

Plan of Operations
Palmer Advanced Exploration Project
Haines, Alaska

Amendment No. 1

MHT Upland Mining Lease No. 9100759



Prepared for:
Alaska Mental Health Trust Land Office
Alaska Department of Natural Resources
Alaska Department of Environmental Conservation

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Executive Summary

This Amendment to the Plan of Operations (Plan) is being submitted to the Mental Health Trust Land Office (Trust), the Alaska Department of Natural Resources (ADNR) and the Alaska Department of Environmental Conservation (ADEC) by Constantine Mining LLC (Constantine or the Company) for the Palmer Advanced Exploration Project (the Project) located in the Porcupine Mining District in Southeast Alaska.

This Amendment describes design and operational changes to specific components of the Phase I and Phase II Plans of Operation, previously approved by the Trust in 2018 and 2019, respectively. These changes were made to incorporate additional hydrogeologic and engineering data generated during several field studies completed at the site between 2019 and 2021.

In 2018, Constantine implemented the two-phase approach to the Plan Approval process to allow Constantine time to initiate the access construction work in Phase I, while continuing to develop detailed facility, underground designs and water and waste rock management plans for Phase II.

In 2018, Constantine completed portions of the Phase I construction including initial site preparation for the settling ponds, constructing a pioneer road to the portal site and another to the lower LAD site. But in 2019, Constantine suspended construction activities and decided to implement several field investigations to better understand certain project components generally related to the hydrogeology of the site and water management. The investigations included a dye tracer study, developing several groundwater monitoring wells, groundwater hydrology tests, seismic surveys and groundwater conceptual and numerical modeling.

Constantine has incorporated the results of the 2019 – 2021 field investigations and modeling into updated engineering designs for certain project components and into a modified water management plan. These changes are described in this Plan Amendment.

Changes proposed in this Amendment to the Phase I Plan include:

1. Alignment and design changes to the portal access road and integration of the portal pad with the road design changes and addition of a debris flow deflection berm and channel, upslope of the road, to improve safety.
2. Layout changes to the settling pond apron to accommodate pump and settled solids management.
3. An update to the Reclamation Plan and reclamation cost estimate to reflect these changes and inflation since 2019. The update is subject to approval by ADNR-Mining as an amendment to ADNR Approval J2018569RPA.

Changes proposed in this Amendment to the Phase II Plan include:

1. Addition of active water treatment, primarily to improve removal of suspended solids from the underground seepage water.
2. Other design changes to the LAD system including relocating the lower LAD diffuser, eliminating the upper LAD diffuser, adding a second invert siphon, adding a pump at the settling ponds, and repurposing the settling ponds for overflow and management of settled solids from the water treatment plant.
3. Updating the Water Management Plan (Appendix A) to reflect the addition of active water treatment and changes to settled solids management.
4. Updating the Reclamation Plan (Appendix B) and reclamation costs estimate to incorporate these changes and to reflect inflation since 2019.

The entire Project surface disturbance will occur on lands where the Trust owns the mineral estate and Constantine has an Upland Mining Lease (No. 9100759) from the Trust. The Trust also owns the surface state for very nearly all the lands that will be disturbed, except that the LAD diffuser will be constructed on lands where ADNR/Lands manages the surface estate while the Trust owns the mineral estate. The Company is applying for an easement to authorize the disturbance planned for ADNR surface lands.

Constantine completed wetlands delineation of the area that encompasses the proposed new location for the LAD diffuser. Constantine will likely impact a small area of wetland temporarily in the process of excavating and filling the very eastern extent of the LAD diffuser trenches. Constantine will perform this work under coverage of USACE Nationwide Permit (NWP) No. 39 which authorizes up to 0.5 acres of wetlands disturbance. Optionally the work could be performed under NWP No. 18 if we determine that impacts can be limited to less than 0.1 acres.

Thus, this Plan Amendment is to serve the purpose of acquiring approval from the Trust for the changes to the Project described in this Amendment. All other components of the Project approved in the Phase I and Phase II Plan Approvals from the Trust remain unchanged and, Constantine assumes they remain approved by the Trust as originally described.

Abbreviations

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
ARD/ML	Acid Rock Drainage/Metal Leaching
ASBP	Alaska Statewide Bonding Pool
BLM	Bureau of Land Management
bgs	below ground surface
BMP	Best Management Practice (s)
CAN	Canada
CPI	Consumer Price Index
DMLW	Division of Mining, Land and Water
EPA	Environmental Protection Agency
HDPE	High Density Polyethylene
JDR	Jurisdictional Determination Report
KCB	Klohn Crippen Berger Ltd.
km	Kilometers
LAD	Land Application Disposal
m	Meters
mi	Miles
MHT	Mental Health Trust
MSGP	Multi-Sector General Permit
NWP	Nation Wide Permit
Plan	Plan of Operations
Project	Palmer Exploration Project
QAP	Quality Assurance Plan
SPCCP	Spill Prevention Control Countermeasure Plan
SWPPP	Storm water Pollution Prevention Plan
US	United States
USACE	US Army Corp of Engineers

1.0 INTRODUCTION

This Introduction includes brief descriptions of the project location and access. Detailed descriptions as well as information regarding Constantine's land tenure and state, local and federal management plans that are relevant to the lands within the Project area were included in the 2019 Phase II Plan of Operations.

1.1 Location, Access, and Property Description

The Project is in the Porcupine Mining District, 34 mi. northwest of Haines, Alaska, on the eastern margin of the Saint Elias mountain range. The western boundary of the Project is the international border with the Canadian province of British Columbia (Figure 1).

The Project is located proximal to the paved Haines Highway (Alaska Hwy 7), which leads to the town of Haines, Alaska, (Figure 1). Haines (population 2,400) is a year-round deep-sea port at the northern end of the Alaska Marine Highway System. Haines has been providing services, skilled labor, accommodations, and equipment to support Constantine's exploration activities.

The closest community to the Project is the Chilkat Indian Village of Klukwan, located on the Chilkat River approximately 17 miles east of the Project. Klukwan is a small, ancient, Alaska Native village. Klukwan is located twenty-two miles north of Haines and is on the Haines Highway with connections to Haines, Haines Junction, Anchorage, Fairbanks, Canada, and the Continental United States. The name Klukwan is taken from the Tlingit phrase "Tlakw Aan" which literally means "Eternal Village." Local oral history tells that Klukwan was originally settled many years ago by a group of Gaanaxteidi (Raven Clan) men and their Kaagwaantaan (Eagle Clan) wives and that the site was chosen because of the rich natural environment found here.

The nearest major economic centers are Juneau (4.5 hours by Ferry) and Whitehorse, Yukon (244 mi. by Haines/Alaska Hwy 7, CND Hwy 1 and 3). Daily scheduled flights connect Haines with Juneau (< 1 hour), which has daily connections with the continental US.

A secondary gravel road connects the project area to the Alaska Hwy 7 via a bridge across the Klehini River at Hwy 7 milepost 26. Drill core storage and camp facilities are located on privately-owned land at the Big Nugget Camp located on Porcupine Creek, approximately 7 mi. from the Klehini River bridge (Figure 2).

Surface access to Glacier Creek valley is via a gravel road that extends approximately 4 mi. from the previously mentioned secondary road. Constantine upgraded and extended the Glacier Creek access road, under approval from the ADNR, BLM and the Mental Health Trust, in 2014, 2016, 2017 and 2018. At the end of the 2018 construction season the access road extended up to the proposed portal location near the terminus of the Saksaiia Glacier. Except for this access road, practical access to most of the property for mineral exploration is by helicopter.

The larger Palmer property consists of a contiguous block of land comprising 340 federal unpatented lode mining claims, which cover an area of approximately 6,567 acres, 63 state mining claims that cover an area of approximately 9,185 acres, as well as approximately 41,631 acres under lease from the Mental Health Trust (Figure 2). The surface rights are managed by the BLM, the State of Alaska, and the Trust, respectively.



Figure 1. Project Location Map

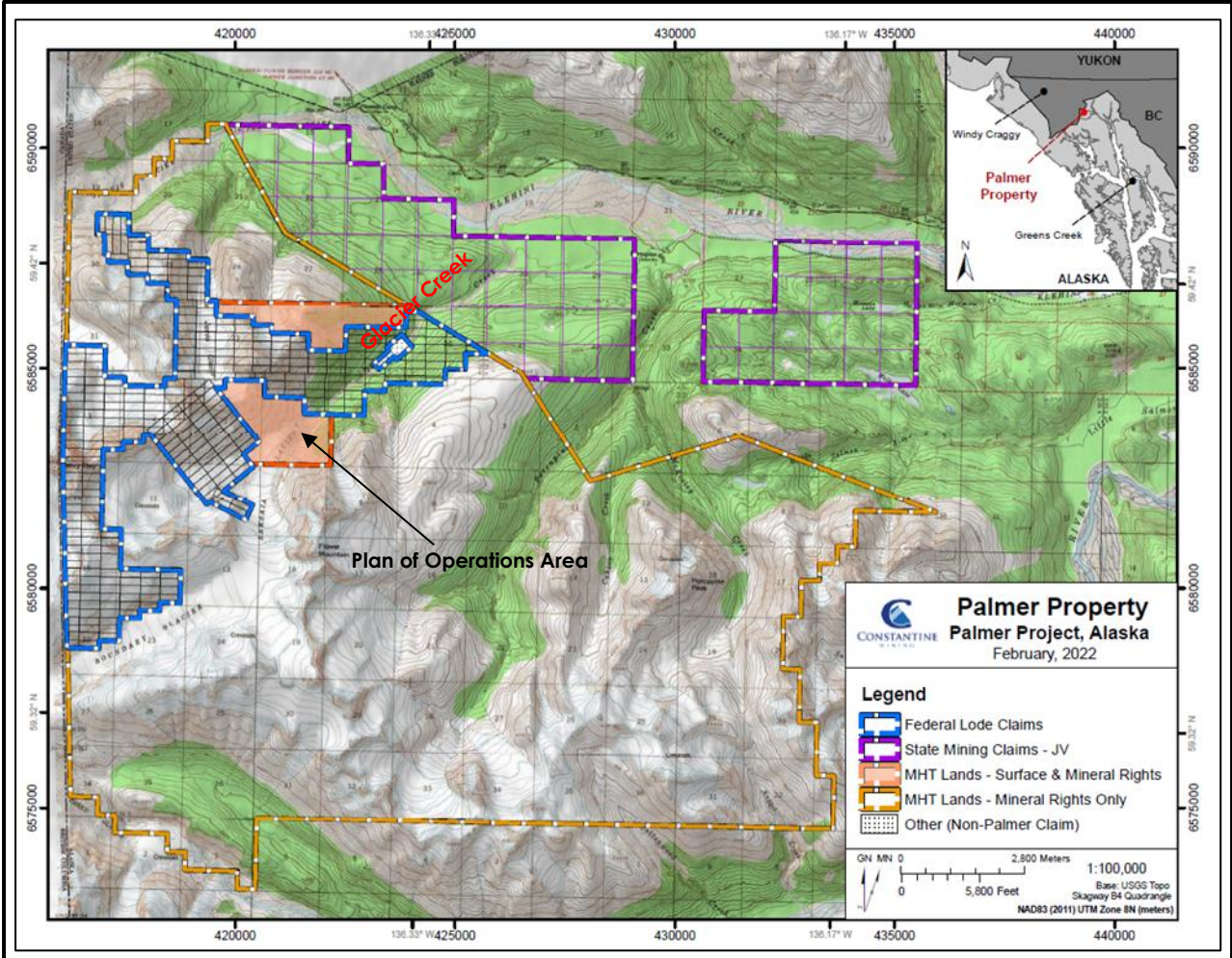


Figure 2. Palmer Project Property Map

2.0 DESCRIPTION OF PROPOSED AMENDMENTS TO THE PLAN OF OPERATIONS

This section briefly lists the activities previously approved in the Phase I and Phase II Plans and describes changes to those activities proposed under this Amendment in more detail.

In the 2018 Phase I Plan of Operations Approval from the Trust, Constantine obtained authorization for the following activities:

- Constructing an access road connecting the main Glacier Creek road to the portal site.
- Constructing a portal pad.
- Constructing two settling ponds.
- Constructing the lower LAD diffuser trenches.

In this Plan Amendment we are seeking Trust approval for the following changes to the Phase I Plan:

1. Alignment and design changes to the portal access road and integration of the portal pad with the road design changes and addition of a debris flow deflection berm and channel, upslope of the road, to improve safety.
2. Layout changes to the settling pond apron to accommodate pump and settled solids management.
3. An update to the Reclamation Plan and reclamation cost estimate to reflect these changes and inflation since 2019. The update is subject to approval by ADNR-Mining as an amendment to ADNR Approval J2018569RPA.

In the 2019 Phase II Plan of Operations Approval from the Trust, Constantine obtained authorization for the following activities:

- Constructing and operating the LAD system including piping, valves, settling ponds diffusers and an inverted siphon over Waterfall Creek.
- Constructing support facilities on the portal pad including power generation, fuel, ventilation, and other facilities as required to support underground activities.
- Excavating ~2,012 meters of underground ramp, starting at the portal, and hauling ~70,000 m³ of development rock to the surface.
- Completing approximately 30,000 meters of underground exploration drilling.
- Placing ~70,000 m³ of non-PAG development rock on the surface to construct avalanche deflection structures (berms and mounds) to protect the road and settling ponds or in development rock disposal piles or using it for road construction and maintenance.

In this Plan Amendment we are seeking approval from the Trust for the following changes to the Phase II Plan:

1. Addition of active water treatment to the management of underground seepage water, primarily to improve the removal of suspended solids.
2. Design changes to the LAD system including relocating the LAD diffuser, adding of a second invert at Hangover Creek, adding a pump at the settling ponds, and repurposing the settling ponds for excess flows and settled solids management.
3. Updating the Water Management Plan (Appendix A) to reflect the addition of active water treatment and changes to settled solids management to protect LAD functionality only.
4. An update to the Reclamation Plan (Appendix B) and reclamation costs estimate to incorporate these changes.

The Proposed changes to the Phase I and Phase II Plans are described in more detail below.

2.1 AMENDMENTS TO PHASE I PLAN

2.1.1 Portal Access Road Design Upgrades

The portal access road includes a series of switchback to reach the portal site. The ground in this steep section consists largely of poorly consolidated colluvium and debris-flow material. Constantine constructed a pioneer trail following the approved road alignment to the portal site in 2018. Since that time Constantine has made minor alignment and construction method improvement to the 2018 design. The design changes improve safety and travelability on the road. These design changes also include construction of a diversion channel with berms above the upper switchback to deflect a natural debris flow (rock and soil) from impacting the road. The updated road alignment is depicted on Figure 3.

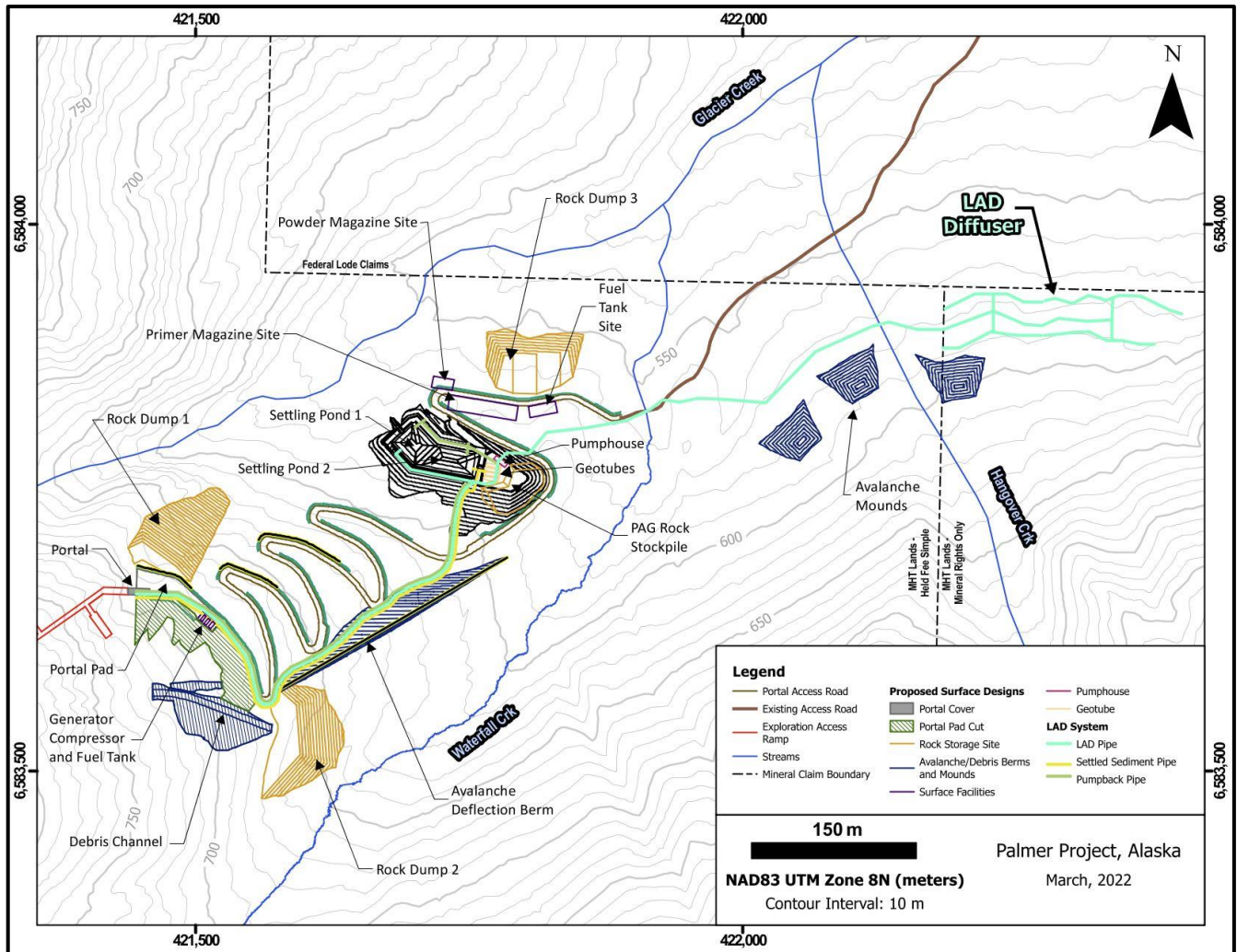


Figure 3. Site Drawing Showing Major Surface Components

2.1.2 Reclamation Plan Update

The proposed changes described above will increase the size of the Project surface disturbance driven largely by the debris channel and slightly longer access road to the new proposed location of the LAD Diffuser. The reclamation plan cost estimate has been updated to reflect these changes as well as changes in unit costs due to inflation between 2019 and 2022. In addition, certain assumptions that were incorporated into the 2019 reclamation cost estimate were independently confirmed including portal plug size and the estimated cost for a final portal plug design. An updated Reclamation Plan and cost estimate will be provided to ADNR/Mining for their review under AS 27.19 and 11 AAC 97, and approval as an Amendment to Reclamation Plan Approval #J2018569ORPA. Constantine will also seek ADEC concurrence with the cost estimate

because some of the costs are driven by terms of the ADEC Waste Management Permit 2019DB0001.

2.2 AMENDMENTS TO PHASE II PLAN

2.2.1 Addition of Active Water Treatment

The 2019 Phase II Plan of Operations relied on passive water treatment for settleable solids in the underground seepage water. That treatment included solid-settling in underground sumps and in the two settling ponds on the surface. The objective of solid-settling is to remove settleable solids before water is conveyed to the LAD diffuser to minimize the potential for reducing the permeability of the gravel downgradient of the diffuser over time and a corresponding reduction in the operational capacity of the diffuser.

Constantine has now integrated active water treatment for settleable solids into the water management strategy and is including it in this Amendment.

Active water treatment will consist of pH adjustment, treatment with coagulant and polymer, followed by settling and clarification. The conceptual flow design of the water treatment plant is illustrated in Figure 4 (Veolia, 2022).

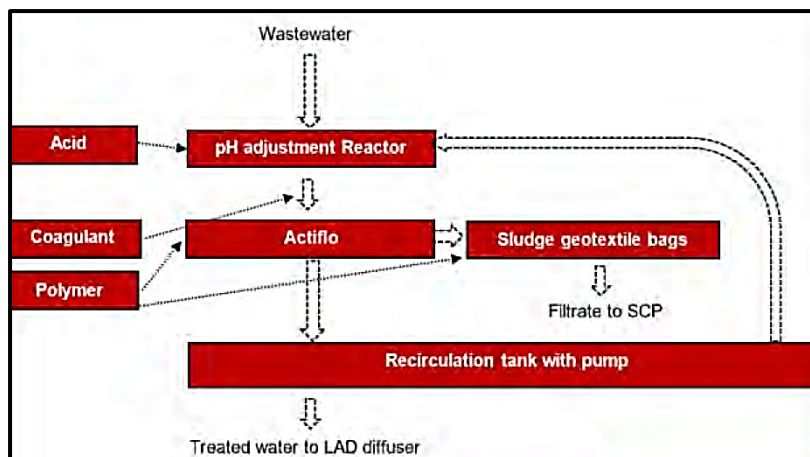


Figure 4. Conceptual Flow Diagram of the Water Treatment Plant

2.2.2 Additional Design Changes to the LAD System

In 2019 – 2021 Constantine completed several field investigations to further characterize the hydrogeology and surficial geology in the Glacier Creek Valley, with a focus on the broad area down-gradient of the proposed lower LAD diffuser (KCB, 2022a). In 2021 and 2022 Constantine integrated that new information into several design changes for the LAD system including:

- Relocating the proposed location of the lower LAD diffuser to the northeast side of Hangover Creek and eliminating the upper diffuser from the LAD system.
- Making design modifications to the LAD diffuser pipe configuration.
- Adding an inverted siphon to the design as required to convey water across Hangover Creek to the new LAD diffuser site. There is already one inverted siphon in the LAD design to convey water across Waterfall Creek.
- Adding a pump facility adjacent to the settling ponds to the design to provide an option to pump untreated water back to the water treatment plant or the LAD diffuser.
- Repurposing the intended settling ponds so they can provide settling or storage during periods of unanticipated surplus underground seepage flow and for settled solids management.

Additional modeling of groundwater and infiltration of the discharge through the LAD diffuser indicates that two diffuser pipes will meet the design discharge criteria of 700 gpm continuously and peak flows up to 900 gpm, while the anticipated base flow will be 360 gpm. The 2019 design of the LAD consisted of three diffuser pipes; the updated design consists of two diffuser pipes (KCB, 2022b).

The addition of active water treatment for suspended solids at the portal reduces reliance on the ponds for solid settling and frees them for other uses. One settling pond is now designated for solid settling or storage when underground seepage flows exceed the water treatment plant capacity (not expected) or for short periods when the plant is not operating (i.e., for maintenance). The addition of a pump facility adjacent to the ponds will also allow Constantine to pump untreated water back to the treatment plant for treatment, or directly the LAD diffuser for short periods. The second pond will be used to manage inert settled solids as noted below.

The water treatment plant will separate solids and generate a stream of solids (slurry) which will be dewatered by pumping the slurry through porous geotubes positioned adjacent to the two ponds. During the summer months the slurry will be pumped directly into geotubes. In winter the slurry will be pumped and stored on one of the settling ponds and then pumped into the geotubes the following summer.

The amended layout of the settling pond area is depicted in Figure 5. The updated design of the diffuser is illustrated in Figure 6.

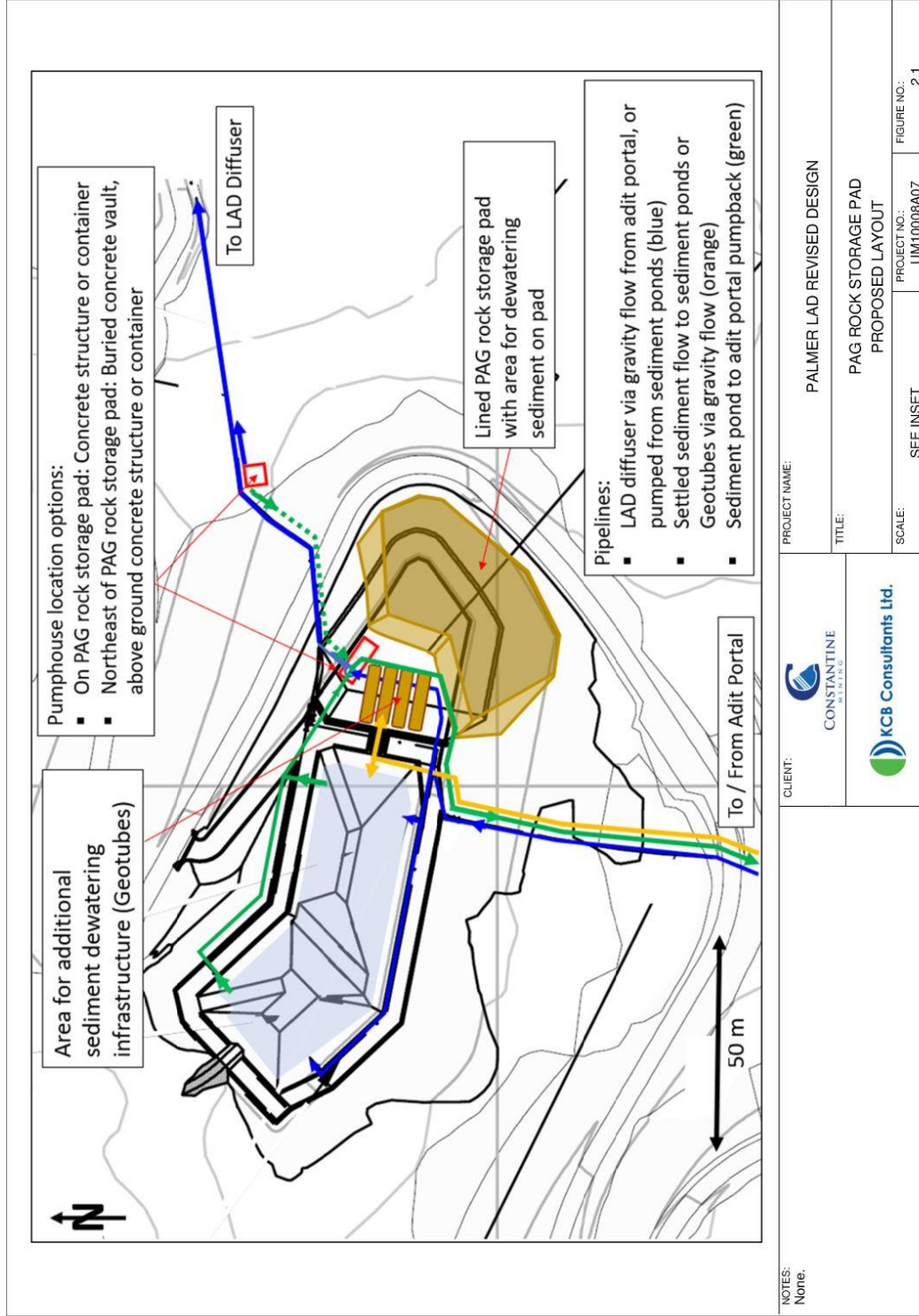


Figure 5. Updated Layout for Settling Pond Area

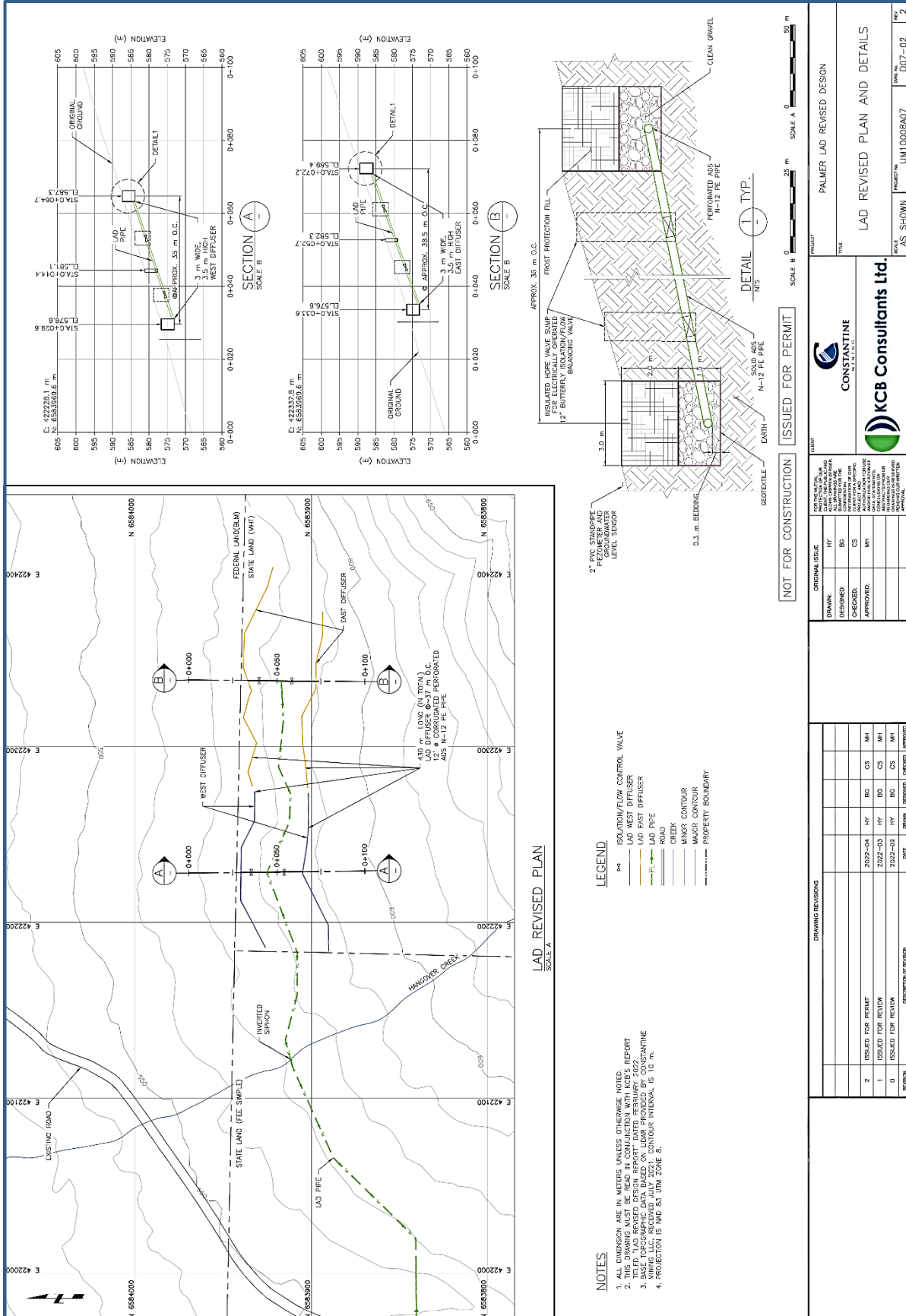


Figure 6. Design Drawings of LAD Diffuser

2.2.3 Water Management Plan Update

Constantine has updated its Water Management Plan as part of this Plan of Operations Amendment. The Water Management Plan is included as Appendix A. Constantine has completed several studies and field investigations to improve its overall understanding of the hydrogeology at site (KCB, 2022a). This information has been incorporated into new estimates of underground seepage inflows (Tundra, 2022). In addition, Constantine has incorporated active water treatment into its water management plan, relocated the lower LAD diffuser, reevaluated the configuration of the diffuser, and eliminated the upper diffuser.

Updated hydrogeology modeling allows an improved estimate of seepage inflows into the underground ramp system. Constantine anticipates a base flow of 360 gpm with a relatively low probability that inflow could be as high as 700 gpm and a very low probability that inflows could be 900 gpm. These higher inflows were derived by forcing conservative assumptions and a margin of safety onto the numerical groundwater model (Tundra, 2022). Constantine has also incorporated these conservative assumptions into its Water Management Plan and its designs for the overall LAD system. The LAD system, starting at the water treatment plant can treat up to 700 gpm continuously and 900 gpm peak flows.

It is important to note that these inflow estimates do not incorporate any adaptive management strategies including drill probing, for water, out in front of the advancing ramp system or pressure grouting through zones that are identified with probe drilling being significant seepage inflow zones. The adaptive strategies could reduce flows below the base case flow of 360 gpm.

2.2.4 Reclamation Plan Update

Constantine has updated the Reclamation Plan and cost estimate to reflect the changes in the Project described in this Amendment. The updated Reclamation Plan is included as Appendix B.

The previously approved Reclamation Plan included narratives and cost estimates for both temporary closure and permanent closure. Both have been updated in the amended Reclamation Plan included as Appendix B.

The updated plans incorporate an increase to all unit costs (wages, rental rates, accommodations, meals, etc.) of 5.2% to reflect the change to the Consumer Price Index (CPI) for Anchorage as shown in Table 1.

Table 1. Consumer Price Index Changes 2019 – 2021, Anchorage

Anchorage CPI	
Year	Percent Change
2021	4.9
2020	-1.1
2019	1.4
Total	5.2

In addition, the time required to reclaim the portal pad and the access road to the LAD diffuser were increased to reflect the longer road.

Indirect costs have also been increased in the 2022 reclamation cost estimate to reflect the increases in direct costs.

Except for these changes the 2022 reclamation cost estimate is the same as the 2019 cost estimate.

As part of ensuring that the 2019 reclamation cost estimate was also accurate regarding select assumptions used previously, Constantine solicited independent reviews of the assumptions for the length of the portal plug, considering the anticipated head pressures, and the funding amount in the cost estimate earmarked for developing final portal plug designs (Langston & Associates, 2022). The reviews concluded that these assumptions were valid, and the costs were more than adequate.

ADNR Mining Section maintains authority over mining-related reclamation on state, federal and private lands under AS 27.19 and 11 AAC 97. Constantine received prior approval for the Reclamation Plan for the Phase I and Phase II Plans of Operations. The updated Reclamation Plan (Appendix B) in this Plan Amendment will also require Approval from ADNR Mining Section. Constantine will submit this updated Reclamation Plan to ADNR Mining concurrent with this Plan of Operations Amendment submittal and seek approval of the Reclamation Plan from ADNR Mining.

3.0 MODIFICATIONS TO OTHER PERMITS

The changes described in this Plan Amendment will affect certain permits that are not authorized by the Trust.

3.1 WASTE MANAGEMENT PERMIT

The proposed changes in the Water Management Plan (Appendix A), design changes to the settling ponds, the LAD diffuser, monitoring requirements and the addition of active water treatment all require approval from ADEC through a LAD Design Approval and modifications of the current Waste Management Permit 2019DB0001. Constantine is working with ADEC concurrent with working with the Trust and will have the LAD design Approval from ADEC in-place before it initiates construction of the LAD, and any Waste Management modifications in-place before commissioning the discharging any water through the LAD system.

3.2 CLEAN WATER ACT – SECTION 404 PERMITTING

Constantine completed wetlands delineation of the area that encompasses the proposed new location for the LAD diffuser (HDR, 2022). Constantine will likely impact a small area of wetland temporarily in the process of excavating and filling the very eastern extent of the LAD diffuser trenches. Constantine will perform this work under coverage of USACE Nationwide Permit (NWP) No. 39 which authorizes up to 0.5 acres of wetlands impacts. Optionally the work could be performed under NWP No. 18 if we determine that impacts can be limited to less than 0.1 acres.

3.3 AIR PERMIT

In the 2019 Plan of Operations Approval Constantine proposed utilizing a 600Kw diesel generator (and duplicate backup) at the portal to power all its surface and underground needs (lighting, pumps, fans, drills etc.). An installation such as this is referred to as a “stationary” source under ADEC air regulations. Air quality permits for stationary sources are regulated by ADEC under AS 46.14.130 and 18 AAC 50. There are triggers for the need to obtain air quality permits based on emission levels from stationary sources. Annual emission limits for several air pollutants are prescribed in 18 AAC 50.502. If a stationary source can be operated without exceeding those annual limits, then it may not be necessary to obtain a permit from ADEC. However, per 18 AAC 50.225(a) - The owner or operator of an existing or proposed stationary source may also request an enforceable limit on the ability to emit air pollutants to avoid all permitting obligations under AS 46.14.130. Constantine previously engaged a consultant to perform an “Air Quality Applicability Determination” for the proposed diesel emission sources contemplated under this Phase II Plan. They concluded that Constantine can continuously operate generators producing up to 1,063 kW (and maintain a standby 1,063 kW generator) and an air compressor up to 125 hp without triggering any requirements for a Minor air permit under AS 46.14.130, if the engines meet EPA Tier 4 requirements for emissions and if they burn ultra-low sulfur fuel (SLR, 2018). If the generators do not meet Tier 4 requirements but meet Tier 2 or 3 requirements Constantine can

still operate up to 600kW power generations. Constantine is presently reevaluating its power generation needs that incorporate all the project changes described in the Amendment to determine whether it can operate under the 1,063 kW threshold or whether an individual Air Quality Control Permit will be required from ADEC. Constantine will make that determination and if required, apply for that permit as soon as practical and have it in place as required.

3.4 ACCESS EASEMENT - LAD DIFFUSER

In this Plan Amendment Constantine proposes a new location for the LAD diffuser and an avalanche deflection mound as described in Section 2.2.2. The mineral estate at the new location is owned by the Trust but the surface estate is owned by the State of Alaska and managed by ADNR Lands Section. Constantine has applied for an Easement from ADNR Lands Section for surface access to construct and operate the LAD diffuser and construct the avalanche deflection mound and will not initiate construction activities on that land without prior approval from ADNR.

4.0 REFERENCES

HDR Engineering Inc., 2022. Office-Based Wetland and Waterbody Delineation Report, Palmer Project. 9 p.

KCB Consultants Ltd., 2022a. Palmer LAD Revised Design, Hydrogeological Site Investigation Summary, Revision 1. 322 p.

KCB Consultants Ltd., 2022b. Palmer LAD Revised Design, Revision 1. 23 p.

Langston & Associates, 2022. Technical Memorandum Re: Decline Bulkhead Analysis, Prepared for Roughstock Mining Services. 12 p.

Tundra Consulting LLC, 2022. Hydrogeology Report, Palmer Project. (Draft, February 2022), 380 p.

Veolia, 2022. Process Overview – Total Suspended Solids Reduction Water Treatment - Revision 0, Veolia Water Technologies Canada, 22 p.

APPENDIX/DIVIDER TITLE

Appendix A WATER MANAGEMENT PLAN

**Appendix B TEMPORARY CLOSURE AND FINAL RECLAMATION
PLANS**