



GENERAL PLAN OF OPERATIONS

APPENDIX 3

TAILINGS DISPOSAL FACILITY MANAGEMENT PLAN

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ACRONYMS

| | |
|-------|---|
| AAC | Alaska Administrative Code |
| ABA | Acid-Base Account |
| ADEC | Alaska Department of Environmental Conservation |
| ADNR | Alaska Department of Natural Resources |
| APDES | Alaska Pollutant Discharge Elimination System |
| ARD | acid rock drainage |
| EA | Environmental Assessment |
| FEIS | Final Environmental Impact Statement |
| GPO | General Plan of Operations |
| HDPE | high-density polyethylene pipe |
| HGCMC | Hecla Greens Creek Mining Company |
| IMP | Integrated Monitoring Plan |
| KCB | Klohn Crippen Berger, Ltd. |
| MSHA | Mine Safety and Health Administration |
| NEPA | National Environmental Policy Act |
| QA | quality assurance |
| QC | quality control |
| QA/AC | quality assurance/quality control |
| SOP | Standard Operating Procedure |
| TDF | Tailings Disposal Facility |
| USDA | United States Department of Agriculture |
| USFS | United States Forest Service |
| WMP | Waste Management Permit |

1.0 INTRODUCTION

The Greens Creek Mine is operated by Hecla Greens Creek Mining Company (HGCMC) in accordance with the General Plan of Operations (GPO) approved by the United States Forest Service (USFS), hereafter referred to as the Forest Service. The GPO has several appendices which describe the management activities conducted at the Greens Creek Mine, the location and timing of those activities, and how the environment and resources in the area are protected through compliance with federal and state requirements. This document, GPO Appendix 3 Tailings Disposal Facility Management Plan, provides information on the management objectives, operations, and monitoring and inspection requirements for the Greens Creek Mine Tailings Disposal Facility (TDF).

Table 1. RECORD OF CHANGES AND AMENDMENTS

| Date | Section(s) Changed or Amended |
|---------------|---|
| August 2000 | Submittal by Kennecott Greens Creek Mining Company |
| April 2004 | Submittal by Kennecott Greens Creek Mining Company Revisions associated with the Record of Decision and Final Environmental Impact Statement (FEIS) supporting an expansion of the tailings disposal facility (Stage 2 expansion). Updated pertinent information and references (USFS 2003). Acknowledged criteria associated with 2003 Waste Management Permit identifying a total projected tailings footprint area of 62.2 acres. |
| February 2014 | Submittal by Hecla Greens Creek Mining Company. Revisions associated with Record of Decision and FEIS supporting an expansion of the tailings disposal facility (Stage 3 expansion). Updated pertinent information and references (USFS 2013). |
| November 2014 | Submittal by Hecla Greens Creek Mining Company. Revisions to incorporate reference to ADEC Waste Management Permit 2014DB0003, issued August 11, 2014. |
| August 2015 | The ratio for codisposal at tailings is 1:1 to 3:2, the previous version had it as 1:1 to 3.2 (waste rock to tails) – 3.2 was a typographic error |
| June 2017 | Allow for codisposal of waste rock at amounts ranging from 0 percent to 60 percent waste rock (3 waste rock to 2 tailings). Simplified placement language to provide more flexibility to adjust to environmental and material constraints. |
| July 2018 | Modified for the disposal of 100% waste rock into discreet cells. |
| April 2019 | Reviewed for submittal with the ADEC Waste Management Permit renewal. |

Certain areas of the mine's operation are subject to federal and state permits and approvals issued by other federal and state agencies. The State of Alaska Department of Environmental Conservation (ADEC) regulates mill tailings and waste rock disposal facilities at the Greens Creek Mine, as well as other aspects of the operation, primarily through Title 18 of the Alaska Administrative Code (AAC), Chapters 50, 60, 70, 72 and 83. ADEC's Waste Management Permit (WMP) authorizes tailings and waste rock disposal and prescribes monitoring, reporting, closure, post-closure and financial responsibility requirements. The Forest Service has issued special use permits and leases for various aspects of the operations.

Closure requirements for the Greens Creek Mine are described in more detail in Greens Creek Mine GPO Appendix 14, Reclamation and Closure Plan. The Alaska Department of Natural Resources (ADNR) regulates the reclamation of the TDF, by issuing the Reclamation Plan approval for the entire site, including the tailings and waste rock disposal sites per 11 AAC 97.310. The Forest Service also sets requirements for reclamation. Permits and authorizations are further discussed in Section 2.1.

Management objectives associated with the TDF consider risk due to potential acid rock drainage (ARD) and metals leaching, and geotechnical stability, all of which can potentially create adverse environmental conditions. These risks are evaluated with respect to local hydrology, climate, geochemistry, and other associated factors to ensure the methods employed best match site-specific conditions while still providing the operational flexibility to improve procedures as needed. Specific aspects of the operational practices used to achieve management objectives outlined in this document are presented in the TDF standard operating procedure (SOP) provided in Attachment A. The SOP format allows flexibility for regular updates as site conditions and needs change. Modifications to the SOP are summarized in the annual report, and substantial modifications are identified which may affect the WMP. This appendix is updated through coordination with the USFS, the ADEC, and the ADNR. If there is a conflict between the terms established in the GPO, applicable regulations, or the WMP, then the terms with the most recent written approval from the ADEC, the USFS, and the ADNR govern.

2.0 BACKGROUND

The mill at the Greens Creek Mine generates approximately 1,800 dry tons of filter-pressed tailings per day, or approximately 650,000 tons of tailings annually. These tailings are dewatered in a filter press at the mill, with about 50% of the tailings being mixed with cement and hauled back into the underground mine for disposal in mined-out areas as mine backfill. The remaining 50% of the tailings are trucked from the along the B Road and placed in a surface tailings disposal area (TDF). The TDF is situated 7 miles from the mine site near the port facility (refer to Attachment B, Figures 1 and 2) and are placed using dry-stack tailings disposal techniques (refer to Attachment A, SOP).

All designs for expansion and placement since 1998 have been accomplished by Klohn Crippen Berger Ltd. (KCB). Design processes address foundation, operations, and closure geotechnical stability factors, as well as water management. Construction plans are submitted to agencies for approval prior to implementation of expansion efforts.

A summary of the TDF historical waste placement areas is provided in Attachment B, Figure 3. Refer to the Greens Creek Mine annual reports for further details.

2.1 Permits and Authorizations

The Forest Service and the ADEC regulate the TDF. ADNR Dam Safety issues the Certificate of Approval to operate the Pond 7 and Pond 10 pond system and appurtenances. The discharge of waters from the water treatment facility, to the marine environment, is permitted under the ADEC Alaska Pollutant Discharge Elimination System (APDES) program. Reclamation requirements are established by the USFS, with Reclamation approval issued by the ADNR-Mining Section. For a complete summary of federal, state, and local agencies involved in the permitting approval processes for Greens Creek Mine, refer to the 2013 Final Environmental Impact Statement (USFS 2013).

NEPA/EIS Processes

The initial FEIS for Greens Creek Mine was completed in 1983 (USFS 1983). Eight alternatives were identified in the 1983 FEIS with number six being selected as the preferred alternative. Under the preferred alternative, tailings generated by the milling process would be transported and disposed as slurry into a settling pond within a 150 acre tailings basin.

In 1988, two major changes were introduced by the Mine Ownership regarding development and operation of the mine. The proposed changes were addressed in the 1988 Environmental Assessment (EA) for Proposed Changes to the General Plan of Operation for the Development and Operation of the Greens Creek Mine (USFS 1988). Under the EA proposed action alternative, tailings generated by the milling process would be dewatered at the mill site and transported by truck to a smaller dry tailings facility. Wastewater from the mill site would be transported through an eight-inch, single-walled, high-density, polyethylene (HDPE) pipeline to a 3.5 acre settling pond within the tailings basin (additional 10-inch and 18-inch single-walled HDPE pipelines have been installed to carry storm water and process water from the mill area to the pond system at the TDF. The Greens Creek Mine TDF was constructed according to guidelines consistent with the 1988 EA Decision Notice (USFS 1988).

Greens Creek Mine applied for an expansion of the existing TDF in January 2001, the expansion area was referred to as the Stage 2 expansion area. The Forest Service issued a Record of Decision on October 24, 2003 which approved the Stage 2 expansion of the TDF area using Alternative C in the FEIS (USFS 2003). With approval of the expansion based on a thorough National Environmental Policy Act (NEPA) review, Greens Creek Mine updated the GPO Appendix 3, Tailings Disposal Facility Management Plan. The subsequent revision of this GPO was undertaken concurrent with the renewal of the Waste Management Permit.

In late 2010, Greens Creek Mine under the ownership of HGCMC applied for further expansion of the TDF; the expansion area was referred as the Stage 3 expansion area. The Forest Service issued a Record of Decision on August 30, 2013, which approved the expansion of the TDF area using Alternative D with modifications as described in the Record of Decision and FEIS (USFS 2013). This expansion provides accommodations for an additional 10 to 15 years of tailings and waste rock disposal.

ADEC Solid Waste Management Processes

The ADEC determined on July 26, 1999 that tailings placed in the TDF are subject to the 18 AAC 60, Solid Waste Management regulations which stipulate that a Waste Management Permit (WMP) must be obtained. Mining waste is regulated under the monofill standards described in Article 4 which gives ADEC discretion to incorporate applicable provisions of 18 AAC 60 into a WMP. The WMP contains applicable provisions of Articles 1, 2, and 4 that pertain to general standards, limitations, prohibitions and administrative procedures to be followed; monofill standards such as locational, operational, and design related requirements, as well as closure and post-closure plans, notifications, monitoring, and reporting requirements.

The Greens Creek Mine facilities are also subject to Article 6, User Fees and Article 7, Monitoring and Corrective Action Requirements. The Article 7 monitoring requirements specify visual, surface water and groundwater requirements. Detection monitoring, and if necessary, assessment monitoring is also required under Article 7. Specific inspection and monitoring requirements are detailed in Section 3.0 of this document. Waivers to any provision of 18 AAC 60 may be applied for per 18 AAC 60.900.

2.2 Tailings Characterization

The geochemical characteristics of tailings affect the design, operation, monitoring requirements, environmental performance, and eventual closure and reclamation of the dry stack tailings disposal site. Given that the Greens Creek Mine ore is from a high-grade sulfide-hosted polymetallic deposit, pyritic sulfur is a component of the tailings. Mineralogy and geochemical studies have established the nature of tailings material.

The weathering characteristics and acid generating and/or neutralization potential of the various materials disposed of in the TDF are discussed in the Greens Creek Mine GPO Appendix 1, Integrated Monitoring Plan (IMP). Inspection and monitoring requirements for the TDF, which include water levels, water quality, and geochemical testing of the tailings, are described in the IMP.

Acid-base accounts (ABAs) completed by HGCMC (2012) and Petros (2011) show that the tailings are acid generating but that the high carbonate content provides substantial buffering capacity. These results are consistent with previous studies of the tailings. Tailings that have been exposed to

weathering for close to 3 decades have been shown to still have a high neutralization potential, equivalent to approximately 20% calcium carbonate. This suggests that the potential lag time to acid generation of exposed tailings is on the order of decades. This long lag time allows time for construction and adequate closure of the site (including covering the pile with a composite soil cover designed to minimize oxygen ingress). Actual oxidation rates are likely to be much less under field conditions due to passivation of reactive surfaces, reduced oxygen supply, and low temperatures.

Under neutral pH conditions, concentrations of metals (particularly zinc) can be released in a soluble form into water that contacts the tailings. To a lesser degree, other metals such as cadmium, nickel, lead, and metalloids (selenium and arsenic) are found in water that infiltrates through tailings.

3.0 TAILINGS DISPOSAL FACILITY MANAGEMENT

HGCMC manages the TDF through its Surface Operations Department. Management responsibility will transfer to the Environment Department after the completion of closure activities. The WMP, as issued by the ADEC, defines wastes that may be disposed of in the TDF. Refer to the most recent WMP for a list of authorized wastes and conditionally approved wastes.

Facility management also includes implementing management controls to maintain surface and ground water quality. This requires a thorough understanding of the site water balance. Site water balance components are periodically evaluated through modeling the primary elements of the mine that include the underground mine, the mill, the TDF, the TDF water treatment plant, and the Port Facility Camp water treatment plant (EDE 2018).

Attachment B, Figure 2 includes the TDF as-built; refer to HGCMC annual reports for the most recent facility as-built.

3.1 Management Objectives

HGCMC plans, designs, constructs, operates, monitors, and will eventually close the TDF with the intent of meeting the following management objectives:

- Construct facility expansions per approved construction drawings.
- Safely receive approved waste material within the designed TDF capacity constraints during the operational period of the mine.

- Minimize run-on water from entering the TDF from upgradient sources.
- Maintain water management system components as designed with an understanding of geochemical and hydrological processes. Control surface water, ground water, and interior facility waters to prevent offsite water quality impacts.
- Minimize fugitive dust impacts from the TDF operations to surrounding land and wetland areas.
- Maintain pile geotechnical stability (short-term and long-term).
- Reduce impacts to the receiving environment and ultimately reclaim the facility in a manner that will support and protect designated beneficial uses.

3.2 Surface Operations

HGCMC surface operations place tailings in the facility in general accordance with criteria established by KCB in 1999 for the placement of tailings in the TDF (KCB 1999). A summary of the applicable criteria includes:

- Tailings shall generally be placed in a cellular pattern centered around the tailings access road(s).
- New tailings shall not be placed on uncompacted saturated tailings.
- The tailings shall be placed in lifts and compacted with a smooth drum roller to a density of no less than 90 percent of the maximum dry density as determined by a Standard Proctor (ASTM D698). If the tailings cannot be placed and compacted upon arrival at the tailings facility, they shall be stockpiled to minimize any additional moisture absorption during wet periods, or drying during warm periods. The tailings shall be handled such that specified placement densities are achieved.
- The top surface of the tailings shall be graded to control surface runoff and be compacted with a smooth drum roller to minimize infiltration from ruts or indentations.
- Placement shall then continue at another location/cell to allow time for any construction pore pressures to dissipate.
- Construct with compacted outside side slopes that are no steeper than 3H:1V. Slopes during operation may be less than 3:1 if future operation or slope work is planned, or HGCMC receives approval for steeper slopes provided pile stability requirements are met.

HGCMC has established a SOP generally based on these criteria established by KCB with the intent of achieving the TDF management objectives presented in Section 3.1. A copy of the SOP is provided in Attachment A.

HGCMC uses off-highway, lidded trailer trucks to transport the tailings from the mill to the TDF. Temporary access roads are constructed as required to access the placement areas (the number of access roads are minimized as much as practicable). The material is end dumped, spread and “track-walked” in using a bulldozer. Before the end of each shift and before any significant rainfall the surface of the placement area is compacted or “sealed” with a smooth-drum vibratory compactor to minimize moisture infiltration into the pile. Compaction checks of pure tailings are periodically completed using methods such as the water balloon or sand cone method, or a nuclear density gauge. Field samples are collected for moisture determination by the HGCMC laboratory. Proper placement requires achievement of 90 percent or greater compaction relative to a standard Proctor density. Though a standard density cannot be identified for co-disposed material because of mixture variability, periodic moisture samples are collected, and density tests completed.

HGCMC places tailings, co-disposed waste rock and tailings, and waste rock into quasi discreet cells at the TDF to provide for better control over compaction, drainage control, and pore-pressure dissipation. The term cell is used to refer to relatively small areas within the tailings facility. Material is placed and compacted in each cell as needed and then placement progresses to another cell, allowing time for construction pore pressures to dissipate.

Water management at the facility consists of a complex network of drains under the pile, bentonite slurry walls around the perimeter of the site, and ditches to divert up-slope water and collect surface runoff. The site is underlain by a low permeability silt/clay till and other glacial/marine deposits and/or an engineered HDPE liner. These features minimize the potential for the downward migration of contact waters. An upward hydrologic gradient under portions of the site further aids in contact water collection.

Co-disposal practices at the TDF have been approved by the agencies (HGCMC 2009). Co-disposal refers to the placement of a mixture of waste rock and tailings. The primary purpose of co-disposal is to reduce pyrite oxidation and metal leaching from waste rock by surrounding it with a matrix of fine-grained material (tailings). The geotechnical, geochemical and operational aspects of co-

disposed materials have been studied, and the results demonstrate that co-disposal of waste rock and tailings will significantly improve the drainage and stormwater runoff quality at uncontained inactive waste rock sites by relocating this material to the TDF, without negatively impacting drainage or stormwater runoff from the TDF, and can be done in a manner that minimizes effects on the environment.

3.3 Monitoring and Inspections

All monitoring shall be conducted in accordance with the WMP, 18 AAC 60.820-860 (surface water and ground water), and GPO Appendix 1, Integrated Monitoring Plan. GPO Appendix 1 contains information regarding water quality compliance monitoring, including monitoring requirements, test procedures, frequency, parameters, field procedures, and quality assurance/quality control (QA/QC) plans.

Visual observations and material sampling are used to ensure that the facility is constructed according to approved construction plans. Monitoring hub, inclinometer, piezometer and topographic survey data are used in conjunction with engineering assessments to determine if the site is stable in the short and long term. Visual observations and routine maintenance ensure that the water management system is functioning as designed. Water quality data, flow and level monitoring, material sampling and site meteorology station data are used to define geochemical and hydrologic processes occurring at the site. This information is evaluated with respect to design expectations, and modifications are made as necessary to minimize effects on the receiving environment in the short and long term.

Monthly inspections of the facility are performed when operations are in process, using an inspection checklist (refer to Attachment C). Daily and weekly visual inspections are made as part of operations for which an inspection checklist is not required or used. A person who is familiar with the WMP requirements conducts the inspection. Visual monitoring is conducted on routine facility operations, leachate collection and diversion systems, leachate pumping systems, and the facility perimeter, where possible. Structural changes or leakage noted during the inspections shall be documented. Inspections shall include but may not be limited to the following:

- Signs of damage or potential damage to any component of the facility from settlement, ponding, leakage, thermal instability, frost action, erosion, slip failure, thawing of the waste, or operations that contribute to a problem;
- Exceptions to conditions of the waste management permit;
- Escape of waste or leachate;
- Unauthorized waste disposal;
- Damage to the structural integrity of a monitoring device, containment or seepage structure; retaining wall, erosion control or diversion structure; and,
- Evidence of death or stress to fish, wildlife, or vegetation caused by the facility.

If visible detrimental structural change, damage to the facility, or noncompliance with a waste management permit condition is observed, during an inspections, HGCMC shall orally notify ADEC no later than the end of the next working day and appropriate action shall be taken to correct the exception or damage, prevent the escape of waste or leachate, and clean up any improper waste disposal. The Forest Service shall also be notified in a timely manner. Refer to the WMP for additional requirements for corrective actions.

HGCMC submits reports on the TDF to the ADEC per WMP requirements, and to the Forest Service in consideration of the GPO. These reports include:

- An as-built topographic survey (in plan and cross section);
- A running total of tailings and other materials placed at the site and a current remaining volume estimate;
- A summary of piezometer readings;
- A summary of key activities, observations, problems and corrective actions;
- A summary of water and tailings monitoring, including a description of the geochemical and hydrological processes occurring at the site; and
- A summary of pertinent reclamation/closure activities and studies.

Refer to the WMP for additional details on reporting requirements and schedule for submittals.

4.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC) Division of Air and Water Quality, Waste Water Discharge Program. *Waste Management Permit 2014DB0003, Hecla Greens Creek Mining Company*. August 11, 2014.

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ATTACHMENT A
TAILINGS DISPOSAL FACILITY
STANDARD OPERATING PROCEDURE

Tailings Disposal Facility Standard Operating Procedure

Hecla Greens Creek Mining Company (HGCMC) uses the following operational procedures for the tailings disposal facility (TDF):

General Requirements

- Only those wastes approved in the Waste Management Permit (WMP) will be disposed of at the facility.
- Facility expansions shall be per agency approved construction design drawings and specifications, within the permitted lease boundary and footprint approved by the USFS. Expansion designs shall be adequate to ensure geotechnical stability.
- Best Management Practices shall be utilized with regards to storm water and sediment management.

Safety

- Conduct operations per HGCMC and MSHA safety standards. This includes:
 - Constructing safety berms per MSHA standards.
 - Providing adequate lighting for night operations.
 - Maintaining proper signage for traffic.
 - Maintaining radio or visual contact with site operator.
 - Maintaining awareness of uneven surfaces, slips trips and falls.
 - Providing adequate health and hygiene training for operators in the TDF.

Site Access

- Construct internal access roads on the surface of the tailings material with quarry rock, waste rock, or tailings to access placement areas. These roads are known as “dirty roads” and are needed to prevent rutting of tailings material, particularly during wet weather. The number and extent of internal cross roads vary given the location and size of the placement area(s) and weather conditions. Compacted tailings can support truck traffic (particularly in dry weather) making it practical to limit the number of crossroads; however, during wet weather, cross roads may be used. The number of internal access roads shall be minimized as much as practicable.
- Recover cross road rock where practical for use in new cross road construction. If areas of rock cannot be recovered, ensure they are isolated from surface drainage by at least two feet of tailings or codisposal material.

- Require wheeled vehicles to remain on dirty roads and trafficable areas on the tailings pile and to pass through a truck wheel-wash facility prior to accessing a clean road or the B road. This prevents tracking of tailings material away from the contained facility.
- During freezing conditions, the truck wheel-wash is not used due to safety restrictions including potential for creating icy roads and creating a situation where the brakes of the trucks may freeze. Instead, operations ensure that the roads are in good condition within the tails facility with the intent of keeping tailings off the rock roads. The truck tires have minimal potential to pick-up and transport/track tails materials under frozen conditions.

Placement Methods

- Placement methods are designed to minimize water infiltration, sediment runoff, oxygen intrusion, and potential for development of acid rock drainage conditions. Per 18 AAC 60.485(c), construct outer slopes at a minimum of 3 horizontal to 1 vertical (3H:1V) to ensure slopes are stable and do not erode or slough.
- Placement cells are defined as placement areas and generally do not exceed 2500 to 3000 sf with average dimensions of 250-ft x 100-ft.
- Prior to tailings placement, ensure that positive surface drainage is occurring for each cell to prevent water pooling or ponding. During winter, ensure snow has been removed from the placement area.
- Deliver tailings from the mill with moisture content of around 10 to 14 percent. Alternative moisture contents may be accepted based on material properties and ability of placement methods to meet compaction standards.
- Spread tailings in approximate one-foot lifts on the areas that have been graded for drainage and compact by several passes with a bulldozer followed by at least two overlapping passes of the vibratory roller (compactor). This compaction is designed to promote runoff, reduce the potential for oxygen and water infiltration, and ensure geotechnical stability.
- Placement will routinely shift to allow dissipation of construction pore pressures.
- Compaction of pure tailings in placement areas will be periodically verified by field measurements of wet density by Surface Operations Technical Services staff. These measurements are used to calculate the dry unit weight after determining the moisture content. The calculated dry unit weight is then compared against the maximum dry unit weight as

determined by the laboratory Compaction verification methods may include the water balloon or sand cone method, or a nuclear density gauge.

- When waste rock is delivered to the tailings facility the material will be disposed in discreet waste rock cells or blended as uniformly as practicable with tailings. Waste rock material will be encapsulated with at least 5 feet of tailings.
- Periodic moisture and density tests will be obtained within co-disposed placement areas by Surface Operations Technical Services staff; however, the variability of co-disposed material precludes the development of a moisture/density standard.
- Place Class 1 waste rock (argillite) on outer slopes, if available.
- If Class 1 waste rock is not available in the interim; coat exposed slopes with any other available rock, or mulch with hydroseeder.
- All final slopes will be covered with Class 1 waste rock.

Water Management

- Divert surface runoff from undisturbed areas around the tailings facility.
- Within the facility provide diversion ditches to prevent surface water from running into placement areas and ensure site runoff is conveyed via appropriately designed and sized conveyance channels to ponds or discharge points to minimize erosion and sediment loss.
- Collect and route runoff on the tailings facility via ditching and piping into the pond system for subsequent water treatment and discharge into Hawk Inlet.
- Minimize tailings contact with groundwater using acceptable engineering practices which may include engineered liners, finger and blanket drains beneath the tailings, and/or slurry walls surrounding to the facility.

Fugitive Dust Control

- Monitor fugitive dust generated from the tailings facility following methods described in the Integrated Monitoring Plan (IMP).
- Install wind breaks such as wind fencing and/or other appropriate mechanical controls on the crest of the tailings pile to reduce wind speed and dust dispersal through this area.
- Limit snow removal to active placement areas only.
- Cover interim slopes with rock or other cover materials (e.g. mulch) as practicable.
- Hydroseed outer slopes, where appropriate.
- Use dust suppression aids where approved/appropriate.

Sediment Control

- Maintain access roads in a manner that minimizes sediment production
- Construct and maintain rock settling basins to reduce sediment loading in site drainage.
- Use flocculent or polymer aids where appropriate and approved.

Snow Removal

- Do not place tailings on snow or ice.
- Remove snow from active placement zones prior to placement.
- Avoid mixing tailings with snow during snow removal.

Reclamation

- Permanent closure requirements are provided in the ADEC waste management permit.
- Conform to stipulations in GPO Appendix 14, Reclamation and Closure Plan.
- Conduct operations in a manner that minimizes closure/reclamation liability.
- Manage materials to maximize availability for reclamation use (separate and stockpile where appropriate).
- Grade final slopes to design specifications and hydroseed with approved seed mix.
- Construct approved reclamation cover when slopes are at final configuration and potential for contamination of cover surface is low (applies to concurrent reclamation).

Emergency Action Plan

Issues identified during inspections shall be addressed in a timely manner before an emergency arises. In the event of unforeseen slope movement within the facility and/or water control issues that could result in a discharge of contaminated water to the environment, the following procedure will be followed:

- Remove non-critical personnel from the area and barricade the area per approved safety standards.
- For slope movement issues, assess the site condition with input from a geotechnical engineer. Prepare and implement an action plan appropriate for the identified site condition(s).
- For water control issues, work with Surface Operations and/or Water Operations personnel to prepare and implement an action plan appropriate for the identified site condition(s).

Monitoring

Monitoring includes visual inspections, and environmental and water quality monitoring. Inspections and environmental monitoring shall be conducted as described in the GPO Appendix 1, Integrated Monitoring Plan. Monitoring activities include:

- General Site Inspections
- Surface water, ground water (wells and lysimeters), and wet wells water quality monitoring
- Acid-base accounting and geochemical analysis of the tailings
- Water levels (wells, piezometers)
- Fugitive dust monitoring
- Meteorological conditions

ATTACHMENT B
FIGURES

Figure 1, Mine Site Location Map

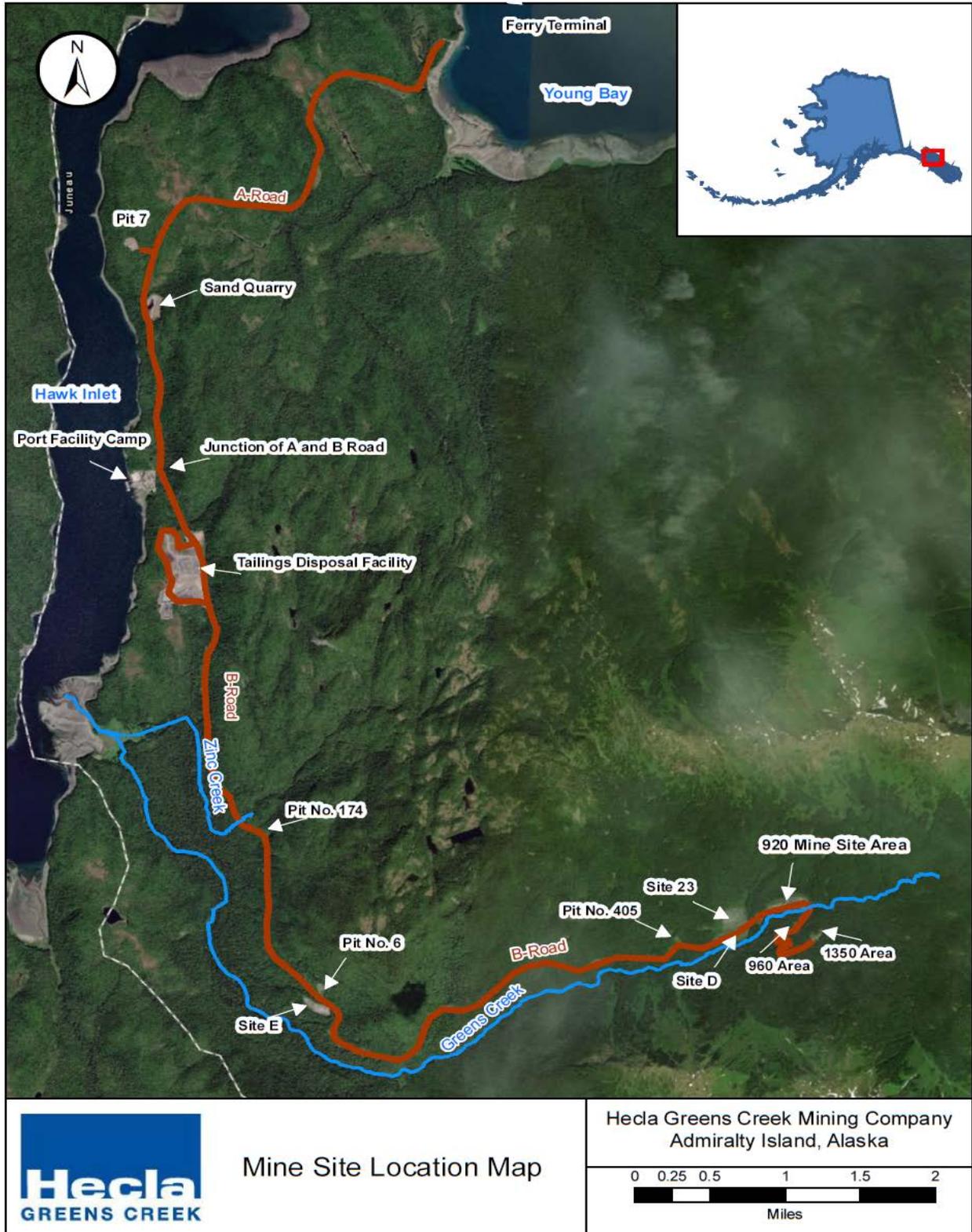
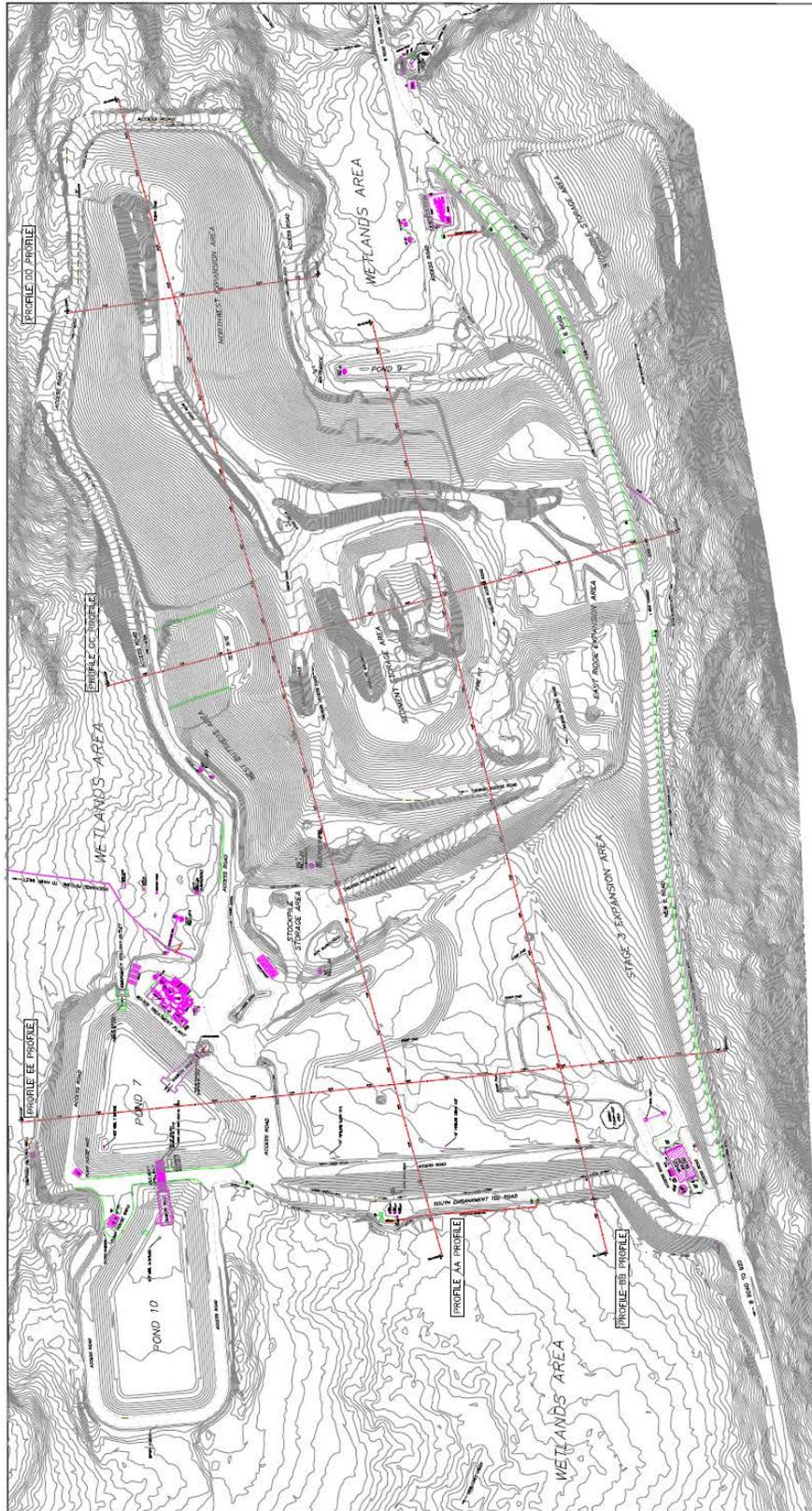


Figure 2, Tailings Facility As-Built

Tailings Disposal Facility Management Plan
Greens Creek Mining Company



HECLA GREENS CREEK MINING CO.
P.O. BOX 32199 JUNEAU, ALASKA 99803
PHONE: (907)790-8441 FAX: (907)790-8448

DATE: 12/31/18
DRAWN BY: Jimbly Edwards
CHECKED BY: _____
SCALE: AS SHOWN
SHEET: 1 OF 1

LEGEND:
 ROAD (thick line)
 TRAIL (thin line)
 FENCE (dashed line)
 STRUCTURE (rectangle)
 WETLANDS (wavy lines)
 POND (blue area)
 STAGE 3 EXPANSION AREA (dotted area)
 PROPOSED ROAD (dashed line)
 PROPOSED TRAIL (dotted line)
 PROPOSED FENCE (dotted line)
 PROPOSED STRUCTURE (dotted rectangle)
 PROPOSED WETLANDS (dotted wavy lines)
 PROPOSED POND (dotted blue area)
 PROPOSED STAGE 3 EXPANSION AREA (dotted dotted area)

Figure 3, Tailings Facility As-Built Cross Sections

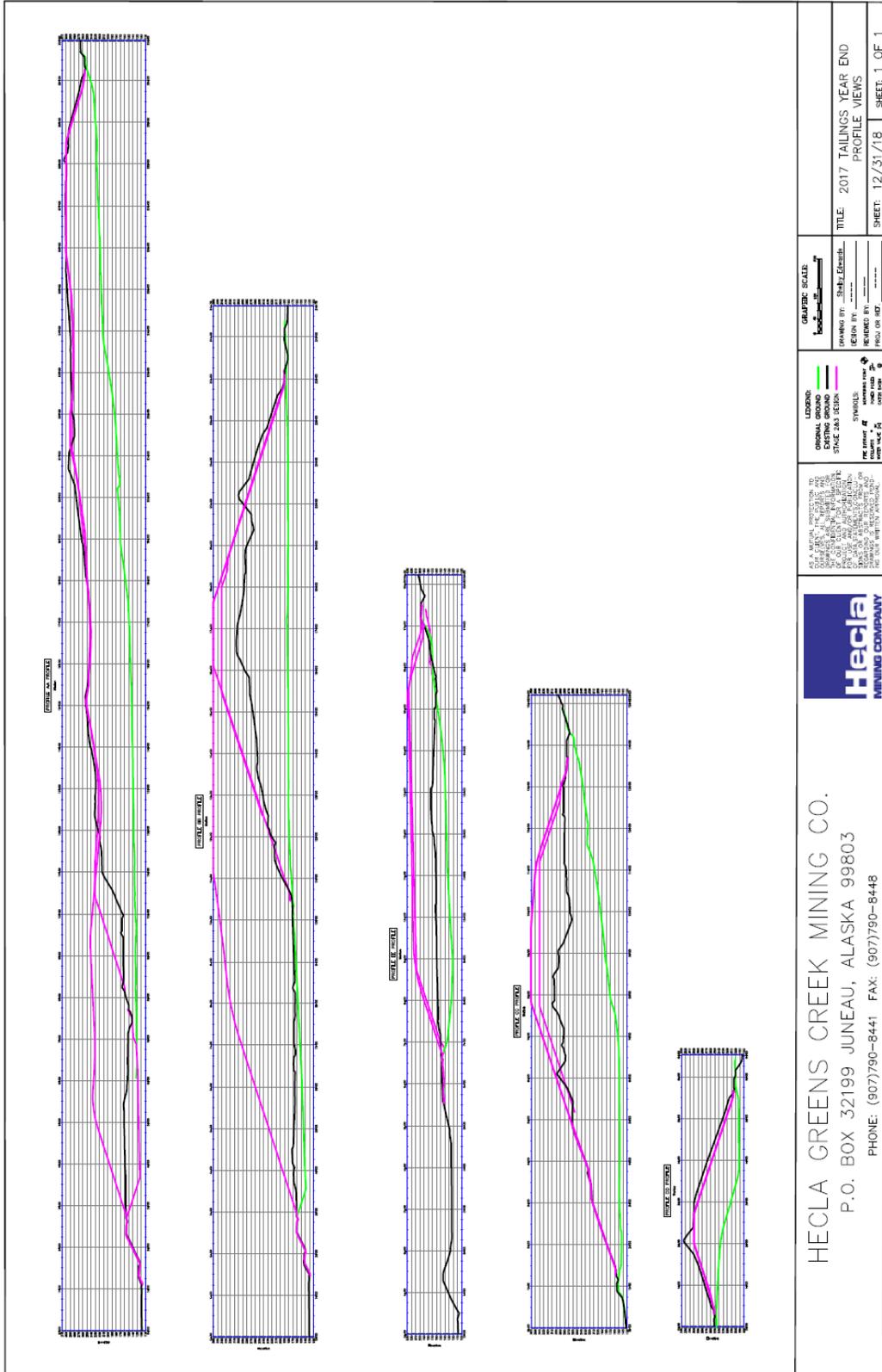
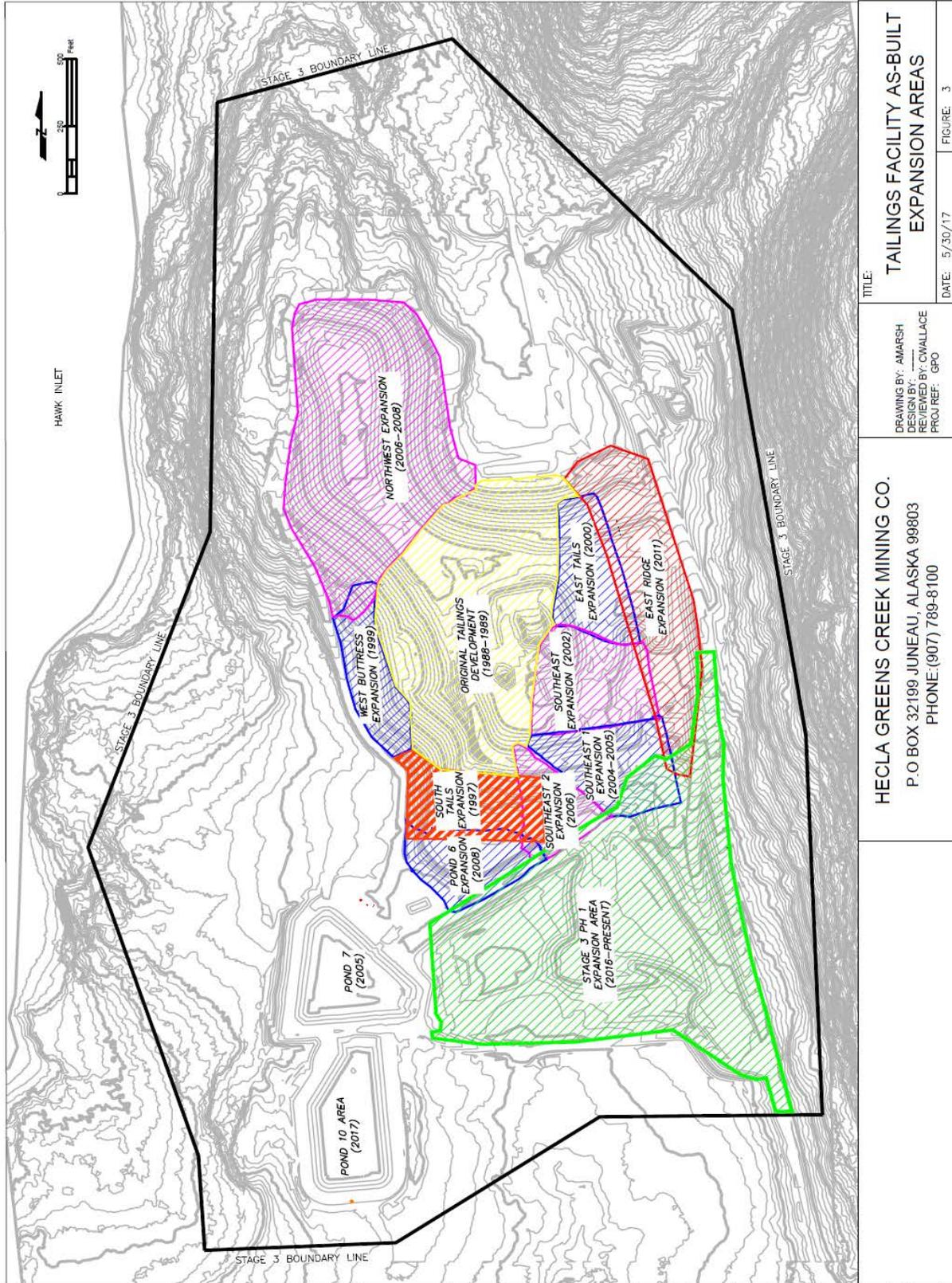


Figure 4: Tailings Facility Expansion Areas



TITLE:
 TAILINGS FACILITY AS-BUILT
 EXPANSION AREAS

DRAWING BY: AMARSH
DESIGN BY: AMARSH
REVIEWED BY: CWALLACE
PROJ REF: GPO

DATE: 5/30/17 **FIGURE:** 3

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