UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101-3140

OFFICE OF
ENVIRONMENTAL REVIEW
AND ASSESSMENT

June 29, 2018

Mr. Shane McCoy, Project Manager
U.S. Army Corps of Engineers
Regulatory Division
P.O. Box 6898
JBER, Alaska 99506-0898

Dear Mr. McCoy:

The U.S. Environmental Protection Agency has reviewed the U.S. Army Corps of Engineers' March 29, 2018, Notice of Intent initiating the scoping process for the proposed Pebble Project Environmental Impact Statement development (EPA Region 10 Project Number 18-0002-COE). We have also reviewed the additional project information available on the Corps website. The EPA is providing comments for your consideration pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 C.F.R. §§ 1500-1508) and Section 309 of the Clean Air Act. The EPA is also supporting the Corps in EIS development as a cooperating agency, due to our special expertise. We appreciate the opportunity to provide early input in the analysis of the Pebble Project.

The Pebble Limited Partnership (PLP) is proposing to develop the Pebble deposit in southwest Alaska, containing copper, gold, and molybdenum. The proposed project includes an open-pit mine, tailings storage facility, a low-grade ore stockpile, an overburden stockpile, a mill facility, a natural gas-fired power plant, and other mine site facilities. The anticipated throughput at the mill facility is 160,000 tons of ore per day, and the proposed mine operating life is 20 years. The proposed project also includes development of a 188-mile natural gas pipeline across Cook Inlet and Lake Iliamna and two compressor stations used to transport natural gas from the Kenai Peninsula to the mine site. The proposed transportation network includes 65 miles of roads, ferry terminals on the north and south shores of Lake Iliamna for use by an ice-breaking ferry, and the Amakdedori Port on Cook Inlet (including dredging and disposal of up to 20 million cubic yards of dredged material).

The scoping comments that follow are provided to inform the Corps of issues the EPA believes are significant and warrant explicit treatment in the EIS, based on current information. Overall, the EPA encourages the development of an EIS that evaluates and compares a full range of reasonable alternatives and comprehensively discusses the reasonably foreseeable direct, indirect, and cumulative impacts of the proposed action.

The EPA has significant concerns regarding the potential impacts of mining activities near the world-class fisheries of the Bristol Bay Watershed.[1] Many of these concerns have been previously documented in the EPA's 2014 Bristol Bay Watershed Assessment, which evaluated the potential impacts of large-scale mining on the region's fish resources, and in the Agency's 2014 Proposed Determination under

[1] See https://www.epa.gov/bristolbay for more information.

Section 404 of the Clean Water Act. This Proposed Determination proposed restrictions on the discharge of dredged or fill material to waters of the U.S. to protect waters that support fishery areas in and near the Pebble deposit area. Because the Watershed Assessment and the Proposed Determination were completed before PLP submitted its permit application to the Corps, these assessments did not consider and were not based on the specific parameters of PLP's pending proposal. The EIS should thoroughly analyze the potential impacts of PLP's proposal to aquatic and other resources, including the anticipated direct impacts of the proposed action, and the reasonably foreseeable indirect and cumulative impacts. We note that the geographic extent of the proposed project infrastructure is not limited to the Bristol Bay watershed, and we recommend that the EIS analyze all areas of impact from the project, including Cook Inlet.

We appreciate the information provided in the Corps' scoping package, including the list of resources to be analyzed in the EIS, and we agree that the suite of issues presented are appropriate to analyze in detail in the EIS. Our enclosed scoping comments provide our recommendations for analysis of key areas that will be the focus of our review of the project, including natural resource impacts, as well as human health and impacts to communities and federally recognized tribes. Our scoping comments also include recommendations related to: risk analysis and hazardous materials management, including geotechnical stability; analytical tools and methodologies, including predictive modeling of impacts to water, air, fish, and other aquatic resources; mitigation and monitoring; and financial assurance. Identification of these key issues and recommendations is based on the EPA's knowledge of the proposed project as well as our experience with mining projects in Alaska and other Region 10 states.

We appreciate the opportunity to participate early in the planning process for this project and are looking forward to working with you as you develop the EIS. Should you have any questions regarding our comments, please contact Patty McGrath, EPA Region 10 Mining Advisor at (206) 553-6113 or mcgrath.patricia@epa.gov.

Sincerely,

R. David Allnutt
Director

Enclosure:

1. U.S. Environmental Protection Agency Detailed Scoping Comments for the Pebble Project EIS

EPA Region 10 Detailed Scoping Comments for the Pebble Project Environmental Impact Statement

GENERAL COMPONENTS OF NEPA ANALYSIS

Purpose and Need

We recommend that the EIS include a clear and concise statement of the underlying purpose and need for the proposed project, consistent with the implementing regulations for NEPA[2] and the Clean Water Act Section 404(b)(1) Guidelines (Guidelines).[3] In presenting the purpose and need, the EIS should reflect not only the Corps' purpose in responding to the permit application, but also the broader public interest and need for this project. An appropriately defined purpose and need statement is of critical importance to setting up the analysis of a range of reasonable and practicable alternatives in the EIS that will meet the requirements of both NEPA and the Guidelines.

Range of Alternatives

We recommend that the EIS include a range of reasonable alternatives that meet the stated purpose and need for the project, are responsive to the issues identified during the scoping process and through tribal consultation, and include options for avoiding significant environmental impacts. This will ensure that the NEPA analysis provides agency decision makers and the public with information that defines the issues and identifies a clear basis for the choices made among the range of alternatives, as required by NEPA. The EIS should clearly outline the physical design of current and proposed facilities and alternatives (including ore storage sites, waste rock disposal areas, tailings areas, water storage and conveyance facilities, and supporting infrastructure including the transportation corridor, port site, and pipeline).

The EIS should "rigorously explore and objectively evaluate all reasonable alternatives"[4] even if some of them are outside the capability or the jurisdiction of the agency preparing the EIS for the proposed action.[5] This includes identifying the specific criteria that were used to (1) develop the range of reasonable alternatives, (2) eliminate certain alternatives, and (3) identify the agency preferred alternative, as appropriate. In addition, we recommend the EIS provide a clear discussion of the reasons for the elimination of alternatives that are not evaluated in detail.

While NEPA requires the evaluation of *reasonable* alternatives to the proposed action, the Guidelines require the analysis of *practicable*[6] alternatives in order to identify the least environmentally damaging

[2] 40 C.F.R. § 1502.13.
[3] Within the context of the Guidelines, practicable alternatives to the proposed discharge of fill or dredged material are identified "in light of overall project purposes," which is also termed "the basic purpose of the proposed activity." 40 C.F.R. § 230.10(a)(2).
[4] 40 C.F.R. § 1502.14(a).
[5] 40 C.F.R. § 1502.14(c).
[6] 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. 40 C.F.R. § 230.10(a)(2).

practicable alternative (LEDPA), which is the only alternative that can be permitted.[7] The analysis of alternatives for NEPA can provide the information for evaluation of alternatives under the Guidelines.[8] We recommend that the EIS range of alternatives include the practicable alternatives developed for the Guidelines analysis.

In evaluating the proposed project and alternatives, the analysis should include an evaluation of performance and effectiveness, as well as the planned monitoring to ensure efficacy of proposed design features, environmental protection measures, and mitigation.[9]

Regarding mitigation for purposes of NEPA, we recommend that the alternatives analysis include appropriate mitigation measures not already included in the proposed action or alternatives.[10] The EIS should evaluate reasonable alternatives, including mitigation measures, to reduce or minimize adverse impacts to environmental resources. We recommend that, in conducting such an evaluation, the Corps consider:

- The disturbance footprint;
- Habitat value, cultural significance, and risks in siting project components for the proposed mine site components, as well as the port site, transportation corridor, and pipeline components;
- Source control measures (effective management of waste rock and tailings to prevent acid generation and metal leaching) and containment (liners and covers);
- Measures to reduce contact between mine waste materials and surface water and groundwater (such as surface water diversions and liners and covers as recommended above);
- Impacts of pit dewatering on groundwater and stream flows;
- Treatment to promote compliance with water quality standards;
- The physical stability of structures (e.g., pit walls, ore storage and waste rock facilities, tailings facility) during operations and closure, such as considering dry stack tailings;
- Impacts along the pipeline route and transportation corridor, including to Lake Iliamna;
- Impacts from dredged material disposal;
- Impacts to the marine environment at the Amakdedori Port site;
- Air pollutant emissions; and
- Impacts to traditional and cultural uses and resources, including key subsistence species and sites.

Indirect Impacts

We recommend that the EIS include consideration of all reasonably foreseeable indirect effects caused by the action but that may occur later in time or farther removed in distance.[11] The indirect effects analysis "may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural

---

[7] 40 C.F.R. § 230.10(a)
[8] 40 C.F.R. § 230.10(a)(4).
[9] The term mitigation included in this "Range of Alternatives" section is referring to the general term as it applies to NEPA. Compensatory mitigation for purposes under CWA section 404 cannot be used to reduce environmental impacts in the evaluation of the least environmentally damaging practicable alternatives for the purposes of requirements under Section 40 C.F.R. § 230.10(a). *See* 1990 Memorandum of Agreement between Army and EPA concerning the determination of mitigation under CWA section 404(b)(1) Guidelines.
[10] 40 C.F.R. § 1502.14(f).
[11] 40 C.F.R. § 1508.8(b).

systems, including ecosystems."[12] While NEPA does not require agencies to engage in speculation, "[t]he EIS must identify all of the indirect effects that are known, and make a good faith effort to explain the effects that are not known but are reasonably foreseeable."[13]

We therefore recommend that the EIS evaluate the expansion and continued operation of the currently proposed project to the extent that the Corps considers it to be a reasonably foreseeable indirect effect of the proposed action. The current proposed Pebble Project description includes mining of approximately 1.1 billion tons of mineralized material, while the 2011 Preliminary Assessment Technical Report[14] estimated that the total Pebble mineral resource may be 11.9 billion tons. It may be reasonable to predict that a mine at the Pebble deposit will eventually operate for longer than 20 years and recover and process additional ore based on the size of the deposit, the significant infrastructure that will be developed under the current project description, and statements made by the Pebble Limited Partnership regarding the potential to examine expanding the mine once initial production has begun on the current proposal.[15] Accordingly, we recommend that the EIS consider the potential impacts associated with reasonably foreseeable mine expansion scenarios, including up to 11.9 billion tons.

In addition, we recommend that the EIS consider the extent to which it is reasonably foreseeable that the proposed transportation corridor and natural gas pipeline may be made accessible to the public and may stimulate additional reasonably foreseeable mining projects in the area, and potential environmental effects associated with that induced mining. Although PLP's current proposal only includes private access to the infrastructure components, public access may be granted in the future. This potential may be different for the different infrastructure elements. For example, if the pipeline is regulated as a common carrier, then public access could be allowed if capacity permits. We recommend that the EIS discuss any reasonably foreseeable future public access to the project's infrastructure components and analyze any reasonably foreseeable indirect effects of this action.

Construction and operation of the project would result in increased vessel traffic in Cook Inlet and on Lake Iliamna because vessels will bring supplies to the site and transport products off-site. In addition to evaluating the direct effects of the increased transportation, we recommend that, if it is reasonably foreseeable that the ports and ferry landings will become available for public use, then any reasonably foreseeable future use of these components should be assessed in the EIS as indirect or cumulative effects. Should the port and ferry terminals remain open following mining, this infrastructure may result in increased use and vessel traffic beyond what PLP is currently proposing.

Indirect project impacts under NEPA can include secondary effects, which are defined by the Guidelines as "effects on the aquatic ecosystem that are associated with the discharge of dredged or fill materials, but do not result from the actual placement of the dredged or fill material."[16] The consideration of secondary effects is necessary for the Guidelines analysis, and examples of potential secondary effects are discussed in the section on aquatic resources below.

---

[12] *Id.*

[13] Forty Most Asked Questions Concerning CEQ's NEPA Regulations, Question 18 (CEQ, 1981).

[14] Preliminary Assessment of the Pebble Project, Southwest Alaska, February 2011. Developed by Wardrop, A Tetra Tech Company, for Northern Dynasty Minerals, Ltd.

[15] e.g., see http://www.alaskajournal.com/2018-01-10/permit-application-reveals-size-scaled-down-pebble-project. "Collier has acknowledged the company might look to expand after initial production commences but contends growing the project would require additional rounds of environmental reviews and permitting that would be independent from any approvals Pebble already had."

[16] 40 C.F.R. § 230.11(h).

Cumulative Impacts

In accordance with NEPA, the cumulative impacts analysis should identify how resources, ecosystems, and communities in the vicinity of the project have already been, or will be affected by, past, present, or reasonably foreseeable future activities in the project area, "regardless of what agency (federal or non-federal) or person undertakes such other actions."[17]

The Guidelines also fundamentally require consideration of reasonably foreseeable cumulative effects in determining whether a project complies with the significant degradation prohibition and to ensure that discharges will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystems of concern.[18] Cumulative effects are "the changes in an aquatic ecosystem that are attributable to the collective effect of a number of individual discharges of dredged or fill material," which individually may be minor, but cumulatively may result in a "major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems."[19]

For the cumulative impacts assessment, we recommend that the EIS delineate appropriate geographic boundaries, including natural ecological boundaries whenever possible, as well as consider an appropriate time period for the project's effects. We recommend that resources be characterized in terms of their response to change and capacity to withstand stresses. Trends data should be used to establish a baseline for the affected resources, to evaluate the significance of any historical degradation (e.g., due to exploration activities), and to predict the environmental effects of the project components.

Past, present, and reasonably foreseeable future activities that should be considered in the cumulative impact assessment will vary across the geographic scope of the various mine-site and infrastructure components. Please refer to CEQ's "Considering Cumulative Effects Under the National Environmental Policy Act"[20] and the EPA's "Consideration of Cumulative Impacts in EPA Review of NEPA Documents"[21] for assistance with identifying appropriate boundaries and identifying appropriate past, present, and reasonably foreseeable future projects to include in the analysis.

In particular, we recommend that the cumulative effects analysis consider, but not be limited to, the following activities:

- Past and current exploration activities conducted by PLP and others at the Pebble site;
- Current exploration activities occurring in the Bristol Bay watershed region;
- Reasonably foreseeable expansion and continued operation of the currently proposed project (while this is an indirect effect under NEPA, as discussed above, it is a cumulative effect under the Guidelines);
- Reasonably foreseeable future use of project infrastructure (road, port, pipeline); and,
- Reasonably foreseeable development of additional mining projects as a result of increased exploration activity in the region. Even if those activities are not determined to be indirect effects of the proposed action (as discussed above), they are still reasonably foreseeable.

---

[17] 40 C.F.R. § 1508.7.
[18] 40 C.F.R. § 230.10(c).
[19] 40 C.F.R. § 230.11(g).
[20] http://ceq.hss.doe.gov/nepa/ccenepa/ccenepa.htm.
[21] http://www.epa.gov/compliance/resources/policies/nepa/cumulative.pdf.

ENVIRONMENTAL RESOURCE IMPACTS

Aquatic Resources, Including Wetlands, Streams, and Fish

Evaluating Compliance with the Clean Water Act Section 404(b)(1) Guidelines
The Corps' potential CWA Section 404 permitting action is triggering preparation of the EIS. We recommend that the Corps' permitting regulations and the Guidelines therefore provide the context for identifying relevant issues and evaluating alternatives in the EIS.

The Guidelines are the substantive environmental criteria for the evaluation of proposed discharges of dredged or fill material, and applicants must demonstrate compliance with the Guidelines.[22] The EIS is a significant component of the administrative record for the District's permit decision, which can and should provide sufficient information to address compliance with the Guidelines and the Corps' public interest review.[23] Although it is not mandatory, we support the Corps' decision to include of the public interest review factors into the list of issues to be considered in the EIS. This will enable the expected benefits to be balanced against reasonably foreseeable detriments, and all relevant public interest factors to be weighed.

We recommend that the organization of the EIS facilitate the evaluation of the proposed project's compliance with the Guidelines. Issues relevant to compliance with the Guidelines should be addressed explicitly in the EIS where possible. Alternatively, a stand-alone Section 404(b)(1) analysis could be included as its own section of, or appendix to, the EIS. As mentioned above, we recommend that the range of alternatives evaluated in the EIS be sufficient to identify the LEDPA. In addition, we recommend that the final EIS identify which alternative is the LEDPA.

The Guidelines prohibit, for example, the authorization of a proposed discharge that would cause or contribute to the violation of an applicable water quality or toxic effluent standard, jeopardize a listed threatened or endangered species, or impact a marine sanctuary.[24] We recommend that these criteria be used to evaluate and compare alternatives.

The Guidelines also prohibit the authorization of a proposed discharge which will cause or contribute to significant degradation of the aquatic ecosystem.[25] Findings of significant degradation must be based upon specific factual determinations, evaluations, and tests identified in the Guidelines. These include the evaluation of the direct, secondary, and cumulative effects of the proposed discharge and alternatives on specific resources including fish, wildlife, and special aquatic sites. The significant degradation findings must also evaluate the effects to resource characteristics including aquatic ecosystem diversity, productivity, and stability. Evaluating the potential for significant degradation also requires the consideration of effects to human uses or values, including recreational, aesthetic, and economic values. With regard to fisheries, the Guidelines require, for example, an evaluation of effects to all forms and life stages of aquatic organisms in the food web, including fish and the plants and animals on which they feed and depend upon for their needs.[26] The Guidelines also require an evaluation of effects to

---

[22] 40 C.F.R. § 230.12(a)(3)(iv).
[23] See 33 C.F.R. § 320.4.
[24] 40 C.F.R. § 230.10(b).
[25] 40 C.F.R. § 230.10(c).
[26] 40 C.F.R. § 230.31.

recreational and commercial fisheries, which includes harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man.[27] The Corps has proposed including a number of these evaluations in the EIS. We recommend that as many of the specific factual determinations, evaluations, and tests required by the Guidelines as possible be included in the EIS, and be used to evaluate and compare alternatives.

The Guidelines also prohibit any proposed discharge that does not include all appropriate and practicable measures to minimize potential harm to the aquatic ecosystem.[28] Subpart H of the Guidelines identifies numerous possible steps to minimize impacts, including reducing the footprint of the project, using co-location of facilities whenever possible, implementation of best management practices to reduce environmental impacts, configuring the project footprint to reduce or eliminate impacts to higher functioning aquatic resources and other appropriate and practicable measures. Also, as previously discussed, we recommend that the EIS include appropriate minimization measures both as part of the action alternatives and relative to the affected environment. The discussion of minimization measures should include assessment of their likely effectiveness.

Compensatory Mitigation

For unavoidable impacts to wetlands, streams, and other aquatic resources, the Guidelines require appropriate and practicable compensatory mitigation to offset unavoidable environmental impacts associated with discharges permitted under CWA Section 404. We recommend that the EIS consider potential mechanisms to offset likely unavoidable aquatic resource impacts. We also recommend that the EIS include the applicant's proposed compensatory mitigation plan. Compensatory mitigation requirements, including the components of a compensatory mitigation plan, are described in Subpart J of the Guidelines. Pursuant to the Guidelines, the level of detail in the compensatory mitigation plan should be commensurate with the scale and scope of the impacts.

Compensatory mitigation may be provided through purchase of credits from an approved mitigation bank, purchase of credits from an approved in-lieu fee mitigation program, and/or completion of a permittee-responsible compensatory mitigation project(s). Final compensatory mitigation requirements must be commensurate with the amount and type of impact that is associated with a particular Section 404 permit.[29] Compensatory mitigation required by the Guidelines is separate from, and may be in addition to, proposed project impact mitigation under NEPA.

Characterizing the Affected Environment

We recommend that the EIS describe aquatic habitats in the affected environment by resource type using the data sources and classification approaches that provide the greatest resolution possible. For example, if wetlands are mapped using a Cowardin classification, that mapping should be to the smallest identifiable map unit. Likewise, streams should be classified and mapped accordingly. The baseline information for aquatic resources should include their functional condition and integrity. We also recommend that the EIS evaluate the characteristics of the potentially affected aquatic resources, how those characteristics provide fish habitat, and how such habitat could be adversely impacted by the proposed project. Wetlands and streams perform different functions at different rates, and capturing this information is critical for evaluating the potential environmental impacts of the proposed action, alternatives, and reasonably foreseeable actions (exploration and mining) on these resources.

---

[27] 40 C.F.R. § 230.51.
[28] 40 C.F.R. § 230.10(d).
[29] 40 C.F.R. § 230.93(a)(1).

Characterizing the distribution of resident and anadromous fish in potentially affected streams and other aquatic resources is also important, and we recommend the use of data sources such as the Anadromous Waters Catalog[30] and the Alaska Freshwater Fish Inventory[31] to help with this characterization.

Aquatic Resource Impacts Analysis

We recommend that the areal extent (i.e., acreage) of impacts to aquatic resources be quantified in the EIS for both direct and secondary effects. The acreage values for the direct and secondary impact footprints should include the acreage for streams as well as for wetlands, ponds, lakes, mudflats, and other waters. In other words, reported acreage losses should represent the total loss of jurisdictional waters. For streams, the loss of channel length should also be quantified by linear feet and/or miles. Channel length values are a more intuitive metric for some, and facilitate different types of analyses than the acreage values. In addition to the areal or linear extent, impacts to aquatic resources should also be quantified by the expected change in the function these resources perform, including fishery support functions, or change in the condition of the resource.

Direct effects are impacts on aquatic resources within the footprint of the discharge of dredged or fill material. Direct effects at the mine site would include stream and other aquatic resource losses within the footprints of the tailings storage facility, the ore and overburden storage sites, the mine pit, and other mine site facilities described in the permit application. Construction of the transportation and pipeline corridors and port facility will likely involve such discharges as well.

Secondary effects, as defined by the Guidelines, are associated with the discharge of dredged or fill material, but do not result from actual placement of this material. These effects are also considered indirect impacts under NEPA. Examples of secondary effects that should be evaluated in the EIS include the following:

- Elimination of streams and wetlands due to drowning by the tailings impoundment and other mine components;
- Dewatering of streams and other aquatic resources due to pumping of groundwater during open pit mining and filling during closure;
- Fragmentation of aquatic resources due to the placement of the mine pit, ore storage sites, tailings storage facility, and other mine components;
- Degradation of downstream fish habitat due to streamflow alterations resulting from water capture, withdrawal, storage, treatment, or release at the mine site;
- Degradation of downstream fish habitat due to water quality impacts associated with mine construction and operation;
- Degradation of downstream fish habitat due to the loss of important inputs such as nutrients and groundwater from upstream sources;
- Degradation of aquatic resources due to dust deposition from mining and transportation activities.

The evaluation of the proposed project's impacts and alternatives should fully consider the physical, chemical, and biological effects of each of the direct and secondary effects, and should consider incremental changes from these impacts along each stream segment downstream of the impact site.

[30] See https://www.adfg.alaska.gov/sf/SARR/AWC/.

[31] See http://www.adfg.alaska.gov/index.cfm?adfg=ffinventory.main.

Considering the value of the region's commercial, subsistence, and recreational fishery resources, we recommend that the EIS focus on quantifying direct, indirect, and cumulative impacts on resident and anadromous fish and their habitat resulting from losses of streams with documented fish occurrences; losses of headwater source areas of these streams; losses of wetlands, lakes, and ponds; and streamflow alterations. We appreciate that the Corps has made the EPA's 2014 Bristol Bay Watershed Assessment available on the Pebble Project website, and we also recommend that this document be referenced in preparing the EIS.[32]

The losses of stream reaches and adjacent wetlands from dewatering, as well as changes to downstream reaches and adjacent wetlands, may result in physical, chemical, and biological changes which would impact fishery habitat and habitat support. We recommend that the EIS model and consider these impacts compared to baseline conditions, including but not limited to:

- Evaluate changes in water volume in the stream areas of impact, as well as changes in the downstream reaches of the watershed resulting from losses of upstream contributions of water. We recommend that the analysis address seasonal changes to the different stream segment hydrographs, including changes to seasonal temperatures, dissolved oxygen levels, sediment transport capabilities, and any associated changes to sediment grain sizes in the different stream segments;
- Evaluate flow changes in the impacted stream reaches, both from pit dewatering as well as any proposed in-stream discharge points, to assess any potential changes to stream profile, form, and pattern, and to identify any areas of accretion and/or scouring which may reasonably be anticipated. We also recommend that areas of stream incision as a result of flow changes be identified, as well as losses of connectivity to floodplains and riparian wetlands currently connected to the downstream reaches;
- Identify potential changes to nutrient levels, turbidity, and dissolved oxygen, particularly with respect to seasonal patterns in the downstream reaches. We further recommend that both the direct losses of both autochthonous and allochthonous inputs from upstream reaches lost and/or disconnected from wetland and other riparian habitats, as well as the incremental reductions in those inputs in downstream segments throughout the stream reaches and their effects on system-wide primary, secondary, and tertiary production, be evaluated. These analyses should consider the direct changes to downstream habitats as well as changes to fisheries support in the different stream reaches;
- Evaluate decreases in anticipated invertebrate transport and production in downstream segments and those effects on fish production; and
- Evaluate the effects of disconnecting any off-channel habitat both near the areas of direct impact and throughout the downstream reaches, both for losses of allochthonous inputs and also for potential losses of nursery habitat.

We recommend that the direct, indirect, and cumulative impacts of any of these potential physical, chemical, and biological alterations be examined for how they may result in the loss and/or degradation of fish habitat, including alterations with respect to spawning, overwintering, nursery, and migration. Habitat losses that may result from freeze-through or seasonal warming of fish production areas should also be evaluated.

[32] See https://www.epa.gov/bristolbay/bristol-bay-assessment-final-report-2014.

Water Quality and Quantity

Evaluating Impacts to Surface Water and Groundwater Quality and Quantity

Water quality is one of the EPA's principal concerns at mine facilities due to the potential for acid-generating and metal-leaching waste materials (ore, waste rock, tailings, pit walls) that are exposed to the environment and require management over long periods of time. In addition, road construction and operation have the potential to contribute a significant quantity of sediment to streams. We recommend that the EIS characterize baseline surface water and groundwater quality, quantity, and interactions, and evaluate the impacts of all aspects of the proposed operations and alternatives (including pit dewatering and backfilling, tailings management and disposal, water management, and port-site and transportation aspects) on these hydrologic components and describe mitigation for adverse impacts.

Given the potential impacts of the proposed Pebble Project, the EPA recommends that the Corps specifically include in the water resources analysis for the EIS (see also our recommendations for Analysis Tools and Methodologies):

- Characterization of existing groundwater, surface water, springs, and wetland resources within the area of both the project and all potential alternatives, including groundwater levels, flow direction and gradients, and chemistry;
- Development of a hydrogeologic conceptual site model, including:
    - Maps of groundwater, surface water, springs, and wetland resources in the area to be developed or affected;
    - Baseline data on the extent and quality of groundwater, surface water, springs and wetlands;
    - Information on the quantity and location of all aquifers, including Underground Sources of Drinking Water, recharge zones and source water protection areas;
    - Identification of any CWA § 303(d) listed waterbodies and any existing restoration efforts for these waters;
    - Identification and description of all wetlands and surface waters that could be affected by the project and alternatives; where applicable, acreages, channel lengths, habitat types, values and functions of these waters should be identified;
    - Identification and description of hydrologic pathways (e.g., the connectivity of springs or groundwater to surface waters; the connectivity of all streams to each other and to wetlands); and
    - A detailed water balance for the proposed action and each alternative.
- Assessment of which waters may be impacted, the sources and nature of potential impacts (both quality and quantity), specific pollutants likely to impact those waters and a comparison to applicable environmental standards (e.g., surface water and drinking water quality standards);
- Consideration of downstream impacts and potential for changes in metal speciation and bioavailability (in particular, the impacts of copper, which can have adverse effects on salmon at very low concentrations);
- Evaluation of surface water and groundwater use, including maps and source identification of agricultural, domestic, and public water supply wells or intakes; and
- Consideration of effects of seasonality on water quantity and quality impact assessment, including predictions for all phases of the project (construction, operations, and closure).

Anti-degradation

The anti-degradation provisions of the CWA apply to those waterbodies where water quality standards are currently being met. In certain high-quality waters, the anti-degradation provisions prohibit

degrading water quality unless it is determined that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.[33] We recommend that the EIS discuss whether and how the CWA anti-degradation requirements could be met.

Water Management and Treatment

We recommend that the EIS describe the plans for water management, treatment, and discharge during all phases of the project (construction, operations, and closure), including plans for long-term water treatment. The EIS should evaluate and disclose the adequacy, reliability, effectiveness, and operational uncertainty associated with proposed operation and closure (long-term) water management and treatment techniques, taking into account seasonality and potential changes associated with future climate scenarios. We also recommend that the analysis characterize chemical compositions and quantities of process waters, mine drainage, storm water, and treated and untreated effluent. This information should be supported by the results of treatability testing. Assumptions used in the analysis should be disclosed and be reasonably conservative. If long-term water treatment is needed, we recommend that the EIS include modeling of predicted stream concentrations of contaminants of concern, both with and without treatment, to evaluate the potential impacts to water quality if the treatment system is not working properly.

The EIS should also identify the Alaska Pollutant Discharge Elimination System (APDES) discharge locations, identify applicable water quality standards, and analyze the likelihood and ability of all discharges to meet applicable standards and the direct, indirect, and cumulative impacts of such discharges to the receiving waters. We recommend that any applicable water quality variance requests, site-specific criteria proposals, and/or any other planned or potential requests for water quality standard revisions also be disclosed in the EIS.

Sediment Management and Stormwater Runoff

Since the project has the potential to cause or contribute to erosion of soils and subsequent sediment loading to nearby surface waters, we recommend that the EIS evaluate construction design and operation practices that will be used to minimize erosion and control stormwater runoff from the mine site, port sites, transportation corridor, and pipeline route. We recommend that the EIS discuss specific mitigation measures that may be necessary or beneficial in preventing and minimizing adverse impacts to water quality and disclose the effectiveness of such measures. We suggest that the Corps consider the Best Management Practices identified by the EPA for mining facilities[34] and specify those that would be suitable and likely implemented at the Pebble Project. We also recommend that the EIS document the project's consistency with applicable APDES stormwater permitting requirements.

Hydrostatic Test Water

Hydrostatic testing will likely be utilized to verify pipeline integrity. We recommend that the EIS identify and describe the location of the water sources required for hydrostatic testing, in terms of surface area, depth, volume, withdrawal rate, and project requirements. For each water source, we recommend that the EIS discuss the presence of any anadromous and/or resident fish species, including discussion of any direct and cumulative impacts to fisheries resources. In addition, we recommend that locations and methods of discharges to land and/or surface waters be specified in the EIS. Emphasis should be placed on minimizing inter-basin transfers of water to the maximum extent practicable, to

[33] 40 C.F.R. § 131.12.

[34] https://www3.epa.gov/npdes/pubs/sector_g_metalmining.pdf.

minimize the risk of mobilizing invasive species. We recommend that the EIS describe the mitigation measures and control devices that would be implemented to minimize environmental impacts.

Marine Environment and Freshwater Lakes

Port Construction and Dredging Impacts

According to the Permit Application Appendix D – Project Description, the Amakdedori Port will require dredging of a channel and turning basin for shipping access to berths. According to the application, annual maintenance dredging will be necessary throughout the life of the port facility. Dredging activities potentially affect habitats and key ecological functions that support recruitment and sustainability of estuarine and marine organisms. We recommend that the EIS:

- Characterize the marine benthic environment and organisms, sediment composition and grain size, etc.;
- Identify any biologically important areas, such as migratory routes, benthic communities, and subsistence areas;
- Evaluate marine dredging, dewatering, transloading (from water to land), placement methods and options (summer and winter), and disposal sites (offshore, nearshore, upland, and open-water), as well as beneficial uses of the dredged material;
- Include and evaluate a sampling and analysis plan, as well as a marine dredging and disposal plan;
- Evaluate the following potential impacts of dredging activities on species and their habitats:
  - Substrate removal and any resulting habitat and species removal (entrainment);
  - Potential changes to estuarine bathymetry, fluvial and tidal energy, and substrate roughness, and any attendant impacts to salinity structure and estuarine circulation;
  - Potential changes to sediment transport processes, including effects on adjacent shorelines;
  - Alteration of sediment composition in and around the dredging site (including changes to the nature and diversity of benthic communities);
  - Local resuspension of sediments and any turbidity increases;
  - Spread of sediments (and any associated contaminants) into the area surrounding the dredging site;
  - Release of sediment-associated nutrients, potential increases in eutrophication and resulting decreases in dissolved oxygen concentrations;
  - Decreased primary production due to reduced transparency of the water column and/or smothering, particularly at in-water disposal sites; and
  - Enhanced bioavailability and ecotoxicological risk of background contaminants and/or chemical or biochemical changes of contaminants;
- Consider implementation of effective mitigation measures to ensure that marine resources and habitats are adequately protected; and
- Incorporate a monitoring plan for marine protected resources and associated habitats to ensure effectiveness of mitigation measures.

Because of the magnitude of the proposal, dredging and disposal operations will need to be carefully planned and scheduled to avoid and minimize impacts to sensitive marine mammals, fish, shellfish, and their habitat at critical spawning and migration periods.

Dredged Material Disposal

According to the Permit Application Appendix D, dredged material will be used to construct the jetty, causeway, and/or the main terminal patio area, if suitable. Excess dredged material will be stockpiled in

an upland location adjacent to the port facilities. The EPA recommends an on-the-ground wetland delineation at the proposed dredged material disposal site to verify whether there are any jurisdictional waters of the United States at this location.

The proposed discharge of dredged material effluent from the confined disposal facility into Kamishak Bay is subject to regulation under Section 404 of the CWA. Thus, the EIS should include sufficient information to support making the required determinations and findings under the Guidelines. For example, Subpart G of the Guidelines includes general evaluation procedures and specific testing procedures to reach the determinations required by 40 C.F.R. § 230.11. The Inland Testing Manual[35] also provides detailed technical guidance on how to evaluate and test dredged material consistent with the Guidelines. In particular, the EPA recommends using the ITM Appendix B, "Guidance for Evaluation of Effluent Discharges from Confined Disposal Facilities."

To support disposal decisions, we recommend that the EIS provide an inventory of the physical and chemical characteristics of the dredged material and an assessment of disposal alternatives. We recommend that the range of dredged material management alternatives include: no action; the proposed action; beneficial uses such as beach nourishment or construction material; a disposal site in internal waters, landward of the Kamishak Bay closing line (regulated under the CWA); and an ocean disposal site seaward of the Kamishak Bay closing line (regulated under the Marine Protection, Research and Sanctuaries Act).

Potential for Ocean Disposal of Dredged Material

Under Section 102 of the MPRSA, the EPA is responsible for designating and managing ocean dumping sites for all materials, including dredged material. The EPA designates ocean disposal sites through rulemaking and sites are published at 40 C.F.R. § 228.15. The EPA bases the designation of an ocean disposal site on environmental studies of a proposed site, studies of regions adjacent to the site, and historical knowledge of the impact of disposal on areas similar to the site in physical, chemical, and biological characteristics. All studies for the evaluation and potential selection of dredged material disposal sites should be conducted in accordance with the criteria for the selection of disposal sites for ocean dumping published in 40 C.F.R. §§ 228.5 and 228.6. The minimum requirements for baseline assessment surveys are found in 40 C.F.R. § 228.13.

The evaluation process includes conducting oceanographic studies to establish the environmental conditions at all alternative locations being considered as potential sites, as well as the area or region encompassing the alternative sites. Results from oceanographic studies and other sources are used to model likely dispersion and deposition of material disposed at the alternative sites and evaluate potential impacts. If there are no practicable alternatives to ocean dumping that will have a less adverse impact on the environment, this information is used to select the best ocean site proposed for designation.

If ocean disposal is to be considered as an alternative, we encourage the Corps to engage early and actively with the EPA to ensure that site selection activities are consistent with the MPRSA and the ocean disposal criteria. The EIS must be adequate for the EPA to ensure that use of the site selected for designation will not likely cause unreasonable degradation to the surrounding marine environment. In addition, only dredged material that is authorized for disposal under the MPRSA and 40 C.F.R. Part 227 may be disposed in an EPA-designated ocean dredged material disposal site.

[35] See https://www.epa.gov/cwa-404/inland-testing-manual.

Impacts of Vessel Traffic

Marine traffic, including barges and other vessels associated with construction and operation of the proposed project, may also result in impacts to the marine environment. For example, vessel traffic may result in potential impacts to marine mammals, including threatened and/or endangered species, and their migration patterns and routes; subsistence, commercial, and recreational fisheries; and other vessel use. We recommend the EIS describe the vessel traffic schedule in Cook Inlet; patterns and marine transportation routes; subsistence, commercial, and recreational fishery resources; and the migration period, patterns, and routes of potentially affected marine mammals, including Cook Inlet Belugas. The direct, indirect and cumulative impacts from vessel traffic on marine mammals, threatened and endangered species, critical habitats, and fishery resources should be analyzed in the EIS, and the EIS should discuss the mitigation measures that would be implemented to minimize such impacts.

Use of the proposed ice-breaking ferry on Lake Iliamna may result in similar impacts to the freshwater lake environment, including the potential for wake impacts to the shoreline. We recommend the EIS analyze the direct, indirect, and cumulative impacts of the year-round use of the lake proposed by the applicant on threatened and/or endangered species, fishery resources, and other lake user groups, and discuss mitigation measures to minimize impacts.

Air Quality

The EPA recommends that the EIS evaluate how the construction and operation of the proposed project and alternatives could affect air quality and what measures may be needed to mitigate potentially significant impacts. Such an evaluation is necessary to ensure compliance with state and federal air quality regulations, and to disclose the potential impacts from temporary or cumulative degradation of air quality. To address potential air quality impacts, the EIS should consider whether the direct, indirect, or cumulative impacts of project-related air emissions would result in any adverse impact on air quality or air quality-related values.

Potential air pollutant concerns for the proposed project include:

- Operation of heavy machinery and equipment, including marine vessels, during construction and operations that result in the emission of fossil fuel combustion exhausts. Such exhausts will include oxides of nitrogen, oxides of sulfur, carbon monoxide, and particulates. The significance of the contribution of project emissions to the formation of secondary particulate matter ($PM_{2.5}$) and ozone should also be evaluated;
- Fugitive dust emissions may be generated from construction and operation of the mine, ancillary facilities, and supporting infrastructure. In addition to human health effects, dust blown from the roadway can settle onto wetlands, vegetation, or waterbodies, impairing their health as well; and
- Hazardous air pollutants may result from fuel combustion and ore processing. The *National Air Toxics Assessment* asserts that numerous human epidemiology studies show increased lung cancer rates associated with diesel exhaust and significant potential for non-cancer health effects (see http://www.epa.gov/ttn/atw/nata). Also, the Control of Emissions of Hazardous Air Pollutants from Mobile Sources Final Rule (66 Fed. Reg. 17,230, March 29, 2001) lists 21 compounds emitted from motor vehicles that are known or suspected to cause cancer or other serious health effects. The EPA recommends the EIS disclose whether hazardous air pollutant emissions would result from project construction and operations, discuss the cancer and non-cancer health effects associated with air toxics and diesel particulate matter, and identify sensitive receptor populations and individuals likely to be exposed to these emissions.

We recommend the following steps for the EIS air quality analysis:

- Characterize the existing conditions to set the context for evaluating project impacts, including:
  - Regional climate and meteorology,
  - Air quality and air quality related values (e.g., visibility),
  - Identification of sensitive receptors in the vicinity;
- Review air quality regulations and any air permitting requirements that apply to the air pollutant sources associated with the project;
- Provide a comprehensive emissions inventory of criteria pollutants (in tons per year), greenhouse gas emissions (in metric tons CO_2 equivalents per year), and significant HAP emissions for all project components (mine site, transportation corridor, port, and pipeline) and project phases; and
- If projected emissions are significant, conduct near-field and far-field air quality modeling to assess project-related air quality and visibility impacts. Also, see our recommendations related to Predictive Modeling, later in this document.

We recommend that the Corps evaluate and incorporate best management practices and mitigation measures into the EIS to reduce emissions of criteria pollutants and HAPs, which also have co-benefits of reducing GHGs. We recommend that the EIS include a comprehensive fugitive dust control plan as well as a construction air pollutant emissions control plan to address reduction of engine emissions.

These recommendations are separate and distinct from, and are not intended as a substitute for compliance with, any additional obligations of the Corps and the project proponent to comply with the federal Clean Air Act and any applicable state or tribal air pollution laws, which may require, among other things, obtaining pre-construction permits and operating permits, compliance with new source performance standards and/or national emission standards for hazardous air pollutants, as well as any applicable state implementation plan (SIP) requirements, including, as applicable to the Corps, the requirements under Section 176 of the Clean Air Act regarding conformity of federal activities to implementation plans approved or promulgated under section 110 of the Clean Air Act.

Climate Adaptation

The EPA recommends that the EIS include a discussion of reasonably foreseeable effects that changes in the climate may have on the proposed project and the project area, including its long term infrastructure. This could help inform the development of measures to improve the resilience of the proposed project. If projected changes could notably exacerbate the environmental impacts of the project, the EPA recommends these impacts also be considered as part of the NEPA analysis.

Fish and Wildlife, including Endangered Species and Essential Fish Habitat

The EPA recommends that the EIS evaluate impacts to fish and wildlife from the proposed project and alternatives. The aquatic resources section above also provides recommendations related to fisheries.

Special consideration should be given to listed and proposed species under the Endangered Species Act and Essential Fish Habitat under the Magnuson Stevens Fishery Conservation and Management Act. NEPA regulations require that, to the fullest extent possible, the EIS be prepared concurrently with

environmental analyses required by the ESA and other environmental laws.[36] Magnuson Stevens Act and ESA implementing regulations also encourage coordination with other environmental reviews.[37, 38]

We recommend that the EIS discuss the species listed and proposed as threatened or endangered under the ESA and the essential fish habitat within the project area (including the pipeline, roads, and port site) and the potentially impacted area surrounding the project. The EIS should describe impacts to ESA species and EFH and discuss the activities proposed to avoid, minimize, mitigate, and monitor listed and proposed species and EFH. We understand that the Corps will develop a biological assessment to evaluate impacts to listed and proposed endangered species and EFH, and recommend that it be included with the draft EIS. We also recommend that the federal action agencies work together to ensure that a single biological assessment is developed that meets all agencies' needs.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 requires federal agencies to consider the effects of their actions on historic properties, including those of traditional religious and cultural importance, following regulations in 36 C.F.R. Part 800. The NHPA requires a federal agency, upon determining that activities under its control could affect historic properties, to consult with the appropriate State Historic Preservation Officer /Tribal Historic Preservation Officer. We support the Corps' early engagement with the Advisory Council on Historic Preservation, and we recommend that the EIS discuss any potential impacts to historic properties, including any tribal, cultural, or other treaty resources that are historic properties or traditional cultural properties. In addition, the EIS should identify alternatives and mitigation to avoid significant impacts. Recommendations related to traditional uses and resources that are not historic properties are discussed further below.

Invasive Species

We know that ballast water from barges or vessels can be a major source of non-native species into marine ecosystems. Non-native species can adversely impact the economy and the environment and cause harm to human health. Impacts may include reduction of biodiversity of species inhabiting coastal waters due to competition between non-native and native species for food and resources. We recommend that the EIS discuss potential impacts from non-native invasive species associated with ballast water in vessels that will be utilizing the Amakdedori Port associated with this project and identify mitigation measures to minimize adverse impacts to the marine environment and human health.

SAFETY, RISK ANALYSIS, AND HAZARDOUS MATERIALS MANAGEMENT

Accidents and Failures

An array of spills, accidents, and failures can occur at mining sites. We recommend that the EIS describe the control measures that will be in place to prevent these events from occurring during construction, operations, and closure. To identify these events, we recommend that the Corps evaluate the proposed design and management of the tailings facility, dams, and other structures and evaluate PLP's waste and water management and reclamation plans to determine the project-specific likelihood of different types of accidents and failures. Designs and management plans for the pipeline and transportation components

[36] 40 C.F.R. § 1502.25.
[37] 50 C.F.R. § 600.92 (c), (f).
[38] 50 C.F.R. § 402.06.

(road, ports, shipping) should also be evaluated to determine the probability of accidents and failures. We recommend that the results of these evaluations be documented in the EIS. For those events that are determined to be of low probability but high consequence, we recommend that the EIS evaluate the potential effects of such events on aquatic ecosystems, particularly fishery resources, and other resources. The EIS should also discuss mitigation measures that could minimize the risk or damages of such events.

Physical Stability of Structures

The EIS should assess the likelihood of earthquakes in the region and describe the geotechnical stability of the tailings and waste storage facilities and open pit walls during operations and closure. We recommend including a description of how these facilities are designed and how they would be operated, closed, and monitored to ensure stability. In addition, we recommend that a risk assessment, such as a Failure Modes Effects Analysis, (FMEA) be conducted on each of the tailings dams with the results summarized in the EIS. An FMEA considers potential failure modes and identifies the relative likelihood and consequences of the failure modes, which are key considerations for impact assessment. We recommend that the EIS incorporate mitigation or alternatives to improve stability should the FMEA identify failure modes that are anything other than a tolerable risk.

For the tailings impoundment in particular, we recommend that the Corps require a demonstration that the structure complies with state dam safety criteria and has been designed by qualified persons. In addition, we recommend that the Corps require that the dam be independently reviewed (and modified if indicated by the review)[39]. Given the proposed size of the dams associated with the Pebble project and value of the downstream resources, we believe that an independent review of the dam structure is appropriate. We recommend that the results of the independent review be documented in the EIS in order to support the assessment of geotechnical stability.

As mentioned above in the Range of Alternatives section, we recommend that the Corps consider alternatives to improve physical stability of the tailings, including consideration of filtered tailings (dry stack). We note that consideration of a filtered tailings alternative and assessment of safety and stability via a FMEA and independent review panel are consistent with recommendations of *The Independent Expert Engineering Investigation and Review Panel Report on Mount Polley Tailings Storage Facility Breach* (January 30, 2015). In addition to investigating the cause of the Mount Polley tailings storage facility failure, the Review Panel made recommendations on actions that could be taken to ensure that similar failure does not occur at other mines. We recommend that the Corps consider the Review Panel Report and, in particular, the recommendations related to best available technology for new impoundments, design commitments to support permit applications, and actions to validate the safety of tailings storage facilities.

Hazardous Materials

We recommend that the EIS address the potential direct, indirect, and cumulative impacts of hazardous materials/wastes management and storage from the construction and operation of the proposed project and alternatives. Mining activities may involve the transport of hazardous materials, and we recommend that the EIS disclose the types and amounts of materials that will be used at each step of mining operations. In addition, we recommend that the EIS describe measures that will be taken to minimize the

[39] 33 C.F.R. § 325.1.

chances of an accidental release, emergency measures that will be implemented should such an event occur, and how potential adverse impacts from spills may be mitigated by effective containment and cleanup operations.

We also recommend that potential health impacts to local communities or other project area users be identified, as well as any strategies employed to communicate risks or actual emergencies. As part of this analysis, we recommend that the EIS use scientific and traditional ecological knowledge to describe potential health effects from exposure to hazardous materials and the effects on the palatability of eating potentially contaminated foods.

HUMAN HEALTH AND IMPACTS TO COMMUNITIES

Sociocultural Impacts

It is anticipated that the proposed project will result in employment opportunities for Alaska Native residents, as well as generate local and corporate revenues in the region. While employment opportunities and local revenues generally increase a community's standard of living, there can also be impacts to families, communities, and cultures, especially in areas where residents are participating in traditional cultural practices. Noise and physical structures may disturb and/or displace subsistence wildlife from the project area. Other project impacts may affect a community's ability to access traditional and accustomed subsistence use areas. We recommend that the EIS identify the specific communities, federally recognized tribes, and corporations that could be impacted, both positively and negatively, which will help agency decision makers and the public understand the scope of the potential sociocultural impacts.

We recommend that the sociocultural impacts associated with this project and alternatives be fully evaluated and disclosed in the EIS and include, but not be limited to, the following:

- Socioeconomic Impacts
    - Evaluate potential changes to the region's economy as a result of the mine construction and operation (e.g., changes to commercial fishery, recreational fishery, and tourism sectors).
    - Evaluate impacts associated with economic changes to families, communities, and cultures, including potential changes to those aspects of the area's economy that are currently subsistence-based;
    - Evaluate the potential decline in the region's economy following mine closure; and
    - Evaluate replacement costs of traditional foods if access or availability are impacted by the proposed project.
- Accessibility of Traditional Use Areas
    - Identify community traditional use areas for subsistence, harvesting, hunting and trapping, fishing, travelling, camping, berry picking, and other uses;
    - Describe the potential access limitations to these traditional use areas and their impacts to local communities; and
    - Coordinate with the tribes and communities on options for mitigating impacts associated with accessibility to traditional and accustomed use areas.
- Compatibility of Traditional Use Areas
    - Identify project activities that may conflict with traditional and accustomed uses; and

- Coordinate with the affected tribes and communities to identify mitigation options for avoiding and minimizing conflicts between traditional and accustomed subsistence uses and the construction and operation of this project.

Environmental Justice and Impacted Communities

In compliance with NEPA and Executive Order 12898 on Environmental Justice, actions should be taken to conduct adequate public outreach and participation that ensures that the public and Native American tribes understand possible impacts to their communities and trust resources.

Executive Order 12898 requires each federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Native American tribes.[40] The EPA also considers children, the disabled, the elderly, and those of limited English proficiency to be uniquely vulnerable populations that may be impacted.

The CEQ has developed guidance concerning how to address Environmental Justice in the environmental review process.[41] In accordance with this guidance, the EPA recommends that the EIS address the following points:

- Identify low income, minority, and Alaska Native communities that may be impacted by the project;
- Describe the efforts that have been or will be taken to meaningfully involve and inform affected communities about project decisions and impacts;
- Disclose the results of meaningful involvement efforts, such as community identified impacts;
- Evaluate identified project impacts for their potential to disproportionately impact low income, minority, or Alaska Native communities, relative to a reference community;
- Disclose how potential disproportionate impacts and environmental justice issues have been or will be addressed by the Corps' decision making process;
- Propose mitigation for unavoidable impacts that will or are likely to occur; and
- Include a summary conclusion, sometimes referred to as an "environmental justice determination" that concisely expresses how environmental justice impacts have been appropriately avoided, minimized, or mitigated.

We also recommend that particular attention be given to consideration of the dependence of local communities on local and regional subsistence resources, access to those resources, and perception of the quality of those resources. Additional information and tools for environmental justice analysis can be found on the EPA's website at: https://www.epa.gov/environmentaljustice.

Health Risk or Impact Analysis

The EPA recommends that the Corps undertake a screening process to determine which aspects of health (including but not limited to public, environmental, mental, social, and cultural) could be impacted by the proposed project. Depending on the screening results, an analysis of health effects, such

[40] EO 12898: Federal Actions To Address Environmental Justice in Minority Populations and Low-income Populations. February 11, 1994.
[41] http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf.

as a health risk assessment or Health Impact Assessment, may be needed to determine the direct, indirect, and cumulative impacts to health. This analysis may need as much time to complete as the Draft EIS, therefore we recommend that early screening is essential to ensuring a timely analysis. We further recommend that the Corps partner directly with local, state, tribal, and federal health officials to determine the type of analysis needed to assess health impacts and conduct the analysis, and to determine appropriate and effective mitigation of potential health impacts.

Scope of Health Assessment in EIS

In terms of the scope of the health assessment, we recommend that the potential for contaminant exposure and resulting risks be evaluated. In addition, we recommend that the EIS consider how income from new jobs can result in positive or negative health impacts, for example by increasing socioeconomic status or by generating rapid social and community change. We also recommend considering the health impacts of potential changes to traditional way of life from the project, including reduced reliance on a traditional diet due to lack of access and corresponding increased reliance on substitutes.

Data Collection

To appropriately evaluate health impacts, we recommend that specific health data that may not be routinely collected as part of the scoping process may be required. To ensure that the necessary data are available for this evaluation, the Corps may want to involve public health professionals early in the NEPA process. Public health data and expertise for prospective health impact analysis, or for providing input on health issues, may be available from local health departments, tribal health agencies, the Alaska Department of Health and Social Services, or federal public health agencies such as the U.S. Centers for Substances and Disease Registry, or the Indian Health Service.

Methods and Tools

The Health Impact Assessment methodology is a common tool that can be used to assess potential health impacts. HIA is a combination of procedures, methods, and tools that enables systematic analysis of potential positive or negative effects of a policy, plan, program, or project on the health of a population, as well as the distribution of those effects within the population.[42] Depending on available data and potential effects, there are different levels of HIA analysis, and we recommend that the Corps' involve public health professionals in determining the appropriate level of analysis. In addition to evaluating impacts, we recommend that the HIA identify the appropriate actions to manage or mitigate health effects from the proposed project.

Guidelines for conducting an HIA are available from various sources.[43] The World Health Organization has links to many guides.[44] The International Finance Corporation has also developed detailed guidelines for conducting an HIA.[45] In addition, the State of Alaska has developed *Technical Guidance for Health Impact Assessment*, also known as the "Alaska HIA Toolkit".[46]

---

[42] This definition is from the International Association for Impact Assessment (IAIA), which is modified from the World Health Organization's Gothenberg consensus statement (1999).

[43] The EPA does not endorse or recommend use of any single or particular guidance on HIA. These references are provided as general information and to assist permitting agencies with identifying additional resources on HIA.

[44] See http://www.who.int/hia/about/guides/en/.

[45] See http://www.ifc.org/wps/wcm/connect/a0f1120048855a5a85dcd76a6515bb18/HealthImpact.pdf?MOD=AJPERES.

[46] See http://dhss.alaska.gov/dph/Epi/hia/Documents/AlaskaHIAToolkit.pdf.

CONSULTATION AND COORDINATION WITH TRIBAL GOVERNMENTS

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (November 6, 2000), was issued to establish regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and to strengthen the United States' government-to-government relationships with Indian tribes. In addition, pursuant to Public Law 108-119, 118 Stat. 452, as amended by Public Law 108-4217, 188 Stat. 3267, federal agencies are required to consult with Alaska Native Claims Settlement Act corporations on the same basis as Indian tribes under Executive Order 13175. We recommend that the EIS describe the process and outcome of any government-to-government and/or government-to-corporation consultations regarding the Pebble Project, issues that were raised during the tribal consultations and how those issues were addressed.

Cooperating agency involvement establishes a mechanism for addressing intergovernmental issues throughout the EIS development process, and we support the Corps' inclusion of two tribal governments as cooperating agencies. We recommend that the Corps remain open to including other potentially affected tribal governments that have the resources and interest in serving as cooperating agencies for EIS development, consistent with the July 28, 1999, memorandum from CEQ to the heads of federal agencies.

ANALYSIS TOOLS AND METHODOLOGIES

Baseline Data Adequacy

We suggest categorizing and synthesizing existing data to ensure pertinent information is available for review and use in the EIS analysis. We understand that the Corps intends to establish focused workgroups during development of the EIS. We support this approach and recommend that the workgroups include cooperating agency subject matter experts for key areas (air, water, wetlands, fisheries, etc.) to review baseline data for completeness, identify data gaps, and recommend approaches toward resolving those gaps in a timely manner. For example, additional analysis or collection of additional data may be required to characterize the accuracy of best available baseline estimates of resources such as fish populations, groundwater elevations, or wetland extents. Such information will be critical for designing and developing a robust monitoring framework and for assessing impacts during and after project development and comparing those to the baseline.

Geochemistry/Characterization of Ore, Waste Rock, and Tailings

To provide reliable predictions of water quality and impacts to surface water and groundwater due to wastewater and mine waste management, we recommend that the physical and chemical characteristics of the ore, pit walls, waste rock, and tailings should be determined and disclosed in the EIS. Environmental samples used to support projections should represent a range of conditions that currently occur and that could occur in the future as a result of the project, including under potentially altered future climate conditions. Waste materials (ore, waste rock, tailings) used for environmental projections should be representative of the material to be mined and related to the mine plan and proposed processing methods. Physical and chemical characterization should be conducted in a manner that provides environmentally conservative estimates of impacts.

It may be helpful to consider EPA Region 10's Sourcebook for Hardrock Mining for recommendations related to the NEPA analyses of mining projects.[47] We recommend that the following information be utilized to characterize geologic and mineralogy setting/aqueous geochemistry in the baseline environment and impact prediction sections of the EIS:

- Whole rock analysis;
- Mineralogy;
- Drill core descriptions;
- Block model or similar model (a computerized estimate of the quantity and characteristics of ore and waste);
- Available literature on the ore deposit;
- Mineral occurrences (e.g., on fracture surfaces, in groundmass, using hand specimens and thin section) with an emphasis on sulfides and carbonates;
- Acid-base accounting;
- Long-term kinetic testing (including possible startup of test pads if sufficient material and access to site are available);
- Baseline surface and ground water quality and flows (including springs);
- Potentiometric surface for groundwater;
- Hydraulic properties (e.g., hydraulic conductivity, porosity, permeability) of soil, vadose zone, and groundwater aquifers, especially under proposed locations of mine facilities; and
- Hydrogeochemical models for prediction of water quality.

Predictive Modeling

We recommend that predictive modeling be based on a site-specific conceptual model that describes the system boundaries, spatial and temporal scales, hydraulic (for water modeling) and chemical characteristics, sources of data and data gaps, and the mathematical relationships used to describe processes. We also recommend that our suggestions be applied to any environmental and predictive modeling used for assessing impacts in the EIS. The water quality model, in particular, should be capable of predicting both whole water and dissolved fractions of metals/metalloids and should provide temporal predictions that are consistent with the time-steps in applicable water quality criteria.

Any modeling documentation should include:

- Tables of parameter values used in the model;
- Tables and graphs of results;
- Uncertainty and sensitivity analyses;
- Errors associated with both measured and assumed data; and
- Recommendations for further analysis, if applicable.

We recommend that discussions on modeling include a clear statement of the management objectives intended to be achieved by the modeling, the level of analysis required to meet the objectives, and uncertainties associated with modeled outcomes. For your reference, please refer to EPA's guidance that provides recommendations for the effective development, evaluation, and use of models in

[47]U.S. EPA Region 10. 2003. EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska January 2003.

environmental decision making.[48]

We recommend that the EIS use caution in describing absolute outcomes based on modeling. Mathematical modeling used for describing the physical and chemical characteristics of the project site and potential impacts includes a level of uncertainty; understanding these uncertainties and associated risks is necessary for informed decision making. We recommend that the study plan for modeling analysis clearly state the purpose, questions of concern, method, data, and limitations of the model to generate valuable interpretations. We also strongly recommend an appropriately conservative approach be taken with modeling and a range of predictive outcomes be discussed (e.g., most likely case, reasonable worst-case, and reasonable best-case scenarios) that reflect a range of climatic settings and critical input values. Inclusion of a reasonable range of outcomes allows the agencies to make better informed plans for mitigation, adaptive management, and contingencies to respond to reasonably foreseeable adverse impacts.

Traditional Ecological Knowledge

Due to the location of the proposed project and traditional uses of the area, we recommend the identification, inclusion, and integration of traditional ecological knowledge into the EIS analysis, as appropriate. Such anthropological work can include the collection of local and traditional knowledge concerning the affected environment, anticipated impacts from the project, and traditional hunting and land use patterns in the area. We recommend that, in addition to reviewing any pertinent traditional ecological knowledge currently available, additional studies be conducted as necessary to clearly identify concerns and potential impacts, including cumulative impacts, from the proposed project and project alternatives. This information should be reviewed and included in the EIS to the extent possible and utilized in the analysis of potential impacts.

MITIGATION, MONITORING, AND ADAPTIVE MANAGEMENT

Mitigation

CEQ regulations at 40 C.F.R. § 1508.20 define mitigation to include five categories of actions to address impacts. Briefly stated, these are: avoiding, minimizing, rectifying, reducing, and compensating. The regulations at 40 C.F.R. § 1502.14(f), 1502.16(h), and 1508.25 indicate that appropriate mitigation measures should be addressed in an EIS both as part of the analysis of alternatives and in discussions of environmental consequences.

Mitigation is also relevant to evaluating compliance with the Guidelines, which prohibit discharges of dredged or fill material that will cause or contribute to significant degradation of the waters of the United States, and prohibit all discharges *"unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem."*[49] The Guidelines identify numerous types of actions to mitigate potential adverse impacts, which include

---

[48] Guidance Document on the Development, Evaluation and Application of Environmental Models (PDF). EPA/100/K-09/003. March 2009. http://www.epa.gov/crem/cremlib.html.

[49] 40 C.F.R. § 230.10(d).

measures to avoid, minimize, and compensate for impacts. Avoidance, minimization, and compensation form a "mitigation sequence" that must be followed in order to comply with the Guidelines' requirement that all appropriate and practicable steps be taken to mitigate impacts to aquatic resources.[50] Compensatory mitigation considerations under the Guidelines are discussed further in the section on aquatic resources above.

The EPA recommends that the EIS identify the type of activities that would require mitigation measures during the construction, operation, and closure phases of this project. In addition, we recommend identifying whether implementation of each measure is required by the Corps or any other governmental entity and which entity will be responsible for implementing the measure. To the extent possible, mitigation goals and measurable performance standards should be identified in the EIS to reduce impacts to a particular level or adopted to achieve an environmentally preferable outcome. CEQ guidance on the Appropriate Use of Mitigation and Monitoring seeks to enable agencies to create successful mitigation planning and implementation procedures with robust public involvement and monitoring programs.[51]

Monitoring

Environmental monitoring programs should be designed to assess both impacts from the project and whether implemented mitigation measures are effective. We recommend that the monitoring programs:

- Define the monitoring goals and objectives;
- Provide details to demonstrate that goals and objectives will be achieved such as the parameters to be monitored, monitoring locations and frequency, data analysis, and reporting;
- Discuss actions (contingencies, triggers, adaptive management, corrective actions, etc.) that will be taken based on monitoring results;
- Identify and incorporate controls and pre-project data with quantified bias and precision to enable detection of impacts, success of BMPs, and ability to distinguish these from natural variation; and
- Require regular analysis and reporting of data to oversight agencies, including submittal of a sampling and quality assurance plan for agency approval.

We recommend that the monitoring programs be described in the EIS and that the EIS also discuss public participation, and how the public can get information on mitigation effectiveness and monitoring results.

Adaptive Management Planning

We recommend that the EIS utilize adaptive management and contingency planning to describe the strategy for responding to unforeseen circumstances at the site. The strategy should include "trigger levels" (e.g., exceedance of ecological benchmarks) or observations (e.g., statistically significant trends in indicators, permit violations, water balance problems, changes in discharge or chemistry of springs/seeps) that would set follow-up actions into motion. This strategy or plan should be described so that reviewers may comment on its adequacy. This type of plan, when coupled with the monitoring program, is necessary to mitigate for uncertainties and risks associated with predictions of

---

[50] 40 C.F.R. § 230.10(a), (d); *See* Memorandum of Agreement between U.S. Department of Army and the Environmental Protection Agency on the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines.

[51] https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf.

environmental outcomes, and will provide an early warning system of unexpected outcomes.

FINANCIAL ASSURANCE

NEPA provides for the disclosure of all information concerning the environmental consequences of a proposed action to agency decision makers and the public before decisions are made and actions are taken. A key component in determining the environmental impacts of a mining project is the effectiveness of the closure and reclamation activities, including long-term water management. In turn, whether any closure and reclamation activities that may be necessary will be adequately funded is key to determining whether those activities will be effective. We therefore recommend that the project's ability to self-fund, and/or any third-party financial assurance mechanisms, be disclosed. Disclosure of the financial assurance amount and mechanism is particularly important for this project given that PLP's proposal includes long term water management and treatment.

We recommend that the draft EIS disclose the estimated costs to reclaim and close the site in a manner that achieves reclamation goals and post-mining land use objectives. The EPA recommends that the final EIS identify proposed financial assurance mechanisms and demonstrate that these mechanisms would ensure that necessary reclamation work is completed.

The EPA is available for further conversations about the level of detail to include in the document. Below are the main elements that we believe should be disclosed in the EIS:

1. Site Reclamation (facility closure, earth moving/stabilization, revegetation, etc.):

- Phases of reclamation;
- Estimated cost (+/- percent) to reclaim and close the site in a manner that achieves reclamation goals and post-mining land use objectives;
- Criteria for determining success of reclamation activities for financial assurance release; and
- Costs associated with implementing contingency measures to address reasonably foreseeable but not specifically predicted outcomes.

2. Long-Term Site Management (post-closure water treatment, mitigation of impacts to aquatic resources, site maintenance, and monitoring):

- Itemized cost estimate (including reasonable contingencies) and appropriate economic variables to calculate the net present value of future expenses; and
- If a trust fund is utilized, address the "mechanics" of the fund, including:
    - Trust fund mechanism (e.g., current value trust, net present value trust, etc.);
    - Requirements for timing of payments into the trust fund;
    - How the Corps would ensure that the trust fund or other financial assurance could not be claimed by a creditor in the case of bankruptcy;
    - Acceptable financial instruments;
    - How trust management fees and taxes will be paid;
    - Identity of the trust fund beneficiaries; and
    - Identity of the operator with responsibility/liability for financial assurance.