July 21, 2020

PEBBLE FINAL EIS -- A NEPA PROCESS STILL OFF-TRACK

The U.S. Army Corps of Engineers, Alaska District, held a media briefing on Monday, July 20 to provide an update on the Pebble project and announce the release of the Final Environmental Impact Statement. Here's a link to a recording of the briefing.

The Corps announced a Friday, July 24 publication date for the Final EIS, and said it would post the document on its website that same day. Upon public release of the Final EIS we will review and provide our perspective on its content and consequence. That said, during the media briefing, it became clear that aspects of the Corps administrative process remain far off-track. This document describes two prominent examples:

1. The Corps is treating landowner objections differently in the Pebble permitting process than in other Alaska project permitting processes.

2. In contrast to what the Corps told the media, the new port site is significantly different than the port site evaluated in the EIS documents to date.

THE ROLE OF A LANDOWNER IN CONSIDERING PROJECT ALTERNATIVES

After the Corps released the Preliminary Final EIS, PLP changed its preferred alternative from one in which the transportation and utility corridor traverses Iliamna Lake and then turns south and east overland to a port on Cook Inlet at Amakdedori to one in which the transportation and utility corridor stays entirely overland north of Iliamna Lake to a port on Cook Inlet near Diamond Point.

On the media call, questions were raised whether a landowner's refusal to grant Pebble Limited Partnership (PLP) permission to use or traverse its property would make impracticable any alternative that requires such use. David Hobbie, Chief of the Regulatory Division, Alaska District, responded to the questions by stating that since PLP considers the route practicable, the Corps also considers it practicable. Consequently, he stated, the north route remains in the EIS and appropriately can be considered the preferred alternative. *Recording at 23:45 to 24:50.*

Past practice of the Corps underscores the inconsistency of the Corps' current position. In 2017, David Hobbie himself signed an Army Corps Record of Decision related to a Clean Water Act Section 404 permit for a proposed Oil Spill Response Facility at Shepard Point in Cordova, Alaska. As shown in the excerpts below, the Corps removed one alternative from consideration in the Final EIS due to a landowner's refusal to sell its property:

> 3.2 Alternatives Considered but Eliminated from Further Consideration:
> The alternatives considered but not carried forward in the FEIS and the rationale for not advancing these alternatives are described in the Section 2.3 of the FEIS.
>
> The privately owned Orca Cannery Facility was an option considered that did not advance for full evaluation. Mr. Steve Ranney, property owner, was unwilling to sell the facility – making the site unavailable. […]

This is the exact posture that the Pebble EIS process is in right now – with pre-FEIS formal refusals by landowners whose permission is necessary for the north route to be constructed.

Notably, the Shepherd Point example also demonstrates the depth of the Corps' history of rejecting alternatives as impracticable in the face of landowner objections. At the ROD stage for that permit the Corps also rejected three other alternatives due to landowner objection:

> *3.1.2 Alternative 2 (Ocean/City Dock)*
> Although Alternative 2 was considered practicable in the FEIS, through the passage of Resolution 03-07-10 the City of Cordova resolved that the City would not make the land at Ocean Dock available for the OSR facility project. (City Of Cordova Resolution 03-07-10, March 2007 and letters from the City of Cordova, dated April 17, 2015 and March 24, 2017). Because the land at Ocean Dock is not available nor capable of being obtained, the Ocean Dock Alternative is not practicable and will not be carried forward for review in this document. [...]
>
> *3.1.3 Alternative 3 (Fleming Point)*
> As the site is unavailable for lease through at least year 2032 (State Tidelands Lease ADL 63896) and unavailable from the land owner (Letter from the Eyak Corporation, dated December 18, 2015), the Fleming Point Alternative is not practicable and will not be carried forward for review in this document.
>
> [...]
>
> *3.1.5 Alternative 5 (Orca Site)*
> Although Alternative 5 was considered practicable in the FEIS, a portion of the land where the OSR facility was proposed to be constructed is owned by the State of Alaska and the state has indicated that they will not lease the land for construction of the OSR facility. (Letter from Governor Bill Walker dated April 15, 2016). Because the land at the Orca site is not available nor capable of being obtained, the Orca Cannery Alternative is not practicable and will not be further discussed in this document.

The Corps' position as stated in the July 20 Media Briefing, that it defers to an applicant's position on practicability of a given alternative, is also not supported by the Pebble administrative record of documents. For example, in August of 2018, PLP wrote to the Corps and stated the following:

> PLP does not currently have access to private lands in the Diamond Point to Eagle Bay area that would be required for this alternative to be practicable.

Indeed, this clear statement from PLP (which is not the only such statement in the record) directly contradicts David Hobbie's statement on the Media Briefing that

> Throughout this process [PLP] has held that [the north route] was a practicable alternative for them… Recording at 24:25.

In short, the north route is impracticable, and should not be carried forward in the Final EIS as an alternative.

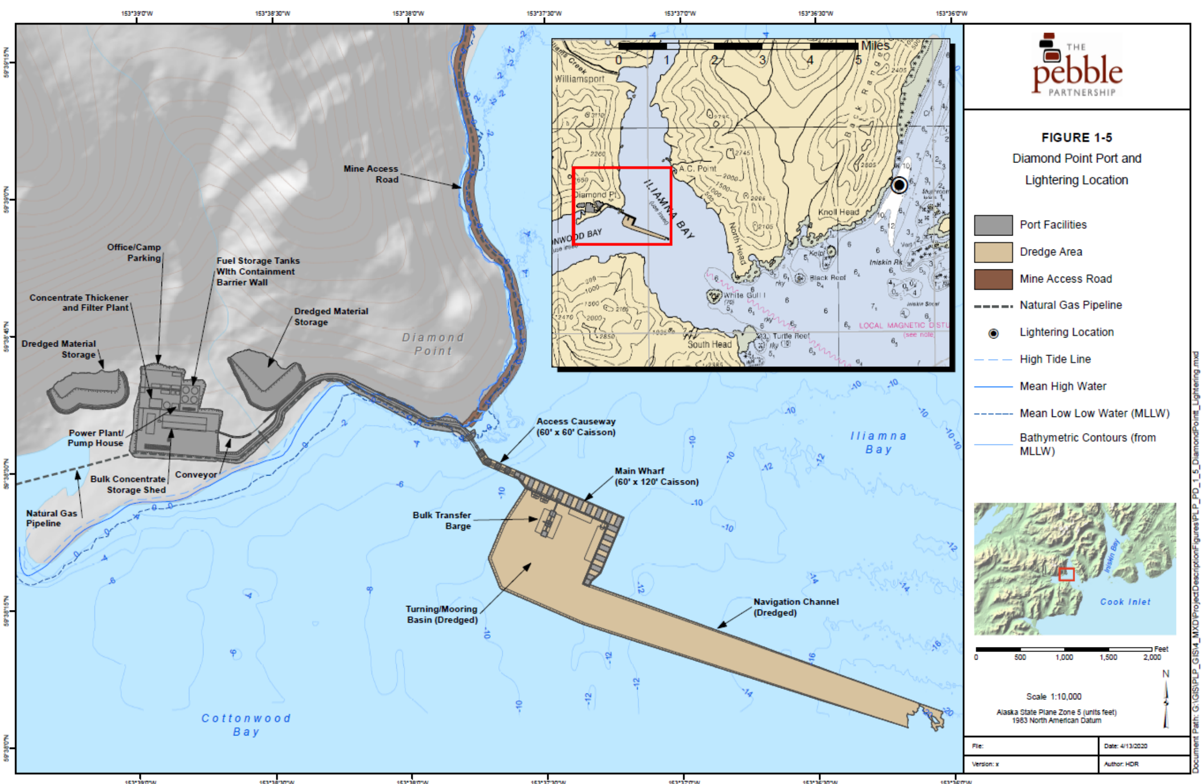
For recent media on this point, *see* https://www.alaskapublic.org/2020/07/20/pebble-mine-to-clear-environmental-review-this-week-but-is-it-practicable/.

July 21, 2020

PEBBLE'S NEW PORT SITE HAS NOT BEEN ANALYZED IN PREVIOUS PEBBLE EIS DOCUMENTS

Another question that was raised in the media briefing was whether there has been sufficient analysis of the northern transportation and utility corridor route in the EIS process to date. Because a goal of NEPA is to gain input from the public, including local knowledge from local stakeholders, NEPA rules require that a draft EIS must resemble as closely as possible the final EIS[1] and the rules provide a process for the agency to revise the EIS if the project changes in significant ways.[2] This ensures a robust analysis of potential impacts, and facilitates the informed decision-making which is the primary goal of NEPA.

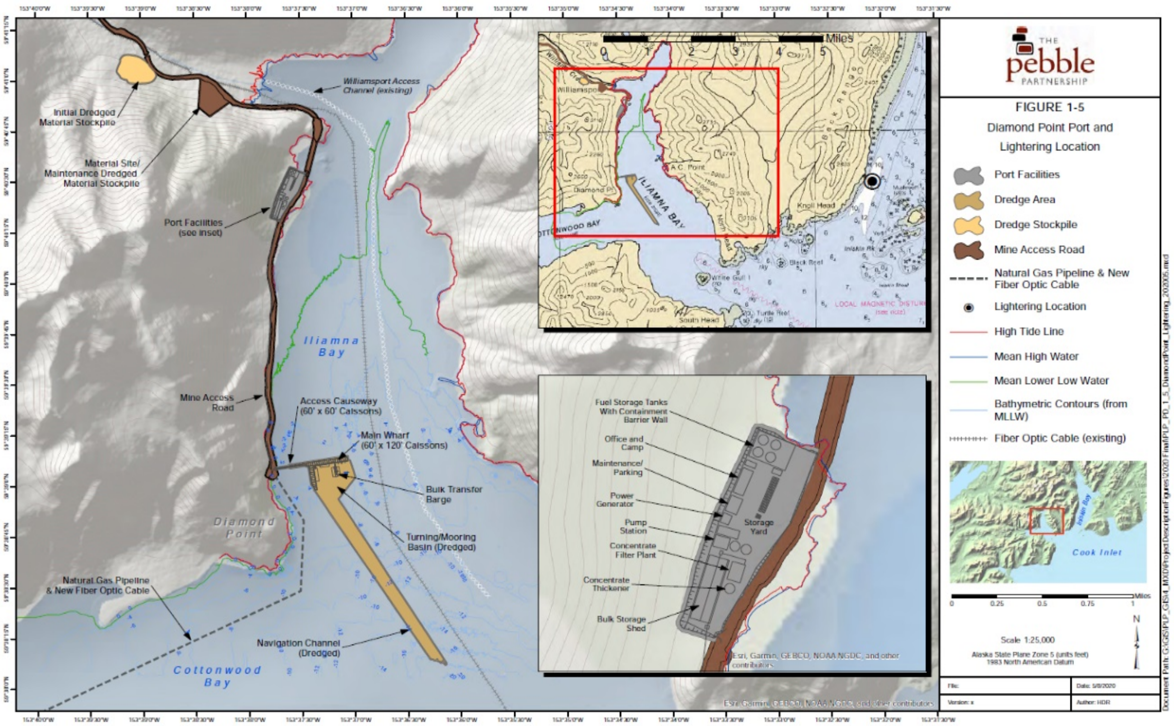
One key component of PLP's proposal is the industrial port on Cook Inlet, which would bring supplies to shore for transport to the mine site and move ore concentrate to ships for delivery to processing facilities outside of the United States. The Draft and Preliminary Final EISs included within Alternative 3 a "Diamond Point Port and Lightering Location." Up to April 2020, that facility was illustrated in Corps' and PLP documents as follows:



PLP Figure I-5, Diamond Point Port and Lightering Location (April 2020) (*see also*, Pebble Project EIS website)

PLP documents from May 2020 reveal that while PLP has kept the name of the port the same – "Diamond Point Port and Lightering Location" -- all key elements of the port have now changed. For example, the Port Facilities were moved from Cottonwood Bay to a location deep inside Iliamna Bay. The Main Wharf was also moved from the mouth of Cottonwood Bay north into Iliamna Bay. These project components are now illustrated as follows:

[1] See 40 CFR 1502.9(a).
[2] See 40 CFR 1502.9(a).



PLP Figure I-5, Diamond Point Port and Lightering Location (May 2020)

Also visible in both illustrations is the Dredge Area, necessary to deepen the marine waters and allow ships to dock. Dredging for the original port alternative is described in the Draft EIS Executive Summary as follows:

> The shallow approach at this port site would require dredging to a -20 feet MLLW to ensure year-round access by vessels requiring 15-foot water depth. Dredged material would either be used in construction of the causeway and dock or disposed of onshore. The dredge area would be approximately 58 acres. The total volume of dredged material for the 20-foot deep channel would be 650,000 cubic yards, of which a minimum of 50 percent is estimated to be used in the barge dock construction, and the remainder would be placed in an onshore fill.

Dredging for the new port alternative is described by in PLP's May 2020 Project Description as follows:

> The dredged material will be placed into two bermed stockpiles located in uplands adjacent to the port facility. Consolidation and runoff water would be channeled into a sediment pond and suspended sediments would be allowed to settle before discharge to Iliamna Bay. [...] The channel will be approximately 2.9 miles in length and 300 feet wide (3 times the maximum expected barge width), while the turning basin will incorporate an area of approximately 1,100 feet by 800 feet. The total volume of dredged material for the initial dredging is estimated at 1,100,000 cubic yards. Maintenance dredging (estimated at 20 inches every 5 years) is expected to total 700,000 cubic yards over twenty years (four times).

Furthermore, PLP's May 2020 Project Description includes a new "dredging plan" that was not disclosed in the Draft EIS. Dredging has offshore and onshore impacts (due to placement of dredged materials onshore), none of which were analyzed in the Pebble Draft EIS.

PLP's new Project Descriptions were sent to the Army Corps on April 14, 2020 and May 8, 2020.

Turning back to the July 20 Corps Media Briefing, the Corps was specifically questioned as to whether the port site in the new preferred alternative is different from what was considered in the earlier EIS documents. David Hobbie, unequivocally, said no. *See recording at 11:45 and again at 27:20.* As detailed above, this answer is not true.

The appropriate course of conduct for the Corps when faced with a change of this magnitude is to revise the Draft EIS and allow opportunity for public review and input of the changes. Doing so would include consulting with the neighboring landowners to seek their input on how the proposed changes to the port facilities may impact their property, and uses of their property, including business uses. This has not been done. Notably, BBNC has a business interest in the neighboring Diamond Point quarry, through the aptly-named Diamond Point, LLC.

In addition and related to the landowner issue addressed above, latest changes to the port site design was likely prompted by Igiugig Village Council's (the primary owner of Diamond Point, LLC) refusal to grant PLP permission to use the Diamond Point property. This reality underscores the central importance of landowner objections to the alternatives analyzed in EIS documents, i.e., excluding certain alternatives when the landowner raises clear objections.

SOURCE DOCUMENTS

for

PEBBLE FINAL EIS -- A NEPA PROCESS STILL OFF-TRACK

Department of the Army

Record of Decision

Alaska District

Applicant: Native Village of Eyak
Project: Cordova Oil Spill Response Facility
File Number: POA-1994-1014, Orca Inlet

This document constitutes the United States (U.S.) Department of the Army (DA), Corps of Engineers' (Corps) Record of Decision (ROD) under the National Environmental Policy Act (NEPA); the compliance determination with the U.S. Environmental Protection Agency's (EPA) Section 404(b)(1) Guidelines (40 CFR 230; Guidelines), and the public interest review, for the Cordova Oil Spill Response Facility (COSRF) project, under the authority delegated to the District Commander by 33 CFR 325.8, pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899.

Background

On March 24, 1989, the Exxon Valdez oil tanker ran aground on Bligh Reef spilling 11,000,000 gallons of crude oil into Prince William Sound (PWS). The Exxon Valdez oil spill (EVOS) was the largest oil spill to occur in U.S. waters, only surpassed by the Deepwater Horizon spill in 2010. The EVOS spread to cover over 11,000 square miles of PWS, the Gulf of Alaska and North Pacific Ocean, and contaminated 1,300 miles of Alaska coastline. The spill resulted in the deaths of 250,000 seabirds, 2,800 northern sea otters, 300 harbor seals, 247 bald eagles, 22 orca whales, and had a major impact on the herring and Pacific salmon fisheries in Prince William Sound.

In 1992 a civil settlement was reached between the State of Alaska and the Alyeska Pipeline Service Company, with the U.S. District Court for the District of Alaska issuing a consent decree. The terms of the settlement included funding the construction of three oil spill response facilities in Prince William Sound at Tatitlek, Chenega Bay, and Shepard Point. The response facilities have been constructed in Tatitlek and Chenega Bay, the facility at Shepard Point has not.

Authority

This document is based on information contained in the Final Environmental Impact Statement (FEIS), prepared by the United States Department of the Interior, Bureau of Indian Affairs (BIA), for the Cordova Oil Spill Response Facility (COSRF). Cooperating agencies include the Native Village of Eyak (NVE), the

Federal Highway Administration (FHWA), and the U.S. Army Corps of Engineers (Corps).

I have independently reviewed and evaluated the information in the FEIS, including all supplemental data subsequently provided, in accordance with 40 CFR 1506.3 and 40 CFR Part 230, and have found them to be sufficient and accurate assessments. Therefore, the FIES is appropriate for the purposes of the public interest review and alternatives analysis required by 33 CFR 320.4(b)(4) and 40 CFR 230.10. The Corps hereby adopts the FEIS for the Cordova Oil Spill Response Facility, and also incorporates the following documents, as referenced in this ROD:

- Letter from Applicant dated Feb 29, 2016; includes the following (but not limited to the following):
  - 2015 Shepard Point Marine Surveys (Dec 22, 2015)
  - CH2MHill Alternatives Assessment (Dec 22, 2015)
  - State Tideland Lease ADL 63896
  - Letter from the Eyak Corporation (Dec 18, 2015)
  - Orca Inlet Sediment Sampling and Analysis (Dec 29, 2015)
- NVE Response to Public Comments on the 2013 public notice
- Letter from the Applicant dated Aug 16, 2016; includes the following (but not limited to the following):
  - Letter from Governor Bill Walker to Jack Hewitt (Apr 15, 2016)
  - Correspondence from applicant (email dated Oct 3, 2014)
  - CH2MHill Technical Memorandum (Jun 19, 2015)
- City of Cordova Resolutions: (Mar. 15, 2007, Mar 7, 2010 and Aug. 7, 2013)
- Agreement and Consent Decree (Nov 25, 1992)
- Additional Information Sheet, Joint Application for Permit Shepard Point Oil Spill Response Facility and Connecting Road Project (CH2MHill Aug 13, 2013)
- Letter from the City of Cordova (Mar 24, 2017)
- Shepard Point Oil Spill Response Facility, Supplemental Biological Assessment (Jul 2017)
- Department of the Army Permit Application (Oct 14, 2013)
- Notice of Residual Soil Contamination (Mar 25, 2009)
- Letter to Mr. Steve Ranney from State of Alaska. Dept. of Environmental Conservation (ADEC) (Mar 19, 2009)
- Letter to Mr. Steve Ranney from ADEC (Jan 2, 2015)
- Orca Cannery Cultural Resources Evaluation Shepard Point Oil Spill Response Facility and Connection Road Project (May 2014)
- FHWA letter to the Corps regarding 4(f) funding (Jun 1, 2015)
- Supplemental Information Report (SIR), (Aug 2017)
- Mitigation Plan, (Aug 2017)
- Updated project drawings (Aug 2017)

1.0 Summary of Decision

I have decided, in light of the overall public interest, to issue a permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), and pursuant to Section 404 of the Clean Water Act (CWA) (33 U.S.C. 1344) for the applicant's Proposed Alternative as described in Section 2.1. This alternative incorporates all practicable avoidance and minimization measures. This permit would authorize construction of a pile-supported dock and 4.5 mile access road.

Principal impacts resulting from the work includes discharging fill material into 1.58 acres of wetlands and 9.74 acres of marine waters, and installing 213 steel piles to support a 60 feet wide by 364 feet long deep-water dock.

The authorization will include special conditions to avoid and minimize potential adverse impacts to the aquatic ecosystem, and to ensure that the project would not be contrary to the public interest.

As stated in the SIR, the Corps considered all relevant data available regarding changes to the project, age of the original NEPA document, consultations with the National Marine Fisheries Service (NMFS) under the Endangered Species Act and for Essential Fish Habitat (EFH), reasonably foreseeable impacts, and updated information regarding alternatives as possible reasons to require a Supplemental Environmental Impact Statement (SEIS). After analyzing each of the topics both individually and cumulatively, the Corps determined that an SEIS was not required because no significant changes were identified within the scope of analysis of Corps' jurisdiction that had not already been discussed in the FEIS, and/or evaluated through the DA permit evaluation process.

2.0 Proposed Project

2.1 Project Description:

The Shepard Point Oil Spill Response Facility would include the following components:

- **Access road –** A new 4.5-mile road connecting Shepard Point to the existing Cordova road system, which provides a connection to the all-weather airport in Cordova. The road would have a crushed aggregate gravel surface of two lanes in the uplands and one lane in areas requiring tideland fill. Two-lane sections would have a top width of 32 feet and one-lane sections would have a top width of 16 feet. The minimum elevation for the road surface would be 20 feet above mean lower low water (MLLW) to prevent the road from being overtopped by waves from Orca Inlet. The roadway would be protected from storm damage by a 6-foot-thick layer of coarse rock riprap on the Orca Inlet side of the road.

The road would cross anadromous fish streams at Unnamed Creek and Humpback Creek using bridges such that approaches, abutments, and piers would be located above the ordinary high water mark (OHWM) with no fill placed in the creeks. Other drainages along the route do not provide fish habitat and would be crossed using culverts, with the exception of one at the beginning of the project. Bridges and culverts would be designed to pass, at a minimum, a 100-year flood event. Road material, including crushed rock surfacing, would be obtained from roadway cuts, and no off-site mining operations are anticipated. The road would be designed and constructed to accommodate avalanche mitigation measures where required.

- **Deepwater dock –** An all-tide, all-weather, deepwater dock at Shepard Point dedicated to oil spill response (OSR) would be constructed The dock face would be 600 feet long; big enough to serve the largest deepwater OSR vessels while simultaneously serving several smaller craft. Major components would be a wharf, mooring dolphins, a trestle, an uplands staging area, and a small boat launch. The wharf would consist of a traditional dock on pilings connected to the uplands by a trestle. Mooring dolphins would be used to provide capacity at the dock face while minimizing the number of piles and wharfs required. The wharf and dolphins would provide approximately 640 feet of useable mooring space, with approximately 340 feet available as useable dock face. The wharf would be situated so that at least 32 feet of water depth would be provided at MLLW without requiring dredging. To construct and support the wharf, trestle, and mooring dolphins, 213 piles would be required. The piles would be embedded approximately 20 feet below the existing mud line. The uplands staging area would cover approximately 3.5 acres, and the expected utilities are electricity from the Cordova Electric Cooperative power plant (located at Humpback Creek), a water well, and wastewater facility. The boat launch ramp would be constructed on a 12-percent grade with a top elevation of +20 feet MLLW and a bottom ramp elevation of -4 feet MLLW. Additional facilities at the port include watertight storage for OSR equipment, a movable crane, gasoline and diesel fuel tanks, a contained concrete or asphalt vessel decontamination washdown area and water recycling system, decontaminated fuel storage tanks, an all-weather equipment storage building, and an administration/office building.

- **Staging/loading area –** A staging and loading area would be constructed adjacent to the deepwater dock dedicated to OSR materials and equipment to ensure efficient loading and off-loading of vessels.

<u>2.2 Project Design Revisions</u>:

Changes since the FEIS and Public Notice: In response to public and agency comments and concerns identified during development of the EIS, as well as during the DA permit evaluation process, NVE verified wetland boundaries as well as the obtained marine surveys of eel grass and other marine habitat, and revised the proposed Shepard Point project design to reduce impacts to aquatic resources, as shown in Table 1 below.

Table 1: Reduction in Impacts to Wetlands and Other WOTUS from 2006 to 2017

<table>
<tr><th>Habitat Type</th><th>2006 FEIS Impact Area (Acres) [1]</th><th>2009 Impact Area (Acres)[2]</th><th>2013 Impact Area (Acres)</th><th>2017 Impact Area (Acres)</th></tr>
<tr><td>Riverine</td><td>0.25[1]</td><td>0.20[2]</td><td>0.47</td><td>0.45</td></tr>
<tr><td>Palustrine</td><td>1.40</td><td>1.20</td><td>1.03</td><td>1.13</td></tr>
<tr><td>Intertidal</td><td rowspan="2">11.10[1]</td><td rowspan="2">11.33[2]</td><td>9.16</td><td>9.23</td></tr>
<tr><td>Subtidal (below MLLW)</td><td>1.11</td><td>0.51</td></tr>
<tr><td>Eelgrass</td><td>1.77</td><td>1.77</td><td>0.90</td><td>0.00</td></tr>
<tr><td>Total Impact</td><td>14.50</td><td>14.50</td><td>12.67</td><td>11.32</td></tr>
</table>

[1]The 2006 FEIS did not distinguish between impacts to intertidal and subtidal habitats and did not account for all riverine impacts.
[2]The 2009 Permit Application, which was withdrawn before a permit decision was made, did not distinguish between impacts to intertidal and subtidal habitats and did not account for all riverine impacts.

The construction of the proposed OSR facility and access road would cause temporary and permanent impacts to wetlands and other waters of the United States (WOTUS). The project is expected to impact 0.45 acre of riverine habitat, 1.13 acres of palustrine habitat, 9.23 acres of intertidal habitat, and 0.51 acre of subtidal habitat. The revised road design eliminates impacts to eel grass.

Between 2006 and 2013 the proposed access road was redesigned to minimize impacts. Road alignment was shifted inland from tidelands to avoid placing fill in productive habitat near the mouth of Unnamed Creek and Humpback Creek. Additionally, segments of the road were redesigned in key areas from a two-way road to a single-lane road with pullouts. By refining the road alignment, road construction avoided impacts to anadromous streams and other sensitive riverine areas. The redesign also removed piers located below the ordinary high water mark in Humpback Creek and Unnamed Creek, and used bridges rather than culverts to cross fish-bearing streams such as Humpback Creek, Orca Creek, and Unnamed Creek. These changes had the following effects:

- Impacts to Orca Creek (a non-fish bearing stream) were completely eliminated from the project design. This reduced impacts to streams by 0.10-acre.
- Impacts to Humpback Creek and Unnamed Creek (fish-bearing streams) were completely eliminated.

- Stream 18 (culvert crossing) was redesigned as a bottomless culvert to avoid impacts to the stream channel and flow.

Between 2006 and 2013 the design of the dock and staging area at Shepard Point was changed from a fill dock to a pile-supported dock. In addition, the staging area was moved inland from its original location. These changes reduced impacts to intertidal and subtidal habitats by a little over one acre.

Due to the fact that the project changes fell within the reasonable range of alternatives discussed in the FEIS, and the changes represented a reduction in impacts relevant to environmental concerns. The Corps concluded that the changes do not constitute a substantial change relevant to environmental concerns nor significant new circumstances or information relevant to environmental concerns bearing on the proposed action and therefore not warranting an SEIS (See SIR).

2.3 Project Purpose:
Applicant's Purpose and Need: The applicant's stated purpose is to construct an Oil Spill Response (OSR) Facility at Shepard Point to enhance current OSR capabilities, near Cordova, Alaska. The facility would be able to receive oil spill equipment from any location through a transportation sequence of either air-ground-to response a transportation sequence of either air-to-ground-to-response–vessel or cargo–vessel-to-response–vessel sequence. The facility would also accommodate existing and foreseeable future oil spill response and cargo vessels with deeper drafts than the current capabilities of existing facilities in the area and provide an adequate staging area contiguous to the proposed dock.

The applicant states the project is needed to improve and enhance Cordova's existing OSR capabilities, and to maximize the efficiency with which Cordova could support a response effort. While Cordova has the longest runway and all-weather airport in PWS, the lack of a deepwater port reduces its ability to transfer supplies efficiently to the site of a major spill. By providing access to deep-draft OSR vessels at any tide, with road connection to the airport, the proposed facility would improve response capacities. Under current spill response plans, crude oil industry logistics planners have assumed that if another large spill occurred in PWS, the Cordova airport would receive 20 percent of out-of-region equipment mobilized to the PWS region, which would then be transported to the spill site by fishing vessels.

Basic Project Purpose: The Corps has determined that the basic project purpose [40 CFR 230.10(a)(3)] is to construct an oil spill response facility and deepwater port in the Cordova area that can transfer response material from the all-weather Cordova Airport to the full range of response vessels, at any tide.

The proposed project is partially located in wetlands, which is a special aquatic site. The project does not require that it be located in a special aquatic site to meet the basic project purpose. Therefore, pursuant to 40 CFR 230.10(a)(3), practicable alternatives not involving special aquatic sites are presumed to be available and are presumed to have less adverse impacts on the aquatic ecosystem unless clearly demonstrated otherwise. Alternatives are discussed below in Section 3.0.

Overall Project Purpose: The overall project purpose is used in the determination of practicable alternatives since the Section 404(b)(1) Guidelines (40 CFR 230; Guidelines) define practicable to mean: “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of the *overall project purpose*” [40 CFR 230.10(a)(2)]. While the definition of overall project purpose is the Corps’ responsibility, it must take into consideration the applicant’s stated need for the project and the type of project being proposed (July 1, 2009, Updated Standard Operating Procedures for the U.S. Army Corps of Engineers Regulatory Program, pg. 15). The overall project purpose should be specific enough to define the applicant’s needs, but not so restrictive as to constrain the range of alternatives that must be considered under the 404(b)(1) guidelines. The overall project purpose is predicated on the need to improve and enhance Cordova’s existing oil spill response capabilities, and to maximize the efficiency with which Cordova could support a response effort.

The Corps has determined that the overall project purpose is to construct an oil spill response facility and deepwater port in the Cordova area that can transfer response material from the all-weather Cordova Airport to the full range of response vessels, at any tide.

Where the activity associated with the placement of fill material in a special aquatic site does not require access or proximity to or locating within the special aquatic site in order to fulfill its basic purpose (i.e., the activity is not water dependent) the Guidelines pose two rebuttable presumptions: 1) practicable alternatives not involving special aquatic sites are presumed to be available, and 2) practicable alternatives not involving discharges to special aquatic sites are presumed to have less adverse impact on the aquatic ecosystem. It is the applicant’s responsibility to clearly and convincingly rebut the presumptions for non-water dependent projects [CFR 230.10(a)(3)].

Failure to rebut the presumptions or to otherwise demonstrate compliance with the Guidelines would require permit denial, regardless of a lead federal agency’s selection of a preferred alternative through the NEPA process. Stated another way, if the permit application for the preferred alternative is denied by the Corps, that alternative shall not be built. This underscores the critical distinctions between ‘purpose and need’ (for NEPA) and ‘overall project purpose’ (for the Guidelines); and between ‘preferred alternative’ (for NEPA) and ‘least environmentally damaging practicable alternative’ (LEDPA; for the Guidelines).

NEPA imposes procedural, not substantive requirements. The Guidelines, however, impose a substantive regulatory requirement that prohibits the discharge of dredged and/or fill material where there is a practicable alternative that would have less adverse impact on the aquatic environment.

2.4 Scope of Analysis

The Corps' scope of analysis involves determining the federal action area by evaluating those direct and indirect project impacts which are subject to control under the Corps' authorities. The extent of cumulative federal control and responsibility is sufficient to make this project a federal action. The project involves required permits under Section 404 of the Clean Water Act (33 U.S.C. 1344) and Section 10 of the Rivers and Harbors Act (33 U.S.C. 403) and federal funding through two separate federal agencies (Bureau of Indian Affairs and Federal Highway Administration).

The Corps' scope of analysis is further defined by its jurisdiction under Sections 10 and 404. The substantive evaluation requirements of the Clean Water Act are outlined in guidelines developed by the Administrator of the Environmental Protection Agency (EPA) in conjunction with the Secretary of the Army and published in 40 CFR Part 230. The fundamental precept of the Guidelines, which are binding regulations, is that discharges of dredged or fill material into waters of the United States, including wetlands, should not occur unless it can be demonstrated that such discharges, either individually or cumulatively, will not result in unacceptable adverse effects on the aquatic ecosystem. The Guidelines state that only the LEDPA can be permitted. Additional evaluation requirements are contained in 33 CFR Part 320.4(a) and NEPA. All fill placed in the 11.32 acres of wetlands and other WOTUS to construct the road and port staging area would require permitting under Section 404.

Section 10 of the Rivers and Harbors Act of 1899 applies to the construction of any structure in, under, or over any navigable water of the United States, the excavating from or depositing of material in such waters, or the accomplishment of any other work affecting the course, location, condition, or capacity of such waters. The substantive evaluation criteria for this authority is the Corps' public interest review (33 CFR Part 320.4(a)) and NEPA. All structures and fill placed below the mean high tide line would require permitting under Section 10.

3.0 ALTERNATIVES

3.1.1 Alternative 1 (No Action Alternative)

Under the No Action Alternative, no new or improved facilities would be constructed. Under the No Action alternative there would be no impacts to the WOTUS from this project. The No Action alternative is described in detail in the FEIS (Section 2.2.1 and Section 4.2). This alternative would not meet the purpose and need of this project and would result in the status quo relative to oil spill response in Prince William Sound.

3.1.2 Alternative 2 (Ocean/City Dock)

Alternative 2 proposes constructing the new OSR facility at Ocean Dock. This alternative and variants of the components of the proposed alternative are described in detail in the FEIS. (Section 2.2.3 and Section 4.3). There are two design variants of the Ocean Dock alternative. Alternative 2A proposes a new fill dock at the site and Alternative 2B proposes a new pile-supported dock at the site. No new road would need to be constructed to access the Ocean Dock site. Both Ocean Dock alternatives require dredging the Eastern Channel to create a channel 350 feet wide to a depth of -35 feet MLLW. A channel of this depth and width is required to provide all-tide access to oil spill response vessels. Dredging would remove 267,000 cubic yards from 32.9 acres of the Eastern Channel which would be placed in a 23 acre deepwater disposal site. It was estimated that less than 1,000 additional cubic yards of dredging would be required for both variants, as both would have the dock face located at the -32 feet MLLW contour or deeper.

The fill dock alternative (2A) would require 5.2 acres of fill below the high tide line (HTL). The pile supported dock with fill area for the staging area (2B) would require fill of 4.6 acres below the HTL.

Although Alternative 2 was considered practicable in the FEIS, through the passage of Resolution 03-07-10 the City of Cordova resolved that the City would not make the land at Ocean Dock available for the OSR facility project. (City Of Cordova Resolution 03-07-10, March 2007 and letters from the City of Cordova, dated April 17, 2015 and March 24, 2017). Because the land at Ocean Dock is not available nor capable of being obtained, the Ocean Dock Alternative is not practicable and will not be carried forward for review in this document.

3.1.3 Alternative 3 (Fleming Point)

Alternative 3 proposes constructing the new OSR facility at Fleming Point. This alternative and variants of the proposed alternative are described in detail in the FEIS (Section 2.2.4 and Section 4.4). There are two design variants of the Fleming Point Alternative. Alternative 3A proposes a new fill dock at the site and Alternative 3B proposes a new pile-supported dock at the site. No new road would need to be constructed to access the Fleming Point site. Both Fleming Point variants require dredging the Eastern Channel to create a channel 350 ft. wide to a depth of -35 feet MLLW contour. Dredging would remove 267,000 cubic yards from 32.9 acres of the Eastern Channel which would be placed in a 23 acre deepwater disposal site.

The fill dock and staging area alternative (3A) would require the placement of fill into 2.1 aces below the HTL. The pile supported dock with staging alternative (3B) would require the placement of fill into 1.4 acres below the HTL.

As the site is unavailable for lease through at least year 2032 (State Tidelands Lease ADL 63896) and unavailable from the land owner (Letter from the Eyak Corporation, dated December 18, 2015), the Fleming Point Alternative is not practicable and will not be carried forward for review in this document.

3.1.4 Alternative 4 (Shepard Point; the Applicant's Preferred Alternative)

Alternative 4 proposes constructing the new OSR facility at Shepard Point, including an access road to the facility. This alternative and variants of the components of the proposed alternative are described in detail in the FEIS (Section 2.2.5 and Section 4.5). A new dock, boat ramp, and staging area of 3.5 acres is proposed. The applicant has revised the preferred alternative to address the potential impacts as described in the FEIS. These changes are described in detail in Section 2.2 above.

There are two alternative dock designs for the Shepard Point Site described in the FEIS. Alternative 4A proposes a new fill dock at the site and Alternative 4B proposes a new pile-supported dock at the site. All options would include construction of a 4.4 to 4.5 mile access road from the existing Cordova road system to Shepard Point. Four different road alignments were evaluated; the Primary Alignment, Option 1, Option 2 and Option 3. None of the alternatives associated with the Shepard Point site would require dredging.

3.1.4.1 Alternative 4A: Fill Dock at Shepard Point (Selected Dock Variant)

Alternative 4A is described in detail in the FEIS (Section 2.2.5.12). This alternative would construct a new fill dock at Shepard Point. Construction of the dock, staging area, and boat ramp would require the discharge of fill into 2.2 acres below the HTL. Alternative 4A was originally the Proposed Action and Preferred Dock variant. Alternative 4A had originally been selected because it would have been cheaper to construct. However, the applicant determined that construction of a pile supported dock would be preferable because it would have fewer impacts on subtidal and intertidal habitat.

3.1.4.2 Alternative 4B: Pile-Supported Dock at Shepard Point (New Dock Variant)

Alternative 4B is described in detail in the FEIS (Section 2.2.5.2). This alternative would construct a new pile-supported dock at Shepard Point. To construct the dock, staging area, and boat ramp would require 18,000 cubic yards of fill in 0.1 acre below the HTL.

Alternative 4 Access Road

Alternative 4 requires construction of an access road from Cordova to the Shepard Creek OSR facility site. Four variants were evaluated. Each alternative is described in detail in the FEIS (Section 2.2.5.3-2.2.5.6).

3.1.4.3 Primary Alignment

This two lane unpaved access road would start at Orca and continue for approximately 4.4 miles to Shepard Point. The road would cross two streams used by anadromous fish. This road alignment would require 26 acres of fill below the HTL for the road. This sub alternative is described in further detail in the FEIS at 2.2.5.3.

3.1.4.4 Road Option 1: Upland Alternate Route
This two lane access road would start at Orca and continue for 4.3 miles to Shepard Point. This road alignment would require 20.5 acres of fill below the HTL for the road. This sub alternative is described in further detail in the FEIS at 2.2.5.4.

3.1.4.5 Road Option 2: Humpback Creek Alternate Bridge Site
This two lane access road would follow the same route as the Primary Alignment except that the bridge crossing Humpback Creek would be placed higher in the delta than the bridge in the primary alignment, requiring 25.3 acres of fill below the HTL for the road. This sub alternative is described in further detail in the FEIS at 2.2.5.5.

3.1.4.6 Road Option 3: Inland Alternate Route (Selected Route/ Preferred Option)
This road would initially follow the same route as the Primary Alignment except it would turn more inland to avoid tidal areas near Humpback and Unnamed Creeks. In some areas the road has been narrowed to a single lane with turnouts to reduce the amount of intertidal fill. Road Option 3 would reduce fill below the high tide line by about 15.1 acres and 190,000 cubic yards compared to the Primary Alignment. Thus, the fill for the inland route would require 10.9 acres below the HTL for the road. This sub alternative is described in further detail in the FEIS at 2.2.5.6.

3.1.5 Alternative 5 (Orca Site)
Alternative 5 proposes constructing the OSR facility at a site just south of the Orca Cannery. This alternative and variants of the proposed alternative are described in detail in the FEIS (Section 2.2.6 and Section 4.6). There are two design variants of the Orca Point Alternative; a new fill dock and a pile supported dock, with both alternatives siting the new dock face at the -32 feet MLLW contour. No new road construction would be required for this alternative and its variants. Both Orca Point variants require dredging the Eastern Channel to create a channel 350 feet wide to a depth of -35 feet MLLW contour. Dredging would remove 267,000 cubic yards from 32.9 acres of the Eastern Channel which would be placed in a 23 acre deepwater disposal site.

The fill dock and staging area variant (5A) would require the discharge of fill into 4.9 acres below the HTL. The pile supported dock and staging area variant (5B) would require the placement of fill into 3.4 acres below the HTL.

Although Alternative 5 was considered practicable in the FEIS, a portion of the land where the OSR facility was proposed to be constructed is owned by the

State of Alaska and the state has indicated that they will not lease the land for construction of the OSR facility. (Letter from Governor Bill Walker dated April 15, 2016). Because the land at the Orca site is not available nor capable of being obtained, the Orca Cannery Alternative is not practicable and will not be further discussed in this document.

<u>3.2 Alternatives Considered but Eliminated from Further Consideration:</u>
The alternatives considered but not carried forward in the FEIS and the rationale for not advancing these alternatives are described in the Section 2.3 of the FEIS.

The privately owned Orca Cannery Facility was an option considered that did not advance for full evaluation. Mr. Steve Ranney, property owner, was unwilling to sell the facility – making the site unavailable. FEIS Section 2.3.10.

In providing comments in response to the 2013 PN, Mr. Ranney informed the Corps that he was willing to sell the Orca Cannery Facility. Other commenters to the PN, including agencies, organizations, and individuals, also suggested that the Corps further evaluate the Orca Cannery location.

In a letter dated April 15, 2016, Alaska Governor Bill Walker informed the Corps that the "State-owned submerged land near the Orca Cannery is not available for the project." Though the Orca Cannery Facility is privately owned and directly bound by tidelands conveyed to the Mr. Ranney, marine access to the COSRF at this location would require use of State-owned submerged land. Therefore, the Orca Cannery Facility Alternative remains an unavailable location for the COSRF.

<u>3.3 Determination of the Least Environmentally Damaging Practicable Alternative:</u>
The preliminary alignment for road segments have been adjusted several times over the course of environmental and preliminary engineering studies since the FEIS to avoid impacts to wetlands, marine areas, wildlife, and cultural resources. Additional information regarding this alternative was supplied by the applicant to supplement the analysis conducted in the FEIS (see "Authority" section above for a list of information provided). Only Alternative 4 is determined practicable, and is evaluated below in further detail to determine if the proposal complies with the 404(b)(1) Guidelines and whether it would be contrary to the Public's Interest (see also Sections 6.1 and 7.1 below).

The Applicant's Preferred Alternative (Revised Alternative 4) as described in Section 2.0 and Section 3.1.4 above was determined to be the LEDPA. This alternative was carried forward for further analysis to determine compliance with the 404(b)(1) Guidelines, specifically 40 CFR 230.10(b), (c), and (d), and to determine if it is contrary to the public interest as defined in 33 CFR 320.4(a)(1). See also Sections 6.0 - 7.18 for analysis and determinations of compliance with the Clean Water Act.

4.0 Public Involvement

A Public Notice was published and open for comment on November 15, 2013 with an extended comment period for a total of 60 days; the close of the comment period was January 15, 2014. The comments below were generated during the comment period for the Public Notice.

4.1 Federal Agencies:

4.1.1 National Marine Fisheries Service (NMFS):

NMFS1: NMFS has determined the project will adversely affect EFH, and notes that alternatives exist which meet the purpose and need, are practicable, would cost less than NVE's preferred alternative, and have less environmental impacts to living marine resources, including EFH.

Corps Response: EFH is discussed in the FEIS Sections 3.3.6, 4.5.3.6, and Appendix U; & in the ROD Section 8.5. The comments were received during the PN comment period, prior to the applicant providing evidence that the alternatives discussed in the FEIS are no longer available, and therefore not practicable.

NMFS2: We have repeatedly provided comments to the Corps (most recently, January 27, 2010), as well as to the BIA, that the applicant's preferred alternative was not the LEDPA. NMFS stance on this project has not changed.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination. See response to NMFS1 also.

NMFS3: The applicant's current preferred design alternative is still not the LEDPA.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination. The comments were received during the PN comment period, prior to the applicant providing evidence that the alternatives discussed in the FEIS are no longer available, and therefore not practicable.

NMFS4: The FEIS states the No Action Alternative does not meet the project purpose and need. NMFS disagrees as current port facilities in Cordova are adequate to meet oil spill response needs.

Corps Response: The No Action Alternative is discussed in the FEIS section 2.2.1.

NMFS5: The current port facilities in Cordova are adequate to meet oil spill response needs. In addition, during the NEPA review process both the Alyeska Pipeline Service Company, and British Petroleum (Alaska) Inc., stated that access to a deep water port in Cordova would not improve oil spill response (FEIS 2007).

Corps Response: The stated project purpose is to 'enhance' the OSR capabilities in the Cordova area. The OSR capabilities within Prince William Sound are discussed in the FEIS Section 1.5.4.

NMFS6: NVE's conclusion from the Basic Oil Spill Cost Estimation Model (BOSCEM) effort is that, "the environmental benefits of deep-draft response capability from Shepard Point are significantly greater than the adverse impacts of the road and port facility." NMFS disagrees with this assertion, as the modeling of future, potential oil spills is highly speculative, and does not take into account the adverse impacts to valuable marine habitat compared to these hypothetical benefits.

Corps Response: The Corps agrees that modeling the parameters of future oil spills is speculative and cannot capture all of the variables that could affect a potential spill, such as the location, proximity to shorelines, wind and wave action, weather conditions, ocean currents, season (time of year), and other environmental conditions. One thing that was learned/reaffirmed during the 1989 Exxon Valdez Spill is that a quick, robust initial response is essential to containing a spill and limiting the environmental impacts.(see CH2MHill Alternatives assessment (Dec. 22, 2015) and Preliminary Shipping Logistics Study (Dec. 22, 2015))

NMFS7: Further, the most critical features of any oil spill response facility and most direct and efficient way to enhance Cordova's current facilities are: 1) an adequate lay-down or staging area, and 2) the ability to transfer equipment such as conex units via cranes. The RCAC Oil Spill Prevention and Response Committee (Lohse 1993) indicates that " ... inventories in Cordova have ample dock space to set up the necessary loading stations, and equipment for those stations is either present or readily available." Thus, if the existing facilities in Cordova meet the standards of the oil spill response community and/or could be enhanced with nominal measures; such as a laydown yard and crane, then the "No Action" alternative would meet the purpose and need of the proposed project.

Corps Response: The proposed facility would provide an adequate lay-down area and the ability to transfer spill response equipment. Project design criteria are discussed in the FEIS Section 2.1.

NMFS8: The Orca Cannery site alternative supports the project purpose and need as an OSR facility.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

NMFS9: EFH Conservation Recommendation - The project as proposed should not be authorized. The applicant should examine less damaging options for providing an oil spill response facility to serve the community of Cordova including the No Action alternative and the Orca Cannery alternative.

Upon additional EFH consultation, the following Conservation Recommendations were provided July 13, 2017:

a. To the maximum extent possible, avoid and minimize fill as described in the Mitigation Plan.
b. Fill be sloped to maintain shallow water, photic zone productivity, allow for unrestricted fish migration, and provide refuge for juvenile fish.
c. In marine areas with kelp and other aquatic vegetation, fill (including artificial structure fill reefs) should be designed to maximize kelp colonization and provide areas for juvenile fish to shelter from high currents and predators.
d. Fill materials should be pH tested and be within the neutral range of 7.5 to 8.4 pH. In marine waters, this pH range will maximize colonization of marine organisms.
e. Complete in-water work within intertidal and shallow subtidal areas during low tide cycles.

Corps Response: The project, as proposed in the public notice, has incorporated design changes that reduce the overall project impacts. The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR. In response to the additional EFH Conservations received after the public notice, part "a" was incorporated with the reduction of impacts in the final design. Part "b" would require more impacts to aquatic resources, so it was not incorporated into the design. Part "c" is not applicable, as no artificial reefs are proposed and the design did not specifically address kelp colonization. Part "d", would not be incorporated as a permit condition. The project would be constructed using cut and fill techniques from native materials that mirror the current environment. There is no reason to believe pH levels would increase or decrease using native materials. Part "e" is incorporated as a special condition.

NMFS10: NMFS strongly opposes issuance of a permit for the applicant's preferred alternative, because the information we have reviewed does not demonstrate that this is the LEDPA. Other alternatives exist; that meet the need for an OSR facility in Cordova, that are less damaging to living marine resources, including EFH.

Corps Response: EFH is discussed in the FEIS Sections 3.3.6, 4.5.3.6, Appendix U; & in the ROD Section 8.5.

4.1.2 Environmental Protection Agency (EPA):

EPA11: The NVE has not demonstrated that the proposed discharge is the LEDPA to achieve the overall project purpose.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination. The comments were received during the PN comment period, prior to the applicant providing evidence that the alternatives discussed in the FEIS are no longer available, and therefore not practicable.

EPA12: A proposed discharge does not comply with the Guidelines if there is a practicable alternative to the proposed discharge that would result in less impact to the aquatic environment.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination. The comments were received during the PN comment period, prior to the applicant providing evidence that the alternatives discussed in the FEIS are no longer available, and therefore not practicable.

EPA13: The proposed discharge does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem.

Corps Response: Mitigation is discussed in the ROD Section 5.0: Means to Minimize or Avoid Adverse Environmental Impacts to Aquatic Resources.

EPA14: We believe that practicable alternatives to the proposed discharge exist that would result in less impact to the aquatic environment.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination.

EPA15: Failure to "*clearly demonstrate*" that there is no "*practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem*" renders the project noncompliant with the Guidelines.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination. The comments were received during the PN comment period, prior to the applicant providing evidence that the alternatives discussed in the FEIS are no longer available, and therefore not practicable.

EPA16: The EIS previously prepared for this project indicates that alternative locations exist where an OSR facility could be developed without the need for as much intertidal and subtidal fill. The EIS describes these alternatives as meeting the project purpose. In addition, the Orca Cannery location, which was not evaluated in detail in the EIS, may be a practicable alternative. Unless the applicant can demonstrate that these other alternatives are no longer practicable, the Shepard Point location cannot be shown to be the LEDPA.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives and the LEDPA determination; and SIR. The comments were received during the PN comment period, prior to the applicant providing evidence that the alternatives discussed in the FEIS are no longer available, and therefore not practicable.

EPA17: The 1992 consent decree identified the Shepard Point site, but did not suggest that site as the only one suitable for an OSR facility.

Corps Response: The Corps agrees that the Consent Decree did not mandate the OSRF must be located at Shepard Point.

EPA18: Location is but one factor to consider in identifying the LEDPA. Project design is another.

Corps Response: Each of the four location alternatives considered in the FEIS had multiple facility design options. See FEIS section 2.2.

EPA19: We do, however, question whether the proposed design represents the minimum necessary to meet the project purpose.

Corps Response: The project, as proposed in the public notice, has incorporated design changes that reduce the overall project impacts. The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

EPA20: Is this capacity (the 600' long dock face to accommodate serving several vessels simultaneously) really necessary to meet the project purpose?

Corps Response: The response vessels utilized for the 1989 EVOS included fishing vessels, cargo vessels, Alaska Marine Highway Ferry vessels, U.S. Coast Guard vessels, U.S. Navy vessels, U.S. Army Corps of Engineers dredge Essayons, and numerous barges. Project design criteria is discussed in the FEIS section 2.1. The physical dimensions of potential response vessels, including length, beam and draft, are listed in Tables 2-1 through 2-6.

EPA21: Adequately addressing compensation for unavoidable project impacts is now integral to demonstrating compliance with the fourth restriction on discharge. The potential compensation projects identified by the applicant fail to do so.

Corps Response: Compensatory mitigation is discussed in the ROD Section 5: Means to Minimize or Avoid Adverse Environmental Impacts to Aquatic Resources.

EPA22: Although the applicant has indicated they may perform permittee responsible mitigation, they have not submitted a mitigation plan.

Corps Response: The mitigation plan is discussed in the ROD Section 5: Means to Minimize or Avoid Adverse Environmental Impacts to Aquatic Resources.

EPA23: As mentioned above, funding research is identified in the public notice as a possible compensation action. Because research does not directly result in a gain of aquatic resource area or functions, it generally will not generate credits that can be used to offset authorized impacts.

Corps Response: Funding research is no longer being considered as compensatory mitigation.

EPA24: Nor has the MSB demonstrated that the proposed discharge includes all appropriate and practicable measures, including compensation, to minimize potential harm to the aquatic ecosystem.

Corps Response: The Corps believes that EPA meant to refer to NVE not MSB. Compensatory mitigation is discussed in the ROD Section 5: Means to Minimize or Avoid Adverse Environmental Impacts to Aquatic Resources.

4.1.3 U.S. Fish and Wildlife Service (USFWS):

USFWS25: The overall project changes are not substantial enough to alter our earlier recommendation that a permit not be issued until certain issues regarding less damaging alternatives and mitigation are resolved.

Corps Response: The applicant has incorporated additional mitigation measures into the proposed project since the public notice was issued. See the ROD Section 2.2: Project Design Revisions.

USFWS26: Because of increased vessel usage in the area, the cumulative release of contaminants into the marine environment over time would increase.

Corps Response: The Corps agrees with this statement. See also 6.1.7 of this document.

USFWS27: As with any project, the selected alternative should be the "LEDPA". We refer you to our position on this important issue, and the apparent existence of at least one less damaging practicable alternative, the Orca Cannery site, as detailed in our 2010 letter responding to the December 28, 2009, public notice. The Orca Cannery site alternative still appears to be a less damaging alternative than the proposed action, and we are unaware of any analysis yet done to indicate otherwise.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

USFWS28: The applicant's current plan lacks any quantitative detail and is insufficient to provide even initial assurances. First, assurance is needed that the new facilities will provide only OSR and that risks from increased vessel and vehicle traffic, including fuel spills, are minimized. This should include a formal mitigation plan statement that the facilities are intended to be limited to OSR purposes in perpetuity, and design features such as permanent signage, a gatehouse, etc.

Corps Response: The primary purpose of the OSRF is to support oil spill response efforts, however other uses of the facility would be allowed as described in the FEIS Section 2.1.2.

USFWS29: Second, we again refer you to our 2010 letter which discusses the minimum acceptable ratios for compensatory mitigation for the type of high value habitat to be displaced by the Shepard Point facility. Appropriate mitigation for unavoidable impacts for the loss of intertidal habitat should be at a minimum 3 to 1 or 2 to 1 ratio according to the Alaska District Regulatory Guidance Letter RGL 09-01.

Corps Response: Comment acknowledged. The Corps rescinded RGL 09-01.

USFWS30: Third, while recovery of the herring fishery is certainly a laudable goal to be appropriately supported in Prince William Sound, such out-of-kind mitigation for a single species hatchery project is not generally considered to be the most preferable or dependable form of compensatory mitigation for habitat loss, and particularly for habitat that helps support such a rich array of species. In the preferred ordering of consideration for mitigation types laid out in the 2008 Guidance on Compensatory Mitigation ("Final Rule"), permittee responsible out-of-kind mitigation is generally the last choice, after the other options have been examined.

Corps Response: An attempt to aid in the recovery of the herring fishery within PWS is no longer included in the proposed mitigation measures. See the ROD Section 5.0: Means to Minimize or Avoid Adverse Environmental Impacts to Aquatic Resources.

USFWS31: The Service recommends that Department of the Army permit not be issued until the LEDPA and mitigation issues are resolved.

Corps Response: See ROD Section 3: Alternatives and the LEDPA determination.

USFWS 32: The Orca Cannery location supports the stated project purpose and need as an oil spill response facility by providing the following: 1) uplands for storage and staging of equipment and supplies, 2) access to the existing road system, 3) closer proximity to Merle "Mudhole" Smith Cordova Airport to receive oil spill response related air support, 4) closer proximity to the fuel dock for fueling response vessels, 5) closer proximity to Cordova Harbor, the location of the approximate 300-boat fishing fleet that are the Tier 1 and 2 oil spill response vessels, and 6) an existing pile-supported dock that can be extended on pilings into waters already disturbed by the original cannery operation.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

USFWS33: A comparison of project alternatives analyzed in the EIS is presented on page 5 of the public notice. All of the alternatives including the No Action Alternative (i.e. as suggested by the information in the FEIS. Appendix B), appear to achieve the stated project purpose and need.

Corps Response: The No Action Alternative does not meet the purpose and need (see FEIS section 2.2.1). The project alternatives located at Ocean Dock, Fleming Point, Shepard Point, and Orca were determined to meet the stated purpose and need as indicated in FEIS Table 2-7.

USFWS34: The Orca Cannery Alternative was not reviewed under the FEIS as it was not presented as an alternative during the development of the FEIS.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

4.2 State Agencies:

4.2.1 State of Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation, Office of History and Archaeology (SHPO):

ADNR35: On August 7, 2006, our office concurred with the BIA finding of ‘no adverse effect' under Section 106 of the National Historic Preservation Act (NHPA). BIA made a Section 106 finding of 'no adverse effect' for the proposed action and preferred alternative identified within their FEIS, which was Alternative 4: New Oil Spill Response Facility and Deepwater Port at Shepard Point. While the BIA analyzed potential effects on various environmental resources (including cultural resources) for all of the alternatives carried forward in the EIS, they only requested our concurrence under Section 106 of the NHPA on the preferred alternative.

Corps Response: Comment acknowledged.

ADNR36: We were recently contacted by representatives of the Eyak Preservation Council and the Orca Cannery in Cordova. They requested that we look into the project file for evidence that the Orca Cannery Property underwent Section 106 review as a potential site for the proposed OSR Facility. In our research, we found that an EIS alternative that considered siting the new facility on the Orca Cannery Property was not carried forward for evaluation. Therefore, it does not appear that this alternative underwent full review under Section 106 of the NHPA. In their rationale for not advancing this potential alternative in Section 2 .3 .10.1 (page 2-34) of the EIS, the BIA states the following: “The Orca Cannery property was determined eligible for the National Register of Historic Places in 1955 with 15 buildings, structures, and features that contribute to its eligibility. It does not appear that an oil spill response facility meeting the project design criteria could be constructed on the property without affecting these building, structures, or features. Also, the landowner has not expressed to the BIA a desire to sell any of the property and an oil spill response facility would appear incompatible with the existing uses of the property. For this reason, this alternative was rejected.

Corps Response: Comment acknowledged.

ADNR37: Section 106 of the NHPA does not mandate preservation. Rather, it requires Federal agencies to take into account the effects of their actions on historic properties. In other words, the mere presence of a significant historic property within a project area is usually not sufficient to eliminate an otherwise viable alternative from further evaluation.

Corps Response: Comment acknowledged.

ADNR38: Several parties believe that siting the new OSR facility on the Orca Cannery Property should not have been dismissed from evaluation in the FEIS. We recommend that the Corps of Engineers consider this input to determine whether additional analysis of the Orca Cannery Property is appropriate, both under NEPA and Section 106 of the NHPA. Further, since the Orca Cannery Property was last evaluated for its eligibility to the National Register in 1995 (nearly 20 years ago), a condition assessment and reevaluation of its National Register- eligibility may be appropriate.

Corps Response: In May 2014, Ms. Anjuli Grantham, M.A., with the Kodiak Historical Society, and Ms. Barbara E. Bundy, PH.D., with Anchor QEA.LLC, prepared an Orca Cannery Cultural Resources Evaluation for NVE. The final recommendation in this evaluation is that the facility retains sufficient integrity to remain eligible for listing in the NRHP as a historic district. Upon review of this report, the Corps requested concurrence from SHPO with our determination that Orca Cannery remains eligible for the NRHP. On 6 May 2015 SHPO concurred that the Orca Cannery Property retains sufficient integrity to remain eligible for the National Register of Historic Places as a historic district under Criterion A.

4.3 Organizations:

4.3.1 Native Village of Eyak (NVE):

NVE39: …the deep channel here (adjacent to Orca Cannery) is very narrow, and ships could simply not be both moored there and transit the area.

Corps Response: Comment acknowledged.

NVE40: Some argue that responding out of Shepard Pt. will increase response time to the flats. This is true, however the large ships that would use this facility would not respond to incidents on the Copper River Flats. It has never been suggested that the presence of a deep water port at Shepard Point would require Cordova to abandon other spill response capacity we now have.

Corps Response: Comment acknowledged.

4.3.2 The Eyak Corporation:

The Eyak Corporation41: …a deep draft dock would greatly assist in transporting spill response equipment and supplies during a spill of major significance.

Corps Response: Comment acknowledged.

4.3.3 Alaska Wilderness Recreation and Tourism Association (AWRTA):

AWRTA42: The Shepard Point Deep Water Port alternative is not technically feasible due to avalanches. NVE has not provide a specific, detailed, and effective avalanche mitigation plan.

Corps Response: There is risk for avalanches and mass wasting events along the route of the Shepard Point alternative have been recognized and is discussed in the FEIS section 3.2.1.2.2. Avalanche mitigation measures are discussed in the FEIS section 5.11. Also see FEIS Appendix I.

AWRTA43: A paying user of the deep water port has not been identified.

Corps Response: Comment acknowledged.

AWRTA44: ...extending Alyeska/SERVS dual escort tug service through Hinchinbrook Entrance might be a better use of limited funds.

Corps Response: Comment acknowledged.

AWRTA45: Alyeska/SERVS is prohibited from staging OSR equipment at Shepard Point because federal law requires OSR equipment to be quickly available at all times.

Corps Response: The role that SERVS vessels would have in response to an oil spill is discussed in FEIS section 2.1.1.1.

4.3.4 Alyeska Pipeline Service Company (APSC):
APSC46: As a company that operates in Prince William Sound… we have not, and will not, be taking a formal company position on this issue.

Corps Response: Comment acknowledged.

4.3.5 Audubon Alaska (Audubon):
Audubon47: The proposed road and port will also result in significant fill of marine waters and may result in the destruction of EFH.

Corps Response: EFH is discussed in the FEIS Sections 3.3.6, 4.5.3.6, Appendix U; & in the ROD Section 8.5.

Audubon48: Simply put, a deep-water port will not enhance effective oil spill response. Indeed, a deep-water port that requires vessels to go out of their way to resupply and increases the distance cars and trucks must travel along an avalanche-prone road has the potential to significantly decrease Cordova's spill response effectiveness.

Corps Response: The project purpose is to enhance current OSR capabilities in the Cordova area. The project design criteria are discussed in the FEIS section 2.1. Vessel response time is discussed in the FEIS sections 1.3, 1.6.1.1, and 1.8.

Audubon49: ...several alternatives exist that would provide the same or greater spill-response capabilities.

Corps Response: Alternatives are discussed in the FEIS Section 2.0 Project Alternatives; and the ROD Section 3.0: Alternatives.

Audubon50: The permit applicant's failure to carefully address the Orca Cannery alternative also means the FEIS and supplementary information fail to meet NEPA's call for a review of reasonable alternatives.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

Audubon51: Audubon comments here because this project will have potentially significant impacts on marbled murrelet, northern goshawks and bald eagle habitat as well as impacts to the marine resources that are the bedrock of Prince William Sound's rich ecosystem.

Corps Response: A general discussion of potential impacts to the bird species listed above can be found in FEIS section 3.3.7.2. The project specific affects to birds for the Shepard Point Alternative are discussed in FEIS section 4.5.3.7.1.

4.3.6. Cascadia Wildlands (CW):

CW52: The purpose & need statement put forward by NVE is unduly narrow, and should be re- focused on the Alyeska Consent Decree's stated purpose of improving oil spill response in the Cordova area. Our objection to this purpose & need statement is two-fold. First, we object to the "all-tide" requirement. Second, we object to the applicant's stated "deepwater port design needs, 32' MMLW at the dock face, and 35' MLLW in navigation channels.

Corps Response: The purpose and need statement does reflect the findings of the Consent Decree which is to improve oil spill response in the Cordova area. The project design criteria, discussed in the FEIS Section 2.1, were established following consultation with the oil spill response organizations having responsibilities in PWS. Appendix B contains a summary of the responses and recommendations.

To accommodate all probable modes of shipment for out-of-region equipment to Cordova, and to efficiently transfer incoming equipment to response vessels, the COSRF was designed to: receive air-freighted response equipment trucked from the airport; receive, directly to the facility or by truck from other area docks, response equipment shipped by cargo vessel; store, stage, and allow the sorting and assembly of response equipment; and quickly and efficiently load equipment onto response vessels.

To ensure the proposed facility incorporates the recommendations of spill response organizations, and to satisfy the project purpose and need, the design criteria established included all-tide access to a deep-water port, with road access to an all-weather airport.

CW53: The position of SERVS, which was ignored in the FEIS, is that even if Shepard Point is developed they'll keep their spill response equipment where it is in order to meet Alaska legal standards for rapid deployment.

Corps Response: The Corps agrees that SERVS has not agreed to relocate initial response equipment to the proposed COSRF. The role of SERVS personnel and vessels during an OSR event is discussed in the FEIS Section 1.6.1.1. The SERVS emergency response equipment is already onboard the first response vessels and would be assisted by fully equipped response barges stationed near the tanker lanes at Port Etches, Naked Island, and Port Valdez. The SERVS escort and response barge vessel system is designed to deploy equipment directly from these stations to reduce or eliminate travel time to shore-based loading docks. Any additional response vessels, to include skimmers, tugs, storage barges, and fishing vessels, would be activated as needed to provide the 72-hour initial response to an oil spill event. The purpose of the proposed COSRF, as stated in the FEIS section 1.2, is to construct a deepwater port capable of transferring response material and equipment from the all-weather Cordova Airport to the full range of potential response vessels at any *tide. The COSRF enhances the existing OSR capabilities during and after the 72-hour initial response effort.*

CW54: The Consent Decree is not a legal mandate to construct a road and locate a port at Shepard Point. The intent of the Decree is to improve oil spill response in the Cordova area.

Corps Response: The Corps agrees that locating the OSRF at Shepard Point is not a legal mandate. The Consent Decree states: "The response projects will require further detailed planning and are subject to various land acquisition issues and state and federal permitting requirements that have yet to be resolved." These permit requirements include a DA permit.

CW55: Also, the applicant NVE is not a party to the Consent Decree. Please clarify their role under the Decree. It had been our understanding that the State could not delegate its decision-making authority over this project, because the Decree specifically names the State as the project implementer.

Corps Response: In the FEIS, Appendix B, it states that the road would run primarily across Eyak Corporation land, and that they are supportive of the project. To the Corps knowledge, the NVE is not a party to the Consent Decree, nor are we aware of any discussions regarding the State of Alaska delegating its decision-making authority to another entity.

CW56: The public notice and supplemental information from the applicant contain additional detail in terms of project design. Please carefully review the latest engineering and drawings to ensure it incorporates all the necessary mitigation measures. Location vis-à-vis (regarding or concerning) avalanches, historic resources, nest trees, wetlands and aquatic areas should be checked. Assumptions regarding project cost, practicability, and wetland fill may have changed.

Corps Response: Comment acknowledged.

CW57: Shepard Point is good for large vessels but bad for small ones; alternative sites are beneficial for both.

Corps Response: Comment acknowledged.

CW58: Avalanche hazard and avalanche mitigation make Shepard Point impracticable for spill response.

Corps Response: As discussed in the FEIS Section 4.5.1.8.3, and Appendix I, the proposed access road to Shepard Point is at risk to temporary closure due to avalanches. While avalanche mitigation measures can reduce the risk, in an *extreme case of a major avalanche, road access to the Shepard Point Facility may be impossible for periods ranging from hours to days.*

CW59: Small spills don't require out-of-region equipment, the project benefit would be for large spills.

Corps Response: Comment acknowledged.

CW60: The Shepard Point location increases the oil spill response time to the Copper River Flats or the Gulf of Alaska.

Corps Response: The increase in travel distance from Shepard Point to an oil spill in the Copper River Delta or Gulf of Alaska is discussed in the FEIS Section 4.5.1.8.3.

CW61: The proposed Shepard Point Facility is not consistent with the oil spill response framework and has not been coordinated with actual spill responders.

Corps Response: Under existing plans, OSR tactics are based on currently available vessels, equipment, and response facilities. As discussed in the FEIS Section 1.5.4.1, the addition of a new response facility would initiate a revision of the oil discharge prevention and contingency plans.

CW62: Applicant's assumptions about travel time savings are unsupported. The travel time analysis is flawed and incorrect comparisons are made regarding travel time savings.

Corps Response: Oil spill response capabilities are discussed in the FEIS Section 4.5.1.8.

CW63: The "BOSCEM Modeling" is flawed and misleading.

Corps Response: Comment acknowledged.

CW64: The supplemental information states that "no practicable alternative to the proposed project exists that would have a less-adverse impact on aquatic ecosystems and that does not have other significant adverse environmental consequences." This is false. At least four alternative locations for the facility have been put forward, all of which are less environmentally damaging, practicable alternatives to the proposed action. In fact, these alternatives are both more achievable in practical terms, and more beneficial for oil spill response. Corps regulations require: no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. 40 CFR 230. 10(a).

Corps Response: Practicable alternatives are discussed in the ROD Section 3.0: Alternatives.

CW65: The Orca Cannery Alternative was not evaluated through the NEPA process.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

CW66: The final alternative is “no action”. The Consent Decree allow the Attorney General to redirect the funds if the project can’t be permitted, and an actual denial from the Corps would be clear evidence of that. For this reason, we urge the Corps to deny the application.

Corps Response: Comment acknowledged.

CW67: Economics don't make alternatives impracticable.

Corps Response: Comment acknowledged.

CW68: City council resolution doesn't make alternatives unavailable or impracticable

Corps Response: Project alternatives are discussed in the ROD Section 3.0: Alternatives.

CW69: Shepard Point is not the LEDPA.

Corps Response: See ROD Section 3.0: Alternatives and the LEDPA determination.

CW70: All of the alternative locations would have less adverse impacts to wetlands, including special aquatic sites.

Corps Response: A summary of wetland fill areas (footprint) and volumes by alternative and design option can be found in the FEIS Table 4.3-5.

CW71: All of the alternative locations would be cheaper to construct and maintain.

Corps Response: The estimated cost to construct each alternative is listed in the FEIS, Table 2-7, Comparison of Project Alternatives.

CW72: Impacts to Water Quality aren't adequately considered

Corps Response: Potential project impacts to water quality is discussed in the FEIS Section 3.2.2.

CW73: Invasive Species impacts aren't adequately considered.

Corps Response: Invasive species are discussed in the FEIS Section 3.3.1.3.

CW74: The FEIS doesn't justify the scope of analysis.

Corps Response: The Notice of Intent to prepare an EIS was published in the Federal Register on October 2, 2002. Interagency and public scoping meetings were held in Anchorage, and a public meeting was held in Cordova, in March 2004. The scoping process is discussed in the FEIS Appendix A.

CW75: Direct and indirect environmental impacts to intertidal and subtidal marine habitats.

Corps Response: Intertidal and subtidal marine impacts are discussed in the FEIS Section 4.5.3.3.

CW76: Direct and indirect impacts to threatened and endangered species.

Corps Response: Potential project impacts to threatened and endangered species is discussed in the FEIS Section 4.4.3.4; and the ROD Section 8.3: Endangered Species Act.

CW77: Direct and indirect impacts to terrestrial habitat.

Corps Response: Impacts to vegetation, habitats, and cover is discussed in the FEIS Section 4.5.3.1.

CW78: The FEIS makes a major error in grouping impacts into “minor-moderate-major” categories that are irrational and unsupported.

Corps Response: Comment acknowledged.

CW79: Deepwater port effects must be considered. The NVE, which would own and control the facility, intends to develop the facility not only for oil spill response, but also for potential cargo container vessels and cruise ships.

Corps Response: The primary purpose of the proposed COSRF is to support oil spill response efforts. However, other uses the facility would be allowed to conduct is discussed in the FEIS Section 2.1.2.

CW80: Effects of Cruise ships should be considered

Corps Response: Cruise ships and tourism opportunities in the Cordova area are discussed in the FEIS Sections 3.1.2.4 and 4.5.1.2.

CW81: The Bering River coal mine may be the worst threat posed by the proposed action.

Corps Response: The potential effects that the proposed COSRF may have on developing coal resources in the area is discussed the FEIS Sections 3.1.1.4, 3.1.2.6, 3.1.5.2.2, 4.5.1.2, and 4.8.2.1.

CW82: Development of a deepwater port would encourage clear-cut logging in Nelson Bay and Carbon Mountain.

Corps Response: The potential effects the proposed COSRF may have on logging is discussed in the FEIS Sections 1.8, 3.1.1.4, 3.1.2, 3.1.2.5, 3.1.5.2.2, and 4.5.1.2.

CW83: Subdivision and housing developments would be a very significant negative impact.

Corps Response: How subdivision and housing developments could be affected by the COSRF is discussed in the FIES Sections 3.1.2, 4.5.1.2, and 4.8.2.2.

CW84: A recent revelation is that the Cordova Electric Coop proposes to build a spur road off of the proposed Shepard Point Road to Snyder Falls to develop a hydro facility.

Corps Response: Comment acknowledged. The Corps does not have an application for the hydro facility, nor had any preapplications for a spur road or hydro facility.

CW85: The proposed project mitigation, to construct a fish hatchery on Humpback Creek, is another spin-off effect of the project that should be considered.

Corps Response: The applicant is no longer proposing a fish hatchery on Humpback Creek as mitigation for the project.

CW86: A supplemental, or new EIS, is required before a §404 permit can be issued because the original FEIS is flawed, and there is substantial new information and changed circumstances bearing on the decision.

Corps Response: As stated in the SIR, the Corps considered all relevant data available regarding changes to the project, age of the original NEPA document, consultations with NMFS for ESA and EFH, reasonably foreseeable impacts, and updated information regarding alternatives as possible reasons to require an

SEIS. After analyzing each of the topics both individually and cumulatively, the Corps determined that an SEIS was not required because no significant changes were identified within the scope of analysis of Corps' jurisdiction that had not already been discussed in the FEIS, and/or evaluated through the DA permit evaluation process.

CW87: Mitigation requirements are not adequately developed.

Corps Response: Mitigation is discussed in the ROD Section 5.0: Means to Minimize or Avoid Adverse Environmental Impact to Aquatic Resources.

CW88: This project would have adverse effects on EFH, and reasonable mitigation and avoidance measures have not been implemented.

Corps Response: EFH is discussed in the FEIS Sections 3.3.6, 4.5.3.6, Appendix U; & in the ROD Section 8.5.

CW89: The same oil spill response goals can be better met, without the environmental costs, at an alternative location along the existing road system. A road and deepwater port at Shepard Point is against the public interest for many reasons. The proposed project would not meaningfully improve oil spill response.

Corps Response: Project alternatives are discussed in the FEIS section 2.2. Public interest factors are discussed in ROD Section 7.1: Public Interest Review. Oil spill history, risk, prevention, response, containment, and recovery capabilities are discussed in the FEIS sections 1.5 and 1.6.

CW90: Our main concern is that the project is designed in such a way that the potential "benefits" are for resource extraction, while it does virtually nothing to improve oil spill response.

Corps Response: The purpose, need, and design criteria for the proposed facility are discussed in FEIS sections 1.2, 1.3, and 2.1.

CW91: We urge that this project not be granted a §404 permit because there are less damaging alternatives, it is contrary to the public interest; and compliance with NEPA requires preparation of a supplemental EIS.

Corps Response: Please refer to the ROD Sections 3.0: Alternatives, and the SIR regarding the need for an SEIS.

4.3.7 Eyak Preservation Council (EPC):

EPC92: The reports and comments you have received, for example from NOAA…explicitly state and list…the negative impacts this proposed project would have on a multitude of essential marine habitats.

Corps Response: Comment acknowledged.

EPC93: ...building a road and having a deep water port at this location (Shepard Point) would actually insure the increase of hydrocarbon pollutants (including run-off) and probable human trash and waste in the waters surrounding the proposed port site.

Corps Response: Compliance with local, state, and federal pollution control laws would minimize construction and operations related solid waste and stormwater run-off impacts.

EPC94: There are alternative sites for the Cordova oil spill response facility that may very well succeed in passing the LEDPA rigorous analysis.

Corps Response: Project alternatives studied in detail are discussed in the FEIS Section 2. An alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. See ROD Section 3: Alternatives and the LEDPA determination.

EPC95: …Shina Duvall from Alaska DNR, Office of History and Archaeology and Historic Preservation (SHPO)...”a section 106 was not done on Orca Cannery, no section 106 was done at the Orca Cannery site ... I don't think because it's a historic property it should be eliminated ...Did the BIA have enough information that having the oil spill response facility at Orca would have an adverse effect? …Mitigation is possible and can go forward...was the site eliminated in a sound manner"…

Corps Response: In May 2014, Ms. Anjuli Grantham, M.A., with the Kodiak Historical Society, and Ms. Barbara E. Bundy, PH.D., with Anchor QEA.LLC, prepared an Orca Cannery Cultural Resources Evaluation for NVE. The final recommendation in this evaluation is that the facility retains sufficient integrity to remain eligible for listing in the NRHP as a historic district. Upon review of this report, the Corps requested concurrence from SHPO with our determination that Orca Cannery remains eligible for the NRHP. On 6 May 2015 SHPO concurred that the Orca Cannery Property retains sufficient integrity to remain eligible for the National Register of Historic Places as a historic district under Criterion A. The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

EPC96: The Rude River (which empties into Nelson Bay) …are the only two watersheds in the entire United States Forest Service landbase mandated to be protected for fish and wildlife habitat.

Corps Response: Nelson Bay and Rude River are located outside of the area being evaluated for the OSRF.

4.3.8 Prince William Sound Audubon Society (PWSAS):
PWSAS97: The justification by the applicant for the Shepard Point Road and Port oil spill response facility centers on the need for deep draft spill response vessels….In the existing state and federal spill response strategies for PWS, nowhere are deep draft vessels listed nor is the need for deep draft spill response vessels identified. Appendix B of the FEIS provides documentation from the oil spill response community that supports the view that a deep draft port is neither critical nor necessary for the success of an oil spill response facility. Should a deep draft vessel be required at a spill site, there is no need for it to first dock at the proposed facility for supplies or equipment. A deep draft vessel could go directly to the spill site and any needed equipment or supplies could be either lightered to the deep draft vessel from barges or smaller vessels, or delivered onto the vessel via helicopter.

Corps Response: The physical dimensions of potential response vessels, including length, beam and draft, are listed in Tables 2-1 through 2-6. The response vessels utilized for the 1989 EVOS included fishing vessels, cargo vessels, Alaska Marine Highway Ferry vessels, U.S. Coast Guard vessels, U.S. Navy vessels, U.S. Army Corps of Engineers dredge Essayons, and numerous barges. The project design criteria is discussed in the FEIS section 2.1.

PWSAS98: The most critical elements of any oil spill response facility are: 1) an adequate lay-down or staging area, and 2) the ability to transfer equipment such as conex units using cranes. The RCAC Oil Spill Prevention and Response Committee (Lohse, 1993) stated that " ... inventories in Cordova have ample dock space to set up the necessary loading stations, and equipment for those stations is either present or readily available." Thus, if the existing facilities in Cordova meet the standards of the oil spill response community, and/or could be enhanced with nominal measures, such as a lay-down yard and crane, then the No Action Alternative would meet the purpose and need.

Corps Response: The No Action Alternative does not meet the project purpose and need. FEIS Section 2.2.1.

PWSAS99: Audubon has examined the 2006 FEIS and found a comparison of project alternatives presented in Table 2-. All the build alternatives presented in this list -which at that time did not include the Orca Cannery alternative - achieve the project purpose and need.

Corps Response: Comment acknowledged.

PWSAS100: Human safety and access issues - avalanche Risk along the proposed road. Nowhere in the Army Corps on line documents for this permit is there any reference to avalanche hazard and risk analysis documents previously completed on existing roads and the proposed Shepard Point Road. The public notice only states "The road would be designed and constructed to accommodate avalanche mitigation measures where required". Audubon examined the August 2013 document "Additional Information Sheet" prepared by CH2MHill for the NVE. On page 2, on the description of the Access Road, it states that the last mile of the proposed Shepard Point Road has the "potential to be impacted by 14 avalanche paths, with estimated return intervals from < 3 years to 50 years. Avalanche mitigation measures will be applied as practicable." Audubon is concerned that the avalanche hazard on the proposed Shepard Point Road is far greater than avalanche exposure on existing roads.

Corps Response: The “Additional Information Sheet”, by CH2MHill, was prepared for NVE, not the Corps. As discussed in the FEIS Section 3.2.1, and Appendix I, avalanches are a safety risk for the Shepard Point alternative. The proposed access road would cross eighteen major avalanche paths and twenty minor paths. Even with avalanche mitigation measures in place, access to the proposed facility could be delayed between mid-November and mid-May.

PWSAS101: An oil spill response facility at Shepard Point will not improve vessel response time to oil spills. An analysis of the vessel run times will clearly show that it is more efficient to develop spill response centers close to the infrastructure and supplies required for vessels and crews. The capacity for crews to get fuel, groceries and repair parts while waiting for spill response equipment saves time and vessel fuel during an actual oil spill. The FEIS (page 4-62) shows that if there is an oil spill on the Copper River section of the Gulf of Alaska, oil spill response times will be significantly increased if local response vessels must first go to the Shepard Point port for supplies (an additional 10 nautical miles) prior to proceeding to response stations on the flats. In addition, if there is a spill in Prince William Sound, for a boat to go from the harbor to a Shepard Point facility before heading out into the Sound adds 3.9 nautical miles.

Corps Response: Response times from Shepard Point, to potential spills sites (including the Copper River Delta), is discussed in the FEIS section 4.5.8.3.

PWSAS102: The proposed oil spill response facility at Shepard Point is not the least environmentally damaging alternative and in fact is the most environmentally damaging and most expensive alternative in the Final Environmental Impact Statement.

Corps Response: Alternatives are is the FEIS Section 2.0 Project Alternatives; and the ROD Section 3.0: Alternatives and LEDPA determination.

PWSAS103: a) The applicant has not demonstrated that their proposed new road and facility is the LEDPA. We examined the FEIS and found that alternative 4, Shepard Point Port & Road, would require 4.5 miles of new road. Alternatives

2, 3, and 5 have similar environmental impacts (see below). In contrast to the Shepard Point Port and Road alternative, alternatives 2, 3, 5, as well as the "new" Orca Cannery Alternative and the No Action Alternative would not require more road building since all five of these alternatives are on the existing road system.

Corps Response: The proposed Shepard Point site is the only alternative carried forward for evaluation in the FEIS that would require constructing additional roadway. See ROD Section 3: Alternatives and the LEDPA determination.

PWSAS104: Compared to the other alternatives listed in the FEIS, as well as the more recently proposed Orca Cannery Alternative, the proposed Shepard Point Port and Road would result in the largest acres of fill in marine waters. The loss of nearshore marine habitat, particularly eelgrass and *Laminaria* under the Shepard Point Port and Road alternative, would result in substantial adverse effects to living marine resources. These effects are not justified given the availability of several viable alternatives.

Corps Response: The Shepard Point Alternative would result in the largest impacts to marine water. However, the applicant has proposed additional avoidance and minimization measures which reduce the overall marine impacts and would completely eliminate impacts to eelgrass habitat. See the ROD Section 3.0: Alternatives.

PWSAS105: Orca Cannery Alternative was not reviewed under FEIS.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

PWSAS106: The nearshore marine environment between Cordova and Shepard Point is productive EFH for various life stages of fish (see Table 3-2 of the EFH Assessment, FEIS). In addition, the Army Corps of Engineers has determined that the Shepard Point project may adversely affect EFH. The project area includes certain marine habitats including eelgrass beds and Laminaria habitat that have enhanced ecological functions and are thus inherently more valuable to the health, stability, and resilience of marine ecosystems

Corps Response: EFH is discussed in the FEIS Sections 3.3.6, 4.5.3.6, Appendix U; & in the ROD Section 8.5.

PWSAS107: The FEIS is out of date and needs to be supplemented.

Corps Response: As stated in the SIR, the Corps considered all relevant data regarding changes to the proposed project, age of the original NEPA document, consultations with NMFS for ESA and EFH, reasonably foreseeable impacts, and updated information regarding alternatives, for possible reasons to require an

SEIS. After analyzing each of these factors, the Corps determined that an SEIS is not necessary to complete the DA permit evaluation process.

PWSAS108: When the FEIS was written, Shepard Point Port and Road was listed as the preferred alternative. In the FEIS there is no explanation as to why Shepard Point Port and Road Alternative was selected, given that it is the most expensive and environmentally damaging alternative. And, at the time that the FEIS was written, the Orca Cannery Alternative did not exist. Since then the owner has made it clear that he is willing to sell his property. In the August 2013 "Additional Information Sheet" on the project supplied to the Corps, the applicant claimed that Orca Cannery site was dismissed because of its historic preservation value. However, the December 2013 letter from the Alaska Department of Natural Resources makes clear that the Orca Cannery has not undergone full review under Section 106 of the National Historic Preservation and that "mere presence of a significant historic property within a project area is usually not significant to eliminate an otherwise viable alternative…

Corps Response: The Shepard Point Alternative (including Road Option 3) is referred to as the preferred alternative in the FEIS, and the explanation is in Section 2.2.5. The Orca Cannery alternative is discussed in the FEIS Section 2.3.10. Also see ROD Section 3.0: Alternatives, and the SIR.

PWSAS109: The Proposed Compensatory Mitigation outlined in the permit application is insufficient.

Corps Response: Compensatory mitigation is discussed in the ROD Section 5.0: Means to Minimize or Avoid Adverse Environmental Impact to Aquatic Resources.

PWSAS110: …the information given in the public notice about the proposed compensatory mitigation is totally insufficient. <u>A technically-detailed mitigation work plan, not a list of options</u> should have been in the application so that the public can make informed comments to the Army Corps as to whether or not the proposed mitigation will compensate for the lost aquatic functions.

Corps Response: Compensatory mitigation is discussed in the ROD Section 5.0: Means to Minimize or Avoid Adverse Environmental Impact to Aquatic Resources.

PWSAS111: …the herring hatchery at Humpback Creek "option" is…much more complicated, expensive, and will require many years in the making with no assurance of the desired consequences. The Exxon Valdez Oil Spill Trustee Council has examined carefully restoration possibilities for herring. The Trustee Council's Draft Integrated Herring Restoration Program (July 2010), states on page 23 that supplemental production "would be the most intrusive alternative, would require the most infrastructure, probably has the most risk from disease, and would be the most costly of all (restoration) alternatives... ... Mass-marking technology for herring would need to be developed and authenticated before enhancement activities could be considered." This document goes on to point out on page 24 that the pilot-scale experimental project to develop mass-marking would not be a trivial undertaking and would take several years.

Corps Response: Comment acknowledged.

PWSAS112: In conclusion, Prince William Sound Audubon believes that the proposed Shepard Point Road and oil spill response facility is not in the public interest because there is no demonstrated need for a deepwater port, and there are viable, less environmentally damaging practicable alternatives available for an oil spill response facility including the no build alternative. If permitted, the project will create a myriad of problems including 1) substantial and unacceptable impacts on essential fish habitat and the nearshore; 2) negative impacts to avian habitats; 3) public safety and road access concerns because of the high avalanche risks; 4) less efficient vessel response in the case of a spill, and, 5) increased public maintenance costs associated with the road and port facility. Given all these reasons, as well as an outdated FEIS that needs to be updated.

Corps Response: See ROD Section 2.3: Purpose and Need, Section 3.0: Alternatives, and Section 7.1 Public Interest Review, and the SIR.

4.3.9 Prince William Soundkeeper:

Prince William Soundkeeper113: Expert opinion has stated that there are other, better alternatives for this port, such as expanding the Cordova City Ocean Dock.

Corps Response: Alternatives are discussed in the FEIS Section 2.0: Project Alternatives; and in the ROD Section 3.0: Alternatives.

4.4 Individuals:

4.4.1 David Grimes:

David Grimes114: …"oil spill response can't effectively happen without deep-draft cargo vessels and a deep water port to service them. This is just simply untrue"…

Corps Response: Water depth at the dock face is discussed in the design criteria, FEIS section 2.1.4.

David Grimes115: 25 years ago Cordova bravely and effectively responded to the Exxon oil spill using its current port facilities and fleet. Having a dedicated oil spill response facility in the Cordova area in no way requires a deep water port for deep draft vessels.

Corps Response: The OSRF design criteria are discussed in the FEIS section 2.1.

David Grimes116: …Shepard Point was originally proposed about two decades ago as a potential site for spill response, the Alyeska oil consortium itself publicly dismissed such a transparently absurd idea.

Corps Response: Comment acknowledged.

David Grimes117: ...proponents of Shepard Point want a deep water port for cruise ships, or resource extraction, or other private development ambitions.

Corps Response: Comment acknowledged.

4.4.2 Dune Lankard:

Dune Lankard118: …a spill port at Shepard Point is not the LEDPA.

Corps Response: See the ROD Section 3.0: Alternatives and the LEDPA determination.

Dune Lankard119: A…comparative study of the scale of environmental damage… has yet to be completed for … alternative sites, such as Orca Cannery, for which no Section 106 process has adequately been done.

Corps Response: Environmental consequences of the alternatives is discussed in the FEIS section 4. In May 2014, Ms. Anjuli Grantham, M.A., with the Kodiak Historical Society, and Ms. Barbara E. Bundy, PH.D., with Anchor QEA.LLC, prepared an Orca Cannery Cultural Resources Evaluation for NVE. The final recommendation in this evaluation is that the facility retains sufficient integrity to remain eligible for listing in the NRHP as a historic district. Upon review of this report, the Corps requested concurrence from SHPO with our determination that Orca Cannery remains eligible for the NRHP. On 6 May 2015 SHPO concurred that the Orca Cannery Property retains sufficient integrity to remain eligible for the National Register of Historic Places as a historic district under Criterion A. The Orca Cannery alternative is discussed in the FEIS section 2.3.10.

Dune Lankard120: In a recent article in the Cordova Times, an NVE employee listed as "fact" in that the avalanche risk associated with the 4.5 mile road to Shepard Point is comparable to the Copper River Highway. When in fact the risk of this proposed road is roughly three times the avalanche risk of the Copper River Highway.

Corps Response: Avalanche mitigation measures are discussed in the FEIS section 5.11, and Appendix I.

4.4.3 Elizabeth Senear:

Elizabeth Senear121: To my knowledge there is not a need for a deep draft port here to bring in supplies in the event of a spill and the current facilities in Cordova are adequate. SERVS has shown that they can get needed supplies through the airport here and over the existing docks in a timely matter.

Corps Response: The purpose, need, and design criteria for the proposed facility are discussed in FEIS sections 1.2, 1.3, and 2.1.

4.4.4 Emily Stolarcyk:
Emily Stolarcyk122: ...alternatives are available…Orca Cannery is the most sensible.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

4.4.5 Eric Manzer and Molly Mulvaney:
Eric Manzer and Molly Mulvaney123: The National Marine Fisheries Service has determined that this project will adversely affect EFH and notes that alternatives exist which meet the purpose and need, are practicable, would cost less than NVE' s preferred alternative, and have less environmental impacts to living marine resources including EFH.

Corps Response: EFH is discussed in the FEIS Sections 3.3.6, 4.5.3.6, Appendix U; & in the ROD Section 8.5. Project alternatives are discussed in the FEIS Section 2.2; and in the ROD Section 3.0: Alternatives.

4.4.6 Frances Mallory:
Frances Mallory124: All current response vessels can already access Cordova.

Corps Response: The types of vessels that could be called upon to respond to an oil spill of national significance is discussed in the FEIS section 2.1.1.

4.4.7 Garrett Lankard-Swenson:
Garrett Lankard-SwensonC125: The Rude River Drainage flows into Nelson Bay where they want to build the deep water port, Rude River…managed primarily for protection of fish and wildlife habitat.

Corps Response: Nelson Bay and Rude River are located outside of the area being evaluated for the OSRF.

4.4.8 James Burton:
James Burton126: As a lifelong Cordovan, commercial fisherman in PWS, Cordova City Council member, I want to voice my personal opinion in SUPPORT of this project.

Corps Response: Comment acknowledged.

4.4.9 James Mykland:
James Mykland127: All the arguments that Cordova does not have deep enough water to effectively respond to oil spills in PWS or Copper River are all a bunch of BS!

Corps Response: Comment acknowledged.

4.4.10 Jennifer Smith:
Jennifer Smith128: Alternative oil response sites exist.

Corps Response: The project alternatives are discussed in the FEIS Section 2.2; and in the ROD Section 3.0: Alternatives.

4.4.11 Jeremy Donahue:
Jeremy Donahue129: …alternative locations for an oil response facility, and one of those is Orca Cannery.

Corps Response: The project alternatives are discussed in the FEIS Section 2.2; and in the ROD Section 3.0: Alternatives. The Orca Cannery alternative is discussed in the FEIS Section 2.3.10 and the SIR.

Jeremy Donahue130: At Orca, there is no risk of an avalanche, no additional operation costs of paying someone to monitor conditions, and no risk of road closures due to avalanches.

Corps Response: While the Orca site alternative, discussed in the FEIS section 2.2.6. An avalanche hazard evaluation and mitigation measures are discussed in the FEIS Appendix I.

Jeremy Donahue131: NVE says that we need deep draft vessels for oil spill response. But, they don't say why. True enough, if there was an oil spill, some of the vessels involved would be deep draft, but not the first responders. No vessels in Cordova are deep draft. The 500-2 (the Alyeska oil spill response barge) is kept in Valdez. In the event of a spill, the 500-2 would be dispatched and take about 12 hours to reach the spill (depending on the location). Alyeska brings the 500-2 to Cordova twice a year during SERVS and keeps it there for the duration of the training. It is the only deep draft vessel that responds. During the training it is anchored in Nelson Bay. When it needs fuel, it docks at the docks we already have available in Cordova. We have the Coast Guard dock and the regular fuel dock by the Alaska Marine Highway (ferry) dock.

Corps Response: The response vessels utilized for the 1989 EVOS included fishing vessels, cargo vessels, Alaska Marine Highway Ferry vessels, U.S. Coast Guard vessels, U.S. Navy vessels, U.S. Army Corps of Engineers dredge

Essayons, and numerous barges. The project design criteria is discussed in the FEIS section 2.1. The physical dimensions of potential response vessels, including length, beam and draft, are listed in Tables 2-1 through 2-6.

4.4.12 Kate Morse:

Kate Morse132: It is not necessary for a deep water port--Federal and State spill response strategies for Prince William Sound do not require deep draft vessels.

Corps Response: The project design criteria is discussed in the FEIS section 2.1.

4.4.13 Kirsti Jurica:

Kirsti Jurica133: … SERVS does not utilize any deep draft vessels for their fishing vessel response program. All response vessels are moored in Cordova and it would inefficient to travel all the way to Shepard Point to pick up equipment. SERVS utilizes a shallow draft barge for equipment deployment, negating any need for a deep draft port.

Corps Response: The role of SERVS personnel and vessels during an OSR event is discussed in the FEIS Section 1.6.1.1. The SERVS emergency response equipment is already onboard the first response vessels and would be assisted by fully equipped response barges stationed near the tanker lanes at Port Etches, Naked Island, and Port Valdez. The SERVS escort and response barge vessel system is designed to deploy equipment directly from these stations to reduce or eliminate travel time to shore-based loading docks. Any additional response vessels, to include skimmers, tugs, storage barges, and fishing vessels, would be activated as needed to provide the 72-hour initial response to an oil spill event. The purpose of the proposed COSRF, as stated in the FEIS section 1.2, is to construct a deepwater port capable of transferring response material and equipment from the all-weather Cordova Airport to the full range of potential response vessels at any tide. The COSRF enhances the existing OSR capabilities during and after the 72-hour initial response effort.

Kirsti Jurica134: …the Shepard Pt. location is contrary to the public interest when there are less damaging alternative locations for the facility. As presented in the BIA 2006 FEIS, there are alternative locations for the Oil Spill Response Facility that are less environmentally damaging and make more economic sense.

Corps Response: The Corps discusses public interest factors in the ROD Section 7.1: Public Interest Review. The FEIS does discuss alternative locations in section 2 and the environmental consequences of the alternatives in section 4.

Kirsti Jurica135: …Orca Cannery…alternative…less environmental impacts than the Shepard Pt. location, with no added safety risks.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

Kirsti Jurica136: There is no need for deep draft capacity for spill response ports in Prince William Sound...

Corps Response: The project design criteria is discussed in the FEIS section 2.1.

4.4.14 Kristin Carpenter:

Kristin Carpenter137: An oil spill response facility at Shepard Point is not the LEDPA because the proposed purpose and need can be met by other locations closer to or in Cordova.

Corps Response: See the ROD Section 3.0: Alternatives and the LEDPA determination.

Kristin Carpenter138: …SERVS equipment quick reference card illustrating that none of the SERVS vessels used for spill response require deeper draft water than what is currently available at the City's ocean dock.

Corps Response: Comment acknowledged.

Kristin Carpenter139: What are SERVS primary infrastructure needs for staging spill response from Cordova, and how do other alternatives meet these needs?

Corps Response: In 2004, the organizations responsible for response planning and readiness in PWS were contacted to gather information for developing functional and engineering criteria for the proposed COSRF. Their recommendations, FEIS Appendix B, were then used to design a facility to accommodate SERVS vessels. The design criterial included minimum dock dimensions, load bearing capacities, staging area criteria, water depth requirements, and facility access for vessels and vehicles. The project alternatives carried forward for evaluation in the FEIS met these the design criteria discussed in the FEIS Section 2.1.

4.4.15 Lauren Padawer:

Lauren Padawer140: NVE's own avalanche danger report for the project states that 1 death every 12 years is an acceptable risk for road construction/maintenance through numerous avalanche chutes.

Corps Response: Comment acknowledged.

Lauren Padawer141: We have existing oil spill response and there are several preferable alternatives to the Shepard Point location, including Fleming Spit, Orca Cannery, Ocean Dock and New Orca Dock.

Corps Response: Comment acknowledged.

4.4.16 Mike Mickelson:
Mike Mickelson142: If an oil spill was to occur in the Copper River Delta area the Shepard Point Facility would actually increase response time.

Corps Response: Estimated travel time to the Copper River Delta from the Shepard Point alternative is discussed in the FEIS Section 4.5.8.3.

Mike Mickelson143: The deep draft large barges used in responding are only limited access to current facilities for several hours 1 to 2 days a year on the lowest tides.

Corps Response: Comment acknowledged.

4.4.17 Nancy Bird:
Nancy Bird144: …several alternative sites more appropriate for an oil spill facility...

Corps Response: The project alternatives are discussed in the FEIS Section 2.2; and in the ROD Section 3.0: Alternatives.

Nancy Bird145: The FEIS also states that response planners recommended the oil spill response facility should have road access throughout the year and consistently noted that uninterrupted access to a response facility at all times was more important than potential temporary delays for large vessels to dock in Cordova.

Corps Response: Comment acknowledged.

Nancy Bird146: …the cumulative effects from other environmental impacts of the proposed project at Shepard Point to be too high when compared to the alternative sites….

Corps Response: The environmental consequences of the alternative sites are discussed in the FEIS Section 4. Cumulative effects are discussed in the ROD Section 6.1.8: Determination of Cumulative Effects on the Aquatic Ecosystem.

4.4.18 Nils Harley Boisen:
Nils Harley Boisen147: I pledge my reasoning for this in full reference to the letter in opposition to the project submitted by the NMFS.

Corps Response: Comment acknowledged.

4.4.19 Paul Swartzbart:

Paul Swartzbart148: …I do not believe that the proposed facility will enhance response capabilities in the Sound, and will likely, either intended or not, enhance other activities like cruise ships and large freight vessels.

Corps Response: Comment acknowledged.

4.4.20 Peter Knape:
Peter Knape149: …I do not believe that the proposed facility will enhance response capabilities in the Sound, and will likely, either intended or not, enhance other activities like cruise ships and large freight vessels.

Corps Response: Comment acknowledged.

Peter Knape150: …it seems that the purpose of avalanche mitigation for an Oil Spill Response Facility should be to maintain that the facility is always open, not to simply ensure the safety of passing traffic when the weather allows.

Corps Response: The avalanche mitigation measures are intended to maintain access to the COSRF and enhance the safety of people traveling on the road. Avalanche mitigation alternatives are discussed in the FEIS Section 3.2, and Appendix I.

Peter Knape151: …I also find no justification for why this road and facility are a needed enhancement to existing facilities, which are used by the local oil spill response fleet currently.

Corps Response: The project purpose and need is discussed in the FEIS sections 1.2 and 1.3.

Peter Knape152: …less damaging and more convenient alternatives, like expanding the ocean dock or Orca Cannery.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10. Project alternatives are discussed in the ROD Section 3.0: Alternatives.

Peter Knape153: …a poorly conceived avalanche mitigation section, no justifications as to the benefit of deep draft vessels over current vessels, and no justification for increased response time caused by locating the response facility an additional 4.5 miles from town.

Corps Response: Comment acknowledged.

Peter Knape154: ….the possibility of the port being used for the ulterior motives of resource extraction and cruise ships…

Corps Response: The other allowable uses of the proposed facility are discussed in the FEIS section 2.1.2.

4.4.21 Rebecca Andersen:
Rebecca Andersen155: Much more suitable locations, such as the Orca Cannery, are available…

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

4.4.22 Rick Steiner:
Rick Steiner156: …in my experience with oil spills around the world - Nigeria, Europe, China, Russia, Europe, and the U.S., etc. - it is clear that oil spill response simply doesn't work – it never has, likely never will. Among those in the spill response business, this is well understood. Even so, we must be prepared to do everything possible when and if the next spill occurs.

Corps Response: This is outside of the Corps' purview.

Rick Steiner157: …it is clear that an oil spill response facility at Shepard Point will not enhance response capability in the Sound. There are other alternatives, already on the Cordova road system (e.g. Orca Cannery), that can easily provide similar response capability.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

Rick Steiner158: …there is simply no justification for building the road…in the eastern Sound…as the oil industry itself concluded years ago.

Corps Response: See ROD Section 2.3: Purpose and Need.

4.4.23 Rion Schmidt:
Rion Schmidt159: This road will have to cross several avalanche paths (making it potentially unusable during winter months).

Corps Response: The proposed access road would cross eighteen major avalanche paths and twenty minor paths. Even with avalanche mitigation measures in place, access to the proposed facility could be delayed between mid-November and mid-May. See the FEIS Section 3.2.1, and Appendix I.

4.4.24 Robert Masolini:
Robert Masolini160: The Oil Pollution Act of 1990 states that equipment must be ready enough to be taken out of the storage connexes within two hours of an oil spill callout, anytime. The 4.5 mile road covered in snow and avalanche debris could block this requirement.

Corps Response: Comment acknowledged.

Robert Masolini161: It is a smokescreen for ... resource extraction

Corps Response: Comment acknowledged.

Robert Masolini162: …there are letters of support of the project from Usibelli mining company, and from the Alaska Mining Association in some regards to coal extraction to the east of Cordova.

Corps Response: The Corps acknowledges the comment, however this is outside of the Corps' purview.

Robert Masolini163: All Oil Spill Response entities agree that this project is not needed for better response. A deepwater port isn't needed.

Corps Response: See ROD Section 2.3: Purpose and Need.

4.4.25 Rod Jensen:

Rod Jensen164: the bottom line is that Cordova doesn't need a "deep water port'' as it is, we can already accommodate a variety of the largest Alaska State ferries (i.e., the "Kennicott"), ocean going tugs and barges to supply fuel and container vans, NOAA ships, as well as our very own USCG, "Sycamore".

Corps Response: See ROD Section 2.3: Purpose and Need.

4.4.26 Rosemary McGuire:

Rosemary McGuire165: There is no need for a designated, deep-water port for spill response in Cordova.

Corps Response: See ROD Section 2.3: Purpose and Need.

Rosemary McGuire166: …the wider oil spill response community has said there is no need for it.

Corps Response: See ROD Section 2.3: Purpose and Need.

Rosemary McGuire167: This is a private development scheme being funded by public money.

Corps Response: This is outside of the Corps' purview.

Rosemary McGuire168: It seems that they must want the port for cruise ship tourism, mineral or timber extraction.

Corps Response: See ROD Section 2.3: Purpose and Need.

4.4.27 Seawan Gehlbach:
Seawan Gehlbach169: All the local vessels currently responding to oil spills through SERVS and other agencies are able to utilize existing dock structures. If deep draft access is required dredging to alternative sites is preferred.

Corps Response: See ROD Section 3: Alternatives.

Seawan Gehlbach170: It is commonly understood that the true intent of the Shepard Point Road and associated deep water port development has been to improve facilities for the future removal of resources (timber and mineral) from the area outside Cordova along the coast. The other motivation for this development is that it opens access to the privately held lands in Nelson Bay.

Corps Response: See ROD Section 2.3: Purpose and Need.

Seawan Gehlbach171: …there are alternative sites that are less environmentally damaging to develop, less expensive, and better serve the needs of the community. The Fleming Spit site has been misrepresented by the City of Cordova as unavailable, but that land is not restricted by any conservation designations as they have claimed.

Corps Response: See ROD Section 3.0: Alternatives.

Seawan Gehlbach172: …the Orca road site all allow year round accessibility along already developed routes.

Corps Response: See ROD Section 3.0: Alternatives.

4.4.28 Steve Witsoe:
Steve Witsoe173: I think it's pretty obvious that the desire for a deep water port has nothing to do with oil spill response, but instead it is an excuse to get money to build a deep water port for other uses. Just look at the drawing of the cruise ship on the Shepard Point Port Feasibility Study.

Corps Response: See ROD Section 2.3: Purpose and Need.

4.4.29 Steve Ranney:
Steve Ranney174: My name is Steve Ranney. I live at the Orca Cannery site. My family is also the land owner of the Orca Cannery facility. As the record on this project shows, there was a proposed deep water port at Shepard Point prior to the current proposed Oil Spill Response port. At the time, in the 1980's the deep water port was proposed as a transfer facility for timber and coal.

Corps Response: See ROD Section 2.3: Purpose and Need, it has been revised since the 1980's.

Steve Ranney175: …in 2011 that covered much of the north portion of the actual proposed Shepard Point staging area.

Corps Response: The Corps acknowledges the comment.

Steve Ranney176: The Shepard Point location is the most…destructive to the local wildlife, and most hazardous

Corps Response: See ROD Section 3.0: Alternatives.

Steve Ranney177: ….the most logical of alternatives is a no action alternative

Corps Response: See ROD Section 3.0: Alternatives.

Steve Ranney178: A single ocean dock, for example would slow down response if all the boats and equipment were to be loaded through this single point.

Corps Response: This is outside of the Corps purview.

Steve Ranney179: Fleming Spit has been listed as an alternative site. While the City of Cordova takes the stand that this land is not available, the current land status of Fleming Spit is that it is available for industrial development.

Corps Response: See ROD Section 3.0: Alternatives.

Steve Ranney180: The Orca Cannery site is wholly owned by my family, portions of the property would be ideal for an oil spill response facility.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

4.4.30 Timothy Metz:

Timothy Metz181: …Alyeska and British Petroleum …do not believe that a deep water port is necessary for Cordova vessels to respond in the event of an oil spill.

Corps Response: See Purpose and Need in Section 2.1 of this document.

Timothy Metz182: There are several worthy alternative locations that could be utilized such as Orca Cannery…

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

4.4.31 William Lindow:
William Lindow183: The existing docks, loading equipment and storage yard seem totally adequate for spill response. I am not aware of any vessels in the current SERVS/Crowley response fleet that require a deeper water port than the currently used Cordova City dock.

Corps Response: Comment acknowledged.

William Lindow184: ...believe a much better alternative is available at the Orca Cannery/Lodge site. This site would have far less environmental impact, due to no new road construction. Infrastructure, such as utilities are already there. Road maintenance concerns are far less, as well as the threat of road closures due to avalanches. The vessel response times to a PWS spill event from Orca Cannery would be nearly identical compared to Shepard Point for shallow draft spill responders, while deep draft responders would see about a three mile increase in response distance.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

William Lindow185: If a new response facility must be built, the Orca Cannery site is a far better alternative.

Corps Response: The Orca Cannery alternative is discussed in the FEIS Section 2.3.10; the ROD Section 3.0: Alternatives; and the SIR.

4.4.32 Anya Honkola:
Anya Honkola186: ...alternatives have not been fully explored.

Corps Response: Alternatives are discussed in the FEIS Section 2.0 Project Alternatives; and the ROD Section 3.0: Alternatives.

4.4.33 Bradley Beckner:
Bradley Beckner187: There are several locations along current road system that may meet the oil spill response needs with reduce cost.

Corps Response: Project alternatives and estimated costs are discussed in the FEIS Section 2.0 Project Alternatives. The alternatives located at Ocean Dock, Fleming Point, Shepard Point, and Orca were determined to meet the stated purpose and need as indicated in FEIS Table 2-7. See the alternatives discussion in the ROD Section 3.0 Alternatives.

5.0 MEANS TO MINIMIZE OR AVOID ADVERSE ENVIRONMENTAL IMPACT TO AQUATIC RESOURCES (40 CFR 1505.2(C), 40 CFR 1505.3, 40 CFR 230.70, SUBPART H)

5.1 Mitigation:

5.1.1 Applicant's Proposed Mitigation: The applicant proposes to implement permittee responsible compensatory mitigation. Under the applicant's proposed compensatory mitigation plan, work within the Copper River drainage would be undertaken to improve fish passage, improve stream hydraulics, and restore habitat connectivity for coho and Chinook salmon and cutthroat trout. The proposed work would involve culvert removal and replacement, including the installation of a bridge for stream crossing.[1]

5.1.2 Avoidance: In evaluating a project area containing waters of the United States, including wetlands, consideration must be given to avoiding impacts on these sites. The applicant over the course of the development of the FEIS has refined the design of the proposed project to reduce the size of the fill footprint within WOTUS. Measures taken to avoid impacts to WOTUS, including special aquatic sites, would consist of shifting the proposed access road alignment, use of bridges for fish-bearing stream crossings, and the development of a detailed wetland delineation of the project area and functional assessment for planning purposes. Of particular note, special aquatic sites consisting of eel grass beds would be entirely avoided from the efforts of the applicant to refine the design of the proposed action.[2]

5.1.3 Minimization: If waters of the United States cannot be avoided, impacts must be minimized. The applicant would: implement controls to maintain water quality; minimize the project footprint within WOTUS; prevent impacts beyond the proposed fill footprint; and reduce the potential to disturb or injure aquatic species within the project area.[3]

5.1.4 Compensatory Mitigation Determination:

5.1.4.1 Is compensatory mitigation required? ☐ yes ☒ no [If "no," state why, and do not complete the rest of this section]

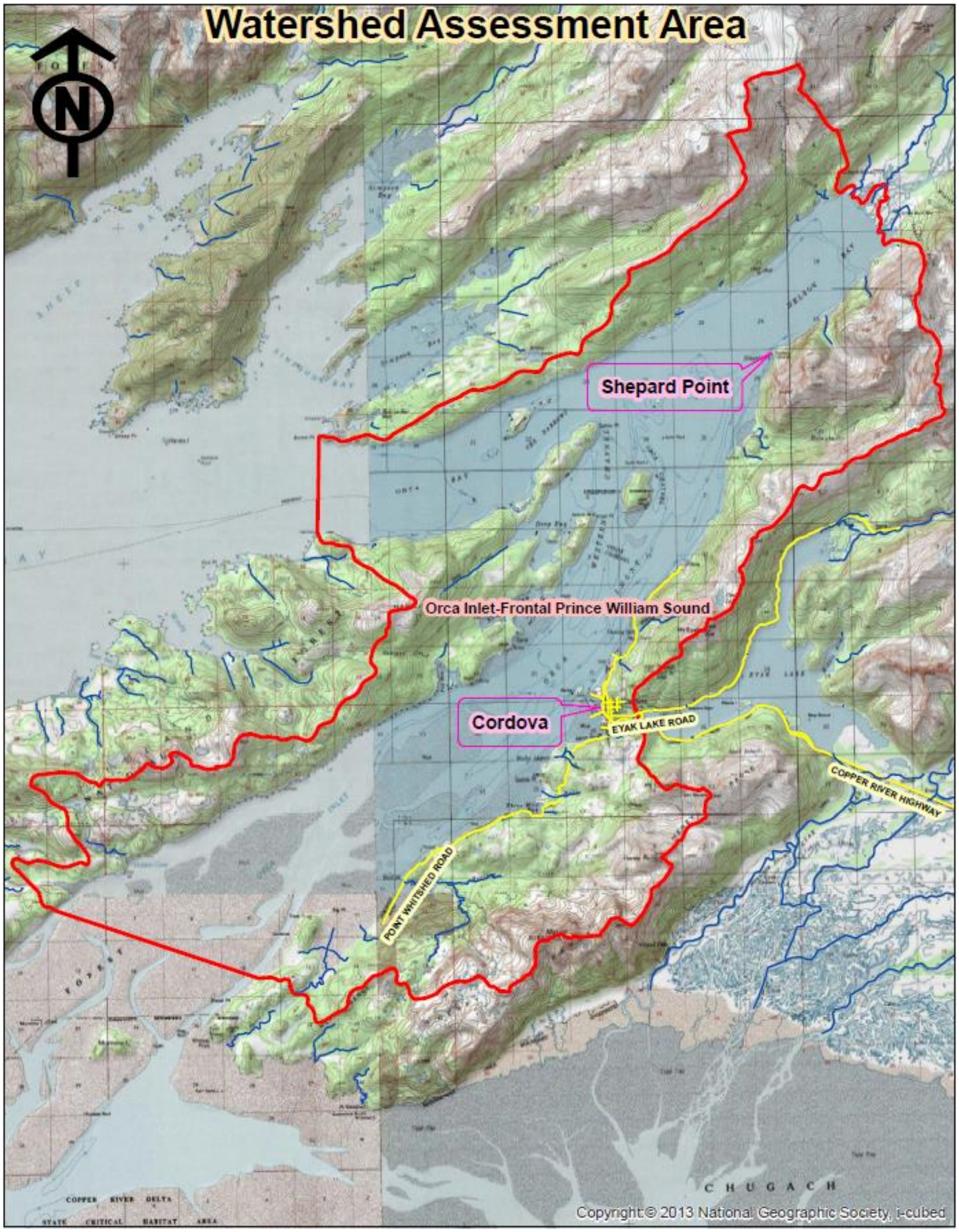
The project site is located within the watershed designated by USGS 10-digit Hydrologic Unit Code (HUC) as 1902020102, and this is the defined geographic area for the watershed analysis.

Although the proposed project would result in a permanent loss of 11.32 acres of WOTUS and 0.46 acre of dock footprint in WOTUS, the proposed project would be sited within the approximate 64,287-acre watershed, including approximately 90.4 miles of shoreline, comprising the assessment area, and there would be

[1] See Section 8. of the Shepard Point Oil Spill Response Facility, Wetlands Mitigation Plan (Mitigation Plan) for detailed information on the proposed compensatory mitigation.
[2] See Section 3.1 of the Mitigation Plan for detailed information on avoidance measures.
[3] See Section 3.2 of the Mitigation Plan for detailed information on minimization measures.

minimal loss of aquatic function from the proposed work.[4] Little past development has occurred within the review area that has resulted in the loss of waters of the United States, and any new proposals subject to the Corps' regulatory authority would undergo a similar review as the current proposal. The proposed work would cause only minimal direct, secondary, and cumulative impacts to waters of the United States, including special aquatic sites, contained within the assessment area.[5] Additionally, the proposed project incorporates controls to minimize effects, and the Department of the Army permit, if issued, would be conditioned to minimize impacts to aquatic resources. Therefore, no significant degradation of the aquatic ecosystem would occur as a result of the proposed project. The Corps has determined that the applicant has avoided and minimized to the extent practicable, the proposed project complies with the 404(b)(1) Guidelines, and would not result in the loss of significant aquatic resources (33 CFR 320.4(r)).

[4] See Section 6.2 of the Corps ROD.
[5] See Section 6.1.7 – 6.1.8 of the Corps ROD.



Watershed Assessment Area
N
Shepard Point
Orca Inlet-Frontal Prince William Sound
Cordova
EYAK LAKE ROAD
COPPER RIVER HIGHWAY
POINT WHITSHED ROAD
C H U G A C H
COPPER RIVER DELTA
STATE CRITICAL HABITAT AREA
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5.1.4.2 Mitigation Summary:
The proposed project would result in no more than minimal individual and cumulative adverse environmental effects and would not be contrary to the public interest, provided the special conditions identified in this document are incorporated.

5.2 Mitigation Measures Required by State Agencies
ADEC's Certificate of Reasonable Assurance for the proposed action includes:

1. Reasonable precautions and controls must be used to prevent incidental and accidental discharge of petroleum products or other hazardous substances. Fuel storage and handling activities for equipment must be sited and conducted so there is no petroleum contamination of the ground, surface runoff or water bodies.

2. During construction, spill response equipment and supplies such as sorbent pads shall be available and used immediately to contain and cleanup oil, fuel, hydraulic fluid, antifreeze, or other pollutant spills. Any spill amount must be reported in accordance with Discharge Notification and Reporting Requirements (AS 46.03.755 and 18 AAC 75 Article 3). The applicant must contact by telephone the DEC Area Response Team for Central Alaska at (907) 269-3063 during work hours or 1-800-478-9300 after hours. Also, the applicant must contact by telephone the National Response Center at 1-800-424-8802.

3. Runoff discharged to surface water (including wetlands) from a construction site disturbing one or more acres must be covered under Alaska's General Permit for Storm Water Discharges from Large and Small Construction Activities in Alaska (AKR100000). This permit requires a Storm Water Pollution Prevention Plan (SWPPP). For projects that disturb more than five acres, this SWPPP must also be submitted to DEC (William Ashton, 907-269-6283) prior to construction.

4. During the work on the culverts and bridges, construction equipment shall not be operated below the ordinary high water mark or mean high water mark if equipment is leaking fuel, oil, hydraulic fluid, or any other hazardous material. Equipment shall be inspected on a daily basis for leaks. If leaks are found the equipment shall not be used and pulled from service until the leak is repaired.

5. All work areas, material access routes, and surrounding wetlands involved in the construction project shall be clearly delineated and marked in such a way that equipment operators do not operate outside of the marked areas.

6. Natural drainage patterns shall be maintained, to the extent practicable, without introducing ponding or drying.

7. Excavated or fill material, including overburden, shall be placed so that it is stable, meaning after placement the material does not show signs of excessive erosion. Indicators of excess erosion include: gullying, head cutting, caving, block slippage, material sloughing, etc.

8. Include the following BMPs to handle storm water and total storm water volume discharges as they apply to the site:
a. Divert storm water from off-site around the site so that it does not flow onto the project site and cause erosion of exposed soils;
b. Slow down or contain storm water that may collect and concentrate within a site and cause erosion of exposed soils;

c. Place velocity dissipation devices (e.g., check dams, sediment traps, or riprap) along the length of any conveyance channel to provide a non-erosive flow velocity. Also place velocity dissipation devices where discharges from the conveyance channel or structure join a water course to prevent erosion and to protect the channel embankment, outlet, adjacent stream bank slopes, and downstream waters.

9. Contact DEC's Contaminated Sites Program Evonne Reese if historical contamination is found during the project (email: Evonne.reese@alaska.gov, (907) 465-5229) for permission before proceeding.

10. Fill material must be clean sand, gravel or rock, free from petroleum products and toxic contaminants in toxic amounts.

11. All in-water work shall be conducted so as to minimize the amount of material and suspended sediments that enter the Orca Inlet. Appropriate Best Management Practices (BMPs) will be employed to minimize sediment loss and turbidity generation during the work.

12. Any disturbed ground and exposed soil not covered with fill must be stabilized and re-vegetated with endemic species, grasses, or other suitable vegetation in an appropriate manner to minimize erosion and sedimentation, so that a durable vegetative cover is established in a timely manner.

5.3 Special Conditions of the Corps Permit

In addition, in order to comply with the 404(b)(1) guidelines, and to ensure the project is not contrary to the public interest, the following special conditions will be carried on the Department of the Army permit:

1. Your use of the permitted activity must not interfere with the public's right to free navigation on all navigable waters of the United States.

Rationale: Protection of navigation and the general public's right of navigation on the water surface is a primary concern of the federal government. This condition is required by regulation (33 CFR 320.4(o)(3)).

2. You must install and maintain, at your expense, any safety lights and signals prescribed by the United States Coast Guard (USCG), through regulations or otherwise, on your authorized facilities. The USCG may be reached at the following address and telephone number: Commander (dpw), 17th Coast Guard

District, P.O. Box 25517, Juneau, Alaska 99802; or by telephone at (907) 463-2272.

Rationale: The facility must be lighted to prevent navigation hazards and this condition is required by regulation (33 CFR 320.4(o)(3)).

3. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

Rationale: This condition is required by regulation to protect free navigation and the interests of the United States in existing or future federal projects (33 CFR 320.4(o)(3) and HQ memorandum).

4. Within 60 days of completion of the work authorized by this permit, the Permittee shall submit as-built drawings of the authorized work and a completed "As-Built Certification By Professional Engineer" form (Attachment A) to the Corps. The as-built drawings shall be signed and sealed by a registered professional engineer and include the following:

a. A plan view drawing of the location of the authorized work footprint, as shown on the permit drawings, with transparent overlay of the work as constructed in the same scale as the permit drawings on 8½-inch by 11-inch sheets or PDF. The plan view drawing should show all "earth disturbance," including wetland impacts and water management structures.

b. A list of any deviations between the work authorized by this permit and the work as constructed. In the event that the completed work deviates, in any manner, from the authorized work, describe on the attached "As-Built Certification By Professional Engineer" form the deviations between the work authorized by this permit and the work as constructed. Clearly indicate on the as-built drawings any deviations that have been listed. Please note that the depiction and/or description of any deviations on the drawings and/or "As-Built Certification by Professional Engineer" form does not constitute approval of any deviations by the Corps.

c. Include the Department of the Army permit number on all sheets submitted.

Rationale: This special condition is required to ensure compliance with the permit and all associated conditions.

5. The following mitigation measures shall be implemented to prevent impacts during project construction to two properties eligible for the National Register of Historic Places (Shepard Point Mess Hall (COR-428) and Shepard Point Orientals' Mess Hall Feature (COR-429)):

a. Archeological monitoring shall be performed periodically to assure that the mess hall area is not disturbed;
b. A keep out zone shall be marked by orange plastic cones, or orange plastic fencing, placed at the outer edge of the construction area near the mess hall area;
c. Prior to project construction, Section 106 compliance is required for material sites that were not yet defined at the time of the 2006 cultural resources survey;
d. If human remains, historic resources, or archaeological resources are encountered during construction, all ground disturbing activities shall cease in the immediate area and you shall immediately (within one business day of discovery) notify the U.S. Army Corps of Engineers (Corps), Alaska District, Regulatory Office by calling (907) 753-2712, toll free from within Alaska at (800) 478-2712, or emailing regpagemaster@usace.army.mil. Upon notification the Corps shall notify the SHPO. Based on the circumstances of the discovery, equity to all parties, and consideration of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. After such notification, project activities on federal lands shall not resume without written authorization from the Corps, and/or SHPO, and federal manager. After such notification, project activities on tribal lands shall not resume without written authorization from the SHPO and the Corps.
e. Mitigation measures shall be noted in the construction contract, and on construction plans.

Rationale: This condition is required to avoid impacts to historic properties/cultural resources and comply with Section 106 of the National Historic Preservation Act. (Section 106 of NHPA, 33 CFR 320.4(e), and 33 CFR 325 Appendix C).

6. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow, or during low tidal stages.

Rationale: This condition is required to minimize impacts to adjacent wetlands and other waters of the U.S. as a result of the permitted project (33 CFR 320.4(b) and (l) and 40 CFR 230.41).

7. Areas disturbed during project construction shall be revegetated as soon as possible, preferably in the same growing season as the disturbance. Revegetation techniques would include seeding, planting, replacement of reserved ground cover, and/or fertilizing of re-contoured ground to promote reestablishment of natural plant communities. Species to be used in order of preference are 1) species native to the site; 2) species native to the area; 3) species native to the state. Re-vegetated areas eventually shall have enough cover to sufficiently control erosion without silt fences, hay bales, or other mechanical means.

Rationale: This condition is required to minimize impacts to adjacent wetlands and other waters of the U.S. as a result of the permitted project (33 CFR 320.4(b) and (l) and 40 CFR 230.41)

8. In peat wetlands, the natural vegetative mat shall be systematically removed (with root masses intact) prior to construction, stored it in a manner to retain viability (usually frozen or hydrated), then replaced after recontouring of the ground following construction, with final contours to be within 1 foot of adjacent, undisturbed, soil surfaces after one growing season and one freeze/thaw cycle.

Rationale: This condition is required to minimize impacts to adjacent wetlands and other waters of the U.S. as a result of the permitted project (33 CFR 320.4(b) and (l) and 40 CFR 230.41

9. Restoration and revegetation of streambank and shoreline habitat shall utilize the most up-to-date bioengineering techniques and biodegradable materials. Techniques shall include, but are not limited to, brush layering, brush mattressing, live siltation, and use of jute matting and coir logs to stabilize soils and reestablish native vegetation.

Rationale: This condition is required to minimize impacts to adjacent wetlands and other waters of the U.S. as a result of the permitted project and to help prevent the inadvertent introduction of invasive plant species in the project area (33 CFR 320.4(b) and (l) and 40 CFR 230.41; EO 13112)

10. Soil from outside the project boundaries will not be imported to the project site. Any soil within the project boundaries identified as containing invasive species will not be transported to other areas of the project.

Rationale: This condition is to help prevent the inadvertent introduction of invasive plant species in the project area. EO 13112

11. Authorized structures shall not impede flood flows. To the extent practicable, equipment shall work from an upland site to minimize adding fill into waters of the U.S. If it is not practicable to work from an upland site, heavy equipment working in wetlands or mudflats must be placed on mats, or other measures (e.g. ice roads, compacted snow, low psi ground bearing weight, etc.) must be taken to prevent soil disturbance.

Rationale: This condition is required to minimize impacts to other waters of the U.S. as a result of the permitted project (33 CFR 320.4(b) and (l) and 40 CFR 230.41)

12. The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete blocks with exposed reinforcement bars, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.

Rationale: This condition is required to prevent adverse impacts to wetlands and other waters of the U.S. outside of the permitted project area (33 CFR 320.4(b) and (d), 40 CFR 230.11(c) and (d), and 40 CFR 230.60)).

13. No stockpiling of fill materials shall occur in wetlands or other waters of the U.S. that do not have DA authorization.

Rationale: This condition is required to avoid adverse impacts to adjacent wetlands or other waters as a result of the permitted project (33 CFR 320.4(b)(1), 33 CFR 320.4(r)(1), and 40 CFR 230.41)

14. Piles shall be driven during low tide stages in intertidal and shallow subtidal areas. Low tidal stage is defined as a six hour period beginning three hours before low tide and ending three hours past low tide.

Rationale: This condition is required to minimize impacts to fish and marine wildlife (33 CFR 320.4(c) and 33 CFR 320.4(r)(i)).

15. The permittee shall comply with the Federal Endangered Species Act, you must implement all of the mitigating measures identified in the enclosed National Marine Fisheries Service (NMFS) letter of concurrence (#AKR-2017-9692, dated October 6, 2017). If you are unable to implement any of these measures, you must immediately notify the Corps and the NMFS so we may consult as appropriate, prior to initiating the work, in accordance with Federal law.

Rationale: This condition is required to reduce the likelihood of adverse impacts to species protected under the Endangered Species Act and to comply with the Act (Section 7 of the ESA and 40 CFR 230.30).

16. The Permittee shall submit all reports, notifications, documentation and correspondence required by the general and special conditions of this permit to the following address:

a. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, P.O Box 6898 JBER, Alaska 99506-0898
b. For electronic mail regpagemaster@usace.army.mil (not to exceed 10 MB).
c. The Permittee shall reference this permit number, POA-1994-1014 (SP), on all submittals.

Rationale for this special condition will vary depending on the reasons reports, notifications, documentation, etc. is being required

17. Within 10 days from the date of initiating the work authorized by this permit for of the authorized project, the Permittee shall provide a written notification of the date of commencement of authorized work to the Corps.

Rationale: This special condition is necessary in order to efficiently plan compliance inspections and ensure compliance of the permitted project.

18. All contractors involved in this permitted activity shall be provided copies of this permit in its entirety. A copy shall remain on site at all times during construction.

Rationale: This special condition is required to ensure compliance with the permit, and to minimize impacts to adjacent wetlands and other waters of the U.S. as a result of the permitted project (33 CFR 320.4(b) and 40 CFR 230.41).

19. Should any other agency require and/or approve changes to the work authorized or obligated by this permit, the Permittee is advised a modification to this permit may be required prior to initiation of those changes. It is the Permittee's responsibility to request a modification of this permit. The Corps reserves the right to fully evaluate, amend, and approve or deny the request for modification of this permit.

Rationale: This special condition is required to ensure compliance with the permit, and to minimize impacts to adjacent wetlands and other waters of the U.S. as a result of the permitted project (33 CFR 320.4(b) and 40 CFR 230.41).

6.0 Evaluation of the Discharge of Dredge and Fill Material in Accordance with 404(b)(1) Guidelines (40 CFR Section 230, Subparts B through F)

6.1 Subpart B - Compliance with the Guidelines:

Findings of significant degradation related to the proposed discharge shall be based upon appropriate factual determinations, evaluation and tests required by subparts B and G, after consideration of subparts C through F, with special emphasis on the persistence and permanence of the effects outlined in those subparts (40 CFR 230.10(c)).

The determinations of potential short or long-term effects of proposed discharges of dredged or fill material on the physical, chemical and biological components of the aquatic environment shall include the following:

6.1.1.Physical Substrate Determinations [230.11(a), *230.20*]: Impacts to the physical substrate are also discussed in Section 6.2.1 below.

References: Physical substrate determinations include an evaluation of the nature and degree of effect that the proposed discharge will have, individually and cumulatively, on the characteristics of the substrate at the proposed disposal site.

See FEIS Sections 3.2.1, 3.3.3, 4.5.3.3 and table 4.3-4. Impacts would be minor and insignificant to Physical substrate determinations. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document.

6.1.2 Water Quality, Circulation, Fluctuation and Salinity Determinations*[*230.11(b), *230.22 – 230.25*]: Impacts to water quality, circulation, water fluctuation and salinity are also discussed in Sections 6.2.2 through 6.2.6 below. Also see discussion under 6.1.7, Determination of Secondary Effects below.

References: Water circulation, fluctuation, and salinity determinations include an evaluation of the nature and degree of effect that the proposed discharge would have individually and cumulatively on water, current patterns, circulation including downstream flows, and normal water fluctuation.

See FEIS Sections 3.2.2, 4.5.2.2, and Appendix J. Impacts would be minor and insignificant to water quality, circulation, fluctuation, and salinity determinations. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document.

6.1.3 Suspended Particulate/Turbidity Determinations[230.11(c), *230.21*]:

References: Suspended particulates and turbidity determinations include an evaluation of the nature and degree of effect that the proposed discharge would have individually and cumulatively, in terms of potential changes in the kinds and concentrations of suspended particulate/turbidity in the vicinity of the disposal site.

See FEIS Sections 3.2.2.2, 4.5.2.2, and Appendix J. Impacts would be minor and insignificant to suspended particulates and turbidity determinations. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document.

6.1.4 Contaminant Determinations [230.11(d)]:

References: Contaminate determinations include an evaluation of the nature and degree to which the material proposed for discharge will introduce, relocate, or increase contaminants.

See FEIS Sections 3.2.8, 4.7.8, and Appendix N, and the ADEC Contaminated Sites Database. Impacts would be insignificant for contaminant determinations. Special conditions to avoid and minimize impacts to aquatic resources are listed in Section 5.3 of this document.

6.1.4.1 The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material for all alternatives: (checked boxes apply)

☒ Physical characteristics (receiving waters, bottom sediments, slurry constituents).
☐ Hydrograph in relation to known or anticipated sources of contaminants.
☐ Results from previous testing of the material or similar material in the vicinity of the project.
☐ Known, significant, sources of persistent pesticides from land runoff or percolation.
☒ Spill records for petroleum products or designated (§311 of CWA) hazardous substances. (FEIS Appendix N)
☒ Other public records of significant introduction of contaminants from industry, municipalities or other sources. (FEIS Appendix N)
☒ Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities. (FEIS Appendix N)

6.1.4.2 An evaluation of the information above indicates that there is reason to believe the proposed dredged or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites. The material meets the testing exclusion criteria.

☒ Yes ☐ No ☐ Unknown

6.1.4.3 Is the discharge site adjacent to the extraction site and subject to the same sources of contaminants, or are the materials at the two sites substantially similar?

☒ Yes ☐ No ☐ Unknown

6.1.4.4 If there is a high probability that the material proposed for discharge is a carrier of contaminants are there constraints available that are acceptable to the permitting authority, and the Regional Administrator, to reduce potential contamination to acceptable levels at the disposal site?

This question is not applicable. There is not a high probability that the material proposed for discharge is a carrier of contaminants.

6.1.5: Aquatic Ecosystem and Organism Determinations [230.11(e)]:

References: Contaminate determinations include an evaluation of the nature and degree of effect that the proposed discharge will have, both individually and cumulatively, on the structure and function of the aquatic ecosystem and organisms.

See FEIS Sections 3.3.2, 3.3.3, 4.5.3, and 4.8.3.3. The FEIS states that Humpback Creek and Unnamed Creek, which are fish bearing streams, would be impacted (FEIS Section 4.5.3.2) however, the road has been redesigned to avoid impacts to these waterbodies (see Mitigation Plan Section 3.1). Therefore, overall impacts to the aquatic ecosystem and organisms would be minor and insignificant. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document.

6.1.6: Proposed Disposal Site Determination [230.11(f)]:

The proposed project would not include disposal of material into open water, or result in dredging of water bodies. There will be no need for a disposal site since no dredging or disposal of material is applicable for this alternative.

6.1.7 Determination of Secondary Effects on the Aquatic Ecosystem [40 CFR 230.11(h)]:

References: Secondary effects determinations include an evaluation of the effects on an aquatic ecosystem that are associated with a discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material. Secondary effects to the aquatic environment include impacts to physical substrate, water quality, vegetation, and aquatic ecosystems and organisms.

See FEIS Sections 4.5.2.3, 4.5.3.1, 4.5.3.2, and 4.5.3.3. and CH2MHill 2013 404(b)(1). The potential secondary impacts directly related to the proposed discharge would be an increase in volume and velocity of storm water runoff and transport of sediment/toxicants, into the adjacent waters. Secondary impacts would include altered animal behavior during construction activities resulting from noise related disturbance, although predicting the degree of impact would be difficult. An increase in air emissions would occur from the increased motor vehicle traffic associated with the proposed project. However, this impact would be minimal. The proposed work would result in an increase in marine vessel traffic within the assessment area. However, the presence of the proposed fill and structures within the navigable waters would not be unfamiliar or require boater's to be alert and cautious of its presence. The proposed work would not adversely impact existing traffic patterns, and would not disrupt a reasonably prudent boater from navigating the waterway, provided the structures are made appropriately visible during periods of reduced visibility if necessary. The additional vessel traffic may result in additional fuel and vessel lubricants in the area, associated with vessel operation. It would not be anticipated to be appreciable, as the facilities would only be used during a large oil spill overshadowing any additional petroleum or other contaminants in the aquatic environment from additional vessels in the vicinity. The Corps has determined that potential adverse secondary impacts from the placement of fill, fuel/oil spills, and safety hazards would be minimal, provided that adequate best management practices are employed and special conditions are followed.

6.1.8 Determination of Cumulative Effects on the Aquatic Ecosystem [40 CFR230.11(g)]:

References: See FEIS Sections 3.14, 4.8.3.2 and 4.8.3.3.
The assessment area is comprised of approximately 64,287 acres. The FEIS Section 3.1.4 describes the cultural and historical context of the assessment area. Within this area there are a total of approximately 36,101 acres of aquatic resources, of which approximately 9,234 acres are wetlands. The Corps Regulatory Division has issued 136 permits within the assessment area. Authorizations for the discharge of fill material into WOTUS, including wetlands have resulted in permanent impacts to 345 acres of the aquatic environment. As a result, approximately 0.93 – 0.964 percent of aquatic resources within the assessment area have been impacted, and 0.537 percent of the watershed has been developed. This percentage can be found in the ORM2 data and data from National Land Cover Database.

The area of affect over which impacts resulting from the proposed project would extend is the review area within which the proposed work would be located. The impacts that are expected in that area from the proposed project, including other actions (past, proposed, and reasonably foreseeable) that have had or are expected to have impacts in the same area, as well as the impacts or expected impacts from these other actions include pile driving, filling, dredging, and/or the discharge of dredged material. The overall impact that can be expected if the individual impacts are allowed to accumulate is the continued loss of habitat for aquatic, terrestrial and avian wildlife.

Overall, the Corps has determined that the project would not result in more than minimal environmental impacts, including impacts on fish and wildlife values.

When considering the overall impacts that would result from this project, in context with the overall impacts from past, present, and reasonably foreseeable future projects, the cumulative impacts are not considered to be significantly adverse. Any future projects within waters of the U.S. would undergo independent permit evaluation review and individual and cumulative impacts would be considered during each review.

***6.1.9 Findings of Compliance or Non-Compliance with the Restrictions on Discharge* [40 CFR 230.12]:**

☐ On the basis of these Guidelines (Subparts C through G), the proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) Guidelines.

☒ On the basis of these Guidelines (Subparts C through G), the proposed disposal site for the discharge of dredged or fill material complies with the Section 404(b)(1) Guidelines with the inclusion of the appropriate and practicable discharge conditions to minimize pollution or adverse effects to the affected aquatic ecosystem. See Section 5.3 for a list of Special Conditions.

☐ The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) Guidelines for the following reasons:

- ☐ There is a less damaging practicable alternative.
- ☐ The proposed discharge will result in significant degradation of the aquatic ecosystem.
- ☐ The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem.

☐ There does not exist sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with these Guidelines.

<u>6.2 Subpart C - Potential Impacts on Physical and Chemical Characteristics of the Aquatic Ecosystem (40 CFR Section 230</u>

<u>Subpart C)</u> (Note: The effects described in this subpart were considered in making the factual determinations and the findings of compliance or non-compliance in subpart B (see 6.1 above).

6.2.1 Substrate *[230.20, required under Section 230.11(a)] –*

References: The substrate of the aquatic ecosystem underlies open waters of the United States and constitutes the surface of wetlands. It consists of organic and inorganic solid materials and includes water and other liquids or gases that fill the spaces between solid particles.

See FEIS Sections 3.2.1 and 3.3.3. Impacts would be minor and insignificant to the substrate. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document. Information regarding the substrate within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in the Section 6.1.1, Physical Substrate Determination.

6.2.2 Suspended Particulates/Turbidity *[230.21, required under 230.11(c)]*

References: Suspended particulates in the aquatic ecosystem consist of fine-grained mineral particles, usually smaller than silt, and organic particles.

See FEIS Sections 3.2.2.2, 4.5.2.2, and Appendix J. Impacts would be minor and insignificant to the suspended particulates and turbidity. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document. Information regarding suspended particulates and turbidity within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in the Section 6.1.3 Suspended Particulates/Turbidity Determination.

6.2.3 Water *[230.22, required under 230.11(b)]*

References: Water is the part of the aquatic ecosystem in which organic and inorganic constituents are dissolved and suspended. It constitutes part of the liquid phase and is contained by the substrate.

See parts 3.2.2, 4.5.2.2 and Appendix J of the FEIS. Impacts would be minor and insignificant to the water. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document. Information regarding general water characteristics within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in

Section 6.1.2 Water Quality, Circulation, Fluctuation and Salinity Determination.

6.2.4 Current Patterns and Water Circulation *[230.23, required under 230.11(b)]*

References: Current patterns and water circulation are the physical movements of water in the aquatic ecosystem. Currents and circulation respond to natural forces as modified by basin shape and cover, physical and chemical characteristics of water strata and masses, and energy dissipating factors.

See FEIS Sections 3.2.2, 4.5.2.2, and Appendix. Impacts would be minor and insignificant to the current patterns and water circulation. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document. Information regarding current patterns and water circulation within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in Section 6.1.2, Water Quality, Circulation, Fluctuation and Salinity Determination.

6.2.5 Normal Water Fluctuation *[230.24, required under 230.11(b)]*

References: Normal water fluctuations in a natural aquatic system consist of daily, seasonal, and annual tidal and flood fluctuations in water level.

See FEIS Section 3.2.2, and Appendix J. Impacts would be minor and insignificant to normal water fluctuation. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document. Information regarding normal water fluctuation within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in Section 6.1.2 Water Quality, Circulation, Fluctuation and Salinity Determination.

6.2.6 Salinity Gradients *[230.25, required under 230.11(b)]*

References: Salinity gradients form where salt water from the ocean meets and mixes with fresh water from land. No impacts to salinity gradients are anticipated to occur due to the proposed project.

6.3 Subpart D - Potential Impacts on Biological Characteristics of the Aquatic Ecosystem (40 CFR Section 230 Subpart D) (Note: The impacts described in this subpart were considered in making the factual determinations and the findings of compliance or non-compliance in subpart B (see 6.1 above).)

6.3.1 Threatened and Endangered Species *[230.30]*

References: An endangered species is a plant or animal in danger of extinction throughout all or a significant portion of its range. A threatened species is one in danger of becoming an endangered species in the foreseeable future throughout all or a significant portion of its range.

See FEIS Section 3.3.4, Appendix T, and the Revised Biological Assessment. The USFWS indicated there were no endangered, threatened, or proposed ESA listed species under their jurisdiction that have the potential to occur within the action area, nor are there any areas designated or proposed as critical habitat within the project area. NMFS indicated that the only ESA-listed species under their jurisdiction that are likely to occur in the project area are the Steller Sea Lion and the Humpback whale. The project may affect, but is not likely to adversely affect any threatened or endangered species or adversely modify any critical habitat. In the letter from NMFS, dated October 6, 2017, NMFS concurred with the determination that the project may affect, but is not likely to adversely affect the above listed species with the mitigative measures included in the LOC.

6.3.2 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms in the Food Web *[230.31]*

References: Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. All forms and life stages of an organism, throughout its geographic range, are included in this category.

See FEIS Sections 3.3.2, 3.3.3, 3.3.4, Appendix O and Appendix P. Impacts would be minor and insignificant to Fish, crustaceans, mollusks, and other aquatic organisms in the food web. Information regarding fish, crustaceans, mollusks, and other aquatic organisms in the food web within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in Section 6.1.5, Impacts to Aquatic ecosystem and organisms.

6.3.3 Other Wildlife *[230.32]*

References: Other wildlife include wildlife associated with aquatic ecosystems are resident and transient mammals, birds, reptiles, and amphibians.

See FEIS Sections 3.3.7 and 4.5.3.7, and the USFWS comment letter. Impacts would be minor and insignificant to other wildlife. Information regarding other wildlife within the project area and impacts from project related structures and activities are discussed in the reference documents. Additional discussion regarding specific impacts and minimization of impacts is included in Section 6.1.5, Impacts to Aquatic ecosystem and organisms.

6.4 Subpart E - Potential Impacts on Special Aquatic Sites (40 CFR Section 230 Subpart E) (Note: The impacts described in this subpart were considered in making the factual determinations and the findings of compliance or non-compliance in subpart B (see 6.1 above).)

6.4.1 Sanctuaries and Refuges *[40 CFR 230.40]*

References: Sanctuaries and refuges consist of areas designated under State and Federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources.

There are no sanctuaries or refuges within the project area.

6.4.2 Wetlands *[40 CFR 230.41]*

References: Wetlands consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

See FEIS Sections 3.3.5, 4.5.3.5, and Appendix P. Impacts would be minor and insignificant to wetlands. Special conditions to avoid and minimize impacts to wetland and riverine substrates are listed in Section 5.3 of this document.

6.4.3 Mud Flats *[40 CFR 230.42]*

References: Mud flats are broad flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems.

No fill is proposed to be discharged into mud flats. This section is not applicable.

6.4.4 Vegetated Shallows *[40 CFR 230.43]*

References: Vegetated shallows are permanently inundated areas that under normal circumstance support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems as well as a number of freshwater species in rivers and lakes.

No fill is proposed to be discharged into vegetated shallows. This section is not applicable.

6.4.5 Coral Reefs *[40 CFR 230.44]*

References: Coral reefs consist of the skeletal deposit, usually of calcareous or siliceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef.

There are no Coral Reefs located in or adjacent to the project area. This section is not applicable.

6.4.6 Riffle and Pool Complexes *[40 CFR 230.45]*

References: Steep gradient sections of streams are sometimes characterized by riffle and pool complexes. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. Pools are characterized by a slower stream velocity, a steaming flow, a smooth surface, and a finer substrate.

No fill is proposed to be discharged into riffle and pool complexes. This section is not applicable.

<u>6.5 Subpart F - Potential Effects on Human Use Characteristics </u>(40 CFR Section 230, Subpart F) (Note: The impacts described in this subpart were considered in making the factual determinations and the findings of compliance or non-compliance in subpart B (see 6.1 above).)

6.5.1 Municipal and Private Water Supplies *[40 CFR 230.50]*

References: Municipal and private water supplies consist of surface water or ground water which is directed to the intake of a municipal or private water supply system.

See FEIS Section 3.1.5.4.2. Impacts would not occur. There are no municipal or private water supplies in the project area and none would be impacted by the proposed action.

6.5.2 Recreational and Commercial Fisheries *[230.51]*

References: Recreational and commercial fisheries consist of harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man.

See FEIS Sections 3.1.5.2.2 and 4.5.1.2. Impacts would be insignificant to recreational and commercial fisheries.

6.5.3 Water-Related Recreation *[230.52]*

References: Water-related recreation encompasses activities undertaken for amusement and relaxation. Activities encompass two broad categories of use: consumptive, e.g., harvesting resources by hunting and fishing; and non-consumptive, e.g. canoeing and sight-seeing.

See FEIS Sections 3.1.2.4, 4.5.1.2, and Appendix G. Impacts would be minor and insignificant to water-related recreation.

6.5.4 Aesthetics *[230.53]*

References: Aesthetics associated with the aquatic ecosystem consist of the perception of beauty by one or a combination of the senses of sight, hearing, touch, and smell. Aesthetics of aquatic ecosystems apply to the quality of life enjoyed by the general public and property owners.

See FEIS Sections 3.1.3, 3.2.7, 4.5.1.3, 4.5.2.5, and 4.8.3.1.3. Impacts would be moderate but insignificant to aesthetics.

6.5.5 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves *[230.54]*

References: These preserves consist of areas designated under Federal and State laws or local ordinances to be managed for their aesthetic, educational, historical, recreational, or scientific value.

See FEIS Section 3.1.2.4. No parks, national and historical monuments, national seashores, wilderness areas, research sites or similar preserves are located within the proposed project area. No impacts to these resources are anticipated due to the proposed project.

6.6 Subpart G – Evaluation and Testing (40 CFR Section 230, Subpart G)

Reference: Information assessed to determine the need for evaluation and testing for Phase 1 of the proposed project is discussed in the reference documents. This is discussed in more detail in Section 6.1.4 Contaminant determinations above. See FEIS Sections 3.2.8, 4.7.8, Appendix N, and Appendix V, and the ADEC Contaminated Sites Database. There is no reason to believe that any of the material to be discharged into waters of the U.S. would be contaminated.

Based on the Initial Site Assessment (ISA) screening process, one preliminary site investigation was recommended for the proposed alternative because the former Shepard Point Cannery site was determined to have a high probability of petroleum contamination.

In late July, 2006, the BIA conducted an additional site investigation at Shepard Point. The Environmental Site Assessment Phase I (ESA PHI) investigation has excluded the presence of non-scope considered hazardous material, specifically, friable asbestos and lead-based paint.

De minimis conditions from past practices are present (for example, small petroleum, oils, lubricant (POL) container dumps).

However, the likely presence of a recognized environmental concern at the winch site, based on historical cannery marine winch operation practices, supports the ISA recommendation of an ESA Phase II prior to construction activity at the proposed Shepard Point alternative site, in order to exclude the probability of POL soil contamination, which, if present, could endanger the health of construction workers and delay construction progress. Conversation with ADEC determined a Phase II would not be required, as the substrate type, the length of time since any potential contaminants may have been introduced, and the shallow, well oxygenated conditions of the site would be presumed to have mitigated the site. Additionally, condition 9 of ADEC's Certificate of Reasonable Assurances in the water quality certification would require notification to their Contaminated Sites Program if historical contaminants are discovered during the construction activities.

6.7 <u>Subpart H – Actions to Minimize Adverse Effects</u> (40 CFR Section 230, Subpart H)

Actions to Minimize Adverse Effects, including permit special conditions, are discussed in Section 5.0 above*.*

<u>7.0 General Policies for Evaluating Section 10 RHA and 404 CWA Permit Decisions [33 CFR 320.4].</u>

<u>7.1 Public Interest Review</u> [33 CFR 320.4(a)]:

The decision whether to issue a permit will be based on an evaluation of the probable impacts, including cumulative impacts, of the proposed activity and its intended use on the public interest.

The Corps has determined, after evaluation of the following general criteria (*i* – *iii* below) and the factors listed in Section 7.2 through 7.18, that the proposed Cordova Oil Spill Response Facility project will not be contrary to the public interest, as long as all permit special conditions listed in Section 5.3 of this ROD are implemented.

i. **The relative extent of the public and private need for the proposed work:**

The purpose and need for the project was predicated on the enhanced response to a major oil spill in Prince Williams Sound and a subsequent court ordered consent decree for three additional OSRFs in the Prince Williams Sound. The public and the aquatic resources in the vicinity of an oil spill would benefit long term if the facility were needed and used to respond to a large oil spill.

ii. **The practicability of using reasonable alternative locations and/or methods to accomplish the objective of the proposed structure or work:**
The Corps has determined that the applicant has clearly demonstrated that due to the unavailability of alternative sites for the OSRF, no practicable alternatives exist. See Section 3.0, Alternatives for additional discussion.

iii. **The extent and permanence of the beneficial and/or detrimental effects that the proposed structures or work may have on the public and private uses which the area is suited:**
The project would result in the discharge of fill material into 11.32 acres of waters of the U.S., including wetlands, as well as the installation of a 0.46 acre dock. Short term impacts would result from construction activities and would include noise from the blasting for road construction, from pile driving, and other construction activities. Aesthetics would be changed long term as well. Terrestrial access to the Humpback Creek Hydroelectric facility and additional oil spill capacity would also be long term benefits from the project.

7.2 Effects on Wetlands [33 CFR 320.4(b)]:

Impacts to wetlands are discussed in Section 6.1.1, 6.1.5, 6.1.8 and 6.4.2 above.

7.3 Fish and Wildlife [33 CFR 320.4(c)]:

Reference: Impacts to Fish and Wildlife are discussed in Sections 6.1.5, 6.1.8, 6.3.2 and 6.3.3 above. Other cumulative impacts to non-aquatic resources include impacts on wildlife habitat, including the impacts of a long linear rail embankment and railroad traffic on wildlife migration corridors and breeding grounds. These impacts include habitat disturbance, loss and fragmentation, and disturbance due to increased traffic and access. Other impacts include reduced winter survival and lowered breeding success from exposure to construction noise/human activity and potential transportation related collisions with wildlife. The impacts would not be expected to be more than minimal and therefore the project would not be contrary to the public's interest for this attribute.

7.4 Water Quality [33 CFR 320.4(d)]:

Impacts to water quality are discussed in Sections 6.1.2, 6.1.3, and 6.1.4 above. The Section 401 Certificate of Reasonable Assurance for the Cordova Oil Spill Response Facility Project from the State of Alaska Department of Environmental Conservation was received on August 17, 2017.

7.5 Historic, Cultural, Scenic and Recreational Values [33 CFR 320.4(e)]

Shepard Point contains two sites eligible for the NHRP. The State Historic Preservation Office determined there would be no adverse effect on these cultural resources with the inclusion of mitigation measures as follows:

The following mitigation measures shall be implemented to prevent impacts during project construction to two properties eligible for the National Register of Historic Places (Shepard Point Mess Hall (COR-428) and Shepard Point Orientals' Mess Hall Feature (COR-429)):

a. Archeological monitoring shall be performed periodically to assure that the mess hall area is not disturbed;

b. A keep out zone shall be marked by orange plastic cones, or orange plastic fencing, placed at the outer edge of the construction area near the mess hall area;

c. Prior to project construction, Section 106 compliance is required for material sites that were not yet defined at the time of the 2006 cultural resources survey;

d. If human remains, historic resources, or archaeological resources are encountered during construction, all ground disturbing activities shall cease in the immediate area and you shall immediately (within one business day of discovery) notify the U.S. Army Corps of Engineers (Corps), Alaska District, Regulatory Office at (907) 753-2712, or by email at regpagemaster@usace.army.mil. Upon notification the Corps shall notify the SHPO. Based on the circumstances of the discovery, equity to all parties, and consideration of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. After such notification, project activities on federal lands shall not resume without written authorization from the Corps, and/or SHPO, and federal manager. After such notification, project activities on tribal lands shall not resume without written authorization from the SHPO and the Corps.

e. Mitigation measures shall be noted in the construction contract, and on construction plans.

7.6 Effects on Limits of the Territorial Sea [33 CFR 320.4(f)]: The project proposes to place some fill into the intertidal areas between Cordova and Shepard Point, however the additional fill would not change the extent or where the limits of the territorial sea are measured.

7.7 Consideration of Property Ownership [33 CFR 320.4(g)]:

References: Shepard Point and the adjacent tidelands are owned in part by both The Eyak Corporation and Chugach Alaska Corporation, as are the uplands located along the proposed access road. The State of Alaska owns some of the tidelands located along the proposed access road. Development of port site and uplands portion of the road would not require a change in land ownership, although depending on the operator of the oil spill response facility, lease and easement agreements may be required. This proposed project has been thoroughly reviewed by these property owners who have provided written comments either in favor of the construction or have no objections; therefore the project would not be contrary to the public's interest for this factor.

7.8 Activities Affecting Coastal Zones [33 CFR 320.4(h)]:
See section 8.2 of this document.

7.9 Activities in Marine Sanctuaries [33 CFR 320.4(i)]:
This proposed project is not located in a marine sanctuary as established by the Secretary of Commerce under authority of Section 302 of the Marine Protection, Research and Sanctuaries Act of 1972.

7.10 Other Federal, State, and Local Requirements [33 CFR 320.4(j)]:
See Section 8.16 below for State and Local authorizations required/obtained.

7.11 Safety of Impoundment Structures [33 CFR 320.4(k)]:
There are not any impoundment structure included in the project or in the vicinity of the project that may be affected.

7.12 Floodplain Management [33 CFR 320.4(l); Executive Order (EO) 11988]:
As stated in the referenced regulations, floodplains possess significant natural values and carry out numerous functions in the public interest including: flood attenuation, water quality maintenance, groundwater recharge, living resource values, and cultural resource values. A particular alteration of the floodplain may constitute a minor change; however, the cumulative impact of such changes may result in a significant degradation of floodplain values and functions and in increased potential for harm to upstream and downstream activities.

Floodplains are discussed in the Executive Summary (pg. ES-22) and Sections 3.2.5 and 4.7.2 of the FEIS. The impacts anticipated from culvert and bridge installations would be minimal. Therefore the project would not be contrary to the public's interest for this attribute.

7.13 Water Supply and Conservation [33 CFR 320.4(m)]:
The proposed project would not have an effect to water supply or conservation of fresh water/aquifers. Therefore the project would not be contrary to the public's interest for this attribute.

7.14 Energy Conservation and Development [33 CFR 320.4(n)]:
The proposed project's affects to energy are described in the Executive Summary and Section 4.7.7 of the FEIS.

The proposed project may result in additional energy consumption as a secondary effect, however it is anticipated that it will be negligible. Therefore the project would not be contrary to the public's interest for this factor.

7.15 Navigation [33 CFR 320.4(o)]:
See Purpose and need of this document. The project would result in a deep draft dock available at all tidal stages. Additionally, the public boat ramp would be a benefit to the public. Therefore the project would not be contrary to the public's interest for this factor.

7.16 Environmental Benefits [33 CFR 320.4(p)]:
There would be no environmental benefits from the construction activities. However, in the event of a large oil spill, the OSRF would enhance environmental clean-up capacity.

7.17 Economics [33 CFR 320.4(q)]:
References: Construction activities associated the proposed alternative would be likely to create positive short-term economic impacts on the regional economy. Benefits could accrue to local vendors who supply construction materials and services. Local spending by the construction crew during the construction period would generate additional economic activity, particularly for local restaurants, lodging places, recreational activities, and other retail and service sectors.

7.18 Mitigation [33 CFR 320.4(r)]:
Mitigation is discussed in Section 5.0 above.

8.0 Compliance with Environmental Requirements (33 CFR 320.3 Related Laws):

8.1 Clean Water Act (33 USC Section 1341) Section 401 Certificate of Reasonable Assurance [33 CFR 320.4(d)]:

Date Issued: September 17, 2017

Special Conditions: Yes

8.2 Coastal Zone Management Consistency Determination [33 CFR 320.4(h)]:
Coastal Zone Management Consistency under Section 307c of the Coastal Zone Management Act (CZMA): By operation of Alaska State law, the federally approved Alaska Coastal Management Program expired on July 1, 2011, resulting in a withdrawal from participation in the Coastal Zone Management Act's (CZMA) National Coastal Management Program. The CZMA Federal consistency provision, section 307, no longer applies in Alaska. Federal Register Notice published July 7, 2011, Volume 76 N. 130, page 39857

8.3 Endangered Species Act of 1973 [16 U.S.C. 1531]:
Endangered Species are discussed in Sections 3.3.4 and 4.5.3.4 of the FEIS. The ESA Biological Assessment is in Appendix T of the FEIS and was revised to

include effects to humpback whales. NMFS concurred with the “may effect, but is not likely to adversely affect” determination on October 6, 2017.

8.4 Fish and Wildlife Coordination Act [16 U.S.C. 661]:
Coordination with the US Fish and Wildlife Service, National Marine Fisheries Service, and completion of the process and analyses contained within this ROD completes the Corps’ responsibility under the FWCA.

8.5 Magnuson-Stevens Fishery Conservation and Management Act:
The EFH Assessment is discussed in the FEIS Section 3.3.6 and Appendix U. The Corps initiated additional EFH coordination with the NMFS on July 13, 2017 following submittal by NVE of the Draft Mitigation Plan. The project design changes reduced impacts to anadromous streams and intertidal marine waters, and completely eliminated impacts to eel grass habitat. The NMFS concurred with the Corps determination that the proposed work would adversely affect EFH, and provided the following EFH conservation recommendations:

a. To the maximum extent possible, avoid and minimize fill as described in the Mitigation Plan.
b. Fill be sloped to maintain shallow water, photic zone productivity, allow for unrestricted fish migration, and provide refuge for juvenile fish.
c. In marine areas with kelp and other aquatic vegetation, fill (including artificial structure fill reefs) should be designed to maximize kelp colonization and provide areas for juvenile fish to shelter from high currents and predators.
d. Fill materials should be pH tested and be within the neutral range of 7.5 to 8.4 pH. In marine waters, this pH range will maximize colonization of marine organisms.
e. Complete in-water work within intertidal and shallow subtidal areas during low tide cycles.

See the Corps response to NMFS9 comments above.

8.6 National Environmental Policy Act of 1969 [42 U.S.C. 4321 - 4347]:
The Corps is adopting and relying on the FEIS for preparation of this Record of Decision (ROD). Signature of this ROD by the authorizing official completes the Corps NEPA requirements and responsibilities.

8.7 National Historic Preservation Act of 1966 [16 U.S.C. 470 et seq.]:
See section 7.5 of this document; completion of the process and analysis contained within this ROD, and the signature by the authorizing official completes the Corps responsibilities under NHPA.

8.8 Clean Water Act [33 U.S.C. 1251 et seq. 404(B)(1) Guidelines 40 CFR 230 Subpart B]:
Completion of the process and analysis contained within this ROD, and the signature by the authorizing official completes the Corps 404(b)(1) requirements.

8.9 Clean Water Act [33 U.S.C. 1251 et seq.] Section 404 [33 U.S.C. 1344]:
Completion of the process and analysis contained within this ROD and signature by the authorizing official completes the Corps CWA 404 requirements.

8.10 Rivers and Harbors Appropriation Act of 1899 [33 U.S.C. 401, 403, 407]:
Completion of the process and analysis contained within this ROD and signature by the authorizing official completes the Corps RHA requirements.

8.11 Marine Mammal Protection Act of 1972 [16 U.S.C. 1361 et seq., 1401-1407, 1538, 4107]:
The permittee would need to comply with the Marine Mammal Protection Act.

8.12 Executive Order 13175 Consultation and Coordination with Indian Tribal Governments:
Project newsletters were distributed to all tribal entities in the region. Additionally, letters initiating government–to–government coordination with the tribal governments of the Chenega Indian Reorganization Act Council, NVE and the Native Village of Tatitlek were mailed in February 2004.

The BIA conducted government to government consultations with NVE concerning NEPA review of the projects since 2002. NVE requested recognition as a cooperating agency in 2004 and has participated in this role since then. Since the 2013 public notice, the Corps has not received any requests for government-to-government consultation. The signature by the authorizing official completes the Corps Executive Order 13175 requirements.

8.13 Clean Air Act [42 U.S.C. 7401 - 7671 Section 176(c)]:
The proposed project has been analyzed for conformity applicability pursuant to regulations implementing Section 176(c) of the Clean Air Act. It has been determined the activities proposed under this permit will not exceed *de minimis* levels of direct emissions of a criteria pollutant or its precursors and are exempted by 40 CFR 93.153. Any later indirect emissions are generally not within the Corps continuing program responsibility and generally cannot be practicably controlled by the Corps. For these reasons, a conformity determination is not required for this individual permit. The signature by the authorizing official on this ROD completes the Corps Clean Air Act requirements.

8.14 Executive Order 12898 (Environmental Justice):
Environmental Justice is discussed in Section 3.1.8 and 4.7.3 of the FEIS. The FEIS concluded that no minority or low-income populations would be adversely affected, and the Corps concurs with the determination. Signature of this ROD by the authorizing official completes the Corps' analysis of Environmental Justice requirements and responsibilities under EO 12898.

8.15 Executive Order 11988 (Flood Plain Management):

See Section 7.12 above. Completion of the process and analysis contained within this ROD and signature by the authorizing official completes the Corps EO 11988 requirements.

8.16 EO 13112, Invasive Species.
☒ Through special conditions, the permittee will be required to control the introduction and spread of exotic species.

8.17 EO 13212 and 13302, Energy Supply and Availability.
☒ The project was not one that will increase the production, transmission, or conservation of energy, or strengthen pipeline safety.

8.16 Other State and/or Local Authorizations (if issued):
ADEC: Alaska Pollutant Discharge Elimination System Construction General Permit for Storm Water Discharges;

ADNR Office of Land and Water Resources permit for Temporary Water Use during construction;

ADNR authorization for ROW or tideland leases for intertidal and subtidal areas affected by the project footprint;

City of Cordova permits and approvals, as required, including any ROW, lease, or temporary use permit needed for activities/structures on tidelands or lands owned by the City of Cordova;

U.S. Coast Guard (USCG) Bridge Permit issued under Section 9 of the Rivers and Harbors Act of 1899 for a structure over Humpback Creek;

ADNR Office of Habitat Management and Permitting Title 41 Fish Habitat Permit for activities or structures below ordinary high water in designated anadromous fish streams, and fish passage requirements in all streams that support anadromous or resident fish;

Eyak Corporation and Chugach Alaska Corporation (CAC) permits and approvals, as required, for activities, structures, material sites, disposal areas, or staging areas on Eyak Corporation or CAC lands.

8.17 Significant National Issues [33 CFR 325.2(a)(6)]:
The regulations state that if a district engineer makes a decision on a permit application which is contrary to state or local decisions, the district engineer will include in the decision document the significant national issues and explain how they are overriding in importance. This decision document and final decision is not contrary to state or local decisions.

9.0 Decision

I find that the issuance of the Corps permit, as described by regulations published in 33 CFR Parts 320 through 332, with the scope of work as described in this document is based on a thorough analysis and evaluation of all issues set forth in this ROD. There are no less environmentally damaging, practicable alternatives available to the Native Village of Eyak to construct the Cordova Oil Spill Response Facility. The issuance of this permit is consistent with National Policy, statutes, and administrative directives; and on balance, issuance of a Corps' permit to construct the Cordova Oil Spill Response Facility is not contrary to the public interest. As explained above, all practicable means to avoid and/or minimize environmental harm from the selected, permitted alternative have been adopted and required by terms and conditions of this permit.

Reviewed and Approved By:

David S. Hobbie ______________ Date: 10/13/2017

FOR (DISTRICT COMMANDER)
Colonel Michael S. Brooks
David S. Hobbie
Regional Regulatory Chief

Concurred By:

______________________________ Date: 10/13/2017

Stephen R. Sullivan
Deputy Chief, Regulatory Division

Prepared and Concurred By:

______________________________ Date: 10/13/2017

Shannon Morgan
South Branch Chief, Regulatory Division

Prepared and Concurred By:

______________________________ Date: 10/13/2017

Shane McCoy
South Section Chief, Regulatory Division

Prepared and Concurred By:

______________________________ Date: 10/13/2017

For Jack Hewitt
Project Manager, Regulatory Division

From: James Fueg, Pebble Limited Partnership

To: Shane McCoy, US Army Corps of Engineers

Date: August 3rd, 2018

Additional Lake Access Options Studied by PLP

In response to a request by USACE for PLP to provide additional information regarding other lake access alternatives considered by PLP, but not advanced at this time, PLP is submitting additional information on alternate ferry access options for consideration by USACE, as outlined in the following sections.

PLP is currently working with a consultant to finalize a report regarding the extent of seasonal ice coverage on Iliamna Lake. The report will be provided as part of the response the RFI-013 Iliamna Lake Landfall Hazards. As part of the ongoing analysis of possible access options, PLP has incorporated new information from this study. The updated study is more is more recent and more comprehensive than the data that was previously available and indicates that the nature and duration of ice coverage on the lake is different to what was previously understood. Particularly, based on this comprehensive analysis, the duration of ice coverage on the eastern portion of Iliamna Lake is less than previously understood.

Kokhanok East Ferry Terminal

PLP has investigated the option of having a ferry terminal for the south side of the lake located approximately five miles east of Kokhanok as shown in Figure 1.

The advantages of this location include:

1) A shorter access road
2) No need for a bridge across the Gibraltar River
3) A more sheltered terminal location under certain wind conditions.

The disadvantages of this location include:

1) High levels of recreational and subsistence use of the lake coastline east of Kokhanok and into Kokhanok Bay.
2) Shallow waters and submerged rocks within Kokhanok Bay that may make navigation hazardous.
3) Longer seasonal ice duration and, potentially, thicker ice within Kokhanok Bay.

As part of the ongoing sonar data collection program PLP intends to collect bathymetry data for an approach into Kokhanok Bay. This will allow for a better understanding on the navigability of the approach and its technical practicability as a potential option or alternative for the Draft EIS.

Pile Bay Ferry Access

PLP has previously considered the option of using a ferry that runs between Pile Bay and a ferry terminal at Eagle Bay (or possibly at North Shore) as presented in the March 20th technical note on project options and screening criteria. This ferry would be operated in conjunction with a port at Diamond Point and a road from the port to Pile Bay as shown in Figure 1.

As previously noted, PLP does not anticipate that this would be a viable option for placement of a gas pipeline on the lake bed due to the potential depth of the water and the anticipated lake bed topography. As part of the ongoing sonar data collection program PLP intends to collect bathymetry data for an approach into Pile Bay. This will allow for a better understanding of both the navigability of the approach and the feasibility of placing of a pipeline on the lake bed.

The advantages of this option include:

1) The ability to use portions of the existing infrastructure and the more sheltered port location at Diamond Point. The area already sees traffic on the Williamsport road and there is existing industrial activity at Diamond Point.
2) No potential for impacts from the project on the southern side of Lake Iliamna and in the Amakdedori area.
3) A shorter crossing of Cook Inlet for the gas pipeline from the Kenai Peninsula.
4) Shorter seasonal ice duration along the ferry route.

The disadvantages of this option include:

1) The possible (to be confirmed) conclusion that it will not be feasible to place the gas pipeline on the lake bed for this location.
2) Potential navigability concerns due to submerged rocks in the Pile Bay area that may make navigation hazardous.
3) PLP does not currently have access to private lands in the Diamond Point to Eagle Bay area that would be required for this alternative to be practicable.

One possible variation of this option that PLP has not, to date, reviewed in depth that now appears to be more practicable, would be the use of a natural gas pipeline without a permanent access road, or a natural gas pipeline and a concentrate pipeline with a small pipeline service road for construction, maintenance, and monitoring during operations; that follow the north shore of the lake from Pile Bay to the mine, combined with the use of a ferry from Pile Bay to Eagle Bay.

The advantages of this option include:

1) The ability to use existing infrastructure and the more sheltered port location at Diamond Point. The area already sees traffic on the Williamsport road and there is existing industrial activity at Diamond Point.

2) No potential for impacts from the project on the southern side of Lake Iliamna and in the Amakdedori area.
3) A shorter crossing of Cook Inlet for the gas pipeline from the Kenai Peninsula.
4) A reduction in traffic associated impacts relative to an all haul road option along the north shore of Iliamna Lake.

The disadvantages of this option include:

1) PLP does not currently have access to private lands in the Diamond Point to Eagle Bay area that would be required for this alternative to be practicable.
2) Potential navigability concerns for the ferry in the Pile Bay area.
3) The ferry introduces additional construction and operational limitations over an all road option.

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From:	James Fueg
To:	POA Special Projects
Cc:	Tim Havey
Subject:	[Non-DoD Source] Project description for Alternative 3
Date:	Tuesday, April 14, 2020 7:34:01 AM
Attachments:	PLP Project Description APR 2020.pdf

Mr. McCoy

Attached please find a project description for Alternative 3.

Thanks,

James

James Fueg

Vice President - Permitting

Main: (907) 339-2600

Direct: (907) 339-2612

3201 C Street, Suite 505

Anchorage, AK 99503

Pebble Project Description

POA-2017-271

Updated April 2020

Pebble Limited Partnership
3201 C Street, Suite 505
Anchorage, AK 99503

CONTENTS

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
ADSP	Alaska Dam Safety Program
ANCSA	Alaska Native Claims Settlement Act
ANFO	ammonium nitrate and fuel oil
BMPs	best management practices
CFR	Code of Federal Regulations
cy	cubic yards
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
H:V	horizontal:vertical (horizontal to vertical)
IDF	Inflow Design Flood
ISO	International Organization for Standardization
ML	Metal Leaching
MMPA	Marine Mammal Protection Act
MW	megawatts
NEPA	National Environmental Policy Act
NFK	North Fork Koktuli River
NPAG	Non-Potentially Acid Generating
OCS	Outer Continental Shelf
PAG	Potentially Acid Generating
PHABSIM	Physical Habitat Simulation System
PMF	Probable Maximum Flood
PMP	Probably Maximum Precipitation
ROW	right-of-way
SAG	semi-autogenous grinding
SFK	South Fork Koktuli River
TSF	Tailings Storage Facility
TSS	Total suspended solids
USGS	U.S. Geological Survey
UTC	Upper Talarik Creek
WMP	Water Management Pond
WTP	Water Treatment Plant

1. PROJECT OVERVIEW

Pebble Limited Partnership (PLP) is proposing to develop the Pebble copper-gold-molybdenum porphyry deposit (Pebble Deposit) as an open-pit mine, with associated infrastructure, in southwest Alaska. This project description summarizes information about the environmental setting, engineered facilities and operations for the proposed Pebble Project (Project) from initial construction through closure and reclamation. It is intended to support the National Environmental Policy Act (NEPA) review process and other permitting efforts for the Project.

1.1. PEBBLE PROJECT SUMMARY INFORMATION[1]

- Project operating life of 20 years.
- A total of 1.44 billion tons of material mined over the life of the Project.
- Final pit dimensions of 6,800 feet in length, 5,600 feet in width, and 1,950 feet in depth.
- Mining rate up to 73 million tons per year, average rate of 70 million tons per year.
- Milling rate up to 66 million tons per year.
- Average annual copper-gold concentrate production (dry concentrate) of 613,000 tons.
- Average annual molybdenum concentration production (dry concentrate) of 15,000 tons.
- Final bulk tailings storage facility (TSF) capacity of 1,140 million tons.
- Temporary storage of 155 million tons of pyritic tails in the pyritic TSF.
- Temporary storage of up to 93 million tons of Potentially Acid Generating (PAG) and/or Metal Leaching (ML) waste rock in the pyritic TSF until closure.
- Power plant generating capacity of 270 megawatts (MW).
- Project operating schedule of two 12-hour shifts per day for 365 days per year.
- A 82-mile transportation corridor from the mine site to a year-round port site located at Diamond Point in Iliamna Bay on Cook Inlet consisting of:
  - A private two-lane unpaved road that connects to the existing Iliamna/Newhalen road system.
  - A buried concentrate pipeline to transport copper-gold concentrate from the mine site to the port and a return water pipeline to the mine site.
- Bulk lightering of concentrate between the Diamond Point Port and an offshore lightering location in Iniskin Bay for loading onto bulk carriers.
- A port facility and jetty with docking for lightering and supply barges.

[1] Design criteria as presented are approximate and have been averaged and rounded as appropriate for ease of reference.

  - Annual vessel traffic of up to 27 concentrate vessels and 33 supply barges.
- A 164-mile gas pipeline from the Kenai Peninsula across Cook Inlet to the Project site with a compressor station on the Kenai Peninsula.
- Employment of 850 to 2,000 personnel for operations and construction, respectively.

1.2. Background

The Project is located on land acquired by the State of Alaska in 1974 via a three-way land swap with the federal government and Cook Inlet Region, Inc. The land was selected by the state specifically for its mineral development potential. The initial discovery of the Pebble Deposit was made in 1988 by Cominco Alaska, a division of Cominco Ltd. (Cominco). Cominco (later acquired by Teck Resources Limited) discontinued work on the project in 1997, and in 2001 the Pebble claims were optioned by a subsidiary of Northern Dynasty Minerals Ltd. (Northern Dynasty).

Northern Dynasty began exploring the property, with significant success, expanding the Pebble Deposit from one billion to four billion tons by the end of 2004. An extensive environmental baseline data collection program commenced in that year, as well as geotechnical investigation and preliminary engineering studies. In 2005, Northern Dynasty exercised its option to acquire the Project and in the same year discovered a significant, higher grade eastern extension to the deposit. Over the next seven years, the Pebble Deposit was expanded through drilling.

In 2007, Northern Dynasty formed PLP with another company and placed the Project into the partnership. Over the next six years, PLP continued to advance the Project through additional drilling, environmental data collection, and engineering studies. In 2013, the other company left PLP and it reverted to a wholly owned subsidiary of Northern Dynasty.

To date, more than one million feet of drilling has been conducted on the Pebble Deposit.

Products from mining this deposit can supply important mineral resources for alternative energy and other purposes of strategic national significance. The Pebble Deposit has significant regional economic importance for southwest Alaska and the entire state through the creation of high-wage jobs and training opportunities, supply and service contracts for local businesses, and government revenue.

1.3. Project Design Considerations

Plans for the design and operation of the Project have focused on the avoidance and minimization of environmental impacts to waterbodies, wetlands, wildlife and aquatic habitat, areas of cultural significance, and areas of known subsistence use and addressing stakeholder concerns. In addition to meeting or exceeding local, state, and federal regulatory requirements, the Project incorporates the following concepts into the design:

- The Project plan is to mine the near-surface portion of the Pebble Deposit. This has significantly reduced the footprint of the open pit, TSF, and mine facilities, as well as eliminated the need for a permanent waste rock storage facility.

- The layout is designed to consolidate the majority of site infrastructure in a single drainage – the North Fork Koktuli River (NFK) – and avoid placing waste rock or tailings in the Upper Talarik Creek (UTC) drainage.
- The Diamond Point Port design includes a caisson-supported dock facility rather than an earth-filled causeway or pile-supported dock. The caisson design significantly reduces the Waters of the US footprint compared to an earth-filled design, and effectively eliminates in-water impact noise generated by pile driving that might adversely affect sensitive marine species.
- A natural gas pipeline and gas-fired electrical generation are being used to power the Project, thereby eliminating the need to transport and store large amounts of diesel fuel for power generation.
- To address stakeholder concerns regarding the transportation and use of cyanide, there is no secondary recovery of gold from the pyritic tailings using a cyanide leach.

The Project adopts a design-for-closure philosophy that considers closure and post-closure site management requirements during all operating phases. Examples include:

- Segregated storage facilities for bulk and pyritic tailings. Bulk tailings will remain in place at closure.
- A lined pyritic TSF. PAG and ML waste rock will be stored with pyritic tailings in the lined pyritic TSF during operations. At closure the stored waste rock will be backhauled to the pit and the pyritic tailings pumped to the pit for sub-aqueous storage in the pit lake. Storage of PAG/ML waste rock and pyritic tailings within the pit lake will avoid post-closure management of the pyritic TSF.

The Project has a comprehensive water management plan that utilizes strategic discharge of surplus treated water to downgradient streams to reduce the effect of stream flow fluctuations and minimize impacts to fish habitat.

1.4. PROJECT AREAS

The Project is located in a sparsely populated region of southwest Alaska near Iliamna Lake, within the Lake and Peninsula and Kenai Peninsula boroughs (Figure 1-1). The Project comprises four primary components: the mine site at the Pebble Deposit location, the port site at Diamond Point on Cook Inlet, the transportation corridor connecting these two sites, and a natural gas pipeline connecting to existing infrastructure on the Kenai Peninsula.

The transportation corridor consists of a road, concentrate pipeline, and return water pipeline from the mine site to the Diamond Point Port at the entrance to Iliamna Bay on Cook Inlet. The road will intersect the existing road network and connect the mine site to the villages of Iliamna and Newhalen (Figure 1-2). The gas pipeline will tie into existing gas supply infrastructure at Anchor Point on the Kenai Peninsula, cross Cook Inlet and come ashore at Ursus Cove, then cross Ursus Head and Cottonwood Bay to the Diamond Point port. From the port the pipeline will parallel the access road to the mine site (Figure 1-1 and Figure 1-2).

The Bristol Bay watershed encompasses approximately 41,900 square miles and is defined by the Alaska Range to the east and southeast, the Kuskokwim Mountains to the west, and a range of hills to the north that separate it from the Kuskokwim River watershed. The largest rivers that drain into Bristol Bay are the Nushagak and Kvichak rivers, which together drain 49 percent of the Bristol Bay watershed, or approximately 20,000 square miles (Figure 1-3).

1.4.1. Mine Site

The Pebble Deposit is located under rolling, permafrost-free terrain in the Iliamna region of southwest Alaska, approximately 200 miles southwest of Anchorage and 60 miles west of Cook Inlet. The closest communities are the villages of Iliamna, Newhalen, and Nondalton, each approximately 17 miles from the Pebble Deposit (Figure 1-2).

The fully developed mine site will include the open pit, bulk TSF, pyritic TSF, overburden stockpiles, material sites, water management ponds (WMPs), milling and processing facilities, and supporting infrastructure such as the power plant, water treatment plants, camp facilities, and storage facilities (Figure 1-4).

The site is currently undeveloped and not served by any transportation or utility infrastructure.

1.4.2. Diamond Point Port and Lightering Locations

The port site (Figure 1-5) will be located at Diamond Point in Iliamna Bay on the western shore of Cook Inlet, approximately 165 miles southwest of Anchorage and approximately 75 miles west of Homer.

The port site will include shore-based and marine facilities for the shipment of concentrate, freight, and fuel for the Project. The shore-based facilities will include facilities for the dewatering of the concentrate and the receipt and storage of freight containers. Other facilities will include fuel storage and transfer facilities, power generation and distribution facilities, a pump station for the return water pipeline, maintenance facilities, employee accommodations, and offices.

The natural gas pipeline from the Kenai Peninsula will have an offtake to distribute natural gas to the port power generation facility.

The marine component includes a concrete caisson-supported access causeway, marine jetty, and barge loader with a 20-foot deep dredged access channel. Dredged material will be stored in two on-shore stockpiles at the port facility.

The port site area is currently used to mine and ship rock and gravel, but is not served by any surface transportation or utility infrastructure.

Copper-gold concentrate will be loaded onto lightering barges using an enclosed conveyor system at the Diamond Point Port and then transported to the lightering location in Iniskin Bay approximately 8 miles from the port (Figure 1-5) for transfer to bulk carriers.

1.4.3. Transportation Corridor

The transportation corridor, which will connect the mine site to the Diamond Point Port on Cook Inlet consists of a private, unpaved two-lane road heading 82 miles east from the mine site to the Diamond Point Port in Iliamna Bay with three pipelines buried in a corridor next the road. The State of Alaska operates an existing road between Williamsport on Iliamna Bay and Pile Bay on Iliamna Lake. The proposed road will parallel that existing road for approximately 4.5 miles from Williamsport and will then replace the existing road for approximately 6.5 miles from that point until the existing road turns toward Pile Bay. The proposed road to the mine also intersects the existing road network for the villages of Iliamna and Newhalen.

1.4.4. Natural Gas Pipeline Corridor

Natural gas, sourced through the existing natural gas supply infrastructure for the Cook Inlet area, will be the primary energy source for the Pebble Project. The gas pipeline alignment (Figure 1-1) will connect to existing infrastructure north of Anchor Point. Gas will be taken from the existing pipeline along the Sterling Highway and sent to a compressor station. From the compressor station, the pipeline heads southwest across Cook Inlet, before turning west to a landfall at Ursus Cove. The pipeline crosses Ursus Head and Cottonwood Bay before joining the transportation corridor at the Diamond Point Port.

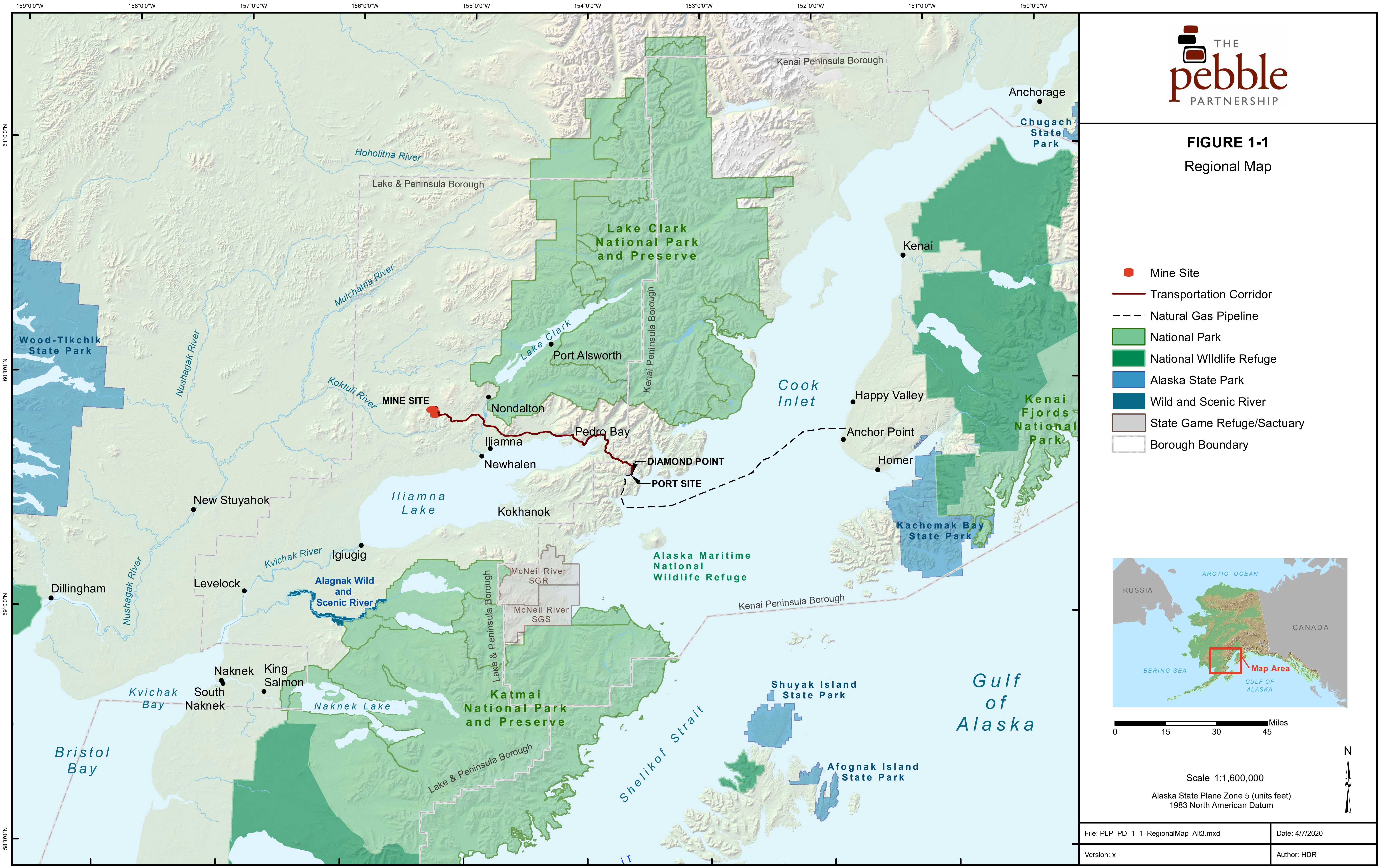
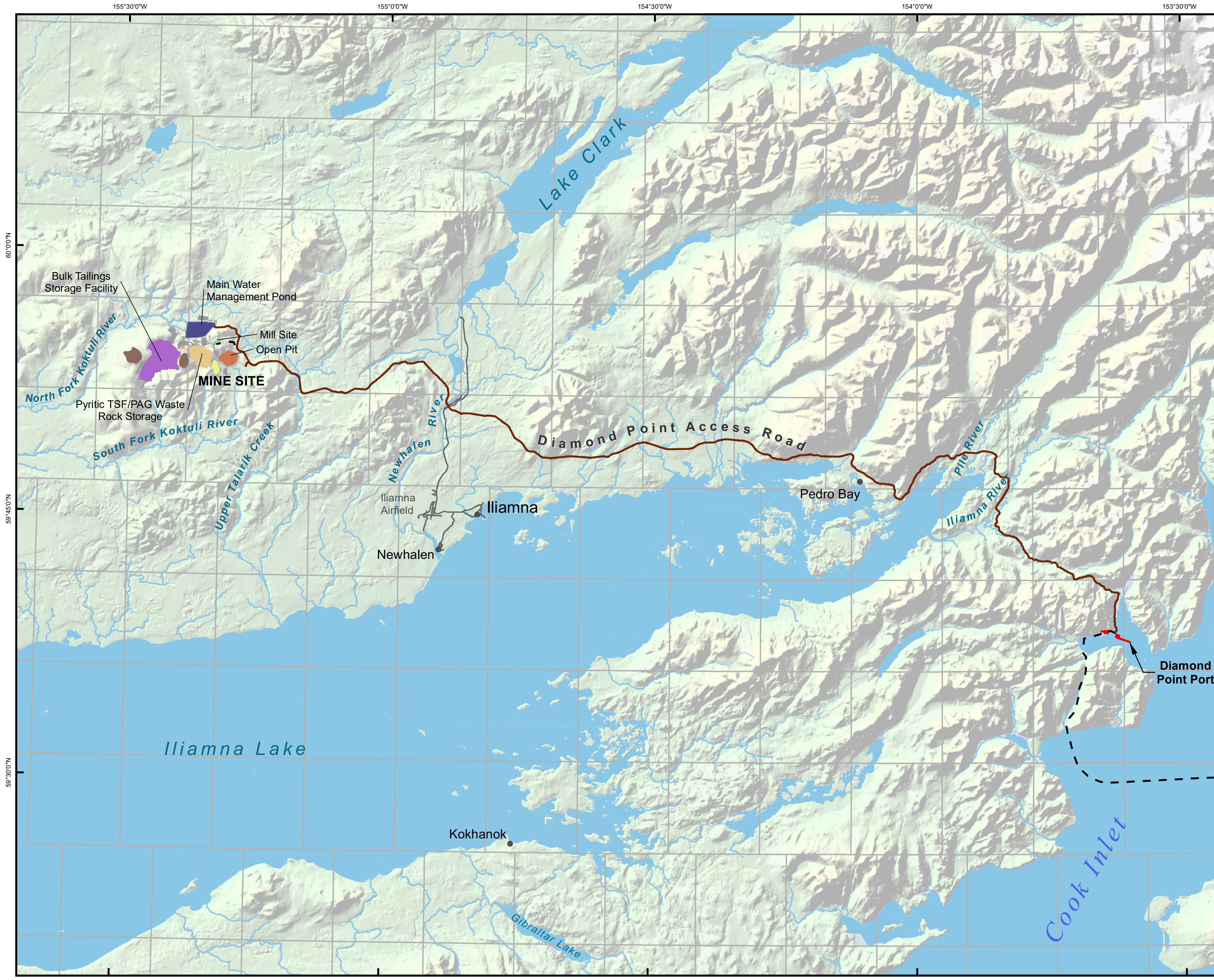


FIGURE 1-1
Regional Map

FIGURE 1-2

Project Area



- Bulk Tailings Storage Facility
- Water Managment Pond
- TSF Laydown
- Pyritic TSF/PAG Waste Rock Storage
- Open Pit
- Overburden Stockpile
- Mill Site Process Plant
- Quarry
- Port Site Features
- Transportation Corridor
- Natural Gas Pipeline
- Township Boundary

0 5 10 15 Miles

N

Scale 1:400,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: PLP_PD_1_2_ProjectArea_Alt3.mxd	Date: 4/13/2020
Version: x	Author: HDR

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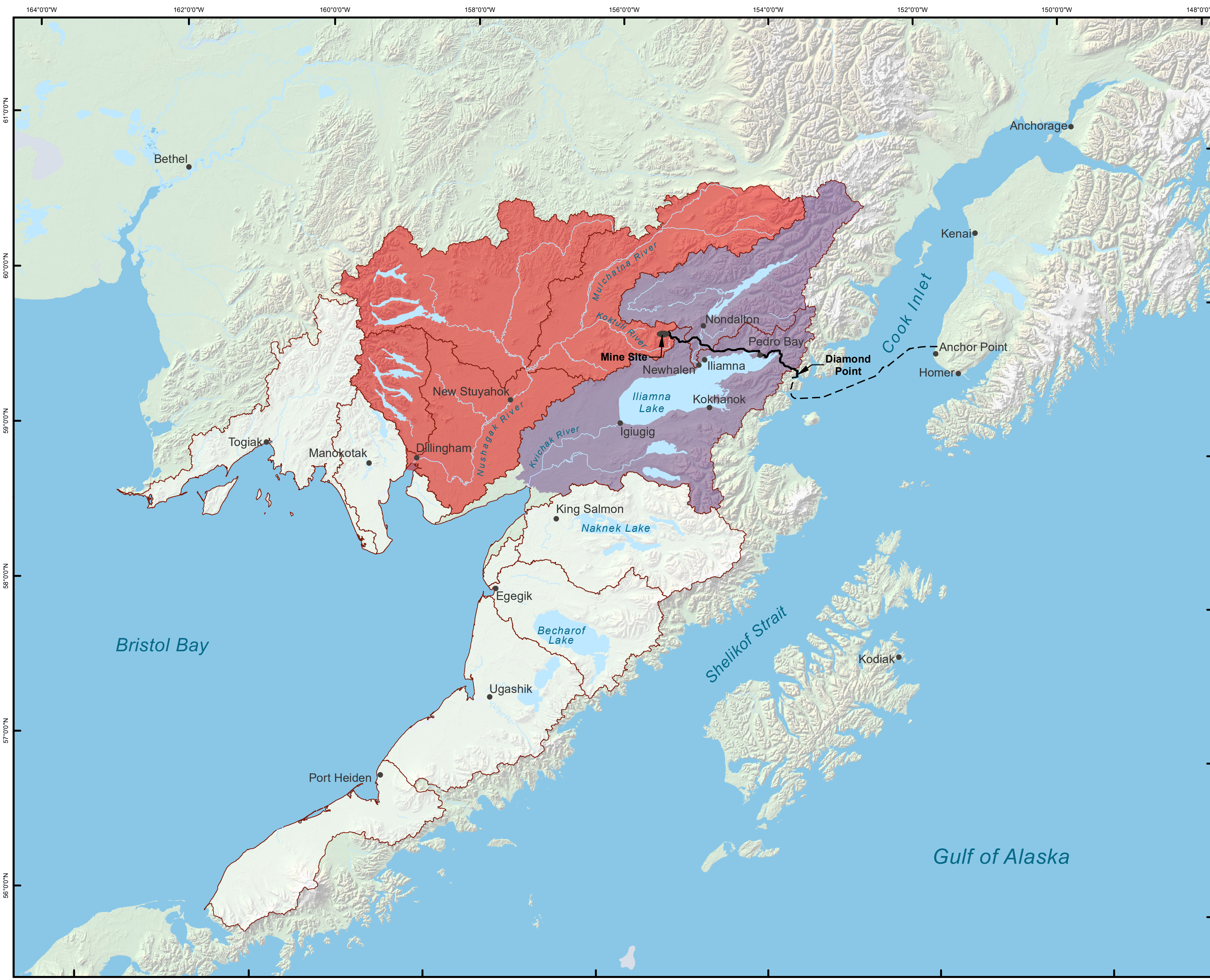

THE pebble PARTNERSHIP

FIGURE 1-3

Bristol Bay Watershed

Scale 1:2,750,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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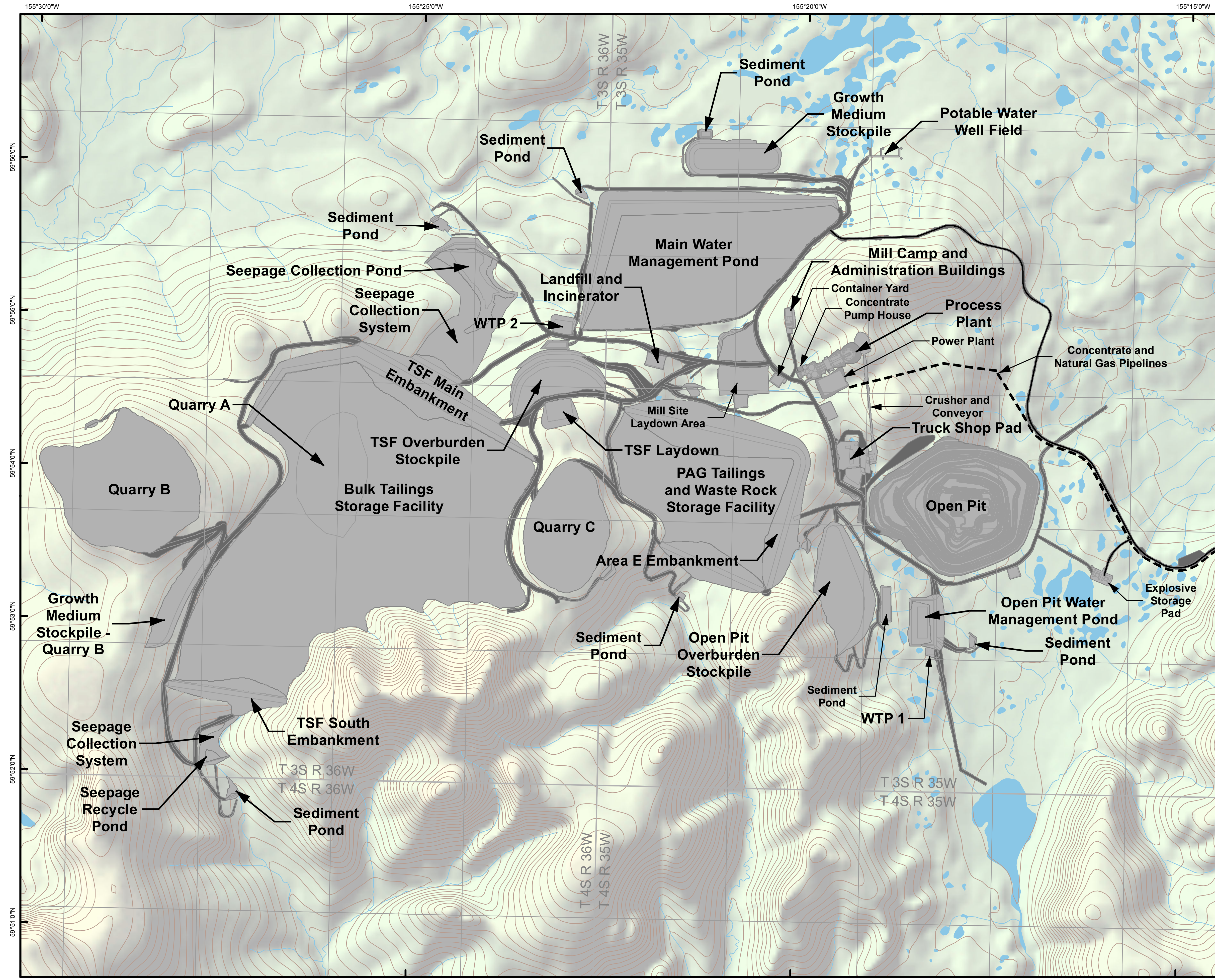
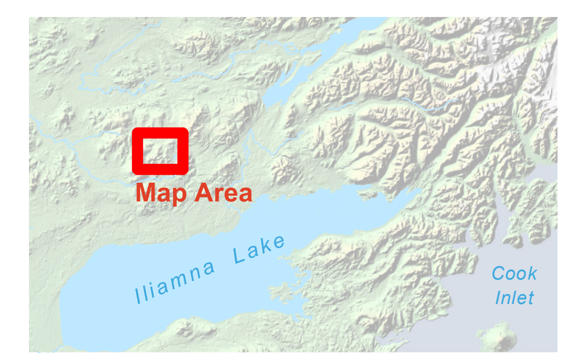


FIGURE 1-4

Mine Site Map

- Mine Site Footprint
- Haul/Service/Access Road
- Mine Site Access Road
- Concentrate & Natural Gas Pipelines
- 50' Contour (Existing)
- Township Boundary
- Section Boundary



0 0.5 1 1.5 Miles

N

Scale 1:46,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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Version: x	Author: HDR

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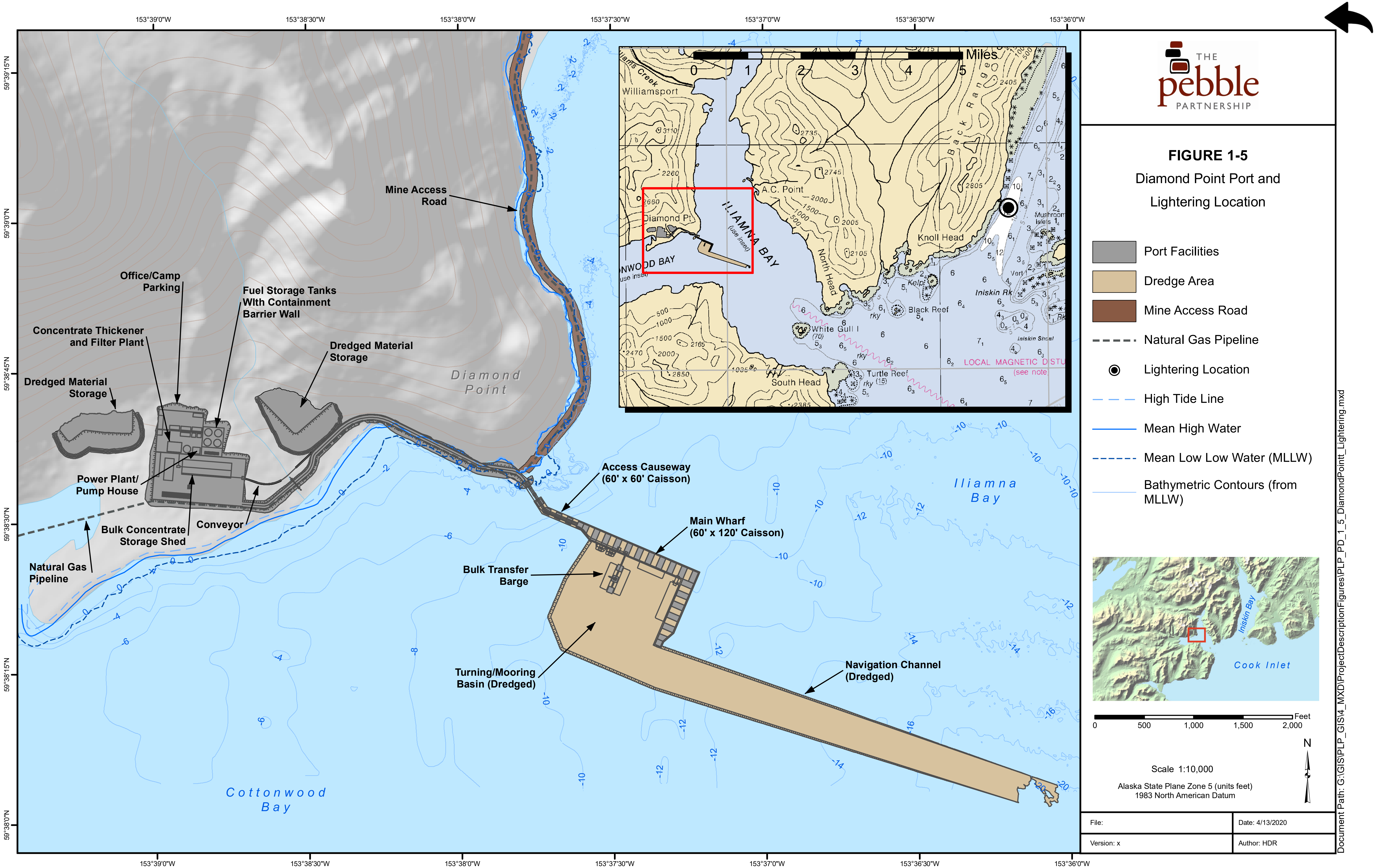


FIGURE 1-5
Diamond Point Port and Lightering Location

1.5. LAND OWNERSHIP AND MINERAL RIGHTS

The Pebble Deposit is located on patented state land specifically designated for mineral exploration and development. Pebble Project facilities will straddle parts of five management units described in the Alaska Department of Natural Resources (ADNR) 2005 *Bristol Bay Area Plan* (amended 2013). These management units—known as R06-05, R06-23, R06-24, R06-30 and R10-02 are designated for minerals extraction. This designation allows for mineral exploration and development with oversight from ADNR. The management intent for all five units also stresses the need to protect the anadromous fish streams in the upper Koktuli River corridor and to minimize or avoid effects from mining on habitat and recreational activities near the upper reaches of UTC.

The Pebble Deposit lies within a 417-square-mile claim block held by subsidiaries of PLP. PLP does not currently own surface rights associated with these mineral claims. All lands within the claim block are owned by the State of Alaska. Surface rights may be acquired from the state government once areas required for mine development have been determined and permits awarded.

The transportation corridor crosses both state land and land patented under the Alaska Native Claims Settlement Act (ANCSA). Further detail is provided in Section 2.2.

1.6. CLIMATE

The climate in the area of the Pebble Deposit/mine site is transitional. Winters are characterized by a continental climate as frozen waterbodies and sea ice in Bristol Bay create a land-like mass, while summers have a maritime climate due to the influence of the open water of Iliamna Lake and, to a lesser extent, the Bering Sea, Bristol Bay, and Cook Inlet. Mean monthly temperatures range from about 55 degrees Fahrenheit (°F) in summer to 2°F in winter. Precipitation in the NFK drainage averages approximately 57.4 inches per year and in the South Fork Koktuli River (SFK) drainage averages approximately 50.8 inches per year. About one-third of this precipitation falls as snow. The wettest months are August through October. White-out conditions and windstorms or periods of poor light/visibility can be expected in winter.

Winter weather systems, consisting of cool to cold saturated air, typically travel into the region from the Bering Sea (west), along the Aleutian Island chain (southwest) and the Gulf of Alaska (south), resulting in frequent clouds, rain, and snow. Less frequent incursions of frigid, stable Arctic air masses produce shorter periods of clear, but very cold conditions. During summer, warm air masses from interior Alaska can cause atmospheric instability, which results in cumulus clouds and thunderstorm activity.

1.7. DEPOSIT GEOLOGY

The Pebble Deposit is hosted by Mesozoic, volcanically derived sedimentary rocks, called flysch, of the Kahiltna terrane, as well as a variety of intrusive igneous rocks emplaced into the flysch between approximately 99 and 90 million years ago during the mid-Cretaceous Period. Between 99 and 96 million years ago, early intrusions into the flysch comprised alkalic syenite to biotite pyroxenite bodies, along with subalkalic diorite and granodiorite sills. Kaskanak Suite intrusions were emplaced approximately 90 million years ago and are the most important igneous event in the area. The suite comprises a granodiorite batholith that is exposed west of, but extends beneath, the Pebble Deposit, as well as several smaller intrusive granodiorite apophyses that emanate from the underlying batholith; collectively these Kaskanak intrusions drove the large magmatic-hydrothermal system that formed the Pebble Deposit.

The Pebble Deposit is classified as a porphyry copper deposit and is hosted by the intrusive and sedimentary rock types described above. Copper, gold, molybdenum, and other metals were transported by hot fluids that emanated from the magmas as they crystallized, and precipitated mostly as sulfide minerals in fractures, now preserved as veins, and as disseminations in the spaces between silicate minerals in the host rocks. The effects of the hot fluids are reflected by widespread hydrothermal alteration whereby some minerals originally present in host rocks were dissolved and replaced with suites of new minerals.

During the Late Cretaceous and Early Tertiary periods, the Pebble Deposit was uplifted by regional tectonic forces and eroded. The exposed deposit was rapidly covered by the Copper Lake Formation, a thick sequence of fine- to coarse-grained clastic sedimentary rocks and interbedded volcanic rocks. At a later point in the Tertiary Period, the eastern part of the Pebble Deposit was dropped up to 3,000 feet along normal faults into the East Graben, a structure that was progressively infilled by basalts, andesites, and subordinate clastic sediments as it grew. The Pebble Deposit and its host rocks were later tilted approximately 20 degrees to the east. The deposit was again uplifted in the later Tertiary Period, and its western part was scoured by Pleistocene glaciers that deposited a veneer of till, glacio-lacustrine, and outwash deposits that are mostly tens of feet thick or less, but which rarely are up to 300 feet thick in the vicinity of the Pebble Deposit. The present geometry of the Pebble Deposit comprises the West Zone, which is covered by thin glacial till and exposed in one small outcrop; the East Zone, which remains concealed by an eastward-thickening wedge of the Copper Lake Formation as well as overlying glacial till; and mineralization that extends an undetermined distance farther to the east but at great depth below the East Graben.

1.8. Resource

The current combined measured and indicated resource estimate for the total Pebble Deposit is approximately 7.1 billion tons containing 57 billion pounds of copper, 70 million ounces of gold, 344 million ounces of silver, and 3.42 billion pounds of molybdenum. In addition, the inferred component of the total deposit is approximately 4.9 billion tons, with 24.5 billion pounds of copper, 36 million ounces of gold, 170 million ounces of silver, and 2.2 billion pounds of molybdenum. The Pebble Deposit also contains important quantities of palladium and rhenium.

The Project will mine approximately 1.3 billion tons of mineralized material (measured, indicated, and inferred) over the 20-year mine life containing 7.4 billion pounds of copper, 398 million pounds of molybdenum, and 12.1 million ounces of gold. The metal content of the reported total resource and the 20-year open pit is presented in Table 1-1.

Table 1-1. Pebble Deposit Estimated Resource (Measured, Indicated, and Inferred)

	Total Deposit		20-Year Open Pit	
	Weight	Grade	Weight	Grade
Copper	81.5 Blbs	0.34%	7.4 Blbs	0.29%
Molybdenum	5.64 Blbs	234 ppm	398 MMlbs	154 ppm
Gold	106.4 MMoz	0.30 g/t	12.1 MMoz	0.32 g/t

Blbs: billion pounds
MMoz: million ounces
MMlbs: million pounds
ppm: parts per million
g/t: grams per tonne

2. PROJECT SETTING

The environmental resources of the area surrounding the Pebble Deposit have been studied extensively by PLP. The *Pebble Project Environmental Baseline Document, 2004 through 2008*, which is available online at www.pebbleresearch.com, provides a complete report of environmental baseline studies conducted during those years. Pebble Project supplemental baseline data reports (2009-2013) provide data supplemental to the environmental baseline report and will accompany permit applications as appropriate.

2.1. MINE SITE

2.1.1. Physiography

The geographic location of the Pebble Deposit is described in Table 2-1.

Table 2-1. Pebble Deposit Geographic References

Item	Value
Pebble Deposit Centroid	59° 53’ 51” N; 155° 18’ 03” W
USGS Quadrangles	Iliamna D-6, D-7
Elevation:	
Minimum	775 ft amsl (SFK valley)
Maximum	2,760 ft amsl (Kaskanak Mountain)
Distance from:	
Cook Inlet	65 miles W
Iliamna Lake	16 miles N
Bristol Bay	100 miles W

amsl = above mean sea level
USGS = U.S. Geological Survey

The Pebble Deposit is located in the Nushagak-Big River Hills physiographic region. The area consists of low, rolling hills separated by wide, shallow valleys. Elevations range from approximately 775 feet in the SFK valley up to 2,760 feet on Kaskanak Mountain. Glacial and fluvial sediment of varying thickness covers most of the study area at elevations below approximately 1,400 feet, whereas the ridges and hills above 1,400 feet generally exhibit exposed bedrock or have thin veneers of surficial material. The hills tend to be moderately sloped with rounded tops. The valley bottoms are generally flat. No permafrost has been identified to date in the project area.

2.1.2. Ecology

The Pebble Deposit area is ecologically diverse, with rivers, tundra, marshy lowlands, and ponds. Much of the land is covered by alpine tundra, shrubs, wetland and scrub communities, or areas of mixed broadleaf and spruce trees, depending on elevation and location.

Rivers near the Pebble Deposit provide habitat for five species of anadromous Pacific salmon. Rainbow trout and other species of fish, such as Dolly Varden and Arctic grayling, are also present. The streams in this area contain many features that support fish spawning and rearing, including complex off-channel habitats, river gravel that promotes spawning, beaver ponds, and combinations of run/glides and riffles. A higher diversity of species and abundance of fish, as well as the most spawning and rearing activity, is found in the lower and middle reaches of these streams, not in the headwater reaches at the Pebble Deposit site.

Various raptors and more than 40 species of water birds are found in the mine area and 22 species have been confirmed as breeding there. The many species of mammals that inhabit this region, while ecologically and economically important, are not particularly abundant. There are moderate densities of brown bear and low densities of black bear, moose, coyotes, wolves, river otters, and wolverines. The mine site is within the historical range of the Mulchatna caribou herd, but radio telemetry and aerial transect surveys suggest that high-density use of the area occurs only during the summer post-calving season when caribou move through the western edge of the project area. No habitat in the mine area has been classified as high value for caribou.

2.1.3. Hydrology

The Pebble Deposit straddles the upper reaches of the SFK and UTC drainages (Figure 2-1). The headwaters of the NFK are immediately north of the Pebble Deposit. The SFK drains south from the Pebble Deposit area, and then west and northwest, where it joins the NFK, which flows west from the Pebble Deposit area. At the confluence, these streams form the Koktuli River, which flows into the Mulchatna River, a tributary to the Nushagak River. The Nushagak River flows into Bristol Bay near the city of Dillingham. Upper Talarik Creek flows south from the Pebble Deposit area and then southwest into Iliamna Lake, which is the source of the Kvichak River.

2.1.3.1 Koktuli River

The NFK and SFK are two of 24 tributaries of similar or larger size in the 315-mile-long Nushagak River system. The north and south forks of the Koktuli River flow for 36 and 40 miles, respectively, to the main stem Koktuli River. The Koktuli River flows for approximately 39 miles before entering the Mulchatna River, which flows another 44 miles before entering the Nushagak River. The Nushagak River flows about 110 miles before it empties into Bristol Bay southwest of Dillingham (Figure 1-1). The total distances from the NFK and SFK headwaters to Bristol Bay are 228 miles and 232 miles, respectively.

2.1.3.2 Kvichak River

The UTC drainage is in the 225-mile-long Kvichak River system. The headwaters of the Kvichak River system are approximately 109 miles northeast of the Pebble Deposit at the source of the Tlikakila River at Lake Clark Pass. UTC flows approximately 39 miles to Iliamna Lake (Figure 2-1). The lake empties into the Kvichak River, which flows approximately 70 miles to Bristol Bay. The total distance from the headwaters of UTC, across the lake, and to Bristol Bay is approximately 140 miles.

2.2. TRANSPORTATION CORRIDOR

The transportation corridor connects the Diamond Point Port to the mine site via a private, two-lane access road. The road will parallel and replace portions of the existing Williamsport–Pile Bay road and intersect the existing Iliamna/Newhalen road system. The natural gas, concentrate, and return water pipelines will parallel the transportation corridor between the port and mine site. Approximately 32 percent of the corridor land is owned by the State of Alaska, with the remaining 68 percent divided among various ANCSA corporations, as shown in Table 22 and Figure 2-2.

The transportation corridor also crosses two Native Allotments (one in the vicinity of Knutson Bay and one in Iliamna Bay) and one private parcel.

Table 2-2. Transportation Corridor Land Ownership[a]

Land Ownership	Road Segments (Miles)	Percentage
State of Alaska	26	32
Pedro Bay Corporation	33	40
Iliamna Natives Limited	15	18
Tyonek Native Association	4	5
Seldovia Native Association	3	4
Salamatof Native Association Inc.	<1	<1
Private Parcel (Diamond Point LLC)	<1	<1
Native Allotment # AKAA 051014	<1	<1
Native Allotment # AKAA 007150A	<1	<1
Total Corridor Miles	82	100

[a] Distances presented are approximate and have been rounded for ease of reference.

2.2.1. Physiography

The geographic location of the transportation corridor is described in Table 2-3.

Table 2-3. Transportation Corridor Geographic References

Item	Value
USGS Quadrangles	Iliamna C-2, C-3 Iliamna D-3, D-4, D-5, D-6, D-7
Elevation:	
Minimum	Near sea level (Diamond Point Port)
Maximum	1,700 ft (leaving mine site)

The transportation corridor is located within three physiographic divisions: Nushagak-Big River Hills, Nushagak-Bristol Bay Lowlands, and the Alaska Range. The terrain includes a range of types, from flat to moderately undulating near the Pebble Deposit, gently sloping and colluvial terrain along the north shore of Iliamna Lake, and mountainside slopes to narrow valley bottoms through the Alaska Range to Iliamna Bay. No permafrost has been identified in the transportation corridor.

2.2.2. Ecology

The transportation corridor traverses a variety of terrain types. From the mine site eastward along the north shore of Iliamna Lake to Canyon Creek the terrain is generally flat to moderately undulating or gently sloping. This area is composed primarily of dense, low shrub understory and sparse tree cover. Moving eastward to Chinkelyes Creek the terrain is more mountainous and forested. The floodplains along the Pile and Iliamna rivers are complex mosaics of vegetation, dominated by willows in flood channels, bars, and abandoned channels. Crossing the divide between the Bristol Bay and Cook Inlet watersheds, the terrain remains mountainous with more shrubland vegetation. Finally, descending down to Cook Inlet along Iliamna Bay there is steep mountainous terrain with dense alder thickets that slope down to a rocky coast with salt-resistant herbaceous vegetation along the extensive mudflats and bedrock outcrops.

Rivers along the transportation corridor provide habitat for five species of anadromous Pacific salmon. Rainbow trout and other species of fish, such as Dolly Varden and Arctic grayling, are also present.

Forest and wetland habitats in the transportation corridor support types of wildlife similar to those at the mine site. Brown bear density is somewhat higher in the transportation corridor, with densities increasing as the corridor approaches the coast. Black bears occur in very low densities along the transportation corridor. Small numbers of caribou from the Mulchatna herd may be found foraging at higher elevations following calving within the transportation corridor north of Iliamna Lake. The transportation corridor contains migratory stopover and breeding habitats for many species of songbirds, raptors, and waterfowl.

2.2.3. Hydrology

The 82-mile-long access corridor crosses numerous streams within the Bristol Bay and Cook Inlet watersheds. The corridor originates in the Nushagak watershed at the mine site and traverses the Kvichak watershed along the north shore of Iliamna Lake. Both are within the greater Bristol Bay watershed. The corridor terminates at Diamond Point in the Tuxedni-Kamishak Bays watershed of the greater Cook Inlet watershed.

2.3. DIAMOND POINT PORT

The Diamond Point Port is located on two land parcels located on the north shore of Cottonwood Bay.

Table 2-4. Diamond Point Port Land Ownership[a]

Land Ownership
Native Allotment # AKAA 004225B
Private Parcel (Diamond Point LLC)

2.3.1. Physiography

The port site is located at Diamond Point in Iliamna Bay. Diamond Point is a small cape marking the separation between Iliamna and Cottonwood bays. Topography is mountainous with steep slopes dropping to narrow rocky beaches and wide tidal mudflats. The port location is in the Iliamna C-2 USGS Quadrangle.

The Diamond Point port facility is located on two parcels of land—a private parcel and Native Allotment # AKAA 004225B.

2.3.2. Ecology

The western shorelines from Kamishak Bay north to Iniskin Bay, including Iliamna and Cottonwood bays, are composed of diverse habitats, including steep rocky cliffs, cobble or pebble beaches, and extensive sand/mudflats. Eelgrass is found at a number of locations and habitats; eelgrass, along with macroalgae, is an important substrate for spawning Pacific herring. The port site is located within critical habitat for the Cook Inlet Beluga Whale and the Northern Sea Otter Southwest Distinct Population Segment (DPS). Cook Inlet Beluga Whale critical habitat includes nearshore waters out to two nautical miles. Northern Sea Otter critical habitat includes foraging areas and escape habitat from marine mammal predators found in Kamishak Bay.

2.3.3. Hydrology

The Cook Inlet basin is an expansive watershed surrounding the 180-mile-long Cook Inlet waterbody. Covering more than 38,000 square miles of southern Alaska, it receives water from six major watersheds and many smaller ones. More than ten percent of the basin is covered by glaciers and suspended sediment loading in glacier fed rivers without lakes is significant, leading to a high suspended sediment load in portions of Cook Inlet.

Lower Cook Inlet is connected to the Pacific Ocean southwest through Shelikof Strait, and southeast by the Gulf of Alaska and demonstrates complex circulation on variable timescales. The region has the fourth largest tidal range in the world; tidal fluctuations in Iliamna Bay average 16 feet ranging as high as 23 feet. When the tide drops from mean high to mean low water, the inlet loses almost 10 percent of its volume, and exposes approximately 8 percent of its surface area. Most of these tidally exposed areas are in the arms at the north end of Cook Inlet and along the west side of the waterbody.

2.4. Natural Gas Pipeline Corridor

The natural gas pipeline connects the mine site and the port site to the Cook Inlet gas supply infrastructure. It ties to an existing pipeline near Anchor Point on the Kenai Peninsula, connecting to a compressor station, which is located on private land owned by the University of Alaska. The pipeline crosses state and federal Outer Continental Shelf (OCS) waters in Cook Inlet to Ursus Cove, crosses Ursus Head before crossing Cottonwood Bay to the port site at Diamond Point. It parallels the transportation corridor to the mine site for most of its length before diverging from the road to cross directly to the power plant. (see Table 2-5).

Table 2-5. Natural Gas Pipeline Land Ownership[a]

Land Ownership	Road Segments (miles)	Percentage
Cook Inlet/Cottonwood Bay Crossing	Total miles: 78	
State of Alaska	16	10
Federal Waters – Alaska OCS	62	38
Ursus Head Crossing	Total miles: 6	
Salamatof Native Association Inc.	2	1
Seldovia Native Association	4	2
Transportation Corridor Parallels	Total miles: 79	
State of Alaska	21	13
Pedro Bay Corporation	33	20
Iliamna Natives Limited	15	9
Tyonek Native Association	4	2
Seldovia Native Association	3	2
Salamatof Native Association Inc.	<1	<1
Private Parcel (Diamond Point LLC)	<1	<1
Native Allotment # AKAA 051014	<1	<1
Native Allotment # AKAA 007150A	<1	<1
Native Allotment # AKAA 004225B	<1	<1
Mine Segment	Total miles: 2	
State of Alaska	2	1
Total Miles	164	100

[a] Distances presented are approximate and have been rounded for ease of reference. Totals may not sum.

2.4.1. Physiography

The geographic location of the natural gas pipeline corridor is defined in Table 2-6.

Table 2-6. Natural Gas Pipeline Geographic References

Item	Value[a]
USGS Quadrangles	Iliamna C-2, C-3 Iliamna D-3, D-4, D-5, D-6, D-7 Seldovia D-5
Elevation:	
Minimum	-230 ft
Maximum	1,700 ft

[a] All references in Table 2-3 apply to the natural gas pipeline, but are excluded from this table.

The pipeline is located in four physiographic regions—the Nushagak-Big River Hills, the Nushagak-Bristol Bay Lowlands, the Alaska Range, and the Cook Inlet-Susitna Lowlands. The terrain includes a range of types, from flat to moderately undulating near the Pebble Deposit/mine site, gently sloping and colluvial terrain along the north shore of Iliamna Lake, mountainside slopes to narrow valley bottoms through the Alaska Range. No permafrost has been identified in the pipeline corridor.

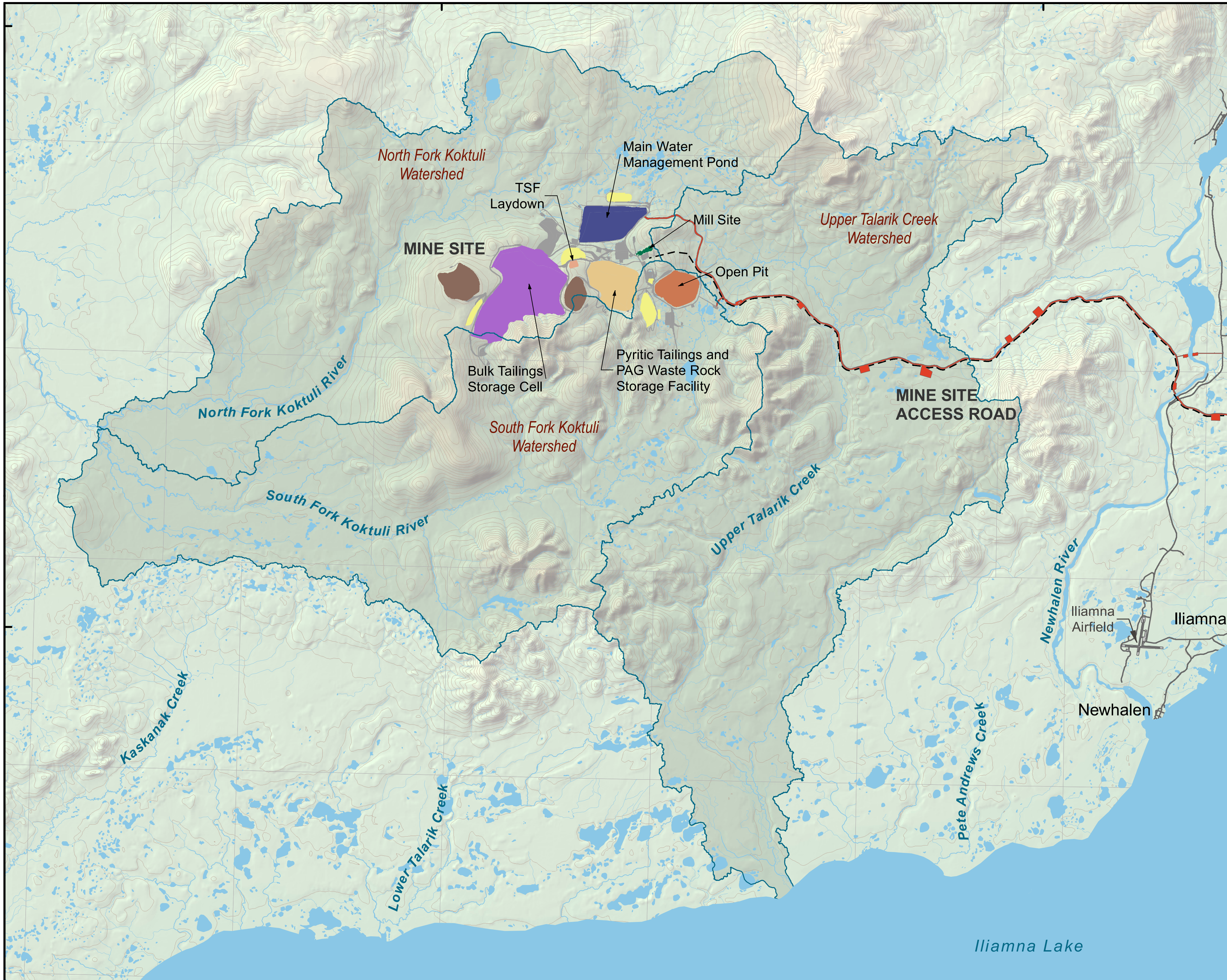
2.4.2. Ecology

The Cook Inlet region is composed of marine, coastal, and estuarine habitats. Pelagic waters within Cook Inlet are influenced by riverine and marine inputs resulting in salinity gradients and horizontal mixing throughout the inlet. Deeper waters of Cook Inlet are characterized by highly variable conditions, ranging from large boulders beds, to dune fields, and unconsolidated sediments on a smooth bottom. Strong tidal currents are present. The variety of habitats in the region support lower trophic organisms, fish, shellfish, marine mammals, and birds. Fish and shellfish are important components of the Cook Inlet food web, as they feed on lower trophic organisms such as plankton, and serve as prey for other fish, birds, and marine mammals.

The Cook Inlet region is a migratory corridor and juvenile rearing area for all five species of Pacific salmon, Dolly Varden, and steelhead trout, which spawn in rivers and streams throughout the region. Nineteen marine mammal species known to occur in Cook Inlet, including the Cook Inlet Beluga whale, which use nearshore waters for feeding in fall and winter. A large seabird nesting colony lies within Kamishak Bay on the western shore of lower Cook Inlet. As outlined in Section 2.3.2 coastal areas of western Cook Inlet, including Kamishak Bay, include critical habitat for the Cook Inlet beluga whale and the Cook Inlet northern sea otter.

2.4.3. Hydrology

See section 2.3.3 for a discussion of Cook Inlet hydrology.



THE pebble PARTNERSHIP

FIGURE 2-1

Mine Site Hydrography

- Bulk Tailings Storage Cell
- Water Managment Pond
- TSF Laydown
- Pyritic Tailings and PAG Waste Rock Storage Facility
- Open Pit
- Overburden Stockpiles
- Mill Site Process Plant
- Quarry
- Watershed Boundary
- Access Road
- Natural Gas & Concentrate Pipelines
- Township Boundary

0 2 4 6 Miles

N

Scale 1:180,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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Version: x	Author: HDR

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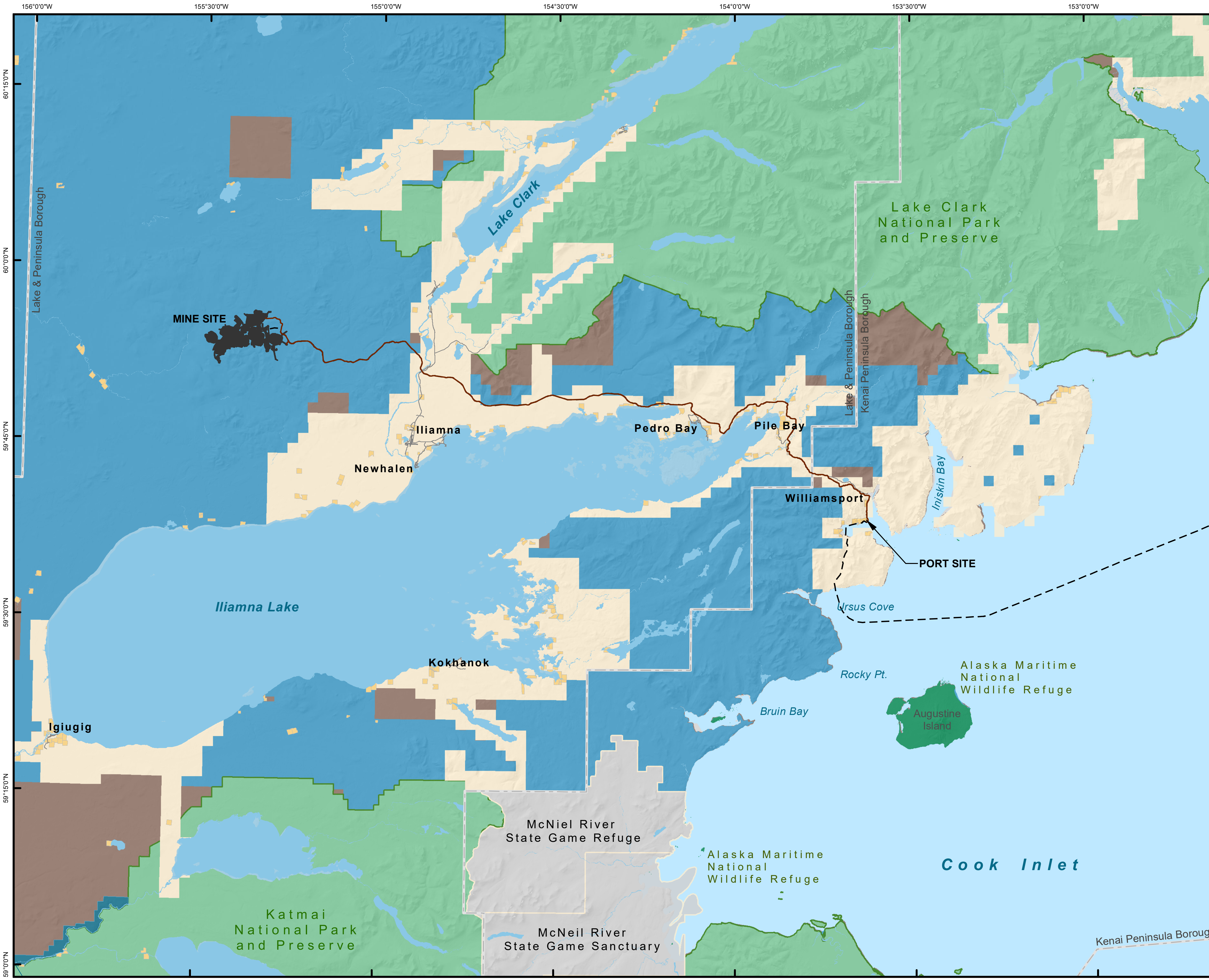

THE pebble PARTNERSHIP

FIGURE 2-2

Regional Land Status

- Project Features
- Transportation Corridor
- Natural Gas Pipeline

Land Status

- Bureau of Land Management
- National Park
- National Wildlife Refuge
- State Land
- State Game Refuge/Sactuary
- Wild and Scenic River
- ANCSA Lands
- Native Allotments
- Borough Boundary

0 5 10 15 20 Miles

N

Scale 1:600,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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Version: x	Author: HDR

2.5. STATE AND FEDERAL INTEREST LANDS

Several state and federally managed lands lie within a 100-mile radius of the mine site or Diamond Point Port (Figure 2-2). Two large national park units—Katmai National Park and Preserve and Lake Clark National Park and Preserve—lie to the south and northeast of the mine site, respectively. Both parks straddle the Bristol Bay/Cook Inlet watershed divide, although most recreational use in both parks occurs in the Bristol Bay drainage, west of the divide. The Alagnak Wild and Scenic River flows west from Katmai National Park and Preserve and into the Kvichak River, which flows into Bristol Bay. The McNeil River State Game Refuge and Sanctuary, which lies north of Katmai National Park and Preserve, is in the Cook Inlet watershed. West of the mine site is Wood-Tikchik State Park, which is in the Bristol Bay watershed.

2.6. LOCAL AND REGIONAL COMMUNITIES

The Pebble Deposit is located in southwest Alaska's Lake and Peninsula Borough, home to an estimated 1,600 people in 18 local villages. Distances to various communities are shown in Figure 1-1. At more than 30,000 square miles, the Lake and Peninsula Borough is among the least densely populated boroughs or counties in the country. There are no roads into the borough, and few roads within it, contributing to an extremely high-cost of living and limited job and other economic opportunities for local residents.

The communities closest to the mine site are Nondalton, Iliamna, and Newhalen. Pedro Bay is also proximal to transportation infrastructure proposed for the Project. While PLP has generated employment for residents of villages throughout the Lake and Peninsula Borough and broader Bristol Bay region over the past decade, the communities surrounding Iliamna Lake have provided the greatest proportion of the local workforce.

With project infrastructure planned to connect the proposed mine site to the villages of Iliamna, Newhalen, and Pedro Bay, residents of these and other communities are expected to continue playing an important role in staffing the Project in the future.

The Bristol Bay Borough is the only other organized borough in the Bristol Bay region, with some 900 full-time residents in three villages. A significant portion of the Bristol Bay region is not contained within an organized borough; the Dillingham Census Area comprises 11 different communities. A total of about 7,500 people call the Bristol Bay region home, with the largest population centers in Dillingham, King Salmon, and Naknek.

Most Bristol Bay villages have fewer than 150–200 full-time residents. A majority of the population is of Alaska Native descent and Yup'ik or Dena'ina heritage. Virtually all of the region's residents participate to some degree in subsistence fishing, hunting, and gathering activities. Subsistence is central to Alaska Native culture and provides an important food source for local residents.

There are 13 incorporated first- and second-class cities in the Bristol Bay region and 31 tribal entities recognized by the U.S. Bureau of Indian Affairs. There are also 24 Alaska Native Village Corporations created under the ANCSA, five of which – Iliamna Natives Limited, Pedro Bay Corporation, Seldovia Native Association, Salamatof Native Association Inc. , and Tyonek Native

Association – hold surface rights for significant areas of land near the Pebble Deposit and along the proposed transportation infrastructure corridor.

The commercial fishing, guiding, and tourism-related sectors provide many jobs in the region, but the work is highly seasonal; year-round employment is the exception rather than the norm. A lack of employment and economic opportunity has contributed to a declining population in many Lake and Peninsula Borough and regional villages, resulting in the closure of several schools over the past decade.

2.7. Legal Description

The legal description of lands on which major project elements will be located is shown in Table 2-6. Sections are within the Seward Meridian Survey of the Public Land Survey System.

Table 2-7. Project Location (Public Land Survey System)

Range	Township	Section
15 West	4 South	14, 15
26 West	4 South	31
	5 South	28, 29, 30, 32, 33, 34, 35
	6 South	1, 2, 4, 12, 13, 23, 24, 27, 34
	7 South	3, 9, 10, 16, 21
27 West	4 South	20, 21, 22, 23, 24, 25, 28, 29, 30, 31, 36
	5 South	2, 3, 10, 14, 15, 23, 24, 25
28 West	4 South	19, 20, 25, 28, 29, 33, 34, 35, 36
	5 South	3, 4
29 West	4 South	17, 18, 19, 20, 21, 22, 23, 24, 26, 27, 28
30 West	4 South	13, 14, 15, 18, 19, 20, 21, 22, 23
31 West	4 South	13, 19, 20, 21, 22, 23, 24, 27, 28, 29, 30
32 West	3 South	31
	4 South	7, 8, 9, 10, 14, 15, 16, 22, 23, 24, 25
33 West	3 South	20, 21, 22, 26, 27, 28, 29, 30, 31, 35, 36
	4 South	1, 2, 12
34 West	3 South	19, 29, 30, 32, 33, 34, 35, 36
	4 South	2, 3, 4, 5
35 West	3 South	6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34
	4 South	4
36 West	3 South	11, 12, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 33, 34
	4 South	3,4

3. PROJECT COMPONENTS AND OPERATIONS

This section describes the various project components and the operations associated with those components through the active life of the Project. Construction will last for approximately four years, followed by a commissioning period and 20 years of mineral processing. Mining preproduction will start during construction with removal of overburden and waste rock material and active mining from the pit will continue through the 20-year operations period. Figure 1-4 shows the layout of the mine site, including the major facilities and site infrastructure.

3.1. SUMMARY PROJECT INFORMATION

A summary of mining and process related information is shown in Table 3-1.

Table 3-1. Summary Project Information[a]

Item	Value
General Operation	
Construction	4 years
Total project operations	20 years
Daily schedule	24 hours
Annual schedule	365 days
Mine Operation	
Preproduction mined tonnage	33 million tons
Average annual mining rate	70 million tons
Operations mined tonnage	1,410 million tons
Mine life strip ratio	0.12:1 (waste: mineralized material)
Open pit dimensions	6,800 x 5,600 ft, 1,950 ft deep
Process Operation	
Daily process rate	180,000 tons
Annual process volume	66 million tons
Copper-gold concentrate	613,000 tons per year (average)
Molybdenum concentrate	15,000 tons per year (average)
Pyritic Tailings Storage Facility	
Approximate capacity (tailings)	155 million tons
Approximate capacity (PAG waste)	93 million tons
South embankment (height)	215 feet
North embankment (height)	335 feet
East embankment	225 feet

Item	Value
Bulk Tailings Storage Facility	
Approximate capacity	1,140 million tons
Main embankment (height)	545 feet
South embankment (height)	300 feet
Main Water Management Pond	
Approximate capacity	2,450 million cubic feet (56,000 ac-ft)
Embankment height	190 feet
Concentrate Pipeline	
Diameter	6.25 inches

[a] Design criteria as presented are approximate and have been averaged and rounded as appropriate for ease of reference.

3.2. MINING

3.2.1. Methods and Phasing

The Pebble Mine will be a conventional drill, blast, truck, and shovel operation with an average mining rate of 70 million tons per year and an overall stripping ratio of 0.12 ton of waste per ton of mineralized material.

The open pit will be developed in stages, with each stage expanding the area and deepening the previous stage. The final dimensions of the open pit will be approximately 6,800 feet long and 5,600 feet wide, with depths to 1,950 feet.

Mining will occur in two phases – Preproduction and Production.

The mine operation will commence during the last year of the Preproduction Phase and extend for 20 years during the Production Phase. Approximately 1,300 million tons of mineralized rock and 150 million tons of waste rock and overburden will be mined. Non-potentially acid generating (NPAG) and non-ML waste will be used in construction of the tailings embankments. The PAG and ML waste rock will be stored in the pyritic TSF until closure, when it will be back-hauled into the open pit. Fine- and coarse-grained soils will be stored southwest of the pit and north of the TSF embankments and will be used for reclamation during mine closure.

The Preproduction Phase consists of dewatering the pit area and mining of non-economic materials overlying the mineralized material from the initial stage of the open pit. Dewatering will begin approximately one year before the start of Preproduction mining. Approximately 33 million tons of material will be mined during this phase (Table 3-2).

Table 3-2. Mined Material—Preproduction Phase

Material Type	Quantity
Overburden	22 million tons
Waste rock	11 million tons

The Production Phase encompasses the period during which economic-grade mineralized material will be fed to the metallurgical process plant that produces concentrates for shipment and sale. The Production Phase is planned to last for 20 years. Mineralized material will be mined and be fed through the process plant at a rate of 180,000 tons/day. The open pit will be mined in a sequence of increasingly larger and deeper stages. Approximately 1.4 billion tons of material are planned to be mined during the Production Phase (Table 3-3).

Table 3-3. Mined Material—Production Phase

Material Type	Quantity
Overburden	38 million tons
Mineralized material process plant feed	1,291 million tons
Waste rock	82 million tons

3.2.2. Blasting

Most open pit blasting will be conducted using emulsion blasting agents manufactured on site. In dry conditions, a blend of ammonium nitrate and fuel oil (ANFO) can be used as the blasting agent. However, most ammonium nitrate will be converted to an emulsion blasting agent because of its higher density and superior water resistance. Initial operations during the Preproduction Phase may use pre-packed emulsion blasting agents or a mobile bulk emulsion manufacturing plant. After the explosives plant is completed, the emulsion-based ANFO explosive will be used as the primary blasting agent.

The ANFO will be stored separately as a safety precaution. All explosive magazines will be constructed and operated to meet mine safety and health regulations. The ammonium nitrate solution will be mixed with diesel fuel and emulsifying agents in a mobile mixing unit on the mining bench where blasting is to take place. The emulsion will become a blasting agent only once it is sensitized using the sensitizing agent while in the drill hole.

Based on knowledge of the rock types in the Pebble Deposit, blasting will require an average powder factor of approximately 0.5 pounds per ton of rock. Blasting events during the Preproduction Phase will occur approximately once per day. The frequency will increase during the Production Phase, with events occurring as often as twice per day.

3.2.3. Waste Rock and Overburden Storage

Waste rock is mined material with a mineral content below an economically recoverable level that is removed from the open pit, exposing the higher-grade production material. Waste rock will be segregated by its potential to generate acid. NPAG and non-ML waste rock may be used for embankment construction. PAG and ML waste rock will be stored in the pyritic TSF until mine closure, when it will be back-hauled into the open pit. Quantities of material mined are outlined in Table 3-1 and Table 3-2.

During the Preproduction Phase, approximately 33 million tons of non-mineralized and mineralized material will be removed from the open pit. Non-mineralized waste and overburden will be stockpiled or used in construction, mineralized waste will be stockpiled and relocated to the pyritic TSF once complete, or if grades are sufficient, stockpiled for milling once the mill is complete. Material will be stockpiled within the pit footprint, or in designated stockpiles as appropriate.

Overburden is the unconsolidated material lying at the surface. At the Pebble Deposit, the overburden depth ranges from 0 to 140 feet. Overburden removal will commence during the Preproduction Phase and will recur periodically during the Production Phase at the start of each pit stage. The overburden will be segregated and stockpiled in a dedicated location southwest of the open pit. A berm built of non-mineralized rock will surround the overburden to contain the material and increase stability. Overburden materials deemed suitable will be used for construction. Fine- and coarse-grained soils suitable for plant growth will be stockpiled for later use as growth medium during reclamation. Growth medium stockpiles will be stored at various locations around the mine site and stabilized to minimize erosion potential.

3.2.4. Equipment

The Project will use the most efficient mining equipment available in the production fleet to minimize fuel consumption per ton of rock moved. Most mining equipment will be diesel-powered. This production fleet will be supported by a fleet of smaller equipment for overburden removal and other specific tasks for which the larger units are not well-suited. Equipment requirements will increase over the life of the mine to reflect increased production volumes and longer cycle times for haul trucks as the pit is lowered (Table 3-4). All fleet equipment will be routinely maintained to ensure optimal performance and minimize the potential for spills and failures. Mobile equipment (haul trucks and wheel loaders) will be serviced in the truck shop; track-bound equipment (shovels, excavators, drills, and dozers) will be serviced in the field under appropriate spill prevention protocols.

Table 3-4. Production Phase Equipment

Equipment Unit	Class	Year 1 Quantity	Average Quantity	Peak Quantity
Electric shovel	73 cy	1	2	2
Diesel hydraulic shovel	53 cy	1	1	1
Wheel loader	53 cy	1	1	1
Electric drill	12.25 in	1	2	2
Diesel drill	12.25 in	1	1	1
Diesel drill	6.5 in	1	1	1
Diesel haul truck	400 ton	7	11	17
Diesel haul truck	150 ton	5	5	5

cy = cubic yards

Track-mounted electric shovels will be the primary equipment unit used to load blasted rock into haul trucks. Each electric shovel is capable of mining at a sustained rate of approximately 30 million tons per year. Diesel hydraulic shovels, due to their greater flexibility, will be used to augment excavation capacity, depending on the mining application.

Wheel loaders are highly mobile, can be rapidly deployed to specific mining conditions, and are highly flexible in their application. Diesel off-highway haul trucks will be used to transport the fragmented mineralized material to the crusher.

Track-mounted drill rigs are used to drill blast holes into the waste rock and mineralized material prior to blasting. Hole diameters will vary between 6 and 12 inches. Drill rigs may be either electrically powered, as is the case for the larger units, or diesel powered.

This equipment will be supported by a large fleet of ancillary equipment, including track and wheel dozers for surface preparation, graders for construction and road maintenance, water trucks for dust suppression, maintenance equipment, and light vehicles for personnel transport. Other equipment, such as lighting plants, will be used to improve operational safety and efficiency.

3.2.5. Mining Supplies and Materials

Fuel, lubricants, tires, and blasting agents (Table 3-5) will be the primary materials used in mining.

Table 3-5. Mining Supplies

Consumable	Use	Shipping
Diesel fuel	Vehicles and blasting	6,350-gallon ISO tank-containers
Lubricants	Vehicles and equipment	Drums and totes in containers
Ammonium nitrate prill	Blasting	Bulk containers
Primers, detonators, and detonating cord	Blasting	Specialized packaging as required
Blasting emulsion ingredients	Blasting	Specialized packaging as required
Packaged explosives	Blasting	Specialized packaging as required
Haulage truck & other tires	Vehicles	Bulk containers/break bulk
Ground-engaging tools	Drilling and loading	Bulk containers

ISO = International Organization for Standardization

3.3. MINERAL PROCESSING

Mineral processing facilities will be located at the mine site. Blasted mineralized material from the open pit will be fed to a crushing plant to reduce the maximum particle size to approximately six inches. This crushed material will be conveyed to a coarse ore stockpile, which in turn feeds a grinding plant within the process plant. In the grinding plant, semi-autogenous grinding (SAG) mills and ball mills further reduce the plant feed to the consistency of very fine sand. The next step is froth flotation, in which the copper and molybdenum minerals are separated from the remaining material to produce copper-gold and molybdenum concentrates. The copper-gold concentrate slurry will then be pumped to the port site where it will be filtered, loaded onto the lightering barges, and then unloaded directly into the holds of Handysize bulk carriers for shipment. The molybdenum concentrate will be filtered at the mine site and placed in large sacks which are in turn placed in conventional shipping containers. The containers will be trucked to the port and shipped with the remaining empty shipping containers to refineries located outside Alaska, Gravity concentrators will be placed at strategic locations to recover free gold, which will be shipped off site for refining. Other economically valuable minerals (gold, silver and palladium in the copper-gold concentrate and rhenium in the molybdenum concentrate) will be present in the concentrates. Figure 3-1 shows the process flowsheet.

Over the life of the Project, approximately 1.3 billion tons of mineralized material will be fed to the process plant at a rate of 180,000 tons/day. On average, the process plant will produce approximately 613,000 tons of copper-gold concentrate per year, containing approximately 318 million pounds of copper, 362,000 ounces of gold and 1.8 million ounces of silver, and approximately 15,000 tons of molybdenum concentrate, containing about 14 million pounds of molybdenum.

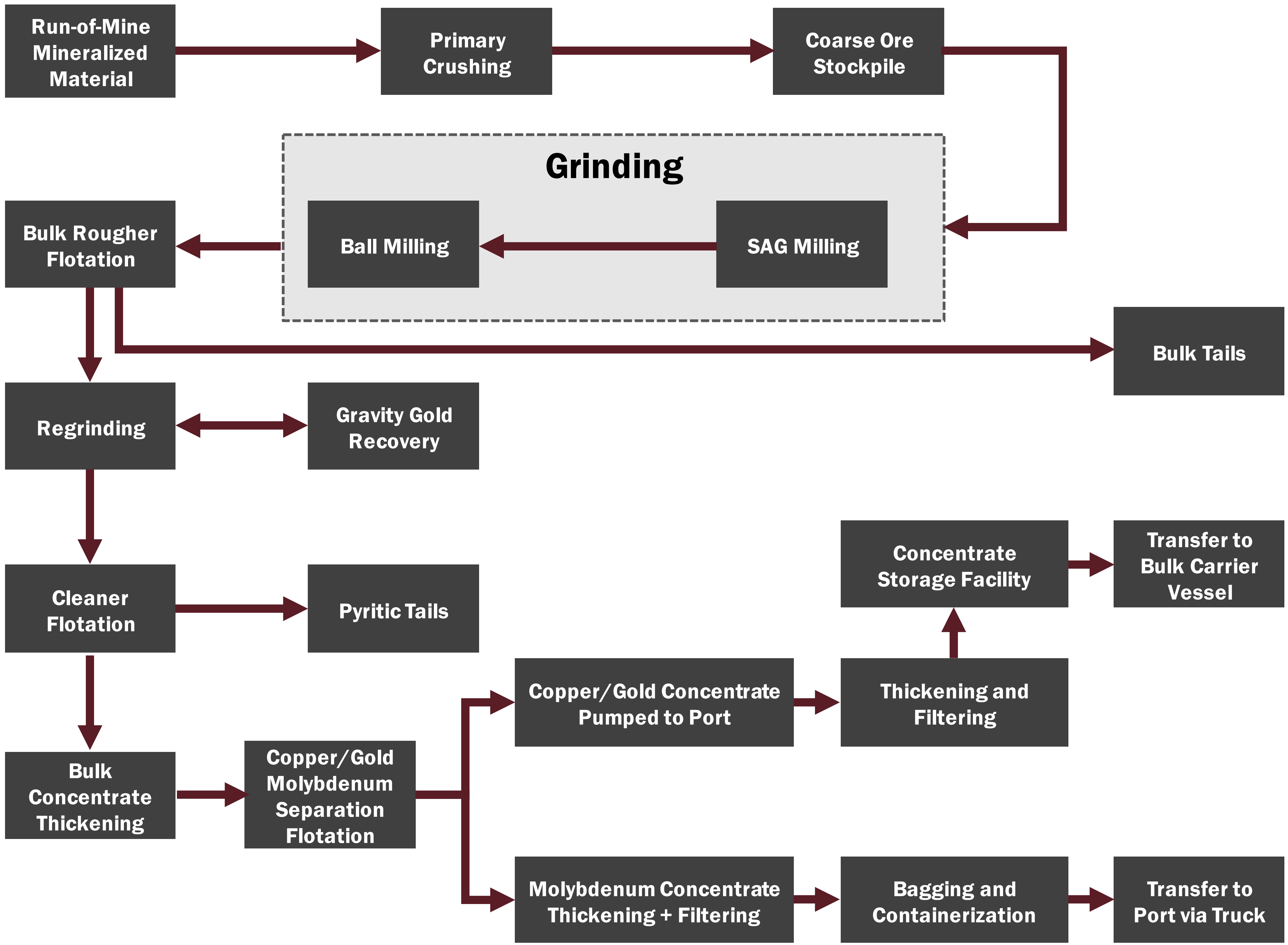

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FIGURE 3-1

Process Flow Sheet

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

3.3.1. Crushing

3.3.1.1 Primary Crushing

Mineralized material from the open pit will be delivered by 400-ton haul trucks to primary gyratory crushers located adjacent to the rim of the open pit. The crushers will reduce the mineralized material to a maximum size of six inches. The crushed mineralized material from both crushers is delivered via a single, covered, overland conveyor to the coarse ore stockpile.

3.3.1.2 Coarse Ore Stockpile

The coarse ore stockpile is contained within a covered steel frame building to minimize fugitive dust emissions and control mineralized material exposure to precipitation. The stockpile provides surge capacity between the crushers and the process plant, improving the efficiency of the latter and enabling it to operate if the feed from the crushers is not available.

The stockpiled material will be reclaimed by apron feeders mounted below the pile that deliver it onto two conveyor belts feeding the SAG mills. Baghouse-type dust collectors will be provided at each transfer point to control fugitive dust emissions. Water will be added to the process at the SAG mill, thereby eliminating the need for additional baghouses. A sump will be located in each reclaim tunnel to collect any excess water; however, such drainage is likely to be minimal, as it is preferable to handle coarse material dry to prevent freezing during cold conditions. An escape tunnel also will be provided for worker safety, with ventilation as required.

3.3.2. Grinding

The primary grinding circuit will use two parallel, 40-foot-diameter SAG mills and associated ball mills to grind mineralized material to the finer consistency necessary to separate the valuable minerals. Steel balls are added to the SAG mill to aid in grinding the mineralized material. Coarse mineralized material, water, and lime are fed into the SAG mills and the mineralized material is retained within the SAG mills by grates until the particles reach a maximum size of one to two inches.

Discharge from each SAG mill will be screened to remove larger particles ranging from one to two inches (“pebbles”). Material passing through the screens will be sent to the ball mills while the large particles will be conveyed to the pebble-crushing facility where they will be crushed and re-introduced to the SAG mill.

The next grinding step is ball milling. Ball mills have a lower diameter-to-length ratio than SAG mills and use a higher percentage of smaller steel balls compared to SAG mills, allowing them to grind the feed to a finer size. Two ball mills will be matched with each SAG mill.

The slurry from the ball mills will be pumped into the hydro-cyclones, which separate the finer material from the larger material through centrifugal force. The slurry with the coarser material will be recycled back to the ball mills for additional grinding. The slurry containing the finer material will be pumped to the flotation cells. Grinding circuit slurry pH levels will be adjusted to 8.5 by adding lime slurry to minimize corrosion on the mill liners and promote efficient mixing prior to flotation.

3.3.3. Concentrate Production

Copper-gold and molybdenum concentrates will be produced via flotation, which will separate the metal sulfides from pyrite and non-economic minerals. Two tailings streams will be produced: bulk tailings and pyritic tailings.

3.3.3.1 Bulk Rougher Flotation

The rougher flotation circuit is designed to separate the sulfide minerals, predominantly copper, molybdenum, and iron sulfides (pyrite) within the process plant feed from the non-sulfide minerals. Slurry from the ball mills is split between two banks of bulk rougher flotation cells. Reagents added to the slurry promote mineral separation by inducing mineral particles to attach to air bubbles created by blowing air through the flotation cells. Additional reagents are added to promote froth bubble stability. This froth, with the mineral particles attached, rises to the surface and is collected as a bulk rougher concentrate for the next phase of flotation.

Bulk rougher concentrate slurry is then routed to the regrind circuit. Material that does not float – the bulk flotation tailings from which most of the sulfide minerals have been removed – will be pumped to two tailings thickeners.

3.3.3.2 Regrind

The bulk rougher concentrate is reground to sufficiently liberate minerals and enable the separation of the copper-molybdenum sulfide minerals from iron and other sulfides, thus producing concentrates with commercially acceptable grades. A gravity gold recovery circuit is attached to the regrind circuit to recover free gold that might otherwise be lost.

3.3.3.3 Cleaning

Reground bulk rougher concentrates will be upgraded through a two-stage cleaning process. The concentrate from the cleaning process will report to copper-molybdenum separation, while the tailings will report to the pyritic tailings thickener for thickening prior to pumping to the pyritic TSF. The same reagents used in the rougher flotation circuit will be used in the cleaning circuit, with additional reagents used to aid in the suppression of gangue minerals. The cleaning stage is operated at an elevated pH—through lime addition—to suppress pyritic minerals, which would lower the grade of final concentrates.

3.3.3.4 Bulk Concentrate Thickener

Water will be removed from the bulk concentrate in a conventional thickener. This will remove as much of the bulk flotation reagents as possible before the slurry enters the copper-gold/molybdenum separation circuit, thus increasing separation process efficiency. Reagents will be recycled to the rougher process with the thickener overflow. The resulting slurry will contain 50 percent solids by weight and will go forward to copper-gold/molybdenum separation.

3.3.3.5 Copper-Gold/Molybdenum Separation Flotation

The final flotation process is designed to separate copper-gold and molybdenum concentrates by adding reagents. The concentrate from the separation stage is the molybdenum concentrate, while the tailings comprise the final copper-gold concentrate.

3.3.3.6 Concentrate Dewatering, Filtration, and Pumping

The upgraded copper-gold concentrate will be thickened to 55 percent solids by weight in a high-rate thickener. The thickener overflow will return to various circuits for use as process water. The thickener underflow will be fed to a pump to transfer it via the concentrate pipeline to the port. At the port, pressure filters will reduce the moisture to approximately eight percent. The filter product will be stored in a covered building at the port site.

The molybdenum concentrate will be thickened in a high-rate thickener to 55 percent solids by weight. The thickener underflow will be pumped to the molybdenum concentrate filter press, where the moisture content will be reduced to 12 percent. The filtered concentrate will be further dewatered by a dryer to five percent moisture before being bagged, containerized, and shipped offshore.

3.3.4. Processing Reagents and Materials

Table 3-6 provides a list of commonly used reagents for this type of process, along with their typical packaging for transportation. The final reagent list will be determined during detailed design.

Table 3-6. Processing Reagents and Materials

Reagent	Use	Shipping/Preparation
Calcium Oxide (quick lime)	pH modifier; depresses pyrite in the copper-molybdenum flotation process.	Calcium oxide pebbles (80 percent) shipped in specially adapted shipping containers. Pebbles will be crushed and mixed with water to form lime slurry at the lime plant.
Sodium Ethyl Xanthate	Copper collector; used in the rougher flotation circuit.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20 percent solution and stored in collector storage tank. Mix and storage tanks vented externally with fans.
Fuel Oil (Diesel)	Used in the flotation process.	Shipped in ISO tank-containers and stored in the main head tank in the copper-molybdenum concentrator area.
Sodium Hydrogen Sulfide (NaHS)	Copper depressant used in the copper-molybdenum separation processes.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20 percent solution and stored in the NaHS storage tank.

Reagent	Use	Shipping/Preparation
Carboxy Methyl Cellulose	Depressant; anionic polymer used to depress clay and related gangue material in the bulk cleaner flotation circuit.	Pelletized reagent shipped in 1-ton bags. Mixed with process water in the agitated dispersant tank to form 20 percent solution and stored in dispersant storage tank.
Methyl Isobutyl Carbinol	Frother; maintains air bubbles in the flotation circuits.	Shipped in 20-foot specialized ISO containers and stored in the frother storage tank.
Depressant (sodium silicate)	Clay or silica gangue mineral depressant used in the copper-molybdenum separation process.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20 percent solution and stored in the sodium silicate storage tank.
Anionic polyacrylamide	Thickener aid.	Pelletized reagent shipped in 1-ton bags. Vendor package preparation system composed of a bag breaking enclosure to contain dust, dry flocculent metering, and a wet jet system to combine treated water with the powdered flocculent in an agitated tank for maturation. Prepared in small batches and transferred to a flocculent storage tank.
Polyacrilic acid	Antiscalant for the lime production process.	Viscous pale amber liquid shipped in 35-cubic-foot specialized container tanks within protected rectangular framework.
Nitrogen	Nitrogen used in the molybdenum flotation circuit to depress copper sulfides.	Nitrogen will be provided by a vendor-supplied pressure swing adsorption nitrogen plant. This equipment separates nitrogen from air for use in the mineral-process plant.

3.3.5. Process Water Supply System

Process water will be drawn from the main WMP and the tailings thickener overflow streams. The primary process water source is the bulk tailings thickener overflow. Precipitation runoff will either be diverted by non-contact water diversion channels, or collected in sediment ponds as appropriate, and pumped to the main WMP. Some treated water will be diverted to the process for pump glands and other similar applications.

3.3.6. Tailings Production

Processing mineralized material to recover copper, gold, and molybdenum will produce two types of tailings: bulk flotation and pyritic. Bulk flotation tailings will be pumped to the bulk tailings thickener, where flocculant will be added as necessary to help the settling process. Tailings thickener underflow, at approximately 55 percent solids, will be pumped to the bulk TSF. The pyritic tailings will be thickened, mixed with WTP sludge, and pumped to the pyritic TSF. The overflow streams from each thickener will be returned to the process. Supernatant water in the bulk and pyritic TSFs will be reclaimed to the mill site WMP. Some of this water will be pumped to the process water tank for re-use in the process plant. Any surplus water will be treated in the WTP and discharged.

3.4. Tailings Storage Facilities

Separate TSFs will be constructed for the bulk and pyritic tailings located primarily within the NFK watershed (Figure 1-4). Total TSF capacity will be sufficient to store the 20-year mine life tailings volume (1.3 billion tons). Approximately 88 percent of the tailings will be bulk tailings, and approximately 12 percent will be pyritic tailings.

The unlined bulk TSF has two embankments – main and south. The pyritic TSF will be lined and has three embankments – north, south, and east.

Starter embankments for both facilities will be constructed as part of the initial TSF construction. The main embankment of the bulk TSF will function as a permeable structure to maintain a depressed phreatic surface in the embankment and in the tailings mass in proximity to the embankment. A basin underdrain system will be constructed at various locations throughout the bulk TSF basin to provide preferred drainage paths for seepage flows. The pyritic TSF will be a fully lined facility with an underdrain system below the liner.

The pyritic TSF, which will also contain the PAG waste, will have a full water cover during operations, while the bulk tailings cell will have a small supernatant pond, located away from the embankments, to promote large tailings beach development upstream of the embankments.

The bulk TSF downstream embankment slopes will be maintained at approximately 2.6H:1V (horizontal:vertical), including buttresses established at the downstream toe of the main embankment. The final embankment crest elevation will be approximately 1,730 feet above sea level for bulk TSF. Embankment heights, as measured from lowest downstream slope elevation, will be 545 feet (main) and 300 feet (south).

The pyritic TSF downstream embankment slopes will be maintained at 2.6H:1V. The final crest elevation will be 1,620 feet above sea level. The north embankment height will be 335 feet, the south embankment height will be 215 feet, and the east embankment height will be 225 feet.

3.4.1. Siting Criteria

PLP conducted a multi-year, multi-disciplinary evaluation to select TSF locations that meet all engineering and environmental goals while allowing for cost-effective integration into the site waste and water management plans. During this evaluation, more than 35 tailings disposal options were tested against a range of siting criteria, including:

- **Minimize potential impact to environmental resources.** The selected sites are within valleys supporting mixed uplands and wetland shrub/herbaceous shrub. The valleys include tributaries to the NFK that have experienced intermittent flows. Index counts indicate lower fish presence than at other locations. Potential impacts to waterfowl are likewise reduced by avoiding areas with high-value habitats for nesting, breeding, molting, or migration.

- **Provide adequate storage capacity.** The sites will accommodate tailings for the 20-year life of the Project.
- **Reasonable proximity.** The sites minimize the distance to the process plant, which reduces power consumption and the overall project footprint.
- **Facilitate closure.** Segregating the pyritic tailings and PAG waste allows for placement of both in the pit at the end of the mine life, thus eliminating this structure from the long-term closure plan.

3.4.2. Design Criteria

The TSFs will be designed to meet or exceed the standards of the updated 2017 *Guidelines for Cooperation with the Alaska Dam Safety Program* (ADSP) prepared by ADNR. The TSFs will be designed to the standards of a Class I hazard potential dam (the highest classification).

The final TSF designs will incorporate the following:

- Permanent, secure, and total confinement of bulk tailings solids within an engineered disposal facility.
- Secure, and total confinement of pyritic tailings and PAG waste rock within a fully lined, engineered facility, with these materials relocated to the pit at closure.
- Control, collection, and recovery of tailings water from within the tailings impoundments for recycling to the process plant operations as process water, or treatment prior to discharge to the environment.
- Providing seepage collection systems below the impoundment structures to prevent adverse downstream water quality impacts.
- The inclusion of sufficient freeboard within the bulk TSF that the entire volume of the Inflow Design Flood (IDF) will not flood the entire tailings beach, maintaining the beach between the maximum operating pond and the bulk TSF embankments.
- Limiting the volume of stored water within the bulk TSF and keeping the operating pond away from the dam face.
- Maintaining the pyritic tails and PAG waste in a sub-aqueous state to prevent oxidation.
- The consideration of long-term closure management at all stages of the TSF design process.
- The inclusion of monitoring instrumentation for all aspects of the facility during operations and after closure.

- The design includes flattened slopes to increase the static factor of safety.

3.4.3. Tailings Deposition

Each tailings stream will be delivered to its respective TSF using two pump stations, one located in the process plant and one booster station positioned approximately mid-way along the pipeline route. The bulk tailings will be discharged via spigots spaced at regular intervals along the interior perimeter of the bulk tailings cell to promote beach development, which will allow the supernatant pond to be maintained away from the main embankment.

PAG waste rock will be placed in a ring around the interior of the pyritic TSF. Pyritic tailings from the cleaner scavenger flotation circuit will be discharged into the pyritic TSF at sub-aqueous discharge points, with the level maintained just below the upper bench level for the PAG waste being stored. The sub-aqueous discharge is necessary to prevent oxidation and potential acid generation.

3.4.4. Construction

A "Certificate of Approval to Construct a Dam" is required from ADNR for the construction of impounding structures meeting the minimum height or impounding thresholds. The TSFs, seepage collection ponds, and WMPs will be jurisdictional dam structures regulated by ADSP. The certificate will include any special conditions or limitations on the construction.

The embankments will be constructed using suitable rockfill or earthfill materials, including quarried rock, NPAG and non-ML waste rock excavated from the open pit, if available, and stripped overburden.

3.4.4.1 Bulk TSF

Main Embankment

The main embankment will be constructed using the centerline construction method with local borrow materials. The centerline construction method provides a high level of embankment stability while reducing the embankment material requirements associated with the downstream method.

The embankment foundation will be prepared by removing overburden materials to competent bedrock prior to the placing structural fill materials. Construction begins with a cofferdam to capture upstream runoff during starter embankment construction. The starter embankment will be constructed to a height of approximately 265 feet and provide capacity to store tailings for the first 24 months of operation.

The material for the starter embankments will be sourced from a quarry located within the impoundment area. The bulk TSF embankments will be raised progressively during the mine life. After the quarry within the impoundment is inundated with tailings, material will be sourced from two quarries immediately west and east of the impoundment.

The earthfill/rockfill embankment will include engineered filter zones and a crushed or processed aggregate drain at the topographic low point. This drain will provide a preferable seepage path from the tailings mass to downstream of the embankment toe. Additional underdrains running parallel to the embankment will allow for drainage of seepage collected along the embankment.

South Embankment

The south embankment will be constructed using the downstream construction method to facilitate lining of the upstream face, which is constructed at a 3H:1V slope. The downstream slope will be at 2.6H:1V. Overburden materials will be removed to competent bedrock below the embankment. The earthfill/rockfill embankment will include engineered filter zones and a grout curtain to reduce seepage below the embankment.

3.4.4.2 Pyritic TSF

The embankments will be constructed using the downstream method with an overall downstream slope of 2.6H:1V. The embankments will be constructed using select borrow materials and include a liner bedding layer, overlain by a liner, on the upstream slope and over the entire internal basin. Basin underdrains will collect and convey any seepage to the downstream seepage collection ponds.

3.4.4.3 Main Water Collection Pond

The Main Water Management Pond is the primary water management structure at the mine site. It will be a fully lined facility and constructed using quarried rockfill materials founded on competent bedrock**.** The embankment is approximately 190 ft high with an overall downstream slope of approximately 2H:1V and an upstream slope of 3H:1V to accommodate the liner. It will be constructed to its final height during the initial construction period. In addition to the geomembrane liner the embankment will include a filter/transition zone. The basin and upstream embankment face will include a layer of materials above the liner to provide ice protection during freezing conditions.

3.4.4.4 TSF Embankment Lifts

TSF embankments will be constructed in stages throughout the life of the Project, with each stage providing the required capacity until the next stage is completed. A 'Certificate of Approval to Modify a Dam' is required from ADSP for each construction lift. Planned embankment raises will be evaluated each year and sized according to a review of the process plant throughput, actual tailings settled densities (TSF ponds are typically sounded to establish the size of the supernatant pond and the density of the deposited tailings in the TSF), and water storage requirements.

3.4.5. Freeboard Allowance

All stages of embankment design include a freeboard allowance above the maximum operating TSF pond level and tailings beach. The freeboard allowance includes containment of the IDF and wave run-up protection, as well as an allowance for post-seismic embankment settlement. The IDF for the facility has been selected as the Probable Maximum Flood (PMF).

The embankment freeboard requirements will be reviewed as part of each dam lift and dam safety review, and will be adjusted, as required to reflect actual mine water management conditions.

3.4.6. Surface Water

The hydrologic input to the TSF design consists of two primary factors –operating conditions based on the 76-year climate record and the IDF. The IDF for the TSF, pyritic TSF, and the main WMP is the PMF, which in turn is calculated using the 24-hour Probable Maximum Precipitation (PMP) event plus the snow water equivalent from a 1-in-100-year snowpack. Available storage, or freeboard, will always be maintained within the storage facilities to account for the IDF. Maximum operating conditions will not encroach on the freeboard allowance.

Pumps located at the bulk tailings cell supernatant pond will control the water level by transferring excess water to either the seepage control pond or the main WMP.

The pyritic TSF will be a fully lined, water retention facility. The primary means of controlling the water level within pyritic TSF will be by pumping from this cell to the main WMP or the mill.

The main WMP will be a fully lined, water retention facility used to store surplus water for milling, or for managing surplus water from other impoundment and seepage structures. The primary means of controlling the water level in the main WMP is by treating surplus water and discharging to the environment. The design of the main WMP will also incorporate an emergency spillway.

3.4.7. Seepage

The main embankment of the bulk TSF will be designed to promote seepage to the seepage collection pond, thereby minimizing the volume of water contained within the impoundment and enhancing consolidation of the tailings solids.

For the other embankments, seepage controls will include grout curtains, liners, and low-permeability zones. The low-permeability zones, in conjunction with the low-permeability tailings mass, will function as the primary seepage control barriers of the internal and east embankments.

The seepage management system will also include seepage control measures downstream of the TSF embankments. These include seepage recycle ponds with grout curtains and low-permeability core zones, and downstream monitoring wells. Embankment runoff and TSF seepage collecting in the downstream seepage collection ponds will ultimately be transferred to the main WMP to be used in mining operations or treated for discharge.

3.5. Mine Site Infrastructure

Due to the remote location and the absence of existing infrastructure, the Project will be required to provide basic infrastructure, as well as the support facilities typically associated with mining operations. These facilities require reasonable access from the Pebble Deposit, and they have been situated foremost for stability and safety. Figure 1-4 shows the mine site layout.

3.5.1. Power Generation and Distribution

There is no existing power infrastructure in the Project vicinity. All required generating capacity, distribution infrastructure, and backup power will be developed by the Project.

To meet the projected power requirement while providing sufficient peaking capacity and N+1 redundancy (one generating unit held in reserve for maintenance or emergency use) will require a plant with an installed nameplate capacity of 270 MW. The plant will use high-efficiency combustion turbine generators operating in a combined-cycle configuration. The units will be fired by natural gas provided to the site via pipeline. Design-appropriate controls will be used to manage airborne emissions and meet Alaska Department of Environmental Conservation (ADEC) air quality criteria and best management practices (BMPs). A closed-loop glycol system will capture some heat from the system for space heat with the unused waste heat rejected through a closed-loop, water cooled system that circulates water through the steam condenser to a mechanical draft cooling tower.

The various mine load centers would be serviced by a 69-kilovolt distribution system using a gas-insulated switchgear system located at the power plant.

Emergency backup power for the mine site will be provided by both standby and prime-rated diesel generators connected into electrical equipment at areas where power is required to ensure personnel safety, avoid the release of contaminants to the environment, and allow for the managed shutdown and/or ongoing operation of process-related equipment.

3.5.2. Heating

Waste heat from the power plant will be used to heat mine site buildings and supply process heating to the water treatment plant. Low-pressure steam, via heat exchangers, will heat a closed-loop glycol system that distributes heat to various buildings. Warm water from the steam condenser discharge will be routed to the water treatment plant to provide process heating.

3.5.3. Shops

The truck shop complex will house a light-vehicle maintenance garage, a heavy-duty shop that can accommodate 400-ton trucks, a truck wash building, a tire shop and a fabrication and welding shop. The layout is designed to maintain optimal traffic flow and minimize the overall complex footprint. An oil-water separation system will be designed for water collected from the wash facility and floor drains.

3.5.4. On-site Access Roads

There will be several access roads within the mine site area, including a road from the gatehouse to the mine site and secondary roads linking with the various facilities around the mine. Roads will be sized according to the operating requirements and the types of equipment using them. Traffic associated with in-pit activity will be segregated from access road traffic to avoid cross-contamination of vehicles with mud and dust from the pit.

3.5.5. Personnel Camp

The first camp to be constructed at the mine site will be a 250-person fabric-type camp to support early site construction activities and throughout the Preproduction Phase as required for seasonal peak overflows. The main construction camp will be built in a double-occupancy configuration to accommodate 1,700 workers. This facility will later be refurbished for 850 permanent single-occupancy rooms for the operations phase. The camp will include dormitories, kitchen and dining facilities, incinerator, recreation facilities, check-in and check-out areas, administrative offices and first aid facilities.

The mine will operate on a fly-in, fly-out basis, except for those personnel residing in the communities connected to the access road corridor. Non-resident personnel will be flown in and out of the Iliamna Airport and transported to the site by road. Workers will remain on site throughout their work period. Site rules will prohibit hunting, fishing, or gathering while on site to minimize impacts to local subsistence resources.

3.5.6. Potable Water Supply

A series of groundwater wells located north of the mine site will supply potable water to the mine site. Preliminary tests indicate that minimal water treatment will be required. Treatment will likely include multimedia filtration, chlorination with sodium hypochlorite, and pH adjustment with sodium hydroxide. The treatment plants will be designed to meet federal and state drinking water quality standards.

Potable water will be distributed through a pump and piping network to supply fresh water to holding tanks at the personnel camp and process plant. Holding tank capacity will be sufficient for a 24-hour supply. Diesel-fired backup pumps will also be installed to provide potable water during an electrical outage.

3.5.7. Communications

Communications to site will be via fiber optic cable with satellite backup for critical systems. The fiber optic cable will connect to existing fiber optic infrastructure in the region or a dedicated fiber optic cable laid in conjunction with the gas pipeline.

The process plant communication system will use a dedicated ethernet network to support mine process control system communications. A separate network will connect various main components of the fire-detection and alarming system. Closed-circuit television, access control, and voice over internet protocol telephone systems will be integrated with the local area network. Mine operations will use two-way radios, cell phones, and similar equipment for communications.

Diamond Point Port operations will be serviced by the fiber optic cable. Radio and/or cell service will be provided for communications at the port with the antenna located with the port facilities.

3.5.8. Laboratories

Two laboratories will operate at the mine site during the Production Phase.

Staff affiliated with the process plant will operate the metallurgical laboratory to support process plant operations. This work will include routine operations support tests to confirm the metallurgical response of near-term plant feed, and development analysis to evaluate alternate treatment strategies. The laboratory will use state-of-the-art equipment and have fully equipped facilities for sample receiving and storage, sample preparation, and flotation.

The assay laboratory will be equipped with the necessary analytical instruments to provide routine assays to support mine and process plant operations. Some environmental samples will also be tested in this laboratory, although many of these samples will likely be submitted to external, third party laboratories.

Each laboratory will be equipped with fume hoods (with exhaust treatment, if required) and drains connected to a central receiving tank. Chemical wastes will be disposed of in accordance with all applicable laws and regulations.

3.5.9. Fire and Emergency Response

The mine site and Diamond Point Port site will be equipped for fire and emergency response. Water for fire suppression will be stored within the freshwater supply tanks at the mine and port and distributed via an insulated pipeline system that meets all pertinent code requirements. A fire truck and ambulance will be located at the mine site. An ambulance will be located at the Diamond Point Port and a pump truck will be used to deliver fire suppression water. A senior member of the safety and health management team, with appropriate training and experience, will have designated responsibility for emergency response. Emergency response teams at the mine and Diamond Point Port sites will be staffed by volunteers and will be trained in fire suppression and mine rescue in accordance with regulations.

Both the mine and Diamond Point Port site will be staffed with an emergency medical technician to provide advanced medical care; appropriate facilities will be established at both locations. As necessary, this person may draw on the capabilities of the existing clinic in Iliamna. Arrangements will be made in advance for emergency evacuation via the airport in Iliamna. Designated locations for helicopter pads will be defined at the mine and Diamond Point Port sites.

Equipment will be installed at the mine site and the Diamond Point Port to deal with oil spills; crews will be appropriately trained for such response.

3.6. Material Management and Supply

General supplies and bulk reagents will typically be stored in, or adjacent to, the areas where they will be used. The location of the explosives storage and emulsion manufacturing plant is based on the need to minimize transfer distances and to provide a safety buffer between the explosives plant and other facilities. Descriptions of mining and process related supplies are provided in Table 3-5 and Table 3-6. Average annual quantities of fuel, mining, milling, and miscellaneous consumables are listed in Table 3-7.

Table 3-7. Supply Quantities

Supply	Average Annual Quantity
Fuel	16 million gallons
Ammonium Nitrate	17,500 tons
Grinding Media, Process and Water Treatment Reagents, and Miscellaneous Supplies	295,000 tons

3.6.1. Diesel Fuel

Diesel fuel to support the mining operation and logistics systems will be imported to the Diamond Point Port using marine barges. The expected maximum parcel size for delivery is four million gallons, which will allow for extended periods between shipments in winter months. The Diamond Point Port will accommodate sufficient bulk fuel storage to provide one month of buffer and allow for the offloading of bulk fuel carriers.

Diesel fuel will be transferred from the Diamond Point Port to the mine site using ISO tank-container units, which have a capacity of 6,350 gallons. These units will be loaded at the port and transported by truck to the mine site. Additional containers will be stored at the mine site to provide for a fuel reserve in the event of a supply disruption.

The main mine site fuel storage area will contain fuel tanks in a dual-lined and bermed area designed to meet regulatory requirements. Sump and truck pump-out facilities will be installed to handle any spills. There will also be pump systems for delivering fuel to the rest of the mine site. Dispensing lines will have automatic shutoff devices, and spill response supplies will be stored and maintained on site wherever fuel will be dispensed.

Fuel will be dispensed to a pump house located in a fuel storage area for fueling light vehicles. It will also be dispensed to the fuel tanks in the truck shop complex, which are used for fueling mining equipment. These tanks will also be in a lined and bermed secondary containment area.

3.6.2. Lubricants

Lubricants will be packaged in drums and/or totes and stored on site within a secondary containment area.

3.6.3. Explosives

The materials used to manufacture blasting agents include ammonium nitrate prill, fuel oil, emulsifying agents, and sensitizing agents (gaseous). The containers used to transport the prill will be offloaded, using a container tilter, to a bucket elevator, which will unload the prill to three silos, each sized for 150,000 pounds. As a safety precaution, ammonium nitrate prill will be stored and prepared for use at a location approximately 0.75 mile southeast of the final pit rim. Electrical delay detonators and primers will be stored in the same general area, but in a separate magazine located apart from each other and separate from the prill. All facilities will be constructed and operated and blasting operations conducted in accordance with Mine Safety and Health Administration (MSHA) regulations as set forth in 30 CFR Subpart N.

Other explosives required for the mining operation include detonating cord, which connects to each blast hole and fires a detonator, initiating the explosion in each blast hole. The detonators, in turn, fire explosive primers, which propagate the explosion to the blasting agent. Small amounts of pre-packaged blasting agents and minor amounts of other explosives may be used for specific purposes.

3.6.4. Reagents

Reagents will arrive at the mine site by truck in 20-ton containers, depending on the reagent. They will be stored in a secure bulk reagent storage area and segregated according to compatible characteristics. The reagent storage area will be sufficient to maintain a two-month supply at the mine site. As needed, reagents will be loaded onto a truck and delivered to the appropriate reagent receiving area.

Reagents will be used in very low concentrations throughout the mineral processing plant and are primarily consumed in the process; low residual reagent quantities remain in the tailings stream and will be disposed in the TSF where they will be diluted and decompose.

The metallurgical and assay laboratories will also use small amounts of reagents. Any hazardous reagents imported for testing will be transported, handled, stored, reported, and disposed of as required by law, in accordance with manufacturers' instructions, and consistent with industry best practices.

3.7. Waste Management and Disposal

3.7.1. Used or Damaged Parts

Used tires and rubber products will be reused to the extent practicable. Additional used tires, along with other damaged parts and worn pipes, will be packaged for shipment and disposal off site. Wood pallets and packaging will be incinerated with domestic waste. Scrap steel, such as broken grinding balls and used mill liners, truck body liners and ground engaging tools, will be shipped off-site to appropriate disposal sites.

3.7.2. Laboratory Waste

Most inorganic aqueous wastes from the metallurgical and assay laboratories will be collected in a sump, with the remainder routed to the domestic sewage treatment plant. Fugitive organics will be skimmed from the surface of the sump prior to discharging the aqueous portion to the main WMP. Generally, non-aqueous waste will be collected in specific and separate bulk containers before being returned to an appropriate place in the plant. If there is no suitable place in the main plant, it will be sent to the general waste storage area where it will be packaged and sent off site for disposal at an appropriate facility.

3.7.3. Waste Oils

Waste oil will be reused as fuel in used oil heaters to augment heating in the truck shop and/or other buildings on site. Waste oils not suitable for burning, including lubricants, will be collected into drums, sealed, and stored in containers for shipment to be recycled or disposed of off-site at an approved facility.

3.7.4. Container Wash Wastewater

Water from the container wash at site will be routed to the main WMP for use in the mill and processing plan or treated for discharge.

3.7.5. Reagent Packaging

Reagent packaging will include wooden boxes, bulk poly-propylene containers, bulk bags, laboratory packaging, and/or glass containers. Spent reagent packaging will be evaluated against applicable regulations, permits and health and safety plans for possible incineration in the on-site incinerator. Glass containers will be rinsed and packed for removal and disposal off site. Broken sharp products will be collected and packaged appropriately for removal and disposal off site.

3.7.6. Hazardous Waste

Miscellaneous hazardous wastes that may accumulate on site, such as paint, used solvents, and empty reagent containers with residual chemicals, will be managed and shipped off site to approved facilities according to applicable BMPs and regulations.

3.7.7. Nuclear Instrumentation

Nuclear instrumentation such as densitometers will be shipped off site to approved facilities in accordance with applicable BMPs and regulations.

3.7.8. Domestic Refuse

Domestic refuse from the camp kitchen, living quarters, and administration block will be disposed of on site in a permitted landfill, or shipped off-site to appropriate disposal sites. Some wastes, including putrescible wastes, will be incinerated on site, and the remaining ashes will be disposed of in accordance with applicable BMPs and regulations.

3.7.9. Sewage and Domestic Wastewater Disposal

Separate sewage treatment plants will be located at the camp and the process plant. Plans for each plant will be reviewed and approved by ADEC prior to construction.

Personnel accommodations will produce grey water from the kitchen, showers, and laundry facilities that will be treated in a water treatment plant (WTP). The WTP will be designed to remove biological oxygen demand, total suspended solids (TSS), total phosphate, total nitrogen, and ammonia to meet ADEC domestic waste-discharge criteria.

The process plant sewage WTP will receive effluent that may have metallic residues from the workers' change house and associated laundry. This WTP will be designed for metals removal in addition to biological oxygen demand, TSS, total phosphate, total nitrogen, and ammonia to meet ADEC domestic waste-discharge criteria.

Sludge from both plants will be stabilized and disposed of on site.

3.8. Transportation Corridor

The Pebble Project mine site is located approximately 82 miles west of Cook Inlet. There are limited existing road networks in the region. The transportation corridor will extend 82 miles from Diamond Point to the mine site along the north shore of Iliamna Lake.

The transportation corridor was designed to avoid wetlands where feasible, minimize disturbance area, minimize stream crossings, avoid geological and avalanche hazards, avoid culturally significant sites, minimize effects on subsistence hunting and gathering, optimize the alignment for the best soil and geotechnical conditions, and minimize road grades.

The mine access road will run east from the mine site to the port site at on Cook Inlet at Diamond Point. It will parallel or replace portions of the existing Pile Bay/Williamsport road and intersect with the existing Iliamna/Newhalen road network (Figure 12).

The concentrate, water return, and gas pipelines and the fiber optic cable will be buried in a corridor adjacent to the road that parallels the road from the mine site to the port.

3.8.1. Road Design

The mine access road will be a private 30-foot-wide gravel road, which will enable two-way traffic, and will be capable of supporting anticipated development and operational activities during construction and supply truck haulage from the port to the mine site.

The access road will include seventeen bridges, eight of which will be single-span, two-lane bridges that range in length from approximately 40 to 90 feet. There will be one large (550 feet) multi-span, two-lane bridge across the Newhalen River and eight other multi-span, two-lane bridges that range in length from approximately 125 to 245 feet. Road culverts at stream crossings are divided into categories based on whether the streams are fish bearing. Culverts at streams without fish will be designed and sized for drainage only, in accordance with ADOT&PF standards. Culverts at streams with fish will be designed and sized for fish passage in accordance with ADOT&PF and Alaska Department of Fish and Game (ADF&G) standards.

The natural gas pipeline, concentrate pipeline, water return pipeline, and fiber optic cable will be buried in a corridor adjacent to the access road. For bridged river crossings, the pipelines will be attached to the bridge structures.

3.8.2. Concentrate and Water Return Pipelines

The concentrate pipeline will consist of a single approximately 6.25-inch diameter API 5L X60 grade (or similar) steel pipeline with an internal HDPE liner to prevent corrosion. A cathodic protection (zinc ribbon or similar) system will be included for prevention of external corrosion. A pressure-based leak detection system, with pressure transmitters located along the pipeline route, will monitor the pipeline for leaks. Two electric pump stations will be required, one at the mine site and one at an intermediate point. Both pump stations will utilize positive displacement pumps in the 1000 horsepower range and the intermediate one will require a power generation facility (1-2-megawatt range). Rupture discs at the intermediate and terminal stations and pressure monitoring will be utilized to protect the pipeline from overpressure events. Manual isolation and drain valves will be located at intervals no greater than 20 miles apart.

The return water pipeline is sized to accommodate water from flushing operations with a diameter of approximately 8 inches. The HDPE lined steel pipeline will have similar corrosion protection and safety controls to the concentrate pipeline. No intermediate pump station is required for the water return pipeline.

3.8.3. Transportation Corridor Traffic

To facilitate efficient cargo movement most material will be transported in shipping containers. Inbound Project cargo and consumables will be transported using standard ISO containers for ocean freight (either 20- or 40-foot size). Diesel fuel will be transferred from the Diamond Point Port to the mine site using ISO tank-container units, which have a capacity of 6,350 gallons. Truck/trailer units will be designed to haul up to three loaded containers per trip.

Daily transportation of fuel, reagents and consumables will require up to 18 round trips per day for each leg of the road, including three loads of fuel per day.

3.9. Diamond Point Port and Lightering Location

Incoming supplies such as equipment, reagents, and fuel will be barged to the Diamond Point Port and then transported by truck to the mine site. To a lesser extent, some supplies, such as perishable food, may be transported by air to the Iliamna Airport and trucked to the mine site. Bulk concentrate will be lightered by barges to Handysize bulk carriers at a mooring point located in Iniskin Bay. The port facilities layout is shown in Figure 1-5. The proposed lightering location is also shown in Figure 1-5.

3.9.1. Port Design

The Diamond Point Port will include shore-based facilities to dewater, store, and load the copper-gold concentrate, a pumping station for the water return pipeline, facilities to receive and store containers and fuel, as well as natural gas powered generators, maintenance facilities, employee accommodations, and offices.

The marine component includes a causeway extending out to a marine jetty located in a 20-foot deep dredged basin. A dredged access channel will lead to deeper water. The jetty will be constructed along the northern and eastern limits of the basin and facilitate moorage of fuel and freight barges. In addition to the jetty, a series of three caissons will be placed within the dredged basin to provide mooring and loading for the concentrate lighter barges. A gantry will support an enclosed conveyor from the jetty to a barge loader mounted on the caissons. A floating dock, on the jetty but separate from the cargo handling berths, will be provided for ice-breaking tug moorage. The causeway and jetty will be constructed using concrete caissons to support a concrete deck.

3.9.2. Port Operations

Copper-gold concentrate will be transferred from the mine site to the Diamond Point Port by concentrate pipeline, then dewatered at the port site, and stored between vessel sailings in a dedicated concentrate storage building. The concentrate will be transported by an enclosed conveyor to a barge loader that will load lightering barges with approximately six thousand tons of concentrate. The two lightering barges will have dust covers to control dust emissions. Once loaded, the barges will be transported to and secured against Handysize size vessels at the mooring location in Iniskin Bay. Wheel loaders will reclaim the concentrate from the barge deck and transfer it to a ship loader, which will load the ships. The barge location will be adjusted along the ship during the loading process. The loading trunk will extend down into the hold of the ship to minimize dusting and mist sprays will be utilized to further control dust generation. Due to the high density of the concentrate the holds will not be loaded to the top, further reducing any potential for concentrate dust to escape the hold. About five to six trips by the lightering barges will be required to load a bulk carrier, which would be anchored for three to four days at the lightering location. The bulk carrier ships will transport the concentrate to out of state smelters.

Up to 27 Handysize ships will be required annually to transport concentrate. Up to 33 marine line-haul barge loads of supplies and consumables will be required annually. Two ice-breaking tugboats will be used to support marine facility operations.

3.10. NATURAL GAS PIPELINE

Natural gas will be supplied to the Diamond Point Port and the mine site by pipeline (Figure 1-1). The pipeline will connect to the existing gas pipeline infrastructure near Anchor Point on the Kenai Peninsula and will be designed to provide a gross flow rate of approximately 50 million standard cubic feet per day. A fiber optic cable will be buried in the pipeline trench or ploughed in adjacent to the pipeline.

A metering station will be constructed at the offtake point that connects to a compressor station located on a land parcel on the east side of the Sterling Highway. The steel pipeline will be designed to meet all required codes and will be a nominal 12 inches in diameter.

The compressor station will feed a 75-mile subsea pipeline across Cook Inlet that will be constructed using heavy wall nominal 12-inch-diameter pipe designed to have negative buoyancy and provide erosion protection against tidal currents. Horizontal directional drilling will be used to install pipe segments from the compressor station out into waters that are deep enough to avoid navigation hazards. From this point, the heavy wall pipe will be trenched into the sea floor as required to maintain pipe integrity.

The pipeline will come ashore in Ursus Cove utilizing trenching, cross Ursus Head and the head of Cottonwood Bay before reaching the port site at Diamond Point. Natural gas will be fed to the port site power station and used for site heating. The distance from the Diamond Point Port to the mine site is approximately 82 miles. The pipeline will be buried with concentrate and water return pipelines in a trench adjacent to the road prism and will follow the mine access road to the mine site. At bridged crossings the pipeline will be attached to the bridges, otherwise the pipeline will utilize trenching or horizontal directional drilling to cross streams.

Long-term corrosion protection and control will be provided by an external coating on the pipeline and components, combined with an impressed current and/or galvanic current cathodic protection system. The cathodic protection system will be installed and activated, as soon as is practical, after pipe installation to maximize the effect of corrosion protection. Metering stations and pig launching and receiving facilities would be located at the compressor station and offtake points as appropriate. Mainline sectionalizing valves will be installed as required by code, with a spacing of no more than 20 miles for the onshore sections of the pipeline.

4. WATER MANAGEMENT

PLP recognizes the importance of effectively managing water resources in the area surrounding the Pebble Deposit and will implement a comprehensive water management program that will minimize impacts to water flow and quality and will minimize and mitigate impacts associated with all waters affected or used by the Project.

4.1. MINE SITE

The main objective of water management at the mine site is to manage, in an environmentally responsible manner, water that originates within the project area while providing an adequate water supply for operations. A primary design consideration is to ensure that all contact water that requires treatment prior to release to the environment will be effectively managed. This includes carefully assessing the Project facility layout, process requirements, area topography, hydrometeorology, aquatic habitat/resources, and regulatory discharge requirements for managing surplus water. All runoff water contacting the facilities at the mine site and water pumped from the open pit will be captured to protect the overall downstream water quality.

4.1.1. Water Balance

The foundation of the water management program is the water balance. The Pebble Water Balance is comprised of three primary models: the Watershed Model, the Groundwater Model, and the Mine Plan Model. These three models, which are all numerical water balance models, are very different, yet complementary. They collectively provide the means of quantifying the numerous water flows in the streams, in the ground, and in the various pipes, ponds, and mine structures associated with the mine development. The Watershed Model focuses on water flows throughout the NFK, SFK, and UTC drainages. The Groundwater Model focuses on the detailed simulation and understanding of groundwater flows within those drainages, and serves to inform the watershed model, and vice versa. The Mine Plan Model focuses on mine site water inflows and uses.

Complementing the water balance models is an instream fish habitat-flow model, which was used to assess the effects of changes in water flow to the fish habitat in the adjacent streams.

4.1.1.1 Watershed Model

The Watershed Model for the NFK, SFK, and UTC drainages considers both surface and groundwater. This model incorporates all key components of the hydrologic cycle, including precipitation as rain and snow, evaporation, sublimation, runoff, surface storage, and groundwater recharge, discharge, and storage. The primary input is monthly precipitation and temperature data collected at the Iliamna Airport from 1942 through 2017. The model was calibrated to measured site flow data collected at various locations in all three drainages over a nine-year period. The Watershed Model also provided input for the instream fish habitat-flow model, as well as the initial boundary parameters associated with groundwater recharge and runoff conditions for the groundwater model.

4.1.1.2 Groundwater Model

The Groundwater Model focuses on the sub-surface movement of water within the NFK, SFK, and UTC drainages. It models hydrogeological conditions in a more sophisticated and detailed manner than the Watershed Model, and its outputs provide a check of reasonableness for the Watershed Model. In addition, the Groundwater Model simulates groundwater flow rates and groundwater-surface water interactions throughout the study area, whereas the Watershed Model considers surface and groundwater flow rates only at the streamflow gaging stations.

4.1.1.3 Mine Plan Model

The Mine Plan Model focuses on water movement within the Pebble Project footprint area. The Mine Plan Model is a site-wide water balance and considers all mine facilities including the bulk TSF, pyritic TSF, open pit, process plant, and the WMPs. This model tracks water movement throughout the Pebble Project footprint area including runoff from the mine facilities, water contained in the ore, groundwater inflows, evaporation and water stored in the tailings voids.

The Mine Plan Model is used to predict the flow regime on the mine site and whether there is a water surplus or deficit. It will also be used to estimate the water storage capacity requirements for the mine under normal operating conditions.

4.1.1.4 Physical Habitat Simulation System (PHABSIM) Instream-flow Model

The PHABSIM model is an integral component of the site water balance design and is used to determine the most effective way of releasing the treated contact water that is surplus to the project needs. This model assesses the effects of changes in water flow to the instream fish habitat in streams downstream of the project site. It quantifies the areal extent of specific habitat changes that result from changes in flow throughout the year:

- for each of the three streams in the area (NFK, SFK, and UTC),
- at multiple locations throughout the whole length of each stream,
- for different salmon and resident fish species within each stream, and
- for different life history stages of each species.

Output from the model, together with a consideration of site-specific fish production limiting factors, will be used to inform and optimize the discharge of water from the site to minimize the effects of reduced flow and/or enhance instream fish habitat below the discharge points.

4.1.2. Preproduction Phase

The water management and sediment control plan during the preproduction phase consists of multiple aspects that will focus on minimizing contact water volumes. Runoff and associated sediment control measures will be managed with BMPs and adaptive control strategies. Where water cannot be diverted, it will be collected, treated, and discharged.

4.1.2.1 Water Management Plan

The water management plan during the Preproduction Phase can be summarized as follows:

- Water diversion, collection, and treatment systems will be installed around the site to address the effect of construction ground disturbance.
- Water management and sediment control structural BMPs, including temporary settling basins and silt fences, will be installed to accommodate the initial mine site construction.
- Among the first permanent facilities to be constructed will be the water management structures that will be maintained for use in adaptive management during operations, such as diversion and runoff collection ditches to minimize water contact with disturbed surfaces, and sediment control measures such as settling ponds to stop sediment from reaching downstream water courses.
- Preproduction Phase mining cannot commence until the water table in the open pit area has been lowered by groundwater pumping. The open pit dewatering system will be installed prior to Preproduction Phase mining to provide sufficient time to draw down the water table in the area. This will allow uninterrupted overburden removal in preparation for production mining of mineralized material. A series of dewatering wells will be drilled into and around the perimeter of the open pit, with the exact well number and location determined by testing the overburden aquifers. The number of wells will include an allowance for wells with poor or no water yields and wells lost through sanding, equipment loss, or other interference with water production. Pump sizes for each well will be based on well-specific yields. Water will be discharged to the environment if it meets water quality criteria; otherwise, it will be treated in a water treatment plant prior to discharge.

Design considerations for the Preproduction Phase water management structures include the following:

- Diversion channels, berms, and collection ditches will be sized for the 100-year, 24-hour rainfall event.
- Diversion channels, berms, and collection ditches will be constructed with erosion-control features, such as geotextile or riprap lining, as appropriate, for site-specific condition. Energy dissipation structures, such as spill basins or similar control measures, will be included where required to reduce erosion at the outlets of the diversion channels and collection ditches.
- Sediment control ponds will be sized to attenuate and treat up to the 10-year, 24-hour rainfall event volume and to safely manage the 100-year, 24-hour rainfall event.
- Water management and sediment control ponds will be constructed using non-PAG rock and earthen fill embankments.

- A temporary cofferdam will be constructed upstream of the main TSF embankment to manage water during the initial construction phase. Runoff from the undisturbed upstream catchment will be collected behind the cofferdam will be pumped downstream of all construction activities and released within the same watershed.

4.1.2.2 Water Treatment

Minimal water storage will be available on site until initial construction activities are completed. Therefore, prior to completion of the TSF embankments and water management structures, all water that does not meet water quality standards will be treated and released. Water from the following sources and activities may require treatment prior to release:

- Preproduction Phase pit dewatering (dewatering of the overburden aquifer near the pit may require treatment).
- Water, primarily from precipitation, accumulating in the open pit during Preproduction Phase mining.
- Runoff from TSF embankment construction.
- Runoff from excavation for site infrastructure such as the process plant, camps, power plant, or storage areas will be routed to settling ponds prior to release.
- Prior to the operations WTPs being brought on-line, modular WTPs will be used to treat contact water that does not meet discharge requirements.

4.1.3. Production Phase

The water management and sediment control plan during the Production Phase focuses on minimizing contact water. Runoff and associated sediment control measures will be managed with BMPs and adaptive control strategies. Where water cannot be diverted, it will be collected for use in the mining process or treated and discharged.

4.1.3.1 Water Management Plan

The water management plan during the Production Phase can be summarized as follows (Figure 4-1 shows a simplified schematic of the site water balance):

- Water collected from the pit dewatering wells and the open pit will be pumped to the open pit water management pond (WMP). From there, water will be pumped to the open pit WTP for treatment and discharge. WTP sludge will be directed to the process plant where it will be added to the pyritic TSF via the pyritic tailings slurry line.

- Bulk tailings slurry from the mill will be directed to the bulk TSF. Additionally, precipitation and runoff water will collect in the TSF. The bulk TSF will maintain a small operating pond.

- The main bulk TSF embankment will operate as a flow-through facility. Water collecting in the bulk tailings storage cell will flow through the embankment to the main embankment seepage collection pond. From there, water will either be directed to the main WMP for use in the mill or to the main WTP for treatment and discharge. Any excess surface water in the bulk tailings TSF will be pumped to the main WMP.

- Contact water will be pumped to the main WMP. Water treatment by-product sludge and reject water will be directed to the process plant and added to the pyritic TSF via the pyritic tailings slurry line. A portion of the treated water from the main WTP will be returned for use in the process plant and power plant cooling towers.

- Pyritic tailings slurry from the mill will be directed to the lined pyritic TSF. Additionally, precipitation and runoff water will collect in the pyritic TSF. A pond will be maintained in the pyritic TSF, fully submerging the pyritic tailings and all but the upper lift of the PAG waste rock. Excess water from the pyritic TSF will be pumped to the main WMP.

- A water surplus for the Production Phase is anticipated under normal and wetter-than-normal climatic conditions. Although the mine site will have a water surplus, the water volume available to discharge will be less than the pre-mine flows within the mine footprint as some water will be consumed in the tailings voids and some will be lost to evaporation and other minor uses. The site water surplus will vary during operations as the mine footprint expands and additional site runoff is collected. Surplus water will be treated and discharged throughout the year.

- The accuracy of water balance models is limited by many factors, including the stochastic nature of the inputs and the potential effects of climate change. In recognition of these limitations, an adaptive water management strategy is planned. Adaptive water management includes the ability to provide additional temporary water storage capacity in the TSFs, to provide surplus storage capacity within the WMPs, and to provide for expansion of the WTP treatment rate by building in excess capacity. In addition to the redundancy built into the pumping and treatment systems, additional storage capacity is available under extreme flood conditions by directing water to the open pit, allowing it to flood until the pumping and treatment systems can restore the water stored in the system to its design level.

- A comprehensive water management system will be implemented to monitor water quantity and quality. All discharged waters will be monitored for compliance with state and federal permit requirements. Water from both water treatment plants will be strategically discharged to optimize fish habitat in the downstream reaches of nearby streams. Discharge locations for the treated water have been identified in the NFK, SFK, and UTC. The treated water discharge will be distributed to these locations in a manner that optimizes downstream aquatic habitat conditions. Optimal conditions will be determined using a PHABSIM habitat instream-flow model and in accordance with ADEC and Alaska Department of Fish and Game (ADF&G) permit conditions.

Design considerations for the Production Phase water management include the following elements:

- Diversion channels, berms, and collection ditches will be sized for the 100-year, 24-hour rainfall event.
- Diversion channels, berms, and collection ditches will be constructed with erosion-control features, such as geotextile or riprap lining, as appropriate, for site-specific conditions. Energy dissipation structures, such as spill basins or similar control measures, will be included where required to reduce erosion at the outlets of the diversion channels and collection ditches.
- Sediment control ponds will be sized to attenuate and treat up to the 10-year, 24-hour storm event volume and to safely manage the 100-year, 24-hour rainfall event.
- Water management and sediment control ponds will be constructed using non-mineralized rock and earthen fill embankments.
- IDF for all WMPs will be the 100-year, 24-hour rainfall event; IDF for the TSFs and main WMP will be the 24-hour PMP plus the 100-year snowpack equivalent water volume.
- Surplus water will be treated to meet the specified water quality criteria prior to discharge.

Water collection, management, and transfer will be accomplished through a system of water management channels, ponds, and pump and pipeline configurations. These systems will be designed to handle the large flows that occur during spring freshet and late summer/fall rains. Spare parts for pump systems will be maintained on site to maintain continuous and effective water management. Leak detection systems that report to a central control system will be employed, as will monitoring systems to control pump cycling, high and low water-level switches, no-flow (or low-flow) alarms, vibration overheating alarms, and other systems as appropriate to monitor water management systems.

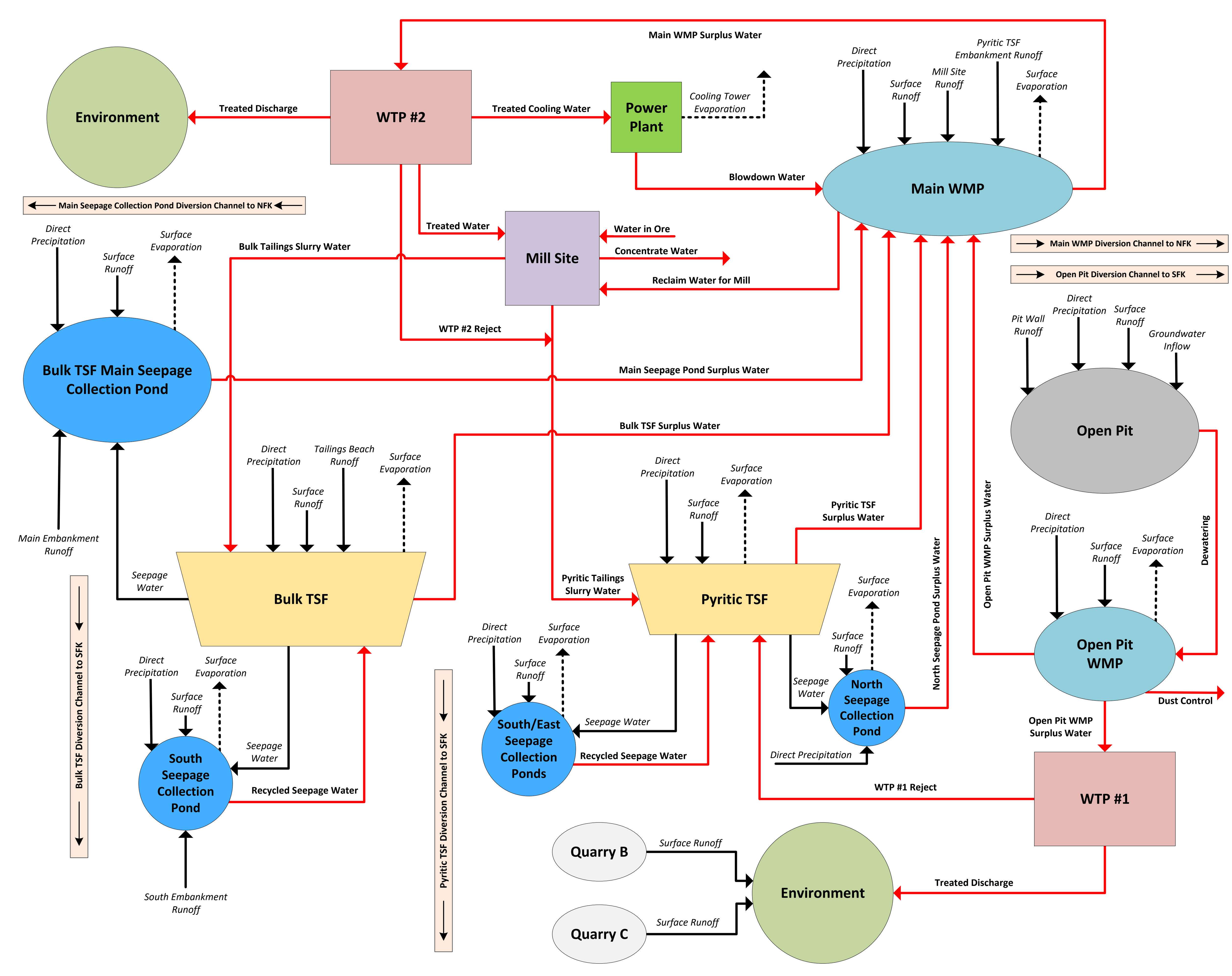

Figure 4-1

Water Balance Flow Schematic - Operations

Pumped Flow Pathway

Runoff, Groundwater, or Seepage Pathway

Evaporation

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Rev: 0	Author: PLP

4.1.3.2 Water Treatment

Water collected around the mine area and Diamond Point Port site will require treatment prior to discharge to the environment. Treatment methods will include a mixture of settling for sediment removal, chemical additions to precipitate dissolved elements, and filtration to meet final discharge criteria.

The mine area will have two water treatment plants: WTP #1 (the open pit WTP) and WTP #2 (the main WTP). Both will be constructed with multiple, independent treatment trains, which will enable ongoing water treatment during mechanical interruption of any one train.

Water Treatment Plant #1

WTP #1 will treat water from the open pit WMP with treatment plant processes commonly used in the mining industry around the world. Figure 4-2 shows a simplified schematic of the treatment process. Major treatment steps are outlined in sequence below.

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Clarifier solids will be thickened and transferred to the pyritic TSF.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and Ultrafiltration (UF) membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the pyritic TSF.
5. A portion of the UF membrane permeate water will be treated with four stages of reverse osmosis (RO) membranes to further remove TDS to a concentration that will be safely below the discharge limit. Permeate from the RO membranes will be recombined with the main effluent stream for discharge to the environment.
6. Reject brine from the RO membranes will be transferred to the pyritic TSF.

Water Treatment Plant #2

WTP #2 will treat water from the main WMP with treatment plant processes commonly used in the mining industry around the world. Figure 4-3 shows a simplified schematic of the treatment process. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.

2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the pyritic TSF.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the pyritic TSF.
5. RO membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the RO membranes may require alkalinity adjustment prior to discharge.
6. Reject from the RO membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the pyritic TSF. Sulfate from the RO reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the pyritic TSF. Based on the expected pH in the pyritic TSF, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged. Brine from the last stage of RO membranes will be transferred to the pyritic TSF.

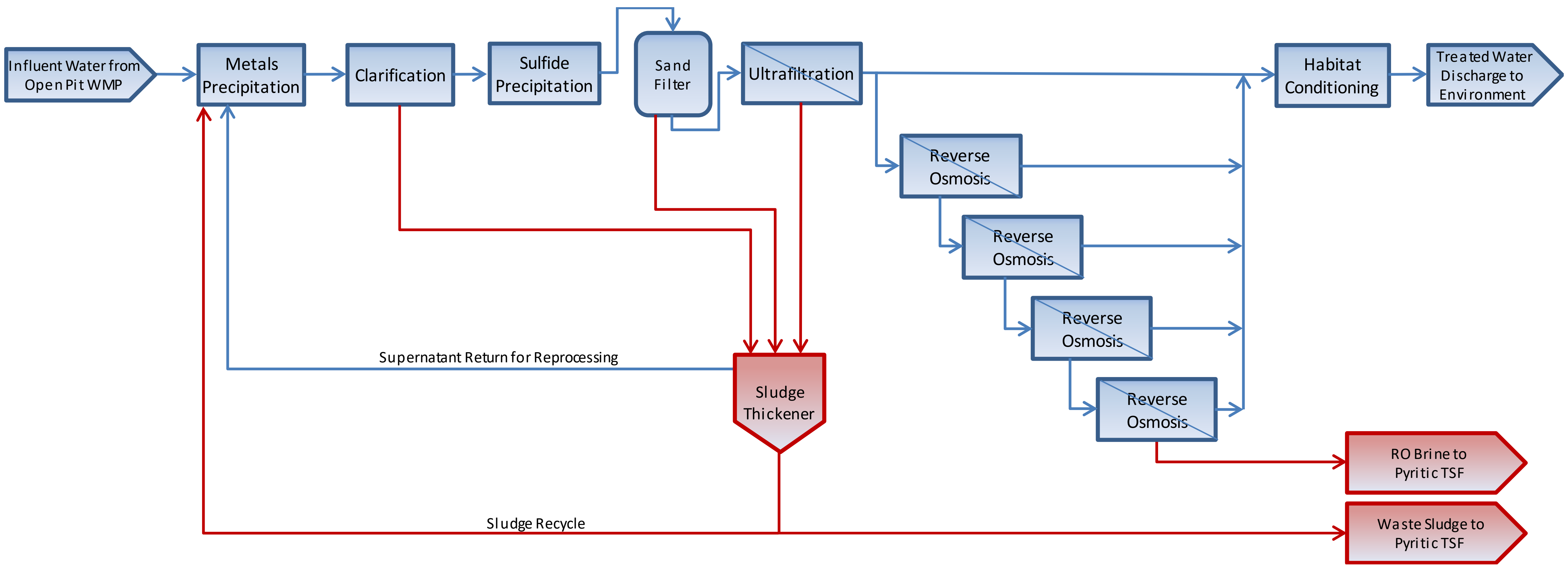

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FIGURE 4-2

Water Treatment Plant #1

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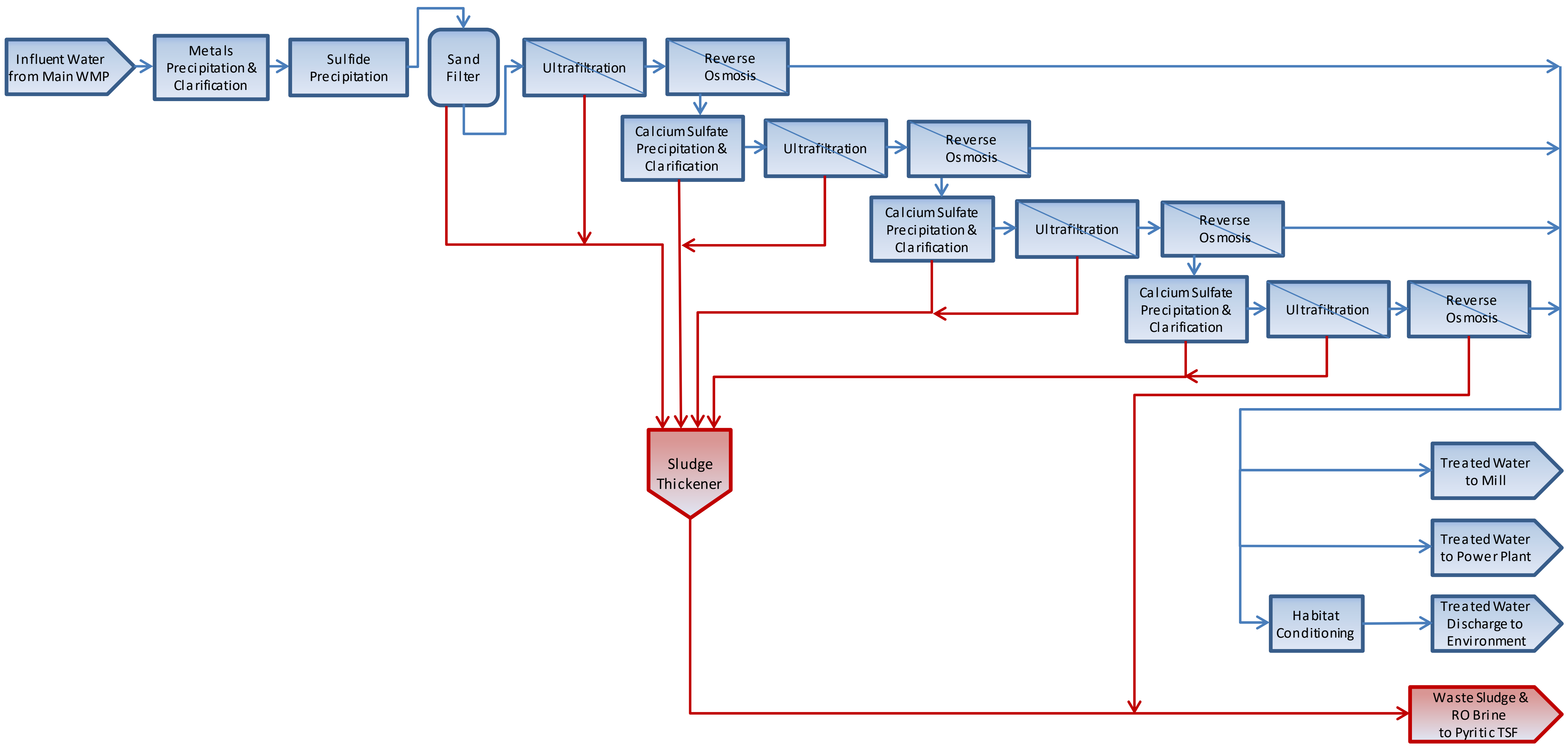

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FIGURE 4-3

Water Treatment Plant #2: Operations Phase

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4.1.4. Closure/Post-Closure Phase

Closure and post-closure water management addresses both the immediate physical closure of the site and associated reclamation activities, as well as the long-term post-closure period and associated maintenance and monitoring activities. Additional details on reclamation and closure are provided in Section 6.

4.1.4.1 Water Management Plan

The water management plan during the closure and post-closure phases can be summarized as follows:

- Closure Phase 1: Years 0-15
  - WTP #3 replaces WTP #1 to treat open pit water.
  - Excess and seepage water from the bulk TSF is pumped to the main WMP.
  - Seepage water from the pyritic TSF is pumped to the main WMP.
  - Surplus water from the main WMP is treated at WTP #2 and released to the downstream environment.
  - Surplus water from the open pit is pumped to WTP #3 to maintain the placement of the PAG waste rock in the dry.
  - Treated water from WTP #3 is released to the downstream environment
  - The open pit WMP is reclaimed.
- Closure Phase 2: Year 16 until the pit is full (approximately Year 20).
  - WTP #2 is decommissioned once it is no longer required.
  - The pyritic TSF and associated seepage collection ponds are reclaimed and surface water runoff from the area is discharged to the downstream environment.
  - The main WMP is reclaimed and surface water runoff from the area is discharged to the downstream environment.
  - Bulk TSF and seepage collection pond water is pumped to the open pit.
  - The open pit fills to the maximum management level.
  - The basis for the current analysis is that no water will be treated during this phase, however an adaptive management strategy would be utilized, and water would be directed to WTP #3 for treatment and release if required to maintain downstream flows.
- Closure Phase 3: Year 20 until the bulk TSF consolidation is complete (approximately Year 50).
  - Bulk TSF seepage is directed to WTP #3.
  - Water levels in the open pit are maintained below the main management level by treating and releasing surplus water from the open pit.

- Post-Closure
  - Runoff water is directly discharged from the reclaimed bulk TSF to the NFK catchment once it has been demonstrated to meet water quality criteria.
  - Bulk TSF seepage water is directed to WTP #3.
  - Water levels in the open pit are maintained below the main management level by treating and releasing surplus water from the open pit.

4.1.4.2 Water Treatment

Water treatment during the closure and post-closure phases will utilize the facilities as outlined below. Water quality will be closely monitored, and changes and adjustments to the treatment process will be made as needed. The reclamation and closure bond package will include provisions for periodic replacement of water treatment facilities and ongoing operating and monitoring costs over the long-term, post-closure period.

Water Treatment during Closure Phase 1

The mine area will have two water treatment plants during Closure Phase 1: WTP #2 and WTP #3. Both will have multiple, independent treatment trains, which will enable ongoing water treatment during mechanical interruption of any one train.

Water Treatment Plant #2 - Closure Phase 1

During Closure Phase 1 WTP #2 will treat water from the main WMP with treatment plant processes commonly used in the mining industry around the world. Figure 4-4 shows a simplified schematic of the treatment process. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric sulfate. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous sulfate to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.
5. RO membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the RO membranes may require alkalinity adjustment prior to discharge.

6. Reject from the RO membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the open pit. Sulfate from the RO reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the open pit. Based on the expected pH in the open pit, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged. Brine from the last stage of RO membranes will be transferred to the open pit.

Water Treatment Plant #3- Closure Phase 1

During Closure Phase 1 WTP #3 will treat water from the open pit with treatment plant processes commonly used in the mining industry around the world. Figure 4-5 shows a simplified schematic of the treatment process. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric sulfate. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous sulfate to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.

5. Nanofiltration (NF) membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the NF membranes may require alkalinity adjustment prior to discharge.
6. Reject from the NF membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the open pit. Sulfate from the NF reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the open pit. Based on the expected pH in the open pit, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
9. Brine from the last stage of RO membranes will be evaporated. The concentrated liquid brine stream from the evaporators will be sent to crystallizers. The crystallized salt stream from the crystallizers will be sent to centrifuges to remove any excess liquid from the salt crystals and that liquid will be returned to the crystallizers for reprocessing. The crystallized salt from the centrifuge, which will be primarily sodium chloride, will be sent to an approved facility for disposal. The water vapor from the evaporators and crystallizers will be condensed and the resulting liquid water will be discharged.

Water Treatment during Closure Phase 2

Closure Phase 2 is a period of approximately 5 years during which inflow to the Open Pit will not be removed, allowing the water level to rise to the Maximum Management Level and no surplus water will be treated. WTP #3 will be maintained in standby status but not operated during Closure Phase 2.

Water Treatment during Closure Phase 3 and Post Closure

During Closure Phase 3 and Post Closure WTP #3 will treat two streams of water separately: a stream from the Bulk TSF Main Seepage Collection Pond (SCP) and a stream from the open pit.

WTP #3 will use treatment plant processes commonly used in the mining industry around the world. The treatment processes utilized for each stream are described separately below:

Water Treatment Plant #3- Closure Phase 3 and Post Closure - Bulk TSF Main SCP Stream

Figure 4-6 shows a simplified schematic of the treatment process for the Bulk TSF Main SCP Stream within WTP #3 during Closure Phase 3 and Post Closure. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.
5. NF membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the NF membranes may require alkalinity adjustment prior to discharge.
6. Reject from the NF membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the open pit. Sulfate from the NF reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the open pit. Based on the expected pH in the open pit, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine

concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged. Brine from the last stage of RO membranes will be transferred to the open pit.

Water Treatment Plant #3- Closure Phase 3 and Post Closure - Open Pit Stream

Figure 4-7 shows a simplified schematic of the treatment process for the Open Pit Stream within WTP #3 during Closure Phase 3 and Post Closure. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. UF permeate water will be discharged to the environment. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.

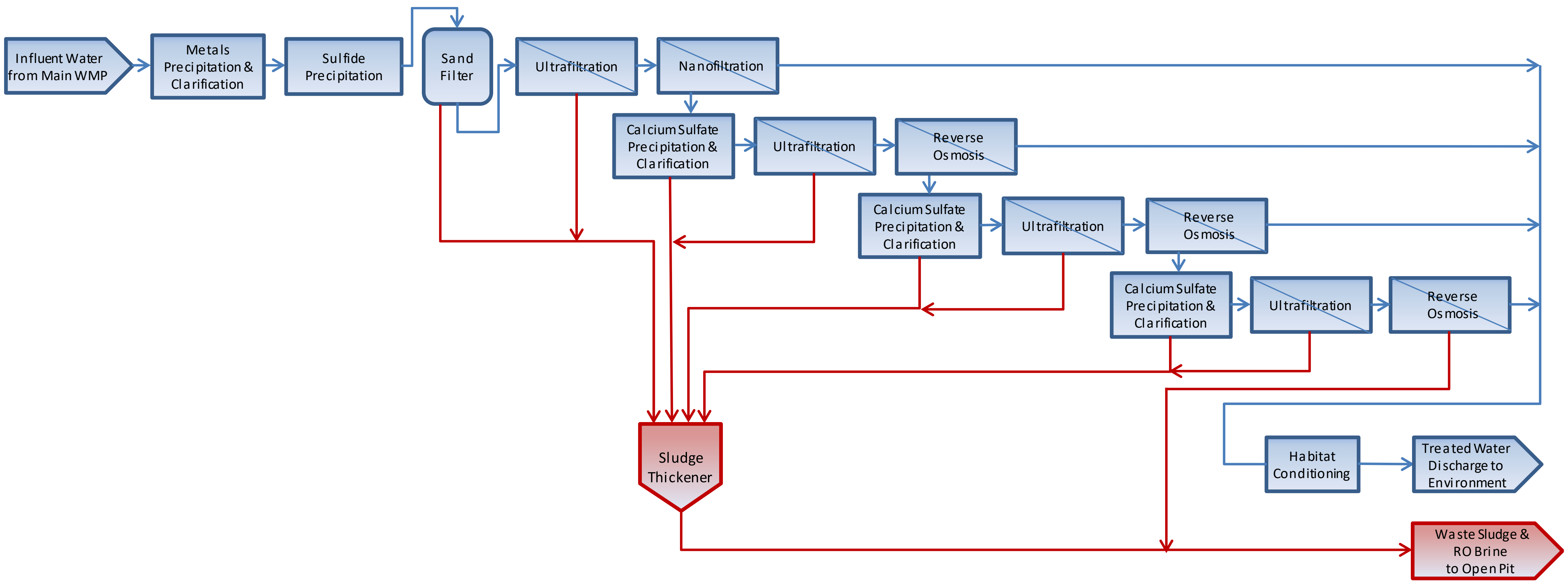

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FIGURE 4-4

Water Treatment Plant #2:
Closure Phase 1

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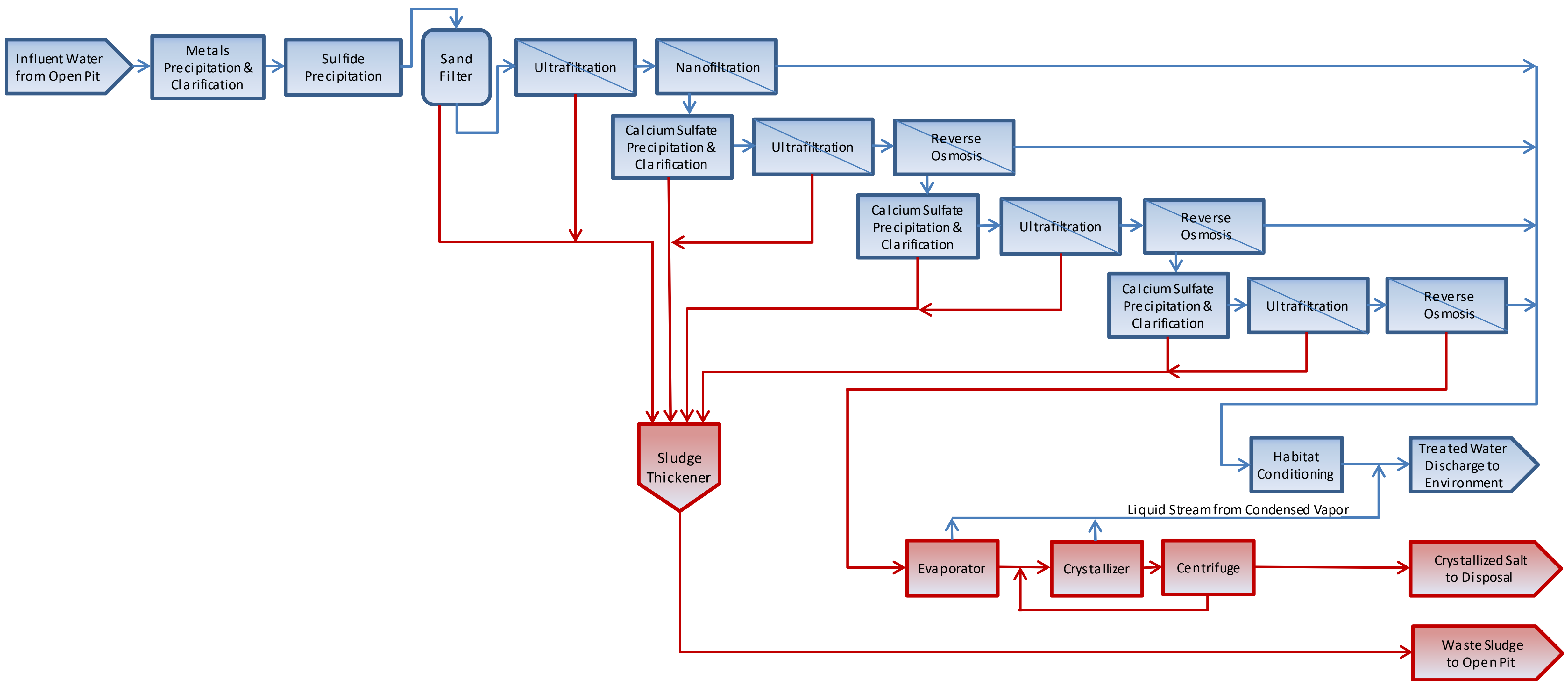

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FIGURE 4-5

Water Treatment Plant #3: Closure Phase 1

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Rev: 0	Author: HDR

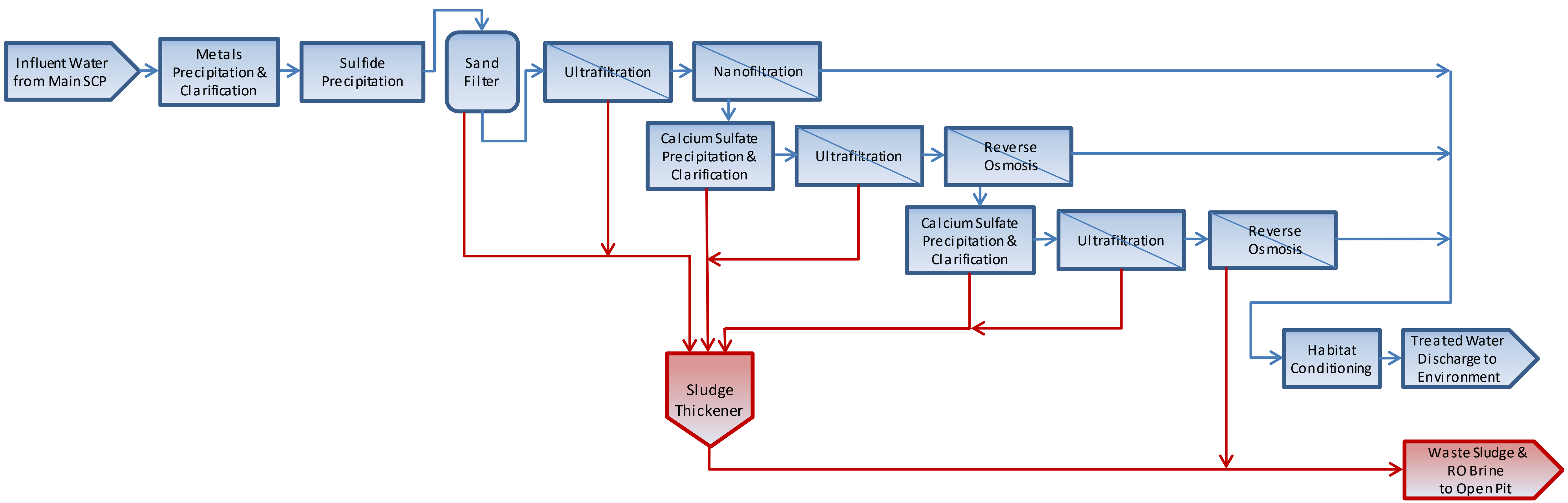

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FIGURE 4-6

Water Treatment Plant #3: Closure Phases 3 & 4 – Main SCP Stream

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

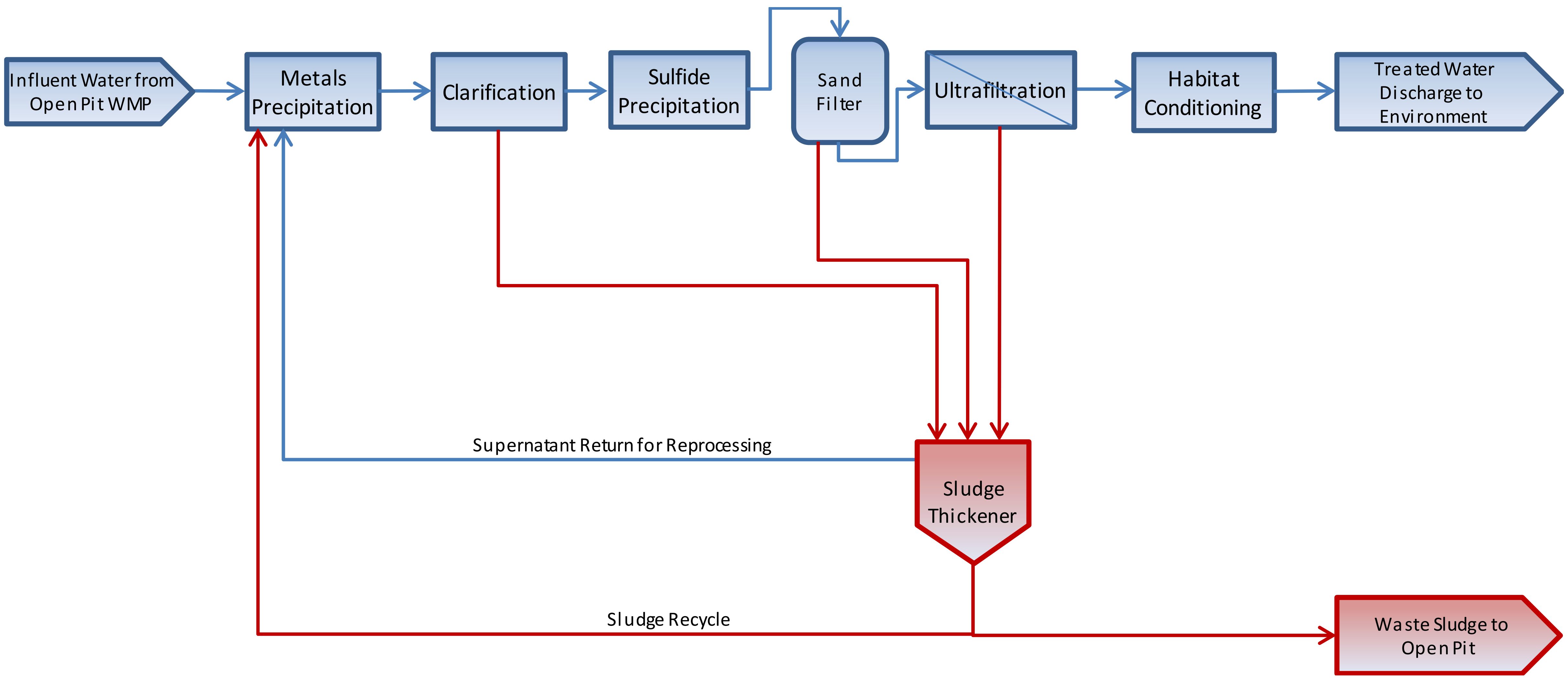

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FIGURE 4-7

Water Treatment Plant #3: Closure Phases 3 & 4 – Open Pit Stream

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

5. PROJECT CONSTRUCTION

The Project will take approximately four years to construct. Construction will occur on the four main project components – mine site, transportation corridor, Diamond Point Port, and natural gas line across Cook Inlet, with the focus shifting between these components depending on the stage of construction. Several temporary elements will be built during the Preproduction Phase to facilitate construction of the permanent facilities. These temporary facilities will be either repurposed or removed and reclaimed when construction is complete.

5.1. Construction Overview

5.1.1. Site Access

Key first steps will be to establish transportation infrastructure to access the site, to install those environmental protection systems that will service the Preproduction Phase, and to construct temporary facilities that enable the construction crews to live and work at the sites.

The initial construction effort will be at the Diamond Point Port. Existing beaching areas at Williamsport and Diamond Point will be used to land equipment and supplies and a temporary camp will be established to support construction. Temporary diesel generators will be used for power supply.

The existing Pile Bay/Williamsport road will be utilized to transport equipment and supplies for initial construction of the road alignment along the north shore of Iliamna Lake while the port facilities and road along Iliamna Bay's west side are being constructed. Additional equipment would be shipped by barge from Pile Bay to Iliamna/Newhalen so that work can commence on the western portions of the access road at the same time.

Initial access to the mine site should be complete within one year.

5.1.2. Mine Site

Construction activities will commence at the mine site with completion of the initial access and the construction of temporary accommodation and service facilities. Earthworks will be the primary initial activity. The level of this activity will expand over the next year, with structure construction commencing as the associated earthworks are complete. The focus will be on establishing the process and power plant sites, the open pit WMP, the main WMP, the pyritic TSF, and the bulk TSF. Support facilities, such as accommodations, fuel storage, and power generation, will expand as the site activity increases. Laydown areas and access roads for construction will be placed within the future footprint of the facilities to minimize impacts.

Following on from this, process plant and power plant foundations will be well advanced and equipment deliveries commenced. The accommodations facility will be completed for construction and access roads built. The initial bulk TSF main embankment construction will be well advanced, with the goal of ensuring that at least one year's worth of water is stored to facilitate process plant startup.

The later construction years will entail significant activity at the site. During this period, the bulk TSF main embankment will be completed, the process plant building erected, and pyritic TSF foundation and liner installed. The WTPs will be ready for initial use and the power plant construction advanced. The initial open pit development will commence with mine service facilities constructed and initial pit dewatering systems installed and operating. Production mining equipment will be delivered and commissioned as required.

A major activity during the final year of construction will be the open pit Preproduction Phase mining. The remaining process and power plant construction will be completed, as will the remaining embankments in the TSF.

5.1.3. Gas, Concentrate, and Water Return Pipelines

The natural gas line installation will be the other major activity occurring during the second and third construction years. Four separate centers will comprise the gas pipeline: the compressor station and transition section on the Kenai Peninsula, the marine section between the Kenai Peninsula and Ursus Cove, the section crossing Ursus Head and the head of Cottonwood Bay, and the overland section along the road. These activities can generally proceed independently of each other, with a target of having natural gas to the mine site by the end of the third construction year.

The concentrate and water return pipelines between the mine site and the port would be constructed at the same time as the road segment of the gas pipeline. Pumping facilities at the mid-point pumping station would also be constructed during this time period.

5.2. Commissioning Overview

Following construction, the process plant undergoes the following activities to transfer the project from a construction site to a fully operational process plant.

5.2.1. Construction Completion

In the lead up to the completion of the construction phases, pipelines will be pressure tested and all mechanical, civil, structural and electrical installations will be checked to ensure that they are installed according to design and can operate safely. The completions process includes structured and rigorous Quality Assessment and Quality Control procedures to resolve any remaining construction issues prior to pre-commissioning.

5.2.2. Pre-commissioning

This phase involves the testing and inspection of individual plant sub-systems, and associated equipment and facilities to confirm that they are safe and ready for the wet commissioning stage. This includes things such as motor rotations, testing and energisation of power and control systems, field instrument calibrations and adjustments, verification of safety devices and alarms, and first fills of lubricants. Testing of safety systems may involve unit process emergency procedures and live testing.

5.2.3. Wet Commissioning

During wet commissioning, plant operations are simulated, using water where applicable, to test equipment, piping, instrumentation and control systems, and interlocking to the maximum extent possible prior to the introduction of mineralized material. The water testing will check that fluid systems perform to their design intent and meet their design specifications prior to the introduction of mineralized material during process commissioning.

5.2.4. Process Commissioning

This phase comprises the initial operation of the plant facilities using mineralized material and process reagents. The objective is to have the process plant operating in a steady and consistent manner prior to the ramp-up phase. During this phase, differing results or any unforeseen issues with the scale up from test work to full-scale operation of the process plant will be identified. During this phase, plant or infrastructure modifications, or process reconfiguration, may be required to improve the process or enhance efficiency.

5.2.5. Ramp Up

The ramp-up phase may last several months, during which the process plant will be ramped up to its full design capacity and performance levels. This phase may also entail infrastructure modifications or process reconfiguration as identified by the commissioning and operations teams.

5.3. Temporary Facilities

Many of the facilities installed during initial construction activities will be converted to permanent use. However, a number of these will be decommissioned and removed during or following construction.

The initial construction camps at the Diamond Point Port and mine site will likely be fabric-covered or transportable facilities. The construction camp at the mine will be located near the mill laydown area. The construction camp at the port will be located in an area that will be used for port operations and will not require a separate footprint. Temporary camps will be established to support road construction and will remain in place until pipeline construction is complete. Existing facilities in Iliamna and Newhalen will also be utilized. During the exploration phase, PLP employed more than 200 staff in Iliamna/Newhalen in these existing accommodations. Until the access road crossing the Newhalen River is complete, the crews will either be bused on existing roads to their workplaces or shuttled to their workplaces by helicopter.

The temporary construction camp at the mine site will be expanded during the initial phase of construction at this location. Construction crews will utilize this camp and the permanent accommodations complex when it is complete. As construction is completed and crew sizes reduce, they will transition to the temporary camp only. This will enable the accommodations complex to be refurbished to single-room occupancy for the mine operations staff.

All temporary construction facilities will be removed after construction, and the sites, unless being used for permanent facilities, will be reclaimed.

5.4. Environmental Protections During Construction

5.4.1. Wastewater and Stormwater

Appropriate ADEC discharge permits or authorizations under general permits will be obtained for all wastewater discharges prior to construction. Stormwater runoff will be properly controlled at all construction sites using structural and non-structural BMPs. No construction will begin without coverage under applicable ADEC general stormwater permits and an approved stormwater pollution prevention plan. Routine inspections and monitoring will ensure the proper functioning of all stormwater BMPs throughout the construction period.

5.4.2. Fuel Management

Fuel management will include appropriate containment and practices, in accordance with ADEC and EPA regulations and approved spill prevention and response plans. Construction equipment and construction-camp power generation will use diesel fuel. Diesel storage will include a variety of tank types and sizes ranging from approximately 10,000 to 50,000 gallons. Aviation fuel for helicopters will be stored at the mine site, Diamond Point Port, and other satellite locations as necessary. Fuel will be distributed to the smaller camps and individual work sites from the main storage locations by fuel truck.

5.4.3. Wildlife Management

PLP will develop a Wildlife Interaction Plan management plans to minimize human-wildlife interactions and resolve conflicts. All employees and contractors will receive wildlife education and training as part of their orientation. The U.S. Fish and Wildlife's national bald eagle management guidelines will be followed to the extent practicable to minimize any potential for disturbance or impacts. A nest relocation or non-purposeful take permit will be requested only when work cannot be limited in the vicinity of a protected nest.

Protection of marine mammals will be addressed through the Marine Mammal Protection Act (MMPA) and PLP will follow the requirements of any authorizations issued under the MMPA.

5.4.3.1 Environmental Construction Windows

Work in anadromous fish streams will comply with Anadromous Fish Act regulations, ADF&G guidance, and ADNR lease requirements. Resident fish will require site-specific protections under the Alaska Fish Passage Act. Stream surveys conducted as part of the environmental baseline studies will inform the establishment of permit conditions. Mitigation measures will be determined during the permitting process.

Ground-clearing activities will be conducted prior to construction work and will be timed to avoid bird-nesting periods in accordance with the U.S. Fish and Wildlife Service's Migratory Bird Treaty Act guidance. Nesting periods are generally spring and summer but vary according to habitats and species.

5.4.3.2 Helicopter Protocols

PLP protocols to ensure that helicopters and fixed-wing planes do not harass wildlife have been well established during the exploration phase of the project. These protocols, listed below, will remain in place throughout construction and the life of the mine.

- Do not harass or pursue wildlife.
- Fly 500 feet above ground level or higher when possible and safe to do so.
- When wildlife (especially bears, caribou, moose, wolves, raptor nests, flocks of waterfowl, seabirds, or marine mammals) are observed, avoid flying directly overhead and maximize lateral distance as quickly as possible.

5.4.3.3 Hunting and Fishing Restrictions

PLP employees and contractors will not be allowed to fish, hunt, or gather while on their work rotation during the construction and operation of the Pebble Project facilities.

6. CLOSURE AND RECLAMATION

PLP's core operating principles are governed by a commitment to conduct all mining operations, including reclamation and closure, in a manner that adheres to socially and environmentally responsible stewardship while maximizing benefits to state and local stakeholders. PLP has adopted a philosophy of "design for closure" in the development of the Project that incorporates closure and long-term post-closure water management considerations into all aspects of the project design to ensure that all regulatory requirements, as well as private landowner obligations, are met at closure.

Considerations incorporated into the project design include:

- A separate pyritic TSF allows potentially acid generating tailings and PAG/ML waste rock to be relocated into the open pit and stored sub-aqueously during closure, preventing acid mine generation from this material and allowing reclamation of the pyritic TSF footprint.
- Quarried and waste rock will be geochemically tested prior to being used in construction to avoid the potential for contaminated drainage during operations and post-closure.
- Growth media and overburden will be salvaged during construction for use as growth medium during reclamation.
- TSF embankment slopes will be 2.6H:1V to provide long-term stability and facilitate the placement of growth medium.
- The overall project footprint will be minimized to facilitate physical closure and post-closure water management.

Reclamation and closure of the Project falls under the jurisdiction of the ADNR Division of Mining, Land, and Water, and the ADEC. The Alaska Reclamation Act (Alaska Statute 27.19) is administered by the ADNR; it applies to state, federal, municipal, and private land and water subject to mining operations. Except as provided in an exemption for small operations, a miner may not engage in a mining operation until the ADNR has approved a reclamation plan for the operation. The landowner participates in the planning process with regard to determining and concurring with the designated post-mining land use.

6.1. PHYSICAL RECLAMATION AND CLOSURE

The physical site closure work will commence as operations end.

- Active mining stops. Pit dewatering rates will be adjusted to maintain water levels in the pit at levels that provide safe access for placement of pyritic tailings and PAG waste rock.
- Pyritic tailings and PAG waste rock will be placed into the pit for long term storage below water. Once the material has been transferred to the open pit, pit dewatering

will cease and the water will be allowed to rise to the maximum management level. The mill, pyritic TSF, main WMP, and other infrastructure not required for post-closure will be removed and/or reclaimed.

- The bulk tailings will have a dry closure and be allowed to fully consolidate. Once runoff is demonstrated to meet water quality criteria it will be directly discharged to the NFK catchment area. Bulk TSF seepage water will be pumped to the WTP.
- Once the open pit water level reaches the maximum management level, dewatering will recommence to maintain the water level, ensuring inward flow of surrounding groundwater and prevent contact water from getting into the groundwater.
- Once physical closure activities are completed, site access infrastructure will be reconfigured to support long-term post closure activities.

All mill and support facilities not required for post-closure, including the pyritic TSF, main WMP, and open pit WMP embankments and liners, will be dismantled and removed. Concrete pads and foundations will be broken up so that they do not act as an impermeable impediment to water flows. Inert materials will be disposed of in an on-site monofill that will be sited within the disturbed footprint, while others will be shipped off site for disposal as appropriate. Disturbed areas will be recontoured, graded, ripped, and scarified. Topsoil and growth media will be placed as needed, and sites will be seeded for revegetation. Surface runoff from the disturbed areas will be collected and either treated in the WTPs or directed to the pit lake until it is found to be suitable for direct discharge to the downstream drainages.

A spillway will be constructed from the bulk TSF. Late in the operating phase, tailings in the bulk TSF will be spigoted to allow for surface drainage toward the closure spillway. As milling operations cease, free water will be pumped from the surface of the bulk tails, and they will be allowed to consolidate until the surface is suitable for equipment traffic on the surface. The tails will be re-graded as needed to facilitate drainage. A capillary break and growth media will be placed over the surface of the tails prior to seeding for revegetation. Growth media will also be placed on the bulk TSF embankments prior to seeding for revegetation.

Seepage water from the bulk TSF embankment seepage collection systems will be collected and directed to the pit lake.

The road system will be retained as long as required for the transport of bulk supplies needed for long-term post-closure water treatment and monitoring. The concentrate and return water pipelines will be pigged and cleaned before being abandoned in place. Surface facilities associated with the pipelines will be removed and reclaimed. The Diamond Point Port facilities will be removed, except for those required to support shallow draft tug and barge access to the dock for the transfer of bulk supplies. The natural gas pipeline will be maintained until such time as it is no longer required to provide energy to the project site. If no longer required, the pipeline will be pigged and cleaned before being abandoned in place or removed, subject to the regulatory review and approval at the decommissioning stage of the project. Surface facilities associated with the pipeline will be removed and reclaimed.

6.2. POST-CLOSURE MANAGEMENT

The pit lake will fill during the closure period. Surface runoff from the walls will result in leaching of accumulated metals from the walls. The pit lake is expected to stratify during the closure period with surface waters retaining a neutral to slightly basic pH over time. Water quality parameters showing predictions that exceed discharge limits include hardness and several trace elements (Al, As, Cd, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se, and Zn). Pit lake water quality will be monitored, and appropriate precautions will be taken to manage wildlife activity on the lake. Once the level of the pit lake has risen to about 890 feet elevation, water will be pumped from the pit, treated as required, and discharged to the environment. By maintaining the water level at this elevation, which is at least 50 feet below the elevation at which groundwater flow would be directed outward from the open pit, upset conditions resulting in an unplanned discharge can be avoided, as there is time to address any problems with the WTP before flows reverse.

Long-term discharge from the bulk TSF seepage collection systems will be pumped to the WTP.

6.3. FINANCIAL ASSURANCE

Prior to commencing construction, the Project Reclamation and Closure Plan approval and associated financial assurance mechanisms will need to be in place. The Reclamation and Closure Plan and financial assurance obligations will be updated on a 5-year cycle in accordance with regulatory requirements to address any changes in closure and post-closure requirements and cost obligations.

A detailed reclamation and closure cost model will be developed to address all costs required for both the physical closure of the Project and the funding of long-term post closure monitoring, water treatment, and site maintenance. The estimate will include the costs of closure planning and design, and mobilization of third-party equipment to site; detailed estimates of equipment and labor requirements for physical closure; capital, sustaining capital, and operating costs for water treatment and other long-term post-closure operations; and appropriate indirect costs and contingencies developed following ADNR guidance.

7. ENVIRONMENTAL PERMITTING

Numerous environmental permits and plans will be required by federal, state, and local agencies. PLP will work with applicable permitting agencies and the State of Alaska large mine permitting team to provide complete permit applications in an orderly manner.

Because the Pebble Project involves a federal permit—U.S. Army Corps of Engineers Section 404/10 permit for the filling of wetlands and placement of structures in navigable waters—the provisions of NEPA will apply to this Project. There are provisions within NEPA, as well as within the permitting processes for many of the individual permits, that will provide for public review and comment on the Project.

Table 7-1 lists the types of permits that are expected to be required for the Pebble Project. Multiple permits of certain types may have to be applied for to accommodate the full scope of facilities.

Table 7-1. Environmental Permits Required for the Pebble Project

Agency	Approval Type	Project-related Examples
Federal		
BATF	License to Transport Explosives	Construction explosives acquisition and use
	Permit and License for Use of Explosives	Construction explosives acquisition and use
BSEE	Right-of-Way Authorization for Natural Gas Pipeline	Subsea natural gas pipeline in OCS waters
DHS	Airport Security Operations Plan	Iliamna Airport
	Port Facility Security Coordinator Certification	Port site
	Port Security Operations Plan	Port site
EPA	Facility Response Plan (required to be submitted to EPA, however EPA does not provide plan approvals)	Fuel storage facilities, fuel transport on the mine roadway
	RCRA Registration for Identification Number	Storage and disposal of hazardous wastes
	Spill Prevention, Control, and Countermeasure (SPCC) Plan (SPCC plans are not required to be submitted or approved by EPA. The plan will be reviewed and certified by a Professional Engineer licensed in Alaska)	Fuel storage facilities

Agency	Approval Type	Project-related Examples
FAA	Notice of Controlled Firing Area for Blasting	Construction and mining blasting activity
FCC	Radio License	Radios
MSHA	Mine Identification Number	Mine site
	Notification of Legal Identity	Mine site
NMFS	Magnuson-Stevens Fishery Conservation and Management Act Consultation documentation	Necessary in areas where mine, road, or port site activity affect essential fish habitat
USACE	Clean Water Act Section 404 permit for Discharge of Dredge or Fill Material into Waters of the U.S.	Fill into wetlands for a variety of facilities at the mine, road, pipelines, port site
	Rivers and Harbors Act Section 10 Construction of any structure in or over any Navigable Waters of the U.S.	Road bridges and causeway; port site docking and ship-loading facilities and maintenance dredging.
USCG	Facility Response Plan	Fuel storage facilities
	Fuel Offloading Plan; Person in Charge Certification	Offloading fuel from barges at the port
	Hazardous Cargo Offloading Plan; Port Operations Manual Approval	Offloading hazardous cargo from ships
	Navigation Lighting and Marking Aids Permit	Port facilities
	Rivers and Harbors Act Section 9 Construction Permit for a Bridge or Causeway across Navigable Waters	Bridge along road
USDOT	Registration for Identification Number to Transport Hazardous Wastes	Transport of hazardous wastes to approved disposal site
USFWS	Bald and Golden Eagle Protection Act Programmatic Take Permit	May be necessary in areas where mine, road, or port site activity may disturb eagles
	Migratory Bird Treaty Act Consultation documentation	May be necessary in areas where mine, road, or port site activity may disturb migratory birds

Agency	Approval Type	Project-related Examples
USFWS/NMFS	Endangered Species Act Incidental Take Authorization	May be necessary at the port site and for sub-sea pipeline construction where activities could disturb northern sea otter, Beluga whale, Steller sea lion, Steller's eider
	Marine Mammal Protection Act Incidental Take Authorization; Letter of Authorization	May be necessary at port site where activities could disturb northern sea otter, Beluga whale, Steller sea lion, harbor seal, Dall's porpoise
State		
ADEC	Alaska Solid Waste Program Integrated Waste Management Permit/Plan Approval	Tailings disposal, waste rock disposal, landfills
	Reclamation Plan Approval and Bonding	Required prior to construction.
	Alaska Solid Waste Program Solid Waste Disposal Permit; Open Burn Permit	Construction waste material disposal
	Clean Water Act Section 402 Alaska Pollutant Discharge Elimination System Water Discharge Permit	Water discharges from water treatment plans at the mine site.
	Approval to Construct and Operate a Public Water Supply System	Mine and port, and construction camps
	Clean Air Act Air Quality Control Permit to Construct and Operate – Prevention of Significant Deterioration	Power plant and other non-mobile air emissions; fugitive dust; applicable to mine, road, and port
	Clean Air Act Title V Operating Permit	Power plant and other non-mobile air emissions; fugitive dust; applicable to mine and road
	Clean Air Act Title I Operating Permit	Non-mobile air emissions; stationary sources, fugitive dust; applicable to port and Kenai compressor station
	Clean Water Act Section 401 Certification	Certification of the Section 404 Permit.
	Clean Water Act Section 402 Stormwater Construction and Multi-Sector General Permit; Stormwater Discharge Pollution Prevention Plan	Surface water runoff discharges at mine, road, and port site
	Food Sanitation Permit	Mine and port, and construction camps

Agency	Approval Type	Project-related Examples
	Oil Discharge Prevention and Contingency Plan (ODPCP or "C" Plan)	Fuel storage and transfer facilities, port and mine
ADF&G	Fish collection permits for monitoring	Required for construction and monitoring
	Fish Habitat Permit	Required for most work in anadromous streams and for most work in resident fish streams that might affect fish passage.
ADNR	Alaska Dam Safety Program Certificate of Approval to Construct a Dam	Tailings dam, seepage control dams
	Alaska Dam Safety Program Certificate of Approval to Operate a Dam	Tailings dam, seepage control dams
	Reclamation Plan Approval and Bonding	Required prior to construction.
	Lease of other State Lands	Any miscellaneous other state lands to be used by the Pebble Project – none identified at this time
	Material Sale on State Land	Materials removed from quarry sites for construction
	Mill Site Permit	All facilities on state lands
	Mining license	All facilities on state lands
	Miscellaneous Land Use Permit	All facilities on state lands
	National Historic Preservation Act Section 106 Review	Area of Potential Effect
	Pipeline Rights-of-Way Lease	Natural gas, concentrate, and water return pipelines on State lands and natural gas pipeline in State waters
	Fiber Optic Cable Right-of-Way Lease	Fiber Optic Cable on State lands and in State waters
	Powerline Right-of-Way Lease	Powerlines to support electric power distribution
	Road Right-of-Way Lease	Road between mine and port site
	Temporary Water Use Permit; Permit to Appropriate Water	Surface and groundwater flow reductions
	Tidelands Lease	Port structures below high tide line
	Upland Mining Lease	All facilities on state lands

Agency	Approval Type	Project-related Examples
ADOL	Certificate of Inspection for Fired and Unfired Pressure Vessels	
ADOT&PF	Driveway Permit	Road
	Utility Permit on Right-of-Way	Natural gas pipeline on the Kenai Peninsula
ADPS	Approval to Transport Hazardous Materials	Transport of hazardous materials along the road
	Life and Fire Safety Plan Check	Mine and port
	State Fire Marshall Plan Review Certificate of Approval	For each individual building
Local		
KPB	Conditional Use Permit	
	Floodplain Development Permit	
	Multi-Agency Permit Application	
L&PB	Lake and Peninsula Borough Development Permit	Mine and road area within the Lake and Peninsula Borough

ADEC = Alaska Department of Environmental Conservation
ADF&G = Alaska Department of Fish and Game
ADOT/PF = Alaska Department of Transportation and Public Facilities
ADPS = Alaska Department of Public Safety
BATF = U.S. Bureau of Alcohol, Tobacco, and Firearms
BSEE = Bureau of Safety and Environmental Enforcement
DHS = U.S. Department of Homeland Security
EPA = U.S. Environmental Protection Agency
FAA = Federal Aviation Administration
FCC = Federal Communications Commission
FERC = Federal Energy Regulatory Commission
L&PB = Lake and Peninsula Borough
MSHA = U.S. Mine Safety and Health Administration
NMFS = National Marine Fisheries Service
RCRA = Resource Conservation and Recovery Act
SHPO = State Historic Preservation Officer
USACE = U.S. Army Corps of Engineers
USCG = U.S. Coast Guard
USDOT = U.S. Department of Transportation
USFWS = U.S. Fish and Wildlife Service

From:	James Fueg
To:	POA Special Projects
Cc:	Tim Havey; Bill Craig
Subject:	[Non-DoD Source] Updated Project Description and GIS Footprint
Date:	Friday, May 8, 2020 9:43:54 PM
Attachments:	PLP_PreferredAlt_2020508.gdb.zip PD Update Alt 3 Final_20200508.pdf

Mr. McCoy

Attached please find PLP's updated PD and associated GIS footprint.

Thanks,

James

James Fueg

Vice President - Permitting

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THE pebble PARTNERSHIP

Pebble Project Description

POA-2017-271

Updated May 2020

Pebble Limited Partnership
3201 C Street, Suite 505
Anchorage, AK 99503

CONTENTS

TABLES

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
ADSP	Alaska Dam Safety Program
ANCSA	Alaska Native Claims Settlement Act
ANFO	ammonium nitrate and fuel oil
BMPs	best management practices
CFR	Code of Federal Regulations
cy	cubic yards
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
H:V	horizontal:vertical (horizontal to vertical)
IDF	Inflow Design Flood
ISO	International Organization for Standardization
ML	Metal Leaching
MMPA	Marine Mammal Protection Act
MW	megawatts
NEPA	National Environmental Policy Act
NFK	North Fork Koktuli River
NPAG	Non-Potentially Acid Generating
OCS	Outer Continental Shelf
PAG	Potentially Acid Generating
PHABSIM	Physical Habitat Simulation System
PMF	Probable Maximum Flood
PMP	Probably Maximum Precipitation
ROW	right-of-way
SAG	semi-autogenous grinding
SFK	South Fork Koktuli River
TSF	Tailings Storage Facility
TSS	Total suspended solids
USGS	U.S. Geological Survey
UTC	Upper Talarik Creek
WMP	Water Management Pond
WTP	Water Treatment Plant

1. PROJECT OVERVIEW

Pebble Limited Partnership (PLP) is proposing to develop the Pebble copper-gold-molybdenum porphyry deposit (Pebble Deposit) as an open-pit mine, with associated infrastructure, in southwest Alaska. This project description summarizes information about the environmental setting, engineered facilities and operations for the proposed Pebble Project (Project) from initial construction through closure and reclamation. It is intended to support the National Environmental Policy Act (NEPA) review process and other permitting efforts for the Project.

1.1. Pebble Project Summary Information[1]

- Project operating life of 20 years.
- A total of 1.44 billion tons of material mined over the life of the Project.
- Final pit dimensions of 6,800 feet in length, 5,600 feet in width, and 1,950 feet in depth.
- Mining rate up to 73 million tons per year, average rate of 70 million tons per year.
- Milling rate up to 66 million tons per year.
- Average annual copper-gold concentrate production (dry concentrate) of 613,000 tons.
- Average annual molybdenum concentration production (dry concentrate) of 15,000 tons.
- Final bulk tailings storage facility (TSF) capacity of 1,140 million tons.
- Temporary storage of 155 million tons of pyritic tails in the pyritic TSF.
- Temporary storage of up to 93 million tons of Potentially Acid Generating (PAG) and/or Metal Leaching (ML) waste rock in the pyritic TSF until closure.
- Power plant generating capacity of 270 megawatts (MW).
- Project operating schedule of two 12-hour shifts per day for 365 days per year.
- An 82-mile transportation corridor from the mine site to a year-round port site located north of Diamond Point in Iliamna Bay on Cook Inlet consisting of:
  - A private two-lane unpaved road that connects to the existing Iliamna/Newhalen road system.
  - A buried concentrate pipeline to transport copper-gold concentrate from the mine site to the port and a return water pipeline to the mine site.
- Bulk lightering of concentrate between the Diamond Point Port and an offshore lightering location in Iniskin Bay for loading onto bulk carriers.
- A port facility and jetty with docking for lightering and supply barges.

[1] Design criteria as presented are approximate and have been averaged and rounded as appropriate for ease of reference.

  - Annual vessel traffic of up to 27 concentrate vessels and 33 supply barges.
- A 164-mile gas pipeline from the Kenai Peninsula across Cook Inlet to the Project site with a compressor station on the Kenai Peninsula.
- Employment of 850 to 2,000 personnel for operations and construction, respectively.

1.2. Background

The Project is located on land acquired by the State of Alaska in 1974 via a three-way land swap with the federal government and Cook Inlet Region, Inc. The land was selected by the state specifically for its mineral development potential. The initial discovery of the Pebble Deposit was made in 1988 by Cominco Alaska, a division of Cominco Ltd. (Cominco). Cominco (later acquired by Teck Resources Limited) discontinued work on the project in 1997, and in 2001 the Pebble claims were optioned by a subsidiary of Northern Dynasty Minerals Ltd. (Northern Dynasty).

Northern Dynasty began exploring the property, with significant success, expanding the Pebble Deposit from one billion to four billion tons by the end of 2004. An extensive environmental baseline data collection program commenced in that year, as well as geotechnical investigation and preliminary engineering studies. In 2005, Northern Dynasty exercised its option to acquire the Project and in the same year discovered a significant, higher grade eastern extension to the deposit. Over the next seven years, the Pebble Deposit was expanded through drilling.

In 2007, Northern Dynasty formed PLP with another company and placed the Project into the partnership. Over the next six years, PLP continued to advance the Project through additional drilling, environmental data collection, and engineering studies. In 2013, the other company left PLP and it reverted to a wholly owned subsidiary of Northern Dynasty.

To date, more than one million feet of drilling has been conducted on the Pebble Deposit.

Products from mining this deposit can supply important mineral resources for alternative energy and other purposes of strategic national significance. The Pebble Deposit has significant regional economic importance for southwest Alaska and the entire state through the creation of high-wage jobs and training opportunities, supply and service contracts for local businesses, and government revenue.

1.3. Project Design Considerations

Plans for the design and operation of the Project have focused on the avoidance and minimization of environmental impacts to waterbodies, wetlands, wildlife and aquatic habitat, areas of cultural significance, and areas of known subsistence use and addressing stakeholder concerns. In addition to meeting or exceeding local, state, and federal regulatory requirements, the Project incorporates the following concepts into the design:

- The Project plan is to mine the near-surface portion of the Pebble Deposit. This has significantly reduced the footprint of the open pit, TSF, and mine facilities, as well as eliminated the need for a permanent waste rock storage facility.

- The layout is designed to consolidate the majority of site infrastructure in a single drainage – the North Fork Koktuli River (NFK) – and avoid placing waste rock or tailings in the Upper Talarik Creek (UTC) drainage.
- The Diamond Point Port design includes a caisson-supported dock facility rather than an earth-filled causeway or pile-supported dock. The caisson design significantly reduces the Waters of the US footprint compared to an earth-filled design, and effectively eliminates in-water impact noise generated by pile driving that might adversely affect sensitive marine species.
- A natural gas pipeline and gas-fired electrical generation are being used to power the Project, thereby eliminating the need to transport and store large amounts of diesel fuel for power generation.
- To address stakeholder concerns regarding the transportation and use of cyanide, there is no secondary recovery of gold from the pyritic tailings using a cyanide leach.

The Project adopts a design-for-closure philosophy that considers closure and post-closure site management requirements during all operating phases. Examples include:

- Segregated storage facilities for bulk and pyritic tailings. Bulk tailings will remain in place at closure.
- A lined pyritic TSF. PAG and ML waste rock will be stored with pyritic tailings in the lined pyritic TSF during operations. At closure the stored waste rock will be backhauled to the pit and the pyritic tailings pumped to the pit for sub-aqueous storage in the pit lake. Storage of PAG/ML waste rock and pyritic tailings within the pit lake will avoid post-closure management of the pyritic TSF.

The Project has a comprehensive water management plan that utilizes strategic discharge of surplus treated water to downgradient streams to reduce the effect of stream flow fluctuations and minimize impacts to fish habitat.

1.4. Project Areas

The Project is located in a sparsely populated region of southwest Alaska near Iliamna Lake, within the Lake and Peninsula and Kenai Peninsula boroughs (Figure 1-1). The Project comprises four primary components: the mine site at the Pebble Deposit location, the port site at Diamond Point on Cook Inlet, the transportation corridor connecting these two sites, and a natural gas pipeline connecting to existing infrastructure on the Kenai Peninsula.

The transportation corridor consists of a road, concentrate pipeline, and return water pipeline from the mine site to the Diamond Point Port at the entrance to Iliamna Bay on Cook Inlet. The road will intersect the existing road network and connect the mine site to the villages of Iliamna and Newhalen (Figure 1-2). The gas pipeline will tie into existing gas supply infrastructure at Anchor Point on the Kenai Peninsula, cross Cook Inlet and come ashore at Ursus Cove, then cross Ursus Head and Cottonwood Bay to the Diamond Point port. From the port the pipeline will parallel the access road to the mine site (Figure 1-1 and Figure 1-2).

The Bristol Bay watershed encompasses approximately 41,900 square miles and is defined by the Alaska Range to the east and southeast, the Kuskokwim Mountains to the west, and a range of hills to the north that separate it from the Kuskokwim River watershed. The largest rivers that drain into Bristol Bay are the Nushagak and Kvichak rivers, which together drain 49 percent of the Bristol Bay watershed, or approximately 20,000 square miles (Figure 1-3).

1.4.1. Mine Site

The Pebble Deposit is located under rolling, permafrost-free terrain in the Iliamna region of southwest Alaska, approximately 200 miles southwest of Anchorage and 60 miles west of Cook Inlet. The closest communities are the villages of Iliamna, Newhalen, and Nondalton, each approximately 17 miles from the Pebble Deposit (Figure 1-2).

The fully developed mine site will include the open pit, bulk TSF, pyritic TSF, overburden stockpiles, material sites, water management ponds (WMPs), milling and processing facilities, and supporting infrastructure such as the power plant, water treatment plants, camp facilities, and storage facilities (Figure 1-4).

The site is currently undeveloped and not served by any transportation or utility infrastructure.

1.4.2. Diamond Point Port and Lightering Locations

The port site (Figure 1-5) will be located north of Diamond Point in Iliamna Bay on the western shore of Cook Inlet, approximately 165 miles southwest of Anchorage and approximately 75 miles west of Homer.

The port site will include shore-based and marine facilities for the shipment of concentrate, freight, and fuel for the Project. The shore-based facilities will include facilities for the dewatering of the concentrate and the receipt and storage of freight containers. Other facilities will include fuel storage and transfer facilities, power generation and distribution facilities, a pump station for the return water pipeline, maintenance facilities, employee accommodations, and offices.

The natural gas pipeline from the Kenai Peninsula will have an offtake to distribute natural gas to the port power generation facility.

The marine component includes a concrete caisson-supported access causeway, marine jetty, and barge loader with a 18-foot deep dredged access channel. Dredged material will be stored in on-shore stockpiles.

The port site area is not served by any surface transportation or utility infrastructure.

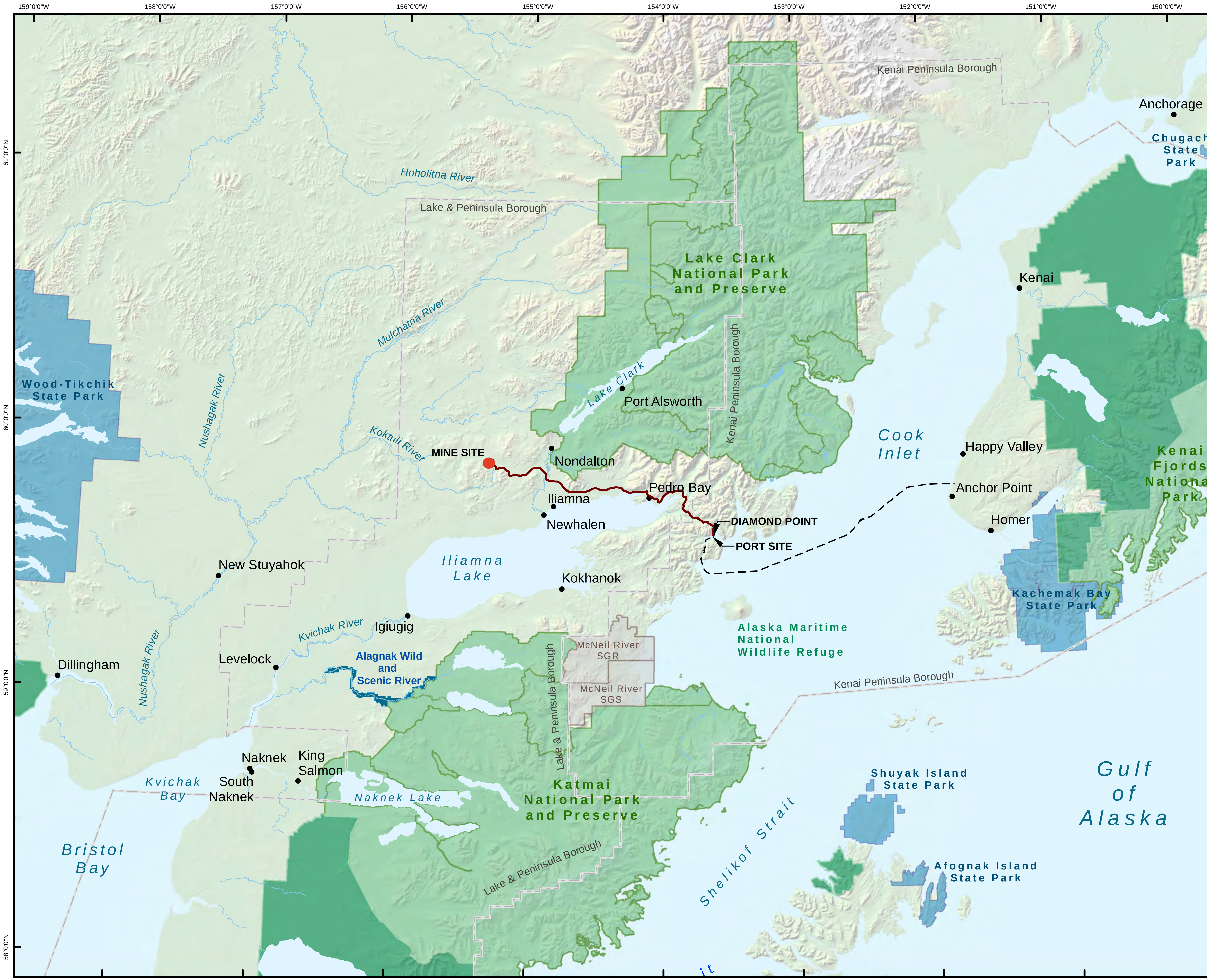
Copper-gold concentrate will be loaded onto lightering barges using an enclosed conveyor system at the Diamond Point Port and then transported to the lightering location in Iniskin Bay approximately 8 miles from the port (Figure 1-5) for transfer to bulk carriers.

1.4.3. Transportation Corridor

The transportation corridor, which will connect the mine site to the Diamond Point Port on Cook Inlet consists of a private, unpaved two-lane road heading 80 miles east from the mine site to the Diamond Point Port in Iliamna Bay with three pipelines buried in a corridor next the road. The State of Alaska operates an existing road between Williamsport on Iliamna Bay and Pile Bay on Iliamna Lake. The proposed road will parallel that existing road for approximately 4.5 miles from Williamsport and will then replace the existing road for approximately 6.5 miles from that point until the existing road turns toward Pile Bay. The proposed road to the mine also intersects the existing road network for the villages of Iliamna and Newhalen.

1.4.4. Natural Gas Pipeline Corridor

Natural gas, sourced through the existing natural gas supply infrastructure for the Cook Inlet area, will be the primary energy source for the Pebble Project. The gas pipeline alignment (Figure 1-1) will connect to existing infrastructure north of Anchor Point. Gas will be taken from the existing pipeline along the Sterling Highway and sent to a compressor station. From the compressor station, the pipeline heads southwest across Cook Inlet, before turning west to a landfall at Ursus Cove. The pipeline crosses Ursus Head and Cottonwood Bay before joining the transportation corridor at the Diamond Point Port.



THE pebble PARTNERSHIP

FIGURE 1-1

Regional Map

- Mine Site
- Transportation Corridor
- Natural Gas Pipeline
- National Park
- National WIldlife Refuge
- Alaska State Park
- Wild and Scenic River
- State Game Refuge/Sanctuary
- Borough Boundary

0 15 30 45 Miles

N

Scale 1:1,600,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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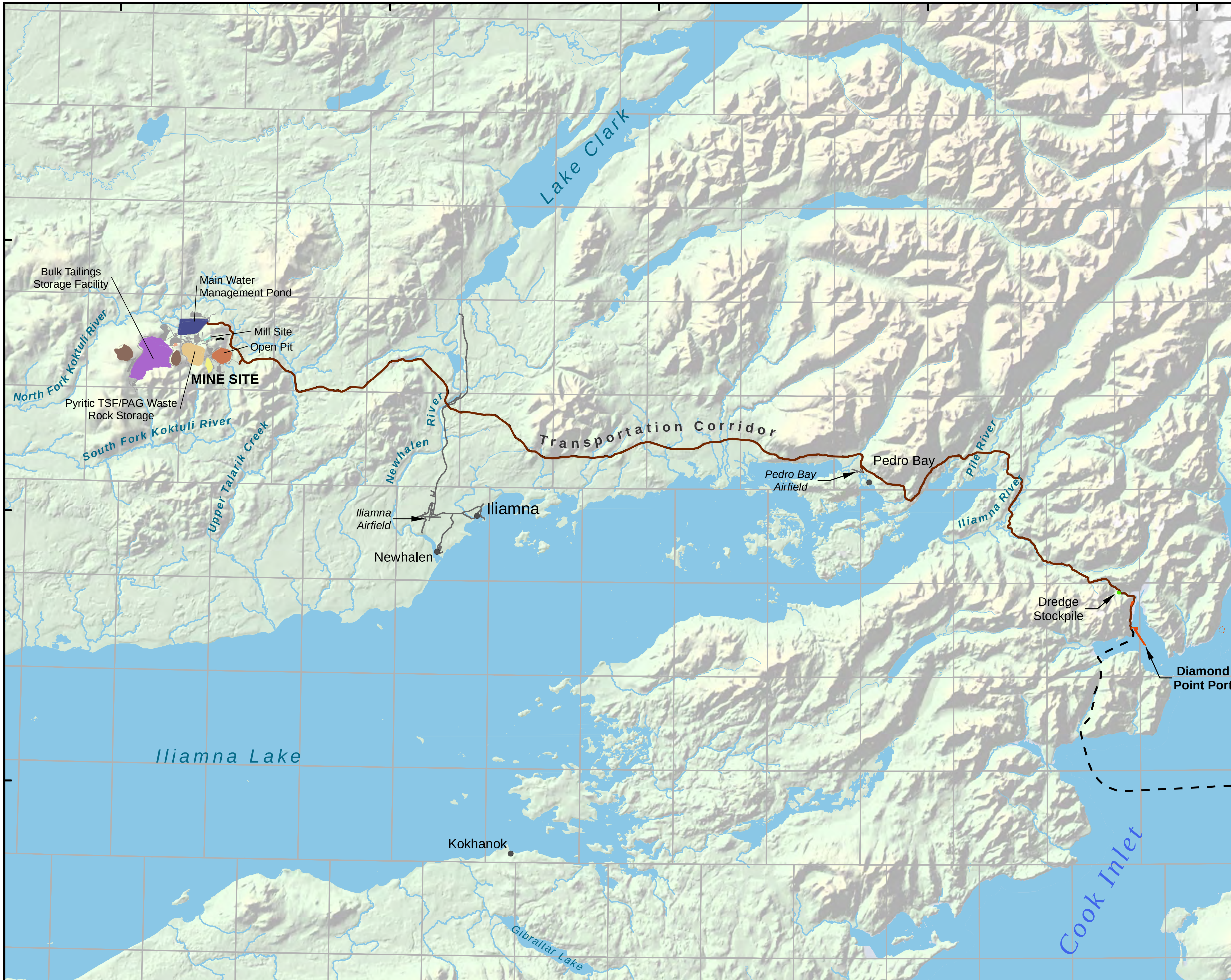
Version: x	Author: HDR



THE pebble PARTNERSHIP

FIGURE 1-2

Project Area

- Bulk Tailings Storage Facility
- Water Managment Pond
- TSF Laydown
- Pyritic TSF/PAG Waste Rock Storage
- Open Pit
- Overburden Stockpile
- Mill Site Process Plant
- Quarry
- Port Site Features
- Dredge Material Stockpile
- Transportation Corridor
- Natural Gas Pipeline
- Existing Roads
- Township Boundary

Miles
0 5 10 15

N

Scale 1:400,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: PLP_PD_1_2_ProjectArea_Alt3_202005.mxd	Date: 5/8/2020
Version: x	Author: HDR

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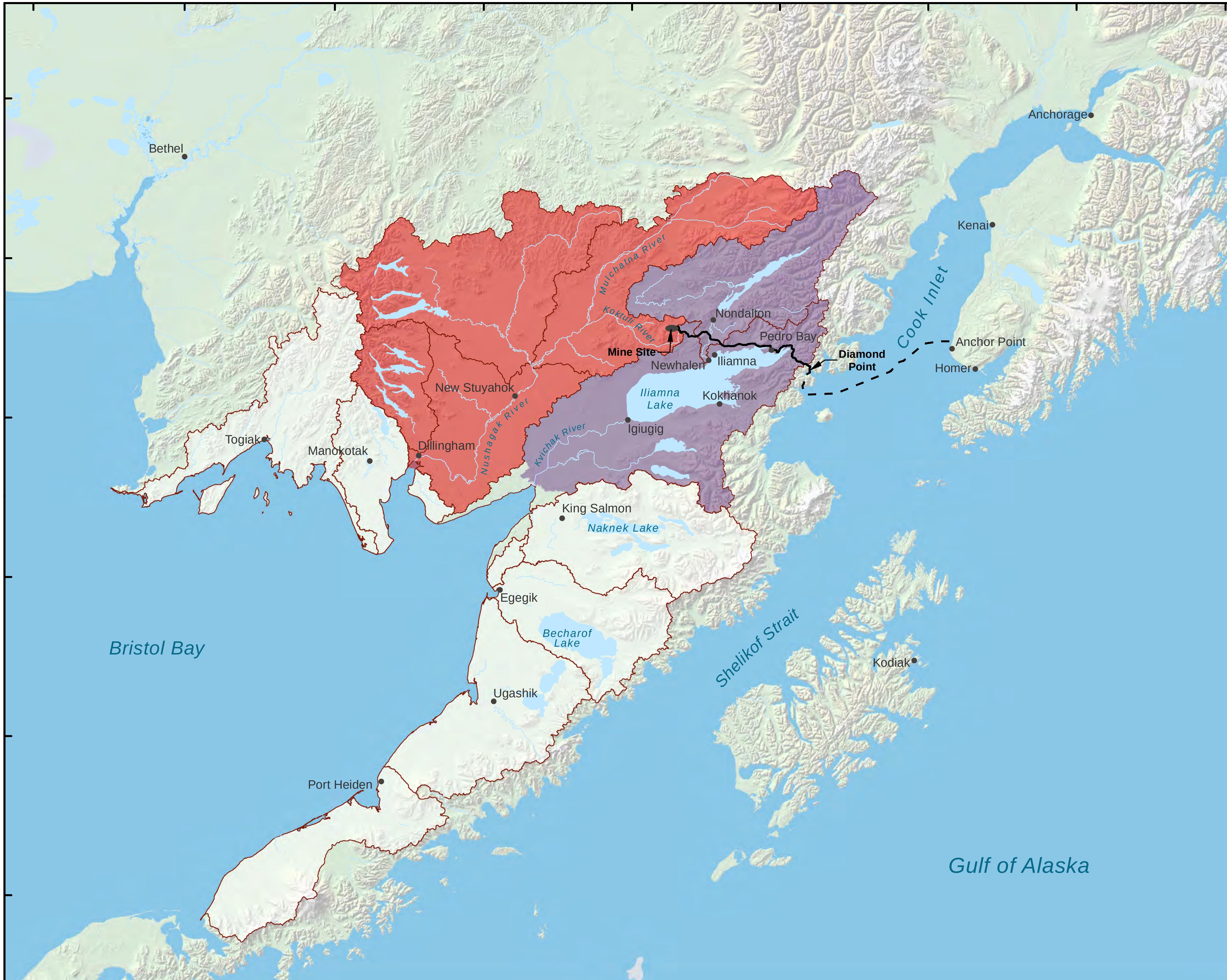

THE pebble PARTNERSHIP

FIGURE 1-3

Bristol Bay Watershed

- Transportation Corridor
- Natural Gas Pipeline
- Nushagak Drainage
- Kvichak Drainage
- Subbasin (HUC8) Bristol Bay

0 25 50 75 100 Miles

N

Scale 1:2,750,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File:	Date: 5/8/2020
Version: x	Author: HDR

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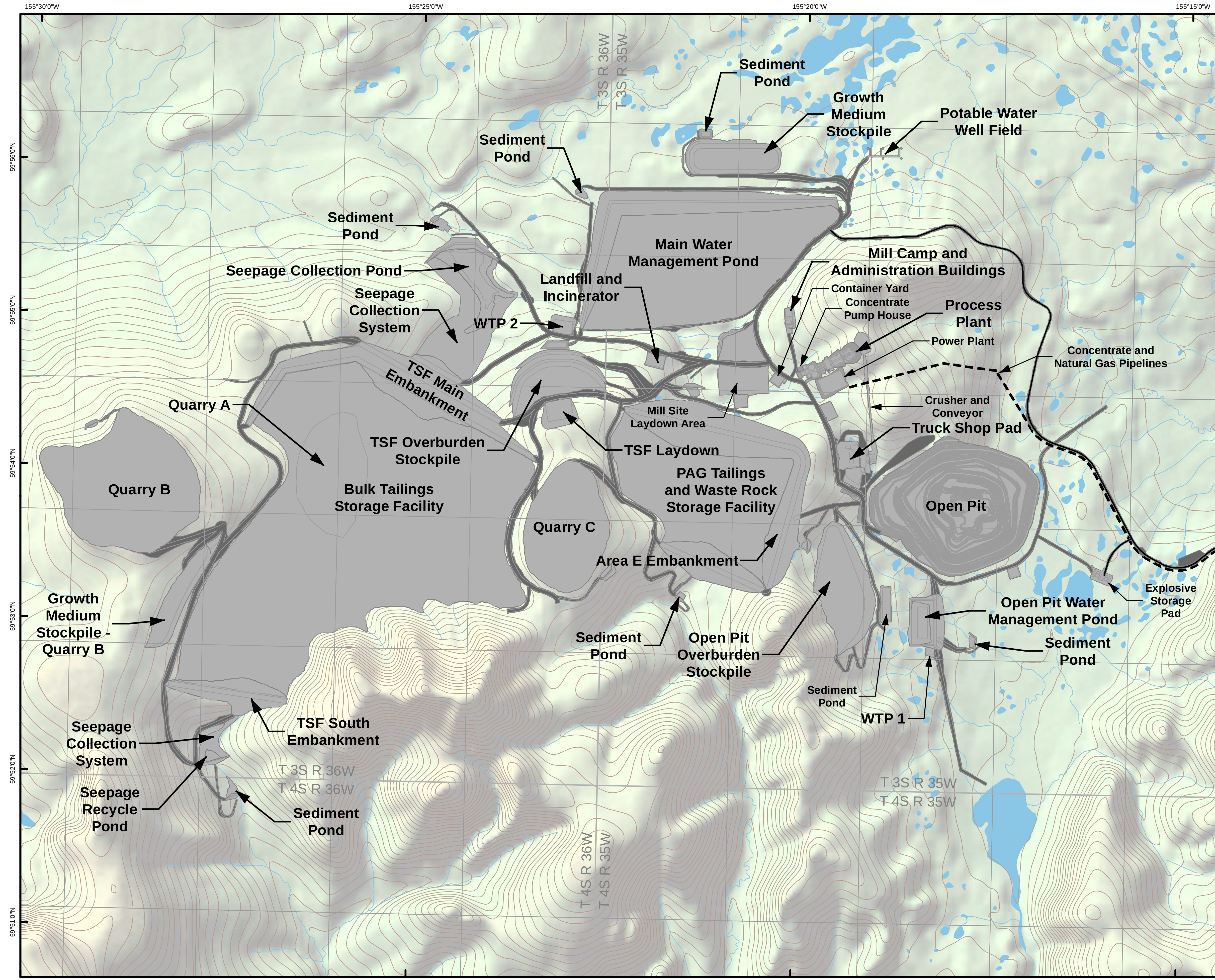
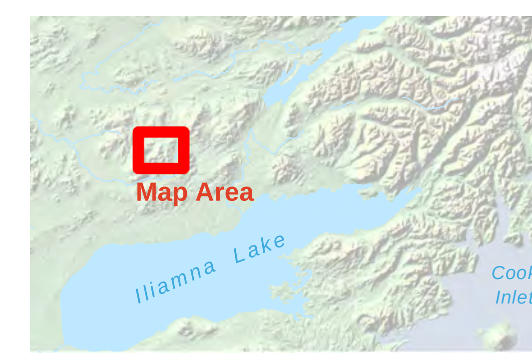


THE pebble PARTNERSHIP

FIGURE 1-4

Mine Site Map

Mine Site Footprint
Haul/Service/Access Road
Mine Site Access Road
Concentrate & Natural Gas Pipelines
50' Contour (Existing)
Township Boundary
Section Boundary



0 0.5 1 1.5 Miles

N

Scale 1:46,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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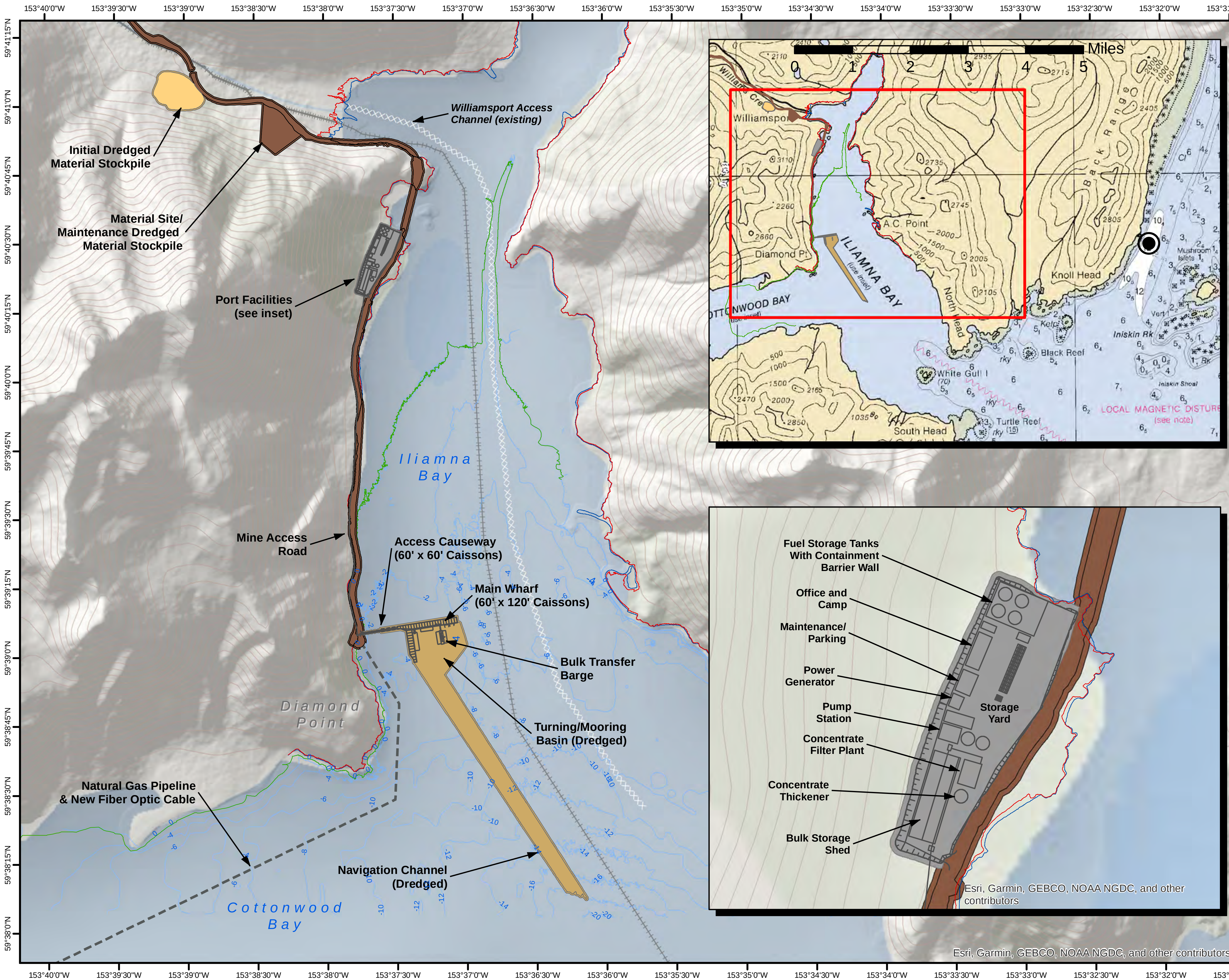

THE pebble PARTNERSHIP

FIGURE 1-5

Diamond Point Port and Lightering Location

- Port Facilities
- Dredge Area
- Dredge Stockpile
- Mine Access Road
- Natural Gas Pipeline & New Fiber Optic Cable
- Lightering Location
- High Tide Line
- Mean High Water
- Mean Lower Low Water
- Bathymetric Contours (from MLLW)
- Fiber Optic Cable (existing)

0 0.25 0.5 0.75 1 Miles

N

Scale 1:25,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

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Version: x	Author: HDR

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1.5. LAND OWNERSHIP AND MINERAL RIGHTS

The Pebble Deposit is located on patented state land specifically designated for mineral exploration and development. Pebble Project facilities will straddle parts of five management units described in the Alaska Department of Natural Resources (ADNR) 2005 *Bristol Bay Area Plan* (amended 2013). These management units—known as R06-05, R06-23, R06-24, R06-30 and R10-02 are designated for minerals extraction. This designation allows for mineral exploration and development with oversight from ADNR. The management intent for all five units also stresses the need to protect the anadromous fish streams in the upper Koktuli River corridor and to minimize or avoid effects from mining on habitat and recreational activities near the upper reaches of UTC.

The Pebble Deposit lies within a 417-square-mile claim block held by subsidiaries of PLP. PLP does not currently own surface rights associated with these mineral claims. All lands within the claim block are owned by the State of Alaska. Surface rights may be acquired from the state government once areas required for mine development have been determined and permits awarded.

The transportation corridor crosses both state land and land patented under the Alaska Native Claims Settlement Act (ANCSA). Further detail is provided in Section 2.2.

1.6. CLIMATE

The climate in the area of the Pebble Deposit/mine site is transitional. Winters are characterized by a continental climate as frozen waterbodies and sea ice in Bristol Bay create a land-like mass, while summers have a maritime climate due to the influence of the open water of Iliamna Lake and, to a lesser extent, the Bering Sea, Bristol Bay, and Cook Inlet. Mean monthly temperatures range from about 55 degrees Fahrenheit (°F) in summer to 2°F in winter. Precipitation in the NFK drainage averages approximately 57.4 inches per year and in the South Fork Koktuli River (SFK) drainage averages approximately 50.8 inches per year. About one-third of this precipitation falls as snow. The wettest months are August through October. White-out conditions and windstorms or periods of poor light/visibility can be expected in winter.

Winter weather systems, consisting of cool to cold saturated air, typically travel into the region from the Bering Sea (west), along the Aleutian Island chain (southwest) and the Gulf of Alaska (south), resulting in frequent clouds, rain, and snow. Less frequent incursions of frigid, stable Arctic air masses produce shorter periods of clear, but very cold conditions. During summer, warm air masses from interior Alaska can cause atmospheric instability, which results in cumulus clouds and thunderstorm activity.

1.7. DEPOSIT GEOLOGY

The Pebble Deposit is hosted by Mesozoic, volcanically derived sedimentary rocks, called flysch, of the Kahiltna terrane, as well as a variety of intrusive igneous rocks emplaced into the flysch between approximately 99 and 90 million years ago during the mid-Cretaceous Period. Between 99 and 96 million years ago, early intrusions into the flysch comprised alkalic syenite to biotite pyroxenite bodies, along with subalkalic diorite and granodiorite sills. Kaskanak Suite intrusions were emplaced approximately 90 million years ago and are the most important igneous event in the area. The suite comprises a granodiorite batholith that is exposed west of, but extends beneath, the Pebble Deposit, as well as several smaller intrusive granodiorite apophyses that emanate from the underlying batholith; collectively these Kaskanak intrusions drove the large magmatic-hydrothermal system that formed the Pebble Deposit.

The Pebble Deposit is classified as a porphyry copper deposit and is hosted by the intrusive and sedimentary rock types described above. Copper, gold, molybdenum, and other metals were transported by hot fluids that emanated from the magmas as they crystallized, and precipitated mostly as sulfide minerals in fractures, now preserved as veins, and as disseminations in the spaces between silicate minerals in the host rocks. The effects of the hot fluids are reflected by widespread hydrothermal alteration whereby some minerals originally present in host rocks were dissolved and replaced with suites of new minerals.

During the Late Cretaceous and Early Tertiary periods, the Pebble Deposit was uplifted by regional tectonic forces and eroded. The exposed deposit was rapidly covered by the Copper Lake Formation, a thick sequence of fine- to coarse-grained clastic sedimentary rocks and interbedded volcanic rocks. At a later point in the Tertiary Period, the eastern part of the Pebble Deposit was dropped up to 3,000 feet along normal faults into the East Graben, a structure that was progressively infilled by basalts, andesites, and subordinate clastic sediments as it grew. The Pebble Deposit and its host rocks were later tilted approximately 20 degrees to the east. The deposit was again uplifted in the later Tertiary Period, and its western part was scoured by Pleistocene glaciers that deposited a veneer of till, glacio-lacustrine, and outwash deposits that are mostly tens of feet thick or less, but which rarely are up to 300 feet thick in the vicinity of the Pebble Deposit. The present geometry of the Pebble Deposit comprises the West Zone, which is covered by thin glacial till and exposed in one small outcrop; the East Zone, which remains concealed by an eastward-thickening wedge of the Copper Lake Formation as well as overlying glacial till; and mineralization that extends an undetermined distance farther to the east but at great depth below the East Graben.

1.8. Resource

The current combined measured and indicated resource estimate for the total Pebble Deposit is approximately 7.1 billion tons containing 57 billion pounds of copper, 70 million ounces of gold, 344 million ounces of silver, and 3.42 billion pounds of molybdenum. In addition, the inferred component of the total deposit is approximately 4.9 billion tons, with 24.5 billion pounds of copper, 36 million ounces of gold, 170 million ounces of silver, and 2.2 billion pounds of molybdenum. The Pebble Deposit also contains important quantities of palladium and rhenium.

The Project will mine approximately 1.3 billion tons of mineralized material (measured, indicated, and inferred) over the 20-year mine life containing 7.4 billion pounds of copper, 398 million pounds of molybdenum, and 12.1 million ounces of gold. The metal content of the reported total resource and the 20-year open pit is presented in Table 1-1.

Table 1-1. Pebble Deposit Estimated Resource (Measured, Indicated, and Inferred)

	Total Deposit		20-Year Open Pit	
	Weight	Grade	Weight	Grade
Copper	81.5 Blbs	0.34%	7.4 Blbs	0.29%
Molybdenum	5.64 Blbs	234 ppm	398 MMlbs	154 ppm
Gold	106.4 MMoz	0.30 g/t	12.1 MMoz	0.32 g/t

Blbs: billion pounds
MMoz: million ounces
MMlbs: million pounds
ppm: parts per million
g/t: grams per tonne

2. PROJECT SETTING

The environmental resources of the area surrounding the Pebble Deposit have been studied extensively by PLP. The *Pebble Project Environmental Baseline Document, 2004 through 2008*, which is available online at www.pebbleresearch.com, provides a complete report of environmental baseline studies conducted during those years. Pebble Project supplemental baseline data reports (2009-2013) provide data supplemental to the environmental baseline report and will accompany permit applications as appropriate.

2.1. MINE SITE

2.1.1. Physiography

The geographic location of the Pebble Deposit is described in Table 2-1.

Table 2-1. Pebble Deposit Geographic References

Item	Value
Pebble Deposit Centroid	59° 53' 51" N; 155° 18' 03" W
USGS Quadrangles	Iliamna D-6, D-7
Elevation:	
Minimum	775 ft amsl (SFK valley)
Maximum	2,760 ft amsl (Kaskanak Mountain)
Distance from:	
Cook Inlet	65 miles W
Iliamna Lake	16 miles N
Bristol Bay	100 miles W

amsl = above mean sea level

USGS = U.S. Geological Survey

The Pebble Deposit is located in the Nushagak-Big River Hills physiographic region. The area consists of low, rolling hills separated by wide, shallow valleys. Elevations range from approximately 775 feet in the SFK valley up to 2,760 feet on Kaskanak Mountain. Glacial and fluvial sediment of varying thickness covers most of the study area at elevations below approximately 1,400 feet, whereas the ridges and hills above 1,400 feet generally exhibit exposed bedrock or have thin veneers of surficial material. The hills tend to be moderately sloped with rounded tops. The valley bottoms are generally flat. No permafrost has been identified to date in the project area.

2.1.2. Ecology

The Pebble Deposit area is ecologically diverse, with rivers, tundra, marshy lowlands, and ponds. Much of the land is covered by alpine tundra, shrubs, wetland and scrub communities, or areas of mixed broadleaf and spruce trees, depending on elevation and location.

Rivers near the Pebble Deposit provide habitat for five species of anadromous Pacific salmon. Rainbow trout and other species of fish, such as Dolly Varden and Arctic grayling, are also present. The streams in this area contain many features that support fish spawning and rearing, including complex off-channel habitats, river gravel that promotes spawning, beaver ponds, and combinations of run/glides and riffles. A higher diversity of species and abundance of fish, as well as the most spawning and rearing activity, is found in the lower and middle reaches of these streams, not in the headwater reaches at the Pebble Deposit site.

Various raptors and more than 40 species of water birds are found in the mine area and 22 species have been confirmed as breeding there. The many species of mammals that inhabit this region, while ecologically and economically important, are not particularly abundant. There are moderate densities of brown bear and low densities of black bear, moose, coyotes, wolves, river otters, and wolverines. The mine site is within the historical range of the Mulchatna caribou herd, but radio telemetry and aerial transect surveys suggest that high-density use of the area occurs only during the summer post-calving season when caribou move through the western edge of the project area. No habitat in the mine area has been classified as high value for caribou.

2.1.3. Hydrology

The Pebble Deposit straddles the upper reaches of the SFK and UTC drainages (Figure 2-1). The headwaters of the NFK are immediately north of the Pebble Deposit. The SFK drains south from the Pebble Deposit area, and then west and northwest, where it joins the NFK, which flows west from the Pebble Deposit area. At the confluence, these streams form the Koktuli River, which flows into the Mulchatna River, a tributary to the Nushagak River. The Nushagak River flows into Bristol Bay near the city of Dillingham. Upper Talarik Creek flows south from the Pebble Deposit area and then southwest into Iliamna Lake, which is the source of the Kvichak River.

2.1.3.1 Koktuli River

The NFK and SFK are two of 24 tributaries of similar or larger size in the 315-mile-long Nushagak River system. The north and south forks of the Koktuli River flow for 36 and 40 miles, respectively, to the main stem Koktuli River. The Koktuli River flows for approximately 39 miles before entering the Mulchatna River, which flows another 44 miles before entering the Nushagak River. The Nushagak River flows about 110 miles before it empties into Bristol Bay southwest of Dillingham (Figure 1-1). The total distances from the NFK and SFK headwaters to Bristol Bay are 228 miles and 232 miles, respectively.

2.1.3.2 Kvichak River

The UTC drainage is in the 225-mile-long Kvichak River system. The headwaters of the Kvichak River system are approximately 109 miles northeast of the Pebble Deposit at the source of the Tlikakila River at Lake Clark Pass. UTC flows approximately 39 miles to Iliamna Lake (Figure 2-1). The lake empties into the Kvichak River, which flows approximately 70 miles to Bristol Bay. The total distance from the headwaters of UTC, across the lake, and to Bristol Bay is approximately 140 miles.

2.2. TRANSPORTATION CORRIDOR

The transportation corridor connects the Diamond Point Port to the mine site via a private, two-lane access road. The road will parallel and replace portions of the existing Williamsport–Pile Bay road and intersect the existing Iliamna/Newhalen road system. The natural gas, concentrate, and return water pipelines will parallel the transportation corridor between the port and mine site. Approximately 30 percent of the corridor land is owned by the State of Alaska, with the remaining 70 percent divided among various ANCSA corporations, as shown in Table 22 and Figure 2-2.

The transportation corridor also crosses two Native Allotments (one in the vicinity of Knutson Bay and one in Iliamna Bay) and one private parcel.

Table 2-2. Transportation Corridor Land Ownership[a]

Land Ownership	Road Segments (Miles)	Percentage
State of Alaska	24	30
Pedro Bay Corporation	33	40
Iliamna Natives Limited	15	18
Tyonek Native Association	5	6
Seldovia Native Association	3	4
Salamatof Native Association Inc.	<1	<1
Native Allotment # AKAA 051014	<1	<1
Native Allotment # AKAA 007150A	<1	<1
Total Corridor Miles	82	100

[a] Distances presented are approximate and have been rounded for ease of reference.

2.2.1. Physiography

The geographic location of the transportation corridor is described in Table 2-3.

Table 2-3. Transportation Corridor Geographic References

Item	Value
USGS Quadrangles	Iliamna C-2, C-3 Iliamna D-3, D-4, D-5, D-6, D-7
Elevation:	
Minimum	Near sea level (Diamond Point Port)
Maximum	1,700 ft (leaving mine site)

The transportation corridor is located within three physiographic divisions: Nushagak-Big River Hills, Nushagak-Bristol Bay Lowlands, and the Alaska Range. The terrain includes a range of types, from flat to moderately undulating near the Pebble Deposit, gently sloping and colluvial terrain along the north shore of Iliamna Lake, and mountainside slopes to narrow valley bottoms through the Alaska Range to Iliamna Bay. No permafrost has been identified in the transportation corridor.

2.2.2. Ecology

The transportation corridor traverses a variety of terrain types. From the mine site eastward along the north shore of Iliamna Lake to Canyon Creek the terrain is generally flat to moderately undulating or gently sloping. This area is composed primarily of dense, low shrub understory and sparse tree cover. Moving eastward to Chinkelyes Creek the terrain is more mountainous and forested. The floodplains along the Pile and Iliamna rivers are complex mosaics of vegetation, dominated by willows in flood channels, bars, and abandoned channels. Crossing the divide between the Bristol Bay and Cook Inlet watersheds, the terrain remains mountainous with more shrubland vegetation. Finally, descending down to Cook Inlet along Iliamna Bay there is steep mountainous terrain with dense alder thickets that slope down to a rocky coast with salt-resistant herbaceous vegetation along the extensive mudflats and bedrock outcrops.

Rivers along the transportation corridor provide habitat for five species of anadromous Pacific salmon. Rainbow trout and other species of fish, such as Dolly Varden and Arctic grayling, are also present.

Forest and wetland habitats in the transportation corridor support types of wildlife similar to those at the mine site. Brown bear density is somewhat higher in the transportation corridor, with densities increasing as the corridor approaches the coast. Black bears occur in very low densities along the transportation corridor. Small numbers of caribou from the Mulchatna herd may be found foraging at higher elevations following calving within the transportation corridor north of Iliamna Lake. The transportation corridor contains migratory stopover and breeding habitats for many species of songbirds, raptors, and waterfowl.

2.2.3. Hydrology

The 80-mile-long access corridor crosses numerous streams within the Bristol Bay and Cook Inlet watersheds. The corridor originates in the Nushagak watershed at the mine site and traverses the Kvichak watershed along the north shore of Iliamna Lake. Both are within the greater Bristol Bay watershed. The corridor terminates at Diamond Point in the Tuxedni-Kamishak Bays watershed of the greater Cook Inlet watershed.

2.3. DIAMOND POINT PORT

The Diamond Point Port is located on three land parcels located on the west shore of Iliamna Bay.

Table 2-4. Diamond Point Port Land Ownership[a]

Land Ownership
Native Allotment # AKAA 051014
Seldovia Native Association
Tyonek Native Association

2.3.1. Physiography

The port site is located north of Diamond Point in Iliamna Bay. Diamond Point is a small cape marking the separation between Iliamna and Cottonwood bays. Topography is mountainous with steep slopes dropping to narrow rocky beaches and wide tidal mudflats. The port location is in the Iliamna C-2 USGS Quadrangle.

The Diamond Point port facility is located on three parcels of land—Native Allotment # AKAA 051014 and land belonging to Seldovia Native Association and Tyonek Native Association.

2.3.2. Ecology

The western shorelines from Kamishak Bay north to Iniskin Bay, including Iliamna and Cottonwood bays, are composed of diverse habitats, including steep rocky cliffs, cobble or pebble beaches, and extensive sand/mudflats. Eelgrass is found at a number of locations and habitats; eelgrass, along with macroalgae, is an important substrate for spawning Pacific herring. The port site is located within critical habitat for the Cook Inlet Beluga Whale and the Northern Sea Otter Southwest Distinct Population Segment (DPS). Cook Inlet Beluga Whale critical habitat includes nearshore waters out to two nautical miles. Northern Sea Otter critical habitat includes foraging areas and escape habitat from marine mammal predators.

2.3.3. Hydrology

The Cook Inlet basin is an expansive watershed surrounding the 180-mile-long Cook Inlet waterbody. Covering more than 38,000 square miles of southern Alaska, it receives water from six major watersheds and many smaller ones. More than ten percent of the basin is covered by glaciers and suspended sediment loading in glacier fed rivers without lakes is significant, leading to a high suspended sediment load in portions of Cook Inlet.

Lower Cook Inlet is connected to the Pacific Ocean southwest through Shelikof Strait, and southeast by the Gulf of Alaska and demonstrates complex circulation on variable timescales. The region has the fourth largest tidal range in the world; tidal fluctuations in Iliamna Bay average 16 feet ranging as high as 23 feet. When the tide drops from mean high to mean low water, the inlet loses almost 10 percent of its volume, and exposes approximately 8 percent of its surface area. Most of these tidally exposed areas are in the arms at the north end of Cook Inlet and along the west side of the waterbody.

2.4. Natural Gas Pipeline Corridor

The natural gas pipeline connects the mine site and the port site to the Cook Inlet gas supply infrastructure. It ties to an existing pipeline near Anchor Point on the Kenai Peninsula, connecting to a compressor station, which is located on private land owned by the University of Alaska. The pipeline crosses state and federal Outer Continental Shelf (OCS) waters in Cook Inlet to Ursus Cove, crosses Ursus Head before crossing Cottonwood Bay to the port site north of Diamond Point. It parallels the transportation corridor to the mine site for most of its length before diverging from the road to cross directly to the power plant. (see Table 2-5).

Table 2-5. Natural Gas Pipeline Land Ownership[a]

Land Ownership	Road Segments (miles)	Percentage
Cook Inlet/Cottonwood Bay Crossing	Total miles: 78	
State of Alaska	16	10
Federal Waters – Alaska OCS	62	38
Ursus Head Crossing	Total miles: 6	
Salamatof Native Association Inc.	2	1
Seldovia Native Association	4	2
Transportation Corridor Parallels	Total miles: 79	
State of Alaska	21	13
Pedro Bay Corporation	33	20
Iliamna Natives Limited	15	9
Tyonek Native Association	5	3
Seldovia Native Association	3	2
Salamatof Native Association Inc.	<1	<1
Native Allotment # AKAA 051014	<1	<1
Native Allotment # AKAA 007150A	<1	<1
Mine Segment	Total miles: 2	
State of Alaska	2	1
Total Miles	**164**	**100**

[a] Distances presented are approximate and have been rounded for ease of reference. Totals may not sum.

2.4.1. Physiography

The geographic location of the natural gas pipeline corridor is defined in Table 2-6.

Table 2-6. Natural Gas Pipeline Geographic References

Item	Value[a]
USGS Quadrangles	Iliamna C-2, C-3 Iliamna D-3, D-4, D-5, D-6, D-7 Seldovia D-5
Elevation:	
Minimum	-230 ft
Maximum	1,700 ft

[a] All references in Table 2-3 apply to the natural gas pipeline, but are excluded from this table.

The pipeline is located in four physiographic regions—the Nushagak-Big River Hills, the Nushagak-Bristol Bay Lowlands, the Alaska Range, and the Cook Inlet-Susitna Lowlands. The terrain includes a range of types, from flat to moderately undulating near the Pebble Deposit/mine site, gently sloping and colluvial terrain along the north shore of Iliamna Lake, mountainside slopes to narrow valley bottoms through the Alaska Range. No permafrost has been identified in the pipeline corridor.

2.4.2. Ecology

The Cook Inlet region is composed of marine, coastal, and estuarine habitats. Pelagic waters within Cook Inlet are influenced by riverine and marine inputs resulting in salinity gradients and horizontal mixing throughout the inlet. Deeper waters of Cook Inlet are characterized by highly variable conditions, ranging from large boulders beds, to dune fields, and unconsolidated sediments on a smooth bottom. Strong tidal currents are present. The variety of habitats in the region support lower trophic organisms, fish, shellfish, marine mammals, and birds. Fish and shellfish are important components of the Cook Inlet food web, as they feed on lower trophic organisms such as plankton, and serve as prey for other fish, birds, and marine mammals.

The Cook Inlet region is a migratory corridor and juvenile rearing area for all five species of Pacific salmon, Dolly Varden, and steelhead trout, which spawn in rivers and streams throughout the region. Nineteen marine mammal species known to occur in Cook Inlet, including the Cook Inlet Beluga whale, which use nearshore waters for feeding in fall and winter. A large seabird nesting colony lies within Kamishak Bay on the western shore of lower Cook Inlet. As outlined in Section 2.3.2 coastal areas of western Cook Inlet, including Kamishak Bay, include critical habitat for the Cook Inlet beluga whale and the Cook Inlet northern sea otter.

2.4.3. Hydrology

See section 2.3.3 for a discussion of Cook Inlet hydrology.

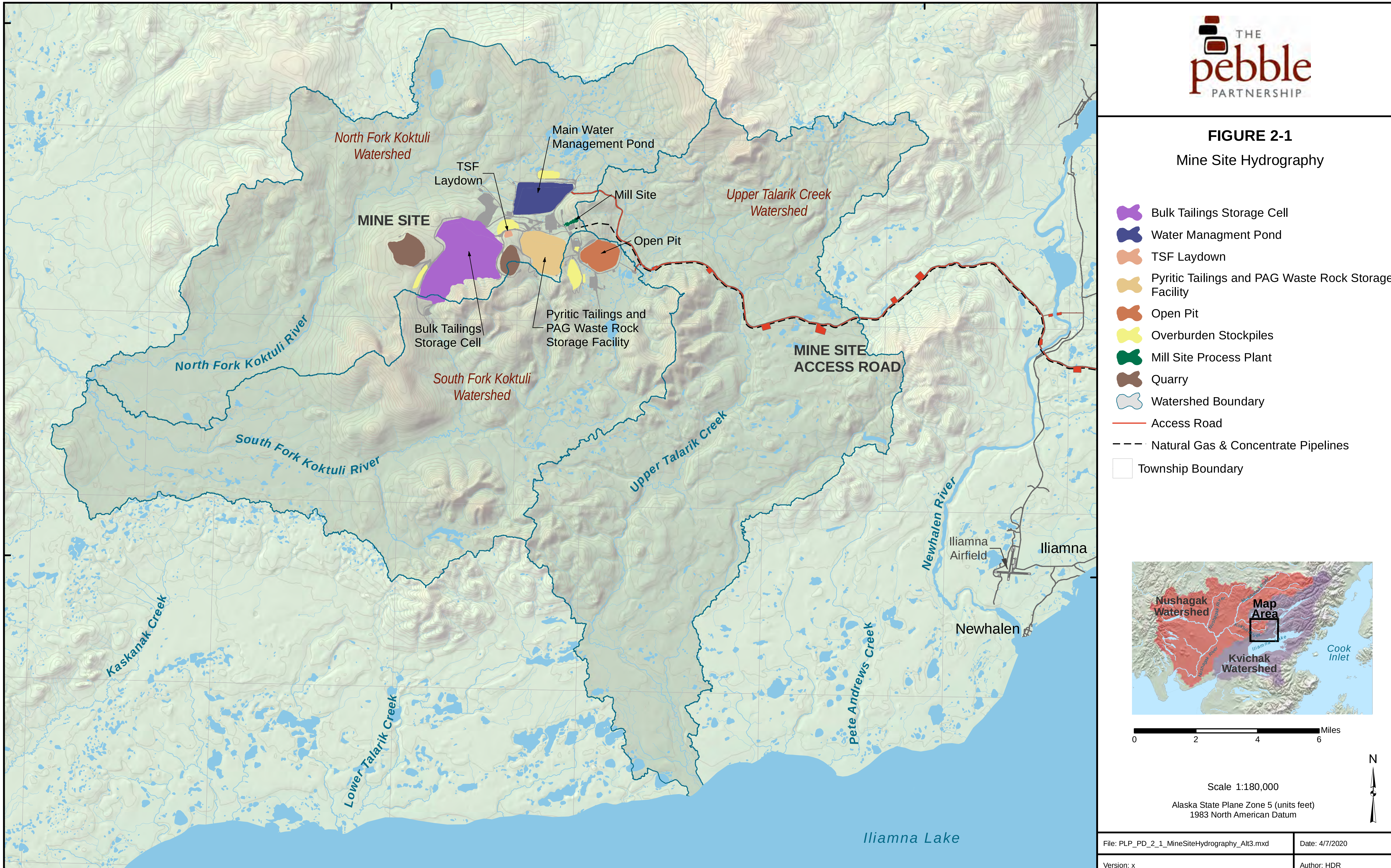


FIGURE 2-1

Mine Site Hydrography

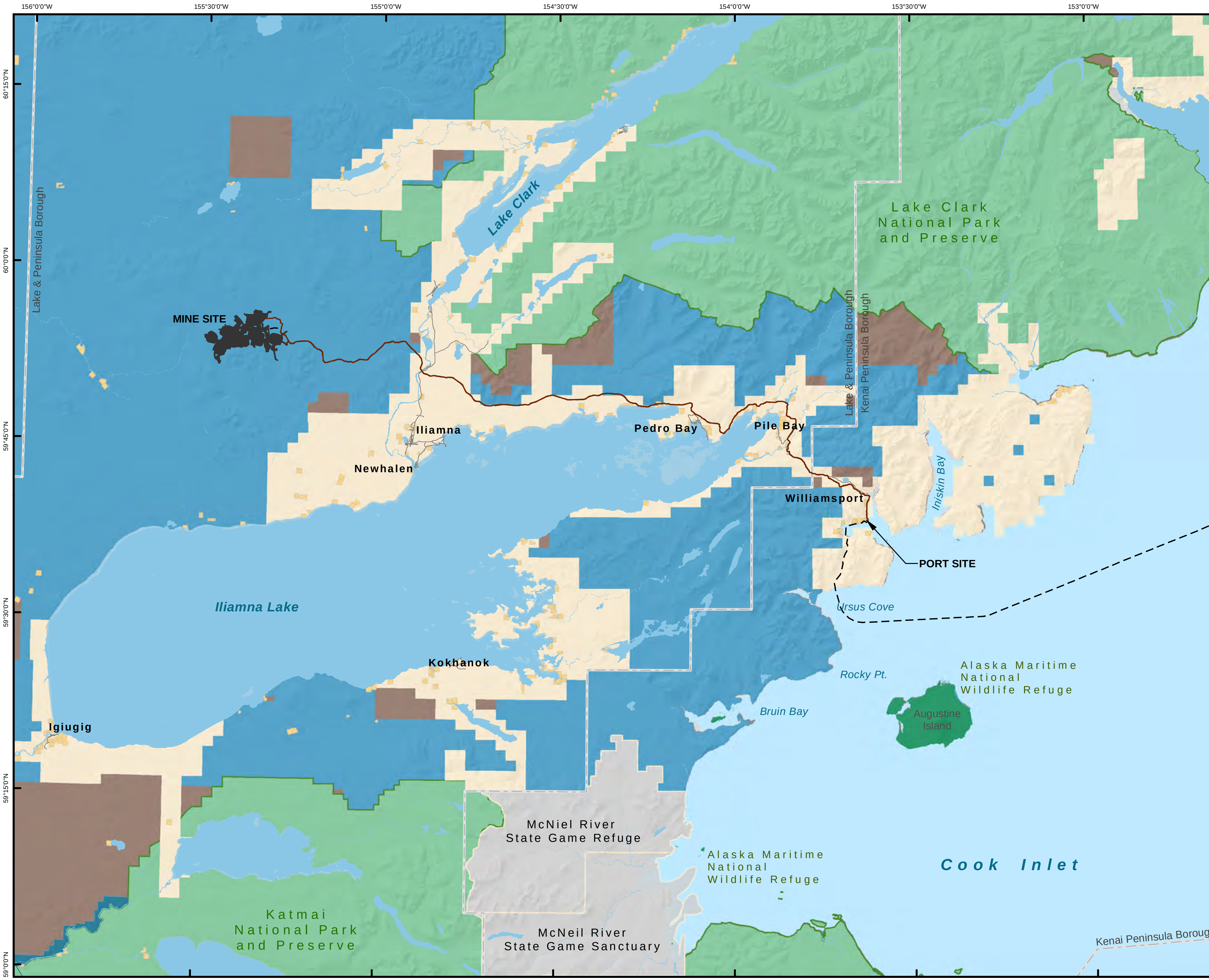


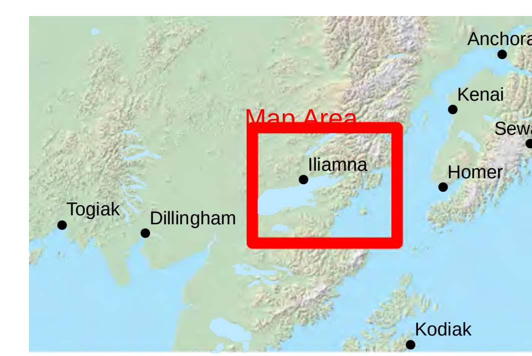
FIGURE 2-2

Regional Land Status

- Project Features
- Transportation Corridor
- Natural Gas Pipeline

Land Status

- Bureau of Land Management
- National Park
- National Wildlife Refuge
- State Land
- State Game Refuge/Sactuary
- Wild and Scenic River
- ANCSA Lands
- Native Allotments
- Borough Boundary



0 5 10 15 20 Miles

N

Scale 1:600,000

Alaska State Plane Zone 5 (units feet)
1983 North American Datum

File: PLP_PD_2_2_RegionalLandStatus_Alt3.mxd	Date: 4/13/2020
Version: x	Author: HDR

2.5. STATE AND FEDERAL INTEREST LANDS

Several state and federally managed lands lie within a 100-mile radius of the mine site or Diamond Point Port (Figure 2-2). Two large national park units—Katmai National Park and Preserve and Lake Clark National Park and Preserve—lie to the south and northeast of the mine site, respectively. Both parks straddle the Bristol Bay/Cook Inlet watershed divide, although most recreational use in both parks occurs in the Bristol Bay drainage, west of the divide. The Alagnak Wild and Scenic River flows west from Katmai National Park and Preserve and into the Kvichak River, which flows into Bristol Bay. The McNeil River State Game Refuge and Sanctuary, which lies north of Katmai National Park and Preserve, is in the Cook Inlet watershed. West of the mine site is Wood-Tikchik State Park, which is in the Bristol Bay watershed.

2.6. LOCAL AND REGIONAL COMMUNITIES

The Pebble Deposit is located in southwest Alaska's Lake and Peninsula Borough, home to an estimated 1,600 people in 18 local villages. Distances to various communities are shown in Figure 1-1. At more than 30,000 square miles, the Lake and Peninsula Borough is among the least densely populated boroughs or counties in the country. There are no roads into the borough, and few roads within it, contributing to an extremely high-cost of living and limited job and other economic opportunities for local residents.

The communities closest to the mine site are Nondalton, Iliamna, and Newhalen. Pedro Bay is also proximal to transportation infrastructure proposed for the Project. While PLP has generated employment for residents of villages throughout the Lake and Peninsula Borough and broader Bristol Bay region over the past decade, the communities surrounding Iliamna Lake have provided the greatest proportion of the local workforce.

With project infrastructure planned to connect the proposed mine site to the villages of Iliamna, Newhalen, and Pedro Bay, residents of these and other communities are expected to continue playing an important role in staffing the Project in the future.

The Bristol Bay Borough is the only other organized borough in the Bristol Bay region, with some 900 full-time residents in three villages. A significant portion of the Bristol Bay region is not contained within an organized borough; the Dillingham Census Area comprises 11 different communities. A total of about 7,500 people call the Bristol Bay region home, with the largest population centers in Dillingham, King Salmon, and Naknek.

Most Bristol Bay villages have fewer than 150–200 full-time residents. A majority of the population is of Alaska Native descent and Yup'ik or Dena'ina heritage. Virtually all of the region's residents participate to some degree in subsistence fishing, hunting, and gathering activities. Subsistence is central to Alaska Native culture and provides an important food source for local residents.

There are 13 incorporated first- and second-class cities in the Bristol Bay region and 31 tribal entities recognized by the U.S. Bureau of Indian Affairs. There are also 24 Alaska Native Village Corporations created under the ANCSA, five of which – Iliamna Natives Limited, Pedro Bay Corporation, Seldovia Native Association, Salamatof Native Association Inc. , and Tyonek Native

Association – hold surface rights for significant areas of land near the Pebble Deposit and along the proposed transportation infrastructure corridor.

The commercial fishing, guiding, and tourism-related sectors provide many jobs in the region, but the work is highly seasonal; year-round employment is the exception rather than the norm. A lack of employment and economic opportunity has contributed to a declining population in many Lake and Peninsula Borough and regional villages, resulting in the closure of several schools over the past decade.

2.7. Legal Description

The legal description of lands on which major project elements will be located is shown in Table 2-6. Sections are within the Seward Meridian Survey of the Public Land Survey System.

Table 2-7. Project Location (Public Land Survey System)

Range	Township	Section
15 West	4 South	14
26 West	4 South	31
	5 South	29, 30, 32, 33, 34, 35
	6 South	1, 2, 12, 13, 24, 27, 34
	7 South	3, 9, 10, 16, 21
27 West	4 South	20, 21, 22, 23, 24, 25, 28, 29, 30, 31, 36
	5 South	2, 3, 10, 14, 15, 23, 24, 25
28 West	4 South	19, 20, 28, 29, 33, 34, 35, 36
	5 South	3, 4
29 West	4 South	17, 18, 19, 20, 21, 22, 23, 24, 27, 28
30 West	4 South	13, 14, 15, 18, 19, 20, 21, 22, 23
31 West	4 South	13, 19, 20, 21, 22, 23, 24, 27, 28, 29, 30
32 West	3 South	31
	4 South	7, 8, 9, 10, 15, 16, 22, 23, 24, 25
33 West	3 South	20, 21, 22, 26, 27, 28, 29, 30, 31, 35, 36
	4 South	1, 12
34 West	3 South	29, 30, 32, 33, 34, 35, 36
	4 South	2, 3, 4, 5
35 West	3 South	7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33
	4 South	4
36 West	3 South	11, 12, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 33, 34
	4 South	3

3. PROJECT COMPONENTS AND OPERATIONS

This section describes the various project components and the operations associated with those components through the active life of the Project. Construction will last for approximately four years, followed by a commissioning period and 20 years of mineral processing. Mining preproduction will start during construction with removal of overburden and waste rock material and active mining from the pit will continue through the 20-year operations period. Figure 1-4 shows the layout of the mine site, including the major facilities and site infrastructure.

3.1. SUMMARY PROJECT INFORMATION

A summary of mining and process related information is shown in Table 3-1.

Table 3-1. Summary Project Information[a]

Item	Value
General Operation	
Construction	4 years
Total project operations	20 years
Daily schedule	24 hours
Annual schedule	365 days
Mine Operation	
Preproduction mined tonnage	33 million tons
Average annual mining rate	70 million tons
Operations mined tonnage	1,410 million tons
Mine life strip ratio	0.12:1 (waste: mineralized material)
Open pit dimensions	6,800 x 5,600 ft, 1,950 ft deep
Process Operation	
Daily process rate	180,000 tons
Annual process volume	66 million tons
Copper-gold concentrate	613,000 tons per year (average)
Molybdenum concentrate	15,000 tons per year (average)
Pyritic Tailings Storage Facility	
Approximate capacity (tailings)	155 million tons
Approximate capacity (PAG waste)	93 million tons
South embankment (height)	215 feet
North embankment (height)	335 feet
East embankment	225 feet

Item	Value
Bulk Tailings Storage Facility	
Approximate capacity	1,140 million tons
Main embankment (height)	545 feet
South embankment (height)	300 feet
Main Water Management Pond	
Approximate capacity	2,450 million cubic feet (56,000 ac-ft)
Embankment height	190 feet
Concentrate Pipeline	
Diameter	6.25 inches

[a] Design criteria as presented are approximate and have been averaged and rounded as appropriate for ease of reference.

3.2. MINING

3.2.1. Methods and Phasing

The Pebble Mine will be a conventional drill, blast, truck, and shovel operation with an average mining rate of 70 million tons per year and an overall stripping ratio of 0.12 ton of waste per ton of mineralized material.

The open pit will be developed in stages, with each stage expanding the area and deepening the previous stage. The final dimensions of the open pit will be approximately 6,800 feet long and 5,600 feet wide, with depths to 1,950 feet.

Mining will occur in two phases – Preproduction and Production.

The mine operation will commence during the last year of the Preproduction Phase and extend for 20 years during the Production Phase. Approximately 1,300 million tons of mineralized rock and 150 million tons of waste rock and overburden will be mined. Non-potentially acid generating (NPAG) and non-ML waste will be used in construction of the tailings embankments. The PAG and ML waste rock will be stored in the pyritic TSF until closure, when it will be back-hauled into the open pit. Fine- and coarse-grained soils will be stored southwest of the pit and north of the TSF embankments and will be used for reclamation during mine closure.

The Preproduction Phase consists of dewatering the pit area and mining of non-economic materials overlying the mineralized material from the initial stage of the open pit. Dewatering will begin approximately one year before the start of Preproduction mining. Approximately 33 million tons of material will be mined during this phase (Table 3-2).

Table 3-2. Mined Material—Preproduction Phase

Material Type	Quantity
Overburden	22 million tons
Waste rock	11 million tons

The Production Phase encompasses the period during which economic-grade mineralized material will be fed to the metallurgical process plant that produces concentrates for shipment and sale. The Production Phase is planned to last for 20 years. Mineralized material will be mined and be fed through the process plant at a rate of 180,000 tons/day. The open pit will be mined in a sequence of increasingly larger and deeper stages. Approximately 1.4 billion tons of material are planned to be mined during the Production Phase (Table 3-3).

Table 3-3. Mined Material—Production Phase

Material Type	Quantity
Overburden	38 million tons
Mineralized material process plant feed	1,291 million tons
Waste rock	82 million tons

3.2.2. Blasting

Most open pit blasting will be conducted using emulsion blasting agents manufactured on site. In dry conditions, a blend of ammonium nitrate and fuel oil (ANFO) can be used as the blasting agent. However, most ammonium nitrate will be converted to an emulsion blasting agent because of its higher density and superior water resistance. Initial operations during the Preproduction Phase may use pre-packed emulsion blasting agents or a mobile bulk emulsion manufacturing plant. After the explosives plant is completed, the emulsion-based ANFO explosive will be used as the primary blasting agent.

The ANFO will be stored separately as a safety precaution. All explosive magazines will be constructed and operated to meet mine safety and health regulations. The ammonium nitrate solution will be mixed with diesel fuel and emulsifying agents in a mobile mixing unit on the mining bench where blasting is to take place. The emulsion will become a blasting agent only once it is sensitized using the sensitizing agent while in the drill hole.

Based on knowledge of the rock types in the Pebble Deposit, blasting will require an average powder factor of approximately 0.5 pounds per ton of rock. Blasting events during the Preproduction Phase will occur approximately once per day. The frequency will increase during the Production Phase, with events occurring as often as twice per day.

3.2.3. Waste Rock and Overburden Storage

Waste rock is mined material with a mineral content below an economically recoverable level that is removed from the open pit, exposing the higher-grade production material. Waste rock will be segregated by its potential to generate acid. NPAG and non-ML waste rock may be used for embankment construction. PAG and ML waste rock will be stored in the pyritic TSF until mine closure, when it will be back-hauled into the open pit. Quantities of material mined are outlined in Table 3-1 and Table 3-2.

During the Preproduction Phase, approximately 33 million tons of non-mineralized and mineralized material will be removed from the open pit. Non-mineralized waste and overburden will be stockpiled or used in construction, mineralized waste will be stockpiled and relocated to the pyritic TSF once complete, or if grades are sufficient, stockpiled for milling once the mill is complete. Material will be stockpiled within the pit footprint, or in designated stockpiles as appropriate.

Overburden is the unconsolidated material lying at the surface. At the Pebble Deposit, the overburden depth ranges from 0 to 140 feet. Overburden removal will commence during the Preproduction Phase and will recur periodically during the Production Phase at the start of each pit stage. The overburden will be segregated and stockpiled in a dedicated location southwest of the open pit. A berm built of non-mineralized rock will surround the overburden to contain the material and increase stability. Overburden materials deemed suitable will be used for construction. Fine- and coarse-grained soils suitable for plant growth will be stockpiled for later use as growth medium during reclamation. Growth medium stockpiles will be stored at various locations around the mine site and stabilized to minimize erosion potential.

3.2.4. Equipment

The Project will use the most efficient mining equipment available in the production fleet to minimize fuel consumption per ton of rock moved. Most mining equipment will be diesel-powered. This production fleet will be supported by a fleet of smaller equipment for overburden removal and other specific tasks for which the larger units are not well-suited. Equipment requirements will increase over the life of the mine to reflect increased production volumes and longer cycle times for haul trucks as the pit is lowered (Table 3-4). All fleet equipment will be routinely maintained to ensure optimal performance and minimize the potential for spills and failures. Mobile equipment (haul trucks and wheel loaders) will be serviced in the truck shop; track-bound equipment (shovels, excavators, drills, and dozers) will be serviced in the field under appropriate spill prevention protocols.

Table 3-4. Production Phase Equipment

Equipment Unit	Class	Year 1 Quantity	Average Quantity	Peak Quantity
Electric shovel	73 cy	1	2	2
Diesel hydraulic shovel	53 cy	1	1	1
Wheel loader	53 cy	1	1	1
Electric drill	12.25 in	1	2	2
Diesel drill	12.25 in	1	1	1
Diesel drill	6.5 in	1	1	1
Diesel haul truck	400 ton	7	11	17
Diesel haul truck	150 ton	5	5	5

cy = cubic yards

Track-mounted electric shovels will be the primary equipment unit used to load blasted rock into haul trucks. Each electric shovel is capable of mining at a sustained rate of approximately 30 million tons per year. Diesel hydraulic shovels, due to their greater flexibility, will be used to augment excavation capacity, depending on the mining application.

Wheel loaders are highly mobile, can be rapidly deployed to specific mining conditions, and are highly flexible in their application. Diesel off-highway haul trucks will be used to transport the fragmented mineralized material to the crusher.

Track-mounted drill rigs are used to drill blast holes into the waste rock and mineralized material prior to blasting. Hole diameters will vary between 6 and 12 inches. Drill rigs may be either electrically powered, as is the case for the larger units, or diesel powered.

This equipment will be supported by a large fleet of ancillary equipment, including track and wheel dozers for surface preparation, graders for construction and road maintenance, water trucks for dust suppression, maintenance equipment, and light vehicles for personnel transport. Other equipment, such as lighting plants, will be used to improve operational safety and efficiency.

3.2.5. Mining Supplies and Materials

Fuel, lubricants, tires, and blasting agents (Table 3-5) will be the primary materials used in mining.

Table 3-5. Mining Supplies

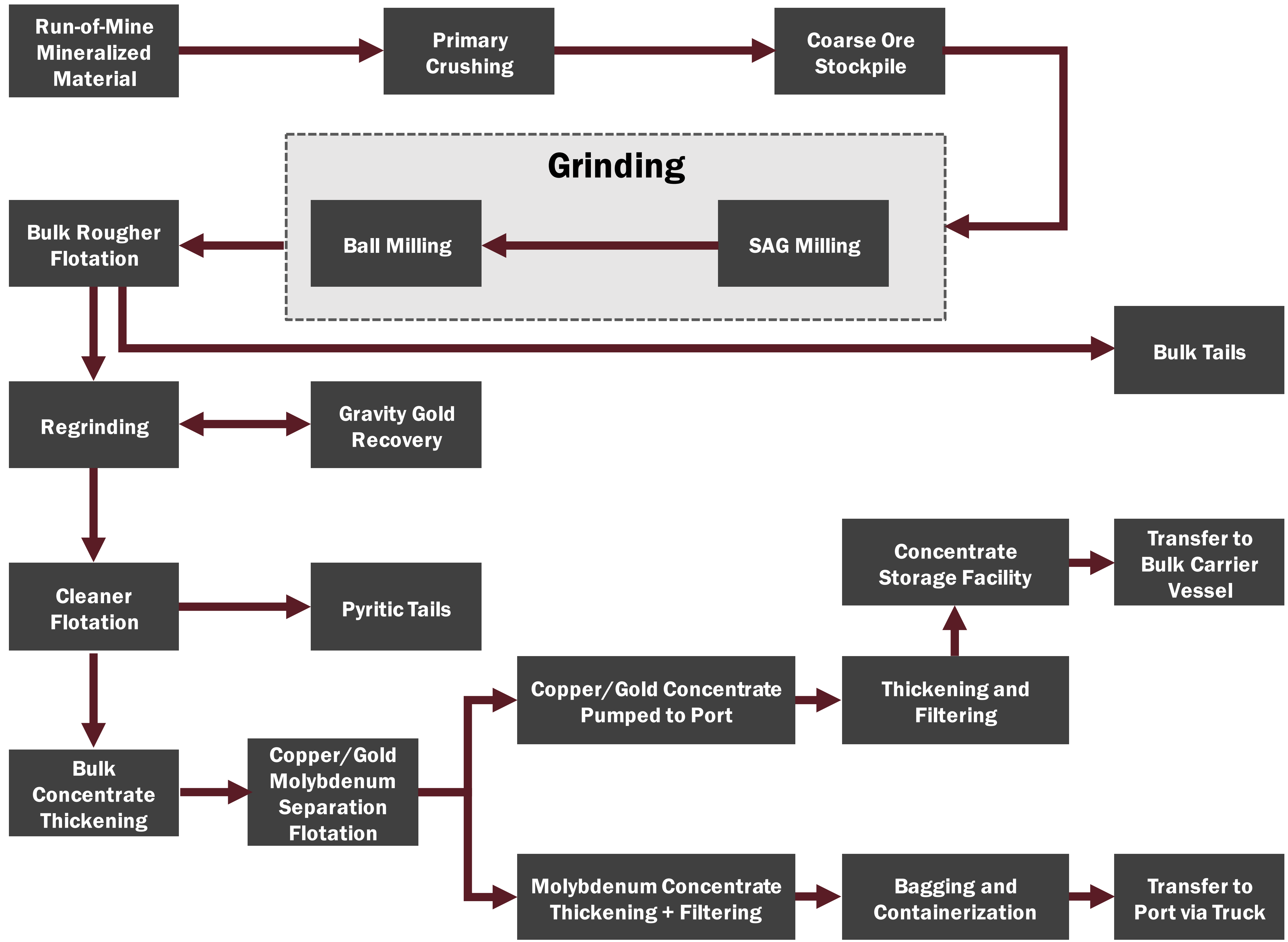
Consumable	Use	Shipping
Diesel fuel	Vehicles and blasting	6,350-gallon ISO tank-containers
Lubricants	Vehicles and equipment	Drums and totes in containers
Ammonium nitrate prill	Blasting	Bulk containers
Primers, detonators, and detonating cord	Blasting	Specialized packaging as required
Blasting emulsion ingredients	Blasting	Specialized packaging as required
Packaged explosives	Blasting	Specialized packaging as required
Haulage truck & other tires	Vehicles	Bulk containers/break bulk
Ground-engaging tools	Drilling and loading	Bulk containers

ISO = International Organization for Standardization

3.3. MINERAL PROCESSING

Mineral processing facilities will be located at the mine site. Blasted mineralized material from the open pit will be fed to a crushing plant to reduce the maximum particle size to approximately six inches. This crushed material will be conveyed to a coarse ore stockpile, which in turn feeds a grinding plant within the process plant. In the grinding plant, semi-autogenous grinding (SAG) mills and ball mills further reduce the plant feed to the consistency of very fine sand. The next step is froth flotation, in which the copper and molybdenum minerals are separated from the remaining material to produce copper-gold and molybdenum concentrates. The copper-gold concentrate slurry will then be pumped to the port site where it will be filtered, loaded onto the lightering barges, and then unloaded directly into the holds of Handysize bulk carriers for shipment. The molybdenum concentrate will be filtered at the mine site and placed in large sacks which are in turn placed in conventional shipping containers. The containers will be trucked to the port and shipped with the remaining empty shipping containers to refineries located outside Alaska, Gravity concentrators will be placed at strategic locations to recover free gold, which will be shipped off site for refining. Other economically valuable minerals (gold, silver and palladium in the copper-gold concentrate and rhenium in the molybdenum concentrate) will be present in the concentrates. Figure 3-1 shows the process flowsheet.

Over the life of the Project, approximately 1.3 billion tons of mineralized material will be fed to the process plant at a rate of 180,000 tons/day. On average, the process plant will produce approximately 613,000 tons of copper-gold concentrate per year, containing approximately 318 million pounds of copper, 362,000 ounces of gold and 1.8 million ounces of silver, and approximately 15,000 tons of molybdenum concentrate, containing about 14 million pounds of molybdenum.



THE pebble PARTNERSHIP

FIGURE 3-1

Process Flow Sheet

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

3.3.1. Crushing

3.3.1.1 Primary Crushing

Mineralized material from the open pit will be delivered by 400-ton haul trucks to primary gyratory crushers located adjacent to the rim of the open pit. The crushers will reduce the mineralized material to a maximum size of six inches. The crushed mineralized material from both crushers is delivered via a single, covered, overland conveyor to the coarse ore stockpile.

3.3.1.2 Coarse Ore Stockpile

The coarse ore stockpile is contained within a covered steel frame building to minimize fugitive dust emissions and control mineralized material exposure to precipitation. The stockpile provides surge capacity between the crushers and the process plant, improving the efficiency of the latter and enabling it to operate if the feed from the crushers is not available.

The stockpiled material will be reclaimed by apron feeders mounted below the pile that deliver it onto two conveyor belts feeding the SAG mills. Baghouse-type dust collectors will be provided at each transfer point to control fugitive dust emissions. Water will be added to the process at the SAG mill, thereby eliminating the need for additional baghouses. A sump will be located in each reclaim tunnel to collect any excess water; however, such drainage is likely to be minimal, as it is preferable to handle coarse material dry to prevent freezing during cold conditions. An escape tunnel also will be provided for worker safety, with ventilation as required.

3.3.2. Grinding

The primary grinding circuit will use two parallel, 40-foot-diameter SAG mills and associated ball mills to grind mineralized material to the finer consistency necessary to separate the valuable minerals. Steel balls are added to the SAG mill to aid in grinding the mineralized material. Coarse mineralized material, water, and lime are fed into the SAG mills and the mineralized material is retained within the SAG mills by grates until the particles reach a maximum size of one to two inches.

Discharge from each SAG mill will be screened to remove larger particles ranging from one to two inches ("pebbles"). Material passing through the screens will be sent to the ball mills while the large particles will be conveyed to the pebble-crushing facility where they will be crushed and re-introduced to the SAG mill.

The next grinding step is ball milling. Ball mills have a lower diameter-to-length ratio than SAG mills and use a higher percentage of smaller steel balls compared to SAG mills, allowing them to grind the feed to a finer size. Two ball mills will be matched with each SAG mill.

The slurry from the ball mills will be pumped into the hydro-cyclones, which separate the finer material from the larger material through centrifugal force. The slurry with the coarser material will be recycled back to the ball mills for additional grinding. The slurry containing the finer material will be pumped to the flotation cells. Grinding circuit slurry pH levels will be adjusted to 8.5 by adding lime slurry to minimize corrosion on the mill liners and promote efficient mixing prior to flotation.

3.3.3. Concentrate Production

Copper-gold and molybdenum concentrates will be produced via flotation, which will separate the metal sulfides from pyrite and non-economic minerals. Two tailings streams will be produced: bulk tailings and pyritic tailings.

3.3.3.1 Bulk Rougher Flotation

The rougher flotation circuit is designed to separate the sulfide minerals, predominantly copper, molybdenum, and iron sulfides (pyrite) within the process plant feed from the non-sulfide minerals. Slurry from the ball mills is split between two banks of bulk rougher flotation cells. Reagents added to the slurry promote mineral separation by inducing mineral particles to attach to air bubbles created by blowing air through the flotation cells. Additional reagents are added to promote froth bubble stability. This froth, with the mineral particles attached, rises to the surface and is collected as a bulk rougher concentrate for the next phase of flotation.

Bulk rougher concentrate slurry is then routed to the regrind circuit. Material that does not float – the bulk flotation tailings from which most of the sulfide minerals have been removed – will be pumped to two tailings thickeners.

3.3.3.2 Regrind

The bulk rougher concentrate is reground to sufficiently liberate minerals and enable the separation of the copper-molybdenum sulfide minerals from iron and other sulfides, thus producing concentrates with commercially acceptable grades. A gravity gold recovery circuit is attached to the regrind circuit to recover free gold that might otherwise be lost.

3.3.3.3 Cleaning

Reground bulk rougher concentrates will be upgraded through a two-stage cleaning process. The concentrate from the cleaning process will report to copper-molybdenum separation, while the tailings will report to the pyritic tailings thickener for thickening prior to pumping to the pyritic TSF. The same reagents used in the rougher flotation circuit will be used in the cleaning circuit, with additional reagents used to aid in the suppression of gangue minerals. The cleaning stage is operated at an elevated pH—through lime addition—to suppress pyritic minerals, which would lower the grade of final concentrates.

3.3.3.4 Bulk Concentrate Thickener

Water will be removed from the bulk concentrate in a conventional thickener. This will remove as much of the bulk flotation reagents as possible before the slurry enters the copper-gold/molybdenum separation circuit, thus increasing separation process efficiency. Reagents will be recycled to the rougher process with the thickener overflow. The resulting slurry will contain 50 percent solids by weight and will go forward to copper-gold/molybdenum separation.

3.3.3.5 Copper-Gold/Molybdenum Separation Flotation

The final flotation process is designed to separate copper-gold and molybdenum concentrates by adding reagents. The concentrate from the separation stage is the molybdenum concentrate, while the tailings comprise the final copper-gold concentrate.

3.3.3.6 Concentrate Dewatering, Filtration, and Pumping

The upgraded copper-gold concentrate will be thickened to 55 percent solids by weight in a high-rate thickener. The thickener overflow will return to various circuits for use as process water. The thickener underflow will be fed to a pump to transfer it via the concentrate pipeline to the port. At the port, pressure filters will reduce the moisture to approximately eight percent. The filter product will be stored in a covered building at the port site.

The molybdenum concentrate will be thickened in a high-rate thickener to 55 percent solids by weight. The thickener underflow will be pumped to the molybdenum concentrate filter press, where the moisture content will be reduced to 12 percent. The filtered concentrate will be further dewatered by a dryer to five percent moisture before being bagged, containerized, and shipped offshore.

3.3.4. Processing Reagents and Materials

Table 3-6 provides a list of commonly used reagents for this type of process, along with their typical packaging for transportation. The final reagent list will be determined during detailed design.

Table 3-6. Processing Reagents and Materials

Reagent	Use	Shipping/Preparation
Calcium Oxide (quick lime)	pH modifier; depresses pyrite in the copper-molybdenum flotation process.	Calcium oxide pebbles (80 percent) shipped in specially adapted shipping containers. Pebbles will be crushed and mixed with water to form lime slurry at the lime plant.
Sodium Ethyl Xanthate	Copper collector; used in the rougher flotation circuit.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20 percent solution and stored in collector storage tank. Mix and storage tanks vented externally with fans.
Fuel Oil (Diesel)	Used in the flotation process.	Shipped in ISO tank-containers and stored in the main head tank in the copper-molybdenum concentrator area.
Sodium Hydrogen Sulfide (NaHS)	Copper depressant used in the copper-molybdenum separation processes.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20 percent solution and stored in the NaHS storage tank.

Reagent	Use	Shipping/Preparation
Carboxy Methyl Cellulose	Depressant; anionic polymer used to depress clay and related gangue material in the bulk cleaner flotation circuit.	Pelletized reagent shipped in 1-ton bags. Mixed with process water in the agitated dispersant tank to form 20 percent solution and stored in dispersant storage tank.
Methyl Isobutyl Carbinol	Frother; maintains air bubbles in the flotation circuits.	Shipped in 20-foot specialized ISO containers and stored in the frother storage tank.
Depressant (sodium silicate)	Clay or silica gangue mineral depressant used in the copper-molybdenum separation process.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20 percent solution and stored in the sodium silicate storage tank.
Anionic polyacrylamide	Thickener aid.	Pelletized reagent shipped in 1-ton bags. Vendor package preparation system composed of a bag breaking enclosure to contain dust, dry flocculent metering, and a wet jet system to combine treated water with the powdered flocculent in an agitated tank for maturation. Prepared in small batches and transferred to a flocculent storage tank.
Polyacrilic acid	Antiscalant for the lime production process.	Viscous pale amber liquid shipped in 35-cubic-foot specialized container tanks within protected rectangular framework.
Nitrogen	Nitrogen used in the molybdenum flotation circuit to depress copper sulfides.	Nitrogen will be provided by a vendor-supplied pressure swing adsorption nitrogen plant. This equipment separates nitrogen from air for use in the mineral-process plant.

3.3.5. Process Water Supply System

Process water will be drawn from the main WMP and the tailings thickener overflow streams. The primary process water source is the bulk tailings thickener overflow. Precipitation runoff will either be diverted by non-contact water diversion channels, or collected in sediment ponds as appropriate, and pumped to the main WMP. Some treated water will be diverted to the process for pump glands and other similar applications.

3.3.6. Tailings Production

Processing mineralized material to recover copper, gold, and molybdenum will produce two types of tailings: bulk flotation and pyritic. Bulk flotation tailings will be pumped to the bulk tailings thickener, where flocculant will be added as necessary to help the settling process. Tailings thickener underflow, at approximately 55 percent solids, will be pumped to the bulk TSF. The pyritic tailings will be thickened, mixed with WTP sludge, and pumped to the pyritic TSF. The overflow streams from each thickener will be returned to the process. Supernatant water in the bulk and pyritic TSFs will be reclaimed to the mill site WMP. Some of this water will be pumped to the process water tank for re-use in the process plant. Any surplus water will be treated in the WTP and discharged.

3.4. TAILINGS STORAGE FACILITIES

Separate TSFs will be constructed for the bulk and pyritic tailings located primarily within the NFK watershed (Figure 1-4). Total TSF capacity will be sufficient to store the 20-year mine life tailings volume (1.3 billion tons). Approximately 88 percent of the tailings will be bulk tailings, and approximately 12 percent will be pyritic tailings.

The unlined bulk TSF has two embankments – main and south. The pyritic TSF will be lined and has three embankments – north, south, and east.

Starter embankments for both facilities will be constructed as part of the initial TSF construction. The main embankment of the bulk TSF will function as a permeable structure to maintain a depressed phreatic surface in the embankment and in the tailings mass in proximity to the embankment. A basin underdrain system will be constructed at various locations throughout the bulk TSF basin to provide preferred drainage paths for seepage flows. The pyritic TSF will be a fully lined facility with an underdrain system below the liner.

The pyritic TSF, which will also contain the PAG waste, will have a full water cover during operations, while the bulk tailings cell will have a small supernatant pond, located away from the embankments, to promote large tailings beach development upstream of the embankments.

The bulk TSF downstream embankment slopes will be maintained at approximately 2.6H:1V (horizontal:vertical), including buttresses established at the downstream toe of the main embankment. The final embankment crest elevation will be approximately 1,730 feet above sea level for bulk TSF. Embankment heights, as measured from lowest downstream slope elevation, will be 545 feet (main) and 300 feet (south).

The pyritic TSF downstream embankment slopes will be maintained at 2.6H:1V. The final crest elevation will be 1,620 feet above sea level. The north embankment height will be 335 feet, the south embankment height will be 215 feet, and the east embankment height will be 225 feet.

3.4.1. Siting Criteria

PLP conducted a multi-year, multi-disciplinary evaluation to select TSF locations that meet all engineering and environmental goals while allowing for cost-effective integration into the site waste and water management plans. During this evaluation, more than 35 tailings disposal options were tested against a range of siting criteria, including:

- **Minimize potential impact to environmental resources.** The selected sites are within valleys supporting mixed uplands and wetland shrub/herbaceous shrub. The valleys include tributaries to the NFK that have experienced intermittent flows. Index counts indicate lower fish presence than at other locations. Potential impacts to waterfowl are likewise reduced by avoiding areas with high-value habitats for nesting, breeding, molting, or migration.

- **Provide adequate storage capacity.** The sites will accommodate tailings for the 20-year life of the Project.
- **Reasonable proximity.** The sites minimize the distance to the process plant, which reduces power consumption and the overall project footprint.
- **Facilitate closure.** Segregating the pyritic tailings and PAG waste allows for placement of both in the pit at the end of the mine life, thus eliminating this structure from the long-term closure plan.

3.4.2. Design Criteria

The TSFs will be designed to meet or exceed the standards of the updated 2017 *Guidelines for Cooperation with the Alaska Dam Safety Program* (ADSP) prepared by ADNR. The TSFs will be designed to the standards of a Class I hazard potential dam (the highest classification).

The final TSF designs will incorporate the following:

- Permanent, secure, and total confinement of bulk tailings solids within an engineered disposal facility.
- Secure, and total confinement of pyritic tailings and PAG waste rock within a fully lined, engineered facility, with these materials relocated to the pit at closure.
- Control, collection, and recovery of tailings water from within the tailings impoundments for recycling to the process plant operations as process water, or treatment prior to discharge to the environment.
- Providing seepage collection systems below the impoundment structures to prevent adverse downstream water quality impacts.
- The inclusion of sufficient freeboard within the bulk TSF that the entire volume of the Inflow Design Flood (IDF) will not flood the entire tailings beach, maintaining the beach between the maximum operating pond and the bulk TSF embankments.
- Limiting the volume of stored water within the bulk TSF and keeping the operating pond away from the dam face.
- Maintaining the pyritic tails and PAG waste in a sub-aqueous state to prevent oxidation.
- The consideration of long-term closure management at all stages of the TSF design process.
- The inclusion of monitoring instrumentation for all aspects of the facility during operations and after closure.

- The design includes flattened slopes to increase the static factor of safety.

3.4.3. Tailings Deposition

Each tailings stream will be delivered to its respective TSF using two pump stations, one located in the process plant and one booster station positioned approximately mid-way along the pipeline route. The bulk tailings will be discharged via spigots spaced at regular intervals along the interior perimeter of the bulk tailings cell to promote beach development, which will allow the supernatant pond to be maintained away from the main embankment.

PAG waste rock will be placed in a ring around the interior of the pyritic TSF. Pyritic tailings from the cleaner scavenger flotation circuit will be discharged into the pyritic TSF at sub-aqueous discharge points, with the level maintained just below the upper bench level for the PAG waste being stored. The sub-aqueous discharge is necessary to prevent oxidation and potential acid generation.

3.4.4. Construction

A "Certificate of Approval to Construct a Dam" is required from ADNR for the construction of impounding structures meeting the minimum height or impounding thresholds. The TSFs, seepage collection ponds, and WMPs will be jurisdictional dam structures regulated by ADSP. The certificate will include any special conditions or limitations on the construction.

The embankments will be constructed using suitable rockfill or earthfill materials, including quarried rock, NPAG and non-ML waste rock excavated from the open pit, if available, and stripped overburden.

3.4.4.1 Bulk TSF

Main Embankment

The main embankment will be constructed using the centerline construction method with local borrow materials. The centerline construction method provides a high level of embankment stability while reducing the embankment material requirements associated with the downstream method.

The embankment foundation will be prepared by removing overburden materials to competent bedrock prior to the placing structural fill materials. Construction begins with a cofferdam to capture upstream runoff during starter embankment construction. The starter embankment will be constructed to a height of approximately 265 feet and provide capacity to store tailings for the first 24 months of operation.

The material for the starter embankments will be sourced from a quarry located within the impoundment area. The bulk TSF embankments will be raised progressively during the mine life. After the quarry within the impoundment is inundated with tailings, material will be sourced from two quarries immediately west and east of the impoundment.

The earthfill/rockfill embankment will include engineered filter zones and a crushed or processed aggregate drain at the topographic low point. This drain will provide a preferable seepage path from the tailings mass to downstream of the embankment toe. Additional underdrains running parallel to the embankment will allow for drainage of seepage collected along the embankment.

South Embankment

The south embankment will be constructed using the downstream construction method to facilitate lining of the upstream face, which is constructed at a 3H:1V slope. The downstream slope will be at 2.6H:1V. Overburden materials will be removed to competent bedrock below the embankment. The earthfill/rockfill embankment will include engineered filter zones and a grout curtain to reduce seepage below the embankment.

3.4.4.2 Pyritic TSF

The embankments will be constructed using the downstream method with an overall downstream slope of 2.6H:1V. The embankments will be constructed using select borrow materials and include a liner bedding layer, overlain by a liner, on the upstream slope and over the entire internal basin. Basin underdrains will collect and convey any seepage to the downstream seepage collection ponds.

3.4.4.3 Main Water Collection Pond

The Main Water Management Pond is the primary water management structure at the mine site. It will be a fully lined facility and constructed using quarried rockfill materials founded on competent bedrock**.** The embankment is approximately 190 ft high with an overall downstream slope of approximately 2H:1V and an upstream slope of 3H:1V to accommodate the liner. It will be constructed to its final height during the initial construction period. In addition to the geomembrane liner the embankment will include a filter/transition zone. The basin and upstream embankment face will include a layer of materials above the liner to provide ice protection during freezing conditions.

3.4.4.4 TSF Embankment Lifts

TSF embankments will be constructed in stages throughout the life of the Project, with each stage providing the required capacity until the next stage is completed. A 'Certificate of Approval to Modify a Dam' is required from ADSP for each construction lift. Planned embankment raises will be evaluated each year and sized according to a review of the process plant throughput, actual tailings settled densities (TSF ponds are typically sounded to establish the size of the supernatant pond and the density of the deposited tailings in the TSF), and water storage requirements.

3.4.5. Freeboard Allowance

All stages of embankment design include a freeboard allowance above the maximum operating TSF pond level and tailings beach. The freeboard allowance includes containment of the IDF and wave run-up protection, as well as an allowance for post-seismic embankment settlement. The IDF for the facility has been selected as the Probable Maximum Flood (PMF).

The embankment freeboard requirements will be reviewed as part of each dam lift and dam safety review, and will be adjusted, as required to reflect actual mine water management conditions.

3.4.6. Surface Water

The hydrologic input to the TSF design consists of two primary factors –operating conditions based on the 76-year climate record and the IDF. The IDF for the TSF, pyritic TSF, and the main WMP is the PMF, which in turn is calculated using the 24-hour Probable Maximum Precipitation (PMP) event plus the snow water equivalent from a 1-in-100-year snowpack. Available storage, or freeboard, will always be maintained within the storage facilities to account for the IDF. Maximum operating conditions will not encroach on the freeboard allowance.

Pumps located at the bulk tailings cell supernatant pond will control the water level by transferring excess water to either the seepage control pond or the main WMP.

The pyritic TSF will be a fully lined, water retention facility. The primary means of controlling the water level within pyritic TSF will be by pumping from this cell to the main WMP or the mill.

The main WMP will be a fully lined, water retention facility used to store surplus water for milling, or for managing surplus water from other impoundment and seepage structures. The primary means of controlling the water level in the main WMP is by treating surplus water and discharging to the environment. The design of the main WMP will also incorporate an emergency spillway.

3.4.7. Seepage

The main embankment of the bulk TSF will be designed to promote seepage to the seepage collection pond, thereby minimizing the volume of water contained within the impoundment and enhancing consolidation of the tailings solids.

For the other embankments, seepage controls will include grout curtains, liners, and low-permeability zones. The low-permeability zones, in conjunction with the low-permeability tailings mass, will function as the primary seepage control barriers of the internal and east embankments.

The seepage management system will also include seepage control measures downstream of the TSF embankments. These include seepage recycle ponds with grout curtains and low-permeability core zones, and downstream monitoring wells. Embankment runoff and TSF seepage collecting in the downstream seepage collection ponds will ultimately be transferred to the main WMP to be used in mining operations or treated for discharge.

3.5. Mine Site Infrastructure

Due to the remote location and the absence of existing infrastructure, the Project will be required to provide basic infrastructure, as well as the support facilities typically associated with mining operations. These facilities require reasonable access from the Pebble Deposit, and they have been situated foremost for stability and safety. Figure 1-4 shows the mine site layout.

3.5.1. Power Generation and Distribution

There is no existing power infrastructure in the Project vicinity. All required generating capacity, distribution infrastructure, and backup power will be developed by the Project.

To meet the projected power requirement while providing sufficient peaking capacity and N+1 redundancy (one generating unit held in reserve for maintenance or emergency use) will require a plant with an installed nameplate capacity of 270 MW. The plant will use high-efficiency combustion turbine generators operating in a combined-cycle configuration. The units will be fired by natural gas provided to the site via pipeline. Design-appropriate controls will be used to manage airborne emissions and meet Alaska Department of Environmental Conservation (ADEC) air quality criteria and best management practices (BMPs). A closed-loop glycol system will capture some heat from the system for space heat with the unused waste heat rejected through a closed-loop, water cooled system that circulates water through the steam condenser to a mechanical draft cooling tower.

The various mine load centers would be serviced by a 69-kilovolt distribution system using a gas-insulated switchgear system located at the power plant.

Emergency backup power for the mine site will be provided by both standby and prime-rated diesel generators connected into electrical equipment at areas where power is required to ensure personnel safety, avoid the release of contaminants to the environment, and allow for the managed shutdown and/or ongoing operation of process-related equipment.

3.5.2. Heating

Waste heat from the power plant will be used to heat mine site buildings and supply process heating to the water treatment plant. Low-pressure steam, via heat exchangers, will heat a closed-loop glycol system that distributes heat to various buildings. Warm water from the steam condenser discharge will be routed to the water treatment plant to provide process heating.

3.5.3. Shops

The truck shop complex will house a light-vehicle maintenance garage, a heavy-duty shop that can accommodate 400-ton trucks, a truck wash building, a tire shop and a fabrication and welding shop. The layout is designed to maintain optimal traffic flow and minimize the overall complex footprint. An oil-water separation system will be designed for water collected from the wash facility and floor drains.

3.5.4. On-site Access Roads

There will be several access roads within the mine site area, including a road from the gatehouse to the mine site and secondary roads linking with the various facilities around the mine. Roads will be sized according to the operating requirements and the types of equipment using them. Traffic associated with in-pit activity will be segregated from access road traffic to avoid cross-contamination of vehicles with mud and dust from the pit.

3.5.5. Personnel Camp

The first camp to be constructed at the mine site will be a 250-person fabric-type camp to support early site construction activities and throughout the Preproduction Phase as required for seasonal peak overflows. The main construction camp will be built in a double-occupancy configuration to accommodate 1,700 workers. This facility will later be refurbished for 850 permanent single-occupancy rooms for the operations phase. The camp will include dormitories, kitchen and dining facilities, incinerator, recreation facilities, check-in and check-out areas, administrative offices and first aid facilities.

The mine will operate on a fly-in, fly-out basis, except for those personnel residing in the communities connected to the access road corridor. Non-resident personnel will be flown in and out of the Iliamna Airport and transported to the site by road. Workers will remain on site throughout their work period. Site rules will prohibit hunting, fishing, or gathering while on site to minimize impacts to local subsistence resources.

3.5.6. Potable Water Supply

A series of groundwater wells located north of the mine site will supply potable water to the mine site. Preliminary tests indicate that minimal water treatment will be required. Treatment will likely include multimedia filtration, chlorination with sodium hypochlorite, and pH adjustment with sodium hydroxide. The treatment plants will be designed to meet federal and state drinking water quality standards.

Potable water will be distributed through a pump and piping network to supply fresh water to holding tanks at the personnel camp and process plant. Holding tank capacity will be sufficient for a 24-hour supply. Diesel-fired backup pumps will also be installed to provide potable water during an electrical outage.

3.5.7. Communications

Communications to site will be via fiber optic cable with satellite backup for critical systems. The fiber optic cable will connect to existing fiber optic infrastructure in the region or a dedicated fiber optic cable laid in conjunction with the gas pipeline.

The process plant communication system will use a dedicated ethernet network to support mine process control system communications. A separate network will connect various main components of the fire-detection and alarming system. Closed-circuit television, access control, and voice over internet protocol telephone systems will be integrated with the local area network. Mine operations will use two-way radios, cell phones, and similar equipment for communications.

Diamond Point Port operations will be serviced by the fiber optic cable. Radio and/or cell service will be provided for communications at the port with the antenna located with the port facilities.

3.5.8. Laboratories

Two laboratories will operate at the mine site during the Production Phase.

Staff affiliated with the process plant will operate the metallurgical laboratory to support process plant operations. This work will include routine operations support tests to confirm the metallurgical response of near-term plant feed, and development analysis to evaluate alternate treatment strategies. The laboratory will use state-of-the-art equipment and have fully equipped facilities for sample receiving and storage, sample preparation, and flotation.

The assay laboratory will be equipped with the necessary analytical instruments to provide routine assays to support mine and process plant operations. Some environmental samples will also be tested in this laboratory, although many of these samples will likely be submitted to external, third party laboratories.

Each laboratory will be equipped with fume hoods (with exhaust treatment, if required) and drains connected to a central receiving tank. Chemical wastes will be disposed of in accordance with all applicable laws and regulations.

3.5.9. Fire and Emergency Response

The mine site and Diamond Point Port site will be equipped for fire and emergency response. Water for fire suppression will be stored within the freshwater supply tanks at the mine and port and distributed via an insulated pipeline system that meets all pertinent code requirements. A fire truck and ambulance will be located at the mine site. An ambulance will be located at the Diamond Point Port and a pump truck will be used to deliver fire suppression water. A senior member of the safety and health management team, with appropriate training and experience, will have designated responsibility for emergency response. Emergency response teams at the mine and Diamond Point Port sites will be staffed by volunteers and will be trained in fire suppression and mine rescue in accordance with regulations.

Both the mine and Diamond Point Port site will be staffed with an emergency medical technician to provide advanced medical care; appropriate facilities will be established at both locations. As necessary, this person may draw on the capabilities of the existing clinic in Iliamna. Arrangements will be made in advance for emergency evacuation via the airport in Iliamna. Designated locations for helicopter pads will be defined at the mine and Diamond Point Port sites.

Equipment will be installed at the mine site and the Diamond Point Port to deal with oil spills; crews will be appropriately trained for such response.

3.6. Material Management and Supply

General supplies and bulk reagents will typically be stored in, or adjacent to, the areas where they will be used. The location of the explosives storage and emulsion manufacturing plant is based on the need to minimize transfer distances and to provide a safety buffer between the explosives plant and other facilities. Descriptions of mining and process related supplies are provided in Table 3-5 and Table 3-6. Average annual quantities of fuel, mining, milling, and miscellaneous consumables are listed in Table 3-7.

Table 3-7. Supply Quantities

Supply	Average Annual Quantity
Fuel	16 million gallons
Ammonium Nitrate	17,500 tons
Grinding Media, Process and Water Treatment Reagents, and Miscellaneous Supplies	295,000 tons

3.6.1. Diesel Fuel

Diesel fuel to support the mining operation and logistics systems will be imported to the Diamond Point Port using marine barges. The expected maximum parcel size for delivery is four million gallons, which will allow for extended periods between shipments in winter months. The Diamond Point Port will accommodate sufficient bulk fuel storage to provide one month of buffer and allow for the offloading of bulk fuel carriers.

Diesel fuel will be transferred from the Diamond Point Port to the mine site using ISO tank-container units, which have a capacity of 6,350 gallons. These units will be loaded at the port and transported by truck to the mine site. Additional containers will be stored at the mine site to provide for a fuel reserve in the event of a supply disruption.

The main mine site fuel storage area will contain fuel tanks in a dual-lined and bermed area designed to meet regulatory requirements. Sump and truck pump-out facilities will be installed to handle any spills. There will also be pump systems for delivering fuel to the rest of the mine site. Dispensing lines will have automatic shutoff devices, and spill response supplies will be stored and maintained on site wherever fuel will be dispensed.

Fuel will be dispensed to a pump house located in a fuel storage area for fueling light vehicles. It will also be dispensed to the fuel tanks in the truck shop complex, which are used for fueling mining equipment. These tanks will also be in a lined and bermed secondary containment area.

3.6.2. Lubricants

Lubricants will be packaged in drums and/or totes and stored on site within a secondary containment area.

3.6.3. Explosives

The materials used to manufacture blasting agents include ammonium nitrate prill, fuel oil, emulsifying agents, and sensitizing agents (gaseous). The containers used to transport the prill will be offloaded, using a container tilter, to a bucket elevator, which will unload the prill to three silos, each sized for 150,000 pounds. As a safety precaution, ammonium nitrate prill will be stored and prepared for use at a location approximately 0.75 mile southeast of the final pit rim. Electrical delay detonators and primers will be stored in the same general area, but in a separate magazine located apart from each other and separate from the prill. All facilities will be constructed and operated and blasting operations conducted in accordance with Mine Safety and Health Administration (MSHA) regulations as set forth in 30 CFR Subpart N.

Other explosives required for the mining operation include detonating cord, which connects to each blast hole and fires a detonator, initiating the explosion in each blast hole. The detonators, in turn, fire explosive primers, which propagate the explosion to the blasting agent. Small amounts of pre-packaged blasting agents and minor amounts of other explosives may be used for specific purposes.

3.6.4. Reagents

Reagents will arrive at the mine site by truck in 20-ton containers, depending on the reagent. They will be stored in a secure bulk reagent storage area and segregated according to compatible characteristics. The reagent storage area will be sufficient to maintain a two-month supply at the mine site. As needed, reagents will be loaded onto a truck and delivered to the appropriate reagent receiving area.

Reagents will be used in very low concentrations throughout the mineral processing plant and are primarily consumed in the process; low residual reagent quantities remain in the tailings stream and will be disposed in the TSF where they will be diluted and decompose.

The metallurgical and assay laboratories will also use small amounts of reagents. Any hazardous reagents imported for testing will be transported, handled, stored, reported, and disposed of as required by law, in accordance with manufacturers' instructions, and consistent with industry best practices.

3.7. Waste Management and Disposal

3.7.1. Used or Damaged Parts

Used tires and rubber products will be reused to the extent practicable. Additional used tires, along with other damaged parts and worn pipes, will be packaged for shipment and disposal off site. Wood pallets and packaging will be incinerated with domestic waste. Scrap steel, such as broken grinding balls and used mill liners, truck body liners and ground engaging tools, will be shipped off-site to appropriate disposal sites.

3.7.2. Laboratory Waste

Most inorganic aqueous wastes from the metallurgical and assay laboratories will be collected in a sump, with the remainder routed to the domestic sewage treatment plant. Fugitive organics will be skimmed from the surface of the sump prior to discharging the aqueous portion to the main WMP. Generally, non-aqueous waste will be collected in specific and separate bulk containers before being returned to an appropriate place in the plant. If there is no suitable place in the main plant, it will be sent to the general waste storage area where it will be packaged and sent off site for disposal at an appropriate facility.

3.7.3. Waste Oils

Waste oil will be reused as fuel in used oil heaters to augment heating in the truck shop and/or other buildings on site. Waste oils not suitable for burning, including lubricants, will be collected into drums, sealed, and stored in containers for shipment to be recycled or disposed of off-site at an approved facility.

3.7.4. Container Wash Wastewater

Water from the container wash at site will be routed to the main WMP for use in the mill and processing plan or treated for discharge.

3.7.5. Reagent Packaging

Reagent packaging will include wooden boxes, bulk poly-propylene containers, bulk bags, laboratory packaging, and/or glass containers. Spent reagent packaging will be evaluated against applicable regulations, permits and health and safety plans for possible incineration in the on-site incinerator. Glass containers will be rinsed and packed for removal and disposal off site. Broken sharp products will be collected and packaged appropriately for removal and disposal off site.

3.7.6. Hazardous Waste

Miscellaneous hazardous wastes that may accumulate on site, such as paint, used solvents, and empty reagent containers with residual chemicals, will be managed and shipped off site to approved facilities according to applicable BMPs and regulations.

3.7.7. Nuclear Instrumentation

Nuclear instrumentation such as densitometers will be shipped off site to approved facilities in accordance with applicable BMPs and regulations.

3.7.8. Domestic Refuse

Domestic refuse from the camp kitchen, living quarters, and administration block will be disposed of on site in a permitted landfill, or shipped off-site to appropriate disposal sites. Some wastes, including putrescible wastes, will be incinerated on site, and the remaining ashes will be disposed of in accordance with applicable BMPs and regulations.

3.7.9. Sewage and Domestic Wastewater Disposal

Separate sewage treatment plants will be located at the camp and the process plant. Plans for each plant will be reviewed and approved by ADEC prior to construction.

Personnel accommodations will produce grey water from the kitchen, showers, and laundry facilities that will be treated in a water treatment plant (WTP). The WTP will be designed to remove biological oxygen demand, total suspended solids (TSS), total phosphate, total nitrogen, and ammonia to meet ADEC domestic waste-discharge criteria.

The process plant sewage WTP will receive effluent that may have metallic residues from the workers' change house and associated laundry. This WTP will be designed for metals removal in addition to biological oxygen demand, TSS, total phosphate, total nitrogen, and ammonia to meet ADEC domestic waste-discharge criteria.

Sludge from both plants will be stabilized and disposed of on site.

3.8. TRANSPORTATION CORRIDOR

The Pebble Project mine site is located approximately 82 miles west of Cook Inlet. There are limited existing road networks in the region. The transportation corridor will extend 82 miles from Diamond Point to the mine site along the north shore of Iliamna Lake.

The transportation corridor was designed to avoid wetlands where feasible, minimize disturbance area, minimize stream crossings, avoid geological and avalanche hazards, avoid culturally significant sites, minimize effects on subsistence hunting and gathering, optimize the alignment for the best soil and geotechnical conditions, and minimize road grades.

The mine access road will run east from the mine site to the port site at on Cook Inlet at Diamond Point. It will parallel or replace portions of the existing Pile Bay/Williamsport road and intersect with the existing Iliamna/Newhalen road network (Figure 12).

The concentrate, water return, and gas pipelines and the fiber optic cable will be buried in a corridor adjacent to the road that parallels the road from the mine site to the port.

3.8.1. Road Design

The mine access road will be a private 30-foot-wide gravel road, which will enable two-way traffic, and will be capable of supporting anticipated development and operational activities during construction and supply truck haulage from the port to the mine site.

The access road will include seventeen bridges, eight of which will be single-span, two-lane bridges that range in length from approximately 40 to 90 feet. There will be one large (550 feet) multi-span, two-lane bridge across the Newhalen River and eight other multi-span, two-lane bridges that range in length from approximately 125 to 245 feet. Road culverts at stream crossings are divided into categories based on whether the streams are fish bearing. Culverts at streams without fish will be designed and sized for drainage only, in accordance with ADOT&PF standards. Culverts at streams with fish will be designed and sized for fish passage in accordance with ADOT&PF and Alaska Department of Fish and Game (ADF&G) standards.

The natural gas pipeline, concentrate pipeline, water return pipeline, and fiber optic cable will be buried in a corridor adjacent to the access road. For bridged river crossings, the pipelines will be attached to the bridge structures.

3.8.2. Concentrate and Water Return Pipelines

The concentrate pipeline will consist of a single approximately 6.25-inch diameter API 5L X60 grade (or similar) steel pipeline with an internal HDPE liner to prevent corrosion. A cathodic protection (zinc ribbon or similar) system will be included for prevention of external corrosion. A pressure-based leak detection system, with pressure transmitters located along the pipeline route, will monitor the pipeline for leaks. Two electric pump stations will be required, one at the mine site and one at an intermediate point. Both pump stations will utilize positive displacement pumps in the 1000 horsepower range and the intermediate one will require a power generation facility (1-2-megawatt range). Rupture discs at the intermediate and terminal stations and pressure monitoring will be utilized to protect the pipeline from overpressure events. Manual isolation and drain valves will be located at intervals no greater than 20 miles apart.

The return water pipeline is sized to accommodate water from flushing operations with a diameter of approximately 8 inches. The HDPE lined steel pipeline will have similar corrosion protection and safety controls to the concentrate pipeline. No intermediate pump station is required for the water return pipeline.

3.8.3. Transportation Corridor Traffic

To facilitate efficient cargo movement most material will be transported in shipping containers. Inbound Project cargo and consumables will be transported using standard ISO containers for ocean freight (either 20- or 40-foot size). Diesel fuel will be transferred from the Diamond Point Port to the mine site using ISO tank-container units, which have a capacity of 6,350 gallons. Truck/trailer units will be designed to haul up to three loaded containers per trip.

Daily transportation of fuel, reagents and consumables will require up to 18 round trips per day for each leg of the road, including three loads of fuel per day.

3.9. Diamond Point Port and Lightering Location

Incoming supplies such as equipment, reagents, and fuel will be barged to the Diamond Point Port and then transported by truck to the mine site. To a lesser extent, some supplies, such as perishable food, may be transported by air to the Iliamna Airport and trucked to the mine site. Bulk concentrate will be lightered by barges to Handysize bulk carriers at a mooring point located in Iniskin Bay. The port facilities layout is shown in Figure 1-5. The proposed lightering location is also shown in Figure 1-5.

The Diamond Point Port will include shore-based facilities to dewater, store, and load the copper-gold concentrate, a pumping station for the water return pipeline, facilities to receive and store containers and fuel, as well as natural gas-powered generators, maintenance facilities, employee accommodations, and offices.

The marine component includes a causeway extending out to a marine jetty located in an 18-foot deep dredged basin. A dredged access channel will lead to deep water. Concentrate will be transferred from the shore-based facilities to the barge loader using an enclosed conveyor that follows the road before transitioning onto the causeway and jetty. Fuel will be pumped from fuel barges to the on-shore storage tanks using an 8-inch pipeline.

3.9.1. Dredging Plan

A 1994 USACE dredging study was completed for the evaluation of a dredged access channel and port facility at Williamsport. PLP completed a bathymetric survey of the Iliamna Bay area in 2008. The information from the USACE report and the bathymetric survey data were used to inform the dredge planning and design.

Based on available geophysical data bedrock in the vicinity of the dredged channel and basin occurs at depths greater than 100 feet, well below the proposed dredge depth. Sediments are expected to be composed of greater than 70% fines, with the remainder consisting of sand and gravel. Dredge slopes of 4H:1V are proposed to address sediment stability and the potential for seismic induced slumping.

Draft requirements for the concentrate and supply barges and tugs used during construction and operations are 15 feet. The dredged depth for the access channel and turning basin is 18 feet below Mean Lower Low Water (MLLW) to provide access to the jetty under all tidal conditions. This allows an additional three feet to accommodate for accumulated sedimentation between forecast maintenance dredging (estimated at 20 inches over 5 years) and over depth excavation.

The channel will be approximately 2.9 miles in length and 300 feet wide (3 times the maximum expected barge width), while the turning basin will incorporate an area of approximately 1,100 feet by 800 feet. The total volume of dredged material for the initial dredging is estimated at 1,100,000 cubic yards. Maintenance dredging (estimated at 20 inches every 5 years) is expected to total 700,000 cubic yards over twenty years (four times).

Dredging will be accomplished using a barge mounted cutterhead suction dredge. Dredged material would either be pumped directly to shore from the dredge barge, or placed into a small barge (200 ft x 40 ft) and hauled to shore. The dredged material will be placed into two bermed stockpiles located in uplands adjacent to the port facility. Consolidation and runoff water would be channeled into a sediment pond and suspended sediments would be allowed to settle before discharge to Iliamna Bay. Boulders encountered during dredging would be removed using a grab bucket or cable net placed by divers and transported to shore for placement in the stockpiles or use in construction.

The proposed dredge channel and port facility is located approximately 1,700 feet to the west of the existing fiber optic cable and Williamsport access channel. Barges accessing Williamsport follow the naturally incised channel north towards the head of Iliamna Bay before turning west towards the dredged Williamsport landing basin and dredging operations will not impede access to the facility. Activities will also be located north of the access corridor to the existing Cottonwood Bay gravel mining operation and would not impede access to that facility. Marine vessels not in active use for construction and dredging would be anchored in deeper water west of the main passage into the bay or moved offsite to avoid impeding access. Initial dredging of the facility is expected to commence in May of the second year of construction and will take four to six months to complete. Maintenance dredging will take place at five-year intervals and is expected to last three to four weeks. Maintenance dredging would be completed during the early summer months.

3.9.2. Port Design

The Diamond Point Port will include shore-based facilities to dewater, store, and load the copper-gold concentrate, a pumping station for the water return pipeline, facilities to receive and store containers and fuel, as well as natural gas powered generators, maintenance facilities, employee accommodations, and offices.

The marine component includes a causeway extending out to a marine jetty located in the 18-foot deep dredged basin. The jetty will be constructed along the northern and western limits of the basin and consist of 120 x 60 foot concrete caissons up to 58 feet high that would be separated by 60 feet. The caissons will be covered with a concrete deck. Fuel and freight barges will be moored to the jetty for loading and unloading. Fuel will be pumped to the storage tanks located at the shore-based facility through an 8-inch pipeline. The concentrate conveyor will be located on the causeway and jetty deck. In addition to the jetty, a series of three caissons will be placed within the dredged basin to provide mooring and loading for the concentrate lighter barges. A gantry will support an enclosed conveyor from the jetty to a barge loader mounted on the caissons. The causeway will also be constructed using concrete caissons to support a concrete deck.

To prepare for caisson placement, the basin footprint under the caissons will be excavated and leveled to a depth of approximately 5 feet below the dredged basin or seabed using a barge mounted excavator. The caissons would then be floated into place using a tug for guidance at high tide and seated on the leveled seabed on the falling tide or slowly lowered by pumping water into the caisson. Cranes may be used to place caissons in shallower water. Once set in place, the caissons would be filled with coarse material from the dredging and additional quarried material of a size that would achieve proper compaction when filled to avoid settlement over time. The additional fill material would be sourced from onshore material sites. Fill would be transported from shore to the caissons using a barge. Initially, only enough fill would be placed into the caisson to achieve proper seating, avoiding displacement and overflow of any water within the caisson. Fill materials would be stored temporarily on a barge moored adjacent to the construction area. Any water accumulated within the caisson would be pumped out to avoid saturation in the top fill layers and, if necessary, run through tanks on a barge for sediment settlement before discharge into the marine environment. Pre-cast bridge beams (T-sections) would be placed on the caissons to create the main service deck and the access trestle. These pre-cast beams would then be tied together with rebar and topped with a cast-in-place concrete deck for the final surface. For the shore transition, concrete pedestals would be constructed from shore to support the final bridge beams leading to the causeway. At the dock area, the caissons would be used to mount the fendering system and barge ramp equipment for the marine operations.

Construction the dock and causeway would take place following completion of the dredging and would occur late in the summer/fall of the second year of construction.

3.9.3. Port Operations

Copper-gold concentrate will be transferred from the mine site to the Diamond Point Port by concentrate pipeline, then dewatered at the port site, and stored between vessel sailings in a dedicated concentrate storage building. The concentrate will be transported by an enclosed conveyor to a barge loader that will load lightering barges with approximately six thousand tons of concentrate. The two lightering barges will have dust covers to control dust emissions. Once loaded, the barges will be transported to and secured against Handysize size vessels at the mooring location in Iniskin Bay. Wheel loaders will reclaim the concentrate from the barge deck and transfer it to a ship loader, which will load the ships. The barge location will be adjusted along the ship during the loading process. The loading trunk will extend down into the hold of the ship to minimize dusting and mist sprays will be utilized to further control dust generation. Due to the high density of the concentrate the holds will not be loaded to the top, further reducing any potential for concentrate dust to escape the hold. About five to six trips by the lightering barges will be required to load a bulk carrier, which would be anchored for three to four days at the lightering location. The bulk carrier ships will transport the concentrate to out of state smelters.

Up to 27 Handysize ships will be required annually to transport concentrate. Up to 33 marine line-haul barge loads of supplies and consumables will be required annually. Two ice-breaking tugboats will be used to support marine facility operations.

3.10. NATURAL GAS PIPELINE

Natural gas will be supplied to the Diamond Point Port and the mine site by pipeline (Figure 1-1). The pipeline will connect to the existing gas pipeline infrastructure near Anchor Point on the Kenai Peninsula and will be designed to provide a gross flow rate of approximately 50 million standard cubic feet per day. A fiber optic cable will be buried in the pipeline trench or ploughed in adjacent to the pipeline.

A metering station will be constructed at the offtake point that connects to a compressor station located on a land parcel on the east side of the Sterling Highway. The steel pipeline will be designed to meet all required codes and will be a nominal 12 inches in diameter.

The compressor station will feed a 75-mile subsea pipeline across Cook Inlet that will be constructed using heavy wall nominal 12-inch-diameter pipe designed to have negative buoyancy and provide erosion protection against tidal currents. Horizontal directional drilling will be used to install pipe segments from the compressor station out into waters that are deep enough to avoid navigation hazards. From this point, the heavy wall pipe will be trenched into the sea floor as required to maintain pipe integrity.

The pipeline will come ashore in Ursus Cove utilizing trenching, cross Ursus Head and Cottonwood Bay before reaching the port site north of Diamond Point. Natural gas will be fed to the port site power station and used for site heating. The distance from the Diamond Point Port to the mine site is approximately 82 miles. The pipeline will be buried with concentrate and water return pipelines in a trench adjacent to the road prism and will follow the mine access road to the mine site. At bridged crossings the pipeline will be attached to the bridges, otherwise the pipeline will utilize trenching or horizontal directional drilling to cross streams.

Long-term corrosion protection and control will be provided by an external coating on the pipeline and components, combined with an impressed current and/or galvanic current cathodic protection system. The cathodic protection system will be installed and activated, as soon as is practical, after pipe installation to maximize the effect of corrosion protection. Metering stations and pig launching and receiving facilities would be located at the compressor station and offtake points as appropriate. Mainline sectionalizing valves will be installed as required by code, with a spacing of no more than 20 miles for the onshore sections of the pipeline.

4. WATER MANAGEMENT

PLP recognizes the importance of effectively managing water resources in the area surrounding the Pebble Deposit and will implement a comprehensive water management program that will minimize impacts to water flow and quality and will minimize and mitigate impacts associated with all waters affected or used by the Project.

4.1. MINE SITE

The main objective of water management at the mine site is to manage, in an environmentally responsible manner, water that originates within the project area while providing an adequate water supply for operations. A primary design consideration is to ensure that all contact water that requires treatment prior to release to the environment will be effectively managed. This includes carefully assessing the Project facility layout, process requirements, area topography, hydrometeorology, aquatic habitat/resources, and regulatory discharge requirements for managing surplus water. All runoff water contacting the facilities at the mine site and water pumped from the open pit will be captured to protect the overall downstream water quality.

4.1.1. Water Balance

The foundation of the water management program is the water balance. The Pebble Water Balance is comprised of three primary models: the Watershed Model, the Groundwater Model, and the Mine Plan Model. These three models, which are all numerical water balance models, are very different, yet complementary. They collectively provide the means of quantifying the numerous water flows in the streams, in the ground, and in the various pipes, ponds, and mine structures associated with the mine development. The Watershed Model focuses on water flows throughout the NFK, SFK, and UTC drainages. The Groundwater Model focuses on the detailed simulation and understanding of groundwater flows within those drainages, and serves to inform the watershed model, and vice versa. The Mine Plan Model focuses on mine site water inflows and uses.

Complementing the water balance models is an instream fish habitat-flow model, which was used to assess the effects of changes in water flow to the fish habitat in the adjacent streams.

4.1.1.1 Watershed Model

The Watershed Model for the NFK, SFK, and UTC drainages considers both surface and groundwater. This model incorporates all key components of the hydrologic cycle, including precipitation as rain and snow, evaporation, sublimation, runoff, surface storage, and groundwater recharge, discharge, and storage. The primary input is monthly precipitation and temperature data collected at the Iliamna Airport from 1942 through 2017. The model was calibrated to measured site flow data collected at various locations in all three drainages over a nine-year period. The Watershed Model also provided input for the instream fish habitat-flow model, as well as the initial boundary parameters associated with groundwater recharge and runoff conditions for the groundwater model.

4.1.1.2 Groundwater Model

The Groundwater Model focuses on the sub-surface movement of water within the NFK, SFK, and UTC drainages. It models hydrogeological conditions in a more sophisticated and detailed manner than the Watershed Model, and its outputs provide a check of reasonableness for the Watershed Model. In addition, the Groundwater Model simulates groundwater flow rates and groundwater-surface water interactions throughout the study area, whereas the Watershed Model considers surface and groundwater flow rates only at the streamflow gaging stations.

4.1.1.3 Mine Plan Model

The Mine Plan Model focuses on water movement within the Pebble Project footprint area. The Mine Plan Model is a site-wide water balance and considers all mine facilities including the bulk TSF, pyritic TSF, open pit, process plant, and the WMPs. This model tracks water movement throughout the Pebble Project footprint area including runoff from the mine facilities, water contained in the ore, groundwater inflows, evaporation and water stored in the tailings voids.

The Mine Plan Model is used to predict the flow regime on the mine site and whether there is a water surplus or deficit. It will also be used to estimate the water storage capacity requirements for the mine under normal operating conditions.

4.1.1.4 Physical Habitat Simulation System (PHABSIM) Instream-flow Model

The PHABSIM model is an integral component of the site water balance design and is used to determine the most effective way of releasing the treated contact water that is surplus to the project needs. This model assesses the effects of changes in water flow to the instream fish habitat in streams downstream of the project site. It quantifies the areal extent of specific habitat changes that result from changes in flow throughout the year:

- for each of the three streams in the area (NFK, SFK, and UTC),
- at multiple locations throughout the whole length of each stream,
- for different salmon and resident fish species within each stream, and
- for different life history stages of each species.

Output from the model, together with a consideration of site-specific fish production limiting factors, will be used to inform and optimize the discharge of water from the site to minimize the effects of reduced flow and/or enhance instream fish habitat below the discharge points.

4.1.2. Preproduction Phase

The water management and sediment control plan during the preproduction phase consists of multiple aspects that will focus on minimizing contact water volumes. Runoff and associated sediment control measures will be managed with BMPs and adaptive control strategies. Where water cannot be diverted, it will be collected, treated, and discharged.

4.1.2.1 Water Management Plan

The water management plan during the Preproduction Phase can be summarized as follows:

- Water diversion, collection, and treatment systems will be installed around the site to address the effect of construction ground disturbance.
- Water management and sediment control structural BMPs, including temporary settling basins and silt fences, will be installed to accommodate the initial mine site construction.
- Among the first permanent facilities to be constructed will be the water management structures that will be maintained for use in adaptive management during operations, such as diversion and runoff collection ditches to minimize water contact with disturbed surfaces, and sediment control measures such as settling ponds to stop sediment from reaching downstream water courses.
- Preproduction Phase mining cannot commence until the water table in the open pit area has been lowered by groundwater pumping. The open pit dewatering system will be installed prior to Preproduction Phase mining to provide sufficient time to draw down the water table in the area. This will allow uninterrupted overburden removal in preparation for production mining of mineralized material. A series of dewatering wells will be drilled into and around the perimeter of the open pit, with the exact well number and location determined by testing the overburden aquifers. The number of wells will include an allowance for wells with poor or no water yields and wells lost through sanding, equipment loss, or other interference with water production. Pump sizes for each well will be based on well-specific yields. Water will be discharged to the environment if it meets water quality criteria; otherwise, it will be treated in a water treatment plant prior to discharge.

Design considerations for the Preproduction Phase water management structures include the following:

- Diversion channels, berms, and collection ditches will be sized for the 100-year, 24-hour rainfall event.
- Diversion channels, berms, and collection ditches will be constructed with erosion-control features, such as geotextile or riprap lining, as appropriate, for site-specific condition. Energy dissipation structures, such as spill basins or similar control measures, will be included where required to reduce erosion at the outlets of the diversion channels and collection ditches.
- Sediment control ponds will be sized to attenuate and treat up to the 10-year, 24-hour rainfall event volume and to safely manage the 100-year, 24-hour rainfall event.
- Water management and sediment control ponds will be constructed using non-PAG rock and earthen fill embankments.

- A temporary cofferdam will be constructed upstream of the main TSF embankment to manage water during the initial construction phase. Runoff from the undisturbed upstream catchment will be collected behind the cofferdam will be pumped downstream of all construction activities and released within the same watershed.

4.1.2.2 Water Treatment

Minimal water storage will be available on site until initial construction activities are completed. Therefore, prior to completion of the TSF embankments and water management structures, all water that does not meet water quality standards will be treated and released. Water from the following sources and activities may require treatment prior to release:

- Preproduction Phase pit dewatering (dewatering of the overburden aquifer near the pit may require treatment).
- Water, primarily from precipitation, accumulating in the open pit during Preproduction Phase mining.
- Runoff from TSF embankment construction.
- Runoff from excavation for site infrastructure such as the process plant, camps, power plant, or storage areas will be routed to settling ponds prior to release.
- Prior to the operations WTPs being brought on-line, modular WTPs will be used to treat contact water that does not meet discharge requirements.

4.1.3. Production Phase

The water management and sediment control plan during the Production Phase focuses on minimizing contact water. Runoff and associated sediment control measures will be managed with BMPs and adaptive control strategies. Where water cannot be diverted, it will be collected for use in the mining process or treated and discharged.

4.1.3.1 Water Management Plan

The water management plan during the Production Phase can be summarized as follows (Figure 4-1 shows a simplified schematic of the site water balance):

- Water collected from the pit dewatering wells and the open pit will be pumped to the open pit water management pond (WMP). From there, water will be pumped to the open pit WTP for treatment and discharge. WTP sludge will be directed to the process plant where it will be added to the pyritic TSF via the pyritic tailings slurry line.

- Bulk tailings slurry from the mill will be directed to the bulk TSF. Additionally, precipitation and runoff water will collect in the TSF. The bulk TSF will maintain a small operating pond.

- The main bulk TSF embankment will operate as a flow-through facility. Water collecting in the bulk tailings storage cell will flow through the embankment to the main embankment seepage collection pond. From there, water will either be directed to the main WMP for use in the mill or to the main WTP for treatment and discharge. Any excess surface water in the bulk tailings TSF will be pumped to the main WMP.

- Contact water will be pumped to the main WMP. Water treatment by-product sludge and reject water will be directed to the process plant and added to the pyritic TSF via the pyritic tailings slurry line. A portion of the treated water from the main WTP will be returned for use in the process plant and power plant cooling towers.

- Pyritic tailings slurry from the mill will be directed to the lined pyritic TSF. Additionally, precipitation and runoff water will collect in the pyritic TSF. A pond will be maintained in the pyritic TSF, fully submerging the pyritic tailings and all but the upper lift of the PAG waste rock. Excess water from the pyritic TSF will be pumped to the main WMP.

- A water surplus for the Production Phase is anticipated under normal and wetter-than-normal climatic conditions. Although the mine site will have a water surplus, the water volume available to discharge will be less than the pre-mine flows within the mine footprint as some water will be consumed in the tailings voids and some will be lost to evaporation and other minor uses. The site water surplus will vary during operations as the mine footprint expands and additional site runoff is collected. Surplus water will be treated and discharged throughout the year.

- The accuracy of water balance models is limited by many factors, including the stochastic nature of the inputs and the potential effects of climate change. In recognition of these limitations, an adaptive water management strategy is planned. Adaptive water management includes the ability to provide additional temporary water storage capacity in the TSFs, to provide surplus storage capacity within the WMPs, and to provide for expansion of the WTP treatment rate by building in excess capacity. In addition to the redundancy built into the pumping and treatment systems, additional storage capacity is available under extreme flood conditions by directing water to the open pit, allowing it to flood until the pumping and treatment systems can restore the water stored in the system to its design level.

- A comprehensive water management system will be implemented to monitor water quantity and quality. All discharged waters will be monitored for compliance with state and federal permit requirements. Water from both water treatment plants will be strategically discharged to optimize fish habitat in the downstream reaches of nearby streams. Discharge locations for the treated water have been identified in the NFK, SFK, and UTC. The treated water discharge will be distributed to these locations in a manner that optimizes downstream aquatic habitat conditions. Optimal conditions will be determined using a PHABSIM habitat instream-flow model and in accordance with ADEC and Alaska Department of Fish and Game (ADF&G) permit conditions.

Design considerations for the Production Phase water management include the following elements:

- Diversion channels, berms, and collection ditches will be sized for the 100-year, 24-hour rainfall event.
- Diversion channels, berms, and collection ditches will be constructed with erosion-control features, such as geotextile or riprap lining, as appropriate, for site-specific conditions. Energy dissipation structures, such as spill basins or similar control measures, will be included where required to reduce erosion at the outlets of the diversion channels and collection ditches.
- Sediment control ponds will be sized to attenuate and treat up to the 10-year, 24-hour storm event volume and to safely manage the 100-year, 24-hour rainfall event.
- Water management and sediment control ponds will be constructed using non-mineralized rock and earthen fill embankments.
- IDF for all WMPs will be the 100-year, 24-hour rainfall event; IDF for the TSFs and main WMP will be the 24-hour PMP plus the 100-year snowpack equivalent water volume.
- Surplus water will be treated to meet the specified water quality criteria prior to discharge.

Water collection, management, and transfer will be accomplished through a system of water management channels, ponds, and pump and pipeline configurations. These systems will be designed to handle the large flows that occur during spring freshet and late summer/fall rains. Spare parts for pump systems will be maintained on site to maintain continuous and effective water management. Leak detection systems that report to a central control system will be employed, as will monitoring systems to control pump cycling, high and low water-level switches, no-flow (or low-flow) alarms, vibration overheating alarms, and other systems as appropriate to monitor water management systems.

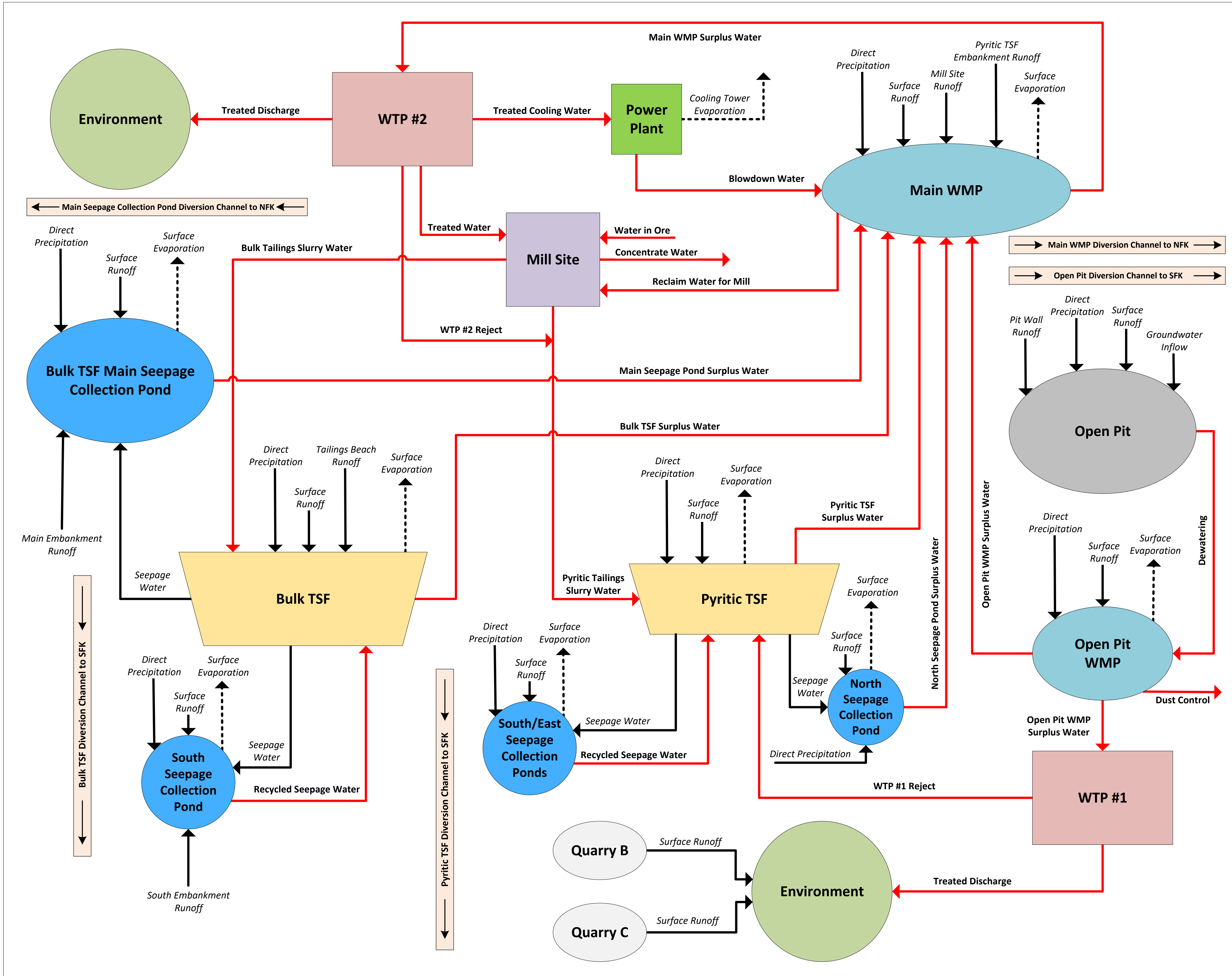


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Figure 4-1

Water Balance Flow Schematic - Operations

Pumped Flow Pathway

Runoff, Groundwater, or Seepage Pathway

Evaporation

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Rev: 0	Author: PLP

4.1.3.2 Water Treatment

Water collected around the mine area will require treatment prior to discharge to the environment. Treatment methods will include a mixture of settling for sediment removal, chemical additions to precipitate dissolved elements, and filtration to meet final discharge criteria. Wastewater from the personnel camp at the Diamond Point Port site will also require treatment prior to discharge.

The mine area will have two water treatment plants: WTP #1 (the open pit WTP) and WTP #2 (the main WTP). Both will be constructed with multiple, independent treatment trains, which will enable ongoing water treatment during mechanical interruption of any one train.

Water Treatment Plant #1

WTP #1 will treat water from the open pit WMP with treatment plant processes commonly used in the mining industry around the world. Figure 4-2 shows a simplified schematic of the treatment process. Major treatment steps are outlined in sequence below.

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Clarifier solids will be thickened and transferred to the pyritic TSF.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and Ultrafiltration (UF) membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the pyritic TSF.
5. A portion of the UF membrane permeate water will be treated with four stages of reverse osmosis (RO) membranes to further remove TDS to a concentration that will be safely below the discharge limit. Permeate from the RO membranes will be recombined with the main effluent stream for discharge to the environment.
6. Reject brine from the RO membranes will be transferred to the pyritic TSF.

Water Treatment Plant #2

WTP #2 will treat water from the main WMP with treatment plant processes commonly used in the mining industry around the world. Figure 4-3 shows a simplified schematic of the treatment process. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.

2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the pyritic TSF.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the pyritic TSF.
5. RO membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the RO membranes may require alkalinity adjustment prior to discharge.
6. Reject from the RO membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the pyritic TSF. Sulfate from the RO reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the pyritic TSF. Based on the expected pH in the pyritic TSF, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged. Brine from the last stage of RO membranes will be transferred to the pyritic TSF.

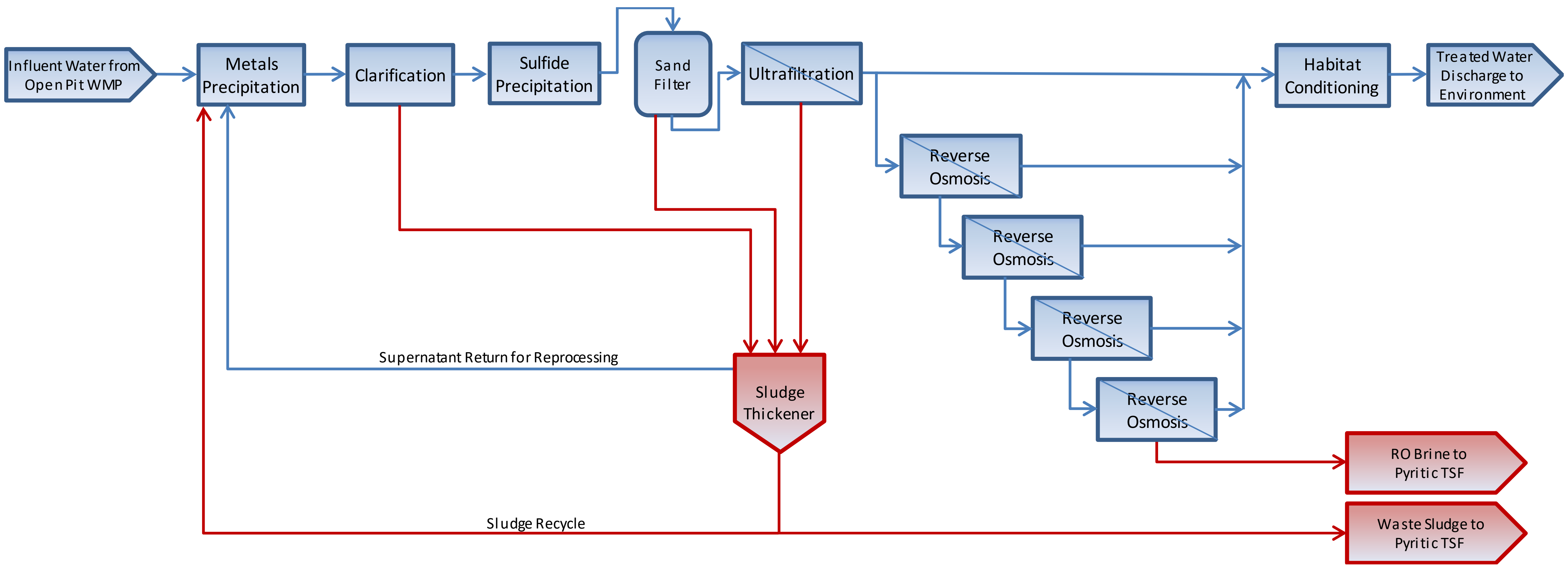

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FIGURE 4-2

Water Treatment Plant #1

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Rev: 0	Author: HDR

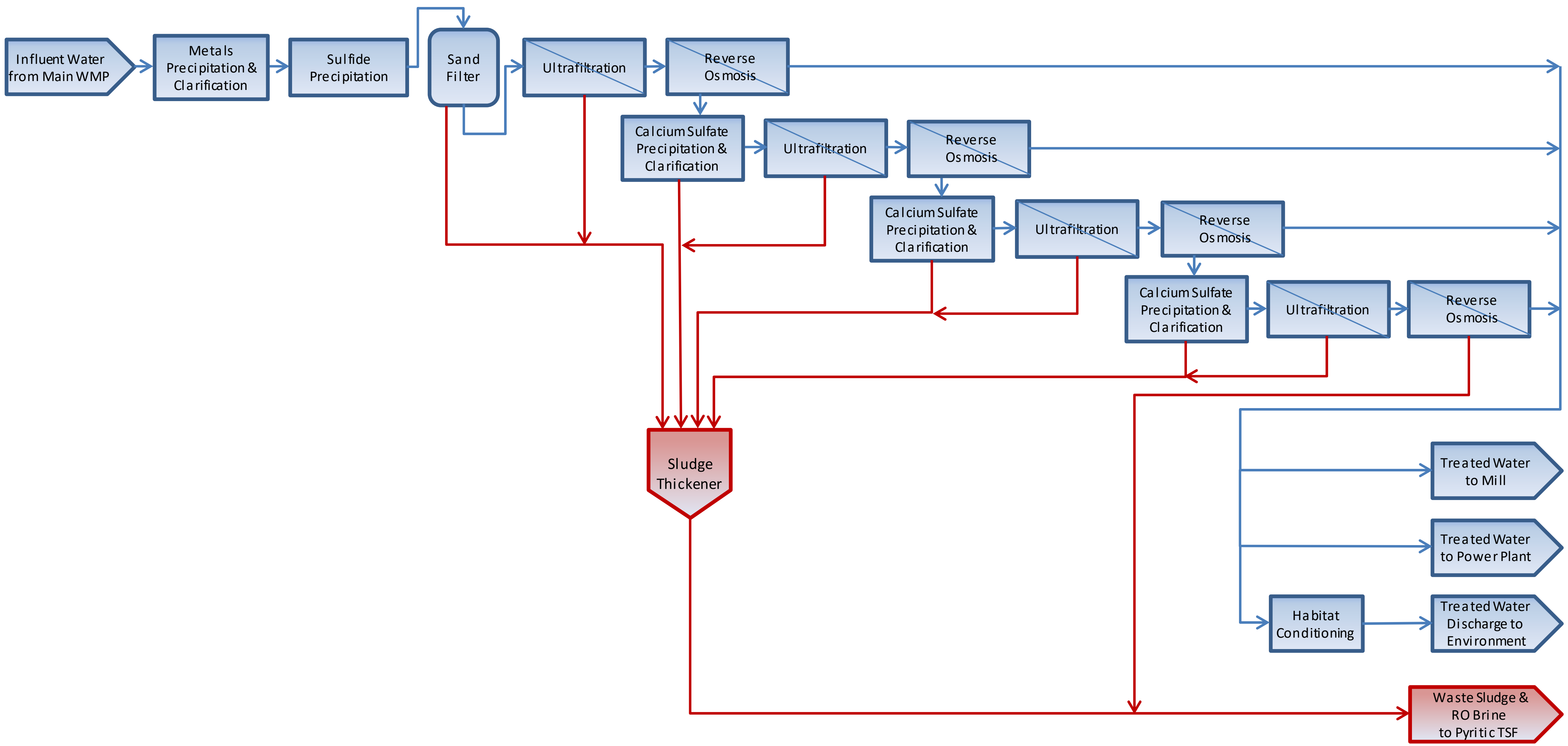

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FIGURE 4-3

Water Treatment Plant #2: Operations Phase

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4.1.4. Closure/Post-Closure Phase

Closure and post-closure water management addresses both the immediate physical closure of the site and associated reclamation activities, as well as the long-term post-closure period and associated maintenance and monitoring activities. Additional details on reclamation and closure are provided in Section 6.

4.1.4.1 Water Management Plan

The water management plan during the closure and post-closure phases can be summarized as follows:

- Closure Phase 1: Years 0-15
  - WTP #3 replaces WTP #1 to treat open pit water.
  - Excess and seepage water from the bulk TSF is pumped to the main WMP.
  - Seepage water from the pyritic TSF is pumped to the main WMP.
  - Surplus water from the main WMP is treated at WTP #2 and released to the downstream environment.
  - Surplus water from the open pit is pumped to WTP #3 to maintain the placement of the PAG waste rock in the dry.
  - Treated water from WTP #3 is released to the downstream environment
  - The open pit WMP is reclaimed.
- Closure Phase 2: Year 16 until the pit is full (approximately Year 20).
  - WTP #2 is decommissioned once it is no longer required.
  - The pyritic TSF and associated seepage collection ponds are reclaimed and surface water runoff from the area is discharged to the downstream environment.
  - The main WMP is reclaimed and surface water runoff from the area is discharged to the downstream environment.
  - Bulk TSF and seepage collection pond water is pumped to the open pit.
  - The open pit fills to the maximum management level.
  - The basis for the current analysis is that no water will be treated during this phase, however an adaptive management strategy would be utilized, and water would be directed to WTP #3 for treatment and release if required to maintain downstream flows.
- Closure Phase 3: Year 20 until the bulk TSF consolidation is complete (approximately Year 50).
  - Bulk TSF seepage is directed to WTP #3.
  - Water levels in the open pit are maintained below the main management level by treating and releasing surplus water from the open pit.

- Post-Closure
  - o Runoff water is directly discharged from the reclaimed bulk TSF to the NFK catchment once it has been demonstrated to meet water quality criteria.
  - o Bulk TSF seepage water is directed to WTP #3.
  - o Water levels in the open pit are maintained below the main management level by treating and releasing surplus water from the open pit.

4.1.4.2 Water Treatment

Water treatment during the closure and post-closure phases will utilize the facilities as outlined below. Water quality will be closely monitored, and changes and adjustments to the treatment process will be made as needed. The reclamation and closure bond package will include provisions for periodic replacement of water treatment facilities and ongoing operating and monitoring costs over the long-term, post-closure period.

Water Treatment during Closure Phase 1

The mine area will have two water treatment plants during Closure Phase 1: WTP #2 and WTP #3. Both will have multiple, independent treatment trains, which will enable ongoing water treatment during mechanical interruption of any one train.

Water Treatment Plant #2 - Closure Phase 1

During Closure Phase 1 WTP #2 will treat water from the main WMP with treatment plant processes commonly used in the mining industry around the world. Figure 4-4 shows a simplified schematic of the treatment process. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric sulfate. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous sulfate to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.
5. RO membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the RO membranes may require alkalinity adjustment prior to discharge.

6. Reject from the RO membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the open pit. Sulfate from the RO reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the open pit. Based on the expected pH in the open pit, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged. Brine from the last stage of RO membranes will be transferred to the open pit.

Water Treatment Plant #3- Closure Phase 1

During Closure Phase 1 WTP #3 will treat water from the open pit with treatment plant processes commonly used in the mining industry around the world. Figure 4-5 shows a simplified schematic of the treatment process. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric sulfate. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous sulfate to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.

5. Nanofiltration (NF) membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the NF membranes may require alkalinity adjustment prior to discharge.
6. Reject from the NF membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the open pit. Sulfate from the NF reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the open pit. Based on the expected pH in the open pit, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
9. Brine from the last stage of RO membranes will be evaporated. The concentrated liquid brine stream from the evaporators will be sent to crystallizers. The crystallized salt stream from the crystallizers will be sent to centrifuges to remove any excess liquid from the salt crystals and that liquid will be returned to the crystallizers for reprocessing. The crystallized salt from the centrifuge, which will be primarily sodium chloride, will be sent to an approved facility for disposal. The water vapor from the evaporators and crystallizers will be condensed and the resulting liquid water will be discharged.

Water Treatment during Closure Phase 2

Closure Phase 2 is a period of approximately 5 years during which inflow to the Open Pit will not be removed, allowing the water level to rise to the Maximum Management Level and no surplus water will be treated. WTP #3 will be maintained in standby status but not operated during Closure Phase 2.

Water Treatment during Closure Phase 3 and Post Closure

During Closure Phase 3 and Post Closure WTP #3 will treat two streams of water separately: a stream from the Bulk TSF Main Seepage Collection Pond (SCP) and a stream from the open pit.

WTP #3 will use treatment plant processes commonly used in the mining industry around the world. The treatment processes utilized for each stream are described separately below:

Water Treatment Plant #3- Closure Phase 3 and Post Closure - Bulk TSF Main SCP Stream

Figure 4-6 shows a simplified schematic of the treatment process for the Bulk TSF Main SCP Stream within WTP #3 during Closure Phase 3 and Post Closure. Key treatment steps occur in the following sequence:

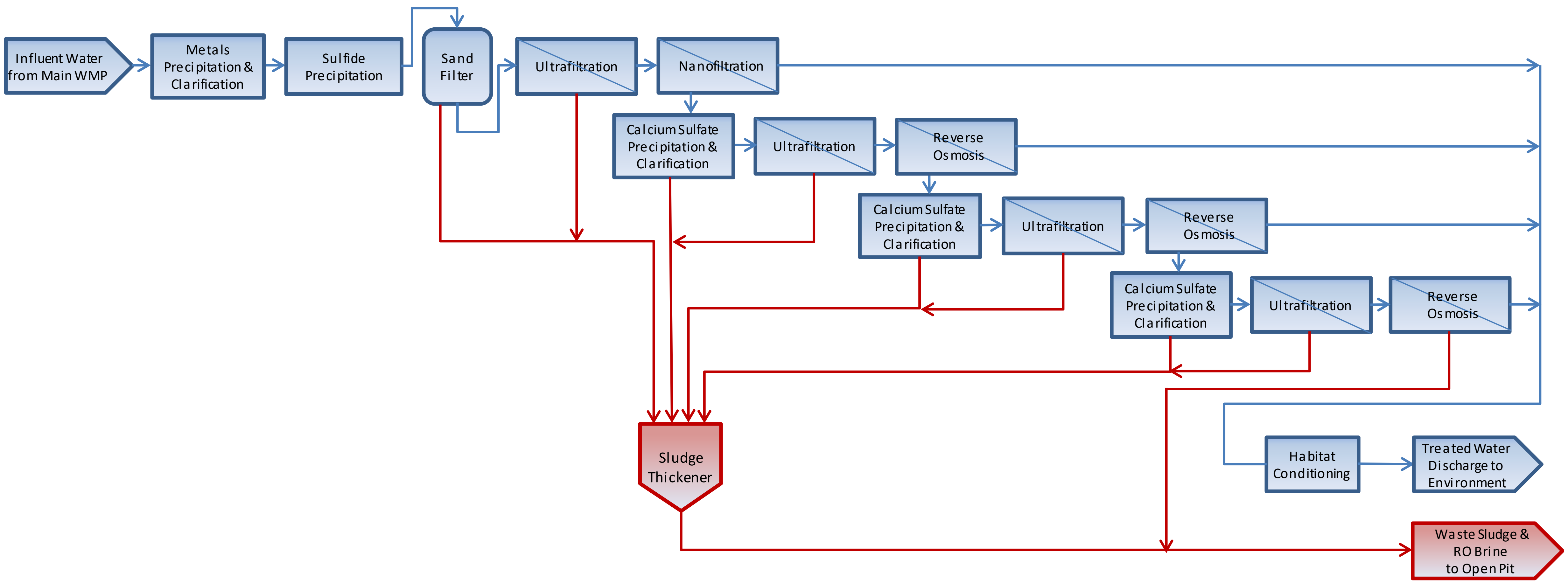
1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.
5. NF membranes will provide additional metals and metalloids removal as well as removal of TDS and sulfate. Permeate from the NF membranes may require alkalinity adjustment prior to discharge.
6. Reject from the NF membranes will have a high concentration of dissolved sulfate and other divalent ions. To prevent overloading the mine water balance with dissolved sulfate, sulfate will be precipitated from the reject before transferring to the open pit. Sulfate from the NF reject will be precipitated as calcium sulfate with a lime softening process. The calcium sulfate sludge will be transferred to the open pit. Based on the expected pH in the open pit, the calcium sulfate sludge is not expected to re-dissolve.
7. Supernatant from the calcium sulfate precipitation process will contain high levels of TDS and dissolved sulfate, a portion of which will need to be removed from the WTP process to avoid continual buildup. The supernatant water will be filtered with UF membranes. UF backwash will be sent to the sludge thickener. UF permeate will be sent to brine concentration RO membranes. Brine concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged.
8. Reject from the brine concentration RO membranes, which will still be a relatively high flow of water with high TDS and dissolved sulfate, will be further processed with a two more identical stages of calcium sulfate precipitation by lime softening, UF membrane filtration, and brine concentration RO membranes. All brine

concentration RO permeate will have alkalinity adjusted as necessary and then will be discharged. Brine from the last stage of RO membranes will be transferred to the open pit.

Water Treatment Plant #3- Closure Phase 3 and Post Closure - Open Pit Stream

Figure 4-7 shows a simplified schematic of the treatment process for the Open Pit Stream within WTP #3 during Closure Phase 3 and Post Closure. Key treatment steps occur in the following sequence:

1. Dissolved metals will be oxidized with potassium permanganate, followed by co-precipitation with ferric chloride. Hydrochloric acid or lime will be added as needed to maintain the water pH for optimal precipitation.
2. Flocculators/clarifiers will be used to separate out the co-precipitated solids. Most of the solids from the clarifiers will be recycled back to the oxidation reaction tanks. The balance of clarifier solids will be thickened and transferred to the open pit.
3. Clarified water will then be treated with sodium hydrogen sulfide, lime, and ferrous chloride to further precipitate remaining metals under reducing conditions.
4. Water from the sulfide reaction tanks will be filtered with sand filters and UF membranes to remove precipitated metals. UF permeate water will be discharged to the environment. Backwash from the sand filters and UF membranes will be thickened and transferred to the open pit.

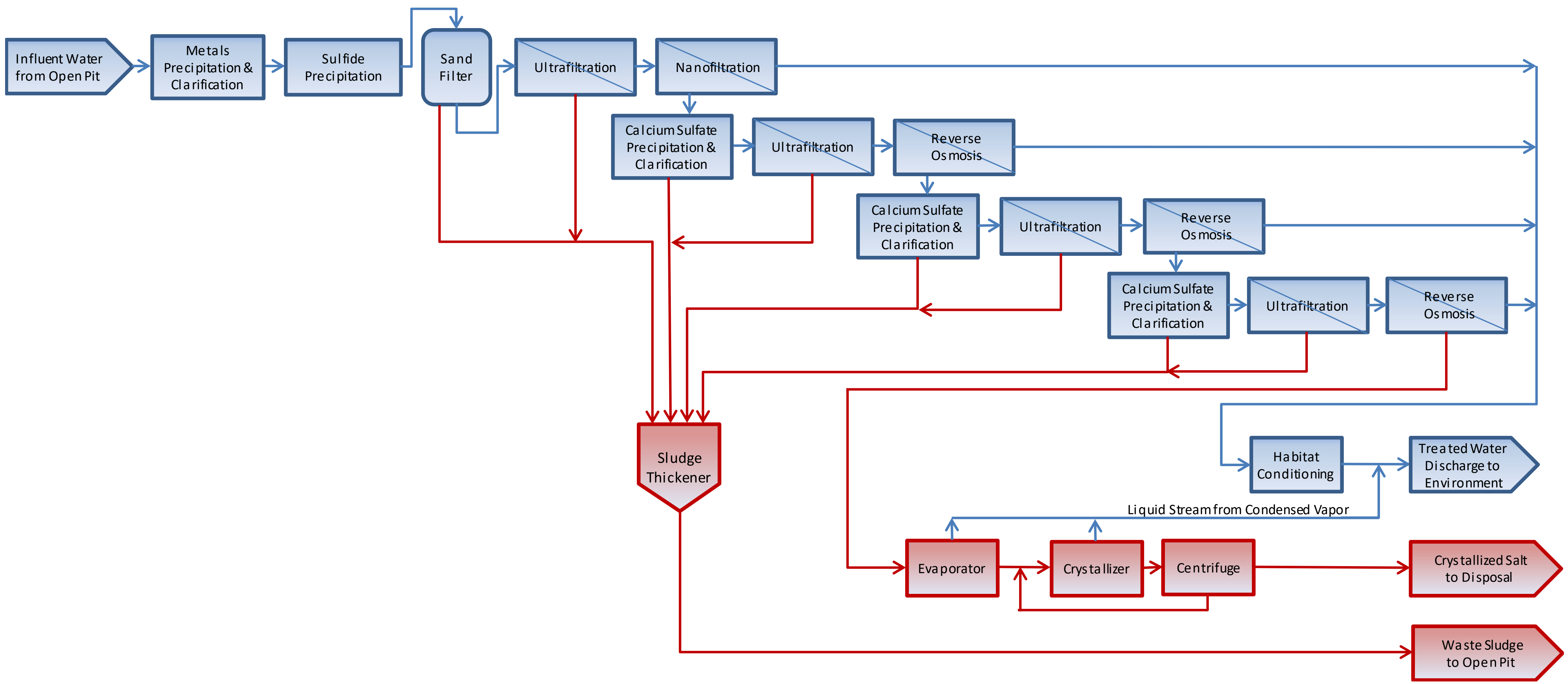


THE pebble PARTNERSHIP

FIGURE 4-4

Water Treatment Plant #2: Closure Phase 1

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

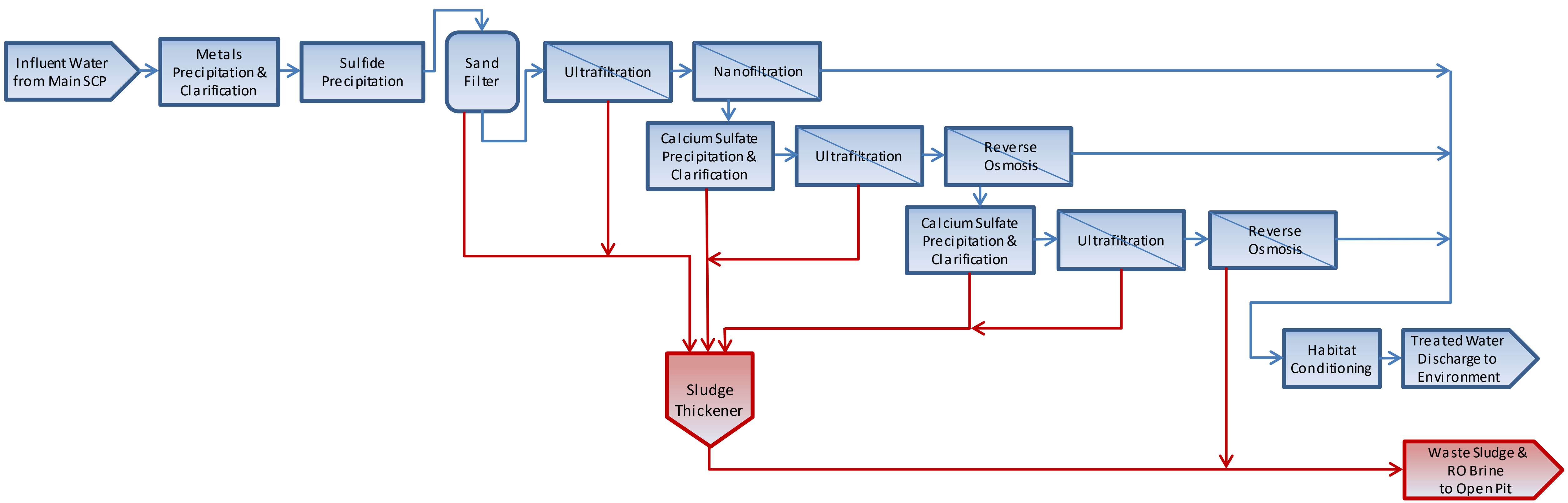


THE pebble PARTNERSHIP

FIGURE 4-5

Water Treatment Plant #3:
Closure Phase 1

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

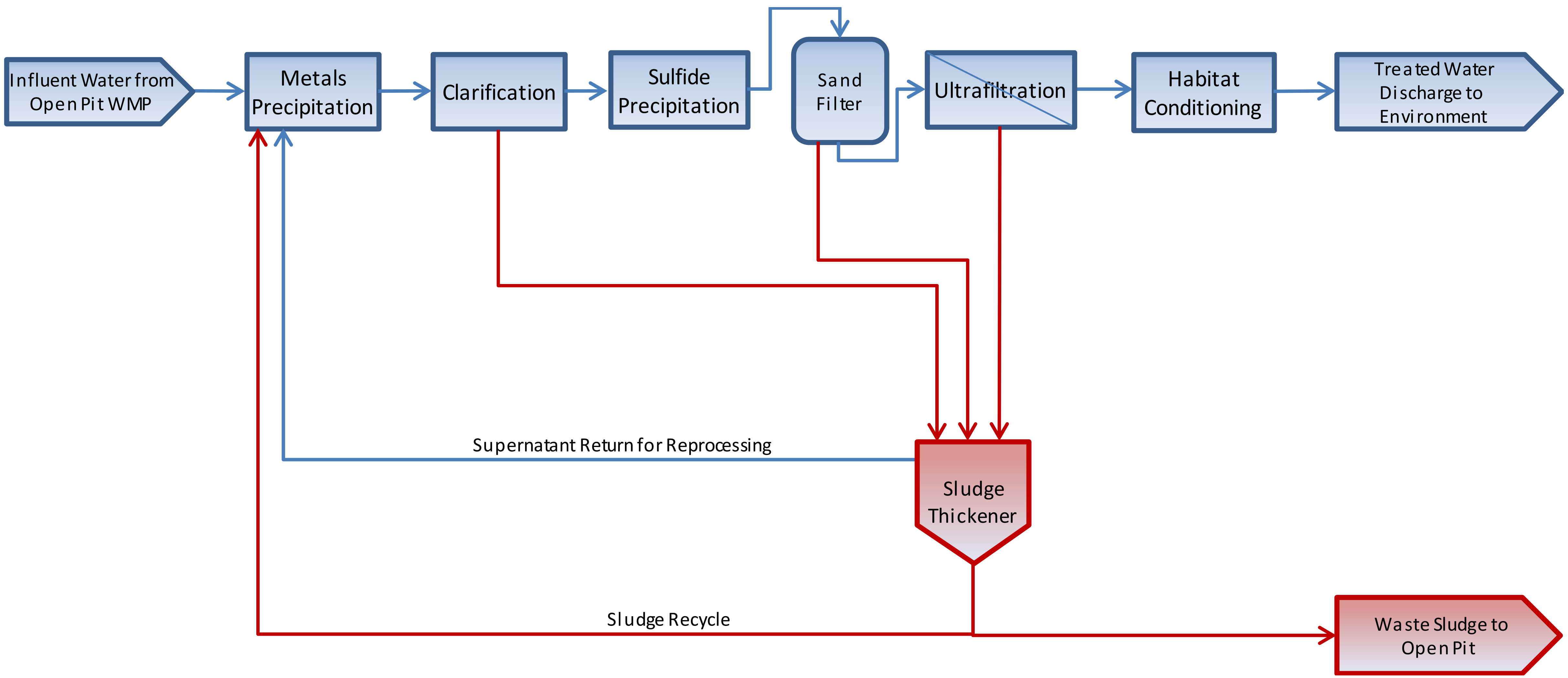


THE pebble PARTNERSHIP

FIGURE 4-6

Water Treatment Plant #3: Closure Phases 3 & 4 – Main SCP Stream

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR



THE pebble PARTNERSHIP

FIGURE 4-7

Water Treatment Plant #3: Closure Phases 3 & 4 – Open Pit Stream

File: WTPSchematics_20191212.vsd	Date: 04/07/2020
Rev: 0	Author: HDR

5. PROJECT CONSTRUCTION

The Project will take approximately four years to construct. Construction will occur on the four main project components – mine site, transportation corridor, Diamond Point Port, and natural gas line across Cook Inlet, with the focus shifting between these components depending on the stage of construction. Several temporary elements will be built during the Preproduction Phase to facilitate construction of the permanent facilities. These temporary facilities will be either repurposed or removed and reclaimed when construction is complete.

5.1. CONSTRUCTION OVERVIEW

5.1.1. Site Access

Key first steps will be to establish transportation infrastructure to access the site, to install those environmental protection systems that will service the Preproduction Phase, and to construct temporary facilities that enable the construction crews to live and work at the sites.

The initial construction effort will be at the Diamond Point Port. Existing beaching areas at Williamsport and Diamond Point will be used to land equipment and supplies and a temporary camp will be established to support construction. Temporary diesel generators will be used for power supply.

The existing Pile Bay/Williamsport road will be utilized to transport equipment and supplies for initial construction of the road alignment along the north shore of Iliamna Lake while the port facilities and road along Iliamna Bay's west side are being constructed. Additional equipment would be shipped by barge from Pile Bay to Iliamna/Newhalen so that work can commence on the western portions of the access road at the same time. The existing Pedro Bay runway will be used to support initial construction of the access road. No modifications of the runway will be required.

Initial access to the mine site should be complete within one year.

5.1.2. Mine Site

Construction activities will commence at the mine site with completion of the initial access and the construction of temporary accommodation and service facilities. Earthworks will be the primary initial activity. The level of this activity will expand over the next year, with structure construction commencing as the associated earthworks are complete. The focus will be on establishing the process and power plant sites, the open pit WMP, the main WMP, the pyritic TSF, and the bulk TSF. Support facilities, such as accommodations, fuel storage, and power generation, will expand as the site activity increases. Laydown areas and access roads for construction will be placed within the future footprint of the facilities to minimize impacts.

Following on from this, process plant and power plant foundations will be well advanced and equipment deliveries commenced. The accommodations facility will be completed for construction and access roads built. The initial bulk TSF main embankment construction will be well advanced, with the goal of ensuring that at least one year's worth of water is stored to facilitate process plant startup.

The later construction years will entail significant activity at the site. During this period, the bulk TSF main embankment will be completed, the process plant building erected, and pyritic TSF foundation and liner installed. The WTPs will be ready for initial use and the power plant construction advanced. The initial open pit development will commence with mine service facilities constructed and initial pit dewatering systems installed and operating. Production mining equipment will be delivered and commissioned as required.

A major activity during the final year of construction will be the open pit Preproduction Phase mining. The remaining process and power plant construction will be completed, as will the remaining embankments in the TSF.

5.1.3. Gas, Concentrate, and Water Return Pipelines

The natural gas line installation will be the other major activity occurring during the second and third construction years. Four separate centers will comprise the gas pipeline: the compressor station and transition section on the Kenai Peninsula, the marine section between the Kenai Peninsula and Ursus Cove, the section crossing Ursus Head and the head of Cottonwood Bay, and the overland section along the road. These activities can generally proceed independently of each other, with a target of having natural gas to the mine site by the end of the third construction year.

The concentrate and water return pipelines between the mine site and the port would be constructed at the same time as the road segment of the gas pipeline. Pumping facilities at the mid-point pumping station would also be constructed during this time period.

5.2. COMMISSIONING OVERVIEW

Following construction, the process plant undergoes the following activities to transfer the project from a construction site to a fully operational process plant.

5.2.1. Construction Completion

In the lead up to the completion of the construction phases, pipelines will be pressure tested and all mechanical, civil, structural and electrical installations will be checked to ensure that they are installed according to design and can operate safely. The completions process includes structured and rigorous Quality Assessment and Quality Control procedures to resolve any remaining construction issues prior to pre-commissioning.

5.2.2. Pre-commissioning

This phase involves the testing and inspection of individual plant sub-systems, and associated equipment and facilities to confirm that they are safe and ready for the wet commissioning stage. This includes things such as motor rotations, testing and energisation of power and control systems, field instrument calibrations and adjustments, verification of safety devices and alarms, and first fills of lubricants. Testing of safety systems may involve unit process emergency procedures and live testing.

5.2.3. Wet Commissioning

During wet commissioning, plant operations are simulated, using water where applicable, to test equipment, piping, instrumentation and control systems, and interlocking to the maximum extent possible prior to the introduction of mineralized material. The water testing will check that fluid systems perform to their design intent and meet their design specifications prior to the introduction of mineralized material during process commissioning.

5.2.4. Process Commissioning

This phase comprises the initial operation of the plant facilities using mineralized material and process reagents. The objective is to have the process plant operating in a steady and consistent manner prior to the ramp-up phase. During this phase, differing results or any unforeseen issues with the scale up from test work to full-scale operation of the process plant will be identified. During this phase, plant or infrastructure modifications, or process reconfiguration, may be required to improve the process or enhance efficiency.

5.2.5. Ramp Up

The ramp-up phase may last several months, during which the process plant will be ramped up to its full design capacity and performance levels. This phase may also entail infrastructure modifications or process reconfiguration as identified by the commissioning and operations teams.

5.3. Temporary Facilities

Many of the facilities installed during initial construction activities will be converted to permanent use. However, a number of these will be decommissioned and removed during or following construction.

The initial construction camps at the Diamond Point Port and mine site will likely be fabric-covered or transportable facilities. The construction camp at the mine will be located near the mill laydown area. The construction camp at the port will be located in an area that will be used for port operations and will not require a separate footprint. Temporary camps will be established to support road construction and will remain in place until pipeline construction is complete. Existing facilities in Iliamna and Newhalen will also be utilized. During the exploration phase, PLP employed more than 200 staff in Iliamna/Newhalen in these existing accommodations. Until the access road crossing the Newhalen River is complete, the crews will either be bused on existing roads to their workplaces or shuttled to their workplaces by helicopter.

The temporary construction camp at the mine site will be expanded during the initial phase of construction at this location. Construction crews will utilize this camp and the permanent accommodations complex when it is complete. As construction is completed and crew sizes reduce, they will transition to the temporary camp only. This will enable the accommodations complex to be refurbished to single-room occupancy for the mine operations staff.

All temporary construction facilities will be removed after construction, and the sites, unless being used for permanent facilities, will be reclaimed.

5.4. ENVIRONMENTAL PROTECTIONS DURING CONSTRUCTION

5.4.1. Wastewater and Stormwater

Appropriate ADEC discharge permits or authorizations under general permits will be obtained for all wastewater discharges prior to construction. Stormwater runoff will be properly controlled at all construction sites using structural and non-structural BMPs. No construction will begin without coverage under applicable ADEC general stormwater permits and an approved stormwater pollution prevention plan. Routine inspections and monitoring will ensure the proper functioning of all stormwater BMPs throughout the construction period.

5.4.2. Fuel Management

Fuel management will include appropriate containment and practices, in accordance with ADEC and EPA regulations and approved spill prevention and response plans. Construction equipment and construction-camp power generation will use diesel fuel. Diesel storage will include a variety of tank types and sizes ranging from approximately 10,000 to 50,000 gallons. Aviation fuel for helicopters will be stored at the mine site, Diamond Point Port, and other satellite locations as necessary. Fuel will be distributed to the smaller camps and individual work sites from the main storage locations by fuel truck.

5.4.3. Wildlife Management

PLP will develop a Wildlife Interaction Plan management plans to minimize human-wildlife interactions and resolve conflicts. All employees and contractors will receive wildlife education and training as part of their orientation. The U.S. Fish and Wildlife's national bald eagle management guidelines will be followed to the extent practicable to minimize any potential for disturbance or impacts. A nest relocation or non-purposeful take permit will be requested only when work cannot be limited in the vicinity of a protected nest.

Protection of marine mammals will be addressed through the Marine Mammal Protection Act (MMPA) and PLP will follow the requirements of any authorizations issued under the MMPA.

5.4.3.1 Environmental Construction Windows

Work in anadromous fish streams will comply with Anadromous Fish Act regulations, ADF&G guidance, and ADNR lease requirements. Resident fish will require site-specific protections under the Alaska Fish Passage Act. Stream surveys conducted as part of the environmental baseline studies will inform the establishment of permit conditions. Mitigation measures will be determined during the permitting process.

Ground-clearing activities will be conducted prior to construction work and will be timed to avoid bird-nesting periods in accordance with the U.S. Fish and Wildlife Service's Migratory Bird Treaty

Act guidance. Nesting periods are generally spring and summer but vary according to habitats and species.

5.4.3.2 Helicopter Protocols

PLP protocols to ensure that helicopters and fixed-wing planes do not harass wildlife have been well established during the exploration phase of the project. These protocols, listed below, will remain in place throughout construction and the life of the mine.

- Do not harass or pursue wildlife.
- Fly 500 feet above ground level or higher when possible and safe to do so.
- When wildlife (especially bears, caribou, moose, wolves, raptor nests, flocks of waterfowl, seabirds, or marine mammals) are observed, avoid flying directly overhead and maximize lateral distance as quickly as possible.

5.4.3.3 Hunting and Fishing Restrictions

PLP employees and contractors will not be allowed to fish, hunt, or gather while on their work rotation during the construction and operation of the Pebble Project facilities.

6. CLOSURE AND RECLAMATION

PLP's core operating principles are governed by a commitment to conduct all mining operations, including reclamation and closure, in a manner that adheres to socially and environmentally responsible stewardship while maximizing benefits to state and local stakeholders. PLP has adopted a philosophy of "design for closure" in the development of the Project that incorporates closure and long-term post-closure water management considerations into all aspects of the project design to ensure that all regulatory requirements, as well as private landowner obligations, are met at closure.

Considerations incorporated into the project design include:

- A separate pyritic TSF allows potentially acid generating tailings and PAG/ML waste rock to be relocated into the open pit and stored sub-aqueously during closure, preventing acid mine generation from this material and allowing reclamation of the pyritic TSF footprint.
- Quarried and waste rock will be geochemically tested prior to being used in construction to avoid the potential for contaminated drainage during operations and post-closure.
- Growth media and overburden will be salvaged during construction for use as growth medium during reclamation.
- TSF embankment slopes will be 2.6H:1V to provide long-term stability and facilitate the placement of growth medium.
- The overall project footprint will be minimized to facilitate physical closure and post-closure water management.

Reclamation and closure of the Project falls under the jurisdiction of the ADNR Division of Mining, Land, and Water, and the ADEC. The Alaska Reclamation Act (Alaska Statute 27.19) is administered by the ADNR; it applies to state, federal, municipal, and private land and water subject to mining operations. Except as provided in an exemption for small operations, a miner may not engage in a mining operation until the ADNR has approved a reclamation plan for the operation. The landowner participates in the planning process with regard to determining and concurring with the designated post-mining land use.

6.1. PHYSICAL RECLAMATION AND CLOSURE

The physical site closure work will commence as operations end.

- Active mining stops. Pit dewatering rates will be adjusted to maintain water levels in the pit at levels that provide safe access for placement of pyritic tailings and PAG waste rock.
- Pyritic tailings and PAG waste rock will be placed into the pit for long term storage below water. Once the material has been transferred to the open pit, pit dewatering

will cease and the water will be allowed to rise to the maximum management level. The mill, pyritic TSF, main WMP, and other infrastructure not required for post-closure will be removed and/or reclaimed.

- The bulk tailings will have a dry closure and be allowed to fully consolidate. Once runoff is demonstrated to meet water quality criteria it will be directly discharged to the NFK catchment area. Bulk TSF seepage water will be pumped to the WTP.
- Once the open pit water level reaches the maximum management level, dewatering will recommence to maintain the water level, ensuring inward flow of surrounding groundwater and prevent contact water from getting into the groundwater.
- Once physical closure activities are completed, site access infrastructure will be reconfigured to support long-term post closure activities.

All mill and support facilities not required for post-closure, including the pyritic TSF, main WMP, and open pit WMP embankments and liners, will be dismantled and removed. Concrete pads and foundations will be broken up so that they do not act as an impermeable impediment to water flows. Inert materials will be disposed of in an on-site monofill that will be sited within the disturbed footprint, while others will be shipped off site for disposal as appropriate. Disturbed areas will be recontoured, graded, ripped, and scarified. Topsoil and growth media will be placed as needed, and sites will be seeded for revegetation. Surface runoff from the disturbed areas will be collected and either treated in the WTPs or directed to the pit lake until it is found to be suitable for direct discharge to the downstream drainages.

A spillway will be constructed from the bulk TSF. Late in the operating phase, tailings in the bulk TSF will be spigoted to allow for surface drainage toward the closure spillway. As milling operations cease, free water will be pumped from the surface of the bulk tails, and they will be allowed to consolidate until the surface is suitable for equipment traffic on the surface. The tails will be re-graded as needed to facilitate drainage. A capillary break and growth media will be placed over the surface of the tails prior to seeding for revegetation. Growth media will also be placed on the bulk TSF embankments prior to seeding for revegetation.

Seepage water from the bulk TSF embankment seepage collection systems will be collected and directed to the pit lake.

The road system will be retained as long as required for the transport of bulk supplies needed for long-term post-closure water treatment and monitoring. The concentrate and return water pipelines will be pigged and cleaned before being abandoned in place. Surface facilities associated with the pipelines will be removed and reclaimed. The Diamond Point Port facilities will be removed, except for those required to support shallow draft tug and barge access to the dock for the transfer of bulk supplies. The natural gas pipeline will be maintained until such time as it is no longer required to provide energy to the project site. If no longer required, the pipeline will be pigged and cleaned before being abandoned in place or removed, subject to the regulatory review and approval at the decommissioning stage of the project. Surface facilities associated with the pipeline will be removed and reclaimed.

6.2. Post-Closure Management

The pit lake will fill during the closure period. Surface runoff from the walls will result in leaching of accumulated metals from the walls. The pit lake is expected to stratify during the closure period with surface waters retaining a neutral to slightly basic pH over time. Water quality parameters showing predictions that exceed discharge limits include hardness and several trace elements (Al, As, Cd, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Se, and Zn). Pit lake water quality will be monitored, and appropriate precautions will be taken to manage wildlife activity on the lake. Once the level of the pit lake has risen to about 890 feet elevation, water will be pumped from the pit, treated as required, and discharged to the environment. By maintaining the water level at this elevation, which is at least 50 feet below the elevation at which groundwater flow would be directed outward from the open pit, upset conditions resulting in an unplanned discharge can be avoided, as there is time to address any problems with the WTP before flows reverse.

Long-term discharge from the bulk TSF seepage collection systems will be pumped to the WTP.

6.3. Financial Assurance

Prior to commencing construction, the Project Reclamation and Closure Plan approval and associated financial assurance mechanisms will need to be in place. The Reclamation and Closure Plan and financial assurance obligations will be updated on a 5-year cycle in accordance with regulatory requirements to address any changes in closure and post-closure requirements and cost obligations.

A detailed reclamation and closure cost model will be developed to address all costs required for both the physical closure of the Project and the funding of long-term post closure monitoring, water treatment, and site maintenance. The estimate will include the costs of closure planning and design, and mobilization of third-party equipment to site; detailed estimates of equipment and labor requirements for physical closure; capital, sustaining capital, and operating costs for water treatment and other long-term post-closure operations; and appropriate indirect costs and contingencies developed following ADNR guidance.

7. ENVIRONMENTAL PERMITTING

Numerous environmental permits and plans will be required by federal, state, and local agencies. PLP will work with applicable permitting agencies and the State of Alaska large mine permitting team to provide complete permit applications in an orderly manner.

Because the Pebble Project involves a federal permit—U.S. Army Corps of Engineers Section 404/10 permit for the filling of wetlands and placement of structures in navigable waters—the provisions of NEPA will apply to this Project. There are provisions within NEPA, as well as within the permitting processes for many of the individual permits, that will provide for public review and comment on the Project.

Table 7-1 lists the types of permits that are expected to be required for the Pebble Project. Multiple permits of certain types may have to be applied for to accommodate the full scope of facilities.

Table 7-1. Environmental Permits Required for the Pebble Project

Agency	Approval Type	Project-related Examples
Federal		
BATF	License to Transport Explosives	Construction explosives acquisition and use
	Permit and License for Use of Explosives	Construction explosives acquisition and use
BSEE	Right-of-Way Authorization for Natural Gas Pipeline	Subsea natural gas pipeline in OCS waters
DHS	Airport Security Operations Plan	Iliamna Airport
	Port Facility Security Coordinator Certification	Port site
	Port Security Operations Plan	Port site
EPA	Facility Response Plan (required to be submitted to EPA, however EPA does not provide plan approvals)	Fuel storage facilities, fuel transport on the mine roadway
	RCRA Registration for Identification Number	Storage and disposal of hazardous wastes
	Spill Prevention, Control, and Countermeasure (SPCC) Plan (SPCC plans are not required to be submitted or approved by EPA. The plan will be reviewed and certified by a Professional Engineer licensed in Alaska)	Fuel storage facilities

Agency	Approval Type	Project-related Examples
FAA	Notice of Controlled Firing Area for Blasting	Construction and mining blasting activity
FCC	Radio License	Radios
MSHA	Mine Identification Number	Mine site
	Notification of Legal Identity	Mine site
NMFS	Magnuson-Stevens Fishery Conservation and Management Act Consultation documentation	Necessary in areas where mine, road, or port site activity affect essential fish habitat
USACE	Clean Water Act Section 404 permit for Discharge of Dredge or Fill Material into Waters of the U.S.	Fill into wetlands for a variety of facilities at the mine, road, pipelines, port site
	Rivers and Harbors Act Section 10 Construction of any structure in or over any Navigable Waters of the U.S.	Road bridges and causeway; port site docking and ship-loading facilities and maintenance dredging.
USCG	Facility Response Plan	Fuel storage facilities
	Fuel Offloading Plan; Person in Charge Certification	Offloading fuel from barges at the port
	Hazardous Cargo Offloading Plan; Port Operations Manual Approval	Offloading hazardous cargo from ships
	Navigation Lighting and Marking Aids Permit	Port facilities
	Rivers and Harbors Act Section 9 Construction Permit for a Bridge or Causeway across Navigable Waters	Bridge along road
USDOT	Registration for Identification Number to Transport Hazardous Wastes	Transport of hazardous wastes to approved disposal site
USFWS	Bald and Golden Eagle Protection Act Programmatic Take Permit	May be necessary in areas where mine, road, or port site activity may disturb eagles
	Migratory Bird Treaty Act Consultation documentation	May be necessary in areas where mine, road, or port site activity may disturb migratory birds

Agency	Approval Type	Project-related Examples
USFWS/NMFS	Endangered Species Act Incidental Take Authorization	May be necessary at the port site and for sub-sea pipeline construction where activities could disturb northern sea otter, Beluga whale, Steller sea lion, Steller's eider
	Marine Mammal Protection Act Incidental Take Authorization; Letter of Authorization	May be necessary at port site where activities could disturb northern sea otter, Beluga whale, Steller sea lion, harbor seal, Dall's porpoise
State		
ADEC	Alaska Solid Waste Program Integrated Waste Management Permit/Plan Approval	Tailings disposal, waste rock disposal, landfills
	Reclamation Plan Approval and Bonding	Required prior to construction.
	Alaska Solid Waste Program Solid Waste Disposal Permit; Open Burn Permit	Construction waste material disposal
	Clean Water Act Section 402 Alaska Pollutant Discharge Elimination System Water Discharge Permit	Water discharges from water treatment plans at the mine site.
	Approval to Construct and Operate a Public Water Supply System	Mine and port, and construction camps
	Clean Air Act Air Quality Control Permit to Construct and Operate – Prevention of Significant Deterioration	Power plant and other non-mobile air emissions; fugitive dust; applicable to mine, road, and port
	Clean Air Act Title V Operating Permit	Power plant and other non-mobile air emissions; fugitive dust; applicable to mine and road
	Clean Air Act Title I Operating Permit	Non-mobile air emissions; stationary sources, fugitive dust; applicable to port and Kenai compressor station
	Clean Water Act Section 401 Certification	Certification of the Section 404 Permit.
	Clean Water Act Section 402 Stormwater Construction and Multi-Sector General Permit; Stormwater Discharge Pollution Prevention Plan	Surface water runoff discharges at mine, road, and port site
	Food Sanitation Permit	Mine and port, and construction camps

Agency	Approval Type	Project-related Examples
	Oil Discharge Prevention and Contingency Plan (ODPCP or "C" Plan)	Fuel storage and transfer facilities, port and mine
ADF&G	Fish collection permits for monitoring	Required for construction and monitoring
	Fish Habitat Permit	Required for most work in anadromous streams and for most work in resident fish streams that might affect fish passage.
ADNR	Alaska Dam Safety Program Certificate of Approval to Construct a Dam	Tailings dam, seepage control dams
	Alaska Dam Safety Program Certificate of Approval to Operate a Dam	Tailings dam, seepage control dams
	Reclamation Plan Approval and Bonding	Required prior to construction.
	Lease of other State Lands	Any miscellaneous other state lands to be used by the Pebble Project – none identified at this time
	Material Sale on State Land	Materials removed from quarry sites for construction
	Mill Site Permit	All facilities on state lands
	Mining license	All facilities on state lands
	Miscellaneous Land Use Permit	All facilities on state lands
	National Historic Preservation Act Section 106 Review	Area of Potential Effect
	Pipeline Rights-of-Way Lease	Natural gas, concentrate, and water return pipelines on State lands and natural gas pipeline in State waters
	Fiber Optic Cable Right-of-Way Lease	Fiber Optic Cable on State lands and in State waters
	Powerline Right-of-Way Lease	Powerlines to support electric power distribution
	Road Right-of-Way Lease	Road between mine and port site
	Temporary Water Use Permit; Permit to Appropriate Water	Surface and groundwater flow reductions
	Tidelands Lease	Port structures below high tide line
	Upland Mining Lease	All facilities on state lands

Agency	Approval Type	Project-related Examples
ADOL	Certificate of Inspection for Fired and Unfired Pressure Vessels	
ADOT&PF	Driveway Permit	Road
	Utility Permit on Right-of-Way	Natural gas pipeline on the Kenai Peninsula
ADPS	Approval to Transport Hazardous Materials	Transport of hazardous materials along the road
	Life and Fire Safety Plan Check	Mine and port
	State Fire Marshall Plan Review Certificate of Approval	For each individual building
Local		
KPB	Conditional Use Permit	
	Floodplain Development Permit	
	Multi-Agency Permit Application	
L&PB	Lake and Peninsula Borough Development Permit	Mine and road area within the Lake and Peninsula Borough

ADEC = Alaska Department of Environmental Conservation
ADF&G = Alaska Department of Fish and Game
ADOT/PF = Alaska Department of Transportation and Public Facilities
ADPS = Alaska Department of Public Safety
BATF = U.S. Bureau of Alcohol, Tobacco, and Firearms
BSEE = Bureau of Safety and Environmental Enforcement
DHS = U.S. Department of Homeland Security
EPA = U.S. Environmental Protection Agency
FAA = Federal Aviation Administration
FCC = Federal Communications Commission
FERC = Federal Energy Regulatory Commission
L&PB = Lake and Peninsula Borough
MSHA = U.S. Mine Safety and Health Administration
NMFS = National Marine Fisheries Service
RCRA = Resource Conservation and Recovery Act
SHPO = State Historic Preservation Officer
USACE = U.S. Army Corps of Engineers
USCG = U.S. Coast Guard
USDOT = U.S. Department of Transportation
USFWS = U.S. Fish and Wildlife Service

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June 30, 2019

Shane McCoy
U.S. Army Corps of Engineers, Alaska District
Program Manager, Regulatory Division
P.O. Box 6898
Join Base Elmendorf-Richardson, Alaska 99506-0898

Re: The Proposed Pebble Mine Project

Dear Mr. McCoy:

Igiugig Village Council (IVC), the federally recognized tribe of Igiugig, submits this letter as a comment on the Public Notice on the Clean Water Act 404 Permit Application for the proposed Pebble Mine Project and the Draft Environmental Impact Statement (Draft EIS). Our tribe requests the U.S. Army Corps of Engineers to deny the Clean Water Act 404 Permit. Lake Iliamna, flowing into the Kvichak River, supplies 100% of the drinking water to the village of Igiugig, which has no alternative supply of potable water and this has been analyzed in the Igiugig Vulnerability Assessment. The groundwater sources cannot meet acceptable drinking water standards in the U.S., and by 2016 the community completed a $1.5 million dollar surface-water installation project to transition the community to relying 100% on the Kvichak River as the sole water source. Two other communities – Kokhanok and Nondalton – also rely on surface water sources that will be impacted by the proposed Pebble Mine development at the headwater source. The section of the draft EIS on drinking water provides the State of Alaska Division of Environmental Conservation drinking water regulations (published in 2012), but fails to address impacts to surface water sources specific to the Pebble Project and the villages. We are alarmed that Lake Iliamna is a Drinking Water Protection Area but there are currently no regulatory restrictions ensuring the safety and longevity of community surface water systems. In addition, there have been no studies of surface water within the mine site and transportation corridor used by local residents for personal use (Section 3.16.4.1 "Domestic Surface Water Use). This is a blatant omission.

In addition, the Village of Igiugig is a 100% Low-to-Moderate Income community and our residents rely on the subsistence way of life which enables our high quality rural existence. The size, type, and location of the proposed Pebble Mine Project will not only create an unjustified risk to our drinking water, but also to our salmon fisheries, and the associated vital economic and subsistence benefits. The Project proposes the direct and permanent loss of 8.87 linear miles of designated salmon streams, which is an incomparable loss in the history of the Clean Water Act 404 permit program in Alaska. The upper Kvichak River does not supply a King Salmon run for our tribal members. We trade for this fish from our relatives on the Nushagak River. In any given year, 25% of the Nushagak River King Salmon are spawning in the North Fork Koktuli River, the location of the proposed Pebble Mine Project. The deep cultural and spiritual connections to this subsistence way of life are impacts which cannot be avoided nor mitigated for, in any realistic manner, and therefore the project should not be permitted under the law. Furthermore, developers of the Project have not offered a mitigation plan that specifies an offset to this insurmountable loss of wetlands, streams, and essential salmonid spawning and rearing habitat.

Transportation Route Impacts:

Northern Corridor:

Igiugig Village Council is the owner of the Diamond Point property on Cook Inlet. The Project does not have access to this port as part of their alternative transportation route, and thus should not be considered. In addition, our village relies on the Williamsport and Pile Bay road corridor for 100% of our barged in resources such as propane, heavy equipment, and even commercial fishing boats use the "Cook Inlet to Bristol Bay" corridor. Increased barge and transportation along the northern corridor will have a direct impact on our operations at Diamond Point and there has not been an assessment on the proposed projects' impacts to our multi-modal shipping route.

Amakdedori Port:

Our tribal members exert an inherent sovereign right to Amakdedori, due to thousands of years of use and access to ocean-side resources. The village site, cabins, and trails have significant personal and cultural values to the Igiugig tribal members. In the Yup'ik language, *Amaktatuli* means "the place to carry things over," denoting its significance as a site for hunting marine subsistence resources. There are more cultural resources at the Amakdedori port and inadequate consultation and field research has been conducted on behalf of agencies responsible for this aspect of the proposed project. Thus, the Igiugig Tribe has taken the initiative to investigate the Projects' impacts on Traditional Cultural properties along the entire transportation corridor from Amakdedori to the mine site. The cultural resources report is still undergoing investigation and before the draft EIS is finalized we urge the following:

- Survey the port footprint and entire road corridor with ground penetrating radar to identify areas requiring concentrated sited investigations;
- On-the-ground investigation in closer transects than 15-meter distances to locate the known existing grave sites and other cultural properties.
- During any construction activities at the port site and portions of the road which intersect the historical path, we recommend a cultural resources monitor and tribal representative be on-site.

Southern Corridor:

The surface land-owning village corporation to which our tribal members belong is the Igiugig Native Corporation. The Igiugig Native Corporation owns 66,000 acres of land, extending all the way to Katmai Park and Preserve in the south, spanning to the bottom of the Kaskanak Flats on the Kvichak River to the west, extending nearly to Big Mountain on the east, and north towards Lower Talarik Creek. All of these lands, and the private Native allotment owners within these lands and along the proposed projects' transportation corridors will be adversely impacted. Our subsurface land-owning corporation, Bristol Bay Native Corporation (BBNC), owns land along all three transportation corridor alternatives assessed in the Draft EIS. The Pebble Limited Partnership has not received BBNC's, Igiugig Native Corporation's, nor Igiugig Village Council's permission to utilize any of the surface or subsurface resources. Therefore, the Corps should not have released a Draft EIS that includes alternatives that implicate our lands, and having done so, violates the law.

Proposed Ferry Route and Effects on Smolt, Lake Iliamna Seals, and IVC Access to Seal Hunting and Seagull Nesting Islands (section 4.24):

The draft EIS provides that the effect of propeller-induced effects to anadromous fish "by motorboat propellers are not frequently assessed, and are limited to a few studies..." (draft EIS page 4-24.9). The draft indicates that propeller-induced effects may be mitigated by "distribution of fish...in the water column" and "fish avoidance behavior responses to ferry noise/turbulence." None of the proposed ferry route nor its effects on smolt, seals, or subsistence access to seals and seagull nesting islands have been undertaken by the project; therefore, mitigation plans are inconclusive, underestimated, and are purely postulations. This is unacceptable.

Failure to Assess Catastrophic Failure:

According to the Draft EIS, catastrophic failure of the proposed mine project is "extremely unlikely" (4.27.6). PLP is proposing to separate mine tailings into a bulk tailings and a pyritic tailings, both of which have the potential to produce acid and leach metals. The bulk TSF is proposed to operate as pervious, which would allow excess fluid to be released into the environment. "Metals could leach from unrecovered tailings on a timescale of years to decades" which could generate acid. (Section 4.27.6.4 Historical Examples of Tailings Releases). "Historical failures of tailings dams have caused damage, including human casualties, destruction of homes and property, economic loss, and environmental impacts, especially impairment of aquatic habitat in drainages beneath the failed embankments." Worldwide, there have been 221 documented dam incidents and 135 failures, of which even modern dams have failed – attributed to human error in design, construction, and operations. For example, Mt. Polley mine failed and 7.3 million cubic meters of tailings solids were released in a breach of the facility embankment and flowed into downstream waterways. Section 4.27.6.5 "Probability of Failure" concludes that leading estimates all indicate that the probabilities of failure are very low. The risk assessment completed for this project was modeled over what time scale? For a people who have thrived in a region for 8,000+ proven and documented years, and for facilities that will need to be monitored *in perpetuity*, we cannot make decisions based upon "assumptions": the data needs to be disclosed on the timeframe of this "probability" factor. This is especially important for a draft EIS which proclaims a low probability for embankment failure, but a ***comparatively high level of consequence.*** The consequence of failure will be felt disproportionately by those living downstream of the site, and the Bristol Bay salmon fishery. Due to the high stakes involved and the project location within an earthquake fault line, we cannot rely on data that is so incomplete and assumptive.

Section K3.9 Subsistence

There are a multitude of specific examples of gaps in the scientific data put forth by PLP. For example, the maps are inaccurate in documenting all of the areas Igiugig residents subsist for large and small mammals both riverine and marine, including the entire Kaskanak Creek watershed, Katmai Preserve, all of the Lake Iliamna Islands, the Amakdedori Creek and proposed port site, the entirety of Big Mountain and Alagnak River. Subsistence studies also do not reflect the full extent of the species the people of Igiugig depend upon. The unique Iliamna Lake harbor seals are not assessed as a distinct and ecologically significant population in the project's draft EIS. There are only about 400 known seals, and they make up one of only five populations in the entire northern hemisphere. Our lake seals are found to reside in the lake year-round, providing a significant food and fur source for the residents of Lake Iliamna, making them a keystone cultural species. These seals have found a safe abode from the changes in the oceans, and they have a stable year-round food source; the ferry route will have a significant adverse impact to their habitat and potentially their food source.

In conclusion, IVC has been disappointed in the Corps fast-track schedule for the permitting process of the most complex, and controversial project in Alaska. The Government-to-Government consultation has been inadequate and unsatisfactory, and the draft EIS displays blatant critical gaps in data on key project specifications, and baseline data. IVC formally requests the Corps to require PLP to provide the missing information, then to revise the public notice on the 404 permit application and the Draft EIS to take into account that information. This will address many of the equitable and legal issues we find with the process to-date. We could continue to comment on specific sections of the draft EIS *ad nauseum* but given inadequate time to review all of the documents, and the lack of proper consultation protocols obligated to a sovereign tribe, we will conclude this particular comment letter. Igiugig Village has the most at-stake and the greatest disproportionate share of the costs associated with a project of this magnitude in a region we inhabit for its environmentally pristine, culturally intact, and economically balanced resources. Quyana for your time and attention to these critical comments and for hopefully honoring our requests.

Sincerely,

AlexAnna Salmon

AlexAnna Salmon
President, Igiugig Village Council