



# 2021 Annual Reclamation Report No. J20185690RPA

Upland Mining Lease No. 9100759

Palmer Project  
Porcupine Mining District, Alaska

Prepared by: Constantine Mining LLC.

February 2022

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# Location and Activity Description

## Location

The Palmer Project is a copper-zinc-gold-silver (barite) exploration project located 34 miles northwest of the town of Haines in Southeast Alaska, USA. The project is being advanced as a joint venture partnership, Constantine Mining LLC, between Constantine North Inc. (Constantine) incorporated in Alaska (a wholly owned subsidiary of Constantine Metal Resources Ltd.) and Dowa Metals & Mining Alaska Ltd. (Dowa) incorporated in Alaska (a wholly owned subsidiary of Dowa Metals and Mining Co. Ltd. of Japan), with Constantine as operator.

The Project is in the Porcupine Mining District on the eastern margin of the Saint Elias mountain range. Figure 1 shows the location of the Project. The western boundary of the Project is the international border with the Canadian province of British Columbia. The Project is located proximal to the paved Haines Highway (Alaska Hwy 7), which leads to the town of Haines, Alaska, to the southeast. A secondary gravel logging road connects the project area to the Alaska Hwy 7 via a bridge across the Klehini River at 26-mile. Drill core storage and camp facilities are located on privately-owned land at the Big Nugget Camp located on Porcupine Creek, approximately 7 miles from the 26-mile bridge.

## Project Activity

Constantine began exploratory surface drilling at the Palmer Project in 2006. Existing surface access onto the Glacier Creek valley is via a gravel road that extends approximately 4 miles from existing logging roads. Constantine upgraded and extended the Glacier Creek access road, under approval from the ADNR and BLM, in 2014, 2016, 2017 and 2018. No work was performed in 2019-2021. The road extension and disturbance associated with surface drilling are bonded through a state-wide pool and is addressed under a separate annual reclamation report, submitted to DNR under APMA 5960 (CNI, 2019).

Currently, Constantine is proposing the development of an underground exploration ramp to support underground drilling. The underground development is broken into two Phases; Phase I is partial construction of the supporting surface infrastructure and the Phase II includes the construction of the adit and operation of the wastewater disposal system. All works associated with underground exploration are on fee simple Mental Health Trust (MHT) lands for which MHT holds title to both the surface estate and the subsurface mineral estate. The lands are leased to Constantine under MHT Upland Mining Lease No. 9100759 (Figure 1).

### **Phase I**

Constantine submitted *Phase I Plan of Operations* to MHT (TLO), and associated Reclamation Plan to Alaska Department of Natural Resources (ADNR) for approval in early 2018. The Phase I Plan of Operations proposed to extend the Glacier Creek access road for 0.7 miles to a future portal location and build additional surface infrastructure associated with plans to begin an underground exploration program, including the construction of two water settling ponds, waste rock storage areas, the construction of snow avalanche defense structures, and excavation of a trench that will eventually be used for a buried Land Application Disposal System (LAD) to dispose of underground

seepage water during future underground activities (Figure 2). On June 14<sup>th</sup>, approval of the Reclamation Plan was provided by the ADNR (No. J20185690RPA). The total approved surface disturbance is for **17 acres**. The reclamation plan and cost estimate associated with Phase I was approved by the ADNR on June 14<sup>th</sup>, 2018 (No. J20185690RPA). Shortly thereafter, in June 2018, Constantine Mining LLC posted a US \$155,403 deposit in an account held with First National Bank with the ADNR to cover temporary and permanent reclamation activities associated with Phase I. In July 2020, the company replaced the \$155,403 deposit with a surety bond for the same amount. Work on Phase I was initiated in 2018, and included road pioneering, and ground clearing and leveling for proposed infrastructure.

### **Phase II**

The Final Phase II Plan of Operations and Reclamation Plan and Cost Estimate was submitted to ADNR and MHT on April 11<sup>th</sup>, 2019. The Phase II Plan of Operations proposed the excavation of roughly 2,012 m of an underground exploration ramp, exploration drilling, construction and operation of the LAD system and associated settling ponds, and the construction of ancillary facilities (Figure 2 and Figure 3). On July 23<sup>rd</sup>, 2019 Constantine received approval from MHT to complete work outlined in the Plan of Operations. The ADNR amended the existing Reclamation Plan Approval obtained for Phase I to incorporate Phase II activities; the final authorization for Phase II work was issued on July 17<sup>th</sup>, 2019 (J20185690RPA), approving a reclamation cost estimate of \$1,011,542. Note that the bonding for Phase I surface infrastructure stands until underground development is begun. No work was completed in 2021.

This report summarizes disturbance as of the end of 2021 associated with the Phase II Plan of Operations and fulfills the annual reporting requirements for the ADNR Reclamation Plan Approval (no. J20185690 RPA).

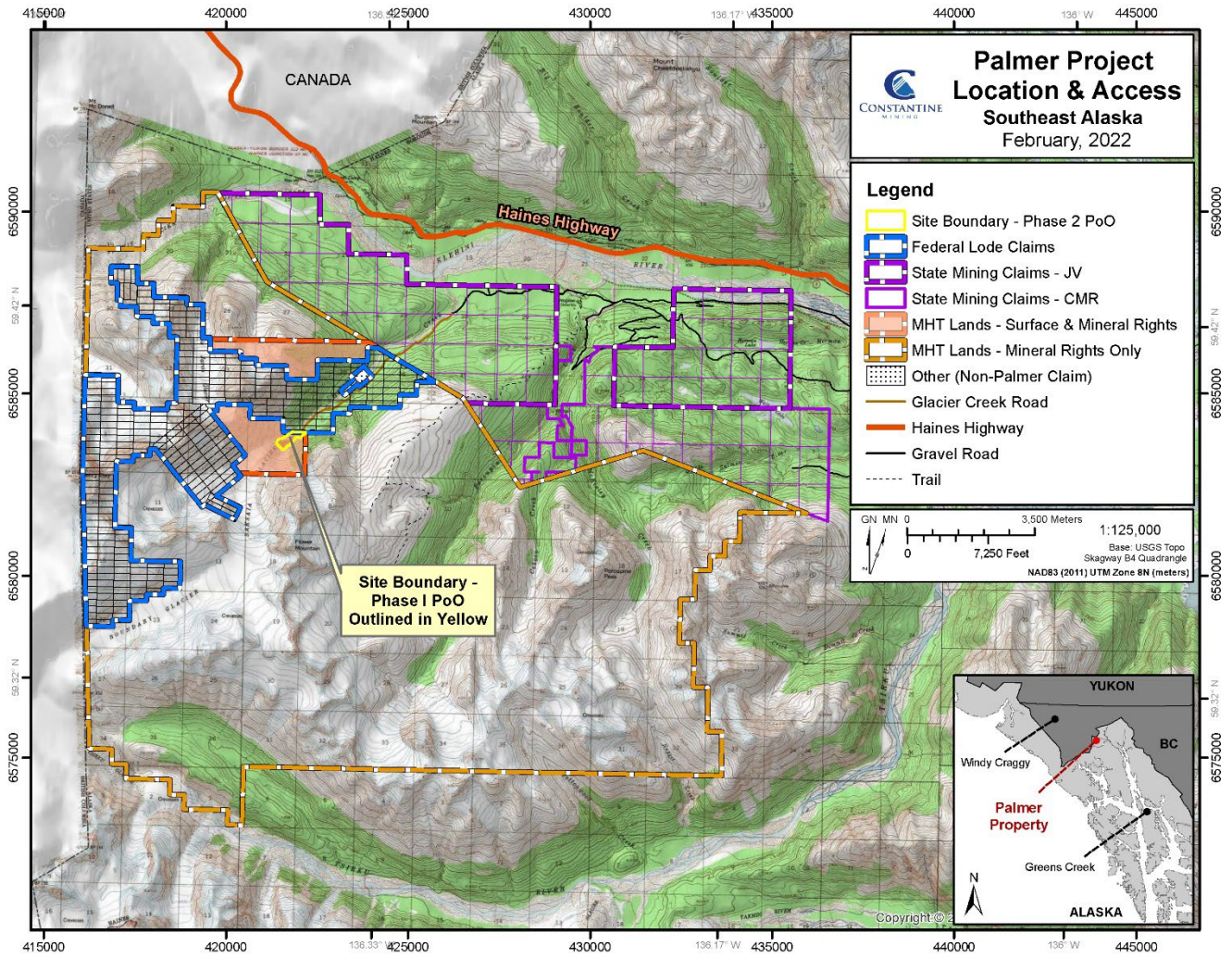
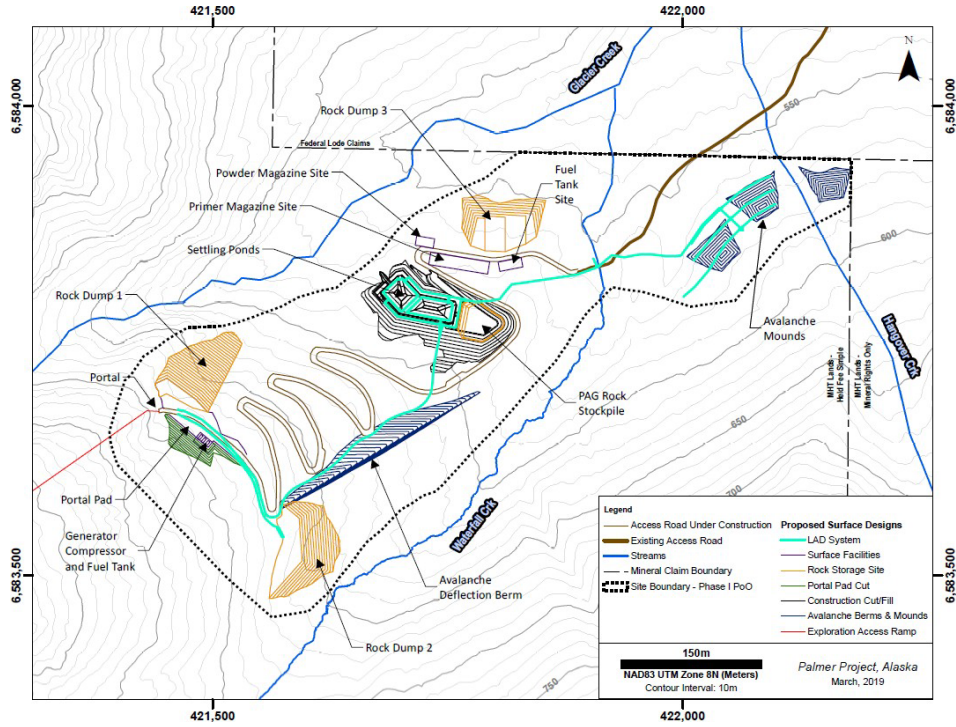
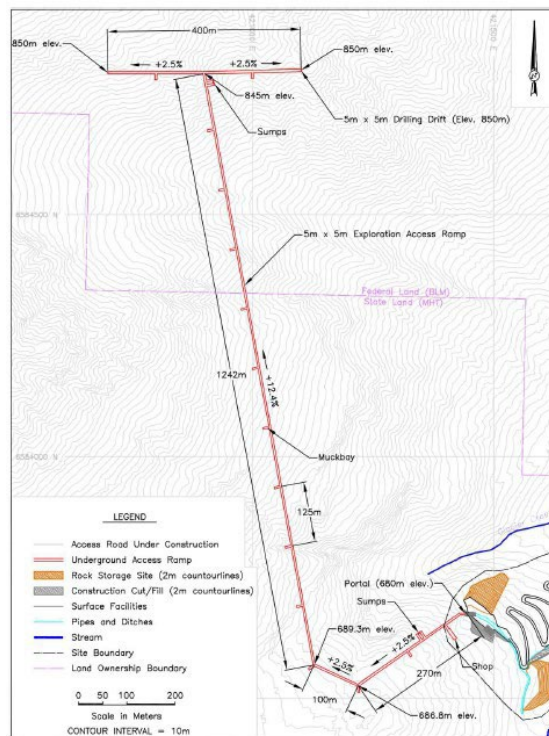


Figure 1 Palmer Project Property Map showing Site Boundary area under J20185690.





**Figure 2 Conceptual designs for the major Phase I (Glacier Creek road, ponds, trench for future LAD system, laydown area, portal pads, avalanche berms and mounds) and Phase II (exploration access ramp, settling ponds) components.**



**Figure 3 Conceptual design for Phase II exploration access ramp.**

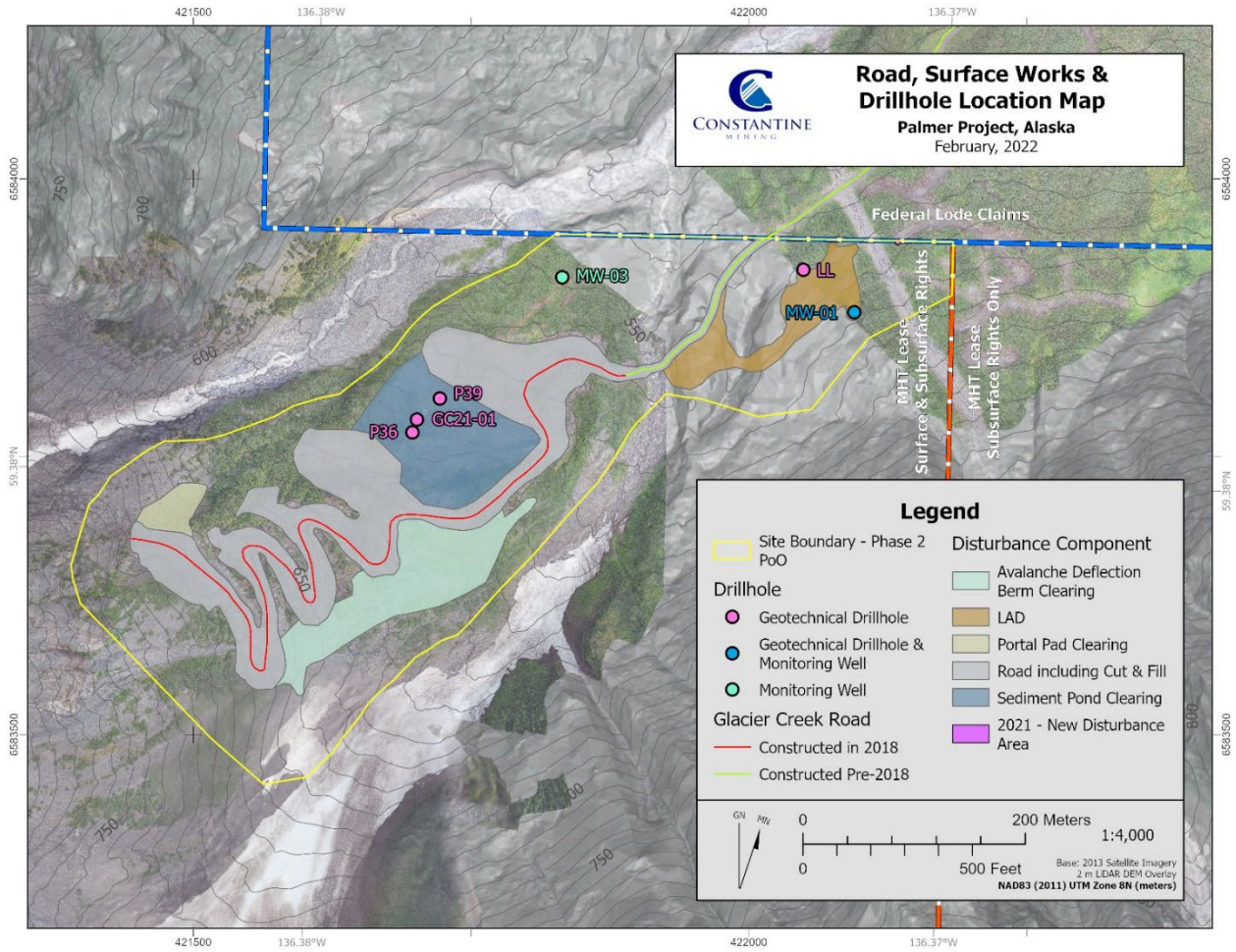
## Site Disturbance

Constantine has prepared reclamation plans for both temporary closure and permanent closure scenarios, approved by the ADNR. The access road on Trust lands will be left in-place at closure per an understanding with the Trust.

In 2021, overburden pads and access trails were constructed in Glacier Creek Valley for overburden drilling to support environmental and hydrogeological work. Only **0.0055** acres were disturbed within the Phase II site boundary, consisting of the corner of the pad cleared for environmental monitoring well MW21-11 (Photo 1). The pad remains unreclaimed for continued monitoring and future hydrogeological work. Disturbance increased slightly to an estimated total of **8.06 acres** (excluding the road), approximately 0.01 acres greater than 2020. All disturbance associated with Phase II approvals are on fee simple claims, within the Phase II site boundary. Disturbances are tabulated below and shown on Figure 4. Additional details are available in the 2018 Annual Reclamation Report submitted to ADNR in March 2019.

**Table 1 Summary of Disturbance Components and Associated Acreage of Disturbance, 2021**

Item	Acreage
Road including Cut & Fill	9.4
Avalanche Deflection Berm Clearing	2.79
Sediment Pond & Rock Stockpile Clearing	3.06
Portal Pad Fill Area	0.44
LAD Clearing	1.74
MW-03 Clearing	0.02
MW21-11 Clearing	0.0055
<b>TOTAL</b>	<b>17.46</b>
<b>TOTAL (Excluding Road)</b>	<b>8.06</b>



**Figure 4 Location map of disturbance components as of 2021. Only 0.0055 acres of additional disturbance was created in 2021.**





**Photo 1** Aerial photo (taken July 31, 2019), looking SE, showing land clearing associated with Phase I & II Plan of Operations (on MHT Lands). Inset photo shows drone imagery (taken September 18, 2021) of the only additional disturbance within the Plan of Operations site boundary created in 2021.

## Reclamation

No permanent reclamation was performed in 2021.

## Financial Responsibility

The reclamation plan and cost estimate associated with Phase I was approved by the ADNR on June 14<sup>th</sup>, 2018 (No. J20185690RPA). Shortly thereafter, in June 2018, Constantine Mining LLC posted a US \$155,403 deposit in an account held with First National Bank with the ADNR to cover temporary and permanent reclamation activities associated with Phase I.

The reclamation plan and cost estimate associated with Phase II was approved by the ADNR on July 17<sup>th</sup>, 2019 and was incorporated as amendment of the existing Reclamation Plan Approval No. J20185690RPA. This reclamation plan and reclamation cost estimate supersede the reclamation plan and cost estimate included in Constantine's Phase I Plan of Operations. The ADNR approved a reclamation cost estimate of \$1,011,542 associated with Phase II activities. This figure includes the Phase I cost estimate.

As no applicable work was completed in 2021, and underground development has not begun yet, no additional financial assurance or bonding has been put into place above what is discussed above. Financial responsibility will be re-evaluated in 2022 as the wastewater management system is being re-designed.

## Monitoring

### Compliance Monitoring – Waste Management Permit

The Waste Management Permit #2019DB0001 (WMP) was issued to Constantine Mining LLC by the State of Alaska, Department of Environmental Conservation (ADEC) on July 17<sup>th</sup>, 2019. The WMP authorizes the management and disposal of underground seepage water and waste rock associated with Phase II.

The WMP was remanded by ADEC in September 2019 for an informal review largely due to the Maui v. Hawaii Wildlife Case which challenged the permitting authority for disposal of wastewater to groundwater. In August 2020 Constantine notified ADEC that an evaluation and re-design of the LAD system was underway to ensure that the LAD was compliant with the changing legal environment. Constantine collected additional information on site hydrogeology to inform the LAD re-design. The results of these studies will be submitted to the ADEC as supporting documentation for the LAD re-design and WMP amendment, likely in 2022. The WMP remains under remand at the time of writing this report.

Quarterly sampling has been conducted on surface water (4 stations) and groundwater (2 stations) as required by the WMP. This sampling is summarized in the 2021 Annual (4th Quarter) Monitoring Report submitted to the ADEC in February 2022. The annual report is included as Appendix A: Waste

Management Permit - 2021 Annual Monitoring Report.

### **Other Monitoring and Studies**

Other environmental monitoring activities conducted in 2021 are summarized in Appendix A: Waste Management Permit - 2021 Annual Monitoring Report, and include:

- Hydrometric surveys of surface water (voluntary)
- Groundwater level and temperature monitoring (voluntary)
- Meteorological monitoring (voluntary)

## **Appendix A: Waste Management Permit – 2021 Annual Monitoring Report**

*Note: appendices of the Waste Management Permit annual report are available from the  
ADEC*

# **2021 Annual (4th Quarter) Monitoring Report**

## **Palmer Advanced Exploration Project Haines, Alaska**

**Waste Management Permit 2019DB0001**



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February 2022



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## 1.0 INTRODUCTION

### 1.1 BACKGROUND

The Waste Management Permit #2019DB0001 (WMP) was issued to Constantine Mining LLC (Constantine) by the State of Alaska, Department of Environmental Conservation (DEC) on July 17<sup>th</sup>, 2019. The WMP authorizes the management and disposal of underground seepage water and waste rock associated with advanced exploration at the Palmer Project (the Project) and is effective until July 16<sup>th</sup>, 2024.

On August 10<sup>th</sup>, 2020, Constantine submitted a letter informing the DEC of their intent to modify the Wastewater Discharge System Design as set out in Appendix A of the WMP. On August 31<sup>st</sup>, 2020, the DEC accepted a redesign with the condition that no construction can commence until the design is complete. Since August of 2020, Constantine has been working on collecting additional hydrogeological information to support the new Wastewater Discharge System Design. Monitoring requirements stipulated by the WMP remain in place.

The WMP outlines monitoring and reporting requirements (Sections 2.5 and 2.6). This report includes the monitoring period for the fourth quarter of 2021 and satisfies Section 2.6.3, which requires annual reporting on monitoring activities. This is the third annual reporting period since the issuance of the WMP in July 2019, and includes data collected in 2021.

### 1.2 PROJECT ACTIVITIES

The surface construction and underground development described in the WMP and Plan of Operations (approved by DNR under J20185690RPA) has not yet commenced. As a result, waste authorized by the WMP has not been generated to date. Monitoring associated with operating site infrastructure is therefore not included in this report (as described in Sections 2.5.1, 2.5.2, 2.5.3, 2.5.4, 2.5.5.3, and 2.5.5.4 of the WMP) and data presented in this report continue to characterize near baseline conditions.

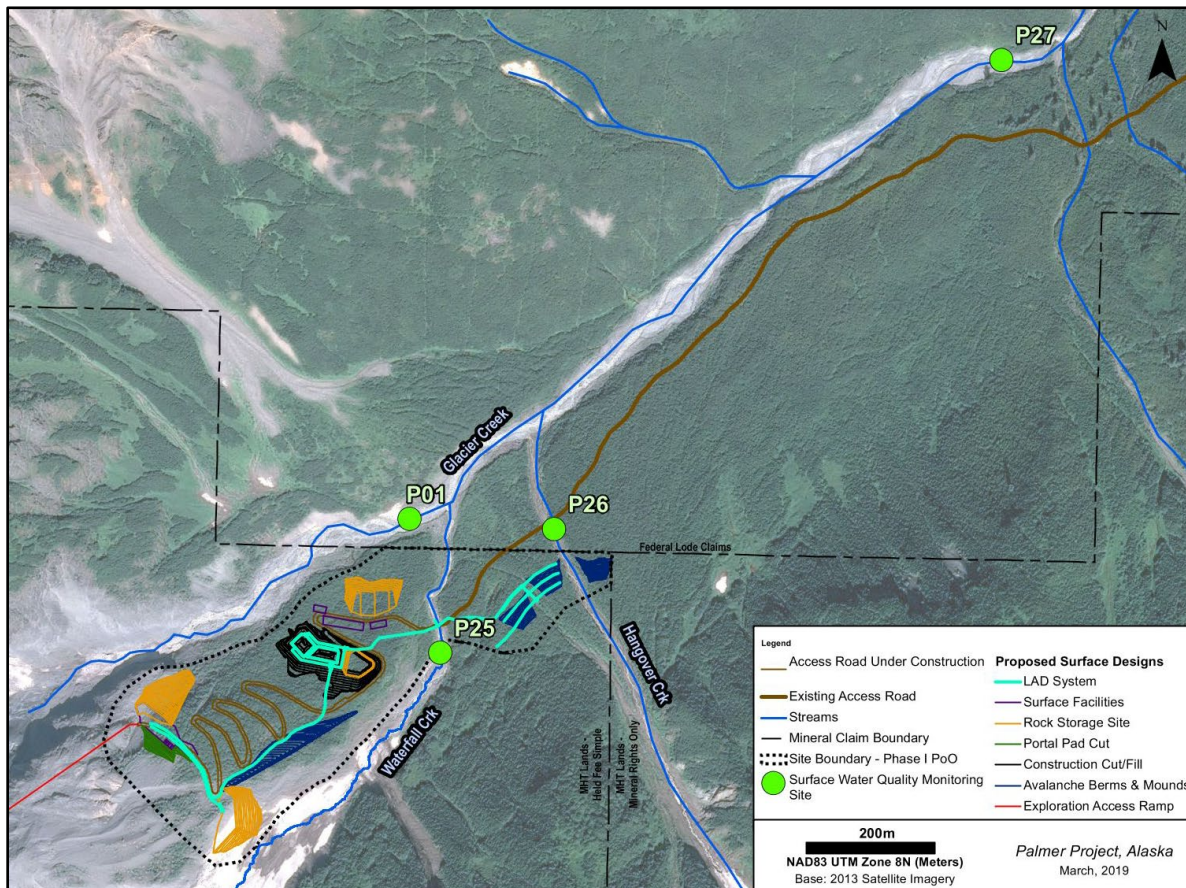
Constantine started the 2021 field season on June 1<sup>st</sup> and mobilized two diamond drills to the South Wall during the first half of June. Diamond drilling activities were completed in early October. A sonic drill program was also conducted in Glacier Creek Valley during August and September. Several new monitoring wells were installed east of Hangover Creek to better understand the hydrogeology of Glacier Creek valley. Activities related to diamond and sonic drilling are not anticipated to impact water quality presented in this report. Sporadic environmental work continues year-round.

## 2.0 ENVIRONMENTAL MONITORING

### 2.1 Surface Water Monitoring

#### 2.1.1 BACKGROUND

Four surface water stations in the Project area have been monitored since as early as 2008: P01 (Glacier Creek upstream), P27 (Glacier Creek midpoint), P25 (Waterfall Creek), and P26 (Hangover Creek; see Figure 1 and Table 1). Water quality sampling and analytical procedures are performed in accordance with Constantine’s Quality Assurance Project Plan (QAPP), prepared by Integral Consulting in 2018 and revised by HDR in October 2019 (as per Section 2.5.5.6 of the WMP). Samples are analyzed by ALS Environmental Laboratory for conventional parameters, settleable solids, cations/anions, total/dissolved metals following SM and EPA methods. Field parameters including pH are also collected at each site during the sampling event (more detail is available in the Project QAPP).



**Table 1 Surface water monitoring stations**

Station	Station Location	Description	Date sampling initiated	No. of water quality sampling events
P01	Upper Glacier Creek	Upstream of exploration impacted area; near source of Glacier Creek	September, 2008	30
P27	Midpoint of Glacier Creek	Below exploration impacted area	February, 2017	30
P25	Waterfall Creek	Downgradient of the proposed LAD upper diffuser	February, 2017	19
P26	Hangover Creek	Downgradient of the proposed LAD lower diffuser	July, 2017	18

## 2.1.2 WATER QUALITY

As per the WMP (Section 2.5.5.2), surface water is monitored on a quarterly basis at four sites: P01, P27, P25, and P26 (see Figure 1 and Table 1). All sites were sampled in the fourth quarter of 2021 (Table 2).

Trigger limits are defined in the WMP for P27, P25, and P26. All water quality parameters fell below the defined trigger limits during the fourth quarter of 2021, except the pH of Hangover Creek (P26), which was recorded at 5.52 (see Table 3).

P01, the upper sampling station on Glacier Creek, was sampled during the 2nd through 4th quarters. Metal exceedances of AWQS were observed in 2nd and 3rd quarters. The metal exceedances were for the total aluminum, iron and manganese (Table 4). Concentrations of the three metals are similar to those sampled in the previous year at the same time with exceedances being multiple times higher than the AWQS. None of the exceedances above AWQS were above the WMP triggers for this site.

P25 is located on Waterfall Creek, a tributary of Glacier Creek's uppermost headwaters and was sampled during the 2nd through 4th quarters. Exceedances of AWQS occurred for aluminum, iron, and selenium, sulfate, TDS, and DO Saturation (Table 4), which have been observed in previous years. The selenium exceedances were just slightly above the AWQS of 0.005 mg/L. There were also exceedances for sulfate and total dissolved solids (TDS), which were also observed in previous years. Concentrations of DO during the June 2021 sampling event was slightly above the AWQS range. None of the exceedances for P25 were above the WMP triggers for the site.

P26 is located on Hangover Creek, a tributary of Glacier Creek. It was sampled during the 2nd, 3rd, and 4th quarters. Exceedances of AWQS occurred for aluminum, iron, manganese, pH, and DO saturation (Table 4). Aluminum, iron, and manganese exceedances follow trends seen in other surface water quality sites with exceedances being higher during the 2nd quarter then the concentrations dropping in the 3rd quarter but still being above the AWQS. pH was just below the AWQS range and also exceeded the WMP trigger for this site. DO saturation was just above the AWQS.

P27 is located a midpoint of Glacier Creek and below exploration activities. It was sampled during the 2nd, 3rd, and 4th quarters. All exceedances of AWQS were for the metals: aluminum, iron and manganese during the months of June and September except for one exceedance. One exceedance for DO saturation occurred during the second quarter sampling event with the reading being higher than the AWQS (Table 4). None of the exceedances at this site for AWQS exceeded the WMP triggers.

Concentrations of water quality parameters at each surface water monitoring station over time are presented graphically in Appendix A, and raw water quality data is digitally available in Appendix B.



**Table 2 Surface water monitoring stations sampled in 2021**

Station	Quarters Sampled
P01	2, 3, 4
P25	2, 3, 4
P26	2, 3, 4
P27	2, 3, 4

\* note sampling did not occur in Q1 due to safety issues and ongoing COVID-19 pandemic

**Table 3 Q4 Surface water quality results compared to WMP trigger limits**

Parameter	Units	P25		P26		P27	
		Result	Trigger	Result	Trigger	Result	Trigger
aluminum	mg/L	0.0485	10	0.0381	21	0.27	43
arsenic	µg/L	<0.10	10	0.12	10	<0.10	10
cadmium	µg/L	0.0403	0.37	0.023	0.79	0.079	0.39
calcium	mg/L	152	NA	108	NA	89.4	NA
copper	µg/L	<0.50	24	<0.50	70	1.03	133
iron	mg/L	0.09	16	0.07	39	0.54	16
lead	µg/L	<0.050	4.3	<0.050	4.3	0.208	6.4
magnesium	mg/L	17.3	NA	6.32	NA	11.3	NA
manganese	µg/L	2.57	290	1.68	970	16.1	2200
mercury	µg/L	<0.0050	0.012	<0.0050	0.012	<0.0050	0.012
nitrate as N	mg/L	0.228*	10	0.0816*	10	0.41	10
pH	s.u.	8.26	<6.5 or >8.5	8.27	<6.5 or >8.5	8.23	<6.5 or >8.5
selenium	µg/L	5.35	8.2	3.38	5	2.12	5
sulfate	mg/L	402	650	216	299	194	268
total dissolved solids	mg/L	546	1037	374	573	354	500
zinc	µg/L	<3.0	146	<3.0	147	59.4	470

\* Nitrate (as N) was analyzed past the 48-hour hold time specified by the QAPP and were qualified as rejected as they were analyzed by the lab at least 2 times over the recommended hold time.

**Table 4 Annual surface water quality results compared to AWQS**

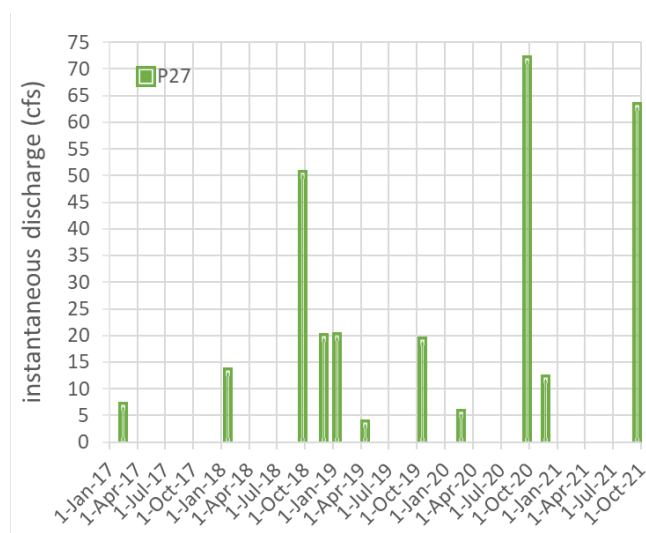
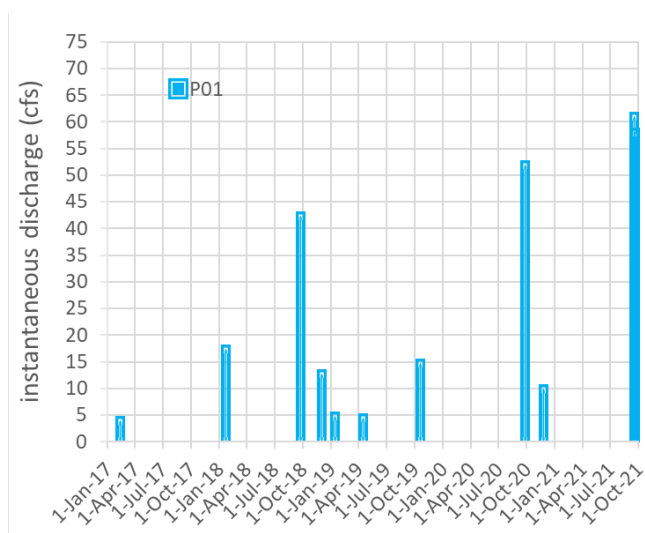
Station ID	Parameter	Date of Exceedance	Concentration (mg/L)	AWQS (mg/L)*
P01	Aluminum-Total	20-Jun-2021	5.52	0.75
		14-Sep-2021	4.02	
	Manganese-Total	20-Jun-2021	0.349	0.05
		14-Sep-2021	0.212	
	Iron-Total	20-Jun-2021	10	1
		14-Sep-2021	7.22	
P25	Aluminum-Total	20-Jun-2021	1.41, 1.28	0.75

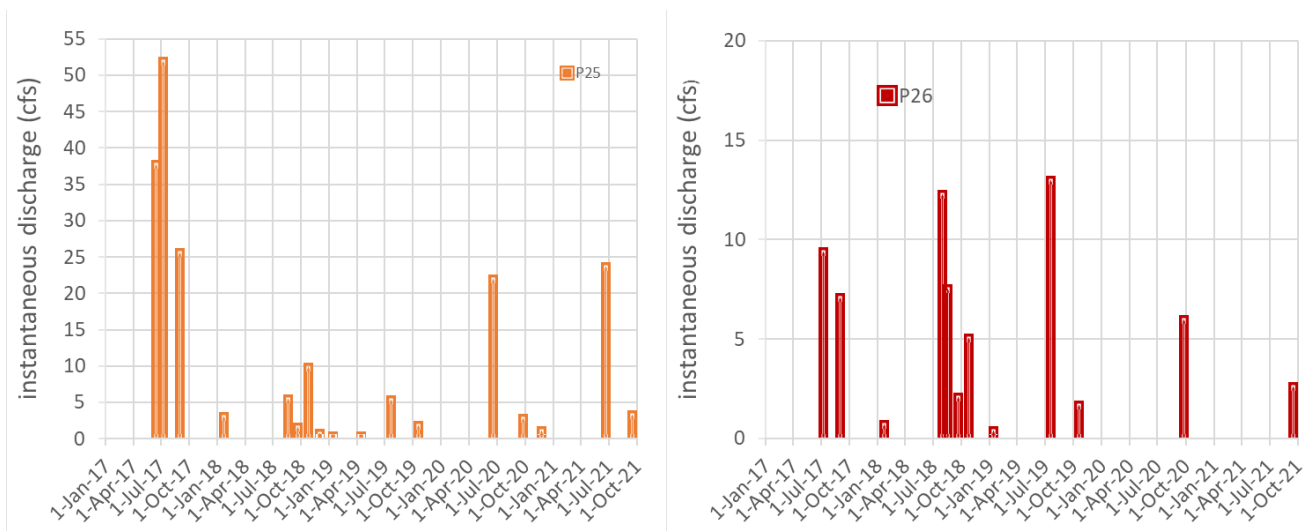
Station ID	Parameter	Date of Exceedance	Concentration (mg/L)	AWQS (mg/L)*
P25 (con't)	Iron-Total	20-Jun-2021	2.20, 2.03	1
	Selenium-Total	10-Nov-2021	0.00535	0.005
	Sulfate	14-Sep-2021	362	250
		10-Nov-2021	402	
	TDS	14-Sep-2021	653	500
		10-Nov-2021	546	
DO saturation	20-Jun-2021	119.5%, 115%	110%	
P26	Aluminum-Total	29-Jun-2021	4.48	0.087 - 0.750
		14-Sep-2021	2.22, 2.11	
	Iron-Total	29-Jun-2021	7.85	1
		14-Sep-2021	3.37, 3.20	
	Manganese-Total	29-Jun-2021	0.194	0.05
		14-Sep-2021	0.0706, 0.0690	
	pH	29-Jun-2021	5.52 SU	6.5-8.5 SU
	DO saturation	29-Jun-2021	110.80%	110%
P27	Aluminum-Total	20-Jun-2021	1/4/1900	0.75
		14-Sep-2021	3.19	
	Iron-Total	20-Jun-2021	867%	1
		14-Sep-2021	5.94	
	Manganese-Total	20-Jun-2021	0.249	0.05
		14-Sep-2021	0.162	
DO saturation	20-Jun-2021	115.20%	110%	

\* ADEC, 2008

### 2.1.3 WATER QUANTITY

Constantine voluntarily collects hydrometric data from the monitoring stations, when safe to do so. Data was collected from all four surface water sites during the fourth quarter of 2021, although not yet analyzed (see Figure 2 for results upto Q3 of 2021).





**Figure 2 Flow measurements collected from surface water monitoring stations over time.**

## 2.2 Groundwater Monitoring

### 2.2.1 Background

In 2018 Constantine developed two groundwater monitoring wells above and below the proposed LAD lower diffuser site (MW-01 and MW-02, respectively), and began sampling on roughly a quarterly basis. Groundwater monitoring sites are depicted in Figure 3. No data is available for MW-04, as the proposed shallow groundwater monitoring well has yet to be developed (see Figure 3 for proposed location).

Water quality sampling and analytical procedures have been performed in accordance with Constantine's QAPP, prepared by Integral Consulting in 2018 and revised by HDR in October 2019 (as per Section 2.5.5.6 of the WMP). Samples are analyzed by ALS Environmental Laboratory for conventional parameters, settleable solids, cations/anions, total/dissolved metals following SM and EPA methods. Field parameters including pH are also collected at each site during the sampling event (more detail is available in the Project QAPP).

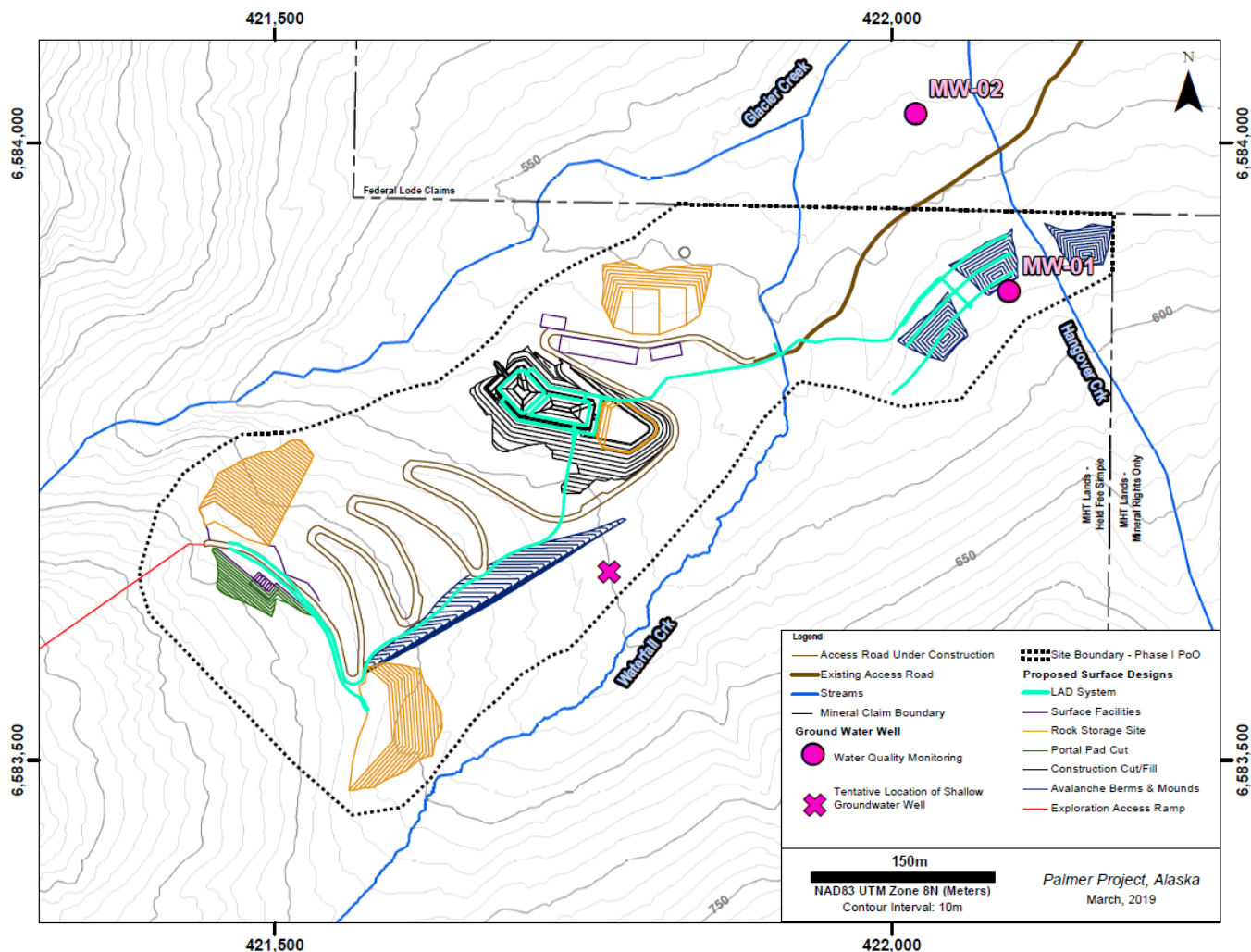


Figure 3 WMP Groundwater quality monitoring stations

Table 5 Groundwater monitoring stations

Station	Description	Date sampling initiated	No. of water quality sampling events
MW-01	Upgradient of proposed LAD lower diffuser	September, 2018	13
MW-02	Downgradient of proposed LAD lower diffuser	September, 2018	13

## 2.2.2 Water Quality

As per the WMP (Section 2.5.5.1), groundwater is monitored on a quarterly basis at two well sites: MW-01 and MW-02 (Figure 3 and Table 5). Both wells were sampled during the fourth quarter of 2021.

Trigger limits have been defined in the WMP for MW-02. All parameters fell below permit trigger limits during the fourth quarter of 2021 (see Table 7).

MW-01 was sampled during three of the four quarterly sampling events during 2021 (Table 6). There was one exceedance of AWQS at this location for pH (a pH of 4.29 was recorded on June 29, 2021), however it was noted in the field as possible pH drifting occurring and this could potentially be equipment error as all other pH readings at MW-01 are above a pH 7. The exceedance also exceeds the pH WMP trigger for this site.

MW-02 was also sampled during three of the four quarterly sampling events during 2021 (Table 6). Exceedances of AWQS occurred during the 4th quarter sampling event and were for aluminum, iron, and manganese. The exceedances at MW-02 were just over the AWQS, except for total manganese which was over twice the AWQS. None of the exceedances were over the WMP triggers for this site.

Concentrations of water quality parameters at groundwater monitoring stations over time are presented graphically in Appendix A, and raw water quality data is digitally available in Appendix B.

**Table 6 Groundwater monitoring stations sampled in 2021**

Station	Quarters Sampled*
MW-01	2, 3, 4
MW-02	2, 3, 4

\* note sampling did not occur in Q1 due to safety issues and ongoing COVID-19 pandemic

**Table 7 MW-02 Q4 water quality results compared to WMP trigger limits**

MW-02	Result	Trigger	Units
aluminum	0.771	15	mg/L
arsenic	<0.10	10	µg/L
cadmium	0.0325	0.4	µg/L
calcium	55.1	NA	mg/L
copper	3.08	53	µg/L
iron	1.56	29	mg/L
lead	0.224	6.2	µg/L
magnesium	6.13	NA	mg/L
manganese	114	550	µg/L
mercury	<0.0050	0.012	µg/L
nitrate as N	0.282*	10	mg/L
pH	7.94	<6.5 or >8.5	s.u.
selenium	0.779	5	µg/L
sulfate	58.7	250	mg/L
total dissolved solids	197	500	mg/L
zinc	5.3	186	µg/L

\* Nitrate (as N) was analyzed past the 48-hour hold time specified by the QAPP and were qualified as rejected as they were analyzed by the lab at least 2 times over the recommended hold time.



**Table 8 Annual groundwater quality results compared to AWQS**

Station	Parameter	Date of Exceedance	Concentration (mg/L)	AWQS* (mg/L)
MW-01	pH	29-Jun-2021	4.29	6.5-8.5
MW-02	Aluminum-Total	8-Nov-2021	0.771	0.75
	Iron-Total	8-Nov-2021	1.56	1
	Manganese-Dissolved	8-Nov-2021	0.0582	0.05
	Manganese-Total	8-Nov-2021	0.114	0.05

\* ADEC, 2008

### 2.2.3 Groundwater Level and Temperature

Groundwater depth and temperature has been voluntarily collected since August 2018 when the wells were installed. Groundwater level is measured in each groundwater monitoring well once every 6 hours, using transducers installed at the bottom of each well. Pressure transducer depth is compensated using barometric pressure, and depths are verified with manual measurements of the water level recorded during each sampling event.

Groundwater level data was downloaded during the fourth quarter sampling event of 2021, but has not yet been analyzed (see Figure 4 and Figure 5 for groundwater level up to Q3 of 2021).

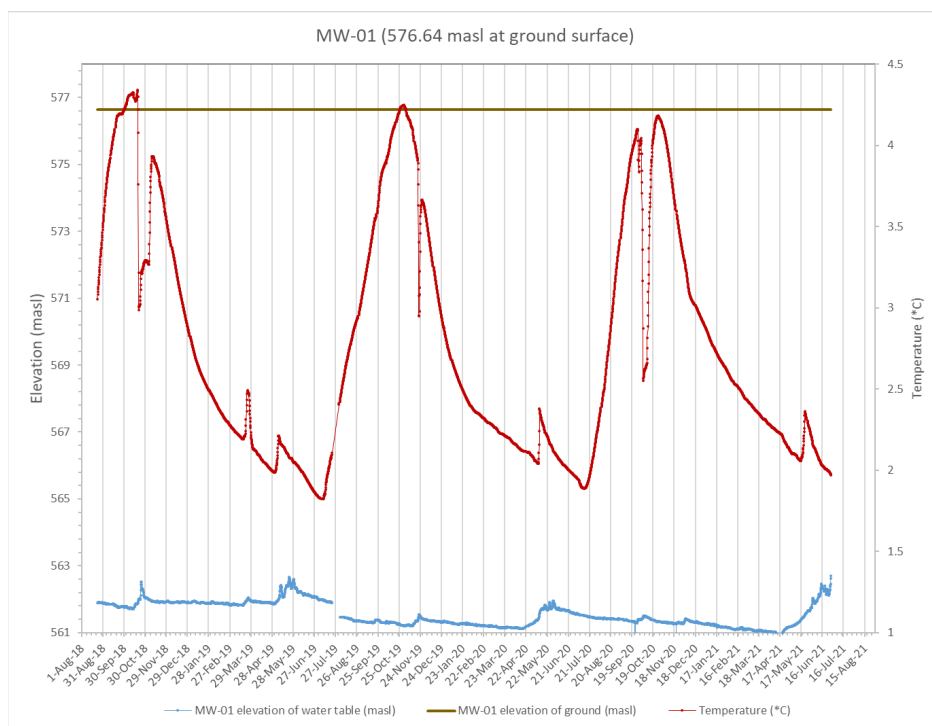


Figure 4 MW-01: Groundwater level and temperature over time

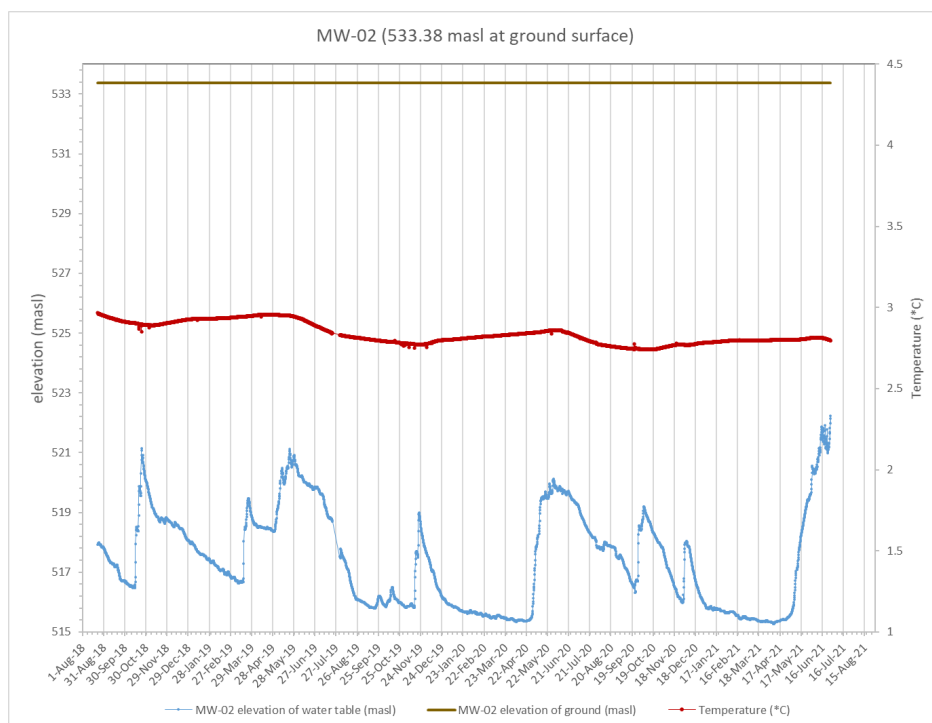


Figure 5 MW-02: Groundwater level and temperature over time

## 2.3 Meteorological Monitoring

Constantine voluntarily collects hourly meteorological data from two stations in the Project Area. The Annual Meteorological Report (2020/2021) is available to State regulators upon request.

## 3.0 OTHER COMPLIANCE ITEMS, UPDATES AND STUDIES

### 3.1 WMP COMPLIANCE

The following deliverables have been completed in compliance with the Waste Management Permit:

	WMP Section	Detail
1	Section 2.5	The monitoring plan (initially submitted in March 2019) was updated and submitted to the DEC on October 15, 2019.
2	Section 2.5.5.6	An updated QAPP was finalized by HDR and submitted to DEC on October 15, 2019.
3	Section 2.6.2	A quarterly report summarizing monitoring activities for Q3 was submitted to DEC on November 29, 2019. This report included historical data; all stations were successfully sampled.
4	Section 2.6.3	An annual report summarizing 2019 monitoring activities (Q3 and Q4) was submitted to DEC on February 29 <sup>th</sup> , 2020. This report included historical data.
5	Section 2.6.2	A quarterly report summarizing monitoring activities for Q1 was submitted to DEC on May 28, 2020. This report included historical data. Note that despite several attempts, only

	WMP Section	Detail
		P27 was collected during the Q1 sampling event due to safety issues (avalanche and evolving COVID-19 situation)
6	Section 2.6.2	A quarterly report summarizing monitoring activities for Q2 was submitted to DEC on Aug 29, 2020. This report included historical data; all stations were successfully sampled.
7	Section 2.6.2	A quarterly report summarizing monitoring activities for Q3 was submitted to DEC on Nov 20, 2020. This report included historical data; all stations were successfully sampled.
8	Section 2.6.2	An annual report summarizing 2020 monitoring activities was submitted to DEC on February 27 <sup>th</sup> , 2021. This report included historical data.
9	Section 2.6.2	A quarterly report summarizing monitoring activities for Q1 was submitted to DEC on May, 28, 2021. This report included historical data. Note that sampling for the first quarter of 2021 was not completed due to health and safety concerns in the field and complications due to the ongoing COVID-19 pandemic.
10	Section 2.6.2	A quarterly report summarizing monitoring activities for Q2 was submitted to DEC on August 28, 2021. This report included historical data; all stations were successfully sampled.
11	Section 2.6.2	A quarterly report summarizing monitoring activities for Q3 was submitted to DEC on November 4, 2021. This report included historical data; all stations were successfully sampled.
12	Section 2.6.3	An annual report summarizing 2021 monitoring activities was submitted to DEC on February 28 <sup>th</sup> , 2022. This report included historical data.

## 3.2 HYDROGEOLOGY WORK

Constantine conducted hydrogeological work in 2021 to support the redesign of the Wastewater Discharge System. The results will be submitted as supporting documentation once the Wastewater Discharge System Design is complete.

## 4.0 FINANCIAL RESPONSIBILITY

Addressing Annual Reporting Section 2.6.3.3:

No construction activity has occurred on site since the Waste Management Permit has been issued. As a result, there are no changes in reclamation activity costs, concurrent reclamation, expansion or other changes to the operation of the facility (as it has not yet been built). The financial responsibility will be re-evaluated concurrent with the Wastewater Discharge System redesign (expected to be submitted in the first half of 2022).

## 5.0 SUMMARY

Reporting for 2021 is abbreviated, as construction has not begun on proposed infrastructure approved by the WMP; construction will not begin until the Wastewater Discharge System is redesigned and approved by the ADEC. Therefore, visual, development rock, and water quality monitoring associated with proposed Project infrastructure has not yet begun.

Quarterly sampling was successfully completed in 2021, except for Q1, where sampling was not conducted due to safety issues and COVID travel advisories.

Parameters at all sites were generally under WMP trigger limits, except for pH, which was exceeded at P26 (in Q4) and MW-01 (in Q2). A number of exceedances of AWQS were recorded for the following stations: P01 (t-Al, t-Mn, t-Fe), P25 (t-Al, t-Fe, T-Se, SO<sub>4</sub>, TDS), P26 (t-Al, t-Fe, t-Mn, pH, D.O.), P27 (t-Al, t-Fe, t-Mn, D.O.), MW-01 (pH), and MW-02 (t-Al, t-Fe, d-Mn, t-Mn).

Additional monitoring in 2021 included hydrometric surveys at surface water sites. Groundwater level and temperature, and the ongoing collection of meteorological data. Hydrogeology studies supporting the redesign of the Wastewater Discharge System are ongoing and will be available at a later date.