



# **Amendment to the General Plan of Operations North Extension Project**

**Tailings Disposal Facility  
Greens Creek Mine  
Admiralty Island, Alaska**

**Prepared for USDA Forest Service  
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## ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADNR	Alaska Department of Natural Resources
ANILCA	Alaska National Interest Lands Conservation Act
APDES	Alaska Pollutant Discharge Elimination System
BMP	Best Management Practices
CWA	Clean Water Act
CY	Cubic Yard
EA	Environmental Assessment
FEIS	Final Environmental Impact Statement
HGCMC	Hecla Greens Creek Mining Company
kV	Kilovolt
Lease Boundary	Forest Service-approved Lease Boundary
Monument	Admiralty Island National Monument
MSHA	Mine Safety and Health Administration
NEPA	National Environmental Policy Act
Project	North Extension Project
Plan	Plan of Operations
POSA	Peat and Overburden Storage Area
ROD	Record of Decision
TDF	Tailings Disposal Facility
US	United States
USACE	United States Army Corps of Engineers

## CHAPTER 1.0 INTRODUCTION

Hecla Greens Creek Mining Company (“HGCMC”) has prepared this plan of operations (“Plan”) for the USDA Forest Service (“Forest Service”) in compliance with the 36 CFR 228A regulations and to serve as an amendment to HGCMC’s existing General Plan of Operations (GPO). With this Plan, HGCMC proposes to extend the existing tailings disposal facility (“TDF”), which includes the Tailings Stack and the modification and/or installation of certain supporting infrastructure, at the Greens Creek Mine to allow for continued operations. This extension is identified as the North Extension Project (“Project”).

This Plan describes the TDF extension. HGCMC will adhere to the same or similar operational procedures, environmental management and monitoring measures, and approved final reclamation techniques, all of which are well-known to the Forest Service and have been described and assessed in detail in the 2013 Final Environmental Impact Statement (“FEIS”). The previous TDF expansion for the Greens Creek Mine was approved by the Forest Service in their 2013 Record of Decision (“ROD”) for the site.

### 1.1 Purpose and Need for the Project

HGCMC plans to extend the existing TDF to provide permanent disposal capacity within the existing Forest Service-approved HGCMC Lease Boundary (“Lease Boundary”) for an additional 4 to 5 million cubic yards (“CY”) of tailings and waste rock produced by the existing mill and mine. This additional disposal capacity is intended to meet HGCMC’s objectives for continued uninterrupted tailings and waste rock disposal operations at the mine site in a safe, environmentally sound, technically and economically practicable, and cost-effective manner, while remaining in compliance with regulatory requirements. The Project is needed to allow planned mineral production at the mine site to continue pursuant to applicable law and pre-existing rights beyond the year 2031, when current disposal capacity is expected to be exhausted. Combined with the practicable disposal capacity of about 8.5 million CY in the approved TDF, the total disposal capacity of the extended TDF would reach approximately 12.5 to 13.5 million CY of tailings and waste rock.

### 1.2 Project Location

The Greens Creek Mine is an underground polymetallic mine located on Admiralty Island in Alaska. The Project site is located about 18 miles southwest of Juneau and 43 miles north of Angoon as shown on **Figure 1-1, General Location Map**. The locations of existing mine facilities are shown on **Figure 1-2, Greens Creek Mine Facility Locations**.

Figure 1-1, General Location Map

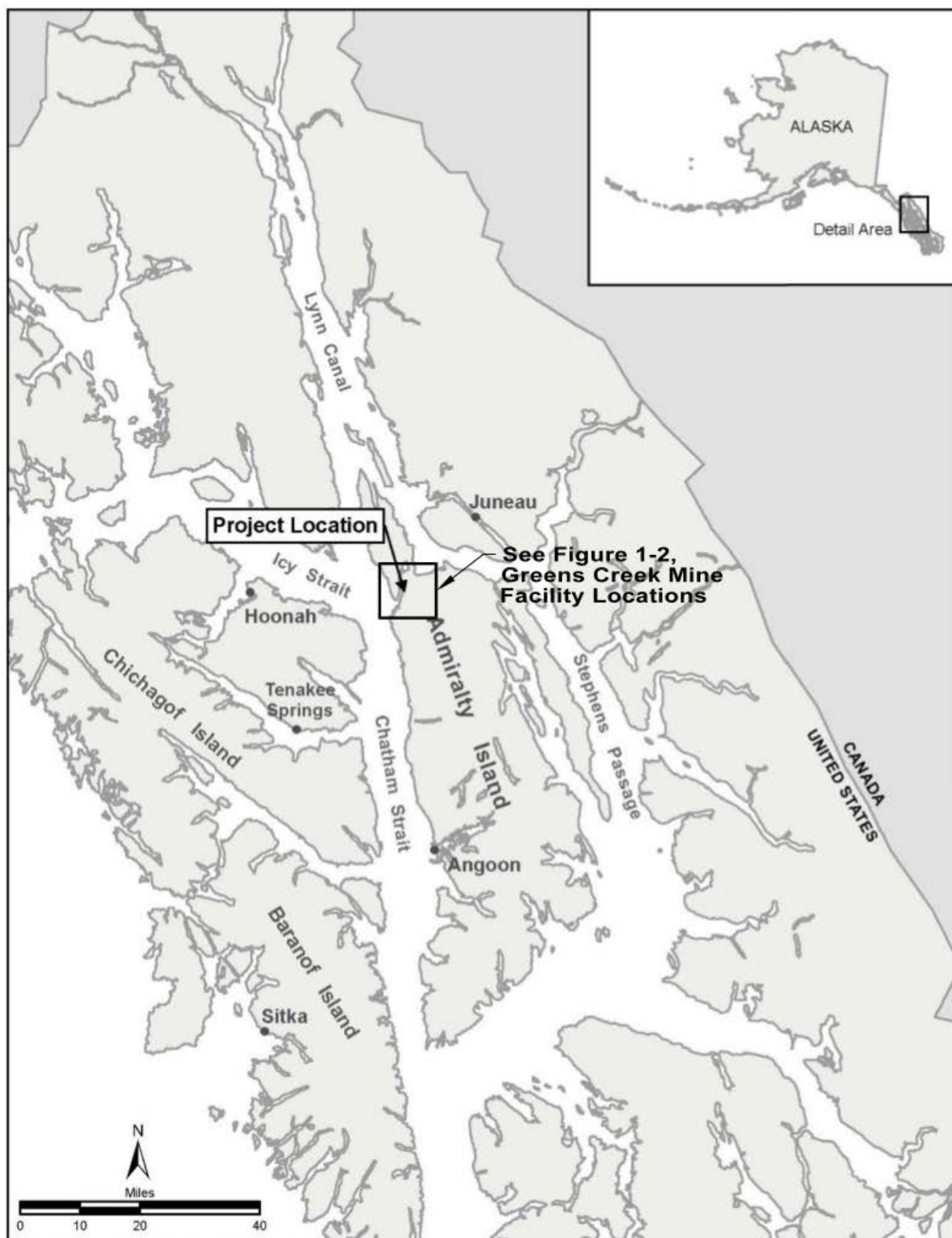
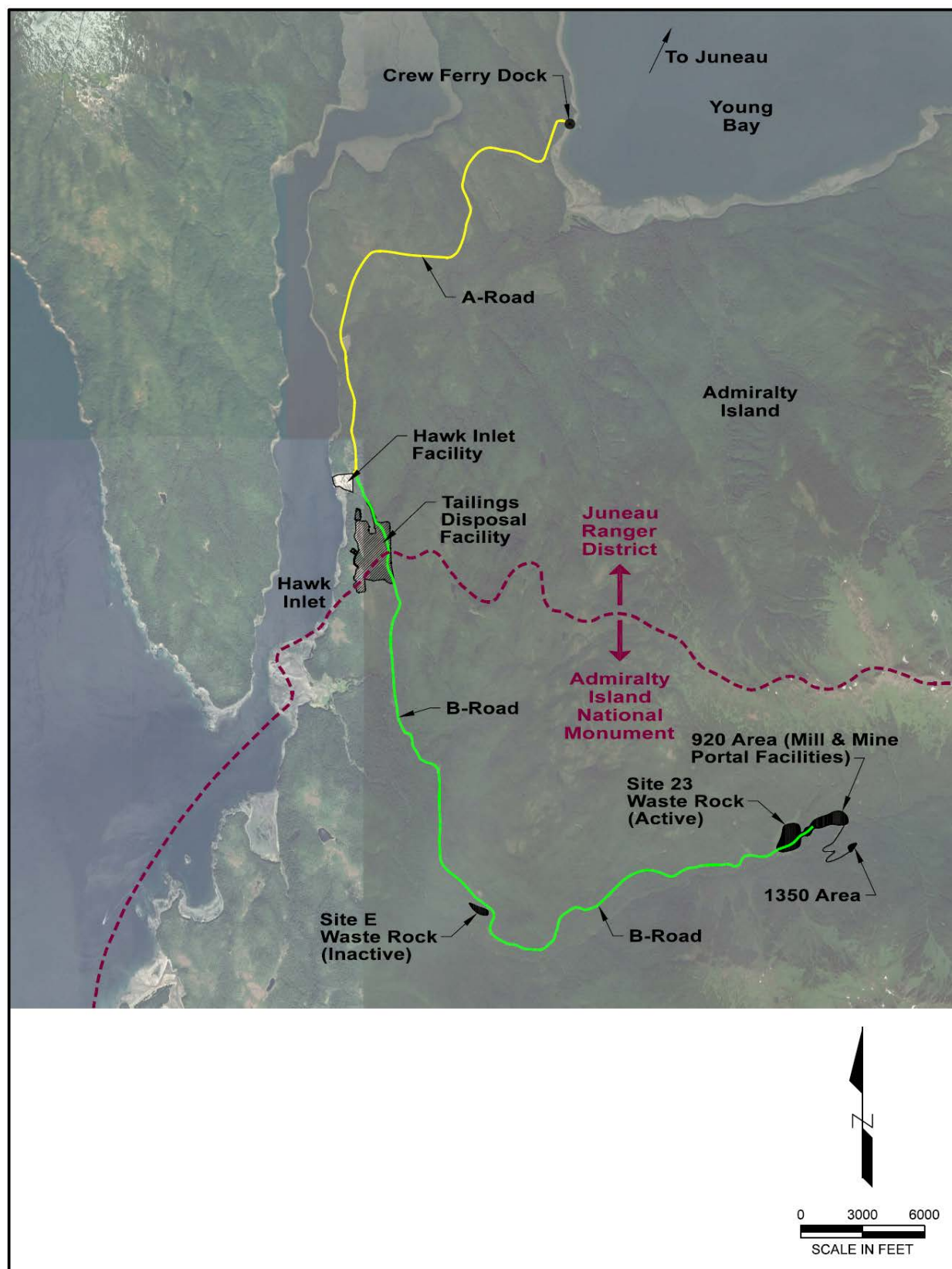


Figure 1-2, Greens Creek Mine Facility Locations





### 1.3 Project Background

Exploration at the Greens Creek site began in 1974. In 1980, Congress provided for mining within the Admiralty Island National Monument (“Monument”) in Section 503 of the Alaska National Interest Lands Conservation Act (“ANILCA”). Greens Creek Mine operations commenced in 1989.

Today the mine operates 24-hours per day, 365 days per year, with a current workforce of approximately 440 people and an annual payroll of over \$50 million. Daily production approximates 2,350 tons of ore, with annual mineral output shown in **Table 1-1, Greens Creek Mine Mineral Production (years ending December 31)**. Major mine components include the underground mine, waste rock disposal areas, a surface mill, a TDF, a water treatment system, ferry dock, ship-loading port, and roads and power infrastructure.

*Table 1-1, Greens Creek Mine Mineral Production (years ending December 31)*

	2015	2016	2017	2018	2019
Silver (ounces)	8,452,153	9,253,543	8,351,882	7,953,002	9,890,125
Gold (ounces)	60,566	53,912	50,854	51,493	56,625
Lead (tons)	21,617	20,596	16,632	18,960	20,112
Zinc (tons)	61,934	57,729	45,407	55,350	56,805

HGCMC utilizes the “dry-stack” tailings disposal technique at the Greens Creek Mine. Details regarding this technique are described in the 1988 Environmental Assessment (“EA”), and the 2003 and 2013 FEIS documents.

In the original 1983 FEIS for the mine, the Forest Service examined the potential for tailings disposal in multiple locations in the vicinity of the mine and Hawk Inlet port facilities. The agency approved the construction and operation of a 150-acre conventional tailings slurry impoundment at the site of the current TDF, which included the construction of an 80-foot high embankment across Tributary Creek to contain slurry tailings.

The conventional tailings disposal method was never implemented at the Greens Creek Mine as subsequent studies determined that the dry-stack method of tailings disposal would be more appropriate for the site, thereby eliminating the embankment and slurry pond and reducing the initially-approved tailings footprint from 150 acres to less than 30 acres. The Forest Service analyzed the effects of dry-stack tailings disposal in a 1988 EA and approved the revised plans.

In 2001 and again in 2010, the mine requested expansion of the existing TDF to accommodate the additional resource base ascertained through ongoing exploration activities. Given these requests, the Forest Service employed the National Environmental Policy Act (“NEPA”) process to review these proposed TDF expansions and issued FEIS documents and RODs approving the expansions in 2003 and 2013. In these FEISs, the Forest Service analyzed alternative TDF sites different than the existing location, but the agency determined the existing site continued to be the appropriate and most environmentally sensible place for TDF expansion.

An aerial view of the existing TDF is shown on **Photo 1-1, Aerial View of Existing Tailings Disposal Facility**. The general layout of the existing and approved TDF is shown on **Figure 1-3, Layout of Approved Tailings Disposal Facility**. The TDF straddles the boundary between the Monument and the Juneau Ranger District, both administered by the Forest Service. The southern portion of the TDF is located within the Tributary Creek watershed, while the northern portion of the TDF lies within the Cannery Creek watershed.

Photo 1-1, Aerial View of Existing Tailings Disposal Facility

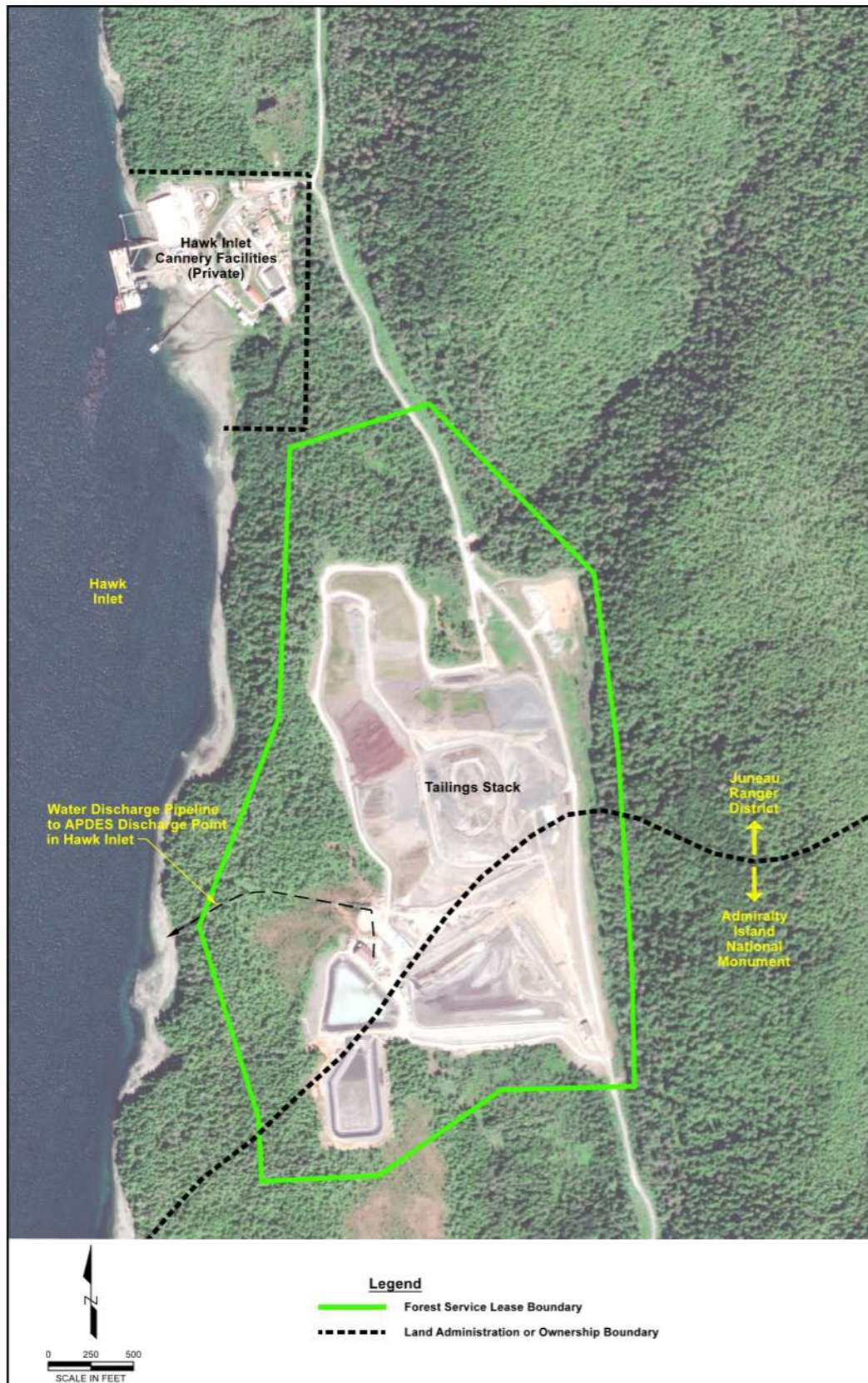
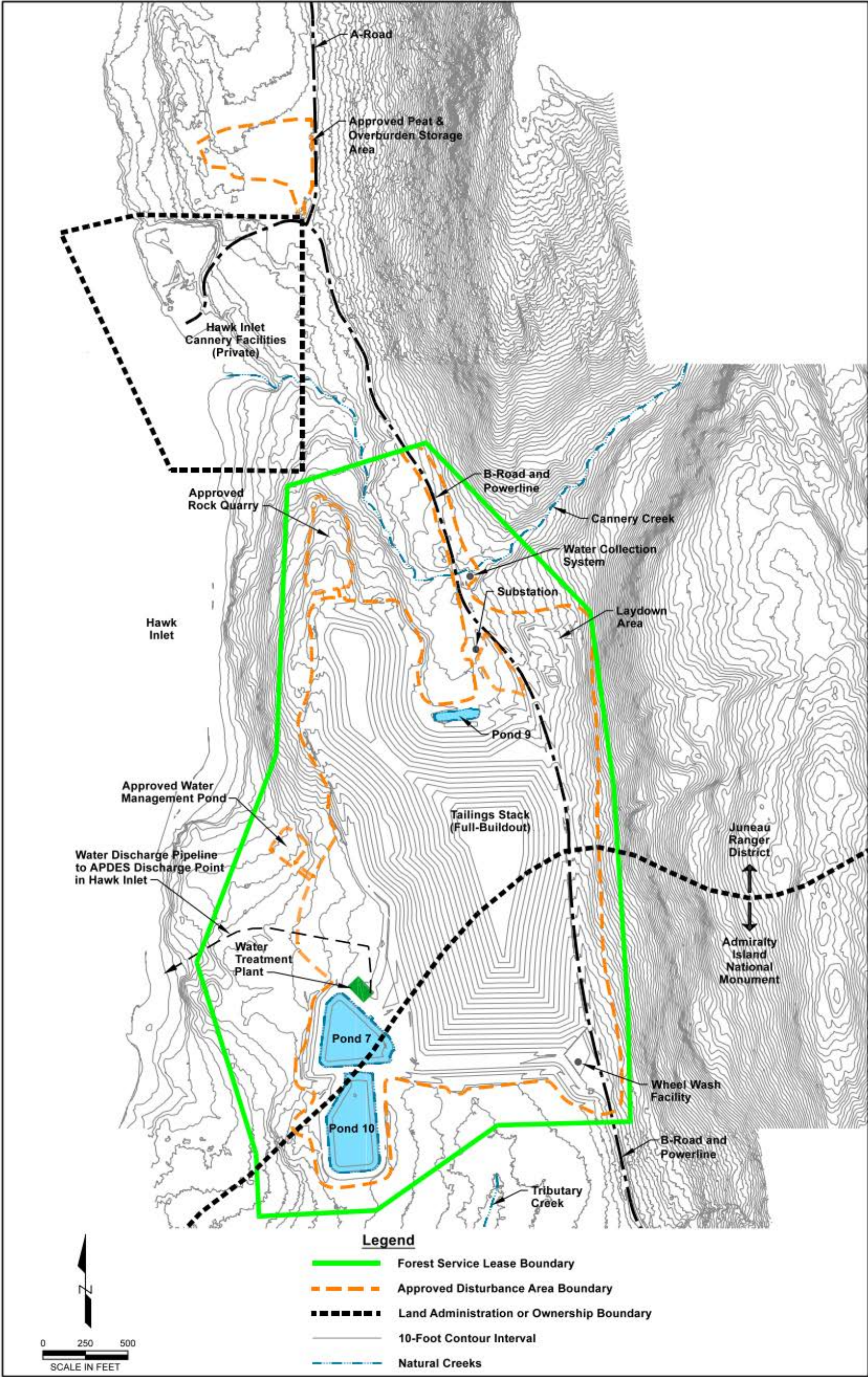




Figure 1-3, Layout of Approved Tailings Disposal Facility





## 1.4 Regulatory Approvals

HGCMC maintains federal, state, and local permits for the existing TDF at the Greens Creek Mine as shown in **Table 1-2, Permits and Approvals – Tailings Disposal Facility**. These permits and approvals will need to be amended or updated for the Project.

*Table 1-2, Permits and Approvals – Tailings Disposal Facility*

Authority	Permits and Approvals
<b>Federal Government</b>	
Forest Service	Amended General Plan of Operations
Forest Service	Private Road Special Use Permit (ADM228) – covers the entire A and B Roads from Youngs Bay to the 1350
Forest Service	Special Use Authorization (ADM230) – includes lease for the tailings basin and wastewater pond, wastewater pipeline right of way, and outfall pipeline right of way.
Army Corps of Engineers (“USACE”)	Clean Water Act (“CWA”) Section 404 Permit (Dredge and Fill) and/or Section 404 Nationwide Permit
<b>State of Alaska</b>	
Alaska Department of Natural Resources (“ADNR”)	Amendment to Reclamation Plan, Water Authorizations for Diverting and Intercepting Water, Certificate of Approval to Construct and Operate a Dam
ADNR	Private non-exclusive Easement (ADL 105124) for marine outfall line and mixing area located on state land
Alaska Department of Environmental Conservation (“ADEC”)	Amendments to Waste Management Permit; Air Quality Permit to Operate; Alaska Pollutant Discharge Elimination System (“APDES”) Permit (including Stormwater)
<b>Local</b>	
City and Borough of Juneau	Amendment to Allowable Use Permit

## **CHAPTER 2.0      PROPONENT INFORMATION**

### **2.1    Proponent**

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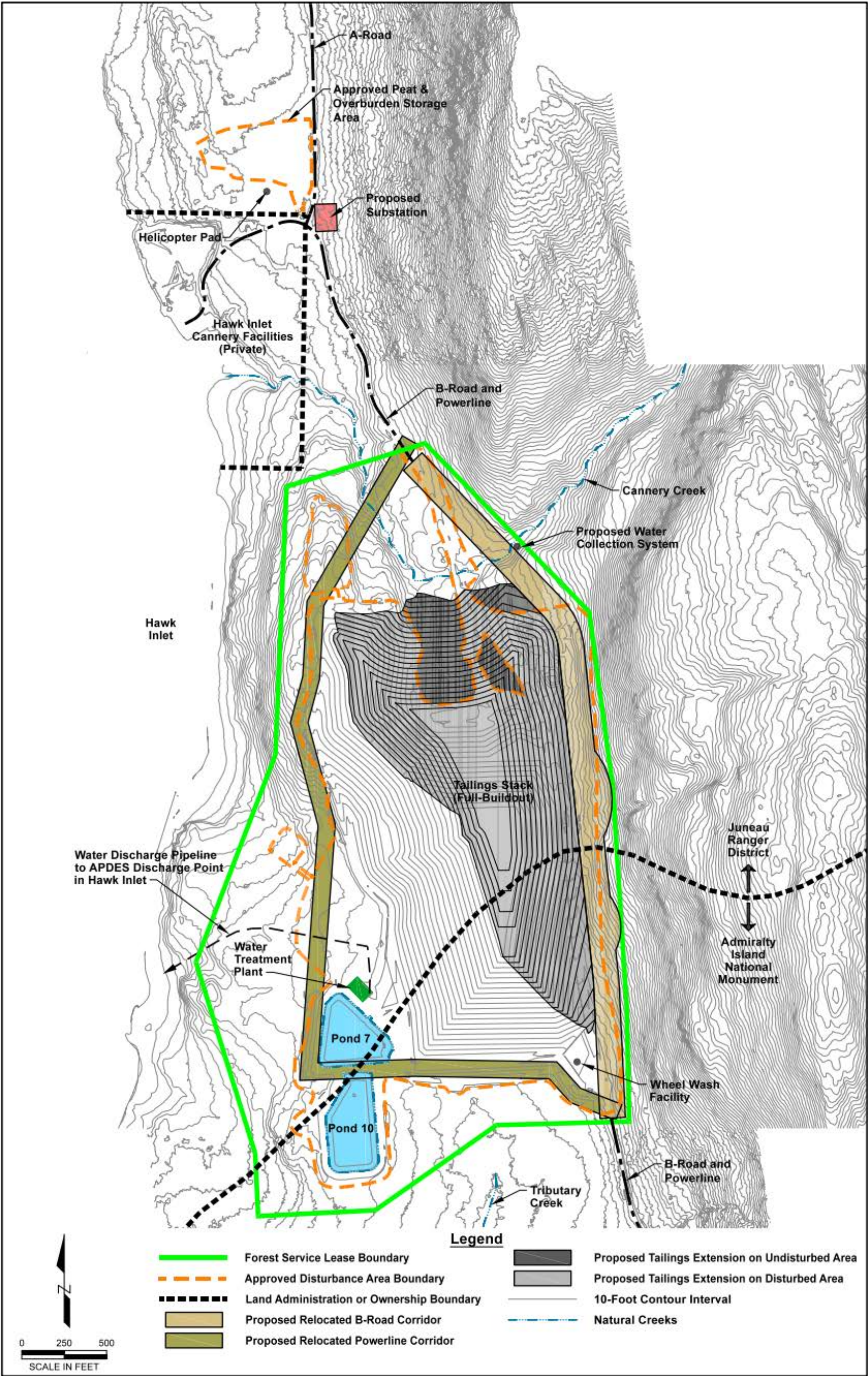
## CHAPTER 3.0 OPERATION DESCRIPTION

HGCMC proposes to extend the existing TDF in a northerly direction as shown on **Figure 3-1, Proposed Layout for North Extension Project**. The following are general design and operational goals to meet HGCMC's Purpose and Need for the Project (see Section 1.1, Purpose and Need for the Project):

- 1) Avoid new Monument disturbance outside the existing Lease Boundary;
- 2) Avoid direct disturbance to fish-bearing reaches of Tributary Creek;
- 3) Avoid construction of a new "remote" TDF;
- 4) Continue the same or similar dry-stack tailings disposal method, which has been previously reviewed and approved by the Forest Service;
- 5) Extend the existing Tailings Stack in a manner that minimizes disturbance. To the extent practical, locate the extended Tailings Stack and new associated supporting infrastructure on areas already disturbed and/or on areas immediately adjacent to existing disturbance. Where possible, use in-place infrastructure (roads, water treatment facilities, drainage control, etc.);
- 6) Minimize direct new disturbance to environmental resources and sensitive habitats, such as jurisdictional Waters of the United States ("U.S.");
- 7) Consider closure and reclamation as part of design and operations;
- 8) Design and construct the TDF to be technically feasible and environmentally sound; and
- 9) Comply with applicable federal, state and local legal and regulatory standards.



Figure 3-1, Proposed Layout for North Extension Project





### 3.1 Estimated Project Disturbance

HGCMC will use the existing TDF area to the extent practical. The estimated surface disturbance associated with the Project is provided in **Table 3-1, Estimated Project Surface Disturbance**.

The Project will result in 12.7 acres of new disturbance beyond the previously approved Forest Service disturbance, including 5.2 acres of new disturbance from the Tailings Stack and 7.5 acres of new disturbance for associated supporting infrastructure. Note that the estimated footprint for the as yet unconfirmed water management infrastructure and peat and overburden storage areas has not been included in this estimate but is estimated to result in up to 7.6 acres for water management infrastructure and 14.7 acres for peat and overburden storage area. The limited new Project disturbance is attributed to HGCMC's use of existing disturbed areas, and the natural topography for placement of the targeted TDF volume.

Based on comments raised during the 2013 FEIS, the proposed Tailings Stack extension will remain within the existing Lease Boundary, resulting in no new Monument disturbance and therefore avoiding the fish-bearing reaches of Tributary Creek. It should be noted that Cannery Creek located immediately north of the existing TDF does not support anadromous fish habitat.



Table 3-1, Estimated Project Surface Disturbance

PROJECT COMPONENT <sup>(1)</sup>	JUNEAU RANGER DISTRICT		ADMIRALTY ISLAND NATIONAL MONUMENT <sup>(2)</sup>		TOTAL AREA (acres) <sup>(9)</sup>
	Previously-Approved Disturbed Area <sup>(3)</sup> (acres)	New Disturbance (acres)	Previously-Approved Disturbed Area <sup>(3)</sup> (acres)	New Disturbance (acres)	
PROPOSED TAILINGS DISPOSAL AREA EXTENSION					
Tailings Stack <sup>(4)</sup>	32.4 <sup>(5)</sup>	6.2	9.5	0	48.1
AREA OF PROPOSED SUPPORT FACILITIES/INFRASTRUCTURE FOR TAILINGS EXTENSION					
Water Collection System	0	0.3	0	0	0.3
B Road <sup>(6)</sup>	5.6	4.1	3.6	2.1	15.4
Powerline <sup>(7)</sup>	0.6	0.5	0.3	0	1.4
Substation	0	0.5	0	0	0.5
TOTAL	38.6	11.6	13.4	2.1 <sup>(8)</sup>	65.7
POTENTIAL ADDITIONAL INFRASTRUCTURE <sup>10</sup>					
Water Management	TBD	TBD	TBD	TBD	TBD
Peat and Overburden Storage	TBD	TBD	TBD	TBD	TBD
Notes:					
<div>1. This column includes Project components that will be modified or added as part of the Project (See <b>Figure 3-1, Proposed Layout for North Extension Project</b>). Note: The placement of water management, and peat and overburden storage area components will be assessed by the Project concurrent with Part 3 (EIS Logistics and Preparation Plan) of the NEPA process and the USFS will be presented with the details for evaluation once available (i.e., to be determined (TBD)) (see Section 3.4.1.1, Ponds and Water Conveyance Facilities, and Section 3.4.2, Peat and Overburden Storage Area).</div> <div>2. The boundary for the Admiralty Island National Monument provided by the Forest Service in 2019 in conformance with the Alaska National Interest Lands Conservation Act (ANILCA). <a href="https://data.fs.usda.gov/geodata/rastergateway/states.regions/admiraltyisland/monument.php">https://data.fs.usda.gov/geodata/rastergateway/states.regions/admiraltyisland/monument.php</a>.</div> <div>3. This column accounts for areas that have either been previously disturbed or are approved for disturbance. New disturbance will be minimized by maximizing the placement of the TDF on or adjacent to existing disturbance (See <b>Figure 3-1, Proposed Layout for North Extension Project</b>).</div> <div>4. The extension of the Tailings Stack maximizes capacity, while minimizing new surface disturbance.</div> <div>5. This acreage includes Pond 9 surface disturbance, which will be consumed by the extension of the TDF.</div> <div>6. The relocated B-Road corridor length is estimated to be 4,450-feet-long. The targeted minimum running surface width of the B-Road is estimated at around 30 feet, with drainage ditches installed to handle contact and non-contact water.</div> <div>7. The width of the relocated powerline corridor is shown as 100 feet on <b>Figure 3-1, Proposed Layout for North Extension Project</b>. Installation of powerline structures (i.e., poles) will involve minimal disturbance as they can mostly be located in areas of previous disturbance. The actual power lines will span between the structures. In certain previously-undisturbed areas, some trees will have to be removed. For acreage disturbance, assume 10% of the area within the corridor will be disturbed by powerline installation and for tree felling.</div> <div>8. The proposed new disturbance in the Admiralty Island National Monument will involve the shifting of the B-road within the existing Forest Service Lease Boundary and adjacent to existing disturbance.</div> <div>9. The total surface disturbance does not include disturbance acres from potential Water Management and Peat and Overburden Storage options.</div> <div>10. For estimated acres of disturbance for this additional infrastructure refer to <b>Table 3-2, Estimated Areas and Volumes – Potential Water Management Pond Options</b> and <b>Table 3-3, Estimated Areas and Capacity – Potential Peat and Overburden Storage Area Options</b>.</div>					

### 3.2 Tailings Disposal Facility Extension

As discussed above, the extended Tailings Stack will be contained within the current Forest Service Lease Boundary and will be confined by the perimeter of existing tailings (west and south) and natural topography (east). This location allows for considerable disposal volume with limited new disturbance (See **Figure 3-1, Proposed Layout for North Extension Project**).

The conceptual design of the Project will include two primary stages of development to meet HGCMC tailings and waste rock storage capacity needs. **Figure 3-2, Conceptual Tailings Stack Layout by Stage (Infrastructure Changes Not Shown)**, provides a conceptual illustration of the Tailings Stack layout. The conceptual schedule for the construction of the two stages is in Section 3.7, Schedule.

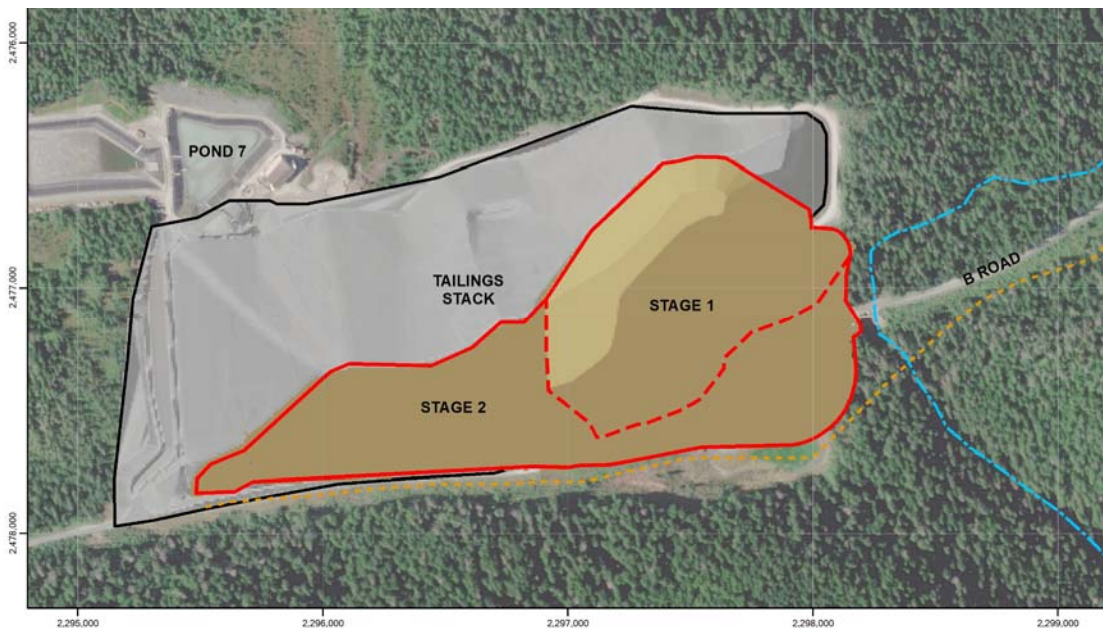
#### Stage 1

- Requires the decommissioning of Pond 9.
- Requires the modification of existing water management ponds or construction of a new water management pond, and associated conveyance system (See Section 3.4.1.1, Ponds and Water Conveyance Facilities).
- Includes the construction of a peat and overburden storage area ("POSA") (See Section 3.4.2, Peat and Overburden Storage Area).
- Includes an estimated storage capacity of 1.9 million CY of tailings and waste rock.

#### Stage 2

- Requires relocation of the B-Road (including construction of a crossing for Cannery Creek).
- Requires relocation of the electric powerline and substation.
- Requires the location of the water collection system at Cannery Creek.
- Includes an estimated combined (Stage 1 and Stage 2) storage capacity of 4.6 million CY of tailings and waste rock.

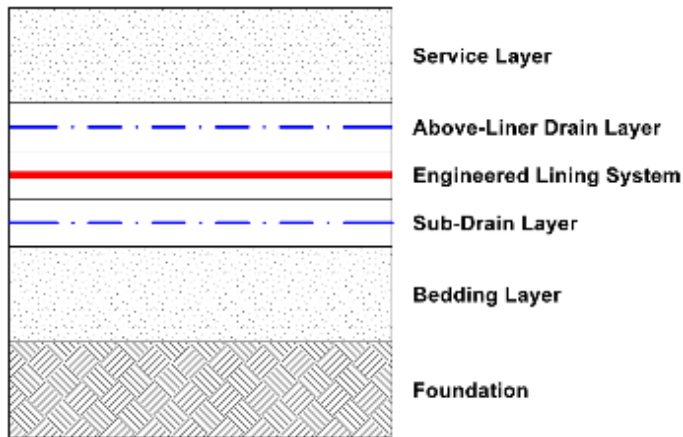
*Figure 3-2, Conceptual Tailings Stack Layout by Stage (Infrastructure Changes Not Shown)*



The proposed TDF extension will minimize disturbance and overall environmental effects by HGCMC's continued use of existing infrastructure (where practical), disposal techniques, environmental management procedures, and reclamation measures previously approved by the Forest Service and other governmental agencies.

HGCMC will design the TDF extension in a manner that will result in the same or better environmental protection than has occurred in past TDF expansions at the site. A conceptual cross-section of a liner system used for the Tailings Stack, beneath previous extensions, is provided in **Figure 3-3, Conceptual Section - Tailings Stack Liner System**.

*Figure 3-3, Conceptual Section - Tailings Stack Liner System*



### 3.2.1 Site Preparation

A large portion of the area proposed for the Tailings Stack extension has been previously disturbed or has been cleared for tailings disposal activities and related operations. See **Table 3-1, Estimated Project Surface Disturbance** and **Figure 3-1, Proposed Layout for North Extension Project**.

Tree felling activities within the existing Lease Boundary were permitted under Forest Service Timber Sale Contract (#063662). Ahead of Project activities, HGCMC will coordinate with the Forest Service to secure the required new or updated authorization for additional tree felling activities, as appropriate.

Once trees are removed, the remaining vegetation will be grubbed and placed into slash piles. After vegetation grubbing activities are completed, peat and overburden material could either be left in place (if feasible and appropriate), incorporated into the TDF as part of interim reclamation, buried for permanent disposal, or hauled to a designated storage area (see Section 3.4.2, Peat and Overburden Storage Area). Growth media will be salvaged and stored for reclamation and closure as per HGCMC's GPO Appendix 14, Reclamation and Closure Plan.

### 3.2.2 Tailings Stack Construction

After vegetation has been removed, the foundation for the Tailings Stack will be shaped and graded to the engineered conditions and footprint specifications for further development. A liner or equivalent engineered system to manage the seepage of leachate from the Tailings Stack into the environment will be designed.

The Tailings Stack liner system approved by the Forest Service in 2003 and 2013 (see **Figure 3-3, Conceptual Section - Tailings Stack Liner System**) included compacted fill material for the liner subgrade; sub-drains to reduce possible groundwater pressure to the liner system; placement and compaction of a liner bedding; placement of a primary synthetic liner that is welded together and



anchored around the perimeter of the Tailings Stack in excavated trenches; an above-liner fabric drain layer and seepage collection system to facilitate drainage; and a service layer to protect the liner from equipment damage. **Photos 3-1 through 3-9** visually illustrate the typical above-described construction stages of the TDF. Tailings placement is described in detail in Section 3.3, Tailings Disposal Facility Operation.

*Photo 3-1, Vegetation Clearing*



*Photo 3-2, Foundation Preparation and Peat Removal as Necessary*



*Photo 3-3, Foundation Preparation*



*Photo 3-4, Placement and Compaction of Bedding Layer*





*Photo 3-5, Installation of Sub-drains*



*Photo 3-6, Placement of Synthetic Liner*



*Photo 3-7, Installation of Above-Liner Drain*



*Photo 3-8, Placement and Compaction of Service Layer*



*Photo 3-9, Tailings Delivery and Placement*

### 3.3 Tailings Disposal Facility Operation

HGCMC currently operates, and will continue to operate, the TDF using sound engineering, tailings placement methods, and water control procedures that have evolved from many years of onsite operational knowledge. Tailings will continue to be placed in discreet cells in the TDF to control compaction, drainage control and pore-pressure generation. **Photos 3-10 through 3-14** visually illustrate the operational procedures used by HGCMC for tailings placement.

In addition to tailings, the TDF is designed to accommodate waste rock, sediments removed from de-gritting basins, settling ponds and ditches, dewatered sewage sludge, dewatered sludge from the water treatment plant, and other material as would otherwise be disposed in an inert solid waste landfill without special handling.

HGCMC implements and will continue to use the following operational objectives and procedures for the TDF:

- Divert surface non-contact water from undisturbed areas around the TDF;
- Collect and route direct contact water runoff on the TDF via ditching and piping into water management ponds for water treatment and discharge into Hawk Inlet, in compliance with HGCMC's APDES permit;
- Minimize tailings contact with groundwater by installing sub-drains, slurry walls, liners, and finger and blanket drains beneath the tailings, as needed;
- Construct internal access roads (identified by HGCMC operators as "dirty roads" versus the designation of roads outside the TDF that are known by site personnel as "clean roads") on the surface of the tailings;



- Establish internal secondary crossroads that branch from the on-tailings “dirty roads” to further distribute tailings at the facility. The number and extent of these crossroads will vary given placement area and weather conditions. Successful compaction supports truck traffic (particularly in dry weather) making it practical to limit the number of crossroads; however, during wet weather, crossroads are used;
- Prior to actual tailings placement, ensure that positive surface drainage is secured to minimize water pooling or ponding;
- Spread tailings in lifts on the sloped area and “track-walk” in with a bulldozer, and seal with a smooth-drum vibratory roller. Sealing with the smooth-drum vibratory roller promotes water runoff and to reduce the potential for oxygen and water infiltration. Tailings are graded to prevent ruts, indentations, and water pooling or ponding. The layout and disturbance area of the TDF will be designed with final outside slopes of 3H:1V (horizontal to vertical). However, as part of stability designs HGCMC will assess the stability and safety of alternate slopes;
- Shift or rotate tailings placement routinely to allow dissipation of construction pore pressures;
- All vehicles driving on the dirty road within the TDF are required to pass through the wheel wash facility prior to exiting the tailings area to prevent tracking tailings out of the facility; and
- Shift or relocate internal secondary access roads to accommodate tailings placement within the TDF.

*Photo 3-10, Dirty Road versus Clean Road*



Photo 3-11, Max Haul Truck Dumping Tailings



Photo 3-12, Spreading and Compacting Tailings

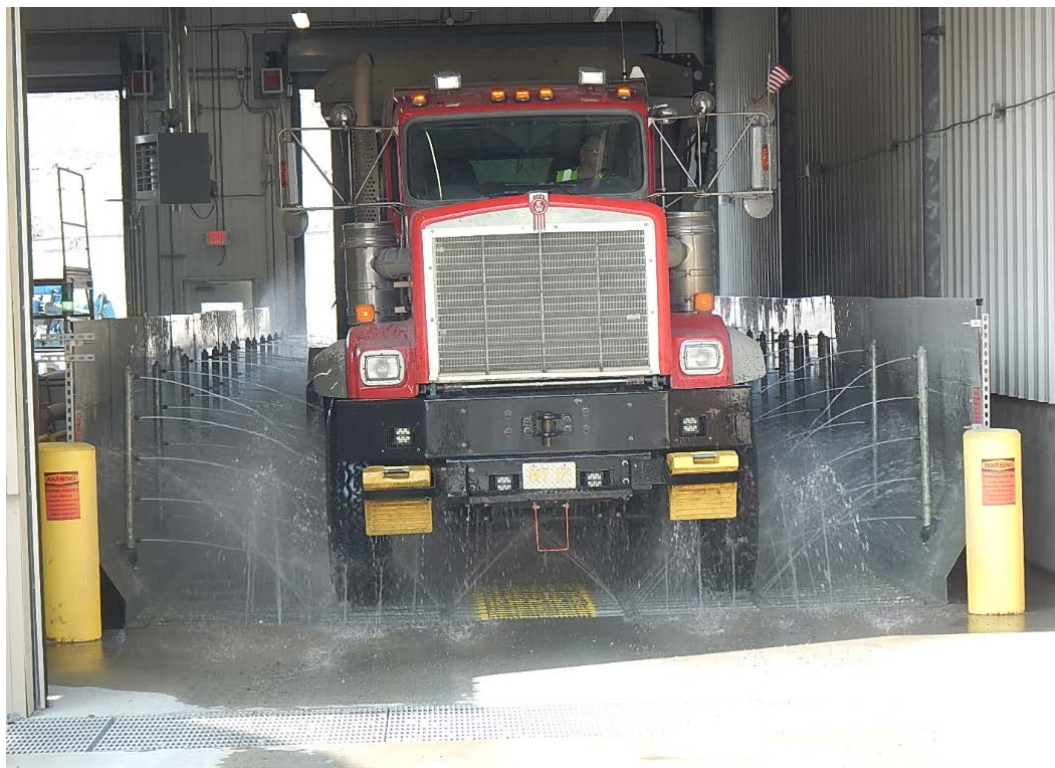




*Photo 3-13, Sealing Tailings Surface with Vibratory Roller Compactor*



*Photo 3-14, Wheel Wash Facility*



### 3.4 Tailings Disposal Facility Supporting Activities and Infrastructure

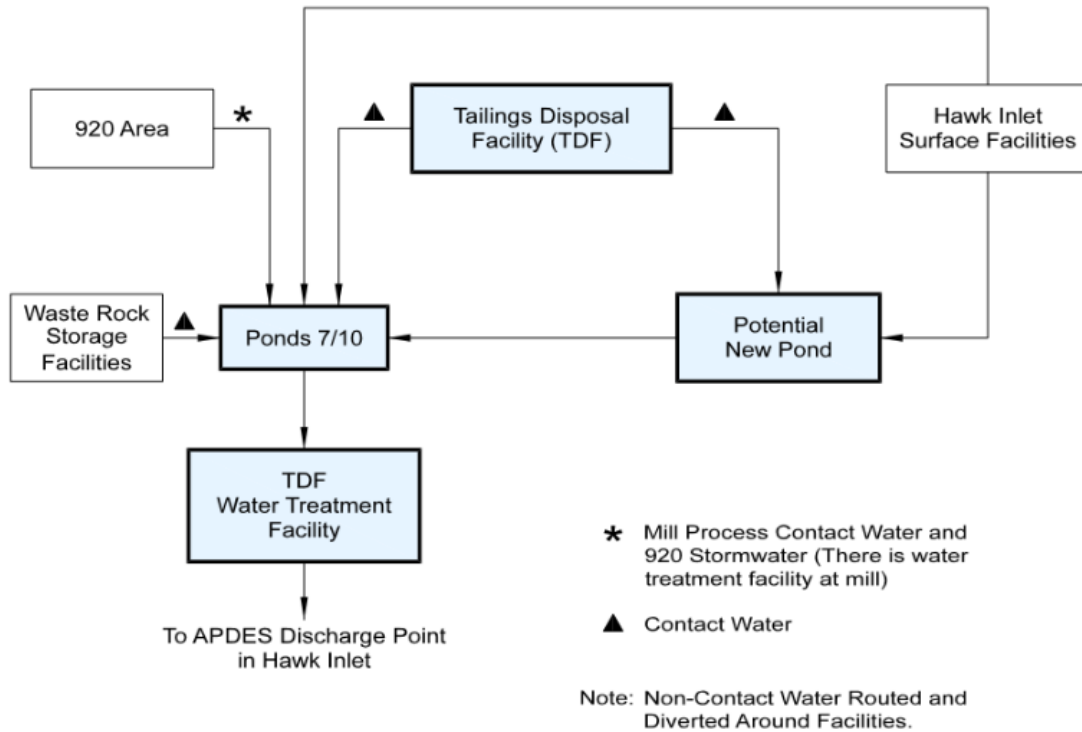
HGCMC will conduct specific activities, and modify or install infrastructure, to support the TDF extension. These activities may include the construction of water management pond(s) and conveyance systems (or expansion of existing pond(s) or systems), stormwater facilities, storage areas for peat and/or overburden, and growth media, realignment of a portion of the existing B-Road and powerline, relocation of the existing electrical substation, and relocation of the water collection system at Cannery Creek.

#### 3.4.1 Water Management

As part of the TDF extension, HGCMC will continue to use water management and stormwater controls including, but not limited to, diversion ditches, culverts, and ponds. Water management operations will be conducted through implementation of best management practices (BMPs) and applicable environmental measures (see **CHAPTER 5.0, Applicant-Committed Environmental Measures**).

Mine contact water will continue to be captured, treated and discharged under the mine's APDES permit. HGCMC will size, construct and maintain water management facilities such as ditches and impoundments using a risk based/hazard-based approach for purposes of meeting the Alaska Dam Safety Program requirements and to assure compliance with applicable environmental quality standards. HGCMC will maintain the existing Ponds 7 and 10, collectively known as "Ponds 7/10", located at the southwest corner of the existing TDF, and the existing adjacent water treatment plant, see **Figure 1-3, Layout of Approved Tailings Disposal Facility**. The water treatment plant utilizes chemical precipitation (ferric chloride and lime) and filtration as the treatment technologies. The treated effluent is routed from the water treatment plant via a discharge pipeline that extends into Hawk Inlet (see **Figure 1-3, Layout of Approved Tailings Disposal Facility**). A conceptual flow diagram on water management within the mine area is provided in **Figure 3-4, Schematic Contact Water Management Flow Diagram**.

Figure 3-4, Schematic Contact Water Management Flow Diagram



### 3.4.1.1 Ponds and Water Conveyance Facilities

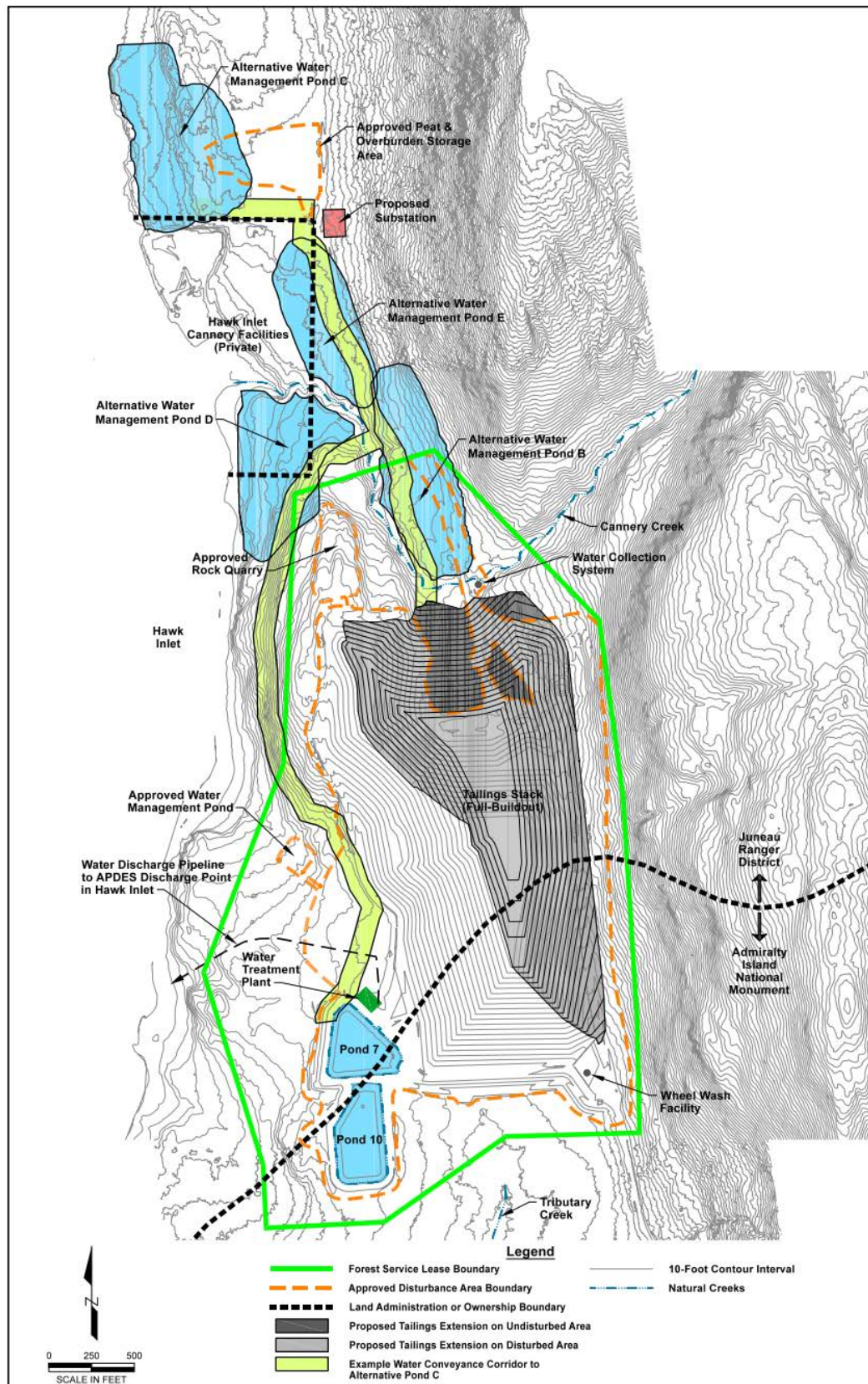
HGCMC is considering several water management control options for the TDF extension. Studies to collect geotechnical information and evaluate foundation conditions for these options is ongoing. HGCMC is also conducting internal engineering analyses to compare the merits and risks of installing a new pond versus modifying the existing Ponds 7/10. HGCMC is also considering appropriate water conveyance corridors for routing contact water to Ponds 7/10 for eventual treatment at the existing water treatment plant, from which water will be discharged into Hawk Inlet, in compliance with HGCMC's APDES permit. These options will be presented to the USFS at the beginning of the Alternatives Evaluation Process.

Currently, there is a small water management pond, identified by HGCMC as Pond 9, at the toe of the north end of the existing Tailings Stack, where contact water is collected and routed to Ponds 7/10 by gravity via a pipeline beneath the existing Tailings Stack (see **Figure 1-3, Layout of Approved Tailings Disposal Facility**). As part of the Project, Pond 9 will be consumed by the proposed TDF extension. Part of HGCMC's ongoing analysis will include the assessment of the aforementioned Pond 9 discharge pipeline to determine if it can continue to be used for water conveyance as part of the TDF extension or if additional water conveyance infrastructure is required.

At present, including the potential modification of Ponds 7/10, HGCMC has identified five potential new water management pond options to handle contact water (see **Figure 3-5, Potential Water Management Pond Options**). The estimated areas and volumes for the water management pond options are provided in **Table 3-2, Estimated Areas and Volumes – Potential Water Management Pond Options**.



Figure 3-5, Potential Water Management Pond Options



HGCMC's initial objectives in selecting a water management option for the Project was to:

- 1) Avoid new disturbance to the Monument, particularly new pond construction activities south of the existing TDF and in the Tributary Creek watershed;
- 2) Avoid pond construction activities in Cannery Creek;
- 3) Avoid areas with expected unsuitable or poor foundation conditions; and
- 4) Design a pond option (including the expansion of existing Ponds 7/10) that can manage the appropriate flood events.

As part of the examination of the potential pond options, HGCMC is also considering water conveyance structures to route contact water to a new pond and from the new pond to Ponds 7/10, for eventual treatment and discharge into Hawk Inlet, in compliance with HGCMC's APDES permit. An example water conveyance corridor for Pond Option C and Pond Option B is provided in **Figure 3-5, Potential Water Management Pond Options**.

In the ongoing engineering assessment of the water management options, HGCMC will:

- 1) Evaluate foundation conditions;
- 2) Evaluate the simplicity of the required water conveyance methods (e.g., ability for gravity drainage from the extended TDF),
- 3) Evaluate the feasibility of the continued use of the existing Pond 9 discharge pipeline beneath the existing TDF;
- 4) Examine opportunity for local cut and fill balance;
- 5) Consider proximity to existing infrastructure at the TDF or Hawk Inlet; and
- 6) Consider technical and regulatory requirements of the Alaska Department of Natural Resources ("ADNR") Alaska Dam Safety Program.

The expansion of Ponds 7/10 and/or any new pond will be constructed and operated in a manner similar to HGCMC's existing on-site water management ponds (**Photo 3-15, Existing Water Management Pond (Pond 7/10)**).

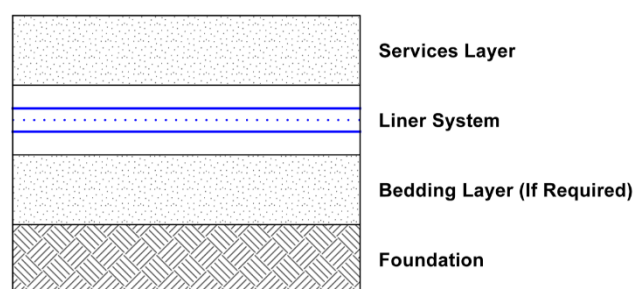
*Table 3-2, Estimated Areas and Volumes – Potential Water Management Pond Options*

Pond Option <sup>(1)</sup>	Estimated Footprint (acres) <sup>(2)</sup>	Estimated Maximum Storage Volume (gallons)
Option B	5.5	7,500,000
Option C	7.6	9,100,000
Option D	7.4	8,100,000
Option E	6.7	8,100,000
Ponds 7/10 <sup>(3)</sup>	Pond 7/10 expansion conceptual design has not yet been assessed	
Notes:		
<div><div>1.</div><div>Pond Options A, F, and G were eliminated from further evaluation by HGCMC during initial screening studies. Evaluation of the pond options will be provided in a forthcoming HGCMC Alternative Screening Report to be submitted by HGCMC to the USFS following the conclusion of the ongoing engineering studies.</div></div> <div><div>2.</div><div>Includes an approximately 60-foot allowance/buffer zone around the conceptual design of the ponds. Surface disturbance for access to the pond options is not included.</div></div> <div><div>3.</div><div>The combined volume of existing Ponds 7/10 is approximately 21.7 million gallons and the footprint (excluding the adjacent water treatment facility and TDF perimeter road) is about 12.8 acres.</div></div>		



*Photo 3-15, Existing Water Management Pond (Pond 7/10)*

The expansion of Ponds 7/10 and/or the construction of a new pond could involve clearing of trees from the pond footprint, with vegetation being grubbed and removed. Removal of peat and overburden material will follow vegetation clearing and grubbing activities, if required. The pond area will then be excavated, as necessary, shaped and graded to receive the liner system. General construction of a pond liner system is expected to be similar to those techniques discussed for the Tailings Stack. A conceptual cross-section of a water management pond liner is shown on **Figure 3-6, Conceptual Section – Water Management Pond Liner System**.

*Figure 3-6, Conceptual Section – Water Management Pond Liner System*

### 3.4.1.2 Stormwater and Surface Runoff

Non-contact water runoff from undisturbed areas will be diverted around disturbed areas through ditches and culverts and released per HGCMC BMPs. Contact water runoff from the TDF will be routed through ditches, culverts and pipelines to water management ponds, from which water will be treated prior to being discharged into Hawk Inlet, in compliance with HGCMC's APDES permit.

Maintaining surface contact water runoff, on the Tailings Stack surface, is an on-going activity and is based on the TDF configuration and active placement area. Tailings erosion protection is a primary operational concern and is typically accomplished by directing water runoff to armored/rocked areas or diversion tubes, maintaining road ditches and outside slopes, and cleaning ditches as sediment



accumulates. Throughout the life of the TDF, HGCMC will maintain applicable sediment control measures to limit tailings erosion.

#### 3.4.1.3 Groundwater

As explained in Section 3.2.2, Tailings Stack Construction, HGCMC plans to install sub-drains beneath the TDF liner or employ an equivalent engineered design. The main purpose of these sub-drains is to reduce uplift pressures on, and prevent uplift of, the liner system. Groundwater entering the underdrains of the extended TDF will be routed through ditches, pipelines, and other water management facilities (such as ponds, as necessary) to Ponds 7/10 or to Cannery Creek if the collected water meets water quality standards.

#### 3.4.2 Peat and Overburden Storage Area

HGCMC will likely require additional storage capacity for peat and overburden excavated during construction of the TDF extension, depending on the evaluation and selection of the water management pond options described in Section 3.4.1.1, Ponds and Water Conveyance Facilities, and pending final engineering designs. Due to the uncertainty of the amount of peat and overburden material to be removed as part of constructing the TDF extension, HGCMC is considering one or more areas for the storage of excavated peat and other overburden material.

As part of the 2013 ROD, the Forest Service approved an approximately 8-acre POSA at a location northwest of the junction of the A and B roads (See **Figure 1-3, Layout of Approved Tailings Disposal Facility**) which has not been developed to date. This area generally corresponds to water management pond option F (see **Figure 3-5, Potential Water Management Pond Options**).

HGCMC is evaluating five potential POSA options. These areas are shown in **Figure 3-7, Potential Peat and Overburden Storage Area Options**). The selection of a POSA(s) will be determined based on the need for additional peat and overburden storage capacity and will be dependent on the selection of the appropriate water management alternative (see Section 3.4.1.1, Ponds and Water Conveyance Facilities). The estimated areas for the POSA options are provided in **Table 3-3, Estimated Areas and Capacity – Potential Peat and Overburden Storage Area Options**.

In addition, HGCMC will continue to use other approved areas for peat and overburden storage, as needed, including the TDF, and the “Sand Pit” (available space for approximately 34,000 CY of peat and overburden material) where such materials from the construction of the previous TDF expansions were placed. Also, as HGCMC continues to move waste rock material from the existing Site E (see **Figure 1-2, Greens Creek Mine Facility Locations**) to the TDF, storage capacity will develop for peat and overburden materials at this site, should additional storage capacity be needed.

Figure 3-7, Potential Peat and Overburden Storage Area Options

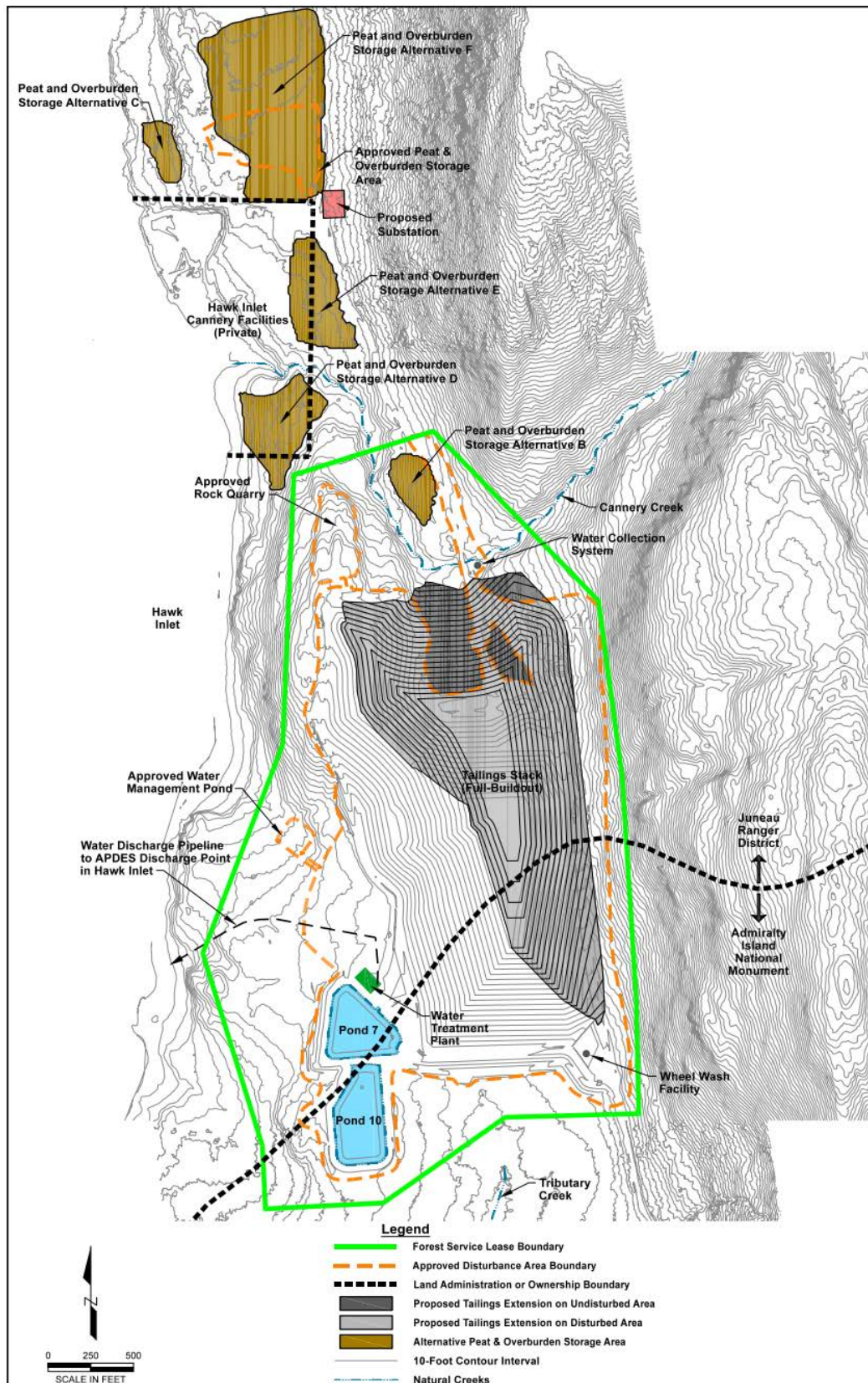


Table 3-3, Estimated Areas and Capacity – Potential Peat and Overburden Storage Area Options

POSA Option	Estimated Footprint <sup>(1)</sup> (acres)	Estimated Storage Capacity (CY)
Option B	1.7	5,800
Option C	1.2	4,600
Option D	3.7	25,000
Option E	3.9	40,000
Option F <sup>(2)</sup>	14.7	231,000
Notes:		
1. Surface Area for access to the POSA options is not included		
2. Includes 4.7 acres of approved disturbance from the 2013 ROD.		

### 3.4.3 Roads

The B-Road is an all-weather road that connects the 920 area (site of the Greens Creek Mine portal and mill) to the marine terminal area at Hawk Inlet and serves as the route for the transport of tailings material to the TDF (see **Figure 1-2, Greens Creek Mine Facility Locations**).

As part of the Project, HGCMC will shift the B-Road eastward to allow for the TDF extension (see **Figure 3-1, Proposed Layout for North Extension Project**). This activity will involve a realignment of approximately 4,450-feet of the B-Road. A portion of the B-Road relocation will occur primarily within previously disturbed areas in the Monument but will remain within the Lease Boundary (see **Figure 3-1, Proposed Layout for North Extension Project**). Estimated surface disturbance associated with this road relocation is shown in **Table 3-1, Estimated Project Surface Disturbance**.

The Forest Service has approved several realignments of the B-Road in the past to accommodate TDF expansions. The realigned segment required for the proposed TDF extension will be constructed with the same or similar design criteria that applied to the existing B-Road. The targeted maximum grade for the B-Road is 9% with minimum “running-surface” width of approximately 30 feet. The new B-Road alignment will include the installation of a large culvert or bridge over Cannery Creek. When necessary, safety berms or barriers (e.g., guard rails or Jersey barriers) will be added to the B-Road (or other roads) as necessary to comply with Mine Safety and Health Administration (“MSHA”) regulations.

HGCMC will install and maintain perimeter service roads or “clean roads” (roads not affected by active tailings placement activities) at or near the toe of the extended TDF, similar to what now exists at the site. These roads will be single-lane, all-weather roads, constructed on prepared foundations and surfaced with crushed rock and/or gravel.

Roads located directly on the Tailings Stack subject to tailings placement activities (commonly referred by HGCMC as “dirty roads”) will be constructed principally from appropriate on-site rock material (e.g., surplus construction rock from the recent TDF expansion) or from off-site sources.

### 3.4.4 Electric Powerline and Sub-Station

To accommodate the buildout of the TDF, HGCMC plans to reroute the existing 69-kilovolt (kV) powerline west around the TDF, as well as to construct and install a new electric substation near the junction of the A-Road and B-Road (see **Figure 3-1, Proposed Layout for North Extension Project**). The realigned powerline segment will carry the same voltage and be the same or similar design to the existing powerline. **Photo 3-16, Existing 69-kV Powerline** shows a configuration of the existing 69-kV powerline.



The activities for rerouting the powerline and the installation of a new substation will involve minimal disturbance (see **Table 3-1, Estimated Project Surface Disturbance**). Similar to the B-Road relocation, a portion of the powerline will be relocated within a previously disturbed area in the Monument, but this relocation will remain within the Lease Boundary (see **Figure 3-1, Proposed Layout for North Extension Project**).

*Photo 3-16, Existing 69-kV Powerline*



The new substation will be of similar design as the existing substation that is located adjacent to the existing TDF. **Photo 3-17, Substation near Existing Tailings Disposal Area** shows the existing substation. Once the new substation is installed and functioning, the existing substation will be dismantled and removed, as this area will be consumed by the TDF extension.

*Photo 3-17, Substation near Existing Tailings Disposal Area*



#### **3.4.5 Water Collection System**

As part of the TDF extension, HGCMC will relocate the existing water collection system at Cannery Creek. The water collection system provides water for potable use, fire suppression, the wheel wash facility, and other activities. The new water collection system will be developed within the Lease Boundary immediately upstream of the new B-Road alignment at Cannery Creek (see **Figure 3-1, Proposed Layout for North Extension Project**). **Photo 3-18, Water Collection Pond on Cannery Creek** and **Photo 3-19, Compressor Building Adjacent to Cannery Creek** show the existing water collection pond and compressor building used to provide air to clean screens at the water collection system.



*Photo 3-18, Water Collection Pond on Cannery Creek*



*Photo 3-19, Compressor Building Adjacent to Cannery Creek*



### 3.5 Non-Hazardous and Hazardous Wastes

HGCMC manages (and will continue to manage) non-hazardous wastes at the Greens Green Mine TDF, including sludge generated in the water treatment processes (both process water and sewage). Sediments removed from settling ponds, ditches and basins are also placed into the TDF. HGCMC maintains a waste management permit issued by the Alaska Department of Environmental Conservation (ADEC) that allows for the placement of non-hazardous waste materials in the TDF. Hazardous wastes are collected and shipped to approved off-site facilities.

During the development/early operations of the Greens Creek Mine debris from the historic cannery was disposed near the north end of the existing TDF. At present, there is no way to determine the type or quantity of debris, short of unearthing the site. As part of site preparation work associated with the TDF extension, HGCMC may unearth the debris, and if so, will identify and segregate materials, and handle accordingly, as appropriate and approved by the Forest Service (either dispose materials in the TDF or haul off-island to an approved disposal facility).

### 3.6 Workforce

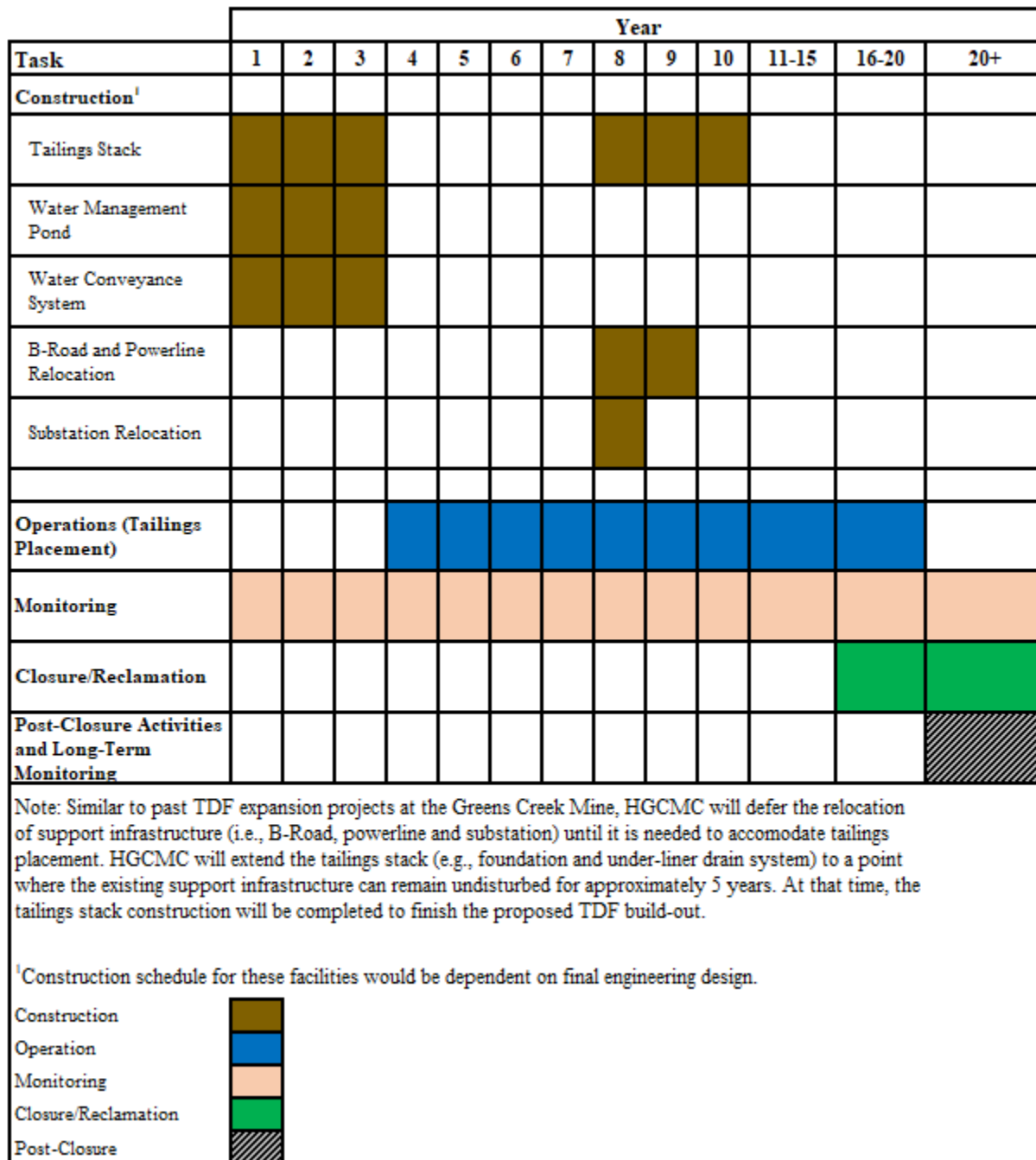
HGCMC conducts mining, milling and TDF operations 24 hours per day, 7 days a week, 365 days a year. HGCMC currently employs 440 workers at the Greens Creek Mine and utilizes outside contractors, as needed. Worker schedules typically include 11 to 12-hour shifts. The current HGCMC workforce will fulfill the labor requirements for the continued operation of the TDF.

For TDF site-preparation and construction purposes, HGCMC projects a contractor workforce of approximately 40-60 workers will be used for 5 to 7 months during the anticipated annual work periods, as discussed in Section 3.7, Schedule. HGCMC will continue to use the existing workforce during and after Project construction to transport and place tailings material in the TDF.

### 3.7 Schedule

A conceptual schedule for construction, operation, and closure/reclamation is provided in **Figure 3-8, Conceptual Project Schedule**.

Figure 3-8, Conceptual Project Schedule





## CHAPTER 4.0 RECLAMATION

HGCMC considers reclamation to be an integral and important component of the Greens Creek Mine operations. Reclamation objectives and procedures will be the same as described in the 2013 EIS (USFS 2013) and in the Forest Service approved Reclamation Plan for the site.

The current and future land use at and surrounding the TDF is primarily for fish and wildlife habitat, with opportunities for remote, isolated recreation activities. The overall purpose of HGCMC reclamation will be to return disturbed areas to stabilized and self-sustaining vegetated conditions to ensure long-term protection of land and water resources in the area and to obtain near-natural conditions.

HGCMC understands that reclamation practices and technology are ever evolving and improving and will take advantage of future opportunities to explore new reclamation technologies or implement improved reclamation measures.

Two years prior to final cessation of tailings placement, HGCMC will prepare a closure management plan, for agency review and approval. At the time of permanent cessation of Project activities, HGCMC will implement final reclamation of the TDF. HGCMC assumes that a significant amount of site-specific reclamation experience and performance data will be available at final closure. Based on this information, HGCMC will review its currently approved Reclamation Plan for improvements and obtain concurrence from the Forest Service and other applicable agencies before any modifications to the approved plan are implemented. The post-operational topography is anticipated to be approximately the same as shown on **Figure 3-1, Proposed Layout for North Extension Project**.

HGCMC will update its current reclamation cost estimate once the Forest Service has approved the Project plans. HGCMC will apply for incremental bond release as reclamation targets are successfully achieved. Reclamation and closure success will be addressed by the standards and performance criteria specified in the closure and reclamation plans and permits approved by the Forest Service, ADEC and ADNR.

## CHAPTER 5.0 APPLICANT-COMMITTED ENVIRONMENTAL MEASURES

HGCMC operates the Greens Creek Mine under federal and state permits and other approvals that will require practices and procedures that reduce or avoid environmental impacts and to reclaim disturbed areas (See **Table 1-2, Permits and Approvals – Tailings Disposal Facility**).

HGCMC is committed to environmental protection in all aspects of its operation. HGCMC plans to minimize, to the extent practicable, the Project's footprint and related impacts by using existing roads and locating facilities on previously disturbed ground. HGCMC uses and will continue to use BMPs, monitor the effectiveness of those practices, and implement environmental protection and management measures based on current technology and applicable federal, state and local laws and regulations. The purpose of these practices will be to maintain responsible operations, avoid or minimize adverse impacts detrimental to human health and the environment, and reclaim disturbed areas.

The following subsections outline specific environmental goals and actions that HGCMC will undertake to realize these goals. In addition, HGCMC will continue to meet and comply with applicable federal, state and local air quality, water quality, and other regulatory requirements in its operations.

HGCMC will continue to implement the following environmental measures to ensure that environmental impacts are and will continue to be minimized or mitigated during the operation of the TDF in accordance with the 2013 ROD and HGCMC's GPO.

### 5.1 Water Management

HGCMC maintains water management systems, including water management ponds and a water treatment plant, to collect contact water and groundwater intercepted by the TDF control structures and liner system. This water is treated to comply with discharge standards set by the company's APDES permit prior to release into Hawk Inlet.

**Goal:** *Minimize impacts to surface and groundwater quality and the hydrology of the area.*

#### **Management and Monitoring Plans:**

- GPO Appendix 1 - Integrated Monitoring Plan/ Quality Assurance Project Plan
- GPO Appendix 2 - NPDES Marine Water and Sediment Sampling Programs/ APDES Quality Assurance Project Plan
- GPO Appendix 3 - Tailings Disposal Facility Management Plan
- GPO Appendix 5 - Best Management Practices
- GPO Appendix 6 - Spill Prevention, Control, and Countermeasure Plan
- GPO Appendix 9 - U.S. Coast Guard and Operations Plan and Facility Response Plan
- GPO Appendix 10 - Pond 7/10 –Operations and Maintenance Program

#### **Actions:**

- Non-contact water will be managed through the construction and maintenance of diversion channels to route precipitation runoff away from the TDF. Mine contact water will be captured and routed to Pond 7/10 and treated before discharge into Hawk Inlet, in compliance with HGCMC's APDES permit.

- Water bars, culverts, wattles, diversion ditches, diversion tubes, stormwater detention basins, stormwater ponds, re-vegetation, rock armoring, hydro-seeding, weed-free jute matting, silt fencing, swales, and other erosion control techniques will be utilized to reduce erosion and soil loss.
- Culverts and ditches along roads will be inspected and maintained.
- Contact water runoff from the TDF will be routed and managed at appropriate collection sites to prevent contact water runoff into surface water bodies.
- Vehicles will have their wheels cleaned at the designated wheel wash facility prior to transitioning from dirty roads to clean roads.
- Slopes will range from 3H:1V to 2H:1V. Erosion control measures (e.g., silt fences, swales, and weed-free jute matting) will continue to be used to slow water and reduce erosion while vegetation becomes established.
- Channels and channel banks will be stabilized in areas that are subject to highly erosive stream flows. Hydroseeding will be used on channel banks to aid in stabilization; channels will be stabilized using techniques such as degradable fiber mat to establish vegetation and riprap or other engineered systems used to stabilize constructed channels.
- Slopes and road cuts will be monitored for exposed soil and appropriate measures (e.g., hydroseeding or other engineered systems) will be applied as appropriate to minimize erosion.
- Liners and sub-drains beneath the TDF and slurry walls surrounding the TDF will be installed to minimize tailings contact with groundwater, as required.
- Covers, liners, and surface water diversions will be installed in the TDF to minimize tailings contact with surface water and groundwater, as required.
- Water management infrastructure will be maintained as needed to treat contact water.

## 5.2 Air Quality

The Project is located in an isolated remote area but is subject to windblown dust generated from exposed tailings, especially during the winter months from the northerly winds.

**Goal:** *Manage air emissions to protect human health and the environment during construction, operation, closure and reclamation.*

### Management and Monitoring Plans:

- GPO Appendix 1 - Integrated Monitoring Plan/ Quality Assurance Project Plan
- GPO Appendix 3 - Tailings Disposal Facility Management Plan
- GPO Appendix 8 - Road Operation and Maintenance
- GPO Appendix 12 - Air Quality Plan

### Actions:

- HGCMC will design, construct and operate Project facilities in compliance with appropriate air pollution controls to comply with applicable regulations and any air quality permits issued by ADEC.
- Applicable state and federal air quality standards will be met through the use of best available control technology to control emissions, as required by ADEC.
- Dust abatement and monitoring will continue. Information obtained from monitoring will be evaluated to improve fugitive dust mitigation measures currently in place.
- Dust controls include periodic watering during dry periods, or the use of surfactants or other methods to control fugitive dust generation.

- Internal and external roads to the TDF will be maintained by a motor grader. Smooth and clean road surfaces are essential for not only minimizing dust but to allow for efficient, safe and economical use of the road. The B-Road will be periodically re-surfaced with crushed rock or gravel.
- Dust controls will continue to be implemented on the Tailings Stack via operational sequencing, interim re-vegetation, temporary storage of reclamation material (soil/peat), placement of snow fences, watering systems, and chemical agents as approved.
- Haul trucks will be inspected to ensure covers are in place and tailgate latches are secured to avoid spillage of material.

### 5.3 Cultural Resources

HGCMC recognizes the importance of cultural and historic resources and is committed to protection or mitigation for such resources that may be encountered during Project development and operations.

**Goal:** *Prevent impacts to cultural resources, especially to any sites listed or eligible for listing on the National Register of Historic Places.*

**Management and Monitoring Plans:**

- Cultural Resources Management Plan (*Currently under development*)

**Actions:**

- HGCMC employees and contractors will be informed about relevant governmental regulations intended to protect cultural and historic resources.
- Cultural surveys will be completed prior to project construction, in coordination with the Forest Service.
- If any previously unidentified cultural resources are unearthed or otherwise encountered during Project construction, such activities will cease in the area of discovery, and HGCMC will notify the Forest Service so that such cultural resources can be identified, and appropriate resource protection measures can be developed and implemented.

### 5.4 Vegetation

Vegetative cover in the Project area has been affected by past and ongoing TDF operations.

**Goal:** *Minimize Project-related impacts to vegetation.*

**Management and Monitoring Plans:**

- GPO Appendix 14 - Reclamation and Closure Plan

**Actions:**

- Surface disturbance and vegetation clearing will occur only in those areas necessary for expansion of the TDF and will be done in a way to minimize and maintain the smallest reasonable footprint.
- Interim re-vegetation will be employed where practical to stabilize slopes and other embankments (e.g., reclamation material stockpiles, long-term tailings facility slopes, and road cuts and fills), which are expected to remain in place until final reclamation.
- Upon permanent cessation of Project activities, disturbed areas will be stabilized and reclaimed in accordance with the reclamation plans set forth in GPO Appendix 14, Reclamation and Closure Plan.
- Continue to perform triennial monitoring for invasive and non-native species.



- Continue to mitigate as practicable (e.g. hand-removal of thistle along road corridors).
- Continue to follow Forest Service guidance on management of invasive and non-native species.

## 5.5 Wetlands & Jurisdictional Waters of the U.S.

The Project is located within areas of known wetlands and jurisdictional Waters of the U.S.

**Goal:** *Minimize impacts to wetlands and jurisdictional Waters of the U.S.*

### Management and Monitoring Plans:

- Applicable United States Army Corps of Engineers (“USACE”) rules and regulations

### Actions:

- HGCMC will locate the TDF and associated infrastructure to minimize direct disturbance to Waters of the U.S.
- HGCMC will work with the USACE under the Clean Water Act Section 404 permitting process to provide mitigation as required for any dredge or fill impacts of wetlands or jurisdictional Waters of the U.S.

## 5.6 Fish and Wildlife

Wildlife habitat in the Project area has been impacted by past and ongoing TDF activities.

**Goal:** *Minimize disruption to wildlife species and wildlife habitats during Project activities.*

### Management and Monitoring Plans:

- GPO Appendix 4 – Fish and Wildlife Monitoring

### Actions:

- Hunting and fishing by HGCMC employees are prohibited at the mine site during their work rotations. Employees may access Admiralty Island by their own means to hunt and fish during their time off.
- HGCMC will inform both contractors and employees about the sensitive nature of the work-place environment, particularly the high density of brown bears on Admiralty Island. HGCMC contractors and employees understand the unique environment in which the Greens Creek Mine is located and are required to abide by HGCMC’s Bear Management Program safety standards.
- HGCMC will minimize disturbance to fish and wildlife habitat by maintaining a small footprint. Vegetation will be cleared only in those areas necessary for the TDF extension. Forest Service-approved seed mixes will be used as necessary for stabilization and reclamation, and to promote reestablishment of wildlife habitat.
- HGCMC will provide safeguards to ensure that the water discharged to Hawk Inlet conforms to APDES standards. HGCMC will continue to conduct quarterly sampling in Hawk Inlet for sea water quality. HGCMC will collect and analyze sediment and bioassay samples annually from various locations in Hawk Inlet for monitoring purposes under the APDES permit.
- Refuse will be carefully managed and hauled to the marine terminal facility for site removal. Special care is taken with used oils, grease, antifreeze, solvents and other chemicals; these items are handled separately from normal trash and garbage, and they are taken off-island for disposal or re-use.

- Specified speed limits for trucks and other vehicles operating on roads will be followed. This measure will reduce the potential for vehicle/wildlife collisions.

## **CHAPTER 6.0 ENVIRONMENTAL MONITORING**

HGCMC will continue the previously approved environmental monitoring programs for the Project, and will work, as appropriate, with the Forest Service, other Federal agencies and Alaska agencies to revise and update those existing monitoring programs pertinent to the construction, operation and final closure and reclamation of the proposed TDF.

Monitoring will establish the effects of Project activities and the efficiency of environmental management and mitigation measures. Monitoring will provide input to HGCMC and governmental regulatory agencies regarding Project performance. The information gained during monitoring will be used as the basis for designing additional or altering existing mitigation measures, if necessary.

The general objectives for site environmental monitoring are as follows:

- Confirm compliance with approved Plan, as well as with other federal and state laws, regulations, and permit conditions;
- Provide data and information to calibrate and validate background modeling applications;
- Provide data and information that can provide for early detection of potential problems;
- Provide data and information that can be used to formulate direct corrective actions should they become necessary; and,
- Provide data to measure the effectiveness of defined environmental performance mitigation standards.

## **CHAPTER 7.0      REPORTING**

HGCMC will continue to prepare detailed reports covering the environmental aspects of the Greens Creek Mine, including the TDF. HGCMC will also continue to schedule meetings as per the Waste Management Permit requirements for interested organizations and the general public to review the Green Creek Mine's prior year's operation and the upcoming year's plans.