	0.24	0.40	0.46	0.30	0.37	0.44	0.44	0.53	0.53
Iron_T	0.19	0.28	1.1	0.98	1.5	1.7	0.59	0.70	1.1	1.3	1.9	2.2
Lead_D	0.00000061	0.00000090	0.0000038	0.0000034	0.0000050	0.0000057	0.0000074	0.0000082	0.000010	0.000011	0.000013	0.000015
Lead_T	0.000013	0.000014	0.000044	0.000044	0.000079	0.000081	0.000055	0.000062	0.000100	0.000096	0.00012	0.00013
Magnesium_D	1.4	1.6	1.9	2.1	2.7	3.2	2.6	2.7	2.8	3.5	4.2	4.7
Manganese_D	0.021	0.050	0.62	0.54	0.93	0.95	0.20	0.26	0.57	0.70	1.1	1.2
Manganese_T	0.059	0.12	0.69	0.61	0.99	1.0	0.25	0.31	0.64	0.77	1.2	1.2
Mercury_D	0.00000015	0.00000018	0.00000042	0.00000049	0.00000093	0.00000098	0.00000091	0.00000094	0.0000011	0.0000011	0.0000012	0.0000013
Mercury_T	0.00000058	0.00000092	0.0000014	0.0000014	0.0000020	0.0000021	0.0000014	0.0000017	0.0000021	0.0000020	0.0000022	0.0000024
Molybdenum_D	0.0000097	0.000012	0.000023	0.000024	0.000041	0.000044	0.000049	0.000050	0.000056	0.000071	0.000089	0.000099
Molybdenum_T	0.000011	0.000014	0.000027	0.000029	0.000050	0.000054	0.000056	0.000059	0.000068	0.000082	0.00010	0.00011
N_Ammonia	0.018	0.034	0.065	0.062	0.086	0.096	0.037	0.046	0.061	0.077	0.11	0.11
N_Nitrate_Nitrite	0.0017	0.0027	0.016	0.016	0.032	0.034	0.022	0.026	0.030	0.032	0.039	0.048
N_Nitrite	0.00073	0.0011	0.0053	0.0050	0.0088	0.010	0.0084	0.0094	0.011	0.011	0.013	0.016
Nickel_D	0.000019	0.000024	0.000050	0.000046	0.000069	0.000073	0.000091	0.000095	0.00011	0.00013	0.00016	0.00016
Nickel_T	0.000027	0.000033	0.00012	0.00012	0.00023	0.00024	0.00015	0.00018	0.00029	0.00028	0.00035	0.00041
Phosphorus_T	0.0018	0.0024	0.0076	0.010	0.026	0.027	0.017	0.017	0.021	0.023	0.033	0.034
Potassium_D	0.40	0.43	0.60	0.56	0.66	0.80	0.65	0.68	0.78	0.85	0.96	1.1
Proton	0.0000000015	0.0000000018	0.0000000042	0.0000000067	0.000000015	0.000000019	0.000000017	0.000000018	0.000000020	0.000000021	0.000000027	0.000000027
Radium_226	0.00028	0.00039	0.0012	0.0011	0.0016	0.0020	0.0019	0.0021	0.0026	0.0027	0.0034	0.0036
Selenium_D	0.0000020	0.0000027	0.000018	0.000037	0.00011	0.00013	0.000053	0.000056	0.000077	0.000087	0.00014	0.00014
Selenium_T	0.0000020	0.0000028	0.000019	0.000037	0.00011	0.00013	0.000054	0.000057	0.000078	0.000088	0.00014	0.00015
Silicon_D	0.93	1.1	1.5	1.5	2.0	2.3	2.3	2.4	2.6	2.9	3.4	3.7
Silicon_T	0.95	1.1	1.5	1.6	2.0	2.3	2.3	2.4	2.6	2.9	3.4	3.7
Silver_D	0.00000011	0.00000015	0.0000015	0.0000035	0.000011	0.000013	0.0000049	0.0000052	0.0000076	0.0000085	0.000014	0.000014
Silver_T	0.00000014	0.00000020	0.0000017	0.0000036	0.000011	0.000013	0.0000051	0.0000055	0.0000077	0.0000087	0.000014	0.000014
Sodium_D	0.33	0.42	0.65	0.66	0.97	1.1	0.89	0.92	1.0	1.2	1.5	1.7
Sodium_T	0.34	0.43	0.67	0.67	0.99	1.1	0.90	0.93	1.0	1.3	1.6	1.7
Strontium_D	0.0080	0.0096	0.014	0.014	0.019	0.022	0.019	0.019	0.021	0.025	0.030	0.033
Strontium_T	0.017	0.018	0.024	0.026	0.035	0.038	0.023	0.024	0.026	0.032	0.039	0.043
Sulfate	0.053	0.067	0.12	0.13	0.22	0.24	0.31	0.32	0.38	0.47	0.60	0.68
Thallium_D	0.000012	0.000014	0.000029	0.000026	0.000033	0.000040	0.000031	0.000036	0.000039	0.000042	0.000050	0.000053
Thallium_T	0.000017	0.000018	0.000034	0.000032	0.000041	0.000050	0.000034	0.000038	0.000042	0.000045	0.000054	0.000058
TSS	0.72	0.92	1.3	1.5	2.1	2.7	2.7	2.8	3.7	3.5	4.2	4.3
Uranium_D	0.00000021	0.00000029	0.0000014	0.0000012	0.0000017	0.0000020	0.0000029	0.0000032	0.0000040	0.0000042	0.0000052	0.0000057
Uranium_T	0.00000022	0.00000032	0.0000015	0.0000013	0.0000020	0.0000024	0.0000032	0.0000035	0.0000046	0.0000048	0.0000060	0.0000066
Vanadium_T	0.000017	0.000026	0.00011	0.00010	0.00021	0.00024	0.00017	0.00018	0.00023	0.00024	0.00030	0.00037
Zinc_D	0.000047	0.000065	0.00019	0.00019	0.00035	0.00041	0.00034	0.00036	0.00059	0.00056	0.00068	0.00070
Zinc_T	0.000055	0.000079	0.00024	0.00026	0.00050	0.00060	0.00043	0.00047	0.00077	0.00075	0.00090	0.00097

Notes:
na denotes not applicable. The model results are not reported for the period when the water volume reached the lower bound (empty reservoir)

Appendix D Comparison of the Water Quality Results Between the Updated Model and the EIS Model for the Average Case

Concentration Ratio of the Updated Model Results to the EIS Model Results (Stantec 2020a) for the Expected Case Scenario - Open Pit Discharge

Parameters	Construction				Operations				Closure				Post-closure			
	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max
Acidity_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.1	0.9	1.2
Alkalinity_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.6	0.5	0.8
Aluminum_D	na	na	na	na	na	na	na	na	na	na	na	na	na	1.5	1.3	1.5
Aluminum_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	0.9
Antimony_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.4	0.4
Antimony_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.4	0.4
Arsenic_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.6	0.5	0.9
Arsenic_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.6	0.5	0.9
Barium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	0.7
Barium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	0.7
Beryllium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.8	0.9
Boron_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.3	0.2	0.3
Boron_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.3	0.2	0.3
Bromide	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.8	1.7
Cadmium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	1.1
Cadmium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.9	0.7	1.1
Calcium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.8	0.7	0.7
Chloride	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	1.1
Chromium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	0.9
Chromium_D_Hex	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	0.9
Chromium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.3	1.1	1.0
Cobalt_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.8	0.7	1.0
Cobalt_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.9	0.8	1.0
Copper_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.8
Copper_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.8
Cyanide_F	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	1.7
Cyanide_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.2	1.0	1.5
Cyanide_WAD	na	na	na	na	na	na	na	na	na	na	na	na	na	1.1	0.9	1.7
Fluoride	na	na	na	na	na	na	na	na	na	na	na	na	na	1.2	0.9	2.1
Hardness	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	1.2
Iron_D	na	na	na	na	na	na	na	na	na	na	na	na	na	1.3	1.1	1.4
Iron_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.8	1.0
Lead_D	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	0.9
Lead_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.2	1.1	1.1
Magnesium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	0.9
Manganese_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	1.8
Manganese_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	1.7
Mercury_D	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.9	0.9
Mercury_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.1	0.9	1.0
Molybdenum_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.5
Molybdenum_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.5
N_Ammonia	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	1.3
N_Nitrate_Nitrite	na	na	na	na	na	na	na	na	na	na	na	na	na	0.8	0.6	2.7
N_Nitrite	na	na	na	na	na	na	na	na	na	na	na	na	na	7.2	6.2	6.8
Nickel_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.7
Nickel_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.6	0.6	0.7
Phosphorus_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.2	0.1	1.0
Potassium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.4	0.4
Radium_226	na	na	na	na	na	na	na	na	na	na	na	na	na	0.3	0.2	1.8
Selenium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.3	0.4
Selenium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.3	0.4
Silicon_D	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.8	1.1
Silicon_T	na	na	na	na	na	na	na	na	na	na	na	na	na	1.0	0.8	1.1
Silver_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.9	0.8	0.8
Silver_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.9	0.8	0.8
Sodium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.3	0.3
Sodium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.4	0.3	0.3
Strontium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	0.6
Strontium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	0.6
Sulfate	na	na	na	na	na	na	na	na	na	na	na	na	na	0.1	0.1	0.2
Thallium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.8	0.7	0.7
Thallium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.8	0.7	0.7
Uranium_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.7
Uranium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.5	0.4	0.7
Vanadium_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.9	0.8	0.8
Zinc_D	na	na	na	na	na	na	na	na	na	na	na	na	na	0.7	0.6	1.4
Zinc_T	na	na	na	na	na	na	na	na	na	na	na	na	na	0.8	0.6	1.3

Notes:

	updated model concentration/EIS model concentration <0.5
	0.5 < updated model concentration/EIS model concentration <2
	updated model concentration/EIS model concentration >2

Concentration Ratio of the Updated Model Results to the EIS Model Results (Stantec 2020a) for the Expected Case Scenario - Collection Pond Dischagre

Parameters	Construction				Operations				Closure				Post-closure			
	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max
Acidity_T	na	1.6	1.5	1.6	1.6	1.2	1.1	1.2	na	na	na	na	na	na	na	na
Alkalinity_T	na	3.3	2.5	3.6	1.5	1.1	1.0	1.3	na	na	na	na	na	na	na	na
Aluminum_D	na	2.9	4.6	2.2	0.7	0.7	0.7	0.6	na	na	na	na	na	na	na	na
Aluminum_T	na	2.0	2.8	1.5	0.6	0.7	0.7	0.8	na	na	na	na	na	na	na	na
Antimony_D	na	11.1	9.1	11.6	0.9	0.9	0.4	1.2	na	na	na	na	na	na	na	na
Antimony_T	na	10.8	9.0	11.3	0.9	0.9	0.4	1.2	na	na	na	na	na	na	na	na
Arsenic_D	na	12.2	9.9	12.7	0.9	0.4	0.4	0.3	na	na	na	na	na	na	na	na
Arsenic_T	na	10.0	8.2	10.7	0.9	0.4	0.4	0.3	na	na	na	na	na	na	na	na
Barium_D	na	2.7	2.2	3.5	1.1	1.0	0.8	1.2	na	na	na	na	na	na	na	na
Barium_T	na	2.6	2.1	3.3	1.0	1.0	0.7	1.2	na	na	na	na	na	na	na	na
Beryllium_T	na	3.7	3.0	5.2	1.1	1.0	0.7	1.3	na	na	na	na	na	na	na	na
Boron_D	na	7.5	5.7	11.2	1.0	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Boron_T	na	7.5	5.7	11.2	1.0	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Bromide	na	2.2	1.9	2.5	2.0	1.4	1.2	1.2	na	na	na	na	na	na	na	na
Cadmium_D	na	3.4	2.7	4.1	1.3	1.1	0.9	1.3	na	na	na	na	na	na	na	na
Cadmium_T	na	2.2	2.0	2.3	0.9	1.0	0.9	1.3	na	na	na	na	na	na	na	na
Calcium_D	na	3.5	2.6	3.8	1.3	1.1	0.9	1.2	na	na	na	na	na	na	na	na
Chloride	na	2.0	1.7	2.2	1.8	1.2	1.1	1.0	na	na	na	na	na	na	na	na
Chromium_D	na	3.0	2.4	3.3	1.8	1.3	1.1	1.5	na	na	na	na	na	na	na	na
Chromium_D_Hex	na	3.0	2.4	3.3	1.8	1.3	1.1	1.5	na	na	na	na	na	na	na	na
Chromium_T	na	0.9	1.1	0.5	0.7	0.9	0.8	1.1	na	na	na	na	na	na	na	na
Cobalt_D	na	1.8	2.0	1.2	0.9	0.9	0.7	1.2	na	na	na	na	na	na	na	na
Cobalt_T	na	1.1	1.4	0.6	0.7	0.9	0.7	1.1	na	na	na	na	na	na	na	na
Copper_D	na	4.5	3.5	6.8	0.9	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Copper_T	na	3.2	2.9	3.1	0.7	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Cyanide_F	na	1.9	1.6	1.9	1.6	1.3	1.2	1.2	na	na	na	na	na	na	na	na
Cyanide_T	na	1.9	1.7	1.9	1.6	1.3	1.2	1.3	na	na	na	na	na	na	na	na
Cyanide_WAD	na	1.9	1.7	1.9	1.6	1.3	1.2	1.3	na	na	na	na	na	na	na	na
Fluoride	na	3.2	2.5	3.6	1.4	0.9	0.9	0.8	na	na	na	na	na	na	na	na
Hardness	na	2.6	2.0	2.5	2.1	1.4	1.3	1.1	na	na	na	na	na	na	na	na
Iron_D	na	1.5	1.6	0.8	1.4	1.4	1.4	1.5	na	na	na	na	na	na	na	na
Iron_T	na	0.8	0.7	0.8	0.6	0.8	0.7	1.0	na	na	na	na	na	na	na	na
Lead_D	na	3.8	3.1	4.9	1.3	1.1	0.8	1.3	na	na	na	na	na	na	na	na
Lead_T	na	1.6	1.7	0.8	0.9	1.0	0.8	1.2	na	na	na	na	na	na	na	na
Magnesium_D	na	3.3	2.5	3.5	1.5	1.1	1.0	1.3	na	na	na	na	na	na	na	na
Manganese_D	na	1.3	1.2	0.7	1.5	1.1	1.0	1.2	na	na	na	na	na	na	na	na
Manganese_T	na	1.2	1.2	0.6	1.2	1.0	1.0	1.2	na	na	na	na	na	na	na	na
Mercury_D	na	2.5	2.1	2.9	1.3	1.2	1.0	1.4	na	na	na	na	na	na	na	na
Mercury_T	na	2.0	1.9	1.4	1.2	1.1	1.0	1.4	na	na	na	na	na	na	na	na
Molybdenum_D	na	5.1	3.7	6.4	1.1	1.0	0.6	1.3	na	na	na	na	na	na	na	na
Molybdenum_T	na	5.0	3.7	6.4	1.1	1.0	0.6	1.3	na	na	na	na	na	na	na	na
N_Ammonia	na	5.9	5.0	7.8	0.7	1.9	1.5	2.8	na	na	na	na	na	na	na	na
N_Nitrate_Nitrite	na	27.4	38.0	21.5	0.5	2.3	1.7	3.0	na	na	na	na	na	na	na	na
N_Nitrite	na	8.5	7.5	10.6	0.8	2.1	1.6	2.9	na	na	na	na	na	na	na	na
Nickel_D	na	3.3	2.8	4.5	0.8	0.9	0.6	1.2	na	na	na	na	na	na	na	na
Nickel_T	na	2.1	2.1	1.6	0.6	0.8	0.6	1.2	na	na	na	na	na	na	na	na
Phosphorus_T	na	3.0	2.3	3.0	2.6	1.5	1.4	1.4	na	na	na	na	na	na	na	na
Potassium_D	na	7.3	5.6	10.0	0.9	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Radium_226	na	2.1	1.7	2.2	1.7	1.1	1.1	0.9	na	na	na	na	na	na	na	na
Selenium_D	na	7.6	6.0	10.3	1.0	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Selenium_T	na	7.2	5.7	9.6	0.9	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Silicon_D	na	2.9	2.2	3.1	1.8	1.2	1.1	1.4	na	na	na	na	na	na	na	na
Silicon_T	na	2.8	2.2	3.1	1.7	1.2	1.1	1.4	na	na	na	na	na	na	na	na
Silver_D	na	3.5	2.8	4.2	1.4	1.1	0.9	1.3	na	na	na	na	na	na	na	na
Silver_T	na	3.4	2.8	4.1	1.3	1.1	0.9	1.3	na	na	na	na	na	na	na	na
Sodium_D	na	6.5	4.9	9.9	0.9	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Sodium_T	na	6.4	4.9	9.9	0.9	0.9	0.5	1.2	na	na	na	na	na	na	na	na
Strontium_D	na	4.5	3.3	5.1	1.3	1.0	0.8	1.2	na	na	na	na	na	na	na	na
Strontium_T	na	4.5	3.3	5.1	1.3	1.0	0.8	1.2	na	na	na	na	na	na	na	na
Sulfate	na	6.7	5.2	9.2	0.9	0.8	0.5	1.1	na	na	na	na	na	na	na	na
Thallium_D	na	4.3	3.5	5.8	1.1	1.0	0.7	1.2	na	na	na	na	na	na	na	na
Thallium_T	na	3.9	3.3	5.1	1.0	1.0	0.7	1.2	na	na	na	na	na	na	na	na
Uranium_D	na	7.2	5.1	9.3	1.1	0.9	0.6	1.2	na	na	na	na	na	na	na	na
Uranium_T	na	7.1	5.1	9.3	1.1	0.9	0.6	1.2	na	na	na	na	na	na	na	na
Vanadium_T	na	1.6	1.7	1.0	0.7	0.9	0.7	1.2	na	na	na	na	na	na	na	na
Zinc_D	na	2.7	2.2	3.0	1.6	1.1	1.0	1.3	na	na	na	na	na	na	na	na
Zinc_T	na	2.0	1.8	2.0	1.2	1.1	1.0	1.3	na	na	na	na	na	na	na	na

Notes:

	updated model concentration/EIS model concentration <0.5
	0.5 < updated model concentration/EIS model concentration <2
	updated model concentration/EIS model concentration >2

Concentration Ratio of the Updated Model Results to the EIS Model Results (Stantec 2020a) for the Expected Case Scenario - Gordon Lake

Parameters	Construction				Operations				Closure				Post-closure			
	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max
Acidity_T	1.6	1.6	1.4	1.7	0.6	1.3	1.3	1.8	0.7	1.4	1.3	1.9	na	1.5	1.3	1.8
Alkalinity_T	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.4	0.5	na	1.1	0.9	0.5
Aluminum_D	29.4	2.1	3.4	1.6	0.6	1.0	0.8	1.2	0.7	1.5	3.5	1.3	na	0.6	0.6	0.7
Aluminum_T	69.8	2.8	4.7	2.0	0.6	1.7	1.4	1.9	0.8	2.3	5.5	1.8	na	0.8	0.8	0.9
Antimony_D	1.7	1.5	1.4	1.3	0.7	1.0	1.1	1.2	0.7	1.2	1.1	1.5	na	1.0	0.9	0.9
Antimony_T	1.7	1.5	1.4	1.3	0.8	1.1	1.2	1.4	0.9	1.3	1.2	1.5	na	1.0	0.9	0.9
Arsenic_D	0.6	0.6	0.6	0.6	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.6	na	0.9	0.8	0.6
Arsenic_T	0.6	0.6	0.6	0.6	0.4	0.5	0.5	0.6	0.4	0.6	0.6	0.7	na	0.9	0.8	0.6
Barium_D	0.5	0.6	0.6	0.7	0.4	0.5	0.5	0.7	0.4	0.6	0.5	0.7	na	1.2	1.1	0.7
Barium_T	0.6	0.6	0.7	0.7	0.5	0.6	0.6	0.7	0.5	0.6	0.5	0.7	na	1.2	1.0	0.7
Beryllium_T	1.4	1.3	1.2	1.2	0.6	0.9	1.0	1.1	0.6	1.1	1.1	1.3	na	1.0	0.9	0.9
Boron_D	0.6	0.8	0.8	0.9	0.4	0.6	0.6	0.9	0.4	0.7	0.6	0.9	na	1.5	1.5	0.9
Boron_T	0.7	0.9	0.9	1.1	0.5	0.8	0.8	1.1	0.5	0.9	0.7	1.1	na	1.5	1.4	1.2
Bromide	0.8	0.8	0.8	0.9	0.4	0.6	0.7	0.8	0.4	0.8	0.8	0.9	na	0.8	0.8	0.8
Cadmium_D	0.8	0.7	0.7	0.7	0.1	0.3	0.3	0.3	0.1	0.4	0.4	0.7	na	0.9	0.9	0.7
Cadmium_T	1.3	0.9	0.9	0.8	0.1	0.4	0.4	0.5	0.1	0.6	0.6	0.8	na	0.8	0.9	0.8
Calcium_D	0.5	0.5	0.5	0.5	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.5	na	1.0	0.9	0.5
Chloride	0.7	0.6	0.7	0.5	0.1	0.3	0.3	0.4	0.1	0.4	0.4	0.5	na	0.8	0.9	0.6
Chromium_D	0.9	0.5	0.5	0.6	0.2	0.2	0.2	0.4	0.2	0.3	0.2	0.5	na	0.8	0.8	0.5
Chromium_D_Hex	0.9	0.5	0.4	0.4	0.2	0.3	0.2	0.3	0.3	0.3	0.3	0.4	na	0.9	1.0	0.4
Chromium_T	1.2	1.1	1.0	1.0	0.3	0.6	0.7	0.8	0.4	0.8	0.8	1.1	na	0.8	0.8	0.8
Cobalt_D	1.8	1.7	1.5	1.8	0.6	1.2	1.2	1.7	0.7	1.4	1.3	1.9	na	1.4	1.3	1.7
Cobalt_T	1.8	1.8	1.6	1.7	0.6	1.3	1.3	1.9	0.8	1.5	1.4	2.1	na	1.4	1.2	1.6
Copper_D	0.8	1.0	1.0	0.8	0.1	0.4	0.3	0.5	0.1	0.5	0.6	0.7	na	0.9	0.8	0.8
Copper_T	1.3	1.1	1.1	1.0	0.2	0.4	0.5	0.5	0.2	0.6	0.6	0.9	na	1.0	1.0	0.9
Cyanide_F	3.4	1.6	1.7	1.4	0.2	0.8	0.7	0.9	0.3	1.0	1.0	1.6	na	0.8	0.8	0.9
Cyanide_T	1.8	1.6	1.4	1.3	0.4	0.8	0.8	1.0	0.4	1.0	1.0	1.5	na	1.0	0.9	0.9
Cyanide_WAD	2.9	1.6	1.5	1.4	0.2	0.7	0.7	0.9	0.3	1.0	1.0	1.5	na	0.8	0.8	0.9
Fluoride	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	na	0.9	0.8	0.5
Hardness	0.5	0.4	0.4	0.5	0.3	0.3	0.3	0.4	0.3	0.4	0.3	0.5	na	1.0	0.9	0.5
Iron_D	1.9	1.9	2.2	1.6	0.7	1.2	1.2	1.2	0.9	1.5	1.6	1.6	na	1.2	1.2	1.3
Iron_T	2.9	2.3	2.6	1.8	1.3	2.0	2.2	1.8	1.7	2.4	3.0	1.9	na	0.9	0.9	1.0
Lead_D	1.2	1.0	0.9	0.9	0.1	0.3	0.4	0.4	0.1	0.5	0.5	0.8	na	0.9	0.9	0.8
Lead_T	1.6	1.3	1.4	1.0	0.4	0.7	0.8	0.8	0.4	0.9	1.0	1.2	na	0.8	0.8	0.8
Magnesium_D	0.4	0.4	0.4	0.5	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.5	na	1.0	0.9	0.5
Manganese_D	2.6	3.1	2.5	3.6	0.8	2.7	2.6	3.5	1.1	2.9	2.7	3.6	na	2.5	2.1	3.1
Manganese_T	2.5	3.2	3.0	3.5	0.9	2.9	3.0	3.6	1.3	3.1	3.1	3.8	na	2.2	1.8	2.7
Mercury_D	1.1	1.2	1.2	1.2	0.2	0.6	0.6	0.9	0.2	0.8	0.9	1.1	na	0.9	0.8	0.9
Mercury_T	1.6	1.4	1.4	1.2	0.8	1.0	1.0	1.2	0.9	1.1	1.1	1.2	na	1.1	1.0	1.0
Molybdenum_D	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	na	0.6	0.6	0.1
Molybdenum_T	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	na	0.6	0.7	0.1
N_Ammonia	0.4	0.7	0.7	0.9	0.3	0.7	0.7	0.8	0.3	0.7	0.6	1.0	na	1.0	1.0	0.8
N_Nitrate_Nitrite	0.8	0.6	0.6	0.6	0.1	0.3	0.3	0.4	0.1	0.4	0.4	0.6	na	0.8	0.8	0.5
N_Nitrite	0.9	0.7	0.7	0.7	0.1	0.4	0.4	0.5	0.1	0.5	0.4	0.7	na	0.8	0.9	0.7
Nickel_D	1.0	0.9	0.9	0.9	0.2	0.4	0.4	0.4	0.2	0.6	0.5	0.9	na	0.9	0.8	0.8
Nickel_T	1.4	1.1	1.2	0.9	0.3	0.6	0.7	0.7	0.3	0.8	0.9	1.1	na	0.7	0.7	0.7
Phosphorus_T	1.0	1.0	0.9	1.2	0.8	0.9	0.8	1.2	0.9	1.0	1.0	1.3	na	0.9	0.8	1.0
Potassium_D	0.4	0.4	0.4	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.4	na	1.1	1.0	0.4
Radium_226	0.3	0.3	0.3	0.2	0.0	0.1	0.1	0.1	0.0	0.1	0.1	0.2	na	0.8	0.9	0.3
Selenium_D	1.0	1.3	1.4	1.1	0.1	0.6	0.5	1.0	0.1	0.8	1.0	1.0	na	0.9	0.8	1.0
Selenium_T	1.1	1.3	1.4	1.1	0.1	0.6	0.5	1.0	0.1	0.9	0.9	1.0	na	0.9	0.8	0.9
Silicon_D	0.6	0.6	0.5	0.7	0.2	0.3	0.3	0.4	0.3	0.4	0.4	0.6	na	1.0	1.0	0.7
Silicon_T	0.6	0.6	0.6	0.7	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.6	na	1.0	1.0	0.7
Silver_D	1.2	1.3	1.5	1.1	0.1	0.6	0.4	1.0	0.1	0.9	1.0	1.0	na	0.9	0.8	0.9
Silver_T	1.1	1.3	1.3	1.1	0.1	0.6	0.5	1.0	0.1	0.8	0.9	1.0	na	0.9	0.8	0.9
Sodium_D	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.3	na	0.9	0.8	0.3
Sodium_T	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.1	0.2	0.2	0.3	na	0.9	0.8	0.3
Strontium_D	0.4	0.4	0.3	0.4	0.2	0.2	0.2	0.3	0.2	0.3	0.3	0.4	na	1.0	0.9	0.4
Strontium_T	0.4	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	na	1.0	0.9	0.4
Sulfate	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2	na	0.8	0.8	0.2
Thallium_D	1.7	1.5	1.4	1.3	0.6	1.0	1.1	1.2	0.7	1.2	1.1	1.4	na	1.0	1.0	0.9
Thallium_T	1.5	1.5	1.5	1.3	1.4	1.5	1.5	1.5	1.4	1.5	1.3	1.5	na	1.1	1.0	1.0
Uranium_D	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	na	0.5	0.5	0.1
Uranium_T	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	na	0.5	0.5	0.0
Vanadium_T	1.1	0.9	0.8	0.9	0.1	0.5	0.5	0.6	0.2	0.6	0.6	0.9	na	0.7	0.7	0.8
Zinc_D	0.6	0.5	0.5	0.4	0.1	0.2	0.2	0.3	0.1	0.3	0.3	0.4	na	0.8	0.8	0.5
Zinc_T	0.7	0.6	0.6	0.5	0.1	0.3	0.2	0.3	0.1	0.4	0.4	0.6	na	0.7	0.6	0.6

Notes:

	updated model concentration/EIS model concentration <0.5
	0.5 < updated model concentration/EIS model concentration <2
	updated model concentration/EIS model concentration >2

Concentration Ratio of the Updated Model Results to the EIS Model Results (Stantec 2020a) for the Expected Case Scenario - Farley Lake West

Parameters	Construction				Operations				Closure				Post-closure			
	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max	Min	Mean	Median	Max
Acidity_T	0.8	1.4	1.6	1.3	0.7	1.4	1.4	1.7	0.8	2.1	2.0	2.4	na	1.1	0.9	1.5
Alkalinity_T	0.4	0.7	0.7	0.9	0.5	0.8	0.8	1.2	0.5	0.9	0.7	1.2	na	0.7	0.6	1.1
Aluminum_D	6.0	2.6	2.4	2.0	1.5	1.7	1.3	2.3	3.3	3.0	2.8	3.3	na	0.9	0.7	1.3
Aluminum_T	4.9	2.4	2.1	1.5	1.5	1.6	1.3	2.1	3.2	2.8	2.6	2.9	na	0.7	0.6	1.0
Antimony_D	1.3	1.4	1.3	1.7	1.7	1.6	1.4	2.2	1.5	1.3	1.4	1.0	na	0.6	0.5	0.6
Antimony_T	1.4	1.4	1.4	1.6	1.6	1.7	1.5	2.1	1.8	1.4	1.6	1.1	na	0.6	0.6	0.5
Arsenic_D	0.6	0.9	1.1	1.2	1.1	1.0	0.9	1.2	0.9	1.4	1.2	1.3	na	0.6	0.7	1.0
Arsenic_T	0.6	0.9	1.0	1.2	1.1	1.0	0.9	1.2	0.9	1.4	1.2	1.3	na	0.6	0.7	1.0
Barium_D	0.5	0.8	0.9	1.0	0.6	0.9	1.0	1.2	0.6	1.1	0.9	1.4	na	0.8	0.6	1.0
Barium_T	0.5	0.8	0.9	1.0	0.6	1.0	1.0	1.2	0.6	1.1	0.9	1.4	na	0.8	0.6	1.0
Beryllium_T	1.1	1.0	1.0	0.9	1.0	1.1	1.1	1.3	1.2	1.2	1.1	1.1	na	0.9	0.8	0.8
Boron_D	0.8	0.9	1.0	0.9	1.0	1.5	1.4	1.6	1.1	1.7	1.4	1.9	na	0.6	0.4	0.8
Boron_T	0.8	0.9	1.0	0.9	1.0	1.5	1.4	1.6	1.1	1.7	1.5	1.9	na	0.6	0.4	0.8
Bromide	0.9	0.8	0.8	0.7	0.7	0.8	0.8	0.9	0.9	1.0	0.9	1.0	na	0.8	0.8	0.9
Cadmium_D	0.6	0.7	0.7	0.6	0.7	0.8	0.8	1.2	0.7	0.8	0.8	0.8	na	0.8	0.8	0.9
Cadmium_T	0.7	0.8	0.8	0.9	0.7	0.9	0.9	1.2	0.8	0.9	0.9	0.9	na	0.9	0.9	1.0
Calcium_D	0.5	0.8	0.9	1.0	0.7	1.0	1.0	1.3	0.7	1.1	0.9	1.4	na	0.9	0.7	1.1
Chloride	0.8	0.7	0.7	0.7	0.9	1.2	1.1	1.6	1.3	1.7	1.5	1.9	na	0.9	0.8	1.4
Chromium_D	0.7	0.9	0.8	1.2	0.5	0.8	0.7	1.2	0.5	0.9	0.9	1.4	na	1.0	0.9	1.1
Chromium_D_Hex	0.8	0.8	0.8	1.1	0.5	0.8	0.7	1.2	0.5	0.9	0.8	1.4	na	1.0	0.9	1.0
Chromium_T	0.8	1.7	1.6	2.1	0.6	1.1	1.1	1.3	0.8	1.4	1.4	2.1	na	1.2	1.2	1.1
Cobalt_D	1.1	1.5	1.5	1.4	0.8	1.3	1.4	1.3	1.0	1.8	1.6	2.5	na	1.0	1.0	1.2
Cobalt_T	1.1	1.8	1.9	1.9	0.8	1.5	1.6	1.8	1.0	2.1	1.8	3.1	na	1.1	1.1	1.4
Copper_D	0.7	0.7	0.7	1.0	0.9	1.3	1.2	1.4	1.0	1.2	1.0	1.5	na	0.6	0.6	0.9
Copper_T	0.8	1.0	1.1	1.2	1.0	1.4	1.3	1.5	1.1	1.5	1.3	1.7	na	0.7	0.6	1.0
Cyanide_F	1.2	1.0	0.9	1.0	0.6	0.8	0.8	0.9	0.7	1.0	1.1	1.3	na	0.7	0.7	0.9
Cyanide_T	1.2	1.0	1.1	0.9	0.8	0.9	0.9	1.0	0.9	1.1	1.2	1.3	na	0.8	0.8	0.9
Cyanide_WAD	1.2	1.0	0.9	1.0	0.7	0.9	0.8	0.9	0.8	1.1	1.1	1.3	na	0.7	0.7	0.9
Fluoride	0.5	0.5	0.5	0.6	0.5	0.7	0.7	0.7	0.5	0.6	0.5	0.7	na	1.0	1.1	1.5
Hardness	0.6	0.8	0.9	1.0	0.7	0.9	0.9	1.3	0.8	1.2	1.0	1.5	na	1.0	0.8	1.4
Iron_D	1.0	1.0	1.0	0.8	0.6	0.8	0.8	1.0	0.7	1.0	0.9	1.6	na	0.9	0.9	0.9
Iron_T	1.6	1.3	1.2	2.0	0.7	1.0	0.7	1.9	1.0	1.5	1.3	2.5	na	0.4	0.3	1.1
Lead_D	0.9	0.8	0.8	0.9	0.7	1.0	0.9	1.4	0.6	1.0	1.0	1.3	na	1.0	0.9	0.9
Lead_T	1.2	1.3	1.2	1.2	1.0	1.2	1.1	1.4	1.3	1.3	1.3	1.4	na	1.0	1.0	0.9
Magnesium_D	0.8	1.0	1.0	1.0	0.9	1.2	1.1	1.5	1.1	1.6	1.3	1.8	na	1.0	0.8	1.3
Manganese_D	0.8	1.6	2.1	1.3	0.6	2.2	2.3	2.5	0.9	3.5	4.0	2.8	na	0.9	0.7	1.6
Manganese_T	1.0	1.5	2.0	1.2	0.8	2.1	2.2	2.4	1.1	3.4	3.8	2.7	na	0.9	0.7	1.5
Mercury_D	1.1	1.1	1.0	1.2	0.7	1.0	0.8	1.4	0.8	1.2	1.2	1.5	na	0.8	0.7	1.0
Mercury_T	1.3	1.4	1.4	1.4	0.9	1.1	0.9	1.5	1.0	1.4	1.4	1.7	na	0.9	0.8	1.1
Molybdenum_D	0.3	0.3	0.2	0.5	0.5	0.9	0.8	1.3	0.2	0.3	0.3	0.7	na	0.6	0.6	0.6
Molybdenum_T	0.3	0.3	0.2	0.5	0.5	0.9	0.8	1.3	0.2	0.3	0.3	0.7	na	0.6	0.6	0.6
N_Ammonia	0.2	0.7	0.8	0.7	0.7	1.4	1.4	1.6	0.2	0.8	0.7	1.1	na	1.0	1.0	1.2
N_Nitrate_Nitrite	0.5	1.3	0.9	2.3	2.2	3.8	3.0	5.5	0.7	1.1	1.0	1.4	na	0.6	0.5	1.3
N_Nitrite	0.6	1.0	0.8	1.5	1.5	1.9	1.8	2.7	0.8	1.5	1.2	2.0	na	1.1	0.9	1.5
Nickel_D	1.0	1.1	1.1	1.0	1.2	1.5	1.4	1.5	1.5	1.9	1.8	1.8	na	0.8	0.8	1.0
Nickel_T	1.0	1.3	1.4	1.2	1.2	1.5	1.5	1.6	1.6	2.0	1.9	2.0	na	0.8	0.7	1.0
Phosphorus_T	0.7	0.7	0.7	1.0	0.6	0.7	0.7	1.1	0.6	0.9	0.8	1.5	na	0.6	0.5	0.9
Potassium_D	0.9	1.1	1.2	1.4	1.1	1.5	1.4	1.6	1.3	1.8	1.5	1.8	na	0.6	0.5	0.8
Radium_226	0.4	0.3	0.3	0.3	0.4	0.5	0.4	0.5	0.2	0.3	0.3	0.5	na	0.6	0.6	0.5
Selenium_D	1.0	2.0	1.9	2.7	1.0	1.6	1.6	2.0	1.0	2.2	2.0	1.9	na	1.0	0.8	1.1
Selenium_T	1.0	1.2	1.2	1.4	1.1	1.3	1.3	2.1	1.1	1.2	1.2	1.0	na	0.6	0.6	0.6
Silicon_D	0.4	0.5	0.5	0.6	0.5	0.7	0.7	0.8	0.3	0.5	0.5	0.8	na	0.9	0.9	1.1
Silicon_T	0.4	0.5	0.5	0.6	0.5	0.7	0.7	0.8	0.3	0.5	0.5	0.8	na	0.9	0.9	1.1
Silver_D	0.9	1.1	0.9	1.6	0.7	1.1	0.9	1.8	0.6	1.3	1.1	2.1	na	0.9	0.8	1.2
Silver_T	0.9	1.1	0.9	1.5	0.7	1.1	1.0	1.7	0.7	1.3	1.1	2.1	na	0.9	0.8	1.1
Sodium_D	0.7	0.9	0.9	1.0	0.9	1.4	1.2	1.5	1.0	1.3	1.1	1.2	na	0.6	0.5	0.7
Sodium_T	0.7	0.9	0.9	1.0	0.9	1.3	1.2	1.5	1.0	1.3	1.1	1.3	na	0.6	0.5	0.7
Strontium_D	0.5	0.8	0.8	1.0	0.7	1.1	1.1	1.4	0.7	1.2	1.0	1.6	na	0.8	0.6	1.0
Strontium_T	0.5	0.7	0.8	1.0	0.7	1.0	1.0	1.4	0.7	1.1	0.9	1.5	na	0.8	0.6	1.0
Sulfate	2.4	1.7	1.8	1.3	2.2	2.1	2.1	2.1	3.6	3.8	3.6	3.2	na	0.8	0.6	1.1
Thallium_D	1.1	1.2	1.3	1.0	0.8	1.2	1.1	1.8	1.0	1.4	1.4	1.3	na	0.9	0.9	0.8
Thallium_T	1.1	1.2	1.3	1.0	0.9	1.2	1.2	1.7	1.1	1.4	1.5	1.3	na	0.9	0.9	0.9
Uranium_D	0.2	0.4	0.5	0.5	0.7	1.3	1.1	1.7	0.4	0.7	0.6	1.0	na	0.7	0.8	0.8
Uranium_T	0.2	0.3	0.3	0.4	0.6	1.2	1.0	1.6	0.3	0.5	0.5	0.9	na	0.7	0.7	0.8
Vanadium_T	1.3	1.3	1.2	1.3	0.9	1.1	1.1	1.1	1.2	1.3	1.2	1.4	na	0.9	0.9	0.9
Zinc_D	0.6	0.6	0.6	0.6	0.5	0.7	0.7	0.9	0.4	0.6	0.6	0.7	na	0.8	0.8	1.0
Zinc_T	0.7	0.9	0.9	0.9	0.6	0.8	0.8	0.9	0.6	0.9	0.8	1.1	na	0.8	0.9	1.0

Notes:

	updated model concentration/EIS model concentration <0.5
	0.5 < updated model concentration/EIS model concentration <2
	updated model concentration/EIS model concentration >2

Appendix G Surface Water Quality Figures

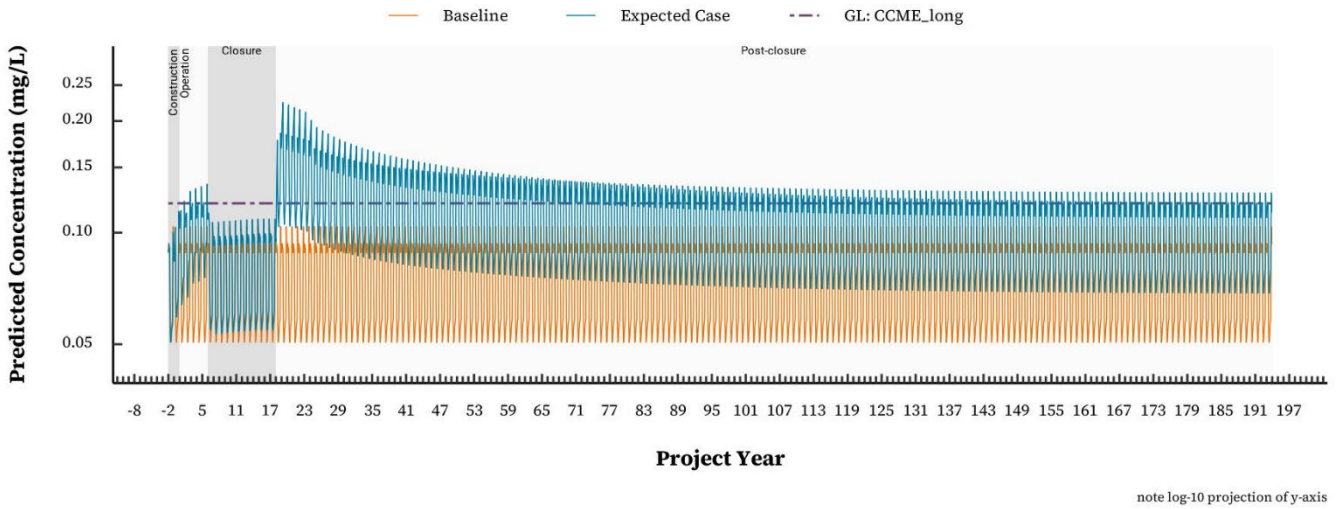


Figure H-1 Predicted Project vs. Baseline Concentrations of Fluoride in West Farley Lake for the Expected Case Scenario

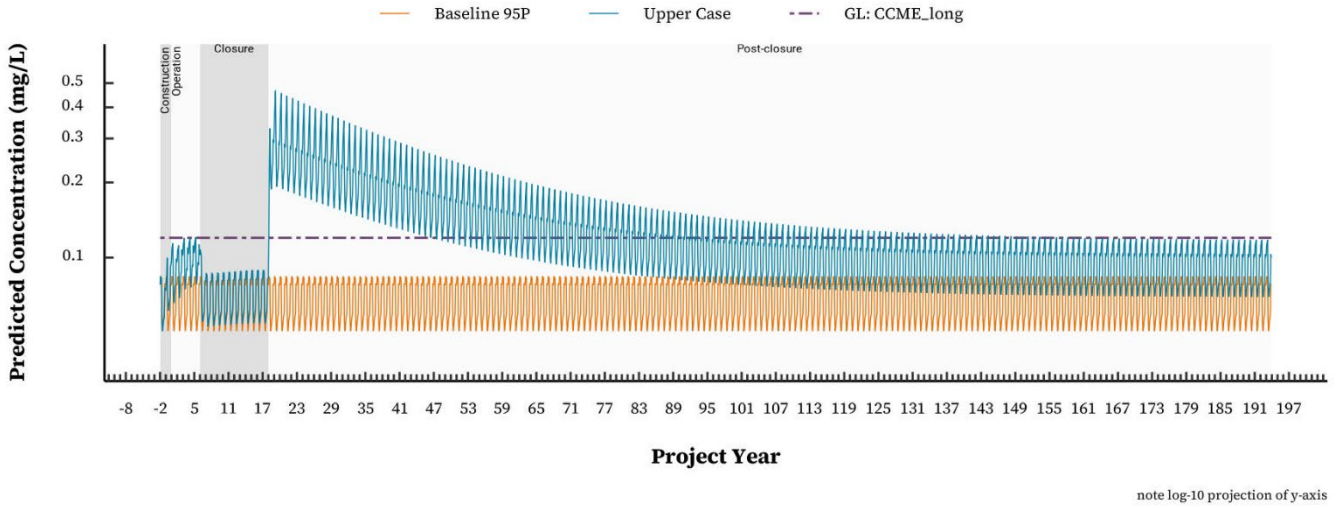


Figure H-2 Predicted Project vs. Baseline Concentrations of Fluoride in West Farley Lake for the Upper-Case Scenario

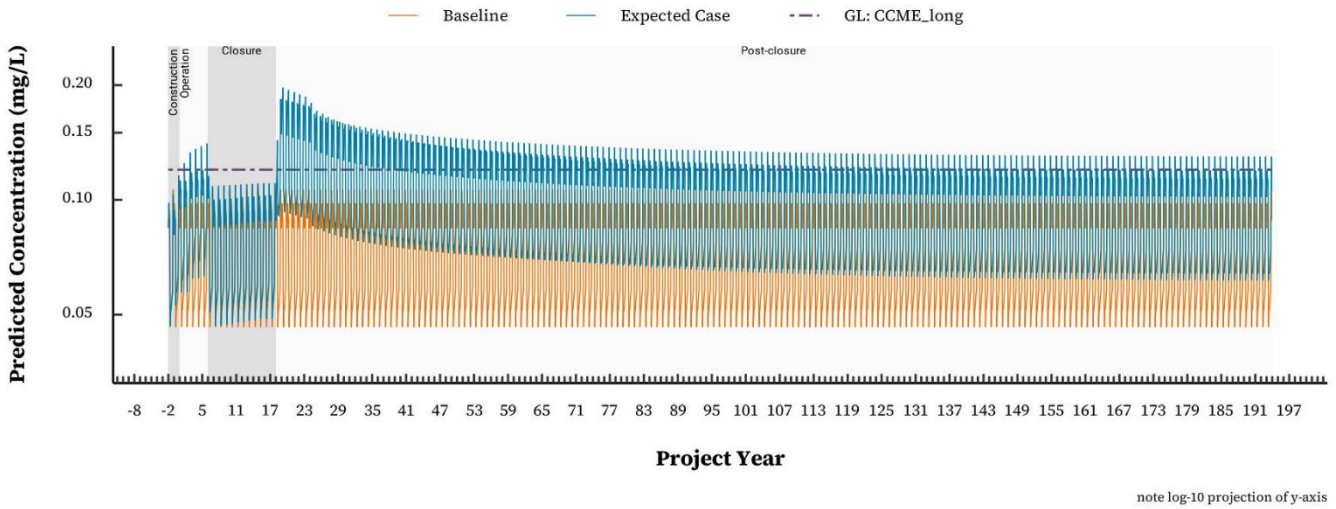


Figure H-3 Predicted Project vs. Baseline Concentrations of Fluoride in East Farley Lake for the Expected Case Scenario

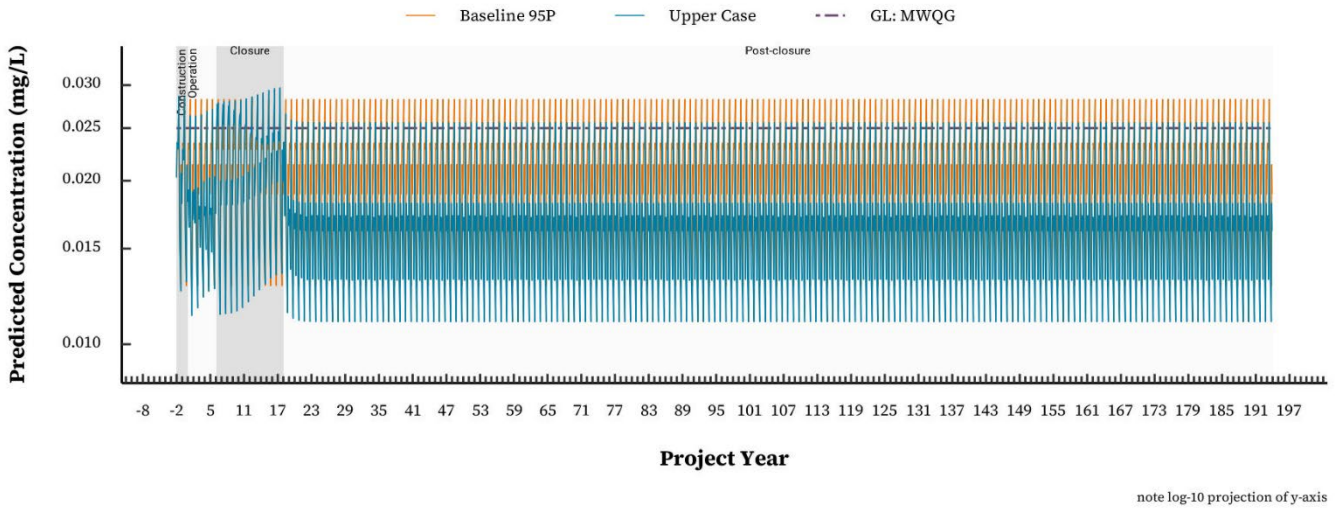


Figure H-4 Predicted Project vs. Baseline Concentrations of Fluoride in East Farley Lake for the Upper-Case Scenario

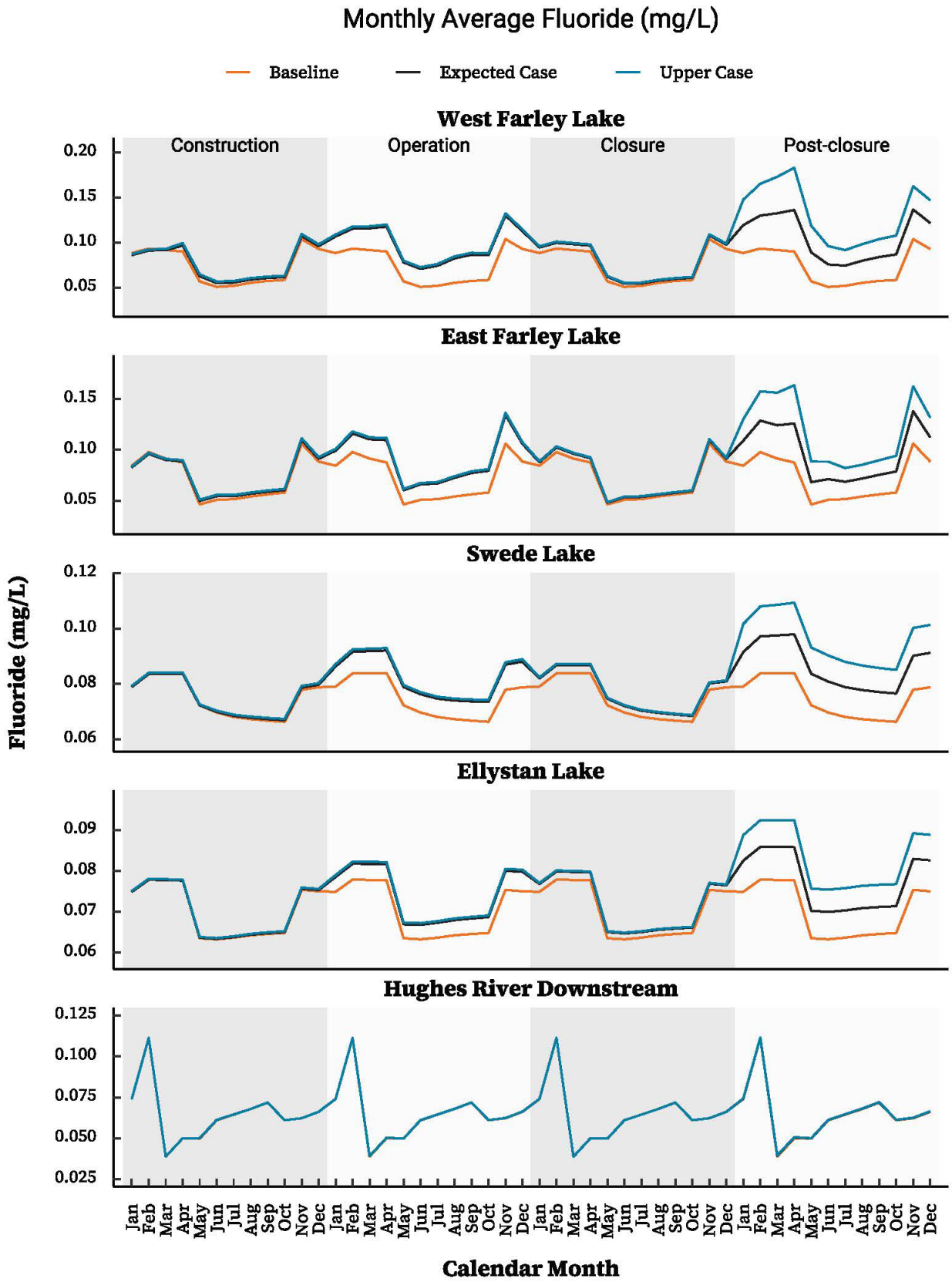


Figure H-5 **Predicted Monthly Mean Fluoride Concentrations in West Farley Lake, East Farley Lake, Swede Lake, Ellystan Lake, and the Hughes River (downstream of LAA) during Construction, Operation, Closure, and Post-Closure Phases. Note: Baseline, Expected Case, and Upper-Case scenarios are indistinguishable from each other in the Hughes River.**

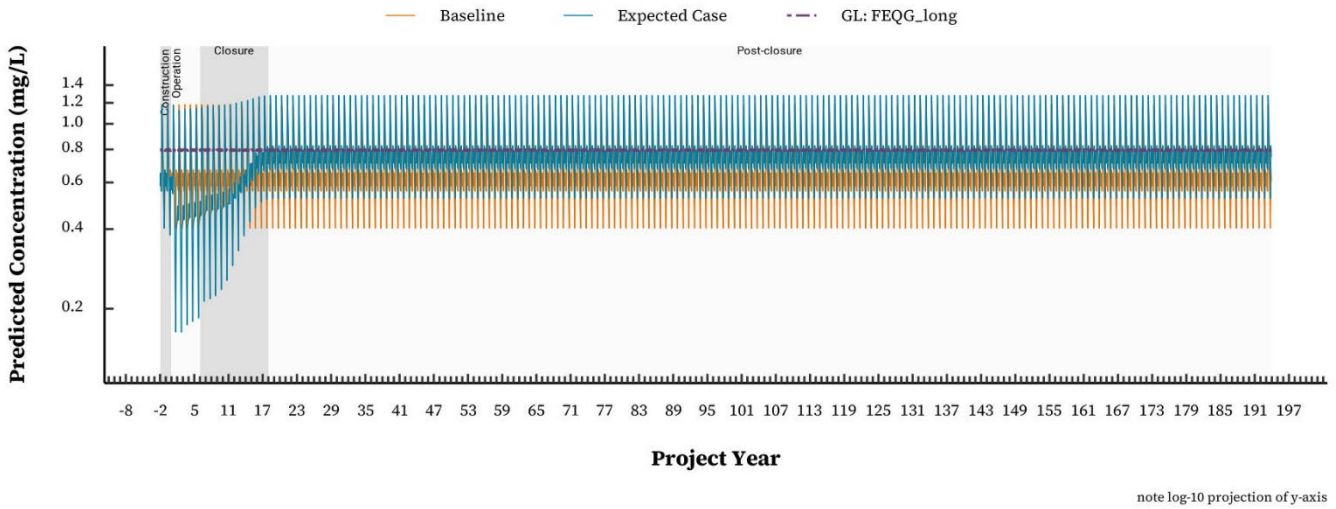


Figure H-6 Predicted Project vs. Baseline Concentrations of Total Iron in Gordon Lake for the Expected Case Scenario

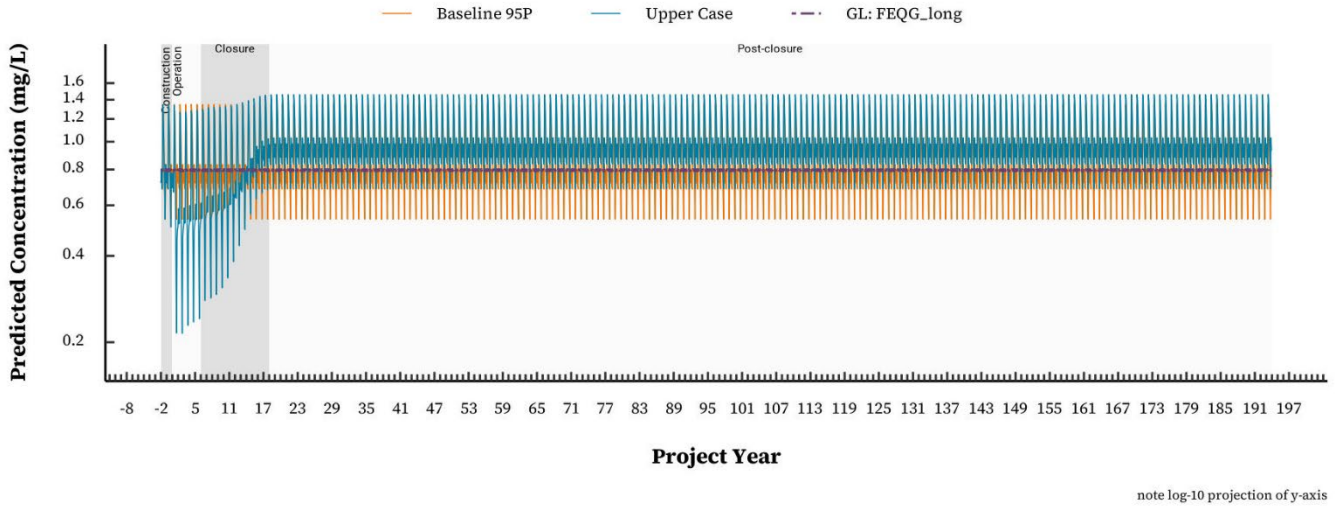


Figure H-7 Predicted Project vs. Baseline Concentrations of Total Iron in Gordon Lake for the Upper-Case Scenario

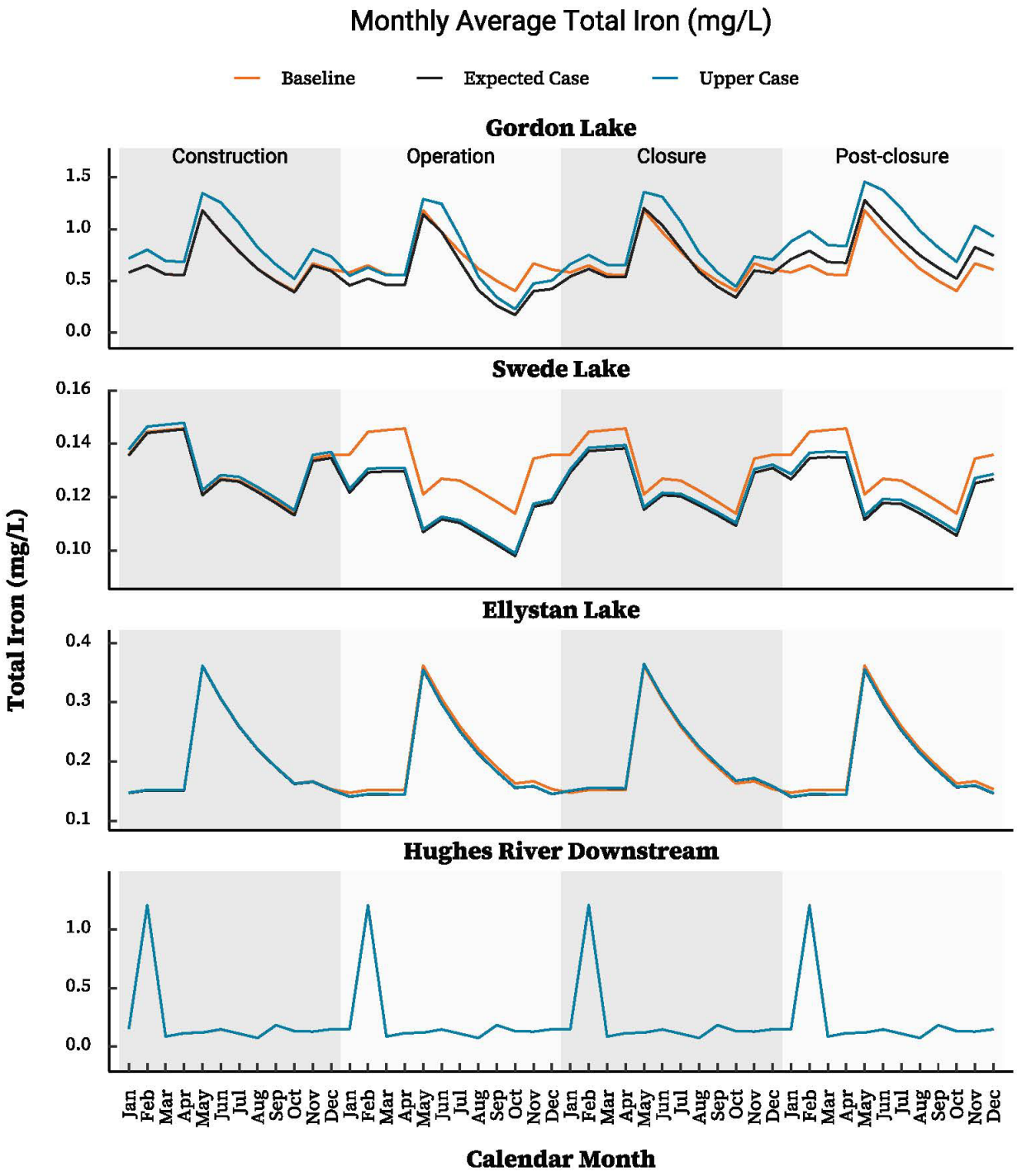


Figure H-8 **Predicted Monthly Mean Total Iron Concentrations in Gordon Lake, Swede Lake, Ellystan Lake, and the Hughes River (downstream) in Construction, Operation, Closure, and Post-Closure. Note: Baseline, Expected Case, and Upper-Case scenarios are indistinguishable from each other in the Hughes River.**

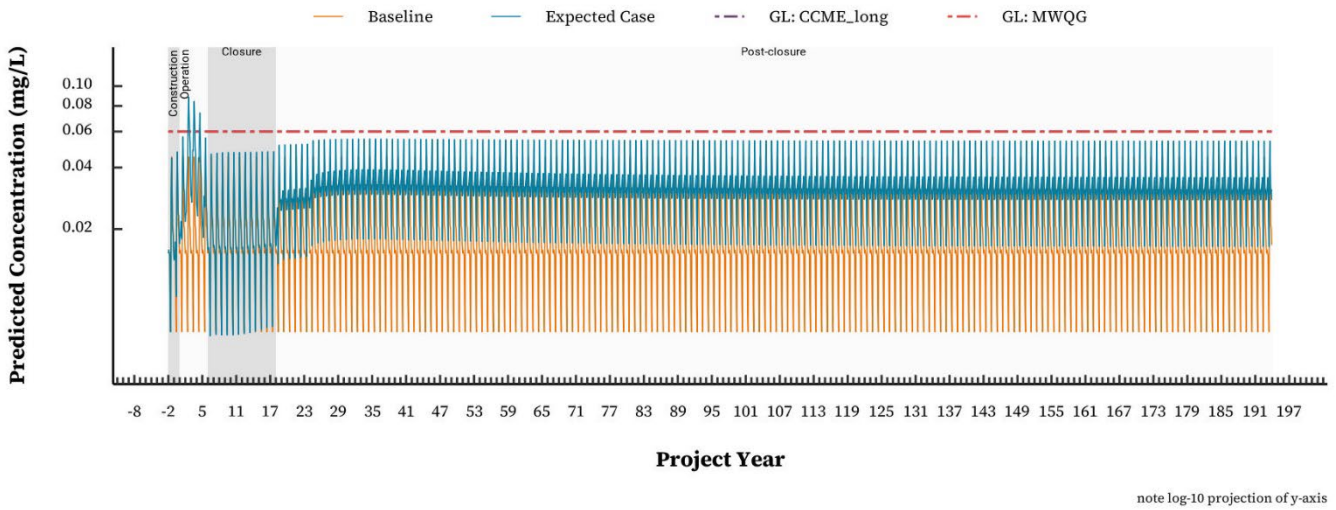


Figure H-9 **Predicted Project vs. Baseline Concentrations of Nitrite in West Farley Lake for the Expected Case Scenario**

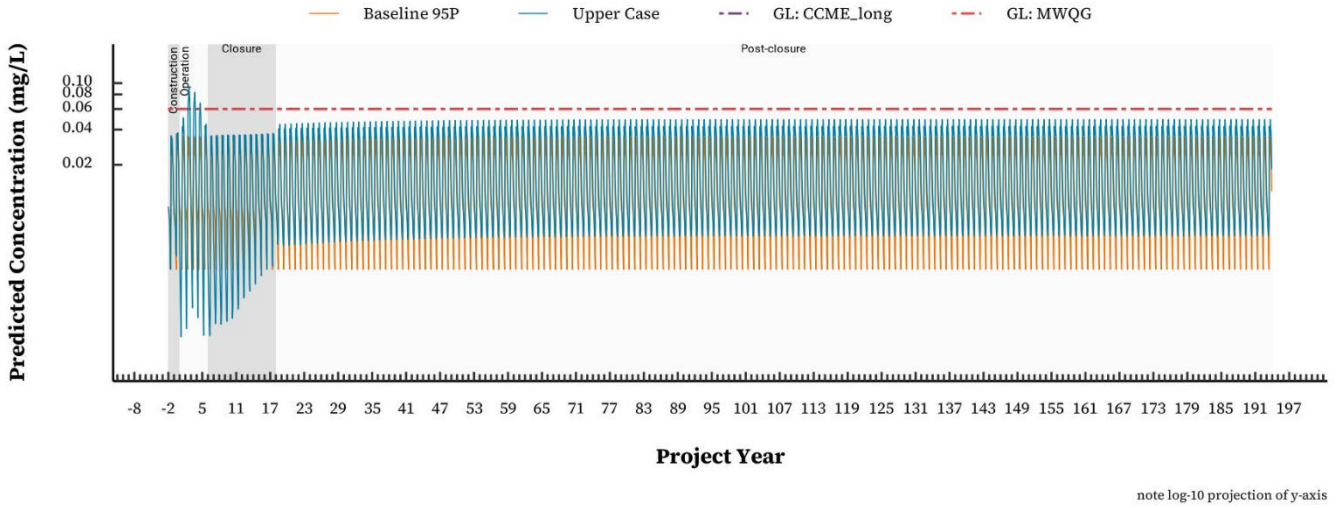


Figure H-10 **Predicted Project vs. Baseline Concentrations of Nitrite in West Farley Lake for the Upper-Case Scenario**

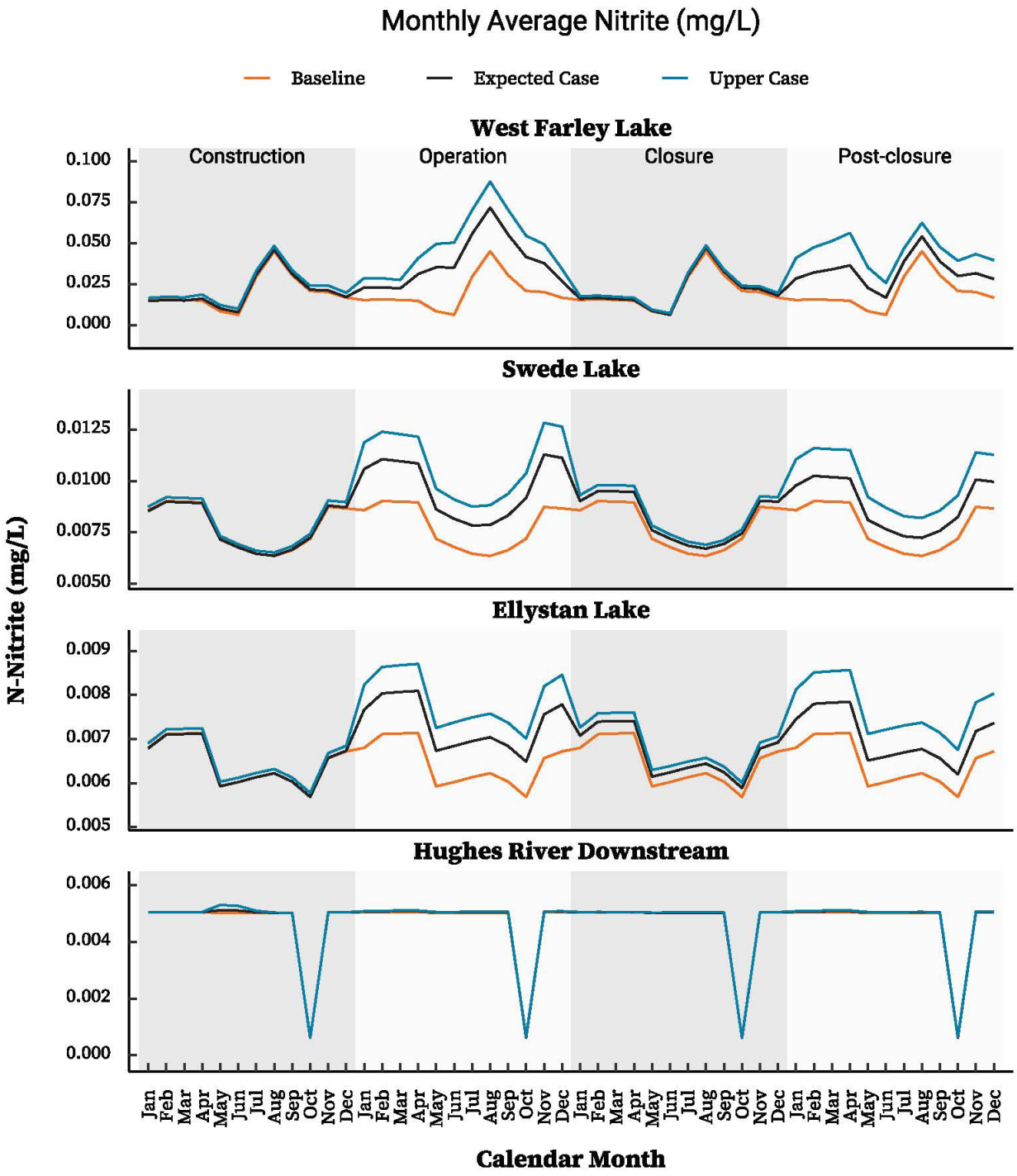


Figure H-11 **Predicted Monthly Mean Nitrite Concentrations in West Farley Lake, Swede Lake, Ellystan Lake, and the Hughes River (downstream) in Construction, Operation, Closure, and Post-Closure. Note: Baseline, Expected Case, and Upper-Case scenarios are indistinguishable from each other in the Hughes River.**

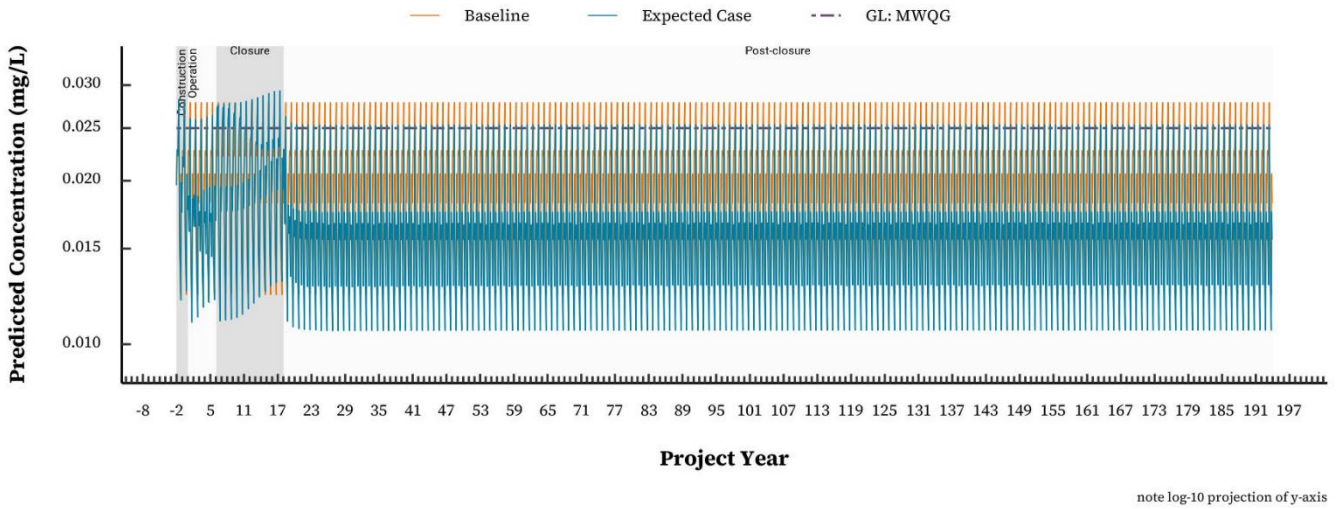


Figure H-12 **Predicted Project vs. Baseline Concentrations of Total Phosphorus in East Farley Lake for the Expected Case Scenario**

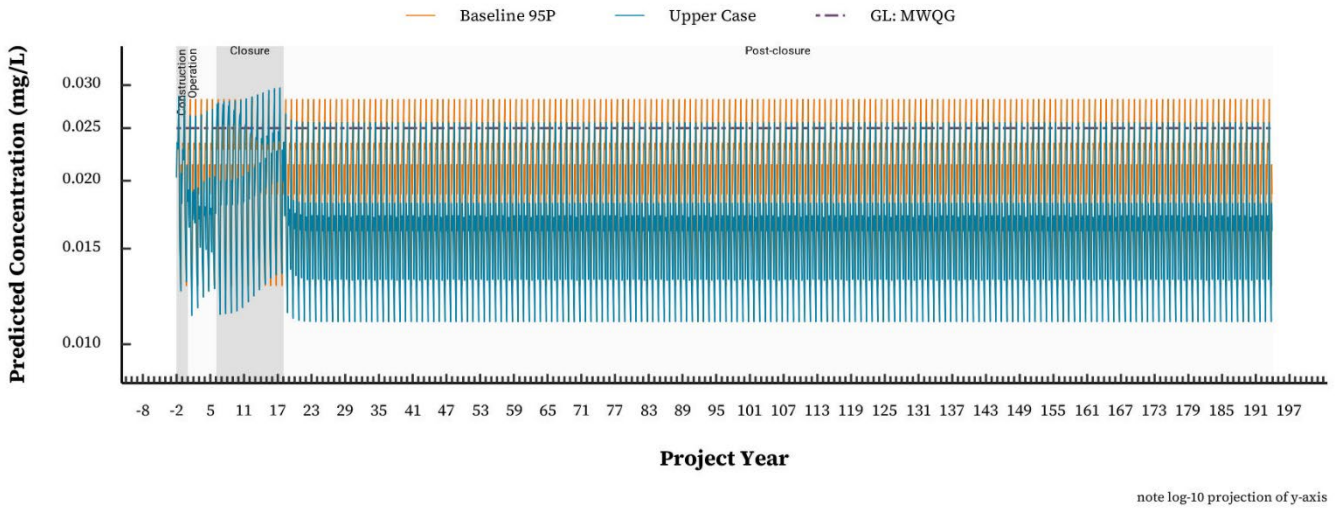


Figure H-13 **Predicted Project vs. Baseline Concentrations of Total Phosphorus in East Farley Lake for the Upper-Case Scenario**

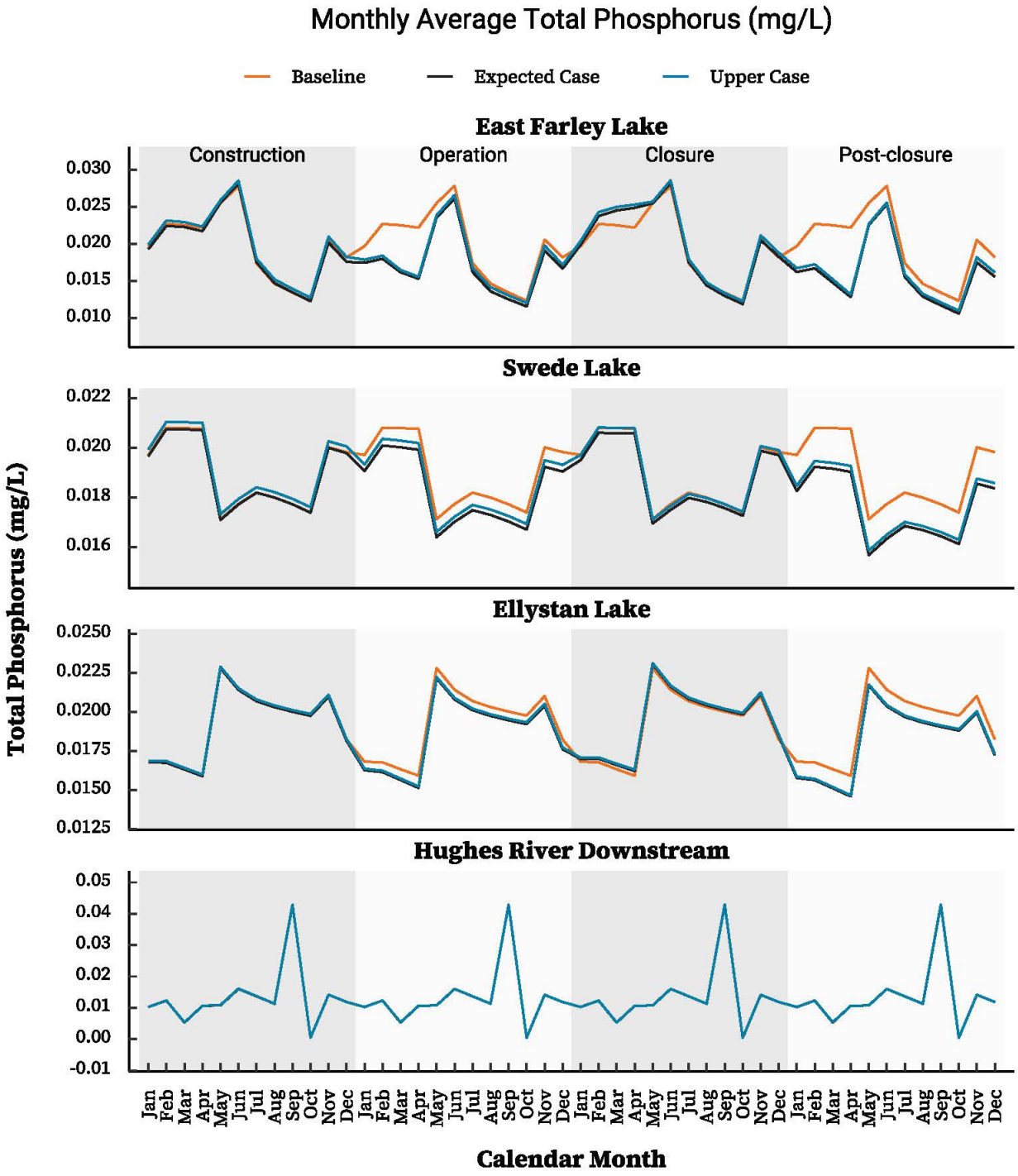


Figure H-14 Predicted Monthly Mean Total Phosphorus Concentrations in East Farley Lake, Swede Lake, Ellystan Lake, and the Hughes River (downstream) in Construction, Operation, Closure, and Post-Closure. Note: Baseline, Expected Case, and Upper-Case scenarios are indistinguishable from each other in the Hughes River.