APPENDIX D—COMMENT ANALYSIS REPORT

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D1.0 COMMENT ANALYSIS REPORT

On March 1, 2019, the Alaska District, US Army Corps of Engineers (USACE), published a Notice of Availability in the Federal Register regarding the Pebble Project Draft Environmental Impact Statement (DEIS). The DEIS was released February 20, 2019 and the formal comment period began March 1, 2019. USACE extended the public comment period on the DEIS to July 1, 2019, for a total comment period of 123 days.

Public comments regarding the DEIS were received as oral and written testimony at public meetings, and as written comments received through postal mail, fax, and email. Comments were submitted by individual citizens as well as groups, including federal agencies, tribal governments, state agencies, local governments, businesses, special interest groups, and non-governmental organizations.

D1.1 PROCESS

The comment analysis process used in the Pebble Project DEIS relied on the concept of identifying individual submissions from commenters, identifying individual substantive comments in each submission, assigning each comment to a topic, and developing statements of concern that group and summarize similar comments. This process has been used by many federal agencies over the last 2 decades to meet National Environmental Policy Act (NEPA) requirements that the lead agency identify and respond to substantive comments submitted on a DEIS. Comments were analyzed, coded, and entered into a database that allowed the Environmental Impact Statement (EIS) team to identify and respond to substantive comments, and track responses to comments made on the DEIS.

D1.2 TERMINOLOGY

There were a total of 311,885 submissions received by USACE during the DEIS comment period. The term “submission” refers to the entirety of oral testimony at a public meeting, an entire letter, or an email message. Of these submissions, 8,427 were “unique” submissions, which were submitted only one time. The remaining 303,458 submissions (97 percent of the total) were form letters, which were submitted in duplicate from different individuals and groups. Most submissions included many “comments,” a term which refers to each of the discrete concepts conveyed in a submission. Table D-1 shows submission and comment totals.

Submissions were analyzed for substantive comments. The DEIS comment period generated 15,880 comments. Substantive comments were assigned to a content-based topic in the database, and then more finely assigned into specific subtopics corresponding to a common issue or concern.

D1.3 STATEMENTS OF CONCERN AND RESPONSES

The set of related issues or concerns for all the comments assigned to a subtopic was summarized into a Statement of Concern (SOC). An SOC was developed for each subtopic. SOCs consist of a concise statement summarizing the issue or concern. The goal in all SOCs was to preserve the original intent of the commenter under the issue or concern.

A response to each SOC was then created that describes how the concerns expressed in each SOC were addressed. Responses indicated how or where the concerns were addressed in the EIS, and/or what changes, if any, were made to the EIS to address the concerns. Table D-1 shows SOC and response totals. SOCs and corresponding responses are presented alphabetically by topic in Table D-2.

Table D-1: Submission and Comment Totals

Total number of submissions:	311,885
Total number of unique submissions:	8,427
Total number of form letter submissions:	303,458
Total number of submissions recorded on the website:*	115,937
Total number of Statements of Concern and Responses:	748

Note:

* 97 percent of all submissions received were form letters and were not all duplicated on the website. Thus the number of submissions recorded on the website is lower than the total number of submissions.

D1.4 COMMENT ANALYSIS REPORT INDEX

An index to this Comment Analysis Report was developed to show how comments from each submission were coded into SOCs, and serves as a comment database for the Administrative Record. The index is available on the project website: https://pebbleprojecteis.com/. The index provides a list of SOCs associated with submissions from commenters, including individuals, cooperating agencies, businesses, and organizations.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Aesthetics or Visual Concerns—Flight Paths	The National Park Service requested an additional figure of current flightpaths in the project area to aid them in future monitoring efforts. There should a description of the impacts of increased flight traffic to park visitors.	A figure and a table with information on current flightpaths have been added into Appendix K3.12, Transportation and Navigation. Section 4.11, Aesthetics, was edited to acknowledge that the mine site would be visible to passengers in overflights.
Aesthetics or Visual Concerns—General Impacts	Concern was expressed that the negative impacts to the visual quality of the area would be far reaching and permanent, affecting more than just the surface disturbance at the mine site, ferry terminals, and roads along the transportation corridor. The EIS fails to identify how infrastructure such as buildings and communication towers would affect the analysis area aesthetics.	The analysis focuses on the direct impacts of project components to visual quality, with discussion provided on the geographic extent of impacts based on viewshed models, displayed in Appendix K4.11. Several Key Observation Points (KOPs) were also identified, representing common and/or sensitive viewer locations. Simulations of project components were developed from most KOPs to analyze the visual impact. To address potential far-reaching impacts, the analysis also discloses expected indirect impacts, and impacts from overflights. Impacts are discussed in Section 4.11, Aesthetics. Some KOPs and simulations have been added to the document.
Aesthetics or Visual Concerns—KOPs	The EIS should include these additional Key Observation Points: Lower Talarik Creek Special Use Area, known Koktuli River, and Upper Talarik Creek dispersed aerial drop-off sites, the mouth of the Gibraltar River, and in Lake Clark National Park.	KOPs have been added at the mouth of the Lower Talarik Creek in the Lower Talarik Creek Special Use Area, in Lake Clark National Park and Preserve (at the Keyes Night Skies Monitoring Location), and at the mouth of the Gibraltar River. A simulation of the south ferry terminal has been developed for the mouth of the Gibraltar River, and is included in Appendix K4.11. A simulation has also been added of Alternative 1a, Alternative 2, and Alternative 3 from the Roadhouse Mountain KOP that depicts the transportation corridor. Simulations were not prepared for the Lower Talarik Creek and Lake Clark KOPs because the KOPs falls outside of the viewshed for the north ferry terminal and the mine access road for Alternative 1. No KOPs were added for dispersed recreation along the Koktuli River and Upper Talarik Creek (UTC), because areas of dispersed recreation are widespread, tend to vary over time, and can be modified in real time based on environmental factors. Refer to the viewshed analysis figures in Appendix K4.11 for areas where the project may or may not be visible.
Aesthetics or Visual Concerns—Lighting	Commenters expressed concern that the analysis of the night sky was inadequate, and additional information was provided by the National Park Service. There were requests for a Lighting Plan to mitigate the effects of lighting.	Additional information has been reviewed and incorporated into Section 3.11 and Section 4.11, Aesthetics. The analysis has been updated appropriately. A Lighting Plan has been added to Appendix M1.0, Mitigation Assessment, for consideration as a potential mitigation measure.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Aesthetics or Visual Concerns—Noise	Commenters requested descriptions of the noise and olfactory impacts from project components.	Noise impacts from overhead flights, ferry traffic, and vehicle traffic are discussed in Section 4.5, Recreation, and Section 4.11, Aesthetics. Because changes in olfactory attributes are subjective, this aesthetic attribute is not analyzed in detail. It is disclosed that localized changes to smells could result from project-related activities that alter the natural smells that exist under current conditions. No changes have been made to the EIS.
Air Quality—Air Emissions not Quantified	Concerns were expressed regarding direct and indirect emissions sources that were not quantified in the analysis. It was recommended to include the following direct greenhouse gas (GHG) emission sources in the analysis: closure of transportation corridor, pipeline corridor, and port and emissions from pipeline ruptures and leaks. It was also recommended to include the following indirect GHG emissions sources: shipping transport beyond Cook Inlet, vehicle combustion emissions and fugitive dust from public use of the new roads in the project area, off-site processing of mined materials, and transportation of the mined materials to their end-use location. Additionally, there were concerns that the EIS did not fully analyze the impact of GHG emissions from reasonably foreseeable actions, such as the Pebble Project expansion.	Following recommendations, the EIS has been revised to include analysis of the cumulative impact of GHG emissions, which includes an analysis of the reasonably foreseeable actions. However, the other concerns were either addressed in the Draft Environmental Impact Statement (DEIS) or are related to emissions that cannot be reasonably quantified and were not addressed. The EIS has qualitatively included the direct GHG emissions from the closure of the transportation corridor, pipeline corridor, and port by using the construction emissions of each component as a surrogate for the closure emissions. The activities are similar enough between the closure and construction phases that the emissions would be reasonably similar validating the approach. The indirect emissions that are accounted for in the EIS are substantial enough to warrant quantification. Although there are likely other sources of indirect GHG emissions, there are not enough robust data available to calculate the GHG emissions with reasonable accuracy. Given this, it would be overly speculative to calculate the GHG emissions from shipping transport beyond Cook Inlet, vehicle combustion emissions and fugitive dust from public use of the new roads in the project area, off-site processing of mined materials, and transportation of the mined materials to their end-use location, because there is currently not enough information to accurately quantify their GHG emissions.
Air Quality—Air Emissions Updates	Concerns were expressed regarding how the on-road and off-road mobile emissions for all project components and phases had been calculated. It was recommended that mobile emissions be calculated using Motor Vehicle Emission Simulator (MOVES). It was also recommended that additional text be included discussing the use of Ultra Low Sulfur Diesel fuel and brake and tire wear emission calculations.	The EIS has been revised according to recommendations received through comments. Detailed documentation supporting revised emissions calculations is provided in PLP 2019-RFI 007b. Calculated on-road and off-road emissions for all project phases and components were updated using the current MOVES model, and this information has been added to the EIS.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Air Quality—Alternatives Modeling	Comments stated that due to differences (e.g. infrastructure, location, terrain, meteorology, duration, activities) among alternatives and variants of alternatives, the modeled impacts of Alternative 1 may not be an appropriate surrogate for all alternatives and variants. It is recommended that the EIS include more representative and/or additional assessments of the potential air quality impacts of Alternative 2 and Alternative 3, and of the variants.	It is agreed some of the differences among alternatives/variants would likely result in varying degrees of different modeled impacts compared to those modeled and presented in Appendix K4.20. However, these differences can be qualitatively deduced from the modeled impacts provided, obviating the need to model any aspect of any alternatives. Given that modeling is provided in Appendix K4.20, and impacts from all other alternatives/variants can be deduced from these results, modeling is not needed for anything but the alternative presented in Appendix K4.20, and no additional modeling was conducted. However, in response, text was added to the EIS where appropriate to better describe the interpreted Appendix K4.20 model results in light of the differing characteristics of the other alternatives/variants.
Air Quality—Ambient Air Boundary	Comment stated that air quality impacts based on dispersion modeling of the mine site are reported only at receptors outside of the ambient air boundary, because those are areas to which the public would have access. The ambient air boundary appears to extend far from the mine operations area, especially on the southeastern side, where most of the maximum air impacts would occur. Therefore, it is critical to ensure that the correct ambient air boundary has been modeled, so that potential air quality impacts may be accurately reported. According to Appendix K4.20, the ambient air boundary used in the modeling is based on a safety zone that "would be established to ensure that the public would not be exposed to worksite safety risks." The commenter was unable to locate additional information regarding the establishment of this safety zone, including the rationale for determining its extent or the means through which it would be enforced. The commenter recommended that this information be added to the EIS as part of the description of the proposed action. Specifically, additional information should be attached or referenced that provides the details regarding the safety zone and what steps (e.g., fencing, posting, patrols) PLP would take to preclude public access to these areas, and confirmation that the land in the boundary would be under the full control of PLP. Comment noted that although the State of Alaska will determine whether the ambient air boundary is properly established during the air permitting of the project, the USACE should consider including this information in the EIS, to accurately and adequately assess impacts.	Additional information has been added to EIS Chapter 2, Alternatives, to better describe the proposed mine site safety zone. The term “ambient air boundary” has been changed to “mine site safety boundary” throughout the EIS. Text has been revised so the narrative does not describe an ambient air boundary, the establishment of which would be under the jurisdiction of the State based on review of permit applications. A proposed mine site safety boundary has been identified by PLP as the minimum area needed to safely conduct mine construction, operations, and reclamation (PLP 2018-RFI 058). The boundary, shown on Figure 2-4 (Chapter 2, Alternatives), would be demarcated by signage at regular intervals and at logical locations such as the mine access road and waterways. The boundary would be reduced during the post-closure phase of the project. As noted, the State of Alaska would have the jurisdiction to establish if this boundary meets the definition of an ambient air quality boundary when air quality construction permits would be sought for this project. Knowing that the State of Alaska has authority for determining what constitutes an ambient air quality boundary, and assuming that they may require more detail than what is known at this time to make their decision, the EIS text was revised to change the term "ambient air boundary" to "mine site safety zone" throughout the document. This was done to avoid implying that it is known what the State of Alaska will establish as the ambient air quality boundary during Clean Air Act new source construction permitting.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Air Quality—AQRVs at Tuxedni	Comments expressed concern that the Air Quality Related Values (AQRV) analysis described in Section K4.20 includes a visibility impacts screening method, as well as a comparison to deposition critical loads for Denali National Park, but not to the Tuxedni Wilderness (in the Alaska Maritime National Wildlife Refuge), which is also a Class I Area within 50 miles of the mine site.	Far-field Class I Area impact assessments of AQRVs were conducted for both Tuxedni Wilderness and Denali National Park and Preserve, although this was not clear in the DEIS. The EIS Appendix K4.20.2 has been revised to make it clear that far-field Class I Area impact assessments were conducted for both Tuxedni and Denali. Furthermore, revisions were made to clarify that deposition measurements cited at Denali National Park are intended to be representative of both Denali and Tuxedni Wilderness Area, and that these measurements were used to determine AQRVs at both parks. Visibility analyses were performed at both Tuxedni Wilderness Area and Denali in PLP 2018-RFI 012, and this assessment was referenced in Appendix K4.20. The mine site and Amakdedori port are more than 62 miles apart, as stated in Section 4.20, Air Quality. However, the alternative Diamond Point port site is just less than 50 miles from the mine site. These distances have been made clear in the EIS, and the EIS has been revised to indicate that the Diamond Point port is closer to a Class I area. A full AQRV analysis is not required, because the Q/D analysis (i.e., emissions over distance analysis defined in the EIS) showed a Q/D value less than 10 at Tuxedni Wilderness for both the mine site and Amakdedori port. Because the Amakdedori port and Diamond Point port sites are similar, if one uses the distance between Diamond Point port and Tuxedni Wilderness in that analysis, the Q/D would still be well less than 10. Because of this, the assertion in the EIS that AQRVs would not likely be impacted at any of the Federal Class I areas remains valid. The discussion surrounding Diamond Point port potential AQRV impacts was updated to disclose that AQRV impacts at the Diamond Point port may be higher than the Amakdedori port impacts, but are still expected to be below Q/D screening thresholds, and additional Class I area assessments are not required.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Air Quality—BBNC Issues with the Analysis Approach	A comment expressed several wide-ranging concerns regarding methodologies used to conduct the ambient air quality impact analysis and how the analysis was presented in the DEIS, and provided suggestions for alternative ways to approach and present that analysis. Concerns included: 1) the use of proxies for cumulative modeling; 2) splitting the analysis across several appendices; and 3) limiting the modeling to Clean Air Act Title I sources. A comment expressed concern that information in the DEIS was difficult to find and hard to interpret, given the way the document is organized, and the information presented.	This response is handled in three parts corresponding to the three concerns articulated. However, as discussed below, in no case did the concern result in a revision to the EIS or the modeling approach. Several commenters raised similar concerns, ultimately recommending that the dispersion modeling should include all sources and avoid reliance on proxies. Although the recommendation represents one possible approach, it is onerous, rarely implemented, and not necessary to reasonably address and characterize project impacts as described in Statement of Concern (SOC) "Air Quality—Cumulative Effects Not Adequately Addressed" and SOC "Air Quality—Transportation Corridor Impact Approach." Therefore, the modeling approach was not revised to reduce reliance on proxies. Several comments expressed similar concerns related to the approach of limiting the modeling to Clean Air Act Title I sources, noting that it was insufficient to properly address impacts. As discussed in the SOC "Air Quality—CAA Title I Only Modeling" the approach is actually designed to characterize impacts through codified screening levels, rather than explicit modeling, obviating the need to conduct unnecessary dispersion modeling. Therefore, the modeling approach was not revised to include more analysis than what is expected to be required by the Clean Air Act. Presenting and describing the interpretation of the large amount of complex data required to support the air quality impacts analysis in a way that allows readers of a wide range of technical skill to find the information they are looking for without getting sidetracked by data they are not interested in is challenging. To address that challenge, the analysis was split so that detailed data and the more technical analyses are presented in appendices or referenced to other supporting documents; and the summary of those data and comparisons between alternatives are presented in Chapter 4 of the main document. Concerns over this approach were rare, and this approach follows the organization of technical content of the EIS as a whole. For this reason, the EIS has not been revised or reorganized.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Air Quality—CAA Title I Only Modeling	Comments noted concern that Section 4.20 and Appendix K4.20 do not fully disclose potential air quality and air quality-related values (AQRV) impacts because the supporting modeling analysis is limited to sources that will be regulated under Title I of the Clean Air Act, and limited to only those assessments that would be required when permitting project components under Alaska Administrative Code Title 18, Chapter 50 (18 AAC 50). Therefore, the DEIS only addresses the impacts from a subset of criteria pollutant emissions, and only from stationary and select fugitive sources; it does not compare impacts to all National and Alaska Ambient Air Quality Standards (NAAQS/ AAAQS) and Prevention of Significant Deterioration (PSD) Increments. Commenters generally recommended that additional analyses based on modeling be provided that address the potential impacts to air quality from all project emissions sources for comparison to all NAAQS/AAAQS, and PSD Class I and Class II Increments.	Project impacts were fully disclosed in the DEIS using a series of assessments designed to explicitly model only those sources and pollutants with the most potential for substantial impacts. Therefore, additional analyses based on modeling are not warranted and have not been conducted. However, Section 4.20.2 of the EIS has been revised to better articulate the analysis approach and why reliance on explicit modeling is required only in certain situations. The assessment of the project's potential air quality impact was accomplished through a characterization of existing air quality in the project region (Section 3.20, Air Quality), an evaluation of air quality regulatory requirements for the project (Section 4.20, Air Quality, and Appendix K4.20), PLP 2018-RFI 009 and PLP 2018-RFI 012, and a demonstration that all project components would comply with applicable Clean Air Act requirements (Section 4.20, Air Quality, and Section K4.20, PLP 2018-RFI 009, and PLP 2018-RFI 012). Although this approach does not explicitly predict impacts, this approach does in fact address impacts using codified screening levels designed to require projects anticipated to have higher impacts to provide progressively more explicit impact quantification, as it becomes less clear that the project will have minimal impacts. This progression is also based on the project location. Under Clean Air Act requirements, projects with the same emissions require different types and levels of analysis if they would be located in an area with known existing air quality issues. For example, projects with emissions of a given pollutant are understood by the Alaska Department of Environmental Conservation (ADEC) to have minimal impacts without the need for explicit modeling if that project is in an attainment/ unclassifiable area, and if project emissions fall below significant emission rates in 18 AAC 50.502(c)(4)(A). This becomes less clear for larger projects, in which case explicit modeling is required to demonstrate the project has minimal impacts. For example, proposed projects with emissions of a pollutant that exceed significant emission rates listed in 40 Code of Federal Regulations (CFR) Part 52.21(b)(1) are required to predict impacts for all pollutants triggering review, and includes a range of cumulative impact analyses on both Class II and Class I areas, including associated growth and air quality-related values analyses. As described in PLP 2018-RFI 009, for projects known to generate large fugitive dust emissions, such as a mine, emissions from certain activities must be considered, and the

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Topic—Subtopic	Statement of Concern	Response
		significant emission rate thresholds listed in 40 CFR Part 52.21 are set at a lower level because it becomes less clear that the project will have minimal impacts. Therefore, in the same way that ADEC implements Clean Air Act procedures to provide reasonable assurance that sources will not cause or contribute to exceedance of health and welfare-based thresholds, the EIS provides an assessment of impacts from all sources, and can show that project impacts are either minimal or substantial.
Air Quality—Class I Area Impacts	Comments noted concerns that Class I increment analyses were not performed at nearby Class I areas (specifically Tuxedni Wilderness in Alaska Maritime National Wildlife Refuge). Commenters recommended: Performing a Class I increment analysis at Tuxedni Wilderness, or addressing the issue of potential impacts more explicitly (if appropriate). Identifying the nearest Class I areas and the distances of the Class I areas from the project, as well as any minor source baseline dates that may have been established at this Class I area. If the baseline date has been set, consider analyzing the likelihood of significant Class I increment consumption from project operation emissions. If this is determined to be significant, 40 CFR Part 51, Appendix W contains screening procedures to determine if a cumulative Class I increment consumption analysis is warranted.	Appendix K.4.20 of the EIS has been revised to present a semi-quantitative Prevention of Significant Deterioration (PSD) Class I increment analysis at nearby Class I areas. Although it was recommended that the assessment include a full increment consumption analysis (i.e., baseline date determination and the increment consumption status of stationary and mobile sources), that assessment was not conducted, because it would not provide information relevant to understanding disclosed increment impacts. When presenting PSD Class I increments, it should be recognized that although explicit modeling was not performed at Tuxedni Wilderness or any other Class I area, the impacts from a Class I assessment are implicit in the Class II PSD Increment analysis. The Class II PSD Increment analysis shows that project impacts of all applicable pollutants are below Class I PSD Increments at the mine site safety zone boundary, with the exception of 24-hour $PM_{2.5}$ and 24-hour PM_{10}. Although these exceed the Class I PSD Increment thresholds, they are still relatively low and it is important to note that the highest 24-hour $PM_{2.5}$ and 24-hour PM_{10} impacts from the modeling assessment occurred less than 1 kilometer away from the mine site near or on the mine site safety zone boundary (see Figure 1.4 of PLP 2018-RFI 009). Furthermore, the analyses presented show impacts would rapidly decrease from that point outward. Therefore, it is highly unlikely that modeled impacts at any nearby Class I area would exceed the 24-hour $PM_{2.5}$ and 24-hour PM_{10} Class I PSD Increments. This is particularly the case at the Tuxedni Wilderness, which is separated by extremely high terrain and a distance of greater than 150 kilometers. This is consistent with Q/D analyses (i.e., emissions divided by distance analysis defined in the EIS) performed which showed impacts at Tuxedni Wilderness would be insignificant. For this reason, specific Class I PSD Increment modeling will not be performed, and it is not necessary to conduct cumulative increment modeling to demonstrate that project-only impacts will not contribute to a violation. Although it is

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
		not necessary to conduct an increment analysis for any project component but the mine site based on air quality permit applicability, a PSD Class I increment assessment of other project components would also likely show insignificant impacts. Q/D analyses at both the compressor station and Amakdedori port both showed Q/Ds less than the Q/D associated with the mine site. Like the mine site analysis described above, it is likely that a quantitative Class I PSD Increment analysis at those sites would also be insignificant.
Air Quality—cumulative effects not adequately addressed	Concern was expressed about the approach used to assess the cumulative air quality impacts of project components and non-project/off-site sources. Commenters noted that all project components would emit air pollution at the same time as the other project components, and that off-site sources exist in the project area that may also emit at the same time as project components. Comments indicated that an approach that does not include modeling all sources of regional emissions is not a valid representation of the impacts, and recommended a new ambient air quality analysis be conducted that includes all regional sources that emit pollutants concurrently.	The approach used for the EIS to quantify project cumulative impacts follows standard United States Environmental Protection Agency (EPA) guidance codified in 40 CFR Part 51 Appendix W (Guideline on Air Quality Models) to account for the impacts from other project components, off-site sources, and other regional sources. This approach has a long history of being approved for a wide range of sources and situations, and has been shown to provide reasonable estimates of cumulative impacts. Although the approach does not explicitly model all sources concurrently, there should be no concern about its application given the history of the approach used in the EIS. For these reasons, additional modeling and/or ambient air quality analysis was not performed, and no additional text updates were made.
Air Quality—Expanded Mine Scenario	Comments noted concern that the DEIS describes air quality impacts during the "expanded development scenario" as being similar in magnitude, duration, and geographic extent as those associated with Alternative 1, although there would be a substantial increase in acreage and increased greenhouse gas emission footprint.	The scenario for expanded development is a Reasonably Foreseeable Future Action (RFFA) that is not evaluated as part of the project, and would require additional planning documents, permits, and separate NEPA compliance. Therefore, it is only included in Section 4.20, Air Quality, of the EIS for the purpose of understanding the potential for cumulative impacts, and the EIS has not been revised to discuss increases not related to that potential. Although this is the case, the EIS has been revised to provide additional discussion related to the cumulative impacts when the expanded development and the project would overlap in time. Section 4.20.9.2 and Table 4.20-2 of the EIS has been revised to provide additional discussion related to the cumulative air quality impacts associated with the expanded development when it and the project overlap in time. Realize that ambient air quality standards do not provide for the evaluation of impacts on anything longer than an annual timescale; therefore, understanding cumulative impacts only focuses on those years and activities that occur when the project and the expansion would overlap in time. The scenario for expanded development would begin at the end of the operations phase of the

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
		project. Therefore, overlapping activities between the project and the expanded development leading to cumulative impacts would be largely limited to a small number of years when there are still emissions associated with the closure of the project, and the expanded development scenario construction phase. During these limited years of overlap, the project is ramping down and project emissions are decreasing. At the same time, activities associated with the expansion scenario begin to increase over a period of years along with expansion emissions. It is reasonable to assume that decreases will approximately balance the increases, leading to no meaningful change during the period of overlapping operations between the proposed and expanded development projects. This is even the case for the power plant, which would be increasing in size; and the processing facilities, which would be increasing throughput. Consider for these sources that the modifications required to increase capacity would not happen right away; and once modified, these sources would not achieve full operating capacity immediately. Therefore, in the few years of overlap between the proposed and expanded development projects, these modified sources would not likely achieve full capacity, and the emissions increases compared to those from the project would not be as large as the potential change in throughput would suggest. Considering this example and preceding discussion, it is reasonable to assert that cumulative emissions would not be meaningfully different from those analyzed and presented in Appendix K4.20. This lack of meaningful change is made even clearer when considering the air quality impacts from those emissions. Overlapping impacts from the project and expanded development scenario would be minimal, given the large distances between project activities, the distance from sources to modeled receptors, and the understanding that the highest impacts from activities would occur near those activities. This leads to the conclusion when considering the expansion scenario, impacts associated with the project would result in similar magnitude, duration, and geographic extent as those air quality impacts described in Appendix K4.20 for a given year.
Air Quality—HAPs Species	Concern was expressed that the Hazardous Air Pollutant (HAP) species selected to be included in the DEIS should have included ethylbenzene and xylene. It was recommended that all BTEX constituents are included in the analysis.	The EIS has been revised to include all Benzene, Toluene, Ethylbenzene, and Xylene (BTEX) constituents in the analysis.

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
Air Quality—Impact Duration	The DEIS states that "the air quality impacts would only remain while the project's activity is ongoing, returning to the baseline conditions once the activity is complete; this would be short-term occurring only during construction..." Commenter noted it is not clear how 4 years of construction activity can be considered "short-term" in the context of air emissions. Commenters recommended explaining how 4 years can be considered "short-term," or change the characterization to "medium-term" to reflect the duration of the air emissions.	As recommended, EIS Section 4.20.1 has been revised to more appropriately define and characterize the duration of air quality impacts related to the construction activities by adding “medium-term” to the duration impact assessment.
Air Quality—Modeling Methodology	Comments noted concerns that some of the modeling technical approaches used are not conservative. Specific concerns included the open pit source characterization at the mine site. Recommendations included using a more representative characterization of the mine pit in the air quality modeling assessment.	The modeling assessment presented in Appendix K4.20 is not intended to be conservative; rather, it is intended to provide a representative assessment that assists in understanding the mine air quality impacts for all alternatives. Mining operation emissions do vary throughout the life of the mine, based on factors such as levels of operation, road traffic, and open pit depth. Therefore, the mine site could be characterized in a variety of different ways and still reasonably represent air quality impacts over the course of the life of the mine. With this in mind, the open pit characterization does likely capture the mine depth well into the life of the mine. However, this depth also corresponds with a time in the mine life during which it would have higher ore hauling emissions. Based on PLP 2018-RFI 007, emissions related to ore hauling were conservatively calculated based on Year 20, consistent with a deeper pit depth. PLP 2018-RFI 007 states: "Annual fugitive PM emissions were calculated based on representative and worst-case information regardless of the operating year in which the representative or worst-case emissions might occur from a particular operation. This methodology is conservative because representative or worst-case fugitive particulate matter (PM) emissions from the various operations would not occur in the same operating year. For example, fugitive PM emissions from ore handling are based on the maximum crushing capacity of the two primary crushers, combined. Fugitive PM emissions from ore hauling are based on a final pit depth (Year 20), which results in the maximum road-miles traveled by haul trucks carrying ore. Fugitive PM emissions from handling and hauling overburden and waste rock are based on Year 2, which is a representative year, because both overburden and waste rock would be hauled." Although no mention of the open pit source was made, it is apparent that overall mine life operations were considered during the emissions calculations

Table D-2: Statements of Concern and Responses

Topic—Subtopic	Statement of Concern	Response
		that were considered in the modeling. Regarding the release heights, 5 meters is appropriate considering the primary activities included in the modeled OPENPIT source include (according to PLP 2018-RFI 009), vehicle traffic on haul roads located in the pit, loader and shovel travel, grading activities, loading ore into haul trucks, loading overburden into haul trucks, and loading waste rock into haul trucks. For these reasons, no additional modeling was performed, and no additional text changes were made.
Air Quality—Source Emissions and Impacts not Described	Concerns were expressed regarding how the DEIS addresses emissions and impacts from the mine site (e.g., 270-megawatt power plant, diesel generators, natural gas engines, waste incinerators, laboratories, and mining activities), transportation corridor (e.g., shipping across waterways), and power generation at the port site. It was recommended that these emissions sources be included in the analysis.	Because the EIS includes the emission sources noted, the EIS analysis has not been revised. The EIS includes emissions from all the activities at the mine site (e.g., 270-megawatt power plant, diesel generators, natural gas engines, waste incinerators, laboratories, and mining activities), transportation corridor (e.g., shipping across waterways), and power generation at the port site. Detailed documentation of the emission calculations and sources is provided in PLP 2018-RFI 007 and PLP 2019-007b series.
Air Quality—Transportation Corridor Impact Approach	Concerns were raised that transportation corridor impacts should not be assessed by proxy using impacts predicted for other project components. Reviewers recommend that instead, the impacts from transportation corridor emissions be predicted and presented.	Although the use of proxies may not provide a predicted numerical impact, they are sufficient to characterize the magnitude, duration, extent, and potential for cumulative transportation corridor impacts; therefore, neither the approach nor the EIS have been revised. When evaluating transportation corridor impacts alone or cumulatively, it is not necessary that the proxy perfectly represents all the emission units, ambient air boundary configurations, etc., provided proxy impacts are sufficiently conservative to represent the impacts from the wide range of source receptor geometries that can occur along the transportation corridor. As described in PLP 2018-RFI 009, the model simulation used to represent the transportation corridor impacts (mine site) includes over 18 different types of haul roads and haul road activities occurring concurrently with a wide range of large fugitive dust sources (e.g., bulldozing, material handling, crushing, blasting), and predicts impacts from sources that represent a very wide range of source-to-source plume interaction and source/receptor/ambient boundary geometries. Couple this with the large amount of modeled emissions, and it can be concluded that the mine site modeling is a reasonable proxy for the transportation corridor activities, and that mine site impacts are conservatively representative of those that could occur along the transportation corridor. Given that overlapping impacts between the transportation corridor activities and other project components would be rare, near component activity interfaces, and in non-modeled areas (e.g., where the

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		transportation corridor road leaves the mine site), and the EIS characterizes transportation corridor impacts at all other locations (e.g., at some location between the mine and the ferry crossing) through proxy, the proxy approach is sufficient to characterize cumulative transportation corridor impacts. Transportation corridor impacts are anticipated to have localized geographic extent like those predicted for other project components. Therefore, the possibility of significant overlapping impacts would be limited to areas very close (less than 500 meters) to where transportation corridor activities and the activities from other project components occur. These areas would largely lie in areas of limited public access where impacts are not characterized. Furthermore, the possibility of overlapping impacts would be rare, given the low probability that specific wind direction and source-to-source-to-receptor geometry alignments would occur, resulting in cumulative impacts. For all these reasons, using a proxy to represent transportation corridor cumulative impacts is sufficient to characterize the magnitude, duration, extent, and potential for cumulative transportation corridor impacts.
Birds—Birds-general impacts	Concerns were expressed about impacts to birds protected by the Endangered Species Act and Migratory Bird Treaty Act that live in the area encompassed by the mine, including downstream areas in Bristol Bay. Birds would be affected by habitat destruction (including wetland habitat), noise, light, dust, disruption by human activity, pollution by mine dust, contamination and spills of toxic materials, climate change, and the 78-year mine build-out, among others.	Birds would be impacted by all project components in a variety of ways that are currently described in Section 4.23, Wildlife Values, and Section 4.25, Threatened and Endangered Species. Additional information on potential impacts (listed in this statement of concern) to birds protected by the Migratory Bird Treaty Act has been expanded in Section 4.23, and birds protected by the Endangered Species Act are addressed in Section 4.25. Potential impacts to birds in Bristol Bay are discussed in Section 4.27, Spill Risk.
Birds—Birds-impacts to sensitive avian species	Concerns were expressed about impacts to sensitive avian species that are declining globally. Some of these species occur in Bristol Bay, and others along the transportation corridor (boreal forest species). Concerns were expressed that the DEIS contains little mention of how the project could reduce adverse effects on sensitive bird populations. Further detail on mitigation measures is warranted, especially in ways to reduce avian collisions with project infrastructure. Additional information on exact numbers of wintering seaducks (and other groups of birds) would be helpful to fully understand potential impacts to important bird areas, especially because areas that may be impacted contain large numbers of several species.	Although Section 4.23, Wildlife Values, details the avian species that may be impacted by the project, impacts (other than elevated metals under spill scenarios) are not anticipated to extend south and west to the mouth of Bristol Bay, where many of the birds listed in this comment stage during migration. Some of the birds listed in this comment do not occur in Bristol Bay (whiskered auklet), and some are rare visitors (short-tailed shearwater). Some of the bird species that breed in boreal forest environments (black-backed woodpecker, solitary sandpiper, olive-sided flycatcher, varied thrush, rusty blackbird, etc.) had very low abundances along the transportation corridor based on project-specific surveys conducted by ABR. The loss of habitat for these species is described in the EIS, and Applicant-committed mitigation measures are provided in Chapter 5, Mitigation.

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		Minimization measures mentioned in comments (modifying roadside vegetation, reducing traffic speeds, reducing nighttime lighting, and control of food sources including dumpsters) have been included in the updated Appendix M1.0, Mitigation Assessment. Seabird survey data from ABR that covers Cook Inlet is included in the EIS. Figure 3.23-10 has been updated to depict which species breed in the different colonies in the EIS analysis area. Bird densities for Iliamna and Iniskin bays are provided in Figure 3.23-16.
Birds—Birds-selenium concentrations	Concerns were raised that the DEIS does not adequately address toxicity impacts to birds from selenium in the tailings ponds (and pit lake), and does not address ways to prevent birds from landing in the tailings ponds/pit lake. Concerns were expressed that the avian species that nest and rear broods in the mine area, particularly near wastewater treatment plant effluent discharge sites, are not sufficiently considered for potential individual and population-level impacts of elevated selenium concentrations resulting from discharge. Additionally, the pit lake has the potential to act as a reservoir of selenium, and birds could consume fish or other aquatic life, causing a long-term cumulative effect of selenium toxicity through prey consumption.	Water quality data have been referenced and incorporated into Section 4.23, Wildlife Values, to clearly identify projected selenium concentrations at the tailings pond and pit lake. All water that is discharged from the wastewater treatment plants will be required to meet Alaska water quality criteria. Addition information regarding the pit lake and its anticipated levels of metals and other elements has been included in Section 4.23. A description of the potential impacts of selenium loading in the streams (due to discharges and spills), its bioaccumulation, trophic transfer, and toxicity in fish and wildlife at the predicted concentrations in discharges/effluents (provided in Appendix K.14), as well as impacts from spills, have been described in greater detail in Section 4.23, Wildlife Values; Section 4.24, Fish Values; and Section 4.27, Spill Risk.
Birds—Pit Lake Impacts	Concerns were raised about the impacts to birds from the pit lake and tailings ponds. Birds could be exposed to toxic metals in a number of ways: 1. Birds could use the pit lake (e.g., resting, foraging, preening). 2. Birds could use the waters surrounding the mine area. 3. Birds could use the watershed following a tailings dam failure. 4. Birds may consume the fish or invertebrates that have accumulated toxic materials. Additionally, concerns were raised that potential impacts to birds from the pit lake may be similar to those experienced at the Berkeley Pit in Montana, where mass avian casualties have occurred.	Section 4.23, Wildlife Values, has been updated to elaborate on the water quality in the pit lake, tailings ponds, and other locations where birds may contact water associated with the project. Section 4.23 references the predicted water quality levels in both the pit lake and tailings ponds. The EIS recognizes that birds may be exposed to elevated levels of metals from contact with water in the pit lake and tailings ponds. The EIS recognizes potential impacts to birds that use the area for resting, foraging, preening, and migrating. The EIS recognizes potential impacts to birds should a tailings dam failure occur, and impacts of consuming fish/invertebrates that occur in the area following a tailings dam failure. The EIS describes some of the differences between the Berkeley Pit and the proposed pit lake from the project.

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Topic—Subtopic	Statement of Concern	Response
Birds—Wildlife-diesel spill impacts	Concerns were expressed about effects to birds from diesel spills in the shipping lanes in Cook Inlet. Quantitative estimates should be provided for potential impacts to seabirds and waterbirds (as was done for rock sandpipers) from a diesel spill. Additional information should be provided regarding realistic impacts to birds from ultra-low sulfur diesel (ULSD) in the intertidal zone and its ability to cause physical fouling, acute toxicity, sublethal toxicity, and impact the avian prey base (mainly invertebrates) far beyond the immediate location of the spill. The phrase "population-level impacts" is problematic without quantification of the population levels and anticipated numbers of birds that may be impacted. The phrase "limited number of birds" is not quantified and appears to downplay the potential risks to several sensitive avian populations. Concerns were also expressed about the risk of inhalation toxicity in birds. The EIS does not recognize the relatively higher severity of impacts to birds (including prey in tidal mud flats and estuarine marshes) from truck spills that may reach Kamishak Bay or Iliamna Bay.	Section 4.27, Spill Risk, has been updated to further evaluate potential impacts to birds from diesel spills in Cook Inlet. To the extent feasible, quantitative estimates have been provided. Text has been revised to remove phrases that cannot be quantitatively established such as "population-level" impacts. Potential impacts from inhalation toxicity in birds has been included along with additional information on potential impacts to shorebirds (impacts to tidal mud flats and marshes from a diesel spill).
Birds—Wildlife-fugitive dust impacts	Concerns were expressed that the DEIS did not sufficiently discuss the potential impacts of habitat loss and alteration for species of birds from fugitive dust emissions.	Section 4.23, Wildlife Values, has been revised to include potential impacts of fugitive dust on birds. The fugitive dust control plan is described in Chapter 5, Mitigation.
Birds—Wildlife-lighting impacts	Concerns were expressed about how port facility lighting may prove disorienting for seabirds during migration and daily foraging flights.	Section 4.23, Wildlife Values, has been revised to include the potential for disorientation of seabirds during migration and daily foraging flights.
Birds—Wildlife-raptor impacts	Concerns were expressed about impacts to nesting raptors (especially bald and golden eagles) from the project at the mine site and along the transportation corridor. Potential impacts may necessitate the application for an eagle nest take permit. Additional concerns were expressed about the age of the historical data and the need to be aware of the survey needs, timing, and level of information required to apply for various permits.	Section 4.23, Wildlife Values, describes potential impacts to nesting raptors from development of the project. Updated raptor surveys would be anticipated during the pre-construction phase of the project prior to applying for the necessary permits from other agencies. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Bonding or Financial Assurance—Canadian Mining Company	Commenters expressed concern that a Canadian company is proposing the Pebble Project, and that they have a reputation of selling the development rights of its mining projects to other foreign companies, making financial responsibility difficult.	The Pebble Limited Partnership is wholly owned by Northern Dynasty Minerals, Limited, a Canadian Company. In the event that a permittee is unable to fulfill their reclamation or long-term care, monitoring, and maintenance obligations, per their Reclamation Plan Approval or Integrated Waste Management Permit, due to bankruptcy or other factors, the State of Alaska could take appropriate enforcement actions, including seizing the bond. Once seized, the State of Alaska could use the funds acquired from the bond to implement the approved Reclamation and Closure Plan under state managed contracts. If a mine transferred to another owner or operator, applicable federal and state permits would need to be transferred to the new entity. The State of Alaska has stated a replacement bond that would be required for the full amount of financial assurance, as defined by the Reclamation Plan Approval and Integrated Waste Management Permit, prior to the new entity initiating or continuing operations. No change has been made to the EIS.
Bonding or Financial Assurance—Financial Responsibility	Questions and concerns were expressed regarding the Applicant's ability to develop, operate, and maintain the mine, including their financial responsibility for reclamation, closure, and long-term monitoring once the project is complete. Commenters also asked for information about financial assurance, such as who would cover the costs of long-term monitoring and treatment in perpetuity, and who would be responsible if PLP were not able to fulfill their obligations.	The State of Alaska's Large Mine Permitting Team (LMPT) provisions are designed to account for reclamation and closure objectives, including long-term environmental management (ADNR 2018g). See Chapter 5, Mitigation, for a summary of the LMPT permitting process. State mining regulations (11 AAC 97.300—97.350) require an approved reclamation plan prior to commencing construction, and the reclamation plan does not become effective until bonding is in place (11 AAC 97.400). PLP's Reclamation and Closure Plan (PLP 2019-RFI 115) specifies that a detailed reclamation and closure cost model would 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 bonding estimate would be developed in compliance with state requirements using vendor-provided equipment handbook, productivity, and operating cost information, current quoted equipment rental rates, State of Alaska-determined labor rates, and industry standard methodology and software, and would include costs of the following elements: • Closure planning and design and mobilization of third-party equipment to site. • Detailed estimates of equipment and labor requirements for physical closure.

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Topic—Subtopic	Statement of Concern	Response
		• Capital, sustaining capital, and operating costs for water treatment and other long-term post-closure operations. • Appropriate indirect costs and contingencies developed following Alaska Department of Natural Resources (ADNR) guidance. The ADNR would work with PLP at the appropriate time to ensure PLP submits a complete Reclamation and Closure Plan, including cost estimates, sufficient for review under applicable state statutes and regulations. Although Reclamation Plan Approvals may be issued for a term of up to 10 years (11 AAC 97.320), ADNR limits the term to 5 years to align with the Integrated Waste Management Permit issued by ADEC, which must not exceed a term of 5 years (18 AAC 15.090). Therefore, financial assurance for mine reclamation and long-term care, monitoring, and maintenance obligations, including water treatment, are updated as part of the renewal process for the Reclamation Plan Approval and Integrated Waste Management Permit on a 5-year basis to remain current with operations, regulatory changes, and issues identified during environmental audits. Following completion of any required reclamation activities, a permittee may request ADNR release the portion of financial assurance related to the completed reclamation work. On confirmation that state reclamation standards have been met, ADNR may approve release of the corresponding portion of the financial assurance. Financial assurances for long-term care, monitoring, and maintenance obligations, including water treatment, would need to be maintained for as long as those activities were required to maintain compliance with applicable state regulations. In the event that a permittee is unable to fulfill their reclamation or long-term care, monitoring, and maintenance obligations, per their Reclamation Plan Approval or Integrated Waste Management Permit, due to bankruptcy or other factors, the State of Alaska could take appropriate enforcement actions, including seizing the bond. Once seized, the State of Alaska could use the funds acquired from the bond to implement the approved Reclamation and Closure Plan under state managed contracts. Cost estimates for engineering redesign, contractor profit and overhead, contract administration, insurance, and other contingencies are accounted for in the bond amount. Should the mine transfer to another owner or operator, all applicable federal and state permits would need to be transferred to the new entity. A replacement bond would be required for the full amount of

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Topic—Subtopic	Statement of Concern	Response
		financial assurance, as defined by the Reclamation Plan Approval and Integrated Waste Management Permit, prior to the new entity initiating or continuing operations. The FEIS has been updated to include pertinent information from the Reclamation and Closure Plan. See related SOC Bonding or Financial Assurance—Financial Surety Estimate Needed and SOC Reclamation and Restoration—Reclamation and Closure Plan.
Bonding or Financial Assurance—Financial Surety Estimate Needed	Commenters stated that the EIS should include a financial surety estimate to enable evaluation of the adequacy of financial assurance, given the need for long-term water treatment. Specific suggestions for the amount that should be required were provided.	State statutes and regulations require proof of financial responsibility (i.e., bonding) to be in place prior to construction or operation of a mine as part of ADNR's Reclamation Plan Approval (Alaska Statute [AS] 27.19.040; 11 AAC 97.300—97.350; 11 AAC 97.400 -97.450) and Certificate of Approval to Construct, Modify, or Operate a Dam (AS 46.17.030; 11 AAC 93.171—93.172), as well as the ADEC Integrated Waste Management Permit (AS 46.03.100(f); 18 AAC 60.265), to ensure an orderly, stable closure and long-term environmental management following cessation of mining activities. See Chapter 5 for a summary of the State of Alaska's Large Mine Permitting Team permitting process. PLP has provided a reasonably detailed Reclamation and Closure Plan to help inform the impact analysis for the FEIS (PLP 2019-RFI 115). The submitted plan does not include cost estimates for implementation, which would form the basis for the financial assurance obligation under state regulations. However, Section 4.13 of PLP's Reclamation and Closure plan specifies that a detailed reclamation and closure cost model would 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 bonding estimate would be developed in compliance with state requirements using vendor-provided equipment handbook productivity and operating cost information, current quoted equipment rental rates, State of Alaska-determined labor rates, and industry standard methodology and software, and would include the costs of the following elements: • Closure planning and design and mobilization of third-party equipment to site. • Detailed estimates of equipment and labor requirements for physical closure.

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Topic—Subtopic	Statement of Concern	Response
		• Capital, sustaining capital, and operating costs for water treatment and other long-term post-closure operations. • Appropriate indirect costs and contingencies developed following ADNR guidance. Under these circumstances, where an estimated bonding amount is not available, the NEPA review analyzes effects under the assumption that state permitting requirements are complied with. The ADNR would work with PLP at the appropriate time to ensure PLP submits a complete Reclamation and Closure Plan, including cost estimates, sufficient for review under applicable state statutes and regulations. The estimated financial assurance costs would be subject to a public review period during the state permitting process. This would be the opportunity for the public to comment on the detailed information that would be part of the calculation for funding amounts for long-term post closure costs. The FEIS has been updated to include pertinent information from the Reclamation and Closure Plan. See related SOCs Bonding or Financial Assurance—Financial Responsibility and Reclamation and Restoration—Reclamation and Closure Plan.
Bonding or Financial Assurance—Legacy Mines	Concern was expressed that Pebble will become a legacy mine or Superfund Site and that the State of Alaska and taxpayers will ultimately be responsible.	State regulations related to mine reclamation and long-term care, monitoring, and maintenance are designed to ensure mine operators fund reclamation and post-closure activities rather than the public. See Chapter 5 for a summary of the State of Alaska's Large Mine Permitting Team permitting process. State statutes and regulations require proof of financial responsibility (i.e., bonding) to be in place prior to construction or operation of a mine as part of the ADNR's Reclamation Plan Approval (AS 27.19.040; 11 AAC 97.300—97.350; 11 AAC 97.400-97.450) and Certificate of Approval to Construct, Modify, or Operate a Dam (AS 46.17.030; 11 AAC 93.171—93.172), as well as the ADEC Integrated Waste Management Permit (AS 46.03.100(f); 18 AAC 60.265), to ensure an orderly, stable closure and long-term environmental management following cessation of mining activities. There are several mines that are legacy mines or Superfund sites in Alaska, including the Salt Chuck Mine, Ross-Adams Mine, and the Red Devil Mine. It is important to note that these mines were generally developed and operated prior to statehood and modern federal or state

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		environmental laws, including state requirements for proof of financial assurance for mine reclamation prior to construction or operation. Current regulations and the financial responsibility requirement prior to mine construction prevents prospective mining projects from becoming a legacy mine or Superfund Site. No change has been made to the FEIS as a result of these comments. See response to related SOCs Bonding or Financial Assurance—Financial Responsibility, Bonding or Financial Assurance—Liability for Failures/Spills, and Tailings Dam Failures—Liability.
Bonding or Financial Assurance—Liability for Failures/Spills	Questions and concerns were expressed regarding catastrophic events and the Applicant's ability to address environmental damages after a catastrophic event such as a dam breach, including water contamination cleanup, fish habitat restoration, and economic rehabilitation for damages to fisherman, fisheries, and subsistence users. These concerns were expressed not only for the active mining period, but for perpetuity. Commenters also asked for information about financial assurance, such as who would pay if there was a major tailings dam failure or other large spills, or in the event of natural caused failures (e.g., floods, earthquakes, wind); especially if the mining company filed for bankruptcy, leaving no one responsible for the cleanup effort. Commenters stated that PLP should be held accountable for all potential pollution that could come out of the project, and should be required to compensate residents and affected stakeholders in the region for resulting losses during the life of the mine and in perpetuity.	Mine reclamation financial assurances are intended to fund the implementation of the approved Reclamation and Closure Plan, including long-term care, monitoring, and maintenance activities. They are not intended to cover costs for compensation for subsistence or commercial harvest losses, corrective actions following unforeseen events such as failure of or damage to permitted facilities, or environmental impacts resulting from unpermitted activities or negligence on the part of the operator. Activities found to be in violation of permit conditions or state law would be handled through enforcement actions, and costs associated with any required corrective actions would be the responsibility of the permittee and/or other liable parties. No change has been made to the FEIS. See response to the related SOC Bonding or Financial Assurance—Financial Responsibility.
Clean Water Act Compliance—Alternative 1 as LEDPA	Comments were received suggesting Alternative 1 as the only practicable alternative that would achieve the purpose and need of the project, and which would be in the public interest.	Comment acknowledged; no change made to the EIS. Information gathered as part of the NEPA process will be used to inform USACE's public interest review determination, required by 33 CFR Part 320.4. Information will also be used by the USACE to make a determination of the least environmentally damaging practicable alternative under the Clean Water Act's (CWA's) Section 404(b)(1) Guidelines and any appropriate required compensatory mitigation for unavoidable impacts to Waters of the US (WOUS). No discharges of dredged or fill materials are permitted to be authorized by the USACE under the CWA if there is a practicable

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		alternative that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. An EIS is used to inform the public and agency decision-makers, but it is not a decision document. A joint Record of Decision (ROD) by the USACE, Bureau of Safety and Environmental Enforcement (BSEE), and US Coast Guard (USCG), issued at the conclusion of the NEPA process, will record each appropriate federal agency’s decision(s); identify the alternatives considered in reaching those decision(s); and identify practicable means to avoid or minimize environmental harm (if required).
Clean Water Act Compliance—Alternative 2 or 3 as LEDPA	Comments were received suggesting Alternative 2 or Alternative 3 as the LEDPA. • Avoids the McNeil River core bear habitat area. • The transportation corridor uses a portion of the existing road from Pile Bay to Williamsport. • Pipeline construction is reduced by about 22 miles. • Uses the already permitted port at Diamond Point. • The Diamond Point Port offers better protection from the weather.	Comment acknowledged; no change made to the EIS. Information gathered as part of the NEPA process will be used to inform USACE's public interest review determination, required by 33 CFR Part 320.4. Information will also be used by the USACE to make a determination of the least environmentally damaging practicable alternative under the CWA's Section 404(b)(1) Guidelines and any appropriate required compensatory mitigation for unavoidable impacts to WOUS. No discharges of dredged or fill materials are permitted to be authorized by the USACE under the CWA if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. An EIS is used to inform the public and agency decision-makers, but it is not a decision document. A joint ROD by the USACE, BSEE, and USCG, issued at the conclusion of the NEPA process, will record each appropriate federal agency's decision(s); identify the alternatives considered in reaching those decision(s); and identify practicable means to avoid or minimize environmental harm (if required).
Clean Water Act Compliance—Alternative 3 with Concentrate Pipeline as LEDPA	Comments were received suggesting Alternative 3 with the concentrate pipeline variant as the LEDPA. • Eliminates the ferry crossing. • Avoids the McNeil River core bear habitat area. • Uses the already permitted port at Diamond Point. • The transportation corridor uses a portion of the existing road from Pile Bay to Williamsport.	Comment acknowledged; no change made to the EIS. Information gathered as part of the NEPA process will be used to inform USACE's public interest review determination, required by 33 CFR Part 320.4. Information will also be used by the USACE to make a determination of the least environmentally damaging practicable alternative under the CWA's Section 404(b)(1) Guidelines and any appropriate required compensatory mitigation for unavoidable impacts to WOUS. No discharges of dredged or fill materials are

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	• Least impact to Iliamna Lake communities. • Reduces spill risks.	permitted to be authorized by the USACE under the CWA if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. An EIS is used to inform the public and agency decision-makers, but it is not a decision document. A joint ROD by the USACE, BSEE, and USCG, issued at the conclusion of the NEPA process, will record each appropriate federal agency's decision(s); identify the alternatives considered in reaching those decision(s); and identify practicable means to avoid or minimize environmental harm (if required).
Clean Water Act Compliance—Comments on EPA Proposed 404(c)	USACE should not ignore comments on the Proposed 404(c) Determination (i.e., 2014 Bristol Bay Watershed Assessment). Comments received by EPA should be considered indicative of the public interest.	USACE solicited comments on the project via a public notice and during the comment period for the DEIS. USACE has considered all comments received during the public comment period. The EPA's Bristol Bay Watershed Assessment (BBWA) was based on conceptual mining scenarios, not the project. No change has been made to the FEIS as a result of these comments.
Clean Water Act Compliance—Compliance with 404(b)(1) Guidelines	Commenters stated that the DEIS fails to demonstrate that the Pebble Project will comply with CWA Section 404(b)(1) Guidelines, and that USACE must ensure compliance with the 404(b)(1) Guidelines before issuing a permit. It was further noted that the record must contain sufficient information to demonstrate that the proposed discharge complies with the requirements of Section 230.10(a) of the Guidelines.	The purpose of the EIS is to inform the USACE's decision under CWA Section 404(b)(1) Guidelines. The NEPA document does not include decisions reached in the CWA Section 404(b)(1) process on how proposed filling of wetlands would be consistent with CWA Guidelines, or the degree of significance of degradation per USACE regulations. This decision would be documented in the ROD. No change made to the FEIS.
Clean Water Act Compliance—DA Permit Should Be Denied	Commenter noted that the Clean Water Act generally states that no discharge of dredged or fill material shall be permitted 1) if there is a practicable alternative to the proposed discharge; 2) if the discharge causes or contributes to violations of applicable state water quality standards; 3) if the discharge will cause or contribute to significant degradation of the environment; or 4) unless all appropriate steps have been taken to minimize potential adverse impacts. Commenter asserted that the Pebble Mine will produce contaminated water that will violate applicable state water quality standards and cause significant adverse impacts to downstream ecosystems; and for these reasons, the 404 permit for the mine should be denied.	Comment acknowledged; no change made to the EIS. Decisions on the PLP's application for authorization to discharge dredged or fill material into WOUS will be documented in the ROD.

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Clean Water Act Compliance—DEIS Did not Address Significant Degradation	Commenters asserted that the DEIS should have addressed significant degradation to Waters of the US (WOUS). They also stated that project impacts would exceed the levels found by EPA in the 2014 Bristol Bay Watershed Assessment to amount to significant degradation of WOUS.	Whether a project causes significant degradation to WOUS is a determination made by the USACE as part of its 404(b)(1) analysis under the Clean Water Act. The USACE's determination regarding significant degradation to WOUS will be included as part of the 404(b)(1) analysis included in the Record of Decision. No change has been made to the FEIS.
Clean Water Act Compliance—Deny 404(c) Determination	Commenters expressed support for denying or removing the EPA's Proposed Determination to prohibit or restrict fill activities in the Bristol Bay watershed.	Comment acknowledged. The 404(c) process is separate from the USACE requirements to process PLP's permit application and prepare an EIS. No change has been made to the FEIS as a result of these comments.
Clean Water Act Compliance—EPA Should Fulfill their Oversight Responsibility	Commenters expressed that EPA needs to make sure the proposed project does not violate Section 404 of the Clean Water Act.	Comment acknowledged; no change was made to the EIS.
Clean Water Act Compliance—Explain Differences EIS/ BBWA	The DEIS should explain the differences in conclusions between the USACE EIS and the EPA Bristol Bay Watershed Assessment. Important topics would include fish and fish habitat and impacts of tailings dam failure.	The EPA Bristol Bay Watershed Assessment was prepared based on hypothetical mine scenarios. The USACE EIS was prepared based on the specific project proposed by PLP. The Watershed Assessment is used as a reference document for the EIS. No changes were made to the FEIS based on these comments.
Clean Water Act Compliance—Mine is Contrary to Public's Interest	Commenters expressed that a majority of the public oppose the mine, and that should be considered by USACE when conducting the public interest review.	The USACE will make a determination if the proposal is contrary to the public interest in the Record of Decision. USACE will consider all comments received in making a permit decision. No changes were made to the FEIS based on these comments.
Clean Water Act Compliance—PLP's Permit Application is Incomplete	Comments stated that PLP's permit application is incomplete and should be denied. The NEPA process should be suspended or terminated.	USACE has determined that PLP's permit application is complete. PLP has submitted modifications to their original permit application and such modifications are normal in the permitting and NEPA processes. The content of a complete application that compels the USACE to initiate the evaluation and review of applications is found in 33 CFR Part 325.1(d). No change has been made to the FEIS as a result of these comments.
Clean Water Act Compliance—Support for 404(c) Determination	Comments were received that expressed support for the EPA's proposed determination to prohibit or restrict fill activities in the Bristol Bay watershed.	The USACE is evaluating the impacts of PLP's project as required when the Section 10/404 permit application was filed by PLP. The EPA process under Section 404(c) is a separate process; no change made to the FEIS.

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Clean Water Act Compliance—USACE Did Not Determine LEDPA in DEIS	Commenter pointed out the USACE did not find the Applicant's Proposed Project as the Least Environmentally Damaging Practicable alternative (LEDPA) in the DEIS, nor did they explain why it would be the LEDPA.	The NEPA document is not a decision-making document; it discloses the potential impacts of the project and alternatives. The NEPA document provides the information to support the federal decisions. The identification of the LEDPA would be made in the ROD; no change made to the FEIS.
Clean Water Act Compliance—USACE Has Not Determined Water Dependency	USACE was required to determine water dependency in the DEIS, but failed to do so.	The NEPA document is a disclosure document that provides information to support the federal decisions. The federal decisions, including USACE's identification of the basic purpose and water dependency, which are part of the findings under the 404(b)(1) Guidelines, will be documented in the ROD; no change made to the FEIS.
Clean Water Act Compliance—USACE Should Adopt 2014 BBWA	Commenters expressed support for the 2014 EPA Watershed Assessment and argued that the USACE should adopt the findings of that report.	USACE is required to disclose the impacts of PLP's project in the EIS. The 2014 EPA Watershed Assessment was not prepared for a specific project, but information in the report was reviewed for relevant data and analysis. No change made to the FEIS based on these comments.
Climate Change (Includes GHG)—Climate Change (CC) Not Occurring in Alaska	A commenter asserted that the DEIS explicitly stated that climate change is not occurring in Alaska.	The DEIS did not explicitly state that climate change is not occurring in Alaska. Climate change analysis in the document is detailed in Section 3.1, Introduction to Affected Environment. A summary of climate change description and analysis in the document is provided in Section 4.1, Introduction to Environmental Consequences. No changes made to the EIS.
Climate Change (Includes GHG)—CC Project Area Impacts	Concerns were expressed about the impacts of climate change on resources or features in the EIS analysis area; impacts of climate change on the ecosystem; and how climate change impacts on various resources may be affected if the mine were to be permitted, constructed, and operated. Specific comments discussed concerns with changes in, and desire for more analysis on, precipitation, temperature, river levels, wildlife habitat, fisheries, wetland drying, water flow and quality, water temperature, winter travel condition changes, marine impacts, tundra vegetation change, and changes to entire food web pathways (including metal and polycyclic aromatic hydrocarbon uptake) and ecosystems. Commenters expressed that climate change should be discussed in every resource section in Chapter 3, Affected Environment; and Chapter 4, Environmental Consequences, and that prior studies in the region were inadequate.	Climate change was analyzed in sections of the EIS where quantitative or qualitative information and data are available to meet Council on Environmental Quality (CEQ) guidance in discussing climate change in an EIS. The framework and current guidance for discussing climate change in the EIS was provided in Section 3.1, Introduction to Affected Environment. One of the three ways in which climate change was discussed in the EIS was climate change impacts to the project area, also known as climate trends. Impacts to the project area from climate change, and how climate change would interact with the project, where applicable, are primarily discussed in specific resource sections of Chapter 3, Affected Environment. Discussion on climate change in Chapter 3 was updated based on comments for applicable sections. Additional analysis on climate change impacts to the project area was not conducted, and a specific climate change section was not added to every resource section in Chapter 3. See also SOC Climate Change—Fish Habitat Analysis. A summary of all climate change discussion in the document was updated in Section 4.1, Introduction to Environmental Consequences.

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Topic—Subtopic	Statement of Concern	Response
Climate Change (Includes GHG)—CC-Analysis Timeframe	The length of time for climate change analysis in the document was suggested to be the same length of time as project activities (approximately 25 years).	Climate change was analyzed in sections of the EIS where quantitative or qualitative information and data are available to meet CEQ guidance in discussing climate change in an EIS. The framework and current guidance for discussing climate change in the EIS was provided in Section 3.1, Introduction to Affected Environment. Two of the three ways in which climate change is discussed in the EIS is climate change impacts to the project area, also known as climate trends; and impacts to proposed project infrastructure from climate change. See SOC Climate Change—Project Area Impacts for discussion on climate change impacts to the project area concerns. Impacts to project infrastructure were discussed in specific sections of Chapter 4, Environmental Consequences. The timeframe for analysis of climate change impacts to the project area is generally the construction, operations, and start of closure phase; language was added to Chapter 4 to clarify the approximate timeframe under consideration, and to include information for all project components. Specific precipitation model timeframes are more clearly defined in Section 4.16, Surface Water Hydrology, where potential impacts to infrastructure from climate change are discussed. Discussion on climate change in Chapter 4 was updated based on comments, and to include information for all project components. Additional analysis on climate change impacts to the project area was not conducted, and a specific climate change section was not added to every resource section in Chapter 4.
Climate Change (Includes GHG)—CC-Cost	Commenters suggested that the social cost of carbon be included in the climate change analysis, or that a monetized estimate of emissions damage be included in the document.	Social cost of carbon or a monetized estimate of emissions damage was not analyzed in the document, because there is no CEQ guidance for this type of analysis. No change was made to the EIS.
Climate Change (Includes GHG)—CC-Cumulative Effects	Concerns were expressed that the analysis of cumulative effects on resources from climate change was inadequate.	Climate change was analyzed in sections of the EIS where quantitative or qualitative information and data are available to meet CEQ guidance in discussing climate change in an EIS. The framework and current guidance for discussing climate change in the EIS was provided in Section 3.1, Introduction to Affected Environment. One of the three ways in which climate change was discussed in the EIS was climate change impacts to the project area, also known as climate trends. Climate change as a cumulative effect was considered under this category, and discussed in a subsection if appropriate to the resource in Section 4.2 through Section 4.27. Discussion on cumulative effects of climate change in Chapter 4 was updated based on comments for applicable sections. Additional analysis on cumulative climate change impacts to the project area was not conducted, and a specific climate change section was not added to every resource section in Chapter 4. A summary of all climate change discussion in the document was updated in Section 4.1, Introduction to Environmental Consequences.

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Topic—Subtopic	Statement of Concern	Response
Climate Change (Includes GHG)—CC-Fish Habitat Analysis	Concerns were expressed on specific impacts of climate change on fish populations and fish and aquatic species habitat. Additional consideration on how future climate changes may affect salmon populations (impacts to genetic diversity [portfolio effect], impacts to habitat diversity, and changes in hydrology) should be included in the fish section of the document. Management of fish population under expected future climate scenarios should be analyzed in the document.	Suggested published references regarding salmon population genetic diversity in the region were considered in the discussion and analysis of fish and aquatic resources in Section 3.24 and Section 4.24, Fish Values. Language in discussion of changes to surface water hydrology was revised in Section 4.16, Surface Water Hydrology. Additional analysis or development of scenarios specific to fish population management scenarios were not included in the document. See also SOC Climate Change—Project Area Impacts.
Climate Change (Includes GHG)—CC-Infrastructure Impacts	Concerns were expressed about the impacts of climate change on project infrastructure and operations, including mining risks in general; transportation system effects; adverse waste effects of mine infrastructure; increases in natural disaster/disturbance events; and higher potential wildfire risk.	Climate change was analyzed in sections of the EIS where quantitative or qualitative information and data are available to meet CEQ guidance in discussing climate change in an EIS. The framework and current guidance for discussing climate change in the EIS was provided in Section 3.1, Introduction to Affected Environment. One of the three ways in which climate change was discussed in the EIS was the potential impacts of climate change on project infrastructure. Project infrastructure impacts were discussed primarily in Section 4.16, Surface Water Hydrology. See SOC Surface Water Hydrology—Climate Change, for specifics on how this section was revised. A specific climate change section was not added to every resource section in Chapter 4. A summary of all climate change discussion in the document was updated in Section 4.1, Introduction to Environmental Consequences. Consideration of mitigation measures for safety concerns that may increase due to climate change (such as wildfire potential) were added to Chapter 5, Mitigation.
Climate Change (Includes GHG)—Climate Change-General	General concerns were expressed about the document needing better climate change analysis, and that the reference documents were inadequate. Suggestions were given for additional analysis, along with citations to guide analysis.	Climate change was analyzed in sections of the EIS where quantitative or qualitative information and data are available to meet CEQ guidance in discussing climate change in an EIS. The framework and current guidance for discussing climate change in the EIS was provided in Section 3.1, Introduction to Affected Environment. A summary of all climate change discussion in the document was updated in Section 4.1, Introduction to Environmental Consequences. See other Climate Change SOCs and SOC Surface Water Hydrology-Climate Change.

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Topic—Subtopic	Statement of Concern	Response
Climate Change (Includes GHG)—Project Contribution to CC	Concerns were expressed that the document did not address the project's contribution to global climate change. Suggestions were given that the EIS should compare GHGs across all alternatives, and should do additional analysis on GHGs from every potential source of emissions, and from potential gas leaks.	Climate change was analyzed in sections of the EIS where quantitative or qualitative information and data are available to meet CEQ guidance in discussing climate change in an EIS. The framework and current guidance for discussing climate change in the EIS were provided in Section 3.1, Introduction to Affected Environment. One of the three ways in which climate change was discussed in the EIS was the project's contribution to GHG emissions. The contribution of the project to GHG emissions, and the context of the analysis performed, was discussed in Section 4.20, Air Quality. No additional analysis was conducted specifically to meet climate change concerns, because existing analysis met current guidance; however, Section 4.20 was revised based on air quality comments received. See the Air Quality SOCs for more details.
Climate Change (Includes GHG)—Wildlife-climate change impacts	Concerns were expressed that contaminant impacts may interplay with other stressors such as climate change to affect marine mammals (including their prey base) in the region. Concerns about the added stressor of climate change for Cook Inlet beluga whales may result in habitat loss or alteration, and a reduced prey base.	The EIS broadly assesses trends in climate change and how those trends may interact with potentials impacts from the project in Section 4.25 (including habitat loss and a reduced or altered prey base). The EIS has been updated to recognize how potential impacts to Cook Inlet beluga whales from climate change may be affected by the project.
Comment Period NOT Sufficient—Comment Period NOT Sufficient	Comments were received that the comment period was not sufficient and should be extended.	Comment acknowledged; no change made to the EIS.
Comment Period Sufficient—Comment Period Sufficient	Comments were received that the comment period was sufficient and should not be extended.	Comment acknowledged; no change made to the EIS.
Commercial Fisheries—Analysis Area	Commenters expressed concerns that the geographic area covered by the EIS is limited to the hydrologically connected areas of the potentially affected commercial fisheries. The EIS analysis area should be expanded to include areas in the marine and brackish environment important for rearing and residential habitats for fish involved in other commercial and recreational fisheries.	The analysis area provided in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries, is based on the analysis area of Section 3.24 and Section 4.24, Fish Values. No effects would be anticipated as a result of the project in brackish and marine environments in Bristol Bay; therefore, impacts are not analyzed for commercial fisheries that may rely on these areas for rearing and residential habitats. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Commercial Fisheries—Beneficial Impacts	Comments indicated the project would be beneficial for the commercial fisheries because it could bring down the cost of energy and allow the ability to flash-freeze fish.	The ability to flash-freeze fish in the affected commercial fisheries is already available and used. Lower energy costs could increase profit margins for processors and for permit holders by lowering operating costs and increasing ex-vessel payments. However, there is no commitment to expand natural gas distribution to the areas where processors are located, and no commitments to provide energy to the region from the project. No changes were made to the EIS analysis.
Commercial Fisheries—CF Permit Loss	Comments noted that the Bristol Bay Economic Development Corporation (BBEDC) Permit Loan Program extends beyond the BBEDC region to watershed communities beyond the geographic boundaries of the Community Development Quota (CDQ) program.	Section 3.6, Commercial and Recreational Fisheries, has been edited to clarify that permit loss is greater for communities outside the BBEDC region even though these communities are included in the BBEDC Permit Loan Program.
Commercial Fisheries—Cost-benefit analysis	Commenters were concerned that there has been no cost-benefit analysis done to compare the value of the fisheries with the project.	NEPA guidance at 33 CFR Part 325 Appendix B.9 states "The Corps shall not prepare a cost-benefit analysis for projects requiring a Corps permit." Impacts to the commercial fishery from potential for reduced harvest or reduced fish values from impacts to the brand are discussed in Section 4.6, Commercial and Recreational Fisheries. The EIS analysis does not predict detectable impacts to returning fish, and therefore no measurable reduction in the number of fish available for commercial or other harvests. It also does not indicate that there would be a reduction in value of harvested fish; therefore, comparing the value of the project with the value of the fisheries is not appropriate because there would not be a tradeoff. No changes were made to the EIS analysis.
Commercial Fisheries—EPA-Update to 2018 information	The commenter requested that the affected environment for commercial fisheries (Section 3.6, Commercial and Recreational Fisheries) be updated to include 2018 harvest, price, and value information, instead of using data for the years 1998-2017.	The document has been updated with a paragraph describing the 2018 season and the preliminary results of the 2019 season. However, fully updating the affected environment section to include 2018/2019 data and shifting the 20-year retrospective period used in the analysis would entail significant work without enhancing readers' understanding of the fishery or resulting in any changes to the analytical results.
Commercial Fisheries—Ferry operations	Commenter expressed concern that the proposed ferry operations associated with Alternative 2 are far riskier than the all-land route, and puts Iliamna Lake at ecological risk. The analysis should include discussion of the value of the fishery at the northern end of Iliamna Lake.	Comment acknowledged. Risks to the Iliamna Lake fisheries associated with all alternatives are analyzed in Section 4.6, Commercial and Recreational Fisheries, and Section 4.27, Spill Risk. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Commercial Fisheries—Fishery Management Plans	Commenter suggests that the document include an extended and detailed discussion, and comprehensive analysis of, fishing area management plans for both Bristol Bay and the Lower Cook Inlet.	Section 3.6, Commercial and Recreational Fisheries, has been updated to include a description of the investments made by the State of Alaska into the long-term health of fishery resources, including efforts such as the Board of Fish process, genetic testing and other biological research, management plans to provide regulatory structure across a variety of productivity scenarios, in-season management of the fishery, post-season summary and analysis of each year's fishery, and pre-season estimation of the upcoming year's fishery.
Commercial Fisheries—Impacts—General	Comments expressed concern that general impacts to commercial fisheries were not addressed.	Impacts to the commercial and recreational fisheries are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries. No changes were made to the EIS.
Commercial Fisheries—Impacts from Spills	Comments expressed concern that the EIS does not sufficiently address impacts to commercial fisheries in the event of a spill or tailings dam failure. Commenters are also concerned about brand damage, especially in the event of a catastrophic tailings dam failure.	Impacts to commercial fisheries from a concentrate spill, fuel spill, or tailings dam failure are discussed in Section 4.27, Spill Risk. The section acknowledges and identifies potential impacts associated with spills and catastrophic failure. No changes were made to the EIS as a result of these comments.
Commercial Fisheries—Impacts-Economic Impacts Not Adequately Addressed	Concerns were expressed that the DEIS did not adequately address the potential economic impact on the commercial fishing industry, including direct jobs, related jobs, wages, revenues, and taxes.	Impacts to commercial fishing are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries. Information presented includes the value of fisheries to the economy, as well as participation. Under normal operating conditions, the EIS concludes that the alternatives would not be expected to affect fish habitat and population levels to the extent that there would be a discernible effect on the health or value of the Bristol Bay salmon fishery, including permit holder earnings, permit holder value, crew earnings, fishery first wholesale values, vessel owners, processor earnings, or local fiscal contributions. The EIS further identifies how action alternatives could affect commercial fishing near port sites in Lower Cook Inlet. No changes were made to the EIS analysis.
Commercial Fisheries—Impacts- King Salmon Population	Commenter expressed concern that given the number of King salmon which spawn in the Koktuli river, the Spill Risk section should indicate that a spill in this area "would" affect commercial fishing instead of "could" affect commercial fishing.	The use of the term "could" in this case is appropriate, because effects are dependent on the magnitude, timing, and duration of a spill event. The use of the term "would" implies that a spill event will result in juvenile or spawning King salmon losses that will then definitely reduce harvest levels by commercial fishermen. The EIS does not establish this direct of a link, particularly in the case of smaller spills of limited magnitude occurring at times of the year when such a spill might not reach the Koktuli river system. Therefore, the use of "could" is most appropriate in this instance. No changes were made to the EIS.

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Commercial Fisheries—Impacts- Natural Gas Pipeline	Comments expressed concern that the language in the DEIS was not clear enough and did not adequately convey potential impacts with respect to the west Cook Inlet/Bristol Bay portion of the natural gas pipeline.	Section 4.6, Commercial and Recreational Fisheries, was edited to clarify the language was referring to the pipeline from the port into the Bristol Bay Watershed, and was adjusted to acknowledge the potential effect of construction activities on these streams. Long-term effects are not expected, given historic experience in Alaska with anadromous streams and sub-service pipelines.
Commercial Fisheries—Inadequate Analysis	Commenters expressed concern that the DEIS does not consider a wider variety of impacts to the analysis in Section 4.6, Commercial and Recreational Fisheries. The analysis does not include the kinds of impacts that would happen to fish or fish habitat as a result of the project.	Section 4.6, Commercial and Recreational Fisheries, relies on the information presented in Section 4.24, Fish Values, which estimates that the project would not have measurable effects on the number of adult salmon returning to the Kvichak and Nushagak river systems. The impacts to commercial fishing are discussed in Section 4.6, Commercial and Recreational Fisheries. Information presented includes the value of fisheries to the economy, as well as participation. Under normal operating conditions, the EIS concludes that alternatives would not be expected to affect fish habitat and population levels to the extent that there would be a discernible effect on the health or value of the Bristol Bay salmon fishery, including permit holder earnings, permit holder value, crew earnings, fishery first wholesale values, vessel owners, processor earnings, or local fiscal contributions. No changes were made to the EIS analysis.
Commercial Fisheries—Inadequate Analysis—Existing Conditions	Commenters expressed concern that the discussion of existing conditions does not fully reflect/describe the value of Bristol Bay salmon fisheries for current or historic conditions.	The value and role of Bristol Bay salmon fisheries is described in Section 3.6, Commercial and Recreational Fisheries. Additional information was included in this section regarding historical participation and seasonal employment.
Commercial Fisheries—Inadequate Analysis- National Econ. Cont.	Commenters expressed concern that discussions of the economic value of the fishery were too limited to Bristol Bay and did not include enough of a regional/national perspective on the economic value of the fishery.	A discussion of the geographic distribution of the economic value of the fishery has been added to follow the discussion of geographic distribution of permit ownership in Section 3.6, Commercial and Recreational Fisheries. This discussion includes employment estimates by state of residence from Knapp, Guettabi, and Goldsmith 2013.
Commercial Fisheries—Lower Cook Inlet	Commenters expressed concerns about the impacts analysis for the Lower Cook Inlet Weathervane Scallop, Pacific Herring roe, and salmon fisheries.	Existing conditions and impacts for these fisheries are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries, respectively, while spill risk is discussed in Section 4.27, Spill Risk. Neither the Weathervane scallop fishery or the Pacific Herring fishery are currently active fisheries, with the last harvest in the scallop fishery taking place in 2012, and in 1999 for the Pacific Herring fishery. The

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		EIS identifies the potential for an impact to these fisheries; however, estimating the magnitude and extent of impacts for fisheries without recent data or indications of a foreseeable reopening is outside the scope of a NEPA analysis. New text was added to the document in response to information provided by commenters regarding the Kamishak Bay purse seine fishery for salmon.
Commercial Fisheries—Permit Earnings and Values	Commenter noted that the term "permit value" was used in place of the term "permit holder earnings" in Section 3.6, Commercial and Recreational Fisheries.	Section 3.6, Commercial and Recreational Fisheries, has been modified to ensure the correct usage of the term "permit holder earnings." Text and a figure have been added to the section to discuss permit values and prices.
Commercial Fisheries—Reputation and Branding	Concerns were expressed that the DEIS did not consider the impacts to the reputation of the Bristol Bay fishery and branding of the fish. There were concerns that if the project were to go forward, the fishery's current reputation would diminish.	Impacts to the Bristol Bay branding and reputation of the commercial fishery are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries. The section has been expanded to include information from additional sources, although the new information does not warrant a change to the conclusions.
Commercial Fisheries—Reputation and Branding- No Effect	Commenter expressed that the Pebble Mine will not affect the brand and reputation of Bristol Bay salmon because there is no Bristol Bay brand.	The issues of fisheries reputation, consumer willingness to pay, and brand power/value are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries. This section has been updated based on comments and new information received during the public comment period.
Commercial Fisheries—Visuals	Commenter suggested revising Figure 3.6-10, Figure 3.6-11, and Figure 3.6-13 in Section 3.6, Commercial and Recreational Fisheries, to include project components. Commenter also requested adding percentages of active permits to Figure 3.6-6, a bar chart. Finally, the commenter suggested adding angling days and statewide harvest survey information for waterbodies to Table 3.6-9 and Table 3.6-10, and including a map showing the location of these waterbodies.	The requested figures have been updated with project components. Because the number of permits is essentially fixed, the number of permits is a proxy for the percentage of active permits. Therefore, Figure 3.6-6 already does show the number of active permits by year. A footnote has been added to the bar chart for context.
Cultural Resources—Additional clarification	Section 4.7, Cultural Resources, should clarify the use of "short-term" and "historical integrity," and explain how data gaps will be filled.	Section 4.7, Cultural Resources, has been edited for clarity in the use of the mentioned terms and expanded to include a description of what identification work has been done since the release of the DEIS; identification of remaining data gaps, and how the information available was used to compare alternatives is discussed.

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Cultural Resources—Amakdedori	The village site, cabins, and trails have significant personal and cultural values to residents in the area. Others have indicated relatives buried in the area. Amakdedori is also the location of current cultural learning camps and school field trips for students in Kokhanok. This feedback suggests that there are more cultural resources near the Amakdedori port than have been identified, and indicates that further consultation and field studies could result in the identification of more cultural resources in this area. Commenters' recommendations include surveying 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 was done to locate the known existing grave sites and other cultural properties; and having a cultural resources monitor and tribal representative be on-site during surveys.	To comply with responsibilities under National Historic Preservation Act (NHPA) Section 106 and the Alaska Historic Preservation Act (AHPA), PLP contracted HDR to conduct a cultural resources investigation of the Amakdedori port site in the summer of 2018. The study area encompassed all construction, staging, and construction access routes for the project. During the pedestrian survey, HDR archaeologists walked parallel transects spaced at 15-meter intervals throughout the entirety of the study area. The methodology was approved by ADNR Office of History and Archaeology (OHA). To that end, a reasonable and good faith effort toward resource identification was met, as were State Historic Preservation Office (SHPO) Guidelines. Recommended nonintrusive techniques (such as ground-penetrating radar) are not standard identification methods at this level of an investigation, and can be applied later, as appropriate. Section 3.7, Cultural Resources, has been updated with relevant identification information.
Cultural Resources—Analysis Area	The EIS analysis area for Section 3.7 and Section 4.7, Cultural Resources, should be 5 miles around the project components, and expanded to include areas further downstream of the mine site.	The EIS analysis area for cultural resources is the project footprint for direct effects, and lands within 3 miles of the mine site and within 1 mile of the other project components (i.e., port sites, transportation corridors, and ferry terminals) for indirect impacts. This geographic area allows for the consideration of potential direct and indirect impacts on cultural resources from the project. Refer to Section 4.11, Aesthetics, for information on visual distance zones, and Appendix K4.11 for project viewshed figures. The primary analysis area has not been expanded from the DEIS, although a qualitative discussion in 3.7, Cultural Resources, has been added for potential spill areas, and cultural resources have been added to 4.27, Spill Risk. No edits were made to the document.
Cultural Resources—ANCSA 14(h)(1)	The FEIS should include Alaska Native Claims Settlement Act (ANCSA) 14(h)(1) sites in and near the area affected by the Pebble Project.	There are no ANCSA 14(h)(1) patented or selected parcels in the EIS analysis area. According to available land status data, the nearest ANCSA 14(h)(1) patented site is approximately 38 miles southwest of the mine site. The nearest site selected but not patented is 30 miles northeast of Diamond Point. Section 3.7, Cultural Resources, has been edited to include this information. Informational reports that were submitted have been reviewed, and it was determined that they did not contain new information from what had been previously reviewed and incorporated.

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Cultural Resources—Baseline Data	Commenters had concerns that there has been limited field work in the area to fully identify cultural resources, and that the studies that do exist do not cover the entire project area. The data in the EIS should be updated to include information gathered since the DEIS.	Information presented in Section 3.7, Cultural Resources, is based on a variety of information sources, including a review of data on file at the Alaska Heritage Resources Survey and the Bureau of Indian Affairs, cultural resource reports, and data sets from subsistence harvest areas. Cultural resources survey reports prepared for the PLP between 2004 and 2013 by Stephen R. Braund and Associates (SRB&A) contain information about cultural resource features derived from interviews of local informants from the villages near the project area. Some data have been refined from the DEIS (see PLP 2019-RFI 113). These various information sources cover the entire project area for all alternatives. Additional studies have been conducted in the 2019 field season for cultural resource identification and are incorporated into the FEIS in Section 3.7 and Section 4.7, Cultural Resources. Further field studies would occur if the project was permitted, through the time of final design and prior to construction, in accordance with the Programmatic Agreement.
Cultural Resources—General Impacts	Concern was expressed about the adverse effects discussed in Section 4.7, Cultural Resources. Adverse effects to cultural resources represent disruptions to the relationship between the people and the natural and cultural resources, and could impact the current and continuing health and vitality of their cultures.	Text has been added to Section 3.7, Cultural Resources, to include the relationship between people and natural and cultural resources. The FEIS discloses the potential impacts to cultural resources under all alternatives for the project in Section 4.7, Cultural Resources. Impacts to historic properties that are discussed have been moved from Section 4.8, Historic Properties, and incorporated into Section 3.7, Cultural Resources. No changes made to the document as a result of this comment.
Cultural Resources—Important sites	The project footprint would be located on top of or near important cultural resources, such as archaeological sites, traditional use areas, cultural landscapes, place names, trails, cabins, burial sites, battle sites, and shipwrecks.	Impacts to cultural resources are evaluated in Section 4.7, Cultural Resources. Potential impacts to historic properties are evaluated in Section 4.8, Historic Properties. As part of the process required by Section 106 of the NHPA, the USACE must consider the effects of the project on historic properties. Additional information received regarding cultural resources or historic properties has been considered and incorporated into the analysis in the FEIS.
Cultural Resources—Inadequate Analysis	The DEIS did not adequately address the direct, indirect, and cumulative impacts to cultural resources, including subsistence practices and the cultural value of fish, traditional use areas, and the fact that many cultural resources are dynamic. Although there is a time horizon for the mine, the damage to cultural resources may not always be restorable to pre-project	Section 3.7, Cultural Resources, has been expanded to include the cultural value of other resources, such as fish, water, and traditionally important areas. The relationship between subsistence and culture has also been expanded on in this section. The relationship between subsistence and culture is also described in Section 3.9, Subsistence, and impacts to subsistence are discussed in Section 4.9, Subsistence.

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	conditions. There should be more analysis of the result of a spill or tailings dam failure.	Information has been added to Section 3.7, Cultural Resources, to explain that additional regulations and executive orders are being considered in the USACE permit decision-making process. Impacts to cultural resources are discussed in Section 4.7, Cultural Resources, which describes some permanent impacts to some cultural resources as a result of construction in the project footprint. The terms direct, indirect, and cumulative impacts have been clarified. Section 4.27, Spill Risk, has been expanded to include potential impacts to cultural resources in the event of the spill scenarios presented, including a tailings dam failure.
Cultural Resources—Modeling Methodology	Section 3.7, Cultural Resources, should explain the creation and composition of the model for high and low potential of archaeological site location model, since it will be used in later analyses. The USACE needs to be explicit in describing that it relies on geographic information system (GIS) data for wetlands and slope only.	A description of the archaeological site potential model has been added to Section 3.7, Cultural Resources. The model that was used helps establish areas of low or moderate to high potential for archaeological sites. The model used wetlands and slope data to determine areas where there would be low potential for the existence of an archaeological site. The model is intended to help inform agencies and identify areas where additional archaeological surveys may be appropriate, and inform the level of effort of surveys. It is not intended to identify a comprehensive list of cultural resources. A more deductive model is being developed as part of the NHPA Section 106 process that will help guide field efforts as the project progresses.
Cultural Resources—Traditional Use Areas	The cultural resources section of the DEIS does not include traditional use areas from the subsistence section as cultural resources. The EIS should analyze traditional use areas, documented as part of subsistence research, in Section 3.7, Cultural Resources, under the cultural resource impact criteria.	Traditional use areas may encompass a wide variety of uses by residents of communities in the area of the Pebble Project. These uses may include subsistence harvest of fish, wildlife, and plant material; areas of community or family cultural importance; transportation routes between communities and used to access subsistence resources; and recognized areas of spiritual, historic, and cultural importance, among others. They may be identified in a variety of sources, including Alaska Department of Fish and Game (ADF&G) subsistence reports, Pebble Project Environmental Baseline Studies, and interview-identified cultural resources conducted by SRB&A for the project. Information on traditional use areas are discussed as appropriate in relevant sections of the FEIS, including Section 3.7 Cultural Resources, and Section 3.12, Transportation and Navigation. Section 3.9, Subsistence, describes contemporary use areas. The document was not edited as a result of these comments.

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Cumulative Effects Analysis—Amakdedori indirect impacts	The indirect effects of developing a port facility at Amakdedori need to be discussed in more detail, such as increased air traffic using the permanent port site airstrip, impacts to listed species; increased vessel traffic in Kamishak Bay and in the Gulf of Alaska; increased human presence in the area altering the landscape (increases in marine debris; illegal hunting/ shooting wildlife; recreational activities; marine species entanglement in anchor lines/mooring buoys/mooring at lightering location; and dredging.	Additional information has been added in relevant sections of Chapter 4 regarding the indirect impacts of developing a port facility at Amakdedori. Dredging is not proposed at Amakdedori.
Cumulative Effects Analysis—Assess temporary or soft closure	The cumulative effects assessment must assess temporary or soft closures caused by suspension of operations such as sale or bankruptcy.	The potential for temporary closure is described in Chapter 2, Alternatives, and is a scenario discussed in the draft Reclamation and Closure Plan (PLP 2019-RFI 115). A temporary closure scenario would not be considered a cumulative effect. No changes were made to the document.
Cumulative Effects Analysis—compounding factors not considered	The DEIS does not address factors that compound impacts, such as additive effects of project and ecosystem components, with the exception of addressing climate change. The DEIS assumed that all stresses associated with the Pebble project occur independently, and do not amplify each other's effects on ecosystems. This assumption ignores decades of research and assessment of the effects of similar projects that show clearly that the effects of mines involve multiple stressors that typically interact with one another and amplify the risks that each individual stressor creates on its own.	When evaluating the potential cumulative effects associated with past, present, and RFFAs, the relationships and compounding factors were considered, along with the potential duration of effects. For example, the contributions of water quality and stream flow were incorporated and discussed in the analysis of effects on fish and aquatic habitat. Similarly, the potential impacts on fish populations and distribution and potential changes in access were considered in the analysis of potential effects on subsistence. Additional language has been added to Section 4.1, Introduction to Environmental Consequences, to clarify relationships between resources and the potential for compounding factors.
Cumulative Effects Analysis—consider longer impact timeframe	The DEIS should consider a time period longer than 50 years. The environmental impacts of this project will persist beyond the period of mine operations, and the DEIS fails to consider post-closure impacts.	The FEIS evaluates potential direct, indirect, and cumulative effects for the period of construction, operations, closure and post closure. The duration of potential effects may vary based on individual resources, and is disclosed in the document. No changes were made to the EIS.
Cumulative Effects Analysis—Consider with Donlin Gold (CE)	Commenters requested that the cumulative effects to fisheries for the Pebble Project EIS be considered along with the impacts to fisheries from the Donlin Gold project.	Donlin Gold is one of the RFFAs considered in the FEIS cumulative effects analysis. The Donlin Gold project would have no effects on Bristol Bay fisheries. No changes were made to the EIS.
Cumulative Effects Analysis—contradicts past conclusions	Conclusions on cumulative impacts contradict past agency conclusions and reports, and the USACE should refrain from contradicting past agency findings and imply that the project is permittable.	The USACE evaluates the potential impacts of the specific project as proposed by the Applicant in their permit application, including cumulative impacts. The analysis of cumulative impacts was based on: 1) a specific mine expansion scenario based on Request for Information 62 (PLP 2018-RFI 062); and 2) a systematic evaluation of potential RFFAs. The USACE is not constrained by previous analyses that were conducted by other agencies for other purposes.

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		For example, the EPA's BBWA was prepared for a different purpose, and analyzes a hypothetical project, whereas this FEIS analyzes the specific project proposed by the Applicant. In addition, the BBWA relies on different assumptions and assessments regarding development of the Pebble deposit and likelihood of other mining projects advancing; the assessment of potential cumulative impacts in the FEIS reaches a different conclusion. Additional information has been added to Section 4.1, Introduction to Environmental Consequences, of the FEIS.
Cumulative Effects Analysis—cumulative effects not adequately addressed	The EIS does not adequately address cumulative effects of developing the Pebble Project. Because the impacts of the 78-year mine are discussed separately in each subsection of Chapter 4 in the DEIS, it is difficult for the reader to form a holistic understanding of the much larger impacts and risks posed by the larger mine. In addition, there is no indication in the EIS how monitoring and compliance will be enforced.	The cumulative effects of past, present, and RFFAs are analyzed in Chapter 4 of the EIS. Section 4.1, Introduction to Environmental Consequences, identifies and screens potential past and present actions and RFFAs to be carried forward in the analysis of cumulative effects. A wide range of past, present, and proposed mining activities were evaluated, including those listed in the EPA Bristol Bay Watershed Study. Cumulative effects were analyzed for each alternative for each resource in Chapter 4, including the Pebble Mine Expansion Scenario. Additional information has been added to Table 4.1-2 with regard to details and assumptions for Pebble Mine expansion, and additional quantification of Pebble Mine expansion has been developed and incorporated under pertinent resources.
Cumulative Effects Analysis—cumulative effects of Alts 2 and 3 mitigated	Comments were received that stated that the cumulative effects of Alternative 2—North Road and Ferry or Alternative 3—North Road Only would be much less than then Alternative 1—Applicant's Proposed Alternative.	Comment acknowledged. No changes were made to the EIS.
Cumulative Effects Analysis—cumulative effects of dewatering	The reasonably foreseeable future action for the Pebble Mine buildout scenario analyzed 55 percent of the resource, but did not analyze the cumulative effects of additional dewatering in the project area.	The cumulative effects of additional dewatering in the project area under the Pebble Mine expansion scenario are analyzed in Section 4.17, Groundwater; Section 4.18, Water and Sediment Quality; Section 4.22, Wetlands; and Section 4.24, Fish Values. No change was made to the EIS as a result of this comment.
Cumulative Effects Analysis—cumulative effects of dust	The revised DEIS must include a cumulative effects analysis to assess potential effects of pollutants associated with fugitive dust, including known landscapes that dust will affect, pathways by which dust and dust-associated pollutants will directly or secondarily enter waterways, biological effects on aquatic ecosystems and wildlife, and likely bio-geochemical cycling of those pollutants in the receiving environment.	The FEIS assesses the potential effects of pollutants associated with fugitive dust, in the context of review of dust control measures proposed by PLP (PLP 2019, Response to RFI 134). Based on the review of dust control measures, additional discussion of potential cumulative effects of dust has been added to Section 4.14, Soils, Section 4.18, Water and Sediment Quality, Section 4.23, Wildlife Values, and Section 4.24, Fish Values.

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Cumulative Effects Analysis—cumulative effects on aquatic resources	The USACE must make a determination of the nature and degree that the proposed discharge will have individually and cumulatively on the aquatic ecosystem; they are discussed in general terms with little or no evaluation of these impacts, such as how many stream miles would be lost due to the expanded mine scenario, or whether the acres of aquatic resources potentially affected includes both direct losses and functional degradation from secondary/indirect effects, what type of aquatic resources and functions would be lost or degraded, or the severity or significance of these impacts.	Additional quantification of the expanded mine scenario has been provided in Section 4.17, Groundwater Hydrology, Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, and Section 4.24, Fish Values, of the FEIS, supported by information provided in Table 4.1-2.
Cumulative Effects Analysis—cumulative effects on EFH	The 78-year expanded mine scenario does not address cumulative effects on Essential Fish Habitat (EFH).	EFH is a subset of overall fish habitat. Section 4.24, Fish Values, of the FEIS addresses direct, indirect, and cumulative effects on fish habitat, which includes EFH. No changes to the document based on this SOC.
Cumulative Effects Analysis—Cumulative impacts of spills	The cumulative effects analysis for the expanded mine case evaluated in the DEIS contains insufficient detail on potential spills; understates the impacts of a larger mine; and in some cases, its conclusions are clearly wrong. The mine would also need to manage five times more tailings and one hundred times more waste rock with an associated increase in the risk of catastrophic containment failure. The DEIS grossly underestimates the potential for accidents and spills that could occur throughout the project area, and potentially pose population-level effects to Cook Inlet, virtually the entire Kvichak watershed, and at least the eastern third (or so) of the Nushagak drainage.	Additional discussion of the potential impacts from the expanded mine scenario of spills of tailings, other mine waste, untreated water, and fuel has been included in Section 4.27, Spill Risk.
Cumulative Effects Analysis—cyanide use in mine expansion	Commenters asserted that PLP/Northern Dynasty Minerals (NDM) have indicated that cyanide would be used at the project in the future and should be analyzed in the EIS.	PLP has stated that cyanide will not be used in the project as proposed. However, PLP did not rule out use of cyanide in the details of the scenario for expansion of the Pebble Mine provided in the response to RFI 062a. Therefore, the potential use, transport, storage, and treatment of cyanide is now analyzed under cumulative effects, and has been added to the assumptions associated with Pebble Mine expansion in Table 4.1-2.

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Cumulative Effects Analysis—Economic feasibility of expansion	The DEIS lacks the information that would be needed to assess the likelihood of expansion. In particular, there is no information regarding the expected cost or profitability of the project, the expected expansion, or the five additional expansions. If by undertaking the project the expansion scenarios become economically feasible, then by definition, they are reasonably foreseeable, and their cumulative effects must be evaluated.	For the purpose of the EIS, USACE has determined that expansion is reasonably foreseeable; an expansion scenario has been developed, and the cumulative effects are evaluated. No change to the EIS. See also the SOC NEPA Process—Economic Feasibility Study.
Cumulative Effects Analysis—exceeds EPA thresholds	Habitat degradation exceeds the EPA thresholds for unacceptable adverse effects in the preferred alternative, and by up to threefold for loss of wetlands in the full development scenario. Environmental effects accumulate because an ecosystem does not have time to rebound from the impacts of the initial project; an ecosystem is much more likely to rebound after 20 years than 100 years. In 2014, EPA stated that the science is clear that mining the Pebble deposit would cause irreversible damage to one of the world's last intact salmon ecosystems. The EPA declared that the impacts to salmon habitat from even the smallest mine scenario would be "unprecedented for the Clean Water Act Section 404 regulatory program in the Bristol Bay region, as well as the rest of Alaska and perhaps the nation." Adequate environmental safeguards would be needed to avoid harming aquatic resources. These acknowledgements cannot be squared with the DEIS's pronouncement that there will be no "long-term, measurable effects" on Bristol Bay salmon.	The USACE evaluates the potential impacts of the specific project as proposed by the Applicant in their permit application, including cumulative impacts. The analysis of cumulative impacts was based on 1) a specific mine expansion scenario based on RFI 62; and 2) a systematic evaluation of potential RFFAs under the guidance. The USACE is not constrained by previous analyses that were conducted by other agencies for other purposes. No change to the EIS.
Cumulative Effects Analysis—expanded mine scenario description	The expanded mine development scenario (Pebble Project Expansion RFFA in Table 4.1-1) needs additional description to understand the scenario, and to assess impacts, including quantification (e.g., waste rock, ore volumes), assumptions and associated limitations, clarity of components, and information on the magnitude and duration of potential impacts. Specific information was requested, including graphics and figures of the expansion scenario that show the full extent, including location and routing of pipelines and roads; information on total area and depth of excavation; clarity on all assumptions applied to the scenario, including type of traffic; quantified spatial and temporal metrics to compare alternatives and to compare the scenario to the project; and that analysis should follow the expansion concept in the EPA BBWA (EPA 2014).	Expansion of the Pebble Mine has been determined to be an RFFA, and a potential scenario for expansion and associated assumptions are presented in Section 4.1, Introduction to Environmental Consequences, and Table 4.1-1 and Table 4.1-2. As a potential scenario for future expansion, no additional detailed information on design and location are available at this time. A greater level of detailed information would be developed at a future date if a decision were made to expand the mine, and would be required for any future permit applications associated with expansion. Additional available information has been added to the description of the mine expansion scenario in Section 4.1, including quantities where available and additional graphics. Additional information on the magnitude and duration of potential cumulative impacts has been added to the FEIS where appropriate in each of the affected resource environmental consequences sections. See also SOC Cumulative Effects Analysis—impact metrics and detail.

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Cumulative Effects Analysis—geochemical risk	Key mischaracterizations in the cumulative effects analysis include: Geochemical Risks. Given Pebble's extremely wet climate, all of this waste would pose an extremely high acid rock drainage (ARD) risk to downgradient groundwater, streams, and rivers. If not controlled, the resultant ARD could have metals concentrations hundreds to tens of thousands of times higher than discharge criteria. Given the large increase in chemically reactive rock mass and surface area, and the decades-longer exposure period of pit walls, waste rock, and tailings before closure, net on-site contaminant release rates are almost certain to be an order of magnitude higher than for the 20-year mine. If actually implemented as designed in the DEIS, the 20-year mine plan also confines most of the geochemical risks to a single drainage (North Fork Koktuli [NFK]); but in the expanded case, geochemical risks would spread into all three drainages (NFK, South Fork Koktuli [SFK], and UTC). Despite this order of magnitude, long-term increase in geochemical risk it is not clearly highlighted; and in some cases, is significantly understated in the cumulative effects descriptions.	As with the Applicant's Preferred Alternative, design, construction, operation, and closure would be subject to rigorous state and federal permitting requirements, and the EIS assumes discharges would not exceed permit limits, as discussed in Section 4.17, Groundwater Hydrology, and Section 4.18, Water and Sediment Quality. The same assumptions apply to impact analysis for expanded development of the Pebble Mine. It is correct that a portion of the expanded waste rock facility would be located in the UTC watershed, and additional text was added to Section 4.16, Surface Water Hydrology to address this. However, a comparison between the increased volume of waste rock/ tailings and exceedances of permit limits is not scientifically or statistically supported.
Cumulative Effects Analysis—ignores cumulative effects on ecosystems	Concerns were expressed that the DEIS did not reflect a basic understanding of ecological interactions and ignored the body of work concerned with the cumulative effects of mines on ecosystems.	The FEIS evaluates the potential direct, indirect, and cumulative effects of ecosystem components and takes them into account when analyzing ecosystem impacts to specific resources such as bears, fish, vegetation, and subsistence/commercial/recreation use of fish and wildlife. The analysis includes the review of pertinent literature on mining impacts on ecosystems. No change was made to the EIS.
Cumulative Effects Analysis—impact metrics and details	Metrics and references should be provided for cumulative impact statements and conclusions. Quantified numbers should be provided to assess impacts.	Additional discussion of the quantitative magnitude of potential cumulative effects from the mine expansion scenario has been included in the pertinent resource sections of Chapter 4, including additional analysis to quantify acreage and miles of direct stream impact. Additional references have also been included where appropriate. A greater level of detailed information would be developed at a future date if a decision were made to expand the mine, and would be required for any future permit applications associated with expansion. Additional available information has been added to the description of the mine expansion scenario in Section 4.1, including quantities where available and additional graphics. Additional information on the magnitude and duration of potential cumulative impacts has been provided where appropriate in each of the affected resource environmental consequences sections. See also SOC Cumulative Effects Analysis—expanded mine scenario development

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Cumulative Effects Analysis—Impacts from similar mines	Concerns were expressed that the DEIS failed to evaluate similar mines in projecting direct, indirect, and cumulative effects.	The Subject Matter Experts (SMEs) responsible for writing specific sections of the EIS have experience with historic and currently operating mines in Alaska, the continental US, and worldwide. When projecting direct, indirect, and cumulative effects, SMEs have incorporated their technical expertise and experience with other mining projects, along with review of impact assessments and technical reports on other relevant mining projects, including those with similar design characteristics and regulatory requirements (EPA 2009b, Red Dog Mine Extension Aqqaluk Project Final Supplemental Environmental Impact Statement; USACE 2018d Donlin Gold Project Final Environmental Impact Statement (FEIS); USDA Forest Service 2019 Resolution Copper Project and Land Exchange DEIS). No change was made to the EIS.
Cumulative Effects Analysis—impacts from transportation access	The DEIS mostly fails to account for many reasonably foreseeable actions that would likely result from the proposed transportation corridor road into a large roadless region that is rich in natural resources.	The analysis of potential RFFAs in Section 4.1, Introduction to Environmental Consequences, follows NEPA guidance, and provides a rationale for future actions that are considered reasonably foreseeable and those that are not. No change was made to the EIS.
Cumulative Effects Analysis—Impacts of block caving on groundwater	Impacts to groundwater quality must be assessed for block caving under the expanded mine scenario.	The expanded mine scenario assumes open pit mining techniques. During permitting for mine expansion, if it occurs, the mine operator would be required to evaluate alternatives, and it is likely that underground mining techniques such as block caving would be considered. No change was made to the EIS.
Cumulative Effects Analysis—Impacts of full mine expansion	The EIS should evaluate the impacts of full development of the Pebble deposit.	The USACE is required to review the proposed action as described in an Applicant's permit application. NEPA requires direct, indirect, and cumulative impacts of the action alternative and other alternatives to be assessed in the EIS. Direct and indirect impacts are assessed on the description of the proposed action and other alternatives carried forward in the EIS. Cumulative effects are interactive, synergistic, or additive effects that would result from the incremental impact of the action when added to other past or present actions, and assessed in the context of RFFAs. The USACE has determined that expansion of the Pebble Mine, as originally described in the Wardrop 2011 Preliminary Assessment Technical Report and refined in the response to RFI 062 (PLP 2018-RFI 062), is an RFFA to be analyzed under the cumulative effects analysis. The expansion scenario would develop 55 percent of its reserves over an additional 58 years of mining, and 20 to 40 years

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		of post-mining processing low-grade ore and pyritic material, as outlined in response to RFI 062 (PLP 2018-RFI 062). The detailed assumptions for expansion of the Pebble Mine are summarized in Table 4.1-2 of the DEIS. Evaluation of the cumulative impacts of the expansion scenario is provided in the EIS. The assessment of the cumulative impacts of Pebble Mine expansion can be found in Section 4 under each of the 27 resource categories, including spills. The level of detail in the cumulative impact assessment is appropriate for a scenario for potential expansion, and refers to more detailed information presented for direct and indirect effects where expansion would combine elements of specific alternatives. These sections have been revised, but no changes were made based on this SOC. If a permit for the activities under USACE authority is issued to PLP, only the action as described in the ROD would be allowed, subject to all conditions of approval contained in the ROD. Any modifications to the activities authorized by USACE, including any expansion of the authorized discharges of dredged or fill into WOUS, or additional work and structures in navigable WOUS, would require a comparable NEPA review and permit evaluation.
Cumulative Effects Analysis—impacts of other mines	Concerns were expressed that the DEIS did not address the impacts of developing other mines in the Bristol Bay watershed. Some commenters expressed that if the project is permitted, the area will become a mining district with many operating mines.	Section 4.1, Introduction to Environmental Consequences, and Table 4.1.1 address the other mineral deposits in the area and what additional exploration and development actions are determined to be reasonably foreseeable. The cumulative effects of those activities that are determined to be reasonably foreseeable are addressed under each specific resource topic as applicable. No change was made to the EIS.
Cumulative Effects Analysis—impacts on commercial and recreational fisheries	Despite that the mine expansion scenario significantly expands the mine footprint and extends the impact period by almost 8 decades, the DEIS devotes only three pages to impacts on commercial and recreational fisheries. All we know is that the massive increase in duration and scope of the project "would affect" the commercial fishery. Because the population effects are, quite literally, not projected; there is no such analysis. That is not a useful or sufficient analysis of impacts.	Additional information has been added to Section 4.24, Fish Values, regarding projected amount of fish habitat that would be potentially affected by mine expansion. This information has been incorporated as appropriate into the analysis of potential cumulative effects on commercial and recreational fisheries in Section 4.6, Commercial and Recreational Fisheries.

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Cumulative Effects Analysis—impacts to birds	Some commenters felt that the DEIS is dismissive and vague in the analysis of cumulative impacts on birds. This small section of cumulative impacts also fails to analyze how impacts to birds from climate change or effects on their migratory pathways may intertwine or exacerbate impacts from the mine, and impacts to birds from increased access to currently unroaded and undeveloped landscapes in Bristol Bay.	Section 4.23, Wildlife Values, has been updated to include additional cumulative impacts to birds and other biological resources in the region from the 78-year mine build-out scenario. Cumulative impacts to birds from current climate change trends (e.g., increased shrub expansion, longer growing season) are also addressed in Section 4.23.
Cumulative Effects Analysis—impacts to fish habitat	The DEIS engages in a cursory analysis of fish impacts that fails to consider impacts to distinct fish populations and to life history diversity, and omits meaningful analysis of how various impacts will accumulate and interact over the life of the mine. A discussion of predicted environmental changes over time and the additive effects of project construction and operation is important to the discussion of cumulative impacts on fish and fish habitat.	The discussion of direct and indirect effects has been updated, and analysis of cumulative impacts to fish and fish habitat has been expanded in Section 4.24, including impacts to flow and quantifying the permanent acres of footprint, miles of direct stream impact, and number of fish stream crossings. The discussion takes into account the fish use of affected habitat in areas where there is fill of fish streams, and project compliance with regulatory requirements regarding in-stream flow requirements and fish passage.
Cumulative Effects Analysis—impacts to wildlife (CE)	Concerns were expressed about the cumulative effects to wildlife, particularly caribou and moose migration patterns, given the noted impact trends described in Appendix K3.1. Concerns were expressed that the DEIS includes the full 78-year buildout scenario in its reasonably foreseeable future actions in the cumulative impacts analysis, but does not actually analyze cumulative impact to birds and wildlife.	Cumulative effects analysis in Section 4.23, Wildlife Values, has been updated to include additional information on potential impacts to wildlife species (such as moose, caribou, bears, and birds) associated with loss of habitat and behavioral change (including altered movement patterns) from the 78-year buildout scenario and additional mineral exploration activities.
Cumulative Effects Analysis—improper application of CE	Some commenters felt EIS misuses the term "cumulative effects"; NEPA defines cumulative effects as how stressors combine, interact, and compound to cause cumulative damage, which is missing from the EIS.	For each of the potentially affected resources, the cumulative effects analysis in the FEIS takes into account how potential stressors combine, interact, and compound. For example, the contributions of climate change, water quality, and stream flow were incorporated and discussed in the analysis of effects on fish and aquatic habitat. Similarly, the potential impacts on fish populations and distribution and potential changes in access were considered in the analysis of potential effects on subsistence. No change was made to the EIS.
Cumulative Effects Analysis—inadequate analysis use of fish	It was asserted that the DEIS failed to adequately address concerns of commenters regarding the reduction in commercial recreation, and subsistence fisheries related to mine expansion, including those raised by ADF&G on the Preliminary DEIS. "This analysis should include survey data from fishermen, lodges, and outfitters, to obtain a realistic estimate of the river miles of alternative fishing areas and what percentage the loss	The FEIS evaluates the reaches of streams that would be directly and indirectly affected by mine expansion. As analyzed in Section 4.24, Fish Values, the aquatic habitat affected was observed to have low use by fish, particularly with regard to the overall productivity of specific drainages, and the Bristol Bay watershed in general. As a result, the projected loss of river miles that experience low use by fish would have limited effects on recreational/commercial and subsistence fishing

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	of river miles makes up of the total. The survey should include the proposed Pebble project area and all applicable RFFAs." Some commenters felt that the analysis of impacts was not useful or sufficient, including that the DEIS seemed to suggest that the same impact of the project also applies to the expanded mining scenario, without a basis for that conclusion. Finally, some commenters felt that the potential impact on commercial fisheries in Iniskin Bay was not adequately addressed.	harvests. This information applies to both the proposed action and the expanded mine scenario, and is used to analyze potential cumulative effects on commercial and recreation use of fish in Section 4.6, Commercial and Recreational Fisheries. Additional information has been added to Section 4.6 of the FEIS to clarify the potential effects on commercial salmon fisheries in Cook Inlet, and other commercial fisheries that have been closed, but could be reopened at some point in the future.
Cumulative Effects Analysis—inadequate risk assessment	Concerns were expressed that an adequate assessment of risk has not been provided for the expanded mine.	Additional information on the assessment of risk associated with expanded mine operations has been provided in Section 4.27, Spill Risk.
Cumulative Effects Analysis—inconsistent with Appendix B	Concerns were expressed that alternatives screened out in Appendix B are proposed for mine expansion.	This comment asserts that screening out Iniskin Bay for the project based on road and other design considerations is inconsistent with its designation as a deepwater port site for mine expansion. The Applicant's Preferred Alternative and other alternatives are based on a level of mining that involves shipping concentrate by truck to a shallow draft port. Under the expanded mining scenario and assumptions, the higher volume of production would require shipping concentrate by slurry pipeline and a deepwater port for loading larger vessels. This would eliminate the need for road access to Iniskin Bay for the purpose of shipping concentrate by truck. No change was made to the document.
Cumulative Effects Analysis—incremental impacts	Some commenters felt that an analysis of the incremental impacts of the proposed project is missing. Direct and indirect effects are stated in each resource section, but the analysis of overlapping effects is missing.	A summary of the incremental impacts of the Applicant's Preferred Alternative and other alternatives have been included in the discussion of cumulative effects for each resource. Additional quantification of cumulative effects from Pebble Mine expansion has been added in the affected resource sections.
Cumulative Effects Analysis—irrelevant comparison	The impact of mine expansion should not be compared to a greenfield mine site.	Under the mine expansion scenario, the proposed mine would exist and be operating. Therefore, the project area would no longer be a greenfield as it is today and the comparison is appropriate. No change was made to the document.
Cumulative Effects Analysis—land management impacts	Some commenters felt that the DEIS fails to assess the cumulative effects of developing a road system in a large roadless area. Other facilitated actions could include additional road system expansion per Alaska DOT planning, and a host of	The EIS considers the direct, indirect, and cumulative impacts of developing the roads and the additional roads that would be required under the expanded mine scenario. Impacts considered include the impacts and land-owner types identified in the comments. Additional

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	potentially resource-impacting activities like fishing, poaching, recreational gold mining, off-road vehicle use, and residential development. Commenters asserted that the DEIS must be revised to address the cumulative effects of the Pebble Project on private lands, native allotments, and state-managed lands and waters, accounting for the state's management intent.	information has been added to Section 4.1 regarding what are considered reasonably foreseeable future actions.
Cumulative Effects Analysis—larger power plant	For the expanded Pebble mine scenario, what would be the impact of a larger power plant and additional processing train?	The impacts of a larger power plant and additional processing train under the expanded mine scenario would primarily be increased air emissions, which are described in Section 4.20, Air Quality. No change was made to the document.
Cumulative Effects Analysis—magnitude of impacts not described	Impact assessment does not clearly describe the magnitude of impacts—negligible, minor, moderate, major.	The EIS quantifies potential impacts where information is available. Additional information has been added to the analysis in Chapter 4 to quantify direct, indirect, and cumulative effects, and incorporated in the analysis of affected resources.
Cumulative Effects Analysis—marine mammal impacts	USACE must conduct a more thorough and complete analysis of the impacts on marine mammals of the full scale and scope of Pebble Mine and other regional development.	The analysis of potential cumulative effects to marine mammals takes the Pebble Mine expansion scenario, and past, present, and RFFAs into consideration. Additional discussion of potential cumulative effects to marine mammals has been added in Section 4.23, Wildlife, and Section 4.25, Threatened and Endangered Species.
Cumulative Effects Analysis—mine expansion piecemeals NEPA	An expanded Pebble Mine is more than a cumulative impact of the proposed action; it is its logical endpoint. In such cases, NEPA prohibits agencies from breaking a project into smaller component parts to minimize significant environmental impacts of the project.	The USACE is required to review the proposed action as described in an Applicant's permit application. NEPA requires direct, indirect, and cumulative impacts of the action alternative and other alternatives to be assessed in the EIS. Direct and indirect impacts are assessed on the description of the action and other alternatives carried forward in the EIS. Cumulative effects are interactive, synergistic, or additive effects that would result from the incremental impact of the action when added to other past, present, and RFFAs. The USACE has determined that expansion of the Pebble Mine, as originally described in the Wardrop 2011 Preliminary Assessment Technical Report and refined in the response to RFI 062 (PLP 2018-RFI 062), is an RFFA to be analyzed under the cumulative effects analysis. The expansion scenario is described in response to RFI 062 (PLP 2018-RFI 062), and detailed assumptions are summarized in Table 4.1-2 of the DEIS. Evaluation of the cumulative impacts of the expansion scenario is provided in the EIS. The assessment of the cumulative impacts of

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		Pebble Mine expansion can be found in Section 4 under each of the resource categories, including spills. The level of detail in the cumulative impact assessment is appropriate for a potential expansion scenario, and references information presented under direct and indirect effects where expansion would use elements of specific alternatives. If a permit for the proposed activities under USACE authority is issued to PLP, only the action as described in the ROD would be allowed, subject to all conditions of approval contained in the ROD. Any modifications to the activities authorized by USACE, including any expansion of the authorized discharges of dredged or fill into WOUS, or additional work and structures in navigable WOUS, would require a subsequent NEPA review and permit evaluation. No change was made to the EIS.
Cumulative Effects Analysis—mine expansion underground mining	Underground mining of the deeper Pebble East portion of the deposit should be included as part of the expanded mine scenario, or the EIS should explain why evaluating the impacts of mining the deeper Pebble East portion is not reasonable or practical.	USACE evaluated and eliminated mining Pebble East as an alternative to the project (see Appendix B Option LOC-006). The evaluation of potential impacts from Pebble East in Appendix B shows that if Pebble East is developed at some future time, underground mining (if determined feasible) would have potential to reduce impacts compared to open pit mining. USACE determined that future expansion of the Pebble Mine to develop Pebble East was a reasonably foreseeable future action for analysis of potential cumulative impacts. A mine expansion scenario was prepared, and includes open pit mining of Pebble East (see PLP 2018-RFI 062). It is reasonable to expect that if expansion occurs in the future, underground mining methods would be considered to determine feasibility and potential for reducing environmental impacts (as acknowledged in RFI 062). The expansion scenario analyzed in the EIS is an open pit scenario, which may be more damaging than underground mining, but is appropriate considering that feasibility of underground mining has not been established. No change was made to the EIS.
Cumulative Effects Analysis—mining exploration impacts	The Cumulative Effects of Mining Exploration Activities on pg. 4.1-4 states that various types of mining exploration activities have occurred, but does not describe a single impact of the disturbances, particularly given that continued exploration is considered reasonably foreseeable.	The potential cumulative effects from exploration associated with other mining prospects are addressed in the appropriate resource sections such as Section 4.9, Subsistence; Section 4.19, Noise; and Section 4.23.6, Wildlife. Additional discussion of cumulative effects associated with mineral exploration has been added to Chapter 4.

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Cumulative Effects Analysis—monitoring and compliance	There is no indication in the DEIS on how monitoring and compliance will be implemented for cumulative effects.	Any monitoring and compliance measures associated with an alternative to address potential direct and indirect impacts would also apply to potential contributions to cumulative effects, and do not need to be called out separately. No change was made to the EIS.
Cumulative Effects Analysis—noise and vibration impacts	The DEIS should be revised to account for noise and vibration from expanded exploration activities in active and currently abandoned mineral claims adjacent to and surrounding PLP's claims, because expanded exploration activities are reasonably foreseeable.	The potential cumulative effects, including noise and vibration, from exploration associated with other mining prospects are addressed in the appropriate resource sections, including Section 4.7 Cultural Resources, Section 4.9, Subsistence, Section 4.19, Noise, and Section 4.23, Wildlife. Additional discussion of cumulative effects associated with mineral exploration has been added to Chapter 4.
Cumulative Effects Analysis—Order/ integration of impacts	The current organization of resources and impacts in the document is not helpful in evaluating individual and combined impacts, and there are disconnects between sections based on cause and effect. The basic physical elements of the environment should be discussed first, followed by geologic hazards and spill risk, fish and wildlife, and then the social environment. There should be an integrated summary key impacts to each element of the environment. Cumulative impacts should be placed in a separate chapter, with a summary of impacts at the end of the chapter, similar to what exists for direct and indirect impacts.	Additional information regarding the relationships between specific resources can be found in Section 4.1, Introduction to Environmental Consequences. A tabular summary comparing the cumulative effects of all action alternatives has been added to each resource section in the FEIS.
Cumulative Effects Analysis—PAG storage	The method of storing PAG rock under the mine expansion scenario was screened out as an alternative for the project in Appendix B, and an explanation is needed as to why PAG rock can be safely stored during mine expansion without keeping it underwater in a pyritic tailings pond.	The project would generate up to 50 million tons of PAG waste rock. Submerging is the preferred method for storage of PAG waste rock. Options that would not submerge PAG materials were eliminated. The mine expansion scenario is not a proposed project, but represents one possible scenario for future development. The scenario includes generation of 4 billion tons of PAG waste rock. An explanation has been added to the EIS that it may not be feasible to store that quantity of material in a facility with an aqueous cover; therefore, the scenario assumes the runoff would need to be captured and treated. The scenario also includes returning the PAG waste to the completed pit at closure for long-term submerged storage.

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Cumulative Effects Analysis—pyritic tailings	How will pyritic tailings be managed under an expanded mine scenario?	During the expanded mining activities, the pyritic tailings would continue to be stored separately in a second lined pyritic tailings facility to the south of the proposed pyritic TSF. After completion of mining after 58 years, pyritic tailings would be removed and deposited directly to the pit during the 20-40 year milling period. The pyritic tailings TSF would be removed and reclaimed post closure. This is described in Section 4.1, Introduction to Environmental Consequences, and Table 4.1.2 of the EIS. Impacts of storing the pyritic tailings during the expanded mining scenario are analyzed in Chapter 4 of the EIS under cumulative effects. No change was made to the EIS.
Cumulative Effects Analysis—Quantify water quality impacts	The impacts related to the reasonably foreseeable 78-year mine will be significantly different than for the project, and some level of quantification is needed for the 78-year mine for potential water quality and quantity impacts.	Additional information on the potential effects of mine pit drawdown on groundwater was provided in RFI 109n (RFI 109n-PLP 2019), expanded development scenario pit groundwater simulation, and incorporated in the cumulative effects analysis in Section 4.17, Groundwater Hydrology. Mine expansion would intercept additional surface water, and additional linear feet of stream course would be occupied by expanded mine facilities, including a portion in the UTC watershed, and create localized impacts. Permit reviews for future mine expansion would be expected to require additional water balance modeling to quantify surface water volumes affected, and treatment and discharge requirements and locations. Additional language has been incorporated in the cumulative effects analysis in Section 4.16, Surface Water Hydrology. With regard to water quality, the source rock and geochemical characterization associated with mine expansion would be similar to the project. The volume of water needing treatment and duration of treatment would increase; and water treatment, discharge, and discharge locations would need to be modified to meet state permitting requirements. As with the Applicant's Preferred Alternative, the analysis assumes that if permitted, the Pebble Mine expansion would meet State of Alaska Water Quality Criteria and instream flow regulations for maintenance of aquatic habitat. Additional language has been incorporated in the cumulative effects analysis in Section 4.18, Water and Sediment Quality.

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Cumulative Effects Analysis—RFFAs	Concerns were expressed about the completeness of the table of reasonably foreseeable future actions (RFFAs), the criteria applied to include the RFFAs, and the assessment of probability for each RFFA. Suggestions were given for additional RFFAs to include in Section 4.1, Introduction to Environmental Consequences; over the 78-year mine expansion life, it may be reasonable to expect that other projects would be reasonably foreseeable for development. Commenters suggested that the criteria for screening should be clarified, in that RFFAs identified for exploration in general should be considered more probable for development should the Pebble Project be approved, and that mine expansion is concluded to be reasonably foreseeable; a range of probabilities should be considered with the most likely projects included in the cumulative impacts analysis.	Discussion of RFFAs in Section 4.1, Introduction to Environmental Consequences, has been clarified, with additional language added for each RFFA evaluated reflecting the criteria used for screening. Additional suggestions (Knutson Creek Hydroelectric Project), and edits for RFFAs have been incorporated. The criteria used in the EIS to determine whether development of other mining deposits may be reasonably foreseeable based on history of exploration, the current assessment of potential reserves is valid, given the history of mining in Alaska and proximity of deposits to other operating mines in Alaska. To assume that a mineral deposit could be developed within 78 years and prepare assumptions for what mine development would look like is speculative, and discouraged under NEPA guidance. Based on the known information on potential mineral deposit reserves, history of exploration and permitting activity, distance from the project, and the history of mining exploration and development in Alaska, a comprehensive list of mineral deposits were evaluated under NEPA guidance as to whether or not they are reasonably foreseeable for development for both exploration and development. NEPA guidance on "reasonably foreseeable" emphasizes considering projects that are in the permitting process or identified as scheduled for development in a specific timeframe. There is no basis for estimating specific probabilities for mineral development. Even if it is assumed that some prospects would have enough reserves identified as measured/ indicated at some point in the future to be feasible, being able to economically connect to Pebble Project infrastructure, and receive permission to do so, is considered speculative. Based on the criteria, however, the USACE is not aware of an RFFA that would come to fruition if the Pebble Mine were to be permitted.
Cumulative Effects Analysis—spatial temporal impacts	Concerns raised in comments included "the spatial scope of cumulative impact analysis should go beyond the EIS analysis area, and temporal impacts should be considered in terms of fish/wildlife life cycles and human generations," "when other reasonably foreseeable future actions (RFFAs) are considered, the spatial area of impact is significantly larger and includes additional watersheds," and "the DEIS should explicitly describe, ideally on a map but at a minimum with acreage, river miles, by vegetation or habitat type, etc., the spatial extent of	The EIS addresses the location of RFFAs; for some resources, the spatial nature of effects fall outside the EIS analysis area for direct and indirect impacts, and are accurately described. The duration of potential cumulative effects have been more clearly discussed for construction, operation, closure, and post-closure for all resources. Additional quantification of potential cumulative effects from Pebble mine expansion have been included in the FEIS with regard to the location and acreage footprint of mine expansion, additional linear lengths of streams removed by mine expansion, and changes to

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	the combined RFFAs and compare it to that of the proposed alternative." The time periods and duration of potential impacts from the development, operation, and closure of the projects should be more clearly discussed, including those that will occur in perpetuity.	groundwater flow into the mine pit associated with expansion. In other cases, the magnitude of increase in specific aspects of mine expansion, such as the increase in processing throughput and power generation, have been used to approximate increase in potential impacts, such as air quality, water use, and ship traffic. This additional quantification has been evaluated in assessing the potential cumulative effects for all resources. Many of the RFFAs, such as mineral or petroleum exploration, are temporary in nature, with small footprints, subject to restoration as required under permits, and lack specific details on the nature of activity until they are specifically scheduled, and are therefore discussed qualitatively. With other RFFAs, the potential cumulative effects nexus with the project is limited to a specific element of the project, such as the ship traffic associated with the Alaska LNG project and potential impacts to marine mammals, and are discussed quantitatively; however, the specific location of potential cumulative effects may occur intermittently over a large area. The location of all of the RFFAs and the representative footprint of potential Pebble Mine expansion, described in the response to RFI 62a Scenario for Expanded Development of Pebble (RFI 062a-PLP 2018), have been included in Section 4.1, Introduction to Environmental Consequences.
Cumulative Effects Analysis—surface water hydrology	Commenter recommended that the surface water hydrology section include additional information on the magnitude and extent of cumulative impacts, including the variability associated with estimates of potential changes.	Mine expansion would intercept additional surface water, and additional linear feet of stream course would be occupied by expanded mine facilities, including a portion in the UTC watershed, and create localized impacts. Permit reviews for future mine expansion would be expected to require additional water balance modeling based on detailed design to quantify surface water volumes affected, and treatment and discharge requirements and locations, and assess compliance with State of Alaska requirements regarding instream flow required to support fish habitat. Additional language has been incorporated in the cumulative effects analysis in Section 4.16, Surface Water Hydrology.

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Data and Available Information—Data Gaps/Missing or Out-of-Date Data	Concerns were expressed regarding data gaps, the use of older data in the analysis of the DEIS, or failure to provide adequate data to evaluate impacts.	The impact assessment in the EIS is based on available past and present data to inform the analysis. A comprehensive data gap analysis was conducted in conjunction with the development of the DEIS to identify data gaps. The process is summarized in Section 3.1, Introduction to Affected Environment. Data age is discussed. CEQ regulations in 40 CFR Part 1502.22 provide direction on how to address incomplete information, which is referred to as "data gaps" in the EIS. These specific regulations need to be viewed in concert with other CEQ NEPA regulations; including, for example, 40 CFR Part 1502.24, which covers methodology and scientific accuracy. CEQ regulations state that when there is incomplete or unavailable information for the evaluation of reasonably foreseeable significant adverse effects, the federal agencies "shall always make clear that such information is lacking." CEQ regulations at 40 CFR Part 1502.22(a) instruct that if incomplete information 1. is relevant to reasonably foreseeable significant adverse impacts; 2. is essential to a reasoned choice among alternatives; and 3. the overall costs of obtaining it are not exorbitant, the agencrcy shall include the information in the EIS. This documentation complies with 40 CFR Part 1502.22(b)(1-4) requirements that the agency shall develop statements for inclusion in the EIS. Additional data has been added to the EIS.
Data and Available Information—Reference Material Comments	Commenters provided assessment of and citations from materials that were cited as references to the DEIS.	Because comments were on the references themselves and language therein, and not in the context of how the reference was applied in the DEIS, no changes were made.
Data and Available Information—RFIs were not complete for DEIS	Comment stated that numerous RFIs were not complete before the DEIS, precluding any opportunity for public review.	USACE recognized when the DEIS was issued that PLP had concurrent ongoing studies, design optimization, and mitigation (impact avoidance, minimization, and compensation) work under way. The RFIs identified by the commenter requested information from this concurrent work so that it could be incorporated into the FEIS. The RFI process is ongoing throughout the course of NEPA. USACE has made RFIs available on the public project website. Additional RFIs have been made public since the DEIS was released, and information has been incorporated into the EIS.
Data and Available Information—Scoping Period Comments	Comments were received that expressed concern that comments received during the scoping period were not considered.	Comments received during the scoping period were considered; Appendix A to the EIS includes the final scoping report. No changes were made to the EIS.

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Data and Available Information—Suggested Reference	Reference documents were suggested for review and inclusion in the FEIS analysis.	Suggested documents and references were reviewed and incorporated as appropriate. Additional references used in the FEIS were added to Chapter 9 and cited in the text where appropriate.
Earthquakes or seismic concerns—Background Earthquake	More information on the background earthquake should be provided, given its level of ground shaking in the seismic hazard analysis, such as consideration of an alternate sense of motion and relationship to local structures, and consideration of a floating (random) earthquake located 30 miles away from the site.	A background earthquake from an unknown shallow crustal fault located directly under the mine site is one of four maximum design earthquakes (MDE) described in Section 4.15, Geohazards and Seismic Conditions, based on PLP seismic hazard analyses (Knight Piésold 2013, 2019d). Ground shaking from the background earthquake was estimated in these analyses based on published relationships from similar earthquakes with a reverse (compressional) sense of motion because it provides the most conservative result from the ground motion models. As noted in comments, the tectonic setting of the mine site could also produce earthquakes with a strike-slip (lateral) or normal (tensional) sense of motion. Text has been added to Section 3.15, Geohazards and Seismic Conditions, and Appendix K4.15 describing the basis of the MDE assigned to this type of fault, the possible sense of motion that could be attributed to it, and why reverse faulting was selected. Because the earthquake is assumed to occur about 7 miles beneath the mine site, the predicted ground shaking is more conservative than it would be from a similarly unknown source farther away from the site.
Earthquakes or seismic concerns—Closure cover infiltration effects	Concerns were expressed that high infiltration through the cover of the bulk TSF in post-closure would cause the tailings to remain saturated in perpetuity, which could have an effect on embankment stability.	Chapter 2, Alternatives, Section 4.15, Geohazards and Seismic Conditions, and Section 4.27, Spill Risk, describe how the bulk TSF would be closed with a low-permeability cover to reduce tailings saturation, lower the phreatic surface, and improve embankment stability over time. The analysis of static and seismic stability in Section 4.15 and Appendix K4.15 in the DEIS was based on a conservative late operations case, when the embankments, tailings surface, and water levels would be at their highest elevation. Additional information received through the RFI process on closure cover design options, infiltration, and implications for post-closure embankment stability have been added to Appendix K4.15 and Section 4.15 to further evaluate these effects over the long-term. Text has also been added to Chapter 5, Mitigation, indicating that a trade-off study would be completed in detailed design to determine the preferred closure system, which would include an evaluation of cover material efficacy and performance (PLP 2019-RFI 130).

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Earthquakes or seismic concerns—cumulative effects not adequately addressed	Additional discussion and details are needed in Section 4.15, Geohazards and Seismic Conditions, that address the cumulative effects of earthquakes, the additional embankment stability risks, effects on the UTC drainage, tsunami risks, and the availability of construction material under the expanded mine scenario.	Section 4.15, Geohazards and Seismic Conditions, of the DEIS provided a generalized description of potential effects under the expanded mine scenario. Additional details have been added to this section regarding the number and size of additional embankments and waste rock stockpiles that would be potentially subject to instability effects; the likely geomorphic and foundation conditions in the areas in the expanded mine scenario; the added design life on certain structures (e.g., pyritic TSF, main water management pond [WMP], and port) that would need to remain beyond their original design life (to wait for the pit to be available for backfill); and applicable state guidelines and standard engineering practices that would likely be applied.
Earthquakes or seismic concerns—Design life	The operating design life used in assessing seismic risk should be revisited given the long-term nature of tailings storage at the mine site.	Estimates of ground shaking in the seismic hazard analyses in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, are based on a 50-year design life that extends into Closure Phase 3, after the bulk TSF has been covered and reclaimed. The low-permeability cover is expected to reduce tailings saturation, lower the phreatic surface, and improve embankment stability over time. As described under SOC "Earthquakes or Seismic Concerns-Maximum Earthquake Considered in Design," the MDE defined for the TSF currently includes four maximum credible earthquakes (MCEs), including two with ground-shaking predictions greater than the 10,000-year event. The analysis of seismic stability in Section 4.15 and Appendix K4.15 is based on the application of these ground-shaking estimates to a conservative late-operations case when the embankments, tailings surface, and water levels would be at their highest elevation. These would also be used for closure, although subsequent seismic events and scenarios may be considered as required by the Alaska Dam Safety Program, and detailed closure design, which would require stability analyses specific to closure conditions and include an independent panel review. These would be completed during closure design and updated as required throughout late operations (PLP 2019-RFI 130). Text has been added to describe the above in Appendix K4.15, Section 4.15, and Chapter 5, Mitigation.
Earthquakes or seismic concerns—Dynamic character of earthquakes	The complex dynamic character of earthquakes as they propagate through the soil/rock column and interact with mine site embankments should be communicated in the EIS.	Text has been added to Appendix K4.15, Geohazards and Seismic Conditions to describe the dynamic characteristics of earthquakes, and how the seismic hazards and stability analyses take this into account.

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Earthquakes or seismic concerns—Effects similar to Anchorage M7 earthquake	Concerns were expressed regarding potential effects similar to the magnitude (M) 7.0-7.1 Anchorage earthquake of November 30, 2018, and that this could indicate that seismic activity is increasing, and that the EIS should address impacts in the event of a similar major earthquake.	The M7.1 Anchorage earthquake occurred on an intraslab portion of the Alaska-Aleutian subduction zone system, which was described in DEIS Section 3.15 and Section 4.15, Geohazards and Seismic Conditions. Text has been added to Section 3.15 to further describe the occurrence of intraslab earthquakes, and the Anchorage earthquake of November 30, 2018 in particular. The location of this earthquake, as well as other earthquakes that have recently occurred in the region, are included in an updated version of Figure 3.15-1. The seismic hazard analyses summarized in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, identifies the active faults and maximum magnitudes being considered in the design of major mine site embankments and port facilities. Ground-shaking estimates from these analyses typically are used as input to stability analyses to identify how much facility deformation would result during a major earthquake; as a result of these analyses, designs are modified as projects progress to final design to avoid the possibility of complete failure of an embankment or facility. As noted in the DEIS (Appendix K4.15 and Section 4.15), large intraslab earthquakes up to M8.0 (similar to the Anchorage earthquake, but nearly 10 times the magnitude) were incorporated into preliminary seismic hazard analyses by Knight Piésold (2013). As a result of additional information provided in the RFI 008 series (PLP 2019-RFI 008g, h; Knight Piésold 2019d), the seismic hazard analysis has been updated, and the predicted ground shaking associated with intraslab earthquakes has been revisited, based on both recent seismic activity and updates to the seismic models published by various industry and academic working groups. The information on this subject in Section 4.15 and Appendix K4.15 has been updated accordingly. Information regarding the effects of the Anchorage M7.1 earthquake on existing dams in the region were also reviewed and summarized in Section 4.15. Because of the Anchorage earthquake and its aftershocks, it may seem that the occurrence of earthquakes is increasing in the project area; this is likely because it occurred near a major population center, had many large aftershocks, and occurred on a segment of intraslab that had not recently ruptured. As Figure 3.15-1 indicates, there have been numerous earthquakes in the project region over the past century at a size that can typically be felt by humans (> M4), with most occurring away from large population centers. In addition, there have been many smaller, more frequent earthquakes not shown on

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		Figure 3.15-1. The size and location of the Anchorage M7.1 earthquake would have a frequency of occurrence (return period) ranging from several decades to centuries, although similar earthquakes could occur at the same frequency on different faults in the region, and earthquake activity on one fault can trigger activity on another fault as the earth adjusts to the release of tectonic stress, leading to a sense that earthquakes are increasing in frequency.
Earthquakes or seismic concerns—Factor of Safety	The EIS should clarify that a calculated factor of safety (FoS) may be misleading with respect to reduction in embankment stability risk, as indicated in ADNR Alaska Dam Safety Program (ADSP) draft guidelines. The static FoS description in Section 4.15, Geohazards and Seismic Conditions is inaccurate.	Clarification on FoS from the ADSP draft guidelines has been added to Section 4.15, Geohazards and Seismic Conditions. The FoS description in this section was not intended to imply a target FoS for the project, and has been edited. Additional discussion of FoS is provided under SOC "Earthquakes or Seismic Concerns-State Dam Safety Guidelines."
Earthquakes or seismic concerns—Fault branching	Concerns were expressed that fault branching and directivity of seismic energy, similar to what occurred during the magnitude (M) 7.9 Denali earthquake of 2002 that caused large (20-foot) surface displacements in Interior Alaska, could occur on the Telaquana, Lake Clark, and Bruin Bay faults and threaten mine site structures.	The 2002 Denali earthquake originated on a splay of the central portion of the strike-slip Denali fault and propagated east for 140 miles, where the seismic energy was then directed south at a branching fault intersection onto the smaller (previously active) Totschunda fault, rather than continuing on the eastern Denali fault (Schwartz et al. 2012). The closest similar crustal faults to the mine site are the Telaquana-Mulchatna, Lake Clark, and Bruin Bay faults (Figure 3.15-1). Their known activity (or lack of activity) is discussed in Section 3.15, Geohazards and Seismic Conditions. The closest fault branch to the mine site that could be considered a potential analog to the Denali-Totschunda event would be where the Castle Mountain fault intersects with the Bruin Bay fault near Tyonek. The proximity of the eastern end of the Telaquana fault and the northern end of fault-cored folds in Cook Inlet to the Castle Mountain fault could also be considered volumetric intersections (per Schwartz et al. 2012), with the potential for an earthquake originating on the Castle Mountain fault to jump to the Telaquana or Cook Inlet faults. The analog situation to the 2002 Denali earthquake would be if a major earthquake originated on the Castle Mountain fault and propagated to the southwest, either continuing straight on the Lake Clark fault, branching south to the Bruin Bay or Cook Inlet faults, or jumping west to the Telaquana fault. The likelihood that such an event would continue to propagate beyond the branch and intersect the mine site is low, because the seismic energy would tend to dissipate after branching to a fault with a lower slip rate and strain accumulation

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		(Schwartz et al. 2012). The Lake Clark fault is considered to have a very low slip rate if active (Koehler and Carver 2018). The mine site is about 180 miles southwest of the branch point. In the case of the Denali-Totschunda branching event, the fault rupture stopped about 40 miles after branching off. Additional concerns with regard to the potential for surface rupture on the Lake Clark fault are addressed under SOC "Earthquakes or Seismic Concerns-Lake Clark Fault." A maximum earthquake that occurs on the Castle Mountain fault and propagates onto one of the southwestern branch faults could also cause ground-shaking impacts to mine site structures. This is accounted for in the seismic hazard analysis of the mine site, described in Section 4.15 and Appendix K4.15 (Geohazards and Seismic Conditions), in which the mine structures would be designed to withstand ground shaking from four types of maximum earthquakes, including two that are assigned higher magnitudes than the 2002 Denali event (a M9.2 subduction zone earthquake, and M8.0 intraslab event similar to the November 2018 Anchorage earthquake), and one on the Lake Clark fault that would have a similar sense of motion as the 2002 Denali event. No changes have been made to the EIS as a result of this SOC.
Earthquakes or seismic concerns—Foundation Conditions	Concerns were expressed regarding the availability of geotechnical data that show structural features and whether borings were drilled to the depth of competent bedrock beneath the locations of the TSF embankments, and that these are needed to evaluate foundation integrity in seismic stability analyses so the occurrence of a Mt. Polley type of failure can be prevented. Concerns were also expressed that the stability analyses of the major mine embankments are based on a simplified concept without consideration of actual foundation conditions, and that the EIS should include further detail on these conditions, how they would be managed, and include revised stability analyses.	Available geotechnical borings drilled beneath the locations of the TSF embankments are shown on Figure 3.15-3, along with depths to moderately weathered bedrock. Most borings extend below the depth of the weathered bedrock. The location of geophysical survey lines, which help identify depth to competent bedrock and faults, are also shown on this figure. Additional depth-to-bedrock data have been added to this figure from PLP 2019-RFI 014b. Section 3.15, Geohazards and Seismic Conditions, provides a summary of rock quality and depths to moderately weathered bedrock beneath each of the mine site areas where major embankments would be constructed. Text has been added to Appendix K4.15 to further describe bedrock types and potential weak zones (such as faults and heavily fractured or sheared rock) beneath the TSF footprints. A figure showing the locations of bedrock faults at the mine site has been added to Section 3.17, Groundwater Hydrology. The DEIS disclosed that glacial lake deposits have been mapped at the surface in the vicinity of the open pit WMP (Section 4.15, Appendix K4.15, and Figure 3.13-2). One of the primary causes of the

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		Mt. Polley breach was design oversight failing to identify the extent and material properties of a similar type of clay unit. (Other causes included the dam being built to a steeper slope than designed, a new designer hired to help cut costs, and inadequate regulatory oversight.) Following the DEIS, the location of the open pit WMP was moved to the west, further away from the concentration of these deposits in SFK valley. Based on available data, glacial lake deposits could still extend beneath the eastern part of the open pit WMP embankment. Additional geotechnical data in the area of the new open pit WMP location and foundation mitigation information received in RFI 014b have been added to Appendix K4.15 and Chapter 5, Mitigation, respectively. Foundation assumptions pertinent to the preliminary embankment stability analysis (such as unit weight and phi angle), which were based on past geotechnical drill hole investigations and laboratory testing, are provided in Appendix K4.15, Geohazards and Seismic Conditions (PLP2018-RFI 008b). These assumptions, as well as additional geotechnical data provided in response to RFI 014b, have been reviewed and compared to engineering experience and data in the literature, and text has been added to Appendix K4.15 regarding their adequacy for use in the stability analyses. Geotechnical investigations are ongoing, and additional analyses would be conducted as project design advances. Data collected through 2019 would form the basis of a scoping proposal and siting study in an Initial Design Package that PLP has committed to submitting to ADNR by year-end 2019. In accordance with Alaska Dam Safety Program draft guidelines, detailed geotechnical data beneath embankments and seismic stability analyses based on those data would be submitted in later Preliminary Design and Detailed Design packages (PLP 2019-RFI 008g).
Earthquakes or seismic concerns—Freeboard	The EIS should address the combined risk of flooding and earthquakes in evaluating the size of freeboard at mine site embankments.	As described in Appendix K4.15, Geohazards and Seismic Conditions, the freeboard of the TSFs would be designed to contain the entire inflow design flood (IDF), wave runup, and predicted post-seismic settlement. This has been clarified in Section 4.15, Geohazards and Seismic Conditions, and Section 4.27, Spill Risk.

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Earthquakes or seismic concerns—General earthquake setting	General concerns were expressed regarding siting the mine in a region of major earthquakes and active volcanoes, that earthquakes cannot be predicted, that impacts could occur from distant tectonic activities, and that large mine structures cannot be built to withstand major earthquakes.	The EIS discloses the history of earthquakes and volcanic activity in the project region in Section 3.15, Geohazards and Seismic Conditions. Section 4.15 describes seismic hazard assessments conducted for the mine site, which predict the amount of ground shaking expected during each of the major earthquakes, as well as seismic stability analyses, which predict the amount of embankment deformation expected during the earthquakes. The mine site embankments would be designed to withstand four types of major earthquakes, including a distant but very large magnitude 9.2 earthquake on a subduction zone source, an earthquake similar to that of the 1964 Great Alaskan earthquake. The point of the seismic hazard and stability analyses is to confirm that the embankments would remain operable or be repairable following a major earthquake, and to make design modifications if the results show the need for them so that the embankments withstand the design earthquakes. Information on the performance of modern dams in major earthquakes is provided under SOC "Earthquakes or Seismic Concerns-Maximum Earthquake Considered in Design." Information on additional seismic analyses that would be performed on mine site embankments as design and permitting progresses is provided under several SOCs (e.g., "Earthquakes or Seismic Concerns—Numerical Seismic Modeling") and has been added to Chapter 5, Mitigation.
Earthquakes or seismic concerns—Hazards to pipeline and roads	Geohazards and related impacts on the pipeline, roads, and shoreside facilities should be further addressed or clarified, such as liquefaction, surface fault rupture, and ground-shaking impacts in an earthquake; and slope stability, avalanches, and related climate change effects.	Potential impacts on roads and the pipeline from hazards such as earthquakes and unstable slopes are described in Section 4.15, Geohazards and Seismic Conditions, under transportation and pipeline subsections, and under port subsections for roads and other structures associated with shoreside facilities. Impacts from lake and oceanographic hazards are addressed in Section 4.16, Surface Water Hydrology. Additional text has been added to Section 3.15 and Section 4.15, Geohazards and Seismic Conditions, to further describe the effects of liquefaction on roads and bridges, the potential for surface fault rupture effects on the pipeline from unknown faults, climate change effects on landslide and avalanche hazards on the roads and pipeline, landslides and avalanche hazards at the Diamond Point port site, and seismic-triggered slope failure and related erosion and sedimentation effects. Text has also been added to Chapter 5, Mitigation, to describe additional seismic and liquefaction analyses that would be conducted as pipeline design and permitting progress (NANA WorleyParsons and IntecSea 2019), and to Appendix M1.0, Mitigation Assessment, for consideration of additional design for potential pipeline displacement in the event of rupture along an unknown fault.

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Earthquakes or seismic concerns—Human safety	The EIS should address how human safety would be protected in the event of earthquake impacts to storage facilities. The EIS also ignores the National Earthquake Hazards Reduction Program (NEHRP) designed to protect lives and property.	Section 4.15 and Appendix K41.5, Geohazards and Seismic Conditions, describe how mine site embankments would be designed to withstand severe ground shaking, so that a release does not occur in the event of a major earthquake and threaten human safety. Text has been added to Section 4.15 to clarify this intent. In addition to a robust design process, as indicated in Appendix K4.15 and Chapter 5, Mitigation, ADSP draft guidelines and state regulations identify specific requirements for an Emergency Action Plan (EAP) to be developed that adequately protects life and property if a dam fails, regardless of cause. EAPs are required to include a modeled prediction of the extent of inundation in the event of a tailings or pond water release, training and notification requirements, on-site emergency supplies, and plans for annual emergency response exercises. The National Earthquake Hazards Reduction Program (NEHRP) was established by congressional act in 1977 and is a nationwide program coordinated among federal agencies (such as the US Geological Survey (USGS) and Federal Emergency Management Agency) and the scientific community to reduce risks to life and property from earthquakes. Elements of NEHRP goals and research, such as maintaining seismic detection systems, funding updates to ground motion models, and improving earthquake hazards identification and risk reduction methods, have been used by PLP dam designers to predict seismic hazards and stability effects, and are incorporated into ADSP draft guidelines that serve to protect life and property.
Earthquakes or seismic concerns—Inactive faults	The definition of "inactive" faults should be clarified, and their potential for impacts on mine site facilities revisited, such as the potential for future activity where they could offset dams or liners, cause pit wall destabilization, or create high-permeability pathways beneath embankments.	A description of faults known or suspected to be active in the project area is provided in Section 3.15, Geohazards and Seismic Conditions. Text has been added to explain the types of evidence for activity, and fault descriptions have been reviewed to avoid the term "inactive" (as opposed to a lack of evidence of Holocene activity). Several faults have been mapped at the mine site that cross-cut only bedrock, with no evidence of Holocene activity, such as offset in surficial deposits or historical seismicity. A figure showing the bedrock faults at the mine site has been added to Section 3.17, Groundwater Hydrology. Text has been added to Section 3.15, Geohazards and Seismic Conditions, describing the relationship between these faults and more regional surface faults such as the Lake Clark fault, based on additional information provided in PLP 2019-RFI 139.

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Topic—Subtopic	Statement of Concern	Response
		Although bedrock faults with little to no evidence of activity are unlikely to pose a surface rupture hazard to mine structures, surface fault investigations related to fault splays of the Lake Clark fault would continue to be examined during design, including consideration of their location with respect to major mine structures (Knight Piésold 2019d), because it has implications for the MCE assigned to this fault in the seismic hazard analysis. Text has been added to Section 4.15 describing possible fault displacement effects in the event they are shown to be active; and Chapter 5, Mitigation, describing planned investigations to further evaluate Lake Clark fault splays. Fault effects on pit wall destabilization and creation of high-permeability pathways could occur regardless of the recency of fault activity. Pit wall stability issues are described in Section 4.15 and Appendix K4.15, and the effects of faults on groundwater flow are described in Section 3.17, Groundwater Hydrology (see also SOCs "Earthquakes or Seismic Concerns—Pit Wall Stability and Effects on Groundwater Near Pit, and Groundwater Hydrology-GW Effects of Faults).
Earthquakes or seismic concerns—Independent Review	Concern was expressed that the USACE should require that an independent review of the embankment conceptual designs be conducted during the EIS process to demonstrate that they would comply with State of Alaska dam safety draft guidelines.	The USACE third-party contractor provided independent NEPA-level due diligence review of embankment conceptual designs based on information provided to date in PLP permit application materials and subsequent RFIs. These reviews were conducted by a number of senior experts in the fields of geotechnical engineering, engineering geology, seismology, slope stability modeling, and liner design. The results of these reviews have been presented in technical memoranda, appear in follow-up RFI requests, and are summarized in FEIS Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, as they pertain to State of Alaska dam safety draft guidelines. In addition, as indicated in Section 4.15, PLP has agreed to employ an Independent Technical Review Board (ITRB) in future design phases in accordance with current accepted practice and ADNR draft guidelines, as addressed in the Failure Mode & Effects Analysis (FMEA) workshop (AECOM 2018k). The State and their contractors also typically provide independent technical reviews of permit submittals under the ADSP. No change was made to the EIS as a result of this comment.

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Topic—Subtopic	Statement of Concern	Response
Earthquakes or seismic concerns—Insufficient Seismicity Information	Concerns were expressed that there is insufficient information included in the EIS about the thousands of earthquakes that occur on the Alaska Peninsula and subduction zone.	Figure 3.15-1 depicts earthquakes that have occurred in the project region over approximately the last 100 years that exceed M4.0. A description of seismic sources (active faults) associated with these is earthquakes is provided in the updated Section 3.15, which has been retitled: "Geohazards and Seismic Conditions." Earthquakes smaller than M4.0 would have little to no effect on project structures, and are not plotted on Figure 3.15-1.
Earthquakes or seismic concerns—Lake Clark fault	Concerns were expressed regarding uncertainties in the location of the Lake Clark fault near the mine site, information used to incorporate the fault into seismic hazard analyses, and the limited paleoseismic studies conducted to date, which may have implications for maximum earthquakes selected for design of mine site facilities.	The location and recency of activity on the Lake Clark fault is described in Section 3.15, Geohazards and Seismic Conditions. Text has been added to this section based on additional information provided in comments, recent literature, and PLP documents (e.g., Koehler and Carver 2018; Higman and Riordan 2019; Knight Piésold 2019d; PLP 2019-RFI 139). Text has also been added to Appendix K4.15 to acknowledge uncertainties in the interpretation of the recency of activity on the Lake Clark fault, and describe the implications of these uncertainties on the potential for surface fault rupture, and on the seismic hazard and stability analyses of mine site embankments. In addition, text has been added to Chapter 5, Mitigation, to describe PLP plans to continue to examine the Lake Clark fault as design and permitting progress, and to Appendix M1.0, Mitigation Assessment, to provide additional recommendations for future studies.
Earthquakes or seismic concerns—Landslide and subsidence effects on embankments	Concerns were expressed that earthquake-induced landslides or land subsidence could cause damage to the tailings embankments.	The occurrence of potentially unstable slope deposits and underlying bedrock that could be triggered in the event of a major earthquake are described in Section 3.15, Geohazards and Seismic Conditions, and Section 3.13, Geology, respectively; and shown on Figure 3.13-2 and Figure 3.13-3. As described in Appendix K4.15, Geohazards, colluvium and solifluction deposits adjacent to the bulk TSF south and pyritic TSF embankments would be removed in the foundation of these structures, and are not expected to pose deep-seated landslide impacts on embankment stability. The western and eastern hills above the bulk TSF main embankment, which would be partially leveled at quarry locations, are underlain by relatively competent granodiorite batholith and basalt rock with some weak zones of heavily fractured or sheared rock (see also SOC Earthquakes or Seismic Concerns-Foundation Conditions). As described in Appendix K4.15, stability analyses conducted to date on the conceptual design of mine site embankments have assumed homogeneous bedrock conditions with rock strength parameters selected based on existing drillhole data. Text has been

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Topic—Subtopic	Statement of Concern	Response
		added to Section 3.15, Appendix K4.15, and Chapter 5, Mitigation to acknowledge that unstable slopes can be triggered by earthquakes, further describe foundation conditions beneath embankments, and note that deep-seated slide risks would be further evaluated as design and state dam safety permitting progress. Land subsidence could occur through two different processes: compaction of deposits beneath the embankments, and tectonic tilting during a major earthquake, as happened across Southcentral Alaska during the 1964 Great Alaska Earthquake. Because overburden and highly weathered bedrock would be removed down to competent bedrock to prepare the TSF foundations, little or no subsidence would be expected from foundation compaction or settlement. If tectonic subsidence occurred during a major earthquake, it would affect both the embankment and tailings deposit together, and would not be expected to cause differential settlement between the embankment crest and tailings surface that could lead to a tailings release. Ground-shaking effects from a megathrust earthquake large enough to cause tectonic subsidence are discussed under "Seismic Hazard Analysis" in Section 4.15 and Appendix K4.15: a magnitude 9.2 megathrust earthquake is one of four maximum design earthquakes that the mine site embankments would be designed to withstand.
Earthquakes or seismic concerns—Liquefaction evidence for LCF activity	Evidence of repeated paleoliquefaction events along the shore of Iliamna Lake and southwest of the mine site were provided in comments, which could have implications for the interpretation of maximum earthquakes in the seismic hazard assessment.	Evidence of repeated dateable liquefaction events documented in surficial deposits near the mine site, such as sand boils (Higman and Riordan 2019), suggest that repeated major earthquakes have occurred in the Iliamna Lake area in the Holocene. These types of effects would be similar to the widespread liquefaction and ground cracking that occurred during the 1964 Great Alaska earthquake and the November 2018 Anchorage Earthquake. As described in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, major earthquakes such as these have been incorporated into the seismic hazards and stability analyses for the mine site, and would continue to be evaluated using numerical modeling methods as design progresses. Two of the four types of earthquakes selected as the MDE for the mine site include an M9.2 subduction zone event similar to the 1964 earthquake, and an M8.0 intraslab event similar to the 2018 earthquake. In other words, the mine site embankments would be designed to withstand these types of events.

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Topic—Subtopic	Statement of Concern	Response
		Higman and Riordan (2019) also suggest that the liquefaction evidence could have implications as to the location and MCE selected for the Lake Clark fault in the seismic hazard analysis. Additional information provided in PLP 2019-RFI 139 regarding the implications of this evidence on the seismic hazard analysis, the location and MCE for the Lake Clark fault, and PLP future investigation plans has been added to Appendix K4.15 and Chapter 5, Mitigation.
Earthquakes or seismic concerns—Location of seismic analysis in EIS	Commenters did not see where seismic issues were addressed in the EIS, including seismology, geotechnical data, material properties, seismic analysis, drain engineering for the tailings dam, preventative measures the mine would take to mitigate operations in an active seismic area, risk of tailings dam failure in an earthquake, and geohazards risks for the expanded mine scenario.	Seismic issues are primarily addressed in Section 3.15 and Section 4.15, and Appendix K3.15 and Appendix K4.15, Geohazards and Seismic Conditions. The titles of these sections have been changed to: "Geohazards and Seismic Conditions" to help the reader find the seismic-related information. Risk of tailings dam failure in an earthquake is discussed in Section 4.27, Spill Risk. More specifically, a description of active faults in the project area, the seismology (earthquakes) associated with these, and their ground-shaking potential is provided in Section 3.15, and shown on Figure 3.15-1 and Figure 3.15-2. Geotechnical data coverage at the mine site is also summarized in Section 3.15 and Appendix K3.15, Geohazards and Seismic Conditions. Seismic stability analysis, seepage analysis, material properties, drain engineering features, and design measures to prevent earthquake- and other geohazard-related impacts are discussed in the updated Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions. Cumulative effects related to geohazards under the expanded mine scenario are provided in Section 4.15. Risk of tailings dam failure in an earthquake was analyzed during the EIS-Phase FMEA (AECOM 2018l), which is discussed in both Section 4.15 and Section 4.27, Spill Risk.
Earthquakes or seismic concerns—Long-term monitoring	Concerns were expressed that the tailings dam would need to be monitored "forever" for potential earthquake impacts, and that there are no plans in the EIS for such long-term monitoring and protection.	As described in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, monitoring of the bulk TSF embankments would be conducted in all mine phases, including throughout post-closure. Additional details have been added to Appendix K4.15 and Chapter 5, Mitigation, to describe state regulatory requirements (11 AAC 93) for financial assurance to fund post-closure stability monitoring and inspections, as well as monitoring committed to by the Applicant in PLP 2019-RFI 135.

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Topic—Subtopic	Statement of Concern	Response
Earthquakes or seismic concerns—Maximum Earthquake Considered in Design	General concerns were expressed that the mine structures would need to withstand an M9 earthquake, earthquakes on regionally important but more distant faults, unknown faults, and the multiple aftershocks. Clarification is also needed on the recency of activity on the Bruin Bay fault, the return period and ground shaking potential of maximum earthquakes used in the seismic hazard analysis, and why a 10,000-year return period event would not be considered the MCE.	As described in DEIS Section 4.15, Geohazards and Seismic Conditions, the mine site embankments would be designed to withstand four types of earthquakes, including an M9.2 earthquake on a subduction zone source, an earthquake similar to that of the November 2018 Anchorage earthquake, the Lake Clark fault, and an earthquake on a buried unknown fault directly beneath the mine site (see also SOCs Earthquakes or Seismic Concerns-Background Fault, Effects Similar to Anchorage M7 Earthquake, and Lake Clark Fault). Since the publication of the DEIS, the seismic hazard analysis (SHA) for the mine site, which assesses ground shaking potential from each of these types of earthquakes, was updated by PLP (2019-RFI 008g, RFI 139; Knight Piésold 2019b, d), and the associated text and tables in Section 4.15 and Appendix K4.15 have been revised accordingly (see also SOC Earthquakes or Seismic Concerns—Update Seismic Hazard Analysis). Edits have been made in Section 3.15, Section 4.15, and Appendix K4.15, Geohazards and Seismic Conditions, to clarify the recency of Bruin Bay fault activity (based on subsurface seismicity, not surficial evidence) and emphasize the significance of the more distant Alaska-Aleutian Megathrust. The SHA (Knight Piésold 2019d) notes that the probabilistic 10,000-year return period earthquake has a predicted ground-shaking value (based on published USGS maps) that is less than the highest values for the MDE in the deterministic SHA, such that the mine site structures would take both into account. Knight Piésold (2019d) also notes that potential cumulative effects on dam stability from multiple earthquakes such as aftershocks would be assessed as design progresses. Text has been added to Appendix K4.15 to describe the above issues. The amount of embankment deformation expected during the design earthquakes was preliminarily analyzed using pseudo-static methods as described in DEIS Section 4.15 and Appendix K4.15, which have been updated in the FEIS based on re-evaluations in PLP 2019-RFI 008g and 008h using more rigorous methods. Further analyses using numerical modeling methods would be conducted as design progresses through ADNR permitting (see SOC "Earthquakes or Seismic Concerns—Numerical Seismic Modeling"). The point of the above analyses is to predict how much the embankments would deform in a major earthquake, and to make

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		design modifications if the results show the need for them, so that the embankments withstand the design earthquakes. Modern dams in Alaska and worldwide have typically performed as designed during major earthquakes. For example, the tailings and water dams at the Fort Knox Mine near Fairbanks performed without consequence during the 2004 M7.9 Denali earthquake (SOA 2007). A rockfill dam 10 miles away from the 2008 M8.0 Wenchuan earthquake in China experienced several types of repairable damage, but no catastrophic failure or containment loss (Lekkas 2008).
Earthquakes or seismic concerns—Mining-induced earthquakes	Concerns were expressed that man-made activities at the mine site, such as blasting or mine site ponded waterbodies causing porewater pressure changes, could trigger earthquakes, particularly on inactive faults mapped at the mine site, and that more detail is needed on this subject in the EIS. In addition, seismic setting comparisons to Usibelli Mine need clarification.	Mining-induced seismicity from blasting, rock mass relaxation, and crustal rebound are addressed in Section 4.15, Geohazards and Seismic Conditions. Edits have been made in this section regarding the seismic setting at Usibelli Mine, and text has been added to describe the potential for earthquakes to be triggered on inactive faults near the pit due to altering of porewater pressure. Additional issues regarding these faults are addressed under SOC "Earthquakes or Seismic Concerns-Inactive Faults."
Earthquakes or seismic concerns—NEPA factors of analysis	General concerns were expressed that the summary of embankment stability effects in Section 4.15, Geohazards and Seismic Conditions, lacks coherence and is based on optimistic assumptions related to complying with state draft guidelines.	As described in Section 4.1, Introduction, NEPA requires that potential effects of a project be analyzed in relation to certain factors such as magnitude, duration, and extent. The summary discussion of embankment stability effects in Section 4.15, Geohazards and Seismic Conditions, is intended to provide a description of mine site geohazard effects in terms of these factors, and is not intended to be a summary of technical engineering and design issues. The text in this section has been edited to clarify this distinction. NEPA requires analysis of the project as proposed, which may include compliance with certain permitting processes and guidelines. Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, provide a discussion of certain design elements that demonstrate this compliance. Text has been added to Chapter 5, Mitigation that also demonstrates Applicant commitments to conducting additional embankment stability analyses as design and permitting progress. Additional discussion of project elements in relation to ADSP draft guidelines is provided under SOC Earthquakes or Seismic Concerns-State Dam Safety Guidelines.

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Earthquakes or seismic concerns—Numerical seismic modelling	Comments stated that seismic analysis of the dam should be conducted using more rigorous numerical modeling techniques than has been done to date, such as those which take into account time histories of the maximum earthquakes and dynamic analysis using finite element modeling techniques.	The seismic stability analysis of the bulk TSF main embankment discussed in DEIS Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, was based on the application of pseudo-static (horizontal) loads to the structure to simulate earthquake forces, using a method by Swaisgood (2003). Since the DEIS was published, additional seismic stability analyses of the bulk TSF main embankment have been provided in PLP 2019-RFI 008g, using updated seismic input parameters (Knight Piésold 2019) and a different pseudo-static method (Bray and Travasarou 2007) that take into account longer-period ground-shaking effects and behavior of the dam structure. Section 4.15 and Appendix K4.15 have been revised based on the more recent analysis. The design of the bulk TSF main embankment is at a conceptual stage. The application of numerical modeling to the design at its current stage would be inappropriate, because it would rely on ongoing geotechnical analyses and permitting reviews that have not been completed yet. As noted in PLP 2019-RFI 008g, the scope of the additional seismic and stability analyses would be specified in an Initial Design Package submitted to ADNR Dam Safety and Construction Unit, which would be negotiated after the EIS is complete; the work would then be completed as part of a later Preliminary Design package. As currently described in Section 4.15 and Appendix K4.15, additional detailed modeling, including analyses using numerical modeling software, would be completed during this later design phase to better define embankment displacements (PLP 2018-RFI 008a). Additional text has been added to Section 4.15 and Chapter 5, Mitigation, to describe PLP plans for package submittals to ADNR and additional modeling.
Earthquakes or seismic concerns—Pile Bay area faults	Faults and lineaments in the eastern area of Iliamna Lake could be active and are not addressed in the DEIS.	Several creeks and rivers in the area east of Iliamna Lake exhibit strong northeast-southwest linear trends, which probably follow structural weaknesses in bedrock in this area. Geologic maps and Landsat imagery were reviewed for evidence of surface fault activity in this area, and possible connection to seismicity associated with the Bruin Bay fault area to the northeast. A summary of the information has been added to Section 3.15, Geohazards and Seismic Conditions. Geologic maps of the Iliamna and Lake Clark quadrangles (Detterman and Reed 1980; Nelson et al. 1983) show several sub-parallel faults in bedrock that are sub-parallel to these drainages, particularly along the lower Pile

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		and Iliamna rivers; however, none of these offset Quaternary deposits. There are several discontinuous lineaments that can be seen on Landsat images in these drainages that are associated with river bluffs, glaciated slopes, and linear depressions or sag ponds in areas of shallow bedrock. A number of these have been previously mapped as faults, bedrock fracture/ joint lineaments, or foliation trends. Erosive or bedrock-controlled origins for these features cannot be ruled out. There is no conclusive evidence of lineaments or surface fault rupture in broader surficial deposits in lowlands near Iliamna Lake. Therefore, these are not included on Figure 3.15-1, which is intended to focus on active surface faults.
Earthquakes or seismic concerns—pit lake tsunami/seiche potential	The EIS should address the potential effects of tsunami or seiche generation in the full pit lake, such as earthquake-induced pit wall failure, as has occurred at other flooded pits.	Appendix K4.15 and Section 4.15, Geohazards and Seismic Conditions, describe the analysis of pit wall stability, which has been updated in the FEIS based on PLP 2019-RFI 023b (see response to SOC Earthquakes or Seismic Conditions—Pit Wall Stability). Section 3.15 and Section 4.15 have been revised to clarify the terms tsunami and seiche. An assessment of the likelihood of earthquake/landslide-induced pit wall failure to cause a tsunami wave to overtop the pit rim has been added to Appendix K4.15 and Section 4.15. PLP 2019-RFI 023b provides the basis for estimating the location and size of the pit wall failures considered. Based on modeling conducted by AECOM (2019p), such an event is not expected to overtop the rim, and the likelihood of a seiche (earthquake-induced standing wave) overtopping the rim is considered less than that of a landslide-induced wave.
Earthquakes or seismic concerns—Pit Wall Stability	Clarification is needed in the EIS regarding the approach, input parameters, and background documents used in the pit wall stability analysis. Commenter suggested additional analyses should be conducted using higher earthquake ground shaking, more rigorous dynamic methods, for an additional area of the pit, and a full pit lake scenario.	FEIS Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, provide the results of stability modeling of the open pit walls for five mine phases and water table scenarios: late operations; early closure with active drains; early closure with dewatering pumps turned off and water table rising; half-full pit lake; and post-closure when the pit lake is full. Text has been clarified to reflect the phases analyzed. Additional technical details have been added to Appendix K4.15 regarding geotechnical input parameters, model methods, and rock disturbance (D) factor zones used in the model. The results of an additional section modeled through the western area of the pit with weak rock, as well as the results of all sections modeled using multiple earthquake scenarios, have been added based on new information provided in PLP 2019-RFI 023b. The table summarizing model results has been moved to Section 4.15, and technical details have been added only to Appendix K4.15 in an effort to streamline the main text.

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Earthquakes or seismic concerns—Port stability	Several concerns were expressed regarding the analysis of dock stability in the DEIS, including clarification regarding the selection of maximum earthquakes in the port design; potential liquefaction should be considered; structural analysis should be done on the dock, coupled with embedded pilings for the pile-supported dock variant; and batter piles should be considered to improve lateral stability. Additional field investigation and structural and stability analyses should be conducted now, or a Supplemental EIS should be conducted to allow the public to review later information.	The discussion on dock stability in Section 4.15, Geohazards and Seismic Conditions, has been updated for the FEIS based on a revised project design to add consideration of a caisson-supported dock (PLP 2019b) and seismic design considerations in PLP 2019-RFI 160. The discussion of seismic hazard analysis for the port in Section 4.15 and Appendix K4.15 has been revised based on updated assessments (Knight Piésold 2019b, d) received as part of PLP 2019-RFIs 008g and 139. The potential for liquefaction and plans for structural design at the Amakdedori port site have been updated in Section 4.15, based on PLP 2019-RFI 160. However, as acknowledged in the EIS, the project design is at a conceptual stage, and the application of additional structural and stability analyses to the design at its current stage would be inappropriate, because they would rely on additional geotechnical analyses that have not been completed yet. As described under SOC NEPA Process—Conceptual Design Level Only, NEPA does not require that engineering plans are at an advanced design level to analyze impacts, and frequently conceptual-level design information is used. If the design changes appreciably after NEPA analysis, USACE would evaluate if permit modifications or reevaluation under NEPA would be needed. Text has been added to Chapter 5, Mitigation, to indicate that PLP has committed to conducting additional geotechnical investigation and stability analyses prior to final design (PLP 2018-RFI 005; PLP 2019-RFI 160; PLP 2020-RFI 071c); and to Appendix M1.0, Mitigation Assessment, for consideration of additional structural analyses. The recommendation to consider batter piles, which would only apply to the pile-supported dock option, is not considered current industry standard for docks in high seismic zones, because they have not performed well historically in areas with moderate to high ground deformations (ASCE 2014).
Earthquakes or seismic concerns—Post-closure embankment stability	Concerns were expressed regarding stability of the bulk TSF main embankment over the long-term in post-closure; that infiltration through the cover could have an effect on embankment stability; and that static and seismic stability analyses of the embankment in post-closure should be provided in the EIS.	Chapter 2, Alternatives, Section 4.15, Geohazards and Seismic Conditions, and Section 4.27, Spill Risk, describe how the bulk TSF would be closed with a low-permeability cover to reduce tailings saturation, lower the phreatic surface, and improve embankment stability over time. The analysis of static and seismic stability in Section 4.15 and Appendix K4.15 of the DEIS was based on a conservative late-operations case when the embankments, tailings surface, and water levels would be at their highest elevation. Geotechnical experts at the EIS-phase FMEA technical meeting rated

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		the likelihood of embankment crest deformation in post-closure causing a breach to be very low (AECOM 2018l), given that static analyses indicate adequate FoS' under normal loading conditions; the phreatic surface would continue to lower over time; the embankment would be constructed of compacted rockfill founded on bedrock with limited potential for dynamic settlement; and design advancement would include further seismic stability analysis. Additional information received through RFI 130 on closure cover infiltration and post-closure stability analyses has been added to Appendix K4.15 and Section 4.15 to further address evaluation of these impacts over the long-term.
Earthquakes or seismic concerns—Potential for Embankment Liquefaction	Concerns were expressed that materials used to construct the bulk TSF main embankment could liquefy during an earthquake.	A well-designed and -constructed rockfill or earthfill embankment, including the filter/transition (F/T) zones, would not be susceptible to liquefaction because the materials would be too coarse to liquefy. However, if the embankment is poorly constructed, includes a lot of fine material in the fill, becomes saturated, and flow-through seepage breaks down, then liquefaction becomes possible. Several sensitivity analyses were run on liquefaction scenarios in PLP 2019-RFI 008h, including one in which the phreatic surface (water level) is higher in the embankment. The results of this analysis, as well as additional information on embankment design and rockfill and F/T zone gradation from PLP 2019-RFI 008h, have been added to Appendix K4.15, Geohazards and Seismic Conditions.
Earthquakes or seismic concerns—Seismic analysis in EIS compared to EPA assessment	The DEIS contains far fewer studies regarding seismic analyses than were referred to in the EPA Watershed Assessment.	The discussion of seismic setting in the EPA (2014) assessment provides similar text on the subject of regional seismicity and major active faults to that presented in DEIS Section 3.15, Geohazards and Seismic Conditions. The discussion of the operating basis earthquake (OBE) and MDE in the EPA assessment are based on outdated Northern Dynasty reports; these design earthquakes have been updated in the EIS based on more recent analyses (Knight Piésold 2013, 2019d), which provide more conservative (higher) ground shaking predictions than those in the EPA assessment for which the embankments would be designed. Although the EPA assessment acknowledges that the TSF embankments would be engineered structures, it does not provide project-specific analysis of seismic stability, because the current project-specific structures had not yet been proposed. The EPA (2014) information on tailings dam failures cites causes from seismic failures over the last 100 years without distinguishing between

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		older dams and those designed to modern seismic standards of the last few decades that would be pertinent to the embankment design and seismic analyses. Geotechnical experts at the EIS-phase FMEA rated the probability of seismic failure of mine site embankments as very low, based on both current site-specific analyses and an assumption of additional typical industry-standard analyses and design refinements that would be conducted as the project progresses through the state dam safety permitting process. Text has been added to Chapter 5, Mitigation, describing additional seismic analyses that PLP has committed to conducting.
Earthquakes or seismic concerns—Seismic focusing	The seismic hazard analysis should take into account local variability in topographic effects and soil/rock conditions that can cause intensification of seismic energy (e.g., Katebi et al. 2018). Without considerations of these effects, the current analysis could be underestimating peak ground acceleration.	The peak ground accelerations predicted by the earthquake attenuation equations used in PLP's seismic hazard analyses reports (Knight Piésold 2013, 2019d; Power et al. 2008; Bozorgnia et al. 2014) are derived from ground motion data recorded on a variety of local geologic types. The subset of these data for soft soil to hard rock sites, which are relevant to the mine site, implicitly include topographic effects, because the recording sites are typically in areas of moderate to high topographic relief. The Kalebi et al. (2018) study is based on an oversimplified 2-D model, and is not directly applicable to the mine site. No change was made to the EIS as a result of this comment.
Earthquakes or seismic concerns—Seismic Stability Analysis—Bulk TSF Main Dam	Concerns were expressed regarding stability of the bulk TSF embankment in a major earthquake, and that additional and updated information is needed regarding seismic stability analyses conducted on this embankment, such as the differences between the previous section modeled and the current proposed design, earthquake input parameters, spectral acceleration of earthquakes used in the analysis, estimated displacements, and model backup data.	The seismic stability analysis of the bulk TSF main embankment discussed in DEIS Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, was based on an analysis of a former larger design of the embankment using an empirical method of Swaisgood (2003), in which pseudo-static (horizontal) loads are applied to a structure to simulate earthquake forces. Since the DEIS was published, seismic stability analysis of the current design of the bulk TSF main embankment has been provided in PLP 2019-RFI 008g, using updated seismic input parameters (Knight Piésold 2019) and a different pseudo-static method (Bray and Travasarou 2007), which takes into account longer-period ground-shaking effects and behavior of the dam structure. Section 4.15 and Appendix K4.15 have been revised based on the more recent analysis. PLP 2019-RFI 008g provides backup data for the revised analysis. Additional stability analyses would be performed as design and permitting progress (e.g., see response to SOC "Earthquakes or Seismic Concerns-Numerical Seismic Modeling").

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Earthquakes or seismic concerns—Seismic Stability Analysis—Other Embankments	Concerns were expressed that there is no pseudo-static (seismic) stability analysis of mine site embankments other than the bulk TSF main embankment in the EIS, and that the other embankments should be analyzed and presented in the impact assessment. In a related comment, ADNR Dam Safety noted that smaller dams such as at the seepage collection ponds (SCPs) are also subject to regulation, and that they would evaluate the design of these after applications for state authorizations are received.	Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, in the DEIS present the results of seismic stability analysis for only one of several major embankments that are proposed at the mine site (the bulk TSF main embankment) because PLP 2018-RFIs 008a and 008b indicated that seismic stability analyses for other major embankments would be completed in future design phases during ADNR dam safety permitting. Since the DEIS was published, PLP 2019-RFI 008g provided the results of a revised pseudo-static analysis for the bulk TSF main embankment design, based on updated maximum earthquake parameters (Knight Piésold 2019) and a different pseudo-static method (Bray and Travasarou 2007) than was previously used for that structure. Given the comments on the DEIS and the revised seismic parameters/methods used for the bulk TSF main embankment, RFI 008i requested pseudo-static analyses for the other major mine site embankments (bulk TSF south, pyritic TSF, and WMPs) using the same method. Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, of the FEIS were updated with information from response to RFI 008i, which was used to assess the impacts of earthquakes on these other embankments. Stability analyses of smaller embankments such as the SCPs would be evaluated during ADNR dam safety permitting. Potential effects of unstable conditions on these structures would be less than those evaluated for the large embankments in Section 4.15, Geohazards and Seismic Conditions, and Section 4.27, Spill Risk.
Earthquakes or seismic concerns—Stacked container stability	The potential for toppling of stacked concentrate storage containers in an earthquake should be further addressed in the EIS.	The likelihood of stacked container toppling is considered relatively low for the following reasons. The concentrate containers would be 6 feet high (shorter than the industry standard of 8 feet), and would be stacked up to three containers high (shorter than the industry standard of 5 or 6 containers). There were no toppling effects from stacked containers reported at the Port of Alaska during the November 2018, magnitude 7.1 Anchorage earthquake. Locked pins that fit the containers together add to stability during ground shaking. Text has been added to Section 4.15, Geohazards and Seismic Conditions, to disclose the above hazard and likelihood of occurrence. In the event that toppling and container spillage does occur, effects on the environment are expected to be similar to those described in Section 4.27, Spill Risk, for concentrate spills.

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Earthquakes or seismic concerns—State dam safety guidelines	Comments stated that the EIS should demonstrate that mine site embankments comply with State of Alaska dam safety draft guidelines, consider the legal requirements of State statutes versus draft ADSP guidance, and describe how specific embankment criteria (e.g., maximum earthquakes, safety factor, slopes) are appropriate and conservative for site conditions.	Section 4.15, Geohazards and Seismic Conditions, describes how site-specific maximum earthquakes have been selected for mine site embankment design in accordance with draft ADSP draft guidelines and accepted industry practices. The text in this section has been reviewed and edited as appropriate to make this clear. The selection of four earthquakes from the deterministic seismic hazard analysis as MCEs to be considered in embankment design demonstrates a careful approach to identifying the highest seismic risk and the effects of different types of ground motions on these structures. Text has also been added to Section 4.15 describing the legal requirements of state statutes; the minimum standard of care in the ADSP draft guidance versus industry standard of care; and (FoS) limitations and goals with respect to slope stability model inputs and results. The FoS' presented in the EIS are acknowledged by PLP as being preliminary, and would be subject to further evaluation and more rigorous modeling as design progresses. The slope stability inputs to the preliminary FoS results have been reviewed compared to values in the literature and engineering experience, and are considered appropriate for site conditions, given that embankment designs considered in the EIS are conceptual, and that although site conditions are generally known, additional geotechnical analyses would be conducted prior to future slope stability modeling as design progresses.
Earthquakes or seismic concerns—Tailings Liquefaction and Stability Upstream Face	Concerns were expressed regarding the likelihood of the bulk tailings liquefying in an earthquake, and the upstream vertical (or zig-zag) face of the bulk TSF main embankment failing. Comments expressed that additional information is needed regarding how the tailings were modeled in a previous pseudo-static (seismic) stability analysis, both before and after liquefaction, as well as input parameters, assumptions, and model backup data.	As discussed in Appendix K4.15, Geohazards and Seismic Conditions, the EIS-phase FMEA considered the likelihood of seismic instability of the upstream face of the centerline-constructed bulk TSF main embankment, based on information provided in response to RFI 008 (which provided a summary of post-liquefaction analysis of a former, larger design of the embankment), as well as discussion among geotechnical experts at the FMEA. As a result of detailed technical comments received on the DEIS, PLP 2019-RFI 008g provided revised stability analyses under several tailings liquefaction scenarios using updated maximum earthquake parameters. RFI 008h further explores the potential effects of deeper tailings liquefaction (to the full depth of the centerline), sensitivity analyses on embankment yield acceleration in an earthquake, higher phreatic surface (groundwater) levels in the embankment, operational practices to ensure drainage and minimize saturation of coarser tailings fractions near the centerline, and examples of similar flow-through centerline dams worldwide. The

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		results provided in responses to RFIs 008g and 008h and a technical memorandum (AECOM 2019n) have been used to revise the discussion of tailings liquefaction effects in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions; describe additional testing and analysis that PLP would be conducting as design progresses under state permitting in Chapter 5, Mitigation; and provide recommendations for future analyses in Appendix M1.0, Mitigation Assessment.
Earthquakes or seismic concerns—Tailings pond seiche impacts	Impacts from seiche waves that could occur in tailings ponds during a large earthquake should be evaluated.	The potential for seiche wave development in an earthquake is related to the length (or width) and depth of a waterbody, and its natural oscillation period compared to that of earthquake ground motions (e.g., Proudman 1953). The likelihood of this hazard occurring at the bulk and pyritic TSF ponds is considered very low because of their large size and the shallow depth of water cover. No change was made to the EIS as a result of this SOC.
Earthquakes or seismic concerns—Transverse cracks	Horizontal seismic forces parallel to the longitudinal axis of the embankment could cause transverse cracks, which could lead to pathways for flow and erosion. An analysis should be performed to assess the potential for this type of impact, which cannot be accomplished with the simplified models used in the DEIS.	Potential tension zones in an earthfill embankment cannot be realistically addressed until final design, following completion of geotechnical investigations, design of embankment zones, and confirmation of geotechnical parameters for these zones. As noted in the comments, these are typically analyzed by finite element methods that take into account boundary conditions and stress-strain characteristics of the materials. Such analyses have shown that susceptibility to cracking can be reduced by shaping of foundation and zone interfaces, proper compaction of the upstream shell to minimize settlement, selection and treatment of core materials to ensure relatively high plasticity, placement of a well-graded sand and gravel zone on the upstream side of a core as a stopper for crack development, sufficiently wide F/T zones to mitigate against shrinkage and seismic forces, staged construction to minimize embankment settlement, and monitoring. As indicated in the response to SOC Earthquakes and Seismic Concerns—Numerical Seismic Modeling, the DEIS acknowledges that the design of mine site embankments is at a conceptual stage. The scope of additional analyses would be specified in an Initial Design Package submitted to ADNR Dam Safety and Construction Unit, which would be negotiated after the EIS is complete; the work would then be completed as part of a later Preliminary Design package (PLP 2019-RFI 008g). As described in Section 4.15 and Appendix K4.15,

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		Geohazards and Seismic Conditions, additional detailed modeling, including analyses using numerical modeling software, would be completed during this later design phase to better define embankment displacements (PLP 2018-RFI 008a). Text has been added to Appendix K4.15 to describe this concern, and a recommendation added to Appendix M1.0, Mitigation Assessment, to address the potential for transverse cracking as part of numerical modeling studies in a later phase of design.
Earthquakes or seismic concerns—Tsunami analysis Cook Inlet	Based on tsunami information presented in DEIS Section 4.15, Geohazards and Seismic Conditions, which identifies the potential for a major tsunami to exceed the current port facility's elevation, comments suggest that the port needs to undergo site-specific tsunami analysis and design changes during the EIS process. Additional concerns were expressed that a volcano-generated tsunami could present greater impacts than seismic-generated events; that potential interaction of loose concentrate containers and hazards to vessels from water drawdown are not discussed; and that a combination of high tides, storm surge, waves, subsidence (seismic or settlement), and sea level rise should be included in site-specific tsunami runup analysis.	As described in DEIS Section 4.15, Geohazards and Seismic Conditions, and PLP 2019-RFI 112, PLP has committed to completing a detailed tsunami analysis prior to final port design that would include probabilistic assessment of tsunamis from both earthquakes and volcanic debris-avalanche sources. A risk analysis would be undertaken for various port components (such as concentrate containers) to determine the associated risk level and associated design event. Facilities would be designed to withstand tsunami forces and protect against debris impacts. As noted under SOC NEPA Process-Conceptual Design Only, NEPA does not require that engineering plans are at an advanced design level to analyze impacts, and frequently, conceptual-level design information is used. If the port design changes appreciably after NEPA analysis, USACE would evaluate if permit modifications or reevaluation under NEPA would be needed. After publication of the DEIS, the Amakdedori port design was revised to reduce potential impacts to the marine environment, and the elevation of the shore-based facilities was raised 5 feet to account for tsunami runup potential (PLP 2019b). Revisions of text addressing tsunami analysis have been made in Section 4.15 based on the design revision (PLP 2019-RFI 112a). In addition, text has been added to Section 4.15 to describe potential water drawdown impacts, and text has been edited in Section 4.15 to emphasize the likelihood of debris avalanche-generated tsunamis to impact port facilities. Mitigation measures for additional tsunami analysis and other protection measures have been added to Chapter 5, Mitigation, and Appendix M1.0, Mitigation Assessment.

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Earthquakes or seismic concerns—Tsunamis in Iliamna Lake	The potential for tsunami generation in Iliamna Lake should be discussed (in addition to seiche or standing wave potential). The EIS confuses the two types of hazards; understates seiche potential and does not consider the possibility of seiche-induced currents and seiche-wind wave interactions; and should provide additional analysis of tsunami potential from submerged faults, seismic tilting, or subaerial or submerged landslides, particularly around the steep eastern end of the lake.	The definition and usage of the terms tsunami and seiche in Section 3.15 and Section 4.15, Geohazards and Seismic Conditions, have been reviewed and edited as appropriate. The potential for seiches to occur in Iliamna Lake is discussed in Section 4.15: under the Applicant's Preferred Alternative and Alternative 1 for the middle portion of the lake; and under Alternative 2 for the narrow eastern end of the lake. Based on the results of seiche calculations in the lake (AECOM 2018d), which indicate little to no likelihood of occurrence, the likelihood of related currents and wind wave interactions is also considered minimal. Text in Section 4.15 has been added to discuss the potential for tsunamis from local submerged seismic or landslide-induced sources. In addition, recommendations have been added to Appendix M1.0, Mitigation Assessment, for additional tsunami modeling prior to final design of shore-based structures, and lake engineering analysis to assess environmental conditions (including tsunamis) that could occur during ferry operations.
Earthquakes or seismic concerns—Update seismic hazard analysis	Comments noted the seismic hazard analysis should be updated to include more recent methods and earthquake data.	The deterministic and probabilistic seismic hazard analyses described in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, were based primarily on information in a Knight Piésold report (Knight Piésold 2013). A review of this report identified several issues to be considered in an update to the 2013 study, and PLP committed to doing so as part of design and reporting requirements during Alaska Dam Safety permitting (PLP 2018-RFI 008c). Since the DEIS was published, PLP completed an update of the seismic hazard analyses (Knight Piésold 2019b; PLP 2019-RFI 008g). A review of the updated analyses resulted in several additional recommendations regarding state-of-practice modifications of models and equations used in predicting ground motions from intraslab and subduction-zone earthquakes, and providing longer period response spectra and acceleration time histories that are used to model embankment stability (PLP 2019-RFI 008h; Knight Piésold 2019d). The information provided in PLP 2019-RFIs 008g and 008h has been used to update the seismic hazard analyses text and tables in Section 4.15 and Appendix K4.15.

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Earthquakes or seismic concerns—Volcano impacts on project infrastructure	Concerns were expressed that observed volcanic activity is related to recent earthquakes; and that the EIS should address the location of the pipeline in relation to Augustine volcano, and impacts to the pipeline and other project components in the event of an eruption.	The distance and location of active volcanoes relative to project infrastructure are provided in Section 3.15, Geohazards and Seismic Conditions, and shown on Figure 3.15-4. The effects of future activity from Augustine volcano as relates to the potential for ashfall effects on project equipment and operations, and landslide-induced tsunamis, are addressed in Section 4.15, Geohazards and Seismic Conditions (see also SOC Earthquakes or Seismic Concerns—Tsunami Analysis Cook Inlet). Text has been added to Section 3.15 and Section 4.15 to describe potential effects on the pipeline and the results of shallow hazards surveys near the volcano conducted in 2019. Effects at the mine site would be mostly related to ashfall (as described in Section 4.15). Earthquake swarms can sometimes be associated with volcanic activity. These are typically small in magnitude and less than the design earthquakes for the mine site and port structures.
Environmental or Social Justice—Additional clarification	The exclusive use of the 50 percent threshold in the CEQ guidance to define a minority community could result in missing smaller communities, segments, or pockets of low-income, minority, or vulnerable populations in larger community settings who might be impacted. The EIS should provide the rationale for selecting the 50 percent threshold definition of minority community, and no other available methodologies from the CEQ, EPA, or the Federal Interagency Working Group on Environmental Justice.	The CEQ's "Environmental Justice: Guidance Under the National Environmental Policy Act" (1997) states that in identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals (such as migrant workers or Native American), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. The data presented in Section 4.4, Environmental Justice, represent the smallest geographic extent where US Census data are available. As discussed in Section 4.4, Environmental Justice, data were obtained from the US Census Bureau 2013-2017 American Community Survey (ACS). Estimates from the ACS are all "period" estimates that represent data collected over a period of time (as opposed to "point-in-time" estimates, such as the decennial census, that approximate the characteristics of an area on a specific date). The primary advantage of using multi-year estimates in the analysis is the increased statistical reliability of the data for less populated areas and small population subgroups, such as those in the vicinity of the project site. Therefore, Section 4.4, Environmental Justice, has adequately identified minority and low-income populations that could be affected by the project. No changes were made to the EIS.

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Environmental or Social Justice—Data and Process	In Section 4.4, Environmental Justice, the first bullet point of the EPA definition concerns risk of hazard exposure, yet health impacts are listed so late in the discussion of environmental justice; and additionally, the first health impact noted is that mine-related jobs are cited as improving health through increasing incomes. Presumably these positive health impacts would be most felt by the 250 local people that would be employed. Even if this mechanism is the predominant one salient to environmental justice, it is interesting that this positive impact is listed first, only followed below by a suite of possible negative factors.	Section 4.4, Environmental Justice, builds on the Needs and Welfare of the People—Socioeconomics, Subsistence, and Public Health sections of the EIS. Section 4.4 analyzes impacts in the order they are discussed in those sections of the EIS. No changes were made to the EIS.
Environmental or Social Justice—EJ-Economic Value	Concerns were expressed about threats to food security/ sovereignty due to cultural significance of Cook Inlet seafood to Alaska Natives, and that the project would have a negative economic impact in terms of food security. Concern was expressed about the salts that come from this area that are currently being used to provide economic support to local communities.	Section 4.3, Needs and Welfare of the People—Socioeconomics, Section 4.9, Subsistence, and Section 4.10, Health and Safety, describe impacts to affected communities and the population in the EIS analysis area for these resources. Section 4.4, Environmental Justice, draws on those sections to consider the social, health, and welfare effects of the project on those living in the area. There is no known salt harvesting in the area. No changes were made to the EIS analysis.
Environmental or Social Justice—Human Rights Declaration	A commenter asserted that the project would violate Article 3 of the Universal Declaration of Human Rights.	Comment acknowledged; this declaration is not applicable to the project. No changes were made to the EIS.
Environmental or Social Justice—Inadequate Analysis	The DEIS does not address the environmental justice impacts to the communities that would be the most impacted, and only looks at the socioeconomic impacts, which are not indicative of the way of life in the region.	Section 4.4, Environmental Justice, draws on information from the following sections to analyze the environmental justice impacts to communities: Section 3.3, Socioeconomics; Section 3.9, Subsistence; and Section 4.10, Health and Safety. No changes were made to the EIS as a result of this comment.
Fish and Aquatic Resources—Baseline Data	Concerns were expressed about the geographic scope, frequency, and age of the environmental baseline data in regard to the fish distribution and abundance and the aquatic habitat surveys. Concerns were specifically expressed about the baseline data collected for the mine site, Iliamna Lake, Cook Inlet, and waterbodies crossed by the transportation corridor.	The Pebble Mine site and associated transportation alternatives have received some of the most intensive fish sampling efforts in the State of Alaska. All fish composition, distribution, and abundance information was based on the latest information available, including the Anadromous Waters Catalog (AWC) database, 10 years of project-specific sampling as detailed in the Pebble Project Environmental Baseline Document (EBD) documents (R2 et al. 2011; R2 et al. 2018; Pentec Environmental/Hart Crowser 2011; Hart Crowser 2015), supplemental data collections by PLP in 2018 (Geoengineers 2018;

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		Paradox 2018), and contributions from agency biologists in earlier drafts of this document. Comments received during scoping raised concerns that some of the data are not current because significant PLP data collection efforts were conducted several years ago. A data gap analysis conducted prior to writing the DEIS considers the age of the data, the sufficiency of the data in terms of quality and quantity, and whether these factors meaningfully affect the evaluation of impacts. This data gap analysis considered whether and to what degree the age of the data affects relevancy to impact analysis. The analysis did not determine that age of environmental baseline data in regard to fish distribution and abundance and aquatic habitat surveys constituted a data gap. A description of the data gap analysis is provided in Section 3.1, Introduction to Affected Environment. Salmon spawning surveys were conducted via aerial overflights over a 6-year period (2004-2009), with multiple surveys at 1- to 3-week intervals during spawning seasons for four species of salmon. Spawning surveys included mainstem reaches of the NFK, the SFK, UTC, and several primary tributaries. All told, 235 surveys were conducted in mainstem reaches and 156 surveys covered tributary reaches. Fish rearing surveys for fry, juvenile, and adult fish were conducted using multiple fish sampling protocols (snorkeling, electrofishing, seining, minnow trapping) in mainstem and tributary reaches of the NFK, SFK, and UTC over an 8-year period (1991, 1993, 2004-2009). Sampling occurred at over 1,800 locations representing 19 mainstem reaches and over 75 tributaries, encompassing headwater reaches well upstream of the mine site, tributaries directly affected by mine development, and mainstem reaches approximately 23 miles downstream of the mine site. Baseline data evaluated for this EIS included additional surveys conducted by ADF&G, non-governmental organizations, and other biologists throughout the EIS analysis area. Instream aquatic habitat assessments were conducted at most fish sampling sites, and at intermediate locations via aerial photography. Fish and aquatic habitat assessments also occurred in 15 off-channel survey locations distributed among the NFK, SFK, and UTC mainstems over a 5-year period. Fish distribution and species composition was

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		assessed during winter months in 4 years of study at over 150 locations. Fifteen fish and aquatic habitat surveys were conducted in Iliamna Lake at three proposed ferry terminal sites in 2018. Surveys at each port site included aerial overflights, snorkel counts, seining surveys, littoral zone substrate assessment, depth profiling, and water quality sampling. A 3-year telemetry study was also conducted to monitor lake and riverine spawning, foraging, and overwintering locations of adult rainbow trout captured and tagged in UTC and Lower Talarik Creek. Zooplankton collections were made monthly (May through October) at five sites in Iliamna Lake in 2005 and 2007. Fish and aquatic habitat assessments were conducted from 2010 to 2018 at road and pipeline waterbody crossings for each of three transportation alternatives. Surveys for fish presence, species composition, and relative abundance were conducted at 30 road crossings associated with the mine access road (Preferred Alternative and Alternative 1), and at 65 road crossings associated with the port access road and variants (Preferred Alternative and Alternative 1). For the North Road and pipeline alternative (Alternative 3), sampling occurred at 60 locations representing 27 study sites, including sites upstream and downstream of the crossing location. Fish, benthic invertebrate, and aquatic habitat data were collected at seven locations in Cook Inlet/Kamishak Bay in 2013 and 2018, including both port sites (Amakdedori and Diamond Point), as well as intervening bays. Fish sampling involved beach seine, otter trawl, and eelgrass/herring spawn surveys. In addition, the distribution of herring spawning and associated marine macrophytes have been monitored by ADF&G and others for several years prior to mine-related sampling. Section 3.24 and Section 4.24, Fish Values, have been revised to better present the aquatic resources baseline data and their application in the impacts analysis.
Fish and Aquatic Resources—EIS Implies No Impact to Salmon	Comments were received expressing concern that the EIS concluded there would be no impacts to salmon. Some reviewers pointed out the contrast with the EPA Watershed Assessment that concluded there would be unacceptable salmon impacts. Other reviewers pointed out that the Draft EFH Assessment (Appendix I) documented impacts to salmon habitat, and the EIS appeared to ignore those impacts.	The EIS documents the changes that would occur to the physical environment from the project such as filling streams, changes in stream flow, water quality, and water temperature. Section 3.24, Fish Values, describes how fish use the habitat/streams that would be impacted by the project. Section 4.24, Fish Values, assesses impacts to fish from the loss and modification of fish habitat that would be likely from the project. Section 4.24 concludes that the productivity of the

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		habitat is marginal overall, and higher-quality habitat is available in lower reaches of the system. The loss of the marginal habitat would not be expected to result in detectable changes in the numbers of returning adult salmon available for harvest in the commercial, recreational, or subsistence fisheries. Impacts described in Section 4.24 align with impacts described in the EFH Assessment in Appendix I. Section 3.24 and Section 4.24 have been revised to more clearly present the aquatic resources baseline data and impacts analysis. Section 4.6, Commercial and Recreational Fishing, concludes that because the numbers of returning adult salmon are not expected to experience detectable changes, future harvests would be within the natural variability of the runs, and there would be no discernible change to commercial and recreational fishing. The EPA BBWA was prepared for a different purpose, and analyzes a hypothetical project, whereas the EIS analyzes the specific Applicant's project. In addition, the BBWA relies on different assumptions and assessments regarding loss of habitat and fish populations; the assessment of impacts in the EIS reaches a different conclusion.
Fish and Aquatic Resources—Fish-Impacts—HDD	Concerns were raised about the inadvertent release of drilling fluids and cuttings associated with horizontal directional drilling (HDD) under streams, wetlands, lakes, and Cook Inlet. A request was made to identify all HDD crossings in the FEIS.	Potential HDD locations are identified in Section 2, Alternatives, of the EIS. As described in Chapter 5, Mitigation, PLP has committed to developing detailed HDD plans during final design for each HDD crossing prior to construction. Plans would include the geometry of the crossing profile, drill methods; such as HDD or direct pipe, methods such as P traps, and exit pits for drill fluid capture and composition at the transition of trenchless to trenched installation. The HDD plans would include measures to ensure that all regulations and permit stipulations are met. The plans would also outline measures to be implemented to avoid the potential for a frac-out of drilling fluids and cuttings, and measures to respond to a frac-out should one occur. Spill response plans will be followed in the event of an inadvertent release. Impacts and mitigation measures are also discussed in Section 4.17, Groundwater Hydrology, and Section 4.18, Water and Sediment Quality. Section 4.24, Fish Values, has been revised to include some of this information as applicable.

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Fish and Aquatic Resources—Fish-Mercury	Concerns were raised that the DEIS did not provide adequate assessment of mine-related mercury releases, its bioaccumulation, and toxicity through the food chain. Specific concerns were raised about potential impacts of mercury bioaccumulation and toxicity in fish and implications of fish tissue mercury on wildlife and human health. Concerns were also raised about changes in aquatic chemistry (from baseline conditions) as they relate to mercury bioavailability along the drainage due to the mining-related releases of mercury from WTPs, runoff, and depositions.	Predicted concentrations of mercury in the pit lake and discharges (effluents) at different stages of closure are provided in Appendix K4.18, Water and Sediment Quality. Based on predicted mercury concentrations and aquatic chemistry parameters, potential impacts of mercury have been discussed in greater detail in FEIS Section 4.24, Fish Values, with respect to its known potential for bioaccumulation and toxicity. Specific discussions on potential impacts of mercury on fish, wildlife, and humans have been provided in greater detail in the context of mercury methylation and methylmercury biomagnification. This expanded discussion is provided in the FEIS Appendix K4.10, Health and Safety; Section 4.23, Wildlife Values; and Section 4.24, Fish Values.
Fish and Aquatic Resources—Fish—Impacts—Groundwater	Concerns were raised that the DEIS did not clearly identify the spatial impacts to fish spawning and rearing habitats from altered surface and groundwater flows during mine operations.	Section 4.24, Fish Values, has been revised to better address the potential impacts from surface and groundwater dewatering. As described in 4.24, detailed modeling results indicate that most of the streamflow impacts would occur from changes to surface waters, although reductions to the groundwater contribution to streamflow would be negligible. This analysis indicates that the distribution of spawning and wintering habitats related to groundwater inputs in the analysis area should remain largely unaffected. Section 4.24 has also been revised to better address the potential impacts from changes in water temperatures, water chemistry, and habitat alterations on fish and fish habitat. New modeling results and a new figure have been added to address spatial impacts from surface water changes.
Fish and Aquatic Resources—Fish--Iliamna Lake—Zooplankton	Concerns were expressed that the DEIS did not adequately describe the ecology of zooplankton in Iliamna Lake; the relationship between phytoplankton, zooplankton, and plankton-feeding fish such as sockeye salmon smolts; or the potential impacts to plankton and fish from project operations on Iliamna Lake.	Section 3.24, Fish Values, of the EIS has been revised to describe Iliamna Lake's zooplankton community and their importance in the aquatic food web. The potential impacts to the aquatic food web from project operations has been addressed in Section 4.24, Fish Values.
Fish and Aquatic Resources—Fish-Affected Environment	Concerns were expressed that descriptions of existing fish resources in the project area are inadequate and lacking sufficient detail to assess potential impacts. Specific comments requested that fish distribution and abundance data include area-based density estimates that better describe temporal and spatial variability; increase information on non-salmonids species; better describe genetic variability in the study area; describe habitat and fish characteristics of Frying Pan Lake; and discuss the extent, importance, and fish use of off-channel habitat.	Section 3.24, Fish Values, has been expanded to include additional fish density data and distribution by life-stage. Expanded descriptions of the relationships between fish densities and habitat types, including off-channel habitat, have been provided. The discussion of impacts in Section 4.24, Fish Values, has been revised accordingly.

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Fish and Aquatic Resources—Fish-Blasting Impacts	General concerns were expressed about the lack of detailed information regarding blasting locations, estimated pressure, and vibration forces associated with blasting. Specific concerns were raised about the potential impacts of blasting on fish and embryos in fish-bearing waters.	Section 2, Alternatives, of the EIS describes the general procedures and blasting agents to be used. Appendix K2, Alternatives, provides information for each material site, including whether blasting would be required. Specific blasting locations along the road and pipeline corridor would be determined at final design. ADF&G requires blasting plans and mitigation measures as described in “Technical Report No. 13-03—Alaska Blasting Standard for the Proper Protection of Fish.” Section 4.24, Fish Values, has been revised to better describe the potential impacts to fish from blasting based on the proximity of fish habitat to blasting areas. Different fish life stages were considered in the analysis. Consistent with permit stipulations, blasting activities would be scheduled when the fewest species and/or least vulnerable life stages of species would be present. Regulatory compliance and collaboration with agency staff will likely result in overpressures and particle velocities below levels that have been shown to cause injury or mortality to fish.
Fish and Aquatic Resources—Fish-Biotic Ligand Model	Concerns were raised on the impacts of mine-related copper on aquatic organisms, particularly fish. Specific concerns were expressed that the impact assessment was inadequate with respect to the sublethal adverse effects of copper on fish, such as potential impairment of olfaction and homing capabilities in salmon at levels expected in the surface waterbodies due to permitted discharges and other diffuse releases. Aquatic life criteria based on hardness adjustment was indicated to be insufficiently protective, and therefore more protective aquatic life criteria based on the Biotic Ligand Model were suggested to evaluate impairment of olfaction and homing capabilities in fish species. Another specific concern raised involved the adequacy of the current fugitive dust deposition modeling and evaluation, and need for assessing the impacts of copper released via mine-related fugitive dust and road dusts.	Adverse effects of copper on aquatic organisms at various trophic levels has been described in greater detail to clarify potential mine-related aquatic impacts of copper. Discussions have been expanded on ADEC’s hardness-based copper water quality criteria (WQC) for aquatic life versus the WQC based on the Biotic Ligand Model, particularly with respect to copper-induced impairment of olfaction and homing capabilities in fish. Additionally, as a part of PLP 2019-RFI 009b response, copper has been included in the dust deposition modeling. Results indicate that the incremental dissolved copper concentration in the area surface waterbodies (5 to 7 percent over baseline) is not sufficient to result in exceedances of the WQCs. Discussions of these results in the context of potential aquatic impacts of copper will be provided. This information has been included in the EIS. Quantitative assessments will not be conducted based on the copper Biotic Ligand Model for the spill/release scenarios because a high level of uncertainty would be involved in trying to predict/estimate location-specific values for ten water quality input parameters that are required for the application of the Biotic Ligand Model. As a result, the uncertainties in the outputs of the Biotic Ligand Model would be too high to yield any meaningful result. However, the expected concentrations of copper in the surface waterbodies through various mine-related releases have been discussed in the context of adverse impacts on aquatic organisms and fish populations.

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Fish and Aquatic Resources—Fish-Egg Development	Concerns were expressed that vibrations from mining activities proximal to spawning areas, and the potential for increased sedimentation and scouring flows due to vegetation removal, would negatively impact survival of incubating eggs.	Effects of sedimentation on water quality and fish habitat from development of the project are discussed in Section 4.18, Water and Sediment Quality, and Section 4.24, Fish Values, respectively. To mitigate effects, PLP has committed to developing a Stormwater Pollution Prevention Plan and an Erosion and Sedimentation Control Plan (EIS Table 5-2). Information has been added to Section 4.24 to describe potential sedimentation/turbidity impacts on fish during construction of mine infrastructure. Discernible vibration in spawning gravels due to truck traffic crossing bridges would be confined to the immediate vicinity of stream crossings, and is highly unlikely to result in a detectable effect on incubating salmonid eggs, survival to emergence, or juvenile and adult abundance. ADF&G has blasting guidelines to protect fish and incubating embryos (Section 4.24). Scouring flows sufficient to displace or injure fish eggs or embryos occur naturally; however, changes in surface flow patterns due to project discharge of treated water are not expected to increase the frequency or magnitude of flows capable of mobilizing spawning gravels. See Section 4.16, Surface Water Hydrology, for discussion of project operation on surface flows.
Fish and Aquatic Resources—Fish-Habitat Characterization	Concerns were expressed that descriptions of instream habitat and fish distribution and abundance in the project area were insufficient to assess the relative diversity, availability, and spatial arrangement, as well as the ecological function of habitats in mainstem, headwater, and off-channel reaches to specific life-stages of both anadromous and resident fish species. Questions were raised about the spatial and temporal variability in fish abundance in the project area in the context of larger spatial scales and species' life-stage requirements.	Section 3.24, Fish Values, has been expanded to include spatial and temporal variation of fish densities and distributions by life-stage. The revised section discusses the relationships between fish densities and habitat types, including relative use by life-stage, comparative abundance in mainstem versus headwater habitats, seasonal use of off-channel habitats, and influence of flow on the availability and diversity of instream habitat. The discussion of impacts in Section 4.24, Fish Values, has been revised accordingly.
Fish and Aquatic Resources—Fish-Impacts Analysis – General	General concerns were expressed that the DEIS did not adequately address a wide variety of potential impacts to aquatic habitat and dependent aquatic species in freshwater streams draining the mine site, Iliamna Lake, and marine environments proximal to terminal facilities. Increased assessment of effects due to dam failure, climate change, flow modifications, water quality impacts, direct habitat loss, etc., and interactions between stressors, should be incorporated into the EIS.	Potential impacts from development and operation of the mine site, transportation, and natural gas pipeline corridors on fish in freshwater streams and lakes have been expanded in Section 4.24, Fish Values. Impacts to marine resources proximal to terminal facilities are described in Section 4.23, Wildlife Values, Section 4.24, Fish Values. and Section 4.25, Threatened and Endangered Species. Direct, indirect, and cumulative impacts are disclosed, including habitat loss and alteration, disturbance, water quality, and injury and mortality. Dam failure scenarios are addressed in Section 4.27, Spill Risk, and have been expanded to better describe the potential impacts. Impact discussions in these sections were clarified in the EIS, where applicable.

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Fish and Aquatic Resources—Fish-Impacts-Culverts	Concerns were expressed over the magnitude, extent, and duration of impacts associated with the construction and operations of culverts. Questions were raised about the potential for erosion, sedimentation, altered hydrology, and habitat simplification from the installation of culverts along the transportation corridor.	PLP has stated it would design culverts to optimize fish passage and use Best Management Practices (BMPs) for design, construction, and maintenance of culverts. Examples of the current practice in Alaska for culvert design, with associated stream bank and erosion control BMPs, can be found at the ADF&G website: https://www.adfg.alaska.gov/ index.cfm?adfg=fishpassage.restoration, and the USFWS website: https://www.fws.gov/alaska/pages/fisheries-aquatic-conservation. Text has been revised in Section 4.16, Surface Water Hydrology, and Section 4.24, Fish Values, to better describe the potential impacts from sedimentation and turbidity from the installation and operations of culverts. Section 4.24 has also been revised to better address the impacts associated with the changes and loss of side channel habitat. Chapter 5, Mitigation, and Table 5.2 provide mitigation measures for addressing erosion and sedimentation.
Fish and Aquatic Resources—Fish-Impacts-Duration	Concerns were raised that the duration of certain impacts to aquatic resources described in the DEIS were incorrect. Many impacts that were determined to be long-term should be considered permanent.	The use of the terms permanent and long-term to describe impacts in Section 4.24, Fish Values, has been reviewed for consistency. Impacts have been identified as permanent if the duration is for the life of the project. Edits were made to the FEIS where applicable.
Fish and Aquatic Resources—Fish-Impacts-EFH	Concerns were expressed that the EIS did not do an adequate job of analyzing impacts to EFH. Comments were received on the Draft EFH Assessment prepared by PLP and their contractor (included as Appendix I in the EIS).	EFH habitat characteristics are described in Section 3.24, Fish Values, and Appendix I. The EIS analyzes potential impacts to fish and fish habitat in Section 4.24, Fish Values. This analysis includes habitat designated as EFH in the EIS analysis area. Comments specific to the EFH Assessment (Appendix I) were reviewed to determine if comments were relevant to the EIS. The EIS was updated where comments made on PLP's EFH Assessment were determined to be applicable to the analysis in the EIS. Otherwise, comments specific to the EFH Assessment were not addressed directly in the EIS.
Fish and Aquatic Resources—Fish-Impacts-EIS Analysis Area	Concerns were expressed that the description of impact area is too restrictive and does not encompass all areas potentially directly or indirectly impacted by the project, and that areas outside of the fixed area around the mine were not adequately mapped. The rationale for using a 2 percent threshold for determining the analysis area should be explained. Additional questions were raised about the geographic extent of downstream effects to habitat from changes in flow regimes and spills or upset conditions.	Environmental baseline conditions are described for the EIS analysis area for each project component and alternative. This is the area where potential impacts, both direct and indirect (secondary), to aquatic resources from the project are likely to occur under permitted operating conditions. The discussion in FEIS Section 3.24 and Section 4.24, Fish Values, describing and discussing the 2 percent threshold has been expanded for clarity. The EIS analysis area is expanded in Section 4.27, Spill Risk, to account for potential impacts from different spill scenarios and upset conditions. The cumulative effects section in Section 4.24 has been revised to better describe the potential cumulative impacts from the expanded mine scenario and RFFAs.

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Fish and Aquatic Resources—Fish-Impacts-Headwater Streams	Concerns were raised about the potential changes in ecological functions from impacts to headwater wetlands and streams at the mine site.	Section 3.24 and Section 4.24, Fish Values, have been revised to better describe the baseline conditions and potential indirect impacts to downstream habitats from changes in headwater habitats. Potential indirect effects on aquatic resources from reduced inputs of organic material, nutrients, water, and macro-invertebrates to downstream reaches were considered in the revised analysis.
Fish and Aquatic Resources—Fish-Impacts-Invertebrates	Concerns were raised that baseline studies were flawed, and impacts relating to freshwater and marine invertebrates were not adequately discussed or analyzed in the DEIS. Impacts to bivalves, including Baltic clams (*Macoma balthica)* and freshwater mussels, should be analyzed. The DEIS similarly includes almost no analyses to address invertebrate transport and production.	Downstream impacts on invertebrates and benthic habitat due to construction are described in Section 4.24, Fish Values. Subsections have been revised to include discussions of baseline study methods, direct mortality, invertebrate habitat loss; and if applicable, changes to invertebrate transport and production at the mine site, along the transportation corridor gas pipeline route, and Iliamna Lake. A discussion of potential impacts to freshwater mussels has also been added. Specifically, long-term significant effects on Baltic clams (*Macoma balthica)* populations in Bristol Bay and Cook Inlet are not anticipated due to construction and operation of the mine. Although there could be some direct mortality of this bivalve at port locations and along the pipeline corridor, this species is adapted to recolonize areas after natural disturbance events such as ice scour or storm surges. As described in Section 4.24, Fish Values, benthic habitat is not limited in the lake, Bristol Bay, or Cook Inlet region; and habitat is available nearby for recolonization.
Fish and Aquatic Resources—Fish-Impacts-Modeling	Concerns were expressed that the modeling of impacts from mine development on surface and subsurface flows were not adequately described, particularly in regard to the application and interpretation of fish habitat modeling using PHABSIM. Comments also suggest inadequate assessment of other factors associated with present or future surface flows, including climate change, groundwater, and habitat loss.	Assessing the potential impacts of mine-related changes in flow to the NFK, SFK, UTC, and tributaries used a suite of modeling programs within the framework of the Instream Flow Incremental Methodology (IFIM) (Section 4.24, Fish Values; R2 Consultants 2018). The IFIM process, and specifically the use of Physical Habitat Simulation (PHABSIM) to assess the relationship between streamflow and the availability and suitability of habitat for target fish species and life-stages, is an industry-standard process developed and applied for many decades, and remains the most widely used and accepted instream flow modeling methodology in the US (Annear et al. 2009). The high level of use, abundant training opportunities, and SOP documentation results in highly standardized and repeatable field data collection, computer modeling procedures, and QA/QC assessment. Flow habitat modeling was conducted using 137 transects distributed among three reaches of the NFK, three reaches of the SFK, five

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		reaches of the UTC, the upper 12 miles of the mainstem Koktuli River, and tributaries SFK 1.19 and UTC 1.19 (see Section 4.24). Transects represented pool, riffle, run/glide, and island complex habitats in 36 miles of the NFK up to within 1.8 mile of the mine site; 52 miles of the SFK up to within 6.5 miles of Frying Pan Lake (anadromous fish were rarely observed above this point); 59 miles of UTC, including the reach immediately adjacent to the mine site, and 21 miles of the upper mainstem Koktuli River. Approximately 43 to 53 percent of PHABSIM study sites in the three principal tributaries were in regions of emerging groundwater. Modeling used Habitat Suitability Criteria (HSC) collected at 1,651 locations in the project area, representing 2,700 fish. Site-specific HSC were developed from these data for most species and life-stages; for rarer species or life-stages, representative HSC were taken from other instream flow studies. All HSC are presented in tabular and graphical format in PLP 2019-RFI 147. The HSC, hydraulic modeling, habitat mapping, and surface flow data were used to develop flow: habitat relationships for spawning and juvenile life-stages for four species of Pacific salmon (Chinook, coho, sockeye, and chum); and spawning, juvenile rearing, and adult rearing life-stages for three species of resident salmonids (Rainbow trout, Dolly Varden, and Arctic grayling). The modeling process produced estimates of the acreage of suitable habitat for each species/life-stage during representative time periods under pre-mine, mine operation, and post-closure scenarios using dry-, average-, and wet-year hydrology. The mine operation and post-closure scenarios included habitat gained or lost due to discharge of treated mine water in each of the three tributaries. These data allowed assessment of the potential benefits or impacts of changes in surface flows in reaches of the NFK, SFK, UTC, and mainstem Koktuli River downstream of the mine site. Information was added to Appendix K4.24, Fish Values, of the FEIS to address these concerns. See the PLP 2019-RFI 147 response for a detailed description of modeling methods and accompanying analysis.

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Fish and Aquatic Resources—Fish-Impacts-NGP-Cook Inlet	Concerns were raised concerning the adequacy of baseline data and impacts assessment for marine species from the construction and operations of the Cook Inlet natural gas pipeline project component. Questions were expressed about the potential for the pipeline to inhibit benthic fauna movement and alter marine fish habitat.	Section 3.24, Fish Values, has been updated to provide more detailed information on benthic fauna and marine fish species known to occur in the natural gas pipeline analysis area. Section 4.24, Fish Values, impacts analysis has been revised accordingly and provides a more comprehensive impacts assessment of potentially impacted marine species.
Fish and Aquatic Resources—Fish-Impacts-Port	Concerns were raised regarding fish and invertebrate impacts from the construction and footprint of the Amakdedori or the Diamond Port facilities. Specific concerns were expressed about the impacts from sediment scouring and dredging on aquatic habitats, including nearby Amakdedori Creek, as well as spawning habitat for Pacific herring, terminal effects on nearshore fish migration, and the effects of construction and operation of docking facilities on benthic invertebrates and nearshore fish species, including Pacific salmon.	Section 3.24, Fish Values, was expanded to better describe benthic and nearshore aquatic resources in proximity to the Amakdedori and Diamond Point port alternatives, including migrating Pacific salmon, herring spawning, and scallop beds. Potential impacts associated with the updated port design and infrastructure were revised in Section 4.24, Fish Values, to include a new pier design, featuring a permeable caisson-designed pier that would minimize or eliminate a variety of potential impacts, including the disturbance of benthic habitat and noise impacts during construction, as well as reduced current-related scour under the pier, elimination of rip-rap armoring, and allowance of passage of migrating fish. Revisions to Section 4.24 also allowed better comparison of potential impacts between the Amakdedori and Diamond Point port options, such as the need for periodic dredging at Diamond Point and its proximity to herring spawning habitat.
Fish and Aquatic Resources—Fish-Impacts-Portfolio Effect	Concerns were expressed that the DEIS did not fully analyze the population-level effects from potential loss of genetic and habitat diversity from the Bristol Bay salmon portfolio. Questions were raised that the project could result in synchronous effects across broad spatial scales on salmon stocks in the Nushagak and Kvichak River watersheds that would impact salmon portfolio and the overall resilience of salmon populations in the Bristol Bay watershed; for example, such losses would degrade the buffering nature of the portfolio effect.	By potentially affecting streamflow, water temperature, and water quality, mine development is expected to have some synchronous effects on the three principal tributaries (NFK, SFK, and UTC); however, the effects are not expected to be discernible outside of those tributaries (e.g., not synchronous beyond the mine's immediate influence). Likewise, development of the transportation corridors may have synchronous effects on fish populations inhabiting streams crossed by the roads or pipeline, if bridge or culvert installation and maintenance does not adequately protect habitat quality or fish passage opportunities. However, permit stipulations and mitigation measures, as described in Chapter 5, Mitigation, would reduce potential impacts associated with stream crossings; therefore, effects are expected to be short-term and localized, and not likely to affect fish populations in tributaries outside of the area immediately affected. A principal impact of mine development is the complete loss of NFK headwater tributaries 1.19 and 1.20 beneath tailing facilities and water management ponds; however, this impact will not directly influence any

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		of the other 10 anadromous tributaries in the NFK subbasin, nor the thousands of anadromous streams in the Bristol Bay watershed (i.e., it is not synchronous). The Bristol Bay watershed encompasses over 39,000 square miles, with nine major salmon-bearing tributaries that support all five species of Pacific salmon; 9,816 miles of anadromous streams; and a vast array of lakes. The Pebble Mine is expected to permanently remove approximately 10 miles of this anadromous habitat, and flow or water quality impacts could potentially affect an additional 150 miles of mainstem habitat, which overall constitutes 1.6 percent of documented anadromous habitat in the Bristol Bay watershed. Given the breadth and diversity of habitat (and salmon populations) in the Bristol Bay watershed, the expected impacts of localized mine and transportation corridor development on the Portfolio Effect are not likely to be discernible; rather, the Portfolio Effect may help to minimize expected impacts of the mine development on Bristol Bay's salmon fishery. Section 4.24, Fish Values, of the FEIS has been revised to more fully analyze the potential portfolio effect.
Fish and Aquatic Resources—Fish-Impacts-Relocation	Concerns were raised regarding fish relocation methods and suitable available habitat for relocation. Specifically, genetic impacts of relocation should be addressed. The EIS should describe the Applicant's capture/relocation program, and indicate when, where, and under what conditions it would be necessary, and what the impacts to fish would be.	Surveys documented low densities and wide distributions of resident and anadromous fish throughout adjacent reaches in the NFK. Species diversity and abundance data indicate there is sufficient available habitat for relocation without impacts to existing populations. Genetic impacts on salmon stocks in the Bristol Bay watershed would not be expected from fish capture and relocation based on the magnitude and geographic extent of the impact. ADF&G regulations require an Aquatic Resource Permit (ARP) for fish capture and relocation. ARPs describe what measures must be implemented to reduce impacts on aquatic species. Stipulations contained in ARPs determine timing, location, capture methods, and relocation protocols. Section 4.24, Fish Values, has been edited for clarity, and the ARP has been described under Fish Displacement, Injury, and Morality.

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Fish and Aquatic Resources—Fish-Impacts-Resident Fish	Concerns were raised that the DEIS focuses almost solely on impacts to Pacific salmon and neglects impacts to resident species such as rainbow trout, Dolly Varden, Arctic char, Northern pike, Arctic grayling, whitefish, stickleback, lamprey, and sculpin. The list of resident fish species list is incomplete, and should also include northern pike, whitefish, threespine stickleback, and ninespine stickleback.	There is not a separate subsection for resident fish in the EIS; however, they are discussed along with anadromous fish in Section 3.24, Fish Values. Rainbow trout, Dolly varden, northern pike, Arctic grayling, whitefish, sticklebacks, lamprey and sculpins are discussed in detail in Section 3.24. Direct and indirect impacts to most resident fish and their habitats are discussed throughout Section 4.24, Fish Values. Section 4.24 has been reviewed, and impacts to these species have been added to the FEIS, including a discussion on impacts to resident fish in Iliamna Lake
Fish and Aquatic Resources—Fish-Impacts-Sedimentation	Concerns were expressed about sedimentation from erosion and its effect on aquatic organisms. Specific concerns were expressed about spawning habitat degradation from sediments filling interstitial spaces in the stream bed.	Effects of sedimentation on water quality and fish habitat at the mine site and transportation corridor are discussed in Section 4.18, Water and Sediment Quality, and Section 4.24, Fish Values, respectively. To mitigate effects, PLP has committed to developing a Stormwater Pollution Prevention Plan and an Erosion and Sedimentation Control Plan (EIS Table 5-2). Information has been added to Section 4.24 to describe potential sedimentation/turbidity impacts on fish during pipeline construction.
Fish and Aquatic Resources—Fish-Impacts-Smolt-Iliamna	Concerns were expressed that the use and ecology of fish populations in Iliamna Lake was lacking sufficient detail, and that assessment of impacts due to the ice-breaking ferry and other mine-related components were not adequately addressed.	Iliamna Lake serves as a pathway for millions of upstream and downstream migrant salmon, and provides abundant and unique beach spawning habitat for adult sockeye salmon and critical rearing habitat for juvenile sockeyes. The majority of adult and juvenile sockeyes will cross the transit route(s) of the ice-breaking ferry in Iliamna Lake. Section 3.24, Fish Values, was expanded to better characterize the population and genetic structure, the distribution and abundance of adult migrants, adult spawners, and rearing juveniles, and the behavior and general life-history characteristics of sockeye salmon and other fish species that inhabit Iliamna Lake. The expanded description provides an improved assessment in Section 4.24, Fish Values, of potential impacts to fish species due to ferry operations, such as propeller-related injury or disorientation, wake-related beach stranding, and noise or vibration effects. Potential impacts due to ferry infrastructure, the natural gas pipeline, the road corridor crossing tributaries to Iliamna Lake, and mine-related impacts to UTC were also addressed.

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Fish and Aquatic Resources—Fish-Impacts-Spills	Concerns were raised that impacts due to petroleum spills and leaks from the ice-breaking ferry and other vessel traffic, and gas leaks from the gas pipeline, were not addressed in the DEIS.	Operational measures for spill preparedness, prevention, and response, including natural gas pipeline maintenance and safety measures, are described Section 4.27, Spill Risk, and Chapter 5, Mitigation. Impacts to fish and aquatic life from scenarios described in Section 4.27 have been revised in the EIS to include petroleum leaks and spills. Chapter 5 has been revised to include mitigation measures for reducing spills of diesel and reagents during transport with trucks or on the ferry. The design of the lake ferry (relative to using standard tug/barge) significantly reduces the risk of grounding or sinking, thereby reducing the risk of spills affecting Iliamna Lake habitat. Fuel delivery barges will be double-hulled to reduce spill risk.
Fish and Aquatic Resources—Fish-Impacts-Strategic Timing of Water Release	There are statements in the DEIS that the treated water discharges will be managed to optimize downstream fish and aquatic habitats (pg. 4.18-7 and elsewhere). However, the DEIS does not specify how the discharges would optimize downstream habitat. Commenters recommend adding a discussion and details of the strategy and how effectively it will mitigate project impacts to stream flow, water quality, and fish. A discussion of how the water will be discharged or whether or where water would be stored in the interim between being treated and being discharged to accomplish strategic timing was also recommended.	Section 4.24, Fish Values, was expanded to present more detailed modeling results according to species, life-stage, stream reach, mine status, and water year scenarios. Section 4.24 has been revised to better describe how water treatment plant discharges at different locations would be managed to avoid or reduce impacts on fish habitat, and in some cases, optimize habitat for select species. Discharge of treated water would be strategically coordinated between three discharge locations to maximize benefit to downstream habitat. Discharges would be managed based on habitat modeling conducted in receiving waters. Discharge of treated water and associated effects are described in Section 4.18, Water and Sediment Quality. No mitigation measures are proposed.
Fish and Aquatic Resources—Fish-Impacts-Water Temperature	Concerns were raised about winter water temperature changes from treated water, specifically in the NFK; and its potential effects on spawning timing, egg incubation, emergence times, and juvenile growth and development. Additional concerns were expressed about the potential impacts on salmon growth and development from minor changes in water temperature.	Section 3.24 and Section 4.24, Fish Values, have been revised in the FEIS to better describe the baseline surface water to groundwater interactions in the NFK, and potential impacts to aquatic species from changes in water temperature due to discharge of treated water. Section 4.24 has been updated to address the specific concerns regarding increases of winter water temperatures and potential impacts on incubating and rearing salmon from changes in water temperature. A figure has been added to the EIS to illustrate documented spawning activity and potential numbers of fish downstream of the affected reaches.

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Fish and Aquatic Resources—Fish-Intermittent Stream Habitat	Concerns were raised that the DEIS does not analyze intermittent stream surface and groundwater flow pathways relevant to fish habitat, specifically the 10-mile reach between Frying Pan Lake and SFK Tributary 1.19. Additional concerns were expressed about the lack of discussion of off-channel habitats, and the important functions these provides to salmonids.	Section 3.24, Fish Values, has been revised to better describe the seasonal importance of intermittent stream habitats and the functions these provide. Section 3.24 has been updated to describe the distribution of off-channel habitat and the ecological functions these provide to fish. Section 4.24, Fish Values, has been revised to discuss the potential downstream impacts to fish from the loss and alteration of intermittent steams and off-channel habitats.
Fish and Aquatic Resources—Fish-Marine-Derived Nutrients	A concern was raised that the discussion of marine-derived nutrients (MDN) in the Bristol Bay watershed is not supported in the EIS. Further concerns were expressed about the baseline data applied to the analysis of MDN in the mine site area.	The importance of MDN in Bristol Bay watershed lakes from returning salmon is well-documented, as noted in Section 3.24, Fish Values. The amount of adult salmon biomass actually available for ingestion by fish (directly via salmon eggs or fragmenting tissue, or indirectly through ingesting invertebrates that assimilate carcass tissue) is a small fraction (estimated 0.1 to 1 percent) of what enters freshwater headwater systems, after accounting for removal by vertebrates (Cederholm et al. 1989; Gende et al. 2004) and other 'losses' from flushing, fragmentation, physical adsorption, or burial (Cederholm et al. 1989; Gende et al. 2002; Moore et al. 2004). The streams directly impacted in the mine area may receive fewer or no MDN from spawning salmon relative to downstream portions of the river network, making terrestrial nutrient sources relatively more important (Wipfli and Baxter 2010). Section 3.24 and Section 4.24 have been revised to better describe the marine-derived nutrients in affected waterbodies, and the baseline data collected to support the analysis.
Fish and Aquatic Resources—Fish-Metals	Concerns were raised on the impacts of mine-related copper on aquatic organisms, particularly fish. Specific concerns were expressed that the impact assessment was inadequate with respect to the sublethal adverse effects of copper on fish, such as potential impairment of olfaction and homing capabilities in salmon at levels expected in the surface waterbodies due to permitted discharges and other diffuse releases. Aquatic life criteria based on hardness adjustment were indicated to be insufficiently protective; therefore, more protective aquatic life criteria based on the Biotic Ligand Model were suggested to evaluate impairment of olfaction and homing capabilities in fish species. Another specific concern raised involved the adequacy of the current fugitive dust deposition modeling, and evaluation and need for assessing the impacts of copper released via mine-related fugitive dust and road dusts.	A range of toxicological effects to individual fish due to metals and other pollutants has been reported in the literature, but implications of each toxic mode of action remain unclear with respect to population-level impacts. Typically, only the apical endpoints such as survival, growth, and reproduction are used in regulatory ecological risk assessments. Nonetheless, due to its significance on homing capabilities of salmon, fish olfactory impairment due to copper was discussed in the DEIS, and those discussions have been augmented in Section 4.24, Fish Values, by inclusion of more recent literature. Potential impacts through bioaccumulative metals (such as mercury, selenium, and cadmium) by fish and other wildlife have also been discussed, as applicable. In addition, Section 3.20 and Section 4.20, Air Quality, have been revised to better describe the fugitive dust deposition modeling, including more specifics on the parameters applied to the model and overall methodology.

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Fish and Aquatic Resources—Fish-References	Questions were raised about cited references in the DEIS. Suggestions were made to consider specific additional references for the Fish Values sections of the EIS.	Recommended additional references cited in these comments were reviewed, and included in Section 3.24 and Section 4.24, Fish Values, in the FEIS as applicable.
Fish and Aquatic Resources—Fish-Regulatory	Concerns were received that inaccurate state and federal regulatory policies were referenced in the DEIS.	State and federal regulatory policies referenced in the EIS were reviewed and corrected where applicable.
Fish and Aquatic Resources—Fish-Selenium	Concerns were raised regarding the potential impacts to fish and wildlife from selenium concentrations in discharge/treated water, post-closure in the pit lake, and other uncaptured, diffuse releases due to mining activities and infrastructure development. Specific concerns were raised regarding inadequate characterization of bioaccumulation, biomagnification, and biotransfer of selenium from surface water (in receiving streams and the pit lake) to aquatic plants and invertebrates, fish, and aquatic-dependent birds and mammals.	Predicted concentrations of selenium in various ponds and the pit lake and in discharges (effluents) at various stages of closure are provided in Appendix K4.18, Water and Sediment Quality. The potential impacts of selenium loading in the streams, its bioaccumulation, trophic transfer, and toxicity in fish and wildlife at the predicted concentrations in discharges/effluents (provided in Appendix K.14) have been described in greater detail in the context of existing literature and surface water quality criteria for selenium. Potential impacts of elevated metals concentrations in the pit lake have been assessed in the context of how management factors and physical environmental conditions prevent and/or minimize ecological exposures. This assessment has been augmented by discussions of exposure specific to selenium.
Fish and Aquatic Resources—Fish-Water Withdrawal-TransCorr	Concerns were raised about the lack of information regarding water withdrawals along the Alternative 1 Transportation Corridor. It was asserted that extractions of extremely large volumes of water from presumably small streams for which insufficient fish and discharge data have been collected could potentially vastly underestimate fish impacts of water withdrawals along the transportation corridor	As stated in the EFH Assessment, Appendix I, ADNR authorizes water withdrawals from fish-bearing streams. ADF&G is responsible for reviewing permit applications to ensure that water withdrawals are protective of fish by verifying that adequate fish passage is available, particularly during critical life stages; and that water levels are sufficient to avoid stranding juveniles and dewatering redds. Permit conditions would set limits on water withdrawal so that fish and their habitat would be protected. The degree of impact to fish habitat from water withdrawal is expected to be minimal. However, minor temporary changes to coho salmon, Chinook salmon, and sockeye salmon spawning and rearing, chum salmon spawning, and pink salmon presence may be observable. Stream habitat characteristics would return to normal in the short-term after the activity ceases. This information was added to Section 4.24, Fish Values, where applicable.

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General Safety Concerns—Concentrate Dust Health Hazard	Commenter requested that the EIS address potential dust exposures to workers unloading concentrate in the hold of ships at Kamishak Bay because of frequent winds in the area.	Clarification has been added to Appendix K4.10, Health and Safety, that PLP developed a Conceptual Fugitive Dust Control Plan (FDCP) to reduce the potential for airborne dust, and control fugitive dust emissions from the activities associated with the project, including lightering operations (PLP 2019-RFI 134). PLP has committed to updating the FDCP, as required, through mine permitting and operations phases. Per the Conceptual FDCP, PLP would implement design features and active and passive controls to reduce fugitive dust emissions from the project. The Applicant's proposed avoidance and minimization measures, including those outlined in the Conceptual FDCP, are presented in Chapter 5, Mitigation. Suggestions for additional measures are presented in Appendix M1.0, Mitigation Assessment. As discussed in the Conceptual FDCP, the concentrate would contain approximately 8 percent moisture during container loading to minimize dust generation. To minimize dust generation during concentrate discharge to the bulk carrier hold, the discharge height of the containers in the hold would be maintained as close to the surface of the pile as possible. Appendix K4.10, Health and Safety, includes an evaluation of safety for the anticipated workforce in the context of relevant regulatory requirements under the Occupational Safety and Health Administration (OSHA) and Mine Safety and Health Act (MSHA). The project would be governed by the OSHA and MSHA regulations in the areas where project activities would occur. As required by OSHA and MSHA, the project would provide safety training for all employees; and health and safety plans would be developed, implemented, and followed that would address worker exposure and safety.
General Safety Concerns—Driver Training	Comments questioned how truck drivers would be trained to deal with bears.	Mitigation measures for the protection of wildlife from drivers have been expanded in Section 4.23, Wildlife Values. Mitigation measures to influence driving behaviors would include wildlife education and training for all employees; emphasis on worker awareness/vigilance in environmental and safety briefings; wildlife present on the road will be given the right-of-way; use of wildlife crossing warning signs; reduced vehicle speed; active wildlife sighting reporting; vegetation trimming to increase visibility; and reducing the height of snowbanks. Mitigation measures to influence animal behavior could be implemented if required (PLP 2019—RFI 122). Additionally, as part of the Wildlife Interaction Plan, the Applicant would provide wildlife safety training used to minimize the potential for wildlife interaction with project activities, and to minimize impacts to wildlife in the project area (see Section 4.23, Wildlife, and Chapter 5, Mitigation and Monitoring).

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General Safety Concerns—Emergency Response	Comments were received about fire and emergency response personnel, as far as training, where personnel would be located, if they are paid/volunteer, etc.	Fire and emergency response training is addressed in Chapter 2, Alternatives. The Applicant has committed to training on-site employees in emergency response, as appropriate. A fire truck and ambulance would be on site. At the mine site and the port, freshwater supply tanks for fire suppression would be available, and water would be distributed via an insulated pipeline system (PLP 2018d). Additionally, the port would be supported by a permanent airstrip (6 acres) that would be retained for incidental/emergency access. Additional details on other emergency response personnel would be determined at a later phase in permitting. No changes were made to the EIS.
General Safety Concerns—Travel on Lake Ice	Comments have cited safety concerns regarding people snowmachining across the ice on Iliamna Lake, and the hazard of open leads left in the ice by the ferry crossing.	The Applicant has committed to work with local communities, and provide funding, to mark safe crossing routes across Iliamna Lake during frozen conditions. Text has been added to Section 4.12, Transportation, to note the inherent risks involved in traveling during low-visibility, and to note that trail marking may not be sufficient under those conditions.
Geology—Additional clarification	Comment noted an apparent discrepancy between the DEIS (Chapter 2) and Knight Piésold 1028f (p. 18) (Closure Water Management Plan) for the stated amount of PAG waste rock that would be moved to the open pit during closure.	The DEIS correctly states 50 million tons of PAG waste rock would be moved to the open pit during closure, and this is consistent with PLP 2017d, Project Description. Knight Piésold 2018f (p. 18) stated a combined amount of PAG waste and pyritic tailings on page 18 as a total PAG waste rock volume. This is an error, but does not affect the conclusions stated in the Water Closure Management Plan. Elsewhere in the Knight Piésold 2018d, they state "...the Pyritic Tailings Storage Facility (Pyritic TSF) will manage pyritic tailings, which are Potentially Acid Generating (PAG), and PAG waste rock from the mining activities." The term "pyritic tailings" has been used in some project documents to collectively describe the pyritic tailings + PAG waste rock. The distinction is primarily important to understand that PAG waste rock would be placed before the pyritic tailings (See PLP 2018-RFI 055). This error in the reference document has been noted, but no changes were made to the EIS based on this SOC.

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Topic—Subtopic	Statement of Concern	Response
Geology—asbestos	Commenter asked whether there is "naturally occurring asbestos" in the material to be used as road fill along the transportation corridor.	Asbestos is a general industrial term used to describe several naturally occurring fibrous minerals. The most common commercial form of asbestos is the mineral chrysotile. Chrysotile forms as a result of metamorphism of mafic minerals such as pyroxene and is very low in silica content (less than 45 percent by weight). The bedrock that would provide material sources along the transportation corridors is predominantly comprised of igneous granodiorite with lesser andesite. These igneous rock types are characterized by high silica content (roughly 60 percent), and not representative of the conditions that would form asbestos minerals. Asbestos is not expected to occur along the transportation corridors. No change was made to the EIS.
Geology—Blasting	Questions were stated to inquire about material to be used in road construction and how often blasting would occur.	Material sites (e.g., sources of aggregate, rock) that would be used for road construction, and those that would require blasting, are described in Section 4.13, Geology, and Appendix K2, Alternatives. Blasting at material sites to support road construction would occur occasionally throughout the construction phase (see Section 4.19, Noise). Section 4.13 includes information from PLP 2019-RFI-84a, and updates to blasting information were included as needed.
Geology—Important mineral source	Commenters noted that the project would produce important mineral raw materials for the security of the US, including some on the critical minerals list (Executive Order 13817).	Comments are noted. The demand and need for mineral commodities is described in Chapter 1, Purpose and Need. No changes were made to the EIS.
Geology—previous exploration	Comment expressed concern that the EIS does not address "current contamination" of previous exploration drilling.	Chapter 2, Alternatives, under "No Action Alternative," states that PLP would be required to reclaim any remaining sites at the conclusion of their state-authorized exploration program. If reclamation approval is not granted immediately after the cessation of reclamation activities, the state may require continued authorization for ongoing monitoring and reclamation work as deemed necessary. Section 3.14, Soils, states that a review was conducted of the ADEC Contaminated Sites Program database, and that no contaminated site records coincided with or were in proximity to the project footprint. No changes were made to the EIS.
Govt-to-Govt Consultation—G2G Consultation Requested	Comments were received regarding the consultation process, or requesting Tribal or government-to-government consultation.	USACE has notified 38 federally recognized tribes of the proposed action and of the opportunity to invite USACE to government to government consultation; 22 federally recognized tribes or their representatives have invited USACE to government-to-government consultation. USACE continues to consult; and considers, and will continue to consider, the concerns of federally recognized tribes as part of our recognition of tribal sovereignty and in our evaluation of the project. A description of the government-to-government consultations is provided in the updated Chapter 6, Consultation and Coordination.

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Topic—Subtopic	Statement of Concern	Response
Govt-to-Govt Consultation—G2G EIS Discussion	Comments were received about where information regarding the government-to-government consultation process was located.	Chapter 6, Consultation and Coordination, provides updated information about the Tribal and government-to-government consultation process.
Govt-to-Govt Consultation—Obligation to come to agreement with tribes	USACE must consult on a government-to-government basis with Federally Recognized Tribes who could be affected by the development activities and cooperatively consider the impacts, and come to agreement with Alaska Native Tribes to whom these areas hold cultural significance.	The USACE has notified 38 federally recognized tribes who may be affected by the project of the opportunity to invite USACE to government-to-government consultation. See the updated Chapter 6, Consultation and Coordination, for a description of government-to-government consultations that have occurred to date. In addition, USACE has consulted with tribes and other consulting parties, as part of the Section 106 process, to consider adverse effects to historic properties that may occur as a result of the project.
Groundwater Hydrology—Baseline Data	Concern was been expressed that baseline data regarding groundwater/surface water interaction does not adequately characterize the conditions; and as a result, the effects of mine site activities on nearby waters are not possible to predict.	Groundwater/surface water interaction has been studied by means of direct observations of up-welling areas in streams, measurement of streamflow in different segments to deduce losing stream reaches, measurement of upward and downward vertical groundwater gradients at monitoring well installations, observations of seeps discharging groundwater to the land surface, and modeling of complex groundwater/surface water interactions under pre-development and development scenarios. This information is described in the EIS (Section 3.16 and Section 4.16, Surface Water Hydrology, and Appendix K3.16 and Appendix K4.16). Information collected through these activities allows for accomplishing a reasonable degree of accuracy in predicting the effects of mine site activities on surface water for the purposes of the EIS. Residual uncertainties in understanding groundwater/surface water interactions have been propagated through the stream flow, water treatment, and fisheries impacts analyses to further elucidate the potential impacts from the project. Additional clarification has been added to the EIS.
Groundwater Hydrology—Bulk TSF Filter/ Transition Zone	Concerns were expressed that geotechnical and geochemical characteristics of the bulk TSF main embankment F/T zone materials are not provided in the EIS; that the permeable flow-through F/T zone could plug up over time with solids/fines and build up the water level behind the dam; and that safety and repair options to prevent plugging should be discussed in the EIS.	Appendix K4.15, Geohazards, and PLP 2018-RFI 006 provide a conceptual description of the geotechnical characteristics of the F/T materials and filter criteria that would be used to refine these characteristics as design and permitting progress. A coarse-grained tailings unit would be immediately upstream of the embankment, which is expected to minimize the amount of finer-grained tailings entering the upstream rockfill part of the embankment. Rockfill is typically pervious cobble- to boulder-sized material that most fines would pass

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Topic—Subtopic	Statement of Concern	Response
		through. The bulk TSF embankment would contain an inner F/T zone, constructed of a designed gradation of sand and gravel without a low-permeability core zone. Therefore, fines such as dispersed clay-sized particles would be expected to pass through the F/T zone and not plug up the embankment. It is possible that the embankment and coarse tailings unit could plug with fines or rockfill materials that chemically degrade if not designed and constructed properly. Additional details regarding geochemical compatibility analyses and operational practices to prevent potential plugging and hindrance of seepage flow out of the TSF provided in PLP 2019-RFI 006c have been added to Appendix K4.15 and Chapter 5, Mitigation. Detailed seepage analyses would be completed in later design stages to refine expected seepage rates and F/T zone gradation requirements. The ADNR Dam Safety Program requires QA/QC plans for construction that would apply to oversight of the embankment and F/T zone (PLP 2018-RFI 006a). Plugging of the embankment would be unlikely if actual tailings gradations during operations are as predicted during design; if actual seepage matches calculated seepage; if the embankment is constructed as designed; and if the rockfill remains pervious and does not chemically degrade. Text has been added to Appendix K4.15 from PLP 2019-RFI 006c to describe operational practices that would be employed to manage tailings segregation and control desired seepage rates. If excess water builds up behind the embankment for whatever reason, it would be managed by pumping to the main WMP, as described in Appendix K4.16, Surface Water Hydrology.
Groundwater Hydrology—Bulk TSF groundwater table changes and leakage	Concern was expressed that there is not an analysis of seepage from the bulk TSF during closure or post-closure.	The bulk TSF is expected to maintain a high water table during closure and post-closure in the central area where fine tailings would be deposited that could drive contaminated pore water from the TSF into the upper portions of underlying aquifers. However, around the perimeter and below the TSF coarser tailings, embankment vertical drains and underdrains beneath the TSF are expected to result in a lower water table and hydraulic containment of contaminated water. The particle tracking module of the new groundwater model analysis (BGC 2019d in PLP 2019-RFI 109e, Part 3) shows that 100 percent of water in the bulk TSF is contained in local groundwater flow systems, and would report to the main and south seepage collection ponds

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		under baseline conditions. The local flow systems would be a direct result of the high relief of the water table surrounding the bulk TSF, and the low elevation of the seepage collection ponds that would form a hydraulic sink to which groundwater would be expected to flow. The EIS has been updated in Section 4.17, Groundwater Hydrology, and Appendix K4.17 to provide additional text and graphics to explain the expected presence of this flow system and the results of sensitivity analysis simulations.
Groundwater Hydrology—Bulk TSF Seepage Analysis	Comments indicated that additional information is needed regarding seepage analysis conducted on the bulk TSF main embankment as pertains to achieving a stable tailings deposit and embankment, such as background data used to estimate the range of rates, more detailed cross-sections, information on beach and filter widths, phreatic surface assumed in the analysis, hydraulic conductivity parameters used, and underdrain design to maintain a reduced phreatic surface. Vertical flow downwards into bedrock fractures also needs a consistent analysis.	Additional information regarding seepage analysis of the bulk TSF has been provided in responses to RFIs 006b, 006c, and 109e, including tailings and foundation material parameters, the source of assumptions used in the seepage model, boundary conditions, sensitivity analyses results, depictions of the estimated phreatic surface, examples and operational experiences at other flow-through dams worldwide, internal erosion protection, and conceptual underdrain design. The information has been incorporated into revised seepage analysis text in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions; and Section 4.17, Groundwater Hydrology. Text has been added to Chapter 5, Mitigation, to describe additional details that would continue to be developed as design progresses through State dam safety permitting.
Groundwater Hydrology—Closure cover infiltration effects	Concerns were expressed regarding the performance of the geomembrane in the bulk TSF closure cover over time, and that a degraded liner could continue to allow vertical migration of contact water to groundwater. The EIS should clarify how groundwater would flow beneath the closure cover in the area of low-permeability tailings. The EIS should also provide more information on the timeline for achieving a permanent landform in post-closure.	Information on the performance and potential for infiltration through a geosynthetic liner in the bulk TSF closure cover, as compared to a compacted overburden design without a liner, is provided in PLP 2019-RFI 130, and discussion has been added to Section 4.17, Groundwater Hydrology. Text has also been added to Chapter 5, Mitigation, noting a trade-off study would be completed in detailed design to determine the preferred closure system, which would include an evaluation of cover material efficacy, performance, longevity, and maintenance. At closure, a water table mound is projected as a result of infiltration from the pond on top of the main TSF and the low hydraulic conductivity of tailings below the pond. The water table would remain at a low elevation near the main embankment during closure and post-closure. Seepage from the tailings would be reduced during post-closure under any of the closure cover options being considered, but would not cease. Residual seepage is anticipated to occur for the long-term and be collected and treated. At some point in the future, the

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		seepage rate could become low enough that dilution from surrounding groundwater collected by the underdrains and seepage collection system could result in water that does not exceed relevant water quality standards, and treatment would no longer be needed. These concepts have been clarified and incorporated into Section 4.17, Groundwater Hydrology, and Section 4.18, Water and Sediment Quality. Information on the expected timeline for achieving a permanent landform in post-closure is provided in Chapter 2, Alternatives; tailings consolidation (i.e., the final shape of the permanent landform) is expected to be complete about 50 years after closure is initiated (Knight Piésold 2018d).
Groundwater Hydrology—Continuous groundwater divides	A concern has been expressed that the description of groundwater divides in the DEIS is incomplete and incorrect, and that groundwater divides are continuous.	In most areas, groundwater divide locations are the same or very nearly the same as surface water divides. A surface water or groundwater divide is usually represented by a continuous line on a map separating areas where water flows into different basins or sub-basins. However, in some areas, it appears that segments of groundwater divides are absent and groundwater crosses the surface water divide, constituting inter-basin flow of groundwater. The most prominent inter-basin flow of groundwater occurs where the UTC/SFK groundwater divide is absent near the UT1.190/SFK drainage boundary. A probable inter-basin flow of groundwater also appears to be present along the surface water divide between the UT and NFK basins upstream of gage station UT100E. The description of groundwater divides in Section 3.17, Groundwater Hydrology, in the EIS has been revised to more completely and correctly describe them.
Groundwater Hydrology—Effects of groundwater model uncertainties on EIS	A concern has been expressed that the groundwater model contains significant uncertainty, that additional model work is needed to reduce this uncertainty, and that the effects of this uncertainty have not been carried through the EIS document to determine the effects of the uncertainty on EIS predictions.	These comments apply to the groundwater model that was used for the DEIS; this model has been replaced with a different groundwater model with greater capabilities, and better documentation and uncertainty analysis (BGC 2019a). Model uncertainties, as determined from a robust sensitivity analysis using many plausible scenarios, have been quantified and propagated through the surface water modeling and aquatic resource impact assessment, and the text of the EIS has been updated accordingly in Section 4.16, Surface Water Hydrology, Section 4.17, Section 4.18, Water and Sediment Quality, Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, and Section 4.24, Fish Values.

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Groundwater Hydrology—Expanded mine analysis	A concern has been expressed that insufficient information is presented in the DEIS to understand the groundwater drawdown zones of influence for major mine components of the expanded development scenario, and the magnitude and extent of impacts to groundwater quality and quantity. Additionally, the variability associated with the estimated mine expansion and the degree to which the predictions are representative of the expansion scenario are unclear.	If the Pebble Project expanded development scenario were to be pursued in the future, additional analysis and NEPA compliance would be required, including an evaluation of groundwater hydrology. It is anticipated that the largest groundwater impact would likely be related to the expanded zone of influence of a wider and deeper mine pit. Since the DEIS, a groundwater model analysis has been performed to quantify the expanded development scenario, and discussion of model results has been added to Section 4.17, Groundwater Hydrology, along with an assessment of model uncertainty and potential impacts on model predictions. Clarification was added to the text in Section 4.17 to indicate that a separate environmental analysis, including an evaluation of groundwater hydrology, would be required for the Pebble Project expanded development scenario. In addition, text was revised to indicate that if the Pebble expanded development scenario were pursued in the future, the separate analysis would also likely include mitigation measures such as the return of excess treated water to streams; which, for the purposes of this cumulative effects evaluation, would be expected to avoid, minimize, or mitigate effects because it would include common measures and industry standards that are designed to reduce impacts to the environment.
Groundwater Hydrology—Foundation Conditions	Comments noted additional information should be provided in the EIS regarding foundation conditions beneath embankments with grout curtains, the depth and extent of the grout curtains, and how geomorphology was incorporated into siting of the bulk TSF main SCP, to demonstrate that they would contain seepage flows in the event of liner leakage.	Embankments that would have grout curtains include the bulk TSF south embankment, the two bulk TSF SCP embankments, and the three pyritic TSF SCP embankments (Table K4.15-1). Geotechnical borings drilled beneath or in the vicinity of these structures are shown on Figure 3.15-3. Section 3.15, Geohazards and Seismic Conditions, provides a summary of rock quality and depths to moderately weathered bedrock beneath each of the mine site areas where embankments would be constructed. Additional siting and geotechnical information in the vicinity of the major embankments (received through PLP 2019-RFI 014b) has been added to Appendix K4.15, Geohazards and Seismic Conditions. Regarding the siting and foundation of the bulk TSF main SCP, the embankment would be near the northern end of tributary NK 1.190 between two north-facing hillslopes to take advantage of the geomorphic constriction and relatively shallow bedrock in this area before the tributary enters the wide part of NFK valley. Overburden deposits beneath the embankment footprint would be removed during construction, and the embankment founded on bedrock. Section 4.17, Groundwater Hydrology, has been updated based on the new groundwater model particle tracking

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		analysis, to show that seepage flow north from the bulk TSF would be constricted by topographic and water table highs on either side of this tributary, and captured by the bulk TSF main SCP. As described in PLP 2018-RFI 006, the grout curtains would extend along the entire length of the embankments in fractured bedrock. The depth and lateral extent would be confirmed during detailed design and ongoing site investigation programs. Geotechnical data collected through 2019 would form the basis of a scoping proposal and embankment siting study in an Initial Design Package to be submitted to ADNR Dam Safety and Construction Unit after the EIS is complete. Detailed geotechnical data beneath embankments and analyses based on those data would be submitted to ADNR in later Preliminary Design and Detailed Design packages (PLP 2019-RFI 008g). Text has been added to Appendix K4.15, Geohazards and Seismic Conditions, and Chapter 5, Mitigation, to provide more information on the grout curtain design and analyses.
Groundwater Hydrology—Groundwater analysis reliability	Concern has been expressed that it cannot be known or very well predicted what would happen to the hydrology as a result of the project; and that the pit could totally change how water behaves in the area, and would likely disrupt fishery resources.	Groundwater flows systems around lakes and local-scale groundwater flow systems have been studied for more than 50 years in many parts of the world using a combination of field methods and mathematical/numerical models of groundwater flow systems such as has been done for the Pebble Project. Although not perfect, such studies are useful in managing the effects of human activities on groundwater and lakes. The pit would function according to the same physical laws governing the behavior of groundwater as occur at other lakes. Although groundwater modeling and prediction is a specialty science, it is not new or groundbreaking in any fundamental way. Computers are now faster and code is more flexible to handle large and ever-more complex problems, but the basic USGS code used for the groundwater modeling work was first published in 1983, and precursor codes were in use for several years before then. This provides a full 40+ years of history in this field, led by the premier and most highly regarded water science agency of the US government. The groundwater field studies and modeling described in this EIS have consistently shown that the pit would not totally change how water behaves to the extent that it would cause disruption of Bristol Bay fisheries. Changes have been made to Section 3.17 and Section 4.17, Groundwater Hydrology, and Appendix K3.17 and Appendix K4.17 regarding hydrologic predictions and uncertainty associated with those predictions from additional groundwater modeling work performed since the DEIS was published.

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Groundwater Hydrology—Groundwater Best Management Practices	Concern has been expressed that Best Management Practices applicable to protection of sand and gravel aquifers have not been addressed.	Sand and gravel aquifers lacking low-permeability materials overlying the aquifers exist in the project area and are widely known to be susceptible to contamination. Although there are no recognized BMPs in Alaska applicable to these types of aquifers, numerous strategies have been developed as part of the project to prevent and control groundwater contamination. These include: 1) control of potential source of contamination by implementing bulk fuel containment systems, dust control systems, hazardous materials containment systems, and permit compliance for infrastructure such as domestic wastewater and solid waste systems; 2) hydraulic containment of contaminated groundwater emanating from the open pit WMP, main WMP, pyritic TSF, and main TSF to prevent spreading to unaffected downstream waterways. The hydraulic containment in these areas would be accomplished by a combination of natural groundwater flow systems, seepage collection ponds, underdrain and pumpback systems beneath lined facilities, and long-term pumping from the pit lake and the main TSF seepage control ponds to maintain control of contact water; 3) data collection and technical analysis to understand groundwater conditions have been extensive as documented in Chapter 3, Affected Environment; and Chapter 4, Environmental Consequences, of the EIS and supporting documents; 4) public participation in reviewing and commenting on strategies to prevent and control groundwater contamination has been extensive as documented in the EIS; 5) it is expected that State environmental regulations will be sufficient to control potential sources of contamination; and that monitoring, adaptive management, and enforcement of permit conditions and stipulations and environmental regulations would be effective in controlling or responding to groundwater contamination. No change has been made to the EIS as a result of this SOC.
Groundwater Hydrology—groundwater leakage from TSFs and WMPs	Concern has been expressed that permeability estimates of glacial gravels and weathered rock and other factors present a hazard for leakage of acidic, high total dissolved solids (TDS), or metal-tainted water beneath and around the water management ponds, tailings storage facilities, embankment footprints, seepage collection ponds, and material stockpiles through gaps between monitoring/pumpback wells. Plans for containment of contact waters, monitoring, and determination of when active management could cease during post-closure	Permeable rocks and deposits create the potential for leakage of water from these facilities; however, one of the primary causes for leakage is the hydraulic gradient that drives groundwater flow. PLP 2019-109e Parts 2 and 3 provide additional detail about underdrain and seepage control systems and potential groundwater flow paths that illustrate hydraulic containment of the leakage from the bulk TSF, and expected leakage through liners beneath the pyritic TSF and main WMP under base case conditions. The material stockpiles would contain materials that have been evaluated for metal-leaching and acid-generating

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	should be developed in greater detail and with greater clarity to determine if they are adequate to protect downgradient water resources, and to determine likely impacts to receiving environments. Alternatives to capturing and treating contaminated groundwater should be provided. Examples of adequate environmental safeguards at other mines that avoid harming aquatic resources should be provided. Design, monitoring, adaptive management, and repair plans should be prepared and examined. A quantitative analysis of risks to the environment should be performed. Clarification of the magnitude, extent, and possible future improvement of water quality related to expected groundwater contamination is needed.	potential, and are not expected to degrade water quality (Section 4.18, Water and Sediment Quality). The EIS has been updated in Section 4.17, Groundwater Hydrology, and Appendix K4.17 to enhance descriptions of underdrains, expected hydraulic gradients around these facilities, and expected destinations for leaked water from the facilities based on updated groundwater model analysis. With these underdrains included in the project, flow of contaminated groundwater through gaps between monitoring/pumpback wells is considered improbable; risks to groundwater associated with leakage from the facilities (including seismic risks) are considered low; and a quantitative risk assessment is not considered to be warranted. Alternatives to capturing and treating contaminated groundwater exist, but are generally regarded as less effective and less certain at controlling the spreading of contaminants in groundwater. Alaska's existing large hard rock metals mines use a variety of environmental safeguards that have successfully avoided harming and, at least in the case of the Red Dog Mine, have improved water quality and aquatic resources (AECOM 2019o). Additional information regarding monitoring, adaptive management, and mitigation planning has been added to Section 4.17. Conceptual design and monitoring plans are considered adequate for the purposes of this EIS. Further plan development, review, and compliance with State of Alaska regulations would occur as the project design and planning advance. There is no predicted end point for collecting seepage from the north or south SCP associated with the bulk TSF; long-term pumping and treating of water is planned. Groundwater from the surrounding areas would commingle with seepage through the bulk TSF for the long-term and be collected at the north SCP, requiring ongoing pumping and treating as contact water. Particle tracking results from the groundwater model indicate that, with pumping, this water would be unlikely to flow down the Koktuli River drainage. Should water monitoring demonstrate that seepage water meets applicable water quality standards, active pumping and treating would then cease. The description of the magnitude and extent of expected groundwater contamination and expectations about the future improvement of groundwater quality has been revised in Section 4.17.

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Groundwater Hydrology—Groundwater model code selection	Concern has been expressed that the model codes used for simulating groundwater, surface water, and mine water management facilities are a fundamental flaw in the analysis described in the EIS. An integrated hydrologic model should have been used instead of the three separate models. Flows between groundwater and surface water are complex and dynamic, and the codes used for the analysis are too simplistic and are incapable of simulating all of the processes that occur in nature, or capturing short-duration (sub-daily) hydrologic events. Comments also expressed concern that a formal code selection process should have been used to select code to simulate groundwater, surface water, and mine plan water movement to fully assess mine impacts on surrounding hydrology, and to define calibration targets for impact assessments.	The groundwater model code used is not a "single-process" code. The code simulates all relevant hydrogeologic processes, including recharge, evapotranspiration, and seepage to and from seeps, streams, and the pit/pit lake. There is no evidence that heat flow, sediment transport, or even explicitly modeled unsaturated flow are relevant, useful, or even definable with environmental data collected in the project area, or that modeling results using such capabilities result in superior assessment of groundwater impacts. For example, the MIKE/SHE model results estimated that groundwater inflow into the pit during post-closure would be 1,080 gallons per minute (gpm), compared to a range of estimates using the new groundwater model (BGC 2019a; Knight Piésold, 2019s of 600 to 4,300 gpm for the end-of-mining scenario. The range of estimates from the MODFLOW model is a much more robust indicator of the effects of the project than the single estimate from MIKE/SHE. The USGS code selected has a 40+-year successful track record of usage and is commonly used for simulating groundwater conditions such as occur at the Pebble site. As another example, comments received have mentioned the possible over-parameterization of recharge in the groundwater model. Creation of a model simulating flow in the unsaturated zone, as MIKE/SHE does, requires far more parameterization, including the specification of detailed soil, saturated zone, vegetation, surface runoff, and climate properties (Prucha 2019). Field data are largely non-existent at Pebble to specify input parameters for many of these variables at the scale of the modeled area and the needed cell size of a usable model for the project. For example, the soil maps referenced by Wobus et al. (2015) for an earlier version of the model were available at a scale of: "...1:1,000,000 in Alaska. The level of mapping is designed for broad planning and management uses covering state, regional, and multi-state areas (NRCS 2019).It is not at all clear that specifying numbers for all of these parameters for a site-specific detailed model analysis results in a superior simulation. The alternative method used in the MODFLOW model (BGC 2019a) includes all of these unsaturated zone flow processes in a lumped parameter methodology that is far simpler to manage and understand and is considered to provide equivalent or superior and satisfactory long-term solutions for the groundwater analysis.

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		It is true that the MIKE/SHE model is capable of providing dynamic event- or hourly level hydrologic simulation; however, it is not clear that any meaningful advantage is created for the purposes of assessing groundwater impacts under NEPA for this project. Most important processes related to the project are large scale—with hundreds of feet of head change—and long-term in nature. Dynamic short-duration simulations with small head changes add little to the analysis. The code selection process referenced in the comments was published in 1988. These were early days of groundwater modeling, and there was a great profusion of model codes being written of varying usability to simulate a wide variety of groundwater conditions; therefore, some guidance was useful. In this case, the code selection process was consistent with EPA (1988), and the resultant groundwater model code meets the criteria of availability, user support, usability, portability, reliability, and extent of model use. The only listed criterion not met is modifiability; which, in the case of such an advanced modern product from the USGS used for this evaluation, is largely irrelevant or even advantageous, because modifiability would add an extra potential source of uncertainty, potential error, and non-standard analysis to the evaluation. Furthermore, other numerical codes were considered as part of the code selection processes, including fully integrated codes that solve both surface water and groundwater flow simultaneously. Examples of fully integrated codes include MIKE SHE (DHI 2017), which was used by Prucha (2019) and HydroGeoSphere (Aquanty 2015). Neither of these codes were selected for use due to the significant amount of data required to adequately parameterize a model of the scale required for the project, as well as substantial execution times required for the large number of simulations requested as part of the RFI process. Further information regarding other limitations of fully integrated codes is provided in DHI (2017). Consequently, the process used for code selection has been deemed adequate for the purposes of the EIS. In comparison, neither the EPA (2014) Watershed Assessment groundwater model, Prucha (2019), or Prucha's (2019) pre-curser modeling report (Wobus et al. 2015) followed the EPA (1988) protocol, or describe any other any sort of model selection process. The description of the groundwater model code used for the updated modeling of BGC (2019a) has been revised in Section 3.17.

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Groundwater Hydrology—Groundwater model pit capture zones	Concerns have been expressed that the descriptions of the pit captures zones, cones of depression, or zones of influence of the pit or pit lake are incorrectly or confusingly presented, or not presented for deeper layers in the model.	Descriptions of the capture zones, cones of depression, and zones of influence have been clarified and revised in the EIS based on the new groundwater flow model (BGC 2019a). Text has been added to the EIS to describe the differences between the terms used, and the text has been simplified by eliminating use of the term "cone of depression." Furthermore, uncertainty in the model has been propagated into the development of multiple zone of influence maps based on different sensitivity analysis scenarios, and these are included in the EIS.
Groundwater Hydrology—Groundwater modeling incomplete assessment	Concerns have been expressed that documentation of groundwater model formulation, digital input files, final calibration results, and sensitivity analyses have not been completed. As a result, assessment of adverse and hydrologic effects is incomplete. Also, methodologies are overly simplistic, with incorrect model inputs and assumptions resulting in unreliable predictions in the DEIS.	The groundwater model has been completely reformulated and calibrated, and a complete model documentation, calibration, and sensitivity analysis report has been provided (BGC 2019a). The new groundwater model is the basis for a more complete assessment of the hydrogeologic effects of the project, and a description has been included in the EIS. Predictions of the new model, where comparable, are generally similar to the predictions of the old groundwater model, and are considered reliable for the purposes of this EIS. Detailed responses to concerns about model methodologies, inputs, calibration, assumptions, sensitivity analyses, uncertainty, and other concerns are addressed in other SOCs provided in this document. Although the EPA (2014) Watershed Assessment and expert reports attached to comments have been characterized as "best available science," the groundwater model for EPA (2014) analysis is documented in a less-than-one-page text box. The EPA model was far more simplistic than BGC (2019a) or Piteau Associates (2018); was limited to a small area around the pit; was not calibrated to observed field data; and was not subjected to a sensitivity or uncertainty analysis. The documentation, complexity, and scientific quality of the modeling by BGC (2019a) exceeds that of EPA (2014) by such a large amount that the two are barely comparable.
Groundwater Hydrology—groundwater open water surveys	Comment noted Figure 3.17-11 does not match the 2006 open water survey presented in Figure 7.2-5 of Chapter 7 of the EBD (Knight Piésold et al. 2011a). Also, 2007 and 2008 open water surveys presented in Chapter 7 of the EBDs differ from what is presented in Section 3.17-11.	The referenced Figure and Section 3.17, Groundwater Hydrology, have been revised to better match information obtained from the 2006, 2007, and 2008 open water surveys.

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Topic—Subtopic	Statement of Concern	Response
Groundwater Hydrology—groundwater permanent sink	Concerns have been expressed that the concept of a permanent groundwater sink at the pit lake is not well explained and hard to believe considering well-fractured rocks, and that the pit lake is some 800 feet above the level of Iliamna Lake. Also, containment of the pit lake cannot be guaranteed forever. Concerns have also been expressed about whether the hydrology is well enough known to assure containment. A commenter requested that the project not make the mistake of the Nuclear Power industry, which still has no foreseeable plans to address its used fuel.	Without long-term pumping of the pit lake down to the maximum managed (MM) lake level, the pit lake would indeed leak groundwater towards Iliamna Lake or the Koktuli River as a result of the permeable rocks and regional groundwater gradients in those general directions. However, with pumping, a region of high groundwater levels constituting a groundwater divide is formed, completely surrounding (and underneath) the pit lake in three dimensions. These types of groundwater flow systems have been known for decades (Winter 1976) The high groundwater levels surrounding the pit lake result in gradients that are always towards the pit lake, as long as pumping continues, and therefore groundwater flow is also towards the pit lake. This conceptual model was confirmed by Prucha (2019) as being also applicable to the management of water at Pebble. EPA (1996) provides extensive guidance on "pump and treat" technology to control the spread of groundwater contamination that also confirms this approach. USACE disagrees that references cited (US EPA 2008 and Bradbury 2002) indicate that capture in a fractured bedrock system (as applicable to the open pit and pit lake at Pebble) is unreliable. An analogy of the plan to pump down the pit lake would be the pumping of a well that draws water into it from all sides and from below. In this case, the pit lake itself acts as a giant "pumping well." The description of the "permanent" groundwater sink lasting "forever" has been revised in the FEIS to "long-term," with "long-term" being defined as "centuries." Extensive data are available to define the groundwater conditions in the vicinity of the pit for this assessment, as detailed in Section 3.17, Groundwater Hydrology, and Appendix K3.17. Additional groundwater modeling conducted (BGC 2019i) confirms and clarifies expected conditions for hydraulic containment of contact water at the pit lake, and additional explanation has been provided in Chapter 4.17, Groundwater Hydrology. Managing spent fuel from the nuclear power industry is fundamentally different from the project plan of long-term pumping and treatment of water. Much of the difficulty of the spent nuclear fuel problem is related to planning for a facility that would function even in a "walk-away" scenario without hydraulic containment for thousands of years, which is not similar to the project description.

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Topic—Subtopic	Statement of Concern	Response
Groundwater Hydrology—Groundwater pit dewatering design	Concern has been expressed that the open pit dewatering design has not been sufficiently developed to provide a basis for assessing project impacts and assuring an inward gradient of groundwater flow.	A new groundwater model has been developed that simulates several configurations of pit dewatering systems, including no wells, perimeter wells, and wells inside the pit (BGC 2019a). Details of a dewatering plan would be developed later by PLP as additional information is obtained, or as required by State of Alaska permit requirements under the Alaska Water Use Act [11 AAC 93]. The various simulations of potential configurations of wells (or no wells) that have been included in the EIS are considered to provide a sufficient array of scenarios to assess an appropriate range of project impacts, including assessment of the maintenance of inward groundwater gradients toward the pit lake, effects on streamflows, wetlands, water treatment, water discharge plans, and other impacts. The EIS has been updated with this information.
Groundwater Hydrology—Groundwater system failure analysis	Concerns have been expressed that various failure modes could result in loss of hydraulic containment and release of contact water, including: • Failure of underdrain systems due to freezing, crushing, plugging, or breaks causing overflow. • Absence of pit lake dewatering causing surface water or groundwater outflow from the lake. • Failure of the WTP (which could result in a failure to pump, treat, and discharge water; see second bullet above). • Failure of a portion of the pit wall during post-closure, leading to complete mixing of the pit lake, increases of the dissolved salts in pumped water, and failure in the ability of the WTP to treat and discharge the necessary volumes of water. • Underestimation of net precipitation and under-sizing of water treatment capability as a result of potential large imbalances in the watershed model. • Increased net precipitation as a result of climate change could exceed capacity of WTP processing. • Increased groundwater inflow to the pit lake compared to planned amounts, resulting in exceedance of WTP capacity.	Mathematically, it is correct that low-likelihood events (in any given year) become high-likelihood events—even approaching 100 percent—as timeframes extend long term. The term "perpetuity" in this context has been replaced with "long term" in the EIS, with long-term being defined as a duration of centuries. PLP 2019-RFI 109m (BGC 2019i) confirms that the pit lake level could rise to an elevation of 950 feet or higher before loss of hydraulic containment of the lake water would occur. This lake elevation could occur after about 1 year of not pumping water from the lake. Revised watershed modeling has addressed concerns about potential large imbalances in the watershed model, and the revised modeling and results are described in Section 4.18, Water and Sediment Quality. Under some of the failure scenarios identified, it is possible that release of contact water to the environment could occur. Section 4.17, Groundwater Hydrology, and Section 4.18 have been updated with this information accordingly.

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Topic—Subtopic	Statement of Concern	Response
	• Occurrence of the largest floods on record for multiple years. • Combination of the four immediately above items, resulting in exceedance of planned water treatment plant capacity. • Occurrence of an earthquake of sufficient magnitude to cause changes in groundwater levels and rock fracturing near the pit lake that result in exposure of PAG or loss of hydraulic containment. • Occurrence of one or more high hydraulic conductivity faults or fracture systems that provide a pathway for contact water to flow toward nearby drainages, in combination with one or more of the other scenarios described in this SOC. • Failures caused or exacerbated by remote location, extreme weather, or human error. • Additional unspecified failure scenarios or combinations of scenarios concerning tailings and water management facilities during operations, closure, and post-closure. • Unspecified leaks and spills with infiltration to permeable near-surface aquifers. Comments expressed concern that evaluation of various failure and pit abandonment scenarios is important because of the long time period that some of these systems are expected to function. Treatment of water in perpetuity is a highly unrealistic assumption. Low annual likelihoods of failure that are extended to very long timeframes become very likely, and may be reasonably foreseeable—even approaching 100 percent likelihood. The effects that untreated wastewater would have on water quality, salmon, and other resident fish species should be properly evaluated.	
Groundwater Hydrology—GW aquifer mapping	Concerns have been expressed that the lateral extents of aquifers and confining units have not been presented in plain view, and the continuity of aquifers and confining units is unclear.	Since publication of the DEIS, information provided by PLP 2019-RFI 109h (BGC 2019h) regarding mapping aquifers and confining units in the mine vicinity has been incorporated into Chapter 3.17, Groundwater Hydrology, and Appendix K3.17. BGC 2019n also includes a table of relevant source material (e.g., boring logs) used to develop the figures requested by RFI 109h.

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Topic—Subtopic	Statement of Concern	Response
Groundwater Hydrology—GW characterization of deep groundwater flow	Concern was expressed that complex geology and sparse and questionable hydraulic conductivity data below 1,800 feet (below ground surface) result in characterization that is not scientifically defensible, and guesses about how groundwater moves in deeper layers. A more detailed understanding of how water moves through these deeper layers is requested.	Sparse hydrogeologic data at depths greater than 1,800 feet below ground surface (bgs) is typical in groundwater modeling studies as a result of the high cost and difficulty of obtaining such data (Voeckler 2012). This is an acknowledged source of uncertainty in the groundwater model, and one of the reasons why sensitivity analyses have been conducted and propagated through other predictive processes in this EIS. The characterization of the geology and hydraulic conductivity is scientifically defensible for the purposes of this EIS. There are more and higher-quality data at depth available for this project than was available at the recently completed Donlin EIS. For example, for the Pebble Project, aquifer testing was conducted to a depth of 4,000 feet bgs using a pumping well and a separate observation well in the mine site area—a depth more than twice the depth of the mine pit. Additional clarity of deep data availability and deep groundwater flow system configurations has been provided in the EIS in Section 4.17, Groundwater Hydrology, based on the responses to RFIs 109e (part 1), 109j, 109m, and 109p (BGC 2019b; BGC 2019f; BGC 2019i; and BGC 2019n).
Groundwater Hydrology—GW Cross-basin flow: SFK to UTC	A concern was expressed that the EIS minimizes the indirect effects of the cross-basin flow that has been documented to occur between SFK River and the Talarik Creek watershed. A commenter quoted the DEIS Executive Summary: "The only mine site features in the Upper Talarik Creek watershed would be the Water Treatment Plant #1 east discharge location and a short section of the mine access road." (DEIS, ES-35). Then the comment follows, expressing concern that this statement limits the discussion of impacts to the Nushagak watershed.	The cross-basin flow (or inter-basin flow) is acknowledged and described in Section 3.17, Groundwater Hydrology. The statement quoted by commenter correctly describes the actual mine site features (and facilities) and is not intended to imply that this would be the extent of impacts—but simply describes the occurrence of mine site features in the context of the watersheds. Impacts to the Talarik Creek watershed that would be caused by the cone of depression created by dewatering the mine pit and managing the mine pit lake are described in Section 4.17, Groundwater Hydrology. Additional clarification and analysis has been provided in the PFEIS about the impacts of projected changes in South Fork Koktuli streamflow to the acknowledged cross-basin flows of groundwater from the South Fork Koktuli watershed to the Talarik Creek watershed. Discussion has also been added in Section 3.17 about probable inter-basin flow between upper portions of the NFK watershed and the UT basin above gaging station UT100E.

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Topic—Subtopic	Statement of Concern	Response
Groundwater Hydrology—GW Effects of faults	Concerns were expressed that assessment of hydraulic connectivity, extent, and flow characteristics of faults is inadequate and that faults could cause significant challenges in characterizing groundwater flow. Model predictions fail to assess potential impacts of faults on dewatering rates, capture zones, and other impacts (such as streamflow), and discussion of these challenges is lacking. Discussion of faults as both barriers and conduits and discussion of compartmentalized flow is confusing and appears contradictory. Commenter suggests performing additional field hydraulic testing of faulted areas. A scenario involving pit lake water moving out to nearby drainages along faults could occur, and should be included in the EIS. Concerns have been expressed that other similar mines have experienced "movement of mine-influenced water along faults and outside the capture zone." There is insufficient discussion of the effectiveness of the maximum managed pit lake level of 890 feet above mean sea level (amsl) to maintain hydraulic containment at depth where faults and fractures in the bedrock aquifer occur.	A capture zone is the three-dimensional region that contributes water extracted by pumping a well or wells (or, in this case, a pit lake) at rates that cause all water to enter the well (or, in this case, the pit lake) rather than continue moving through the subsurface (EPA 1996). Therefore, the suggestion that other mines have experienced movement of groundwater outside of the capture zone must mean (assuming the water did indeed move) that the capture zone was improperly defined or maintained. One example cited in comments was for the Buckhorn Mine in Washington, which is an underground mine, and therefore is fundamentally different than the Pebble Project open pit (See SOC: Water and Sediment Quality—Water Quality Model). A capture zone for an underground mine with various underground tunnels and workings would be expected to be much more difficult to define and maintain than for a pit lake, because the hydrogeology would be much more complex. Additional clarification of the groundwater flow systems at depth surrounding the pit and further evaluation of the elevation of the pit lake required to maintain hydraulic containment was requested through RFI 109m. The response to this RFI clarifies and confirms that movement of water towards nearby drainages would not occur under high bedrock hydraulic conductivity and bedrock fault scenarios up to a lake elevation of at least 950 feet amsl, which is at least 50 feet above the Not to Exceed pit lake elevation of 900 feet amsl. See also SOC Groundwater—Groundwater model pit capture zones. The groundwater flow model (BGC 2019a) reviewed site water level data and found no persistent water level anomalies that would indicate that individual faults control groundwater flow to the extent that simulation of them in the base case model was warranted—a finding that was confirmed by the USACE. However, in consideration of the uncertainty surrounding this topic, sensitivity analyses were conducted on the potential influence of faults on model predictions. For example, the effects of a high hydraulic conductivity fault on groundwater inflow to the pit at the end of mining was found to significantly increase flow to the pit, confirming the potential effects of faults to present water management challenges as commented. These higher inflow rates were used to develop a range of possible higher inflow rates that was propagated through other predictive processes of this EIS affecting water treatment and the aquatic and wetland environment. The USACE believes that sufficient hydraulic testing of deep faulted areas has

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		occurred. Additional discussion of these data has been included in Section 3.17, Groundwater Hydrology. Discussion of faults as both barriers and conduits (different faults) has been revised in the FEIS to improve clarity. BGC (2019l) evaluated the potential effects of a fault through the western wall of the bulk TSF and concluded seepage pathways from the facility could be influenced if the hydraulic conductivity of the faulted bedrock is sufficiently high. Although field hydraulic conductivity data, monitoring well (water level) data, and model calibration degradation suggest that such a scenario is unlikely, further hydrogeologic data could be collected at future stages of project design to characterize the hydraulic properties of the bedrock in the vicinity of this interpreted fault to allow for design of appropriate mitigation (e.g., grouting, partial liner placed over the fault trace, seepage collection wells), should this be necessary. Collection of further hydrogeologic data and design of appropriate mitigation has been added to Appendix M1.0, Mitigation Assessment, and adopted by PLP as shown in Table 5-2; and model analysis of the fault through the west wall of the bulk TSF has been added to the EIS Appendix K4.17, Groundwater Hydrology.
Groundwater Hydrology—GW impacts to private wells	Concerns have been expressed about potential impacts to private wells on the eastern side of Cook Inlet from installation, operation, or a potential failure of the pipeline, and potential plans for adaptive management, community outreach, and for provision of safe drinking water should a pipeline failure occur.	Section 4.17, Groundwater Hydrology, of the EIS has been revised to include the results of additional analysis about the expect radius of influence of aquifer disturbance potentially caused by installation, operation, or potential failure of the natural gas pipeline. The distances between private wells and the pipeline far exceed the 200-foot distance to potential sources of contamination applicable to public water supply wells in Alaska, and the wells in question are not considered to be in a downgradient direction from the pipeline. Therefore, adaptive management planning, including community outreach or provision of alternative drinking water supplies, are not expected to be warranted.
Groundwater Hydrology—GW model AET simulation	Concerns have been expressed that the groundwater model uses an oversimplified method for simulating actual evapotranspiration (AET); and as a result, would likely overestimate baseflow loss and incorrectly parameterize stream-aquifer conductance value, and impact the entire water balance and estimation of downstream impacts due to mining. Commenter stated the MIKE/SHE modeling provides values of AET compared to groundwater recharge. Commenter	Actual evapotranspiration (AET) was considered in the new groundwater model (BGC 2019a) by subtracting AET (and sublimation) from precipitation, partitioning out surface water runoff, and considering soil types and calibration results to determine recharge. Explicitly modeling AET as a "complicated function of complex climate inputs..., soil properties, precipitation, groundwater depths with time, and vegetation properties..." risks over-parameterizing the model with parameters that are ill-defined by field data, and that do not

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	expressed concern that omission of complex AET simulation is a substantial oversight and likely significantly affects model calibration and predictions.	demonstrably result in more accurate simulations or otherwise add clear value to the simulations needed for this EIS. MIKE/SHE model simulations suggesting that AET in riparian zones exceeds groundwater discharge on an average annual basis is not supported by field observations or comparison with other modeling work (BGC 2019g. BGC (2019a) incorporated groundwater evapotranspiration in the modeling by using the Evapotranspiration (EVT) Package. USACE believes that simulation of AET, baseflow gains and losses, and parameterization of stream-aquifer conductance values by BGC (2019a) is not a significant source of uncertainty or calibration inaccuracy, and that model predictions are not significantly affected by the methodologies used to simulate AET in the new groundwater model. Section 3.17, Groundwater Hydrology; and Section 4.17, Groundwater Hydrology, have been updated with information about the new groundwater modeling.
Groundwater Hydrology—GW model Calibration concerns	Concerns were expressed that it is not clear what level of accuracy of the groundwater model is required or adequate for the EIS. Comment stated that seep discharge rates could "greatly aid calibration," yet appear not to have been used for the calibration of the model. Comment expressed concern that calibration appears to be biased, evidenced by high simulated heads at upper elevations that are likely caused by low specified hydraulic conductivities that have the effect of simulating reduced discharge into the pit.	The groundwater model described in the DEIS has been replaced with a new groundwater model analysis, calibration report, and sensitivity analysis in response to RFI 109d (BGC 2019a). Section 3.17, Section 4.17, Appendix K3.17, and Appendix K4.17, Groundwater Hydrology, have been revised based on the response to RFI 109i (BGC 2019g. A commonly used metric for determining the accuracy of a groundwater model is a comparison of modeled head values with field-measured head values from wells. This is commonly expressed as the Normalized Root Mean Square Error (NRMSE), and a value of 10 percent or less is generally considered to indicate an acceptable calibration, and was used as a guideline for the EIS. In addition, comparison of calculated fluxes of water in the model are normally compared with estimates of fluxes determined by other means, including: 1) recharge estimates from precipitation, snowmelt, AET, runoff, and baseflow data; and 2) groundwater fluxes to or from seeps or streams calculated by the model and compared to streamflow or seepage rate data. The NRMSE for streamflows is also less than 10 percent, indicating an acceptable fit. For the EIS, the closeness of fit of these fluxes from the new groundwater model (BGC 2019a) is disclosed, and a qualitative assessment is made of the expected accuracy of the model for evaluating project impacts. Seep discharge rates have not been used to calibrate the model; however, in the

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		project area, many seeps are quickly responsive and exhibit highly variable flow, depending on recent rainfall events or snowmelt. As a result of the generally transient and variable nature of measured seep flows, groundwater seeps were not used as quantitative targets for calibration of the groundwater flow model. Instead, visual comparison of seepage locations relative to observed locations was used to qualitatively evaluate results of the groundwater flow model. In addition, an aquifer pumping test, evaluation of vertical hydraulic gradients, an evaluation of simulated and measured seasonal and multiyear hydrographs from observation wells, and observed versus simulated streamflow statistics have been presented to assess model accuracy (BGC 2019a). A review of simulated versus measured heads at high elevations in the new groundwater model (BGC 2019a, Figure 6.2) does not reveal any evidence of high simulated heads at upper elevations. To further evaluate whether the model is sufficiently accurate for the purposes of the EIS, a sensitivity/uncertainty analysis has also been conducted to determine the potential range of model predictions on streamflow and wetland impacts to bracket the estimated level of accuracy of the groundwater model. Further discussion of these factors has been added to Section 3.17, Section 4.17, Appendix K3.17, and Appendix K4.17.
Groundwater Hydrology—GW model Hydraulic properties	A concern was expressed that the DEIS does not discuss the groundwater model's upscaling of hydraulic property measurements from localized hydraulic testing to the scale of much larger grid cell areas used in the model.	The new groundwater model (BGC 2019a) simulated an aquifer test (localized hydraulic testing) as part of the calibration process to gain insight on the scale effect of aquifer parameters. Additional discussion of the process of specifying hydraulic properties over larger grid cell areas than is typically derived from localized hydraulic testing has been added to Appendix K3.17 of the FEIS. This is an acknowledged source of uncertainty in the model, and is one of the reasons why sensitivity analyses were performed and the results propagated to other predictive components of the EIS analysis, including water treatment and effects on streamflow and wetlands.

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Groundwater Hydrology—GW model Recharge method	Numerous concerns were expressed related to how the groundwater model simulates groundwater recharge, deemed critical to acceptable calibration and model predictions. Several comments referred to baseline studies (Schlumberger 2011a, an EIS reference). Other comments applied to the early (Piteau Associates 2018) groundwater modeling report. Concerns include: • The methodology used is unreferenced and non-standard. • Specification appears to be constant in time, which is unrealistic. • Only two of many factors controlling recharge have been considered: ○ i. Soils: ♦ 1. Unsaturated zone hydraulic conductivity ♦ 2. Residual moisture content ♦ 3. Saturated moisture content ♦ 4. Wilting/field capacity ○ ii. Saturated zone ♦ 1. Layer slopes ♦ 2. GW depths ○ iii. Vegetation ♦ 1. LAI (time) ♦ 2. Root depths ○ iv. Surface Runoff ♦ 1. Slope ♦ 2. Depressions ♦ 3. Streams ♦ 4. Aspect ○ v. Climate ♦ 1. PET ♦ 2. Precipitation intensity/duration/frequency ♦ 3. Air temperature ♦ 4. Snowmelt dynamics • Recharge Zonation appears highly over-parameterized (278 zones), likely a result of attempting to force simulated heads to match observed heads at each individual well. However, it is well known that this produces highly non-	The groundwater model described in the DEIS has been replaced in response to RFI 109d (BGC 2019a), and the FEIS updated accordingly. Section 3.17 and Section 4.17, Groundwater Hydrology, and Appendices K3.17 and K4.18 have also been revised as a result of responses to RFI 109i (response to Prucha comments, BGC 2019g). The USACE has reviewed relevant documents and finds: 1. The new groundwater model uses a methodology that is adequately referenced and standard. 2. Recharge specification varies monthly in transient models according to precipitation patterns and snowmelt. 3. Recharge was specified as a lumped parameter that implicitly incorporates all of the detailed physical and biological processes itemized in the comments; because, although mathematical equations exist to simulate those processes, meaningful modeling requires specification of values for those parameters based on physically and biologically relevant field information, which is almost completely lacking and prohibitive to obtain for the large area of investigation. The acceptable calibration of the BGC (2019a) model using commonly accepted methods demonstrates that obtaining such field information and calibrating a model such as Prucha's is not necessary to accomplish the goals of the modeling. Also, evaluation of uncertainty of a model built on such complexity such as Prucha's requires evaluation of uncertainty stemming from the multitude of parameters, which was not performed as part of the Prucha modeling, and which affects the usability and reliability of such a model. Prucha, for example (Figure 37) shows numerous areas where recharge is modeled as -50 to -100 inches/year, values which may be applicable to stream-side areas in hot dry climates with phreatophytic vegetation, but are unsupported by any local studies in this part of Alaska, and seem improbable. These modeling results may be an artifact of overparameterizing the very complex physical and biological process known as recharge in a model that is not adequately validated. 4. Calibration of groundwater models typically requires adjustment of either recharge, hydraulic conductivity, or both for the model to match calibration criteria such as groundwater-level data, streamflow data, or pumping test responses. BGC (2019a) had large and constant-value zones for hydraulic conductivity in bedrock; and alternatively, used recharge as a primary calibration parameter, constrained by precipitation, snowmelt, and soil types/geology. The problem of non-uniqueness is a well-known feature of all models of this type, including the Prucha model. The solution to this problem is through conducting a

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	unique model calibrations, especially when not constrained by datasets other than heads. • Justification of monthly time steps to simulate recharge and streamflow lack a physical basis or reference, especially in comparison to the MIKE/SHE model that simulates hourly event-based flows. • Recharge zonation appears to be highly over-parameterized compared to literature recommendations to strive for parsimonious parameterization. • Recharge is "externally assumed" rather than calculated from rigorous physically based processes and input parameters. • The link between the groundwater model and the spreadsheet model is poorly documented. • The analysis should consider all disturbances (e.g., surface hardening and soil compaction from roads, airstrip, overall facility footprint, overburden removal, permafrost disturbance) that may influence water storage capacity and infiltration rates related to groundwater. • Recharge is a critical model input, is linked to model hydraulic conductivity, and is a factor towards highly non-unique model calibrations and increased model uncertainty. The combination of concerns about recharge raises serious questions about the accuracy and reliability of the model for mine impact predictions and without significant corrections, the modeling is flawed and should not be relied upon in the EIS.	robust sensitivity analysis, which BGC (2019a) accomplished, but that Prucha did not. In this respect, the BGC (2019a) model provides a more usefully reliable analysis than the Prucha model. 5. Monthly time steps are physically clear and also appropriate for the EIS analysis because expected hydrologic impacts of the project are long-duration phenomena amenable to monthly average condition analysis. The MIKE/SHE analysis presented that simulates hourly or event-based flows does not appear to present significant advantages in environmental analysis, especially in consideration of the challenges of data limitations, calibration difficulty, and sensitivity analysis limitations. 6. Groundwater recharge is geographically variable as a result of orography, aspect, rain shadow, wind, variable surficial geology, and land slope effects, and does not appear to be over-parameterized. Parameterization of recharge is constrained by streamflow data, which is one of the principal calibration data sets. 7. Recharge in the new groundwater flow model is not "externally assumed," and is based on physical processes. 8. Additional information about the linkages between the new groundwater flow model and the watershed and mine plan models have been added to Section 3.17 and Section 3.18, Water and Sediment Quality. 9. Smaller features such as roads, airstrips, building footprints, etc. (there is no permafrost in the project area) were not considered to be of sufficient size to affect groundwater flow model results, and were not individually simulated. For the model simulating the end-of-mining scenario, adjustments of recharge applied to the model were made to the footprint of the open pit, Quarry B, Quarry C, embankments, stockpiles, bulk TSF, main WMP, pyritic TSF, and open pit WMP. The adjustments varied according to the characteristics of excavation, compaction, material type, or presence of a liner associated with the individual facilities. For post-closure conditions, the rates of recharge for reclaimed facilities were set equal to baseline conditions. The new groundwater model presents considerable enhancements over the model described in the DEIS, even though the results are not fundamentally dissimilar. Model uncertainty, including uncertainty related to recharge, have been evaluated through a sensitivity analysis, and the results have been propagated through other predictive aspects of the FEIS. The USACE analysis indicates that the model is not significantly flawed, and that the results are usable and reliable for the purposes of the EIS.

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Groundwater Hydrology—GW model Seep setup	Comments expressed concern that the groundwater model simulation of seeps is overly simplistic, incapable of simulating re-infiltration or ponding of seep water, fully accounting for water discharged at seeps, or using seep information to calibrate the model.	The groundwater model described in the DEIS has been replaced in response to RFI 109d (BGC 2019). Section 3.17, Section 4.17, Appendix K3.17, and Appendix K4.17, Groundwater Hydrology, have been revised to include the new groundwater model, based on BGC (2019g) (the response to RFI 109i [response to Prucha comments]). According to BGC (2019g), groundwater outflow or discharge from the model was simulated at ground surface as seepage using the Drain package. Water removed from the model through this boundary condition was tracked in the model output and treated as runoff to the simulated surface water network. Although this methodology does not allow the discharged water to recharge the groundwater system further downslope, this is considered a reasonable approach, considering the relatively steep topography in the area. In the project area, many seeps are quickly responsive and exhibit highly variable flow depending on recent rainfall events or snowmelt water activity. As a result of the generally transient and variable nature of measured seep flows, groundwater seeps were not used as quantitative targets for calibration of the groundwater flow model. Instead, visual comparison of seepage locations relative to observed locations was used to qualitatively evaluate results of the groundwater flow model. See also SOC: Groundwater—GW model calibration concerns.
Groundwater Hydrology—GW model simulation of unsaturated zone	A concern has been expressed to clarify how water flow through the unsaturated zone will be simulated.	The new groundwater model (BGC 2019a) simulates flow through the unsaturated zone using a lumped parameter methodology. The methodology assumes relatively rapid vertical flow downward through the unsaturated zone, and no changes in storage of water in the unsaturated zone. The upper surface of the groundwater flow model domain is the water table. Recharge to the water table is determined by first subtracting sublimation and actual evapotranspiration from precipitation. The result of that calculation, which is performed separately from the groundwater flow model simulation, is further divided into groundwater recharge and surface runoff and adjusted for soil type. The resulting distribution of recharge is then adjusted through the calibration process to determine the final recharge distribution of the calibrated model. Section 3.17, Groundwater Hydrology, has been updated with this information.

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Groundwater Hydrology—GW model stream/ aquifer setup	Concerns have been expressed that the analysis of impacts that rely on the groundwater model are flawed because of limitations in how the model simulates stream-aquifer flow, considering the highly coupled flow systems present. At a minimum, the model should have used a stream routing option in Modflow. Even Modflow (with monthly time steps) does not account for: • Dynamic and distributed overland flow, including hillslope surfaces. • Flooded overbank conditions. • Sub-daily or event-level flow conditions. • The groundwater model is also limited in how it simulates river widths, leakage rates, and river stages as constant values rather than time-varying. These limitations preclude the modeling system from simulating physically realistic changes caused by the project, and the EIS is therefore incapable of assessing realistic groundwater impacts, and the impacts presented are flawed.	It is agreed that the impacts presented in the DEIS were imperfect in the global sense that all simulations of natural groundwater flow systems are imperfect. Improvements in the modeling work have been incorporated into Section 3.17, Groundwater Hydrology, of the FEIS describing how the new groundwater flow model (BGC 2019a) uses the STR module to route streamflow, as suggested. The EIS acknowledges and considers in numerous places that stream-aquifer flow systems are highly coupled. Detailed hydrologic processes such as dynamic and distributed overland flow, overbank flooding, and sub-daily or event-level flow conditions are of limited importance in simulating larger-scale processes such as areal recharge, groundwater discharge to streams, and average stream flow. Data and integrated models have limitations in adequately parameterizing and calibrating/validating basin-wide modeling of these processes, and conducting necessary uncertainty analyses. Hydrologic impacts of the project are long-term, large-scale (relative to the detailed hydrologic processes described) phenomena amenable to analysis using longer-term (e.g., monthly) average conditions for the purposes of this EIS. The USACE finds that the revised groundwater flow modeling conducted as described in the FEIS and supporting documents are capable of assessing realistic groundwater impacts of the project.
Groundwater Hydrology—GW Model uncertainty analysis	Comments have expressed concerns that: 1) The Monte Carlo analysis used to assess groundwater model uncertainty in the DEIS is not well described. 2) The groundwater model should be revised to improve its accuracy. 3) The effects of model uncertainty and inaccuracy on model predictions should be disclosed. 4) Model uncertainty could have effects on potentially required WTP capacities and the water balance model, and these should be updated and revised to reflect groundwater model uncertainties. WTP capacity is needed to provide for variable flow conditions, and higher-than-expected groundwater flow could reduce this planned capacity to accommodate surface water flow variability. However, it should be noted that the groundwater inflows to the WTP represent a relatively small	1. The Monte Carlo analysis applies only to the model developed for the DEIS and does not apply to the new groundwater model developed by BGC (2019a). 2. The USACE finds that the enhancements to the groundwater model described by BGC (2019a) have improved the accuracy of the model. 3. A description of a robust sensitivity analysis has been added to Section 4.17 to better explain model uncertainty. 4. The sensitivity analysis has resulted in a simulation of a range of aquifer and project conditions that have been propagated with additional revised modeling through other predictive components of this EIS related to water treatment (Section 4.18, Water and Sediment Quality) and assessing streamflow (Section 4.16, Surface Water Hydrology), and wetlands and other waters/special aquatic sites (Section 4.22) impacts. The FEIS has been updated based on the response to RFI 109f on this topic.

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	portion of the water balance, and would have only a limited effect on overall treatment volumes. 5) Additional analysis is needed about the risks to aquatic resources if the groundwater modeling assumptions are flawed. 6) The USACE analysis is so tied to certain of the groundwater modeling that it becomes virtually impossible to understand what the anticipated impacts are. 7) Uncertainty analysis was unconstrained by surface discharge. 8) Uncertainty stemming from unconsolidated sediments is more important than from lower bedrock units, and should have been the focus of the sensitivity analysis. 9) Justification for parameter selection for the sensitivity analysis is absent. 10) The range of predicted output from the sensitivity analysis should be applied to all predictions of the model, including the bulk TSF, main WMP, and pyritic TSF facilities. 11) The uncertainty analysis should have been propagated through to the watershed and mine plan models. 12) A more robust, comprehensive, and expanded sensitivity analysis should have been used to address the range of impacts with mitigation and operational and design changes. 13) The model does not distinguish between a calibration sensitivity analysis and a prediction sensitivity analysis; however, what should have been performed is a predictive uncertainty analysis that constrains realizations to maintain calibrations within acceptable targets.	5. The primary risk from model uncertainty regarding management of water from the pit lake is that differing amounts of water would need to be pumped from the pit lake to maintain hydraulic containment and prevent impacts to the aquatic environment. This differing amounts could have secondary impacts on process water available for the mine, and in the amount of treated water that would be available to discharge to streams. The effects of these uncertainties have been propagated through other predictive components of this EIS related to water treatment, and assessing streamflow and wetlands impacts. The EIS has been updated based on the response to RFI 109f on this topic. 6. The impact assessment is complicated and difficult to understand, partially because of the scientific rigor of the analysis, large groundwater data sets, and complex hydrogeology of the area. Propagation of groundwater model uncertainty is intended to improve the understanding of the likely range of impacts associated with the project. Revisions to the EIS have been made in Section 3.17 and Section 4.17, Groundwater Hydrology, to improve comprehension, based on the responses to RFI 109f and the revised modeling of BGC (2019a). 7. The calibration and sensitivity analysis reported by BGC (2019a) was constrained by surface discharge. 8. The sensitivity analysis reported by BGC (2019a) shows that varying bedrock hydraulic conductivity by a factor of 10 is more important than varying the hydraulic conductivity of unconsolidated sediments by a factor of 10. Bedrock faults are also shown to be important factors that are not factors in flow through unconsolidated sediments. 9. The sensitivity analysis reported by BGC (2019a) varied up to 21 different scenarios for baseline, end-of-mining, and post-closure conditions for both higher and lower values that reasonably covered the range of expected conditions for a wide range of the typically sensitive model parameters and boundary conditions. Individual justification for each scenario is not warranted for the EIS, but additional information is available in the supporting documents that are publicly available on the project website. Some parameters were adjusted to such an extent that model calibration was severely affected, providing a reasonable constraint on parameter selection. 10. From the initial suite of sensitivity analysis scenarios provided by BGC (2019a), additional simulations were requested by RFI 132 and

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		RFIs 109e, 109f, 109g, 109h, 109j, 109k, 109l, 109m, 109n, and 109o to cover key features of the project, and the responses have been incorporated into EIS Section 3.17 and Section 4.17, Groundwater Hydrology, and Appendix K3.17 Appendix K4.17. 11. The uncertainty analysis was propagated through the watershed and mine plan modules; and the effects on other predictive components of the EIS such as water treatment and effects on streamflows and wetlands have been assessed, and the EIS updated accordingly. 12. The revised groundwater modeling and more robust, comprehensive, and expanded sensitivity analysis have been used to develop, conceptualize, and evaluate mitigation and monitoring features such as WTP discharge to streams, groundwater monitoring systems, and additional data collection and modeling needs during future design efforts. Text has been added to Chapter 5, Mitigation, and Appendix M1.0, Mitigation Assessment. The modeling work has also contributed to evaluating operational and design changes such as adjustments to the sizing and timing of water treatment capacity. 13. The new groundwater model (BGC 2019a) performed both calibration and predictive sensitivity analyses. The effects of varying model parameters and boundary conditions both on the quality of the calibration (most variations still produced acceptable calibrations) and on model predictions are fully disclosed. Further sensitivity analyses have also been conducted as part of the RFI process (responses to RFI 132, RFI 109e, RFI 109f, RFI 109l, and RFI 109m). Together, these sensitivity analyses provide an extremely robust set of sensitivity analyses that greatly enhance the assessment of model uncertainty compared to the DEIS, and the FEIS has been updated accordingly, mainly in Section 4.17, Groundwater Hydrology.
Groundwater Hydrology—GW quantification of contact water infiltration	A concern has been expressed that the DEIS does not adequately describe how much contact water would infiltrate to groundwater.	The identified potential sources of contact water that could infiltrate to groundwater are: 1) Vertical seepage downward from the bulk TSF. 2) Seepage from the open pit WMP. 3) Seepage through the liners of the main WMP and pyritic TSF. 4) Seepage from various seepage collection, recycle, and sediment ponds.

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		5) Seepage from miscellaneous spills and leaks is further described in SOC Groundwater Hydrology—Groundwater system failure analysis. Descriptions of how much contact water would infiltrate to groundwater from the potential sources identified above: 1) Estimated vertical seepage rates from the bulk TSF during operations and closure are described in Section 4.15, Geohazards and Seismic Conditions. Particle tracking results show that this water is expected to mix with groundwater from the surrounding drainage, and discharge to the main and south SCPs, where it would combine with surface runoff and be pumped either to a water treatment plant (during operations) or to the pit lake (during post-closure). 2) Seepage leaking through the liner at the open pit water management pond would be captured by a system of drains, a collection point, and monitoring/pumpback wells (BGC 2019p). 3) Seepage through the main WMP and pyritic TSF liners is described in Section 4.17, Groundwater Hydrology; this water would mix with background groundwater and would report to the sump of the respective underdrain seepage collection system. 4) Seepage from the north and south SCPs of the bulk TSF are expected to be "sinks" for local groundwater flow and would not be expected to leak into groundwater (PLP 2019-RFI 109e). Seepage from other seepage, recycling, and sediment ponds would be expected to be modest amounts, and/or would be from materials that have been screened to confirm they do not contain appreciable metal-leaching or acid-generating material. 5) Seepage from miscellaneous spills and leaks could result in localized infiltration of contact water to groundwater. FEIS Section 4.17 has been revised to include more detailed information as described above compared to the DEIS.
Groundwater Hydrology—GW seepage through TSF saddles	Concerns have been expressed that there are no details provided regarding monitoring, detecting, and responding to any uncontrolled seepage through two topographic saddles along a ridge northwest of the bulk TSF facility, and that these details should be provided in a detailed plan and adaptive management strategy, and summarized and referenced in the EIS.	Additional details have been provided in the EIS explaining that the area of the bulk TSF near the saddles would be filled with relatively permeable tailings that would facilitate downward drainage towards the base of the embankment and a low water table (BGC 2019a; BGC 2019d. Additionally, a particle-tracking simulation of the new groundwater model shows that groundwater would not flow through the saddle area (BGC 2019a). As a result, the likelihood of uncontrolled seepage through the saddles is low and the conceptual plan of

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		groundwater monitoring is sufficient for the purposes of the EIS. The description in the EIS was modified to indicate that one of the purposes of the monitoring would be to confirm that there is hydraulic containment provided by the high water table in the saddle areas, and the drainage features of the bulk TSF. See SOC: Mitigation and Monitoring—Request for Proposed Management Plans (including a monitoring plan).
Groundwater Hydrology—GW third party review	A concern has been expressed that the groundwater model and model parameters should be tested by experts at USGS to evaluate both the results and limitations of the model.	The third-party contractor and their SMEs (on behalf of the USACE) are responsible for providing an appropriate level of technical review of the groundwater modeling performed for the project. In general, through the NEPA process, the project invites expert review and evaluation of all aspects of the groundwater modeling work to establish full scientific rigor and transparency through the process of public comment and cooperating agency review of the DEIS. Any party may review and comment on the groundwater modeling work used in the DEIS, and cooperating agencies provided review and comment on the PFEIS. There have been no specific changes to the EIS as a result of this comment.
Groundwater Hydrology—GW/ SW Interactions details	Comments expressed concern that the DEIS does not adequately characterize groundwater and surface water (streams, ponds, and wetlands) interactions, which are widely considered to be very important to fish habitat at multiple life stages in the project area. Dynamic interactions between reductions in streamflows, reduced groundwater levels, and magnitudes and directions of groundwater flow, and impacts on wetland/habitat areas appear not to have been considered. Predicted impacts to seeps, wetlands, and other features are not properly characterized as only applicable to areas adjacent to the pit. Water quality impacts to wetlands, ponds, lakes, and streams, a vastly more significant variable than water quantity, are not addressed. Concerns have been expressed that the important inter-basin groundwater flow between the SFK and UTC watersheds has been treated as hypothetical or barely worthy of mention in the DEIS, and that damages to these connected waters would be numerous and severe.	Additional detail has been added to Section 3.16 and Section 4.16, Surface Water Hydrology, and Section 3.17 and Section 4.17, Groundwater Hydrology, of the EIS regarding the complex processes governing groundwater-surface water interactions in the areas that may be affected by the project including hyporheic flow, upwelling groundwater in areas where salmon spawn, gaining and losing reaches of headwaters catchments, the geographic areas of impacts, and the significance of the documented inter-basin flow of groundwater from the SFK to the UTC drainages and from the NFK to UTC drainages. Additional details are provided on project impacts to smaller headwaters catchments than were provided in the DEIS. Water quality impacts are addressed in Section 4.18, Water and Sediment Quality. These additional details provide a more science-based and process-based assessment of impacts to wetlands, ponds, streams, and lakes than was provided by EPA (2014, Box 7-1) where stream segments, wetlands, ponds, and lake areas were simply classified as "dewatered" (or eliminated or blocked if they met other criteria) if they fell within the groundwater drawdown zone of the open pit. The meaning of "dewatered" is unclear and could easily be interpreted as being "completely dewatered." This classification does not consider the importance of precipitation and snowmelt in sustaining these waterbodies, especially in areas where

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		groundwater drawdown and loss of water from the waterbody to groundwater is relatively small. For example, Figures 7.10, 7.11, and 7.12 (EPA 2014) show parts of lakes being "dewatered" at the edge of the drawdown zones, which is physically difficult to envision if "dewatered" is interpreted to mean "completely dewatered."
Groundwater Hydrology—Inadequate science	Concerns have been expressed that groundwater hydrology issues are inadequately addressed, and that the BBWA (EPA 2014) and the expert reports included as attachments to comments on the DEIS present the best available science on groundwater impacts, and should be used to inform the EIS.	The groundwater modeling performed for the Bristol Bay Watershed Assessment (BBWA) (EPA 2014) is fully explained in only a text box (Box 6-2) and is extremely simplistic compared to BGC (2019a) and the responses to numerous RFIs. Many important processes are simply not addressed. The entire BBWA analysis is based on three hypothetical mining scenarios, none of which closely align with the project. Basic logic dictates that if the premise of a conditional statement (i.e., if, then) is invalid, then the truth of subsequent assertions cannot be determined. The BBWA applies an overly simplistic methodology of determining surface water/groundwater interactions (see "GW/SW Interactions detail" subtopic). The USACE does not consider the BBWA "best available science" with regard to the assessment of groundwater impacts from the project. Prucha (2019) provides useful scientific perspectives that are the core of numerous SOCs in this document. However, in some places, Prucha (2019) misunderstood important details of the project, and therefore some of the conclusions presented are not reliable. Responses to Prucha's (2019) concerns, where applicable, have been incorporated into the FEIS. The USACE does not consider Prucha's (2019) work "best available science" with regard to the assessment of groundwater impacts of the project. Wobus (2019) provided less detailed, but also useful, comments (especially on the topic of the overall water budget of the area—see RFI 138) that have been used to revise the EIS (Section 4.17, Groundwater Hydrology). The groundwater science incorporated into the FEIS exhibits scientific rigor and transparency, having benefited from: 1) The presence of an actual project description and a logically valid analysis. 2) A revised groundwater model (BGC 2019a). 3) The responses to numerous RFIs that add considerable detail and analysis to the revised groundwater model (RFI 109e, RFI 109f,

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		RFI 109g, RFI 109h, RFI 109i, RFI 109j, RFI 109k, RFI 109l, RFI 109m, RFI 109n, RFI 109o, RFI 109p, RFI 132, and RFI 138). 4) Numerous comments on the DEIS that have helped focus analysis and clarity in the presentation of groundwater information in the FEIS. The USACE disagrees that the BBWA and expert reports present "best available science" with regard to groundwater science in assessing the impacts of the project.
Groundwater Hydrology—Liners and core zones	Additional information is needed on the design and construction of liner systems beneath the main WMP and pyritic TSF to support contact water leakage predictions. Clarification is also needed regarding whether both liners and low-permeability core zones would be needed in the non-flow-through embankments, and whether sufficient quantities of low-permeability material would be available on site.	Information on the liner protection during construction is provided in Chapter 2, Alternatives. Information regarding liner types, installation practices, and durability is provided in Appendix K4.15, Geohazards and Seismic Conditions, for the pyritic TSF. Additional information on current industry-standard installation procedures, Quality Assurance/ Quality Control (QA/QC) practices, and liner defect assumptions (from PLP 2019-RFI 019c) has been added to Appendices K4.15 and K4.17, Groundwater Hydrology. Text has been also added to Chapter 5, Mitigation, to indicate that liner material specifications for the pyritic TSF and main WMP would be finalized in detailed design (Knight Piésold 2018b; Piteau Associates 2018a) and that current industry standard QA/QC monitoring would be used during liner installation. A suggested measure to revisit the liner defect assumption during groundwater and water quality modeling updates in final design was added to Appendix M1.0, Mitigation Assessment. The bulk TSF embankment would contain an inner F/T zone, constructed of a designed gradation of sand and gravel without a low-permeability core zone. Therefore, a source of low-permeability, fine-grained material would not be required for construction of this embankment. Edits have been made in Appendix K4.15 to clarify that an upstream liner keyed into a grout curtain is the current concept at the bulk TSF south and SCP embankments. Other options that may be explored during final design and permitting include use of low-permeability (zone S) material as liner bedding, incorporating a low-permeability core zone into the embankment, or incorporating low-permeability liner bedding zones and filter zones without a specified core zone (PLP 2019-RFI 129). This has been clarified in Appendix K4.15. Additional details provided in PLP 2019-RFI 129 regarding the availability of low permeability materials onsite for the potential bedding and core zones have been added to Appendix K4.15, Geohazards.

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Groundwater Hydrology—Seasonal groundwater level fluctuations	A concern has been expressed that the description of seasonal groundwater level fluctuations is incorrect in Section 3.17 of the DEIS, but that it is more correctly described in Appendix K3.17, and that the wording in Section 3.17 should be revised to be similar to the wording in the appendix.	The wording in Section 3.17, Groundwater Hydrology, has been revised in the EIS to more closely reflect the wording in Appendix K3.17.
Groundwater Hydrology—Stream stage effects on groundwater	Concerns have been expressed that the effects of reduced surface flows on downstream groundwater levels have not been assessed, and impacts on the magnitude of groundwater flow and vertical direction of flow in critical wetland/habitat areas have not been considered or disclosed.	Changes in streamflow (with return of treated water to streams) is projected to be a small percentage of total streamflow. These average changes would be distributed across varying natural changes in streamflow resulting from storms, snowmelt, dry spells, winter conditions, etc. These natural changes in streamflow are expected to result in changes in water levels in streams that are of greater magnitude than changes of water level caused by the projected average changes in flow. Therefore, any groundwater levels that respond to changes in streamflow would be expected to be subject to a range of highs and lows that typically exceed the changes imposed by the project. The effects of potential changes in streamflow and groundwater water levels is expected to exert only a minor impact on magnitudes and directions of groundwater flow in wetland and habitat areas downstream of the zone of influence. Text has been added to the FEIS to describe these potential effects (Section 4.17, Groundwater Hydrology).
Groundwater Hydrology—Unclear volumes of water requiring management	Water volumes requiring management and treatment to maintain hydraulic containment, especially during post-closure, are not clearly presented.	The EIS has been updated in Section 4.17, Groundwater Hydrology, to provide additional detail about water treatment totals under end-of-mining and post-closure conditions. Predictions of long-term water management requirements contain uncertainty, as described in Section 4.17, largely because hydraulic conductivity surrounding the future pit/pit lake is variable and imperfectly known. State of Alaska bonding requirements for closure and post-closure are expected to be reviewed every 5 years to evaluate and allow for consideration of changing or newly discovered conditions. Appendix M1.0, Mitigation Assessment, of the EIS has been modified to include a potential mitigation measure to monitor all groundwater extraction rates related to pit/pit lake groundwater inflows and pumping from wells, monitoring groundwater levels and precipitation surrounding the pit and pit lake; and update the groundwater flow model at least every 5 years until conditions reach annualized steady-state conditions, including consideration of climate change, during post-closure.

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Groundwater Hydrology—Underdrains	Concerns have been expressed that additional information, including locations, performance criteria, and capacity, should be provided in the EIS regarding underdrains beneath the TSFs and WMPs to demonstrate how they relate to control of seepage and groundwater flow paths. Additional information should also be provided discuss how the complex system of filters and drains associated with the bulk TSF is intended to work and be constructed during raising of the embankment; how it will be repaired if it fails; and what additional options and redundancies are available for safety of the dam and control of seepage.	Knight Piésold 2019c (provided with response to RFI 109e, Part 3), provides additional information on the underdrain and basin foundation beneath the liners under the main WMP and the pyritic TSF. The conceptual underdrain systems under these facilities would be in a herringbone pattern that would be connected to a toe drain near the embankments and a sump where water collected would be pumped out and controlled. Groundwater modeling (BGC 2019a and BGC 2019d) particle tracking indicates these systems would provide effective hydraulic containment of fluid leaking through the liners. Description of these facilities has been updated in Section 4.17, Groundwater Hydrology. Information about drainage beneath and through the bulk TSF is also provided in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions. Details of the construction, safety, repair, and control of seepage by the filters and drains associated with the bulk TSF would be included at a later stage of the project in the design work to be conducted prior to permitting by the State of Alaska. Conceptually, the drains would be interconnected, and would be constructed of rock material of sufficient size to prevent under-capacity or plugging issues. The drain material would also be protected from plugging by finer-grained filter material that would prevent fines (tailings) from infiltrating into the drain. The drains are expected to provide effective areas of low hydraulic head in and beneath the north embankment that would funnel seepage towards the north SCP.
Groundwater Hydrology—Water Balance Model	Concerns have been expressed about how the hydrologic models will be calibrated, functionally tested, and ground-truthed after the mine goes into operation.	Watershed models and groundwater models are commonly updated as new information is obtained. This frequently occurs as time passes and boundary conditions or hydrologic stresses (like dewatering a pit) change; and as more data become available, either through additional data collection, or as a direct result of mining and observations about actual groundwater inflows. PLP 2019-RFI 135 (Monitoring Summary) provides groundwater monitoring wells and streamflow monitoring plans that could be used to update, recalibrate, and ground-truth the models as needed based on operational experience and changing conditions. State of Alaska bonding requirements for closure and post-closure are expected to be reviewed every 5 years to evaluate and allow for consideration of changing or newly discovered conditions. Chapter 5, Mitigation, has been modified to include monitoring related to pit and pit lake groundwater inflows, as well as monitoring included

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		by reference in PLP (2019-RFI 135) water management and water quality monitoring plans, such as water inflows and discharge rates, streamflow and groundwater monitoring locations, groundwater levels, pit lake levels, and model updates. Additional recommendations have been included in Appendix M1.0, Mitigation Assessment, to collect additional (deep) groundwater monitoring data near the pit, and update watershed, water balance, and groundwater flow models at least every 5 years until conditions reach annualized steady-state conditions, including consideration of climate change, during post-closure.
Groundwater Hydrology—Watershed Model and Water Balance	Concerns have been expressed that between 9 and 66 percent of water falling on watersheds as precipitation is not accounted for, indicating that the model is flawed and should not be relied on. This creates risk that the hydrology and the requirements to pump, treat, and discharge water are poorly understood, and the risk of failure over long periods of future time are high. Consequently, the EIS does not adequately present the environmental risks or impacts of the project.	The large purported differences in the accounting of water is caused by a combination of the following: 1. An error in the watershed model that was discovered after the DEIS had been prepared. The original mine-affected flow values did not properly account for the reclamation of the bulk TSF and the resulting diversion of runoff from the NK119A basin to the NK119B basin. Instead, the model directed diverted runoff out of the NFK basin, and thereby overestimated the losses in the NFK system. (PLP response to request for additional information associated with RFI-138). This issue has been corrected in the FEIS. 2. An oversimplified analysis by the commenter and the failure to adequately account for orographic and rain-shadow effects, wind-transfer of snow (and therefore snowmelt), and groundwater discharge from subcatchments (Knight Piésold 2019h, Response to RFI 138). Water balance calculations indicate that, when these factors are accounted for in the complex study area, good agreement is achieved between inputs and outputs of the baseline watershed model using the basic water balance methodology of the commenter. Section 3.16 and Section 4.16, Surface Water Hydrology, have been updated with 2019 revisions to the watershed model.
Hazardous Materials Storage or Transport—Solid Waste	Comments were received requesting details on the solid waste management.	Non-hazardous solid waste would be incinerated on site. Hazardous waste would be stored and transported off-site for disposal, as per state and federal regulations. The FEIS was updated to disclose that the on-site monofill would be closed during the closure phase.

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Hazardous Materials Storage or Transport—Use of toxic substances	Concerns were raised over the use and transport of toxic substances such as herbicides, pesticides, antifreeze, brake pad fluid, oils, grease, heavy fuel oil, de-icer, cyanide, chemicals used for "heat bleaching," etc., and the potential impacts of spills of these materials. Commenters requested risk analysis for smaller, high-frequency spill events of such substances. Commenters also requested more details on the risk of transporting molybdenum concentrate.	The EIS acknowledges that various toxic substances such as hydrocarbons would be used at the proposed mine site. Section 4.18, Water and Sediment Quality, states that small hydrocarbon spills would result in a direct impact to surface water quality if spilled materials come into contact with surface water. Spill response kits for small spills would be located at various locations around the mine site, at the port, in vehicles, etc. Section 4.27, Spill Risk, addresses spills of substances that would be transported and used in large volumes. The transportation of molybdenum concentrate is also addressed in this section. No changes were made to the EIS.
Historic Properties—Additional clarification	Commenters suggested revising the language that describes 36 CFR Part 800 (the implementing regulations of the Advisory Council on Historic Properties [ACHP]) and 33 CFR Part 325 Appendix C (the implementing regulations of the USACE) to note the implementing agencies, and deleting reference to a memorandum of agreement. The Area of Potential Effect (APE) and the permit area should be more clearly defined.	Section 3.8, Historic Properties, has been combined with Section 3.7. Cultural Resources in the FEIS. This section has been edited to include the implementing agencies for the regulations under 36 CFR Part 800 and 33 CFR Part 325 Appendix C, and reference to the memorandum has been removed. The section has also been edited to clarify the descriptions of the APE, the Permit Area, and the EIS analysis area. A reasonable and good faith effort to identify and evaluate historic properties will be spelled out in the PA, which is Appendix L to the FEIS.
Historic Properties—Identification	The status of the effort to identify historic properties indicates that the effort so far is very limited, with a major focus on archaeological survey in portions of the project APE. Although cultural properties have been identified through interviews, only one of the cultural properties has been evaluated for eligibility for inclusion on the National Register of Historic Places.	Information presented in Section 3.8, Historic Properties, has been moved to Section 3.7, Cultural Resources, and is based on a review of data on file at the Alaska Heritage Resources Survey. Identification and evaluation of historic properties has occurred and continues to occur, in consultation with the ACHP, the Alaska State Historic Preservation Officer, tribes, and other consulting parties. The submissions for Determination of Eligibility (DOE) have begun and are ongoing. DOEs and additional studies that have been conducted in the 2019 field season for cultural resource identification have been incorporated into the FEIS in Section 3.7 and Section 4.7, Cultural Resources. Further field studies would occur if the project was permitted, through the time of final design and prior to construction, in accordance with the Programmatic Agreement.
Historic Properties—Important sites	There were concerns that the project would impact existing or potential historic properties, including Groundhog Mountain, an old village site at the Amakdedori port with reported graves, house pits, traditional use areas, and a building that is recorded in the Federal Register of Historic Places.	Impacts to cultural resources and historic properties are evaluated in Section 4.7, Cultural Resources. This does include the old village site at Amakdedori. As part of the process required by Section 106 of the NHPA, the USACE must consider the effects of the project on historic properties. Additional information received regarding cultural resources or historic properties has been considered and incorporated into the analysis in the EIS.

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Historic Properties—Inadequate Analysis	The DEIS did not adequately address the impacts to historic properties as a result of the project.	Potential impacts to cultural resources and historic properties are evaluated in Section 4.7, Cultural Resources. As part of the process required by Section 106 of the NHPA, the USACE must consider the effects of the undertaking on historic properties. Additional information received regarding cultural resources or historic properties has been considered, and incorporated into the analysis in the EIS. In addition, USACE is consulting with tribes and other consulting parties as part of the NHPA Section 106 process to consider effects of the project on historic properties. As part of this consultation, USACE is preparing a Programmatic Agreement (PA) with the ACHP and other consulting parties, including tribes. The PA will establish the actions necessary to meet the reasonable and good faith effort standard for identification or evaluation of historic properties; the impacts to historic properties; as well as avoidance, minimization, and mitigation of impacts. Information presented in Section 3.7, Cultural Resources, is based on a variety of information sources, including a review of data on file at the Alaska Heritage Resources Survey and the Bureau of Indian Affairs, cultural resource reports, and data sets from subsistence harvest areas. Cultural resources survey reports prepared for PLP between 2004 and 2013 by SRB&A contain information about cultural resource features derived from interviews of local informants from the villages near the project area. Determinations of eligibility for inclusion of historic properties in the NRHP are ongoing. Additional studies have been conducted in the 2019 field season for cultural resource identification that are incorporated into the FEIS. Further field studies would occur at the time of final design and construction, in accordance with the Programmatic Agreement.
Invasive Species—Invasive Species Analysis	Invasive species analysis in the EIS should include potential impacts from reasonably foreseeable introduction of terrestrial and marine invasive species, including how species should be detected and remediated, during construction and shipping (transportation) activities. Concerns were expressed about the threat of invasive species to biodiversity, commercial and recreational fishing, and natural resources.	Text on potential impacts from invasive species introduction and spread has been added to Section 4.26, Vegetation. Information on invasive species prevention, detection, and remediation (including early detection and rapid response, or EDRR; and BMPs), is included in Chapter 5, Mitigation. USACE requested a conceptual invasive species management plan from the Applicant (PLP 2019-RFI 133); appropriate discussion and analysis from the plan were incorporated into the EIS.

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Topic—Subtopic	Statement of Concern	Response
Invasive Species—Invasive Species Plan	Commenters provided suggestions for what should be included in an invasive species management plan for the project.	Information on invasive species prevention, detection, and remediation (including early detection and rapid response, or EDRR; and BMPs), is included in Chapter 5, Mitigation. USACE requested a conceptual invasive species management plan from the Applicant (PLP 2019-RFI 133); appropriate discussion and analysis from the plan were incorporated into the FEIS. See also SOC Mitigation or Monitoring Measures—Request for Proposed Management Plans.
Lands—Access	Please address how access through native corporation lands could be accomplished if a corporation has publicly announced there would be no agreement.	An EIS analyzes reasonable alternatives that may include alternatives that are not in the Applicant's capacity. Alternatives were screened for this EIS for practicability using the 404(b)(1) Guidelines to define a practicable alternative as one that is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR Part 230.10[a][2]). Land ownership agreements would not disqualify an alternative under NEPA, but may be reevaluated at the time of the ROD. Per 33 CFR Part 320.4(g), a Department of the Army permit does not convey any property rights, either in real estate or material, or any exclusive privileges. Furthermore, a Department of the Army permit does not authorize any injury to property or invasion of rights or any infringement of federal, state, or local laws or regulations. The Applicant's signature on an application is an affirmation that the Applicant possesses or will possess the requisite property interest to undertake the activity proposed in the application. The district engineer will not enter into disputes, but will remind the Applicant of the above. The dispute over property ownership will not be a factor in the USACE public interest decision. The document was not changed as a result of these comments.
Lands—Additional clarification	The DEIS stated that the mine site would be in the Alaska Department of Natural Resources Bristol Bay Area Plan (BBAP) Region 6; specifically, R06-23 and R06-24. Commenters noted that the bulk TSF would also be in R06-30 and R06-05, and asserted that not all of Region 6 is designated for minerals development.	Most of the mine site would be in R06-05, R06-23 and R06-24. However, small portions of the bulk TSF embankment, seepage collection pond embankment, and north water treatment plant would be in R06-30 (ADNR 2013a). Section 4.2, Land Ownership, Management, and Use, has been edited to reflect this information. Section 3.2, Land Ownership, Management, and Use, has been edited to note that the project location would be in Region 6 units designated for mineral development, among other uses.

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Topic—Subtopic	Statement of Concern	Response
Lands—Conservation easement	Alternative 2 proposes a northern access to Cook Inlet with a ferry construction between Eagle Bay and Pile Bay that would pass through the islands protected by a conservation easement. The EIS should address impacts to the easement.	The conservation easement encompasses islands only and no outer shores of Iliamna Lake. The easement would prevent development on those islands, but would not prevent the passage of vessels. The easement was added to Section 3.2, Land Ownership, Management, and Use; and the effects of Alternative 2 on the easement have been added to Section 4.2, Land, Ownership, Management, and Use.
Lands—Easements	There were questions about what easements would be impacted for each alternative. Specifically, concerns were brought up about ANCSA 17(b) easements EIN 15c and EIN 15f, RS2477 easement RST 396, ADL 232949, and ADL 218329.	All existing easements in relation to project alternatives are listed in Section 3.2, Land Ownership, Management, and Use, and shown in figures for that section. This includes ANCSA Section 17(b) easements, Revised Statute 2477 rights-of-way (ROWs), section line easements, and State of Alaska public access easements. Impacts to affected easements are discussed in Section 4.2, Land Ownership, Management, and Use. Access would be agreed on by the landowners and PLP, and not reliant on public easements or ROWs, except the Williamsport-Pile Bay Road corridor. Section 3.2 and Section 4.2, Land Ownership, Management, and Use, have been edited to correct information regarding ADL 232949 and ADL 218329.
Lands—Impacts—Regulatory	There are concerns that the mine site footprint would include anadromous streams that are designated under the State of Alaska Department of Natural Resources Bristol Bay Area Plan for Habitat and not for mineral entry. Therefore, the mine site would be inconsistent with the state's area plan.	The mineralized area of the current Pebble prospect was identified in the 1984 Bristol Bay Area Plan (BBAP), in the 2005 BBAP, and again in the 2013 amended version of the BBAP (ADNR 2013a). According to the Alaska Constitution, state lands are to be managed for multiple use. When potentially conflicting uses are designated in a management unit, the plan provides guidelines to allow various uses to occur without unacceptable consequences. State statutes require that the ADNR classify state lands according to their apparent best use. The BBAP acknowledged areas where mineral resources were known, as well as habitat resources, and took that into consideration when establishing land use designations and subsequent classification. Areas of the project identified co-designations of Minerals and Habitat, as well as co-designations of Habitat and Public Recreation and Tourism-Dispersed, representing the uses and resources for which the area will be managed. Land co-designated and classified as Minerals and Habitat are to be managed for the exploration and development of mineral deposits, subject to state permitting requirements and the protection of sensitive habitats. Mineral development may be

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Topic—Subtopic	Statement of Concern	Response
		authorized after a robust public process and with the appropriate stipulations or measures identified as needed to protect fish, wildlife, or their habitats (SOA 2019-RFI 125). The BBAP divides the Bristol Bay area into 20 regions with management units. The mine site would be in Region 6, and the transportation corridor would be in Regions 6, 8, 9, and/or 10, depending on the alternative. Region 6 is designated for mineral development, among other uses, and managed to ensure that impacts to the anadromous and high-value resident fish streams are avoided, reduced, or mitigated as appropriate in the permitting processes. Additionally, impacts to moose wintering habitat are to be taken into consideration during mine permit review, and the upper Koktuli River also is managed for recreation. Regions 8, 9, and 10 are managed for a variety of uses, including mineral exploration and development, public recreation and tourism, and protection of anadromous fish and wildlife resources and habitat. Most of the area of the mine itself is designated with the primary use of mineral development. An additional goal for this region is for the state to provide support for mining by aiding in the development of infrastructure, such as ports and roads. Section 3.2, Land Ownership, Management, and Use, has been edited to clarify this. 33 CFR Part 320.4(j) discusses other federal, state, or local requirements for evaluating permit applications. The primary responsibility for determining zoning and land use matters rests with state, local, and tribal governments, and the district engineer will normally accept decisions by such governments on those matters unless there are significant issues of overriding national importance. Additionally, CEQ NEPA regulations at 40 CFR Part 1506.2, require that statements shall discuss any inconsistency of an action with any approved state or local plan and laws. Consistency with local plans is discussed in EIS Section 4.2, Lands Ownership, Management, and Use.
Lands—Land Use	The cumulative impacts discussion in Section 4.2, Land Ownership, Management, and Use, states that community development and infrastructure projects would contribute to a slow land use change in the region; from undeveloped, generally natural landscapes to more industrial use and resource extraction. This characterization can be misleading, portraying relatively small community improvement projects as leading to inexorable development of a landscape dominated by industry and mining.	The cumulative impacts discussion in Section 4.2, Land Use, Ownership, and Management, has been edited to note that impacts from community projects would have a local extent.

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Topic—Subtopic	Statement of Concern	Response
Lands—Management	The DEIS stated that the transportation corridor and mine site components would occur in the vicinity of, but not on, lands managed by the National Park Service (NPS), and would therefore not be subject to the NPS's land management jurisdiction. The NPS expressed concern that potential pollutants and some resources are mobile, and therefore the mine has capacity to affect conditions in NPS conservation units.	Section 3.2, Land Ownership, Management, and Use, has been edited to reflect the concerns from the National Park Service.
Lands—Native Allotments	There is concern that the project would impact Native Allotments, conveyed, proposed, and selected (via the Alaska Native Veterans Allotment Act).	Native Allotments that could be impacted by the project are listed in Section 3.2, Land Ownership, Management, and Use, and Section 3.7, Cultural Resources. Impacts to those allotments are described in Section 4.2, Land Ownership, Management, and Use, and Section 4.7, Cultural Resources. Lands available for Native Allotments under the Alaska Native Veterans Act of 2019 include lands owned and managed by the Bureau of Land Management, including state and Native Corporation selected lands). No lands within 1 mile of the project footprint are owned or managed by the Bureau of Land Management. No changes were made to the EIS.
Lands—Ownership	The EIS should include ownership of all lands for the action and alternatives, including material sites and lands owned by the University of Alaska.	Section 3.2, Land Ownership, Management, and Use, describes the land ownership for the project; and Section 4.2, Land Ownership, Management, and Use, describes impacts to those lands. The sections have been edited to clarify lands owned by the University of Alaska.
Lands—Permits	The DNR Division of Mining, Land and Water, Southcentral Regional Land Office wishes to note that it may require applications from PLP or associated contractors for authorization of project activities and/or facilities where proposed for location on State-owned, DNR-DMLW managed lands. It is likely that easements, leases, and permits will be required for various aspects of the project. Because there have been no applications received by the Southcentral Regional Land Office, commenting on specific details of the project could be deemed pre-decisional. Issues and concerns will be evaluated and addressed with each application and subsequent adjudication process.	Comment acknowledged. No changes made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Lands—Regulatory—ANILCA	The USACE has not received an analysis from the Secretary from the Department of the Interior in instructing the National Park Service, Bureau of Land Management, United States Fish and Wildlife Service, and Bureau of Indian Affairs the trust obligations provided in ANILCA Sections 810 and 811. The subsistence management provisions of ANILCA also apply to Alaska Native Allotments, which are "public lands" as defined in ANILCA.	The project components would not cross or be located on federal lands; therefore, an ANILCA Section 810 analysis is not required. ANILCA Section 811 provides an exception for rural residents to use traditional methods of access, including motorized vehicles for subsistence uses; no analysis for this project is required by this ANILCA section. No changes were made to the EIS.
Lands—Subsurface rights	Commenters asserted that the transportation corridor would need to use the subsurface estate for the natural gas pipeline, and this would require the approval of Bristol Bay Native Corporation (BBNC). BBNC has not extended any permission to occupy lands or to make use of subsurface resources. Additionally, BBNC has a parcel held in unrestricted fee title that would be directly bisected by the transportation corridor under Alternative 3, and is not disclosed in Section 3.2, Land Ownership, Management, and Use.	As private land, uses on land owned by Alaska Native village and regional corporations are subject to approvals of the surface and subsurface landowners. In the past, there have been conflicts over what is defined as surface and subsurface rights and the need for landowner approval; these are primarily resolved on a case-by-case basis, either through negotiations or in the court system. Per policy, the USACE would not engage in disputes over land use or ownership. Section 3.2, Land Ownership, Management, and Use, has been edited to include BBNC as a landowner for the former Native Allotment AKA 63274A that would be in the footprint of the transportation corridor under Alternative 3.
Lands—Telecommunica-tions Infrastructure	Several project components have the potential to damage or interfere with existing fiber-optic cables, including the transportation corridors, natural gas pipelines, telecommunications systems, and concentrate/return water pipelines, as well as ports and associated vessel traffic. PLP should contact the owners to discuss potential conflicts with existing facilities, or to seek prior consent where required under applicable land use instruments.	Right-of-ways and easements that could be impacted by the project or alternatives are listed in Section 3.2, Land Ownership, Management, and Use. Impacts to those ROWs and easements are discussed in Section 4.2, Land Ownership, Management, and Use. PLP would follow all regulations and permit stipulations for coordination with owners and users of any ROWs or easements prior to beginning construction. No changes were made to the EIS.
Mitigation or Monitoring Measures—Additional Mitigation	Additional mitigation, monitoring, and adaptive management measures were suggested to avoid and/or minimize project impacts.	Specific recommendations for additional mitigation, monitoring, and adaptive management measures (that are not already covered by existing design features or measures in Chapter 5, Mitigation, or otherwise previously evaluated in Appendix B alternatives development process) have been added to Appendix M1.0, Mitigation Assessment, for a comprehensive list of all measures identified during the NEPA process. All suggested measures have been assessed based on three factors described in Chapter 5 (Effective, Potential Jurisdiction, Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant or implemented as a condition in a state, federal, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.

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Mitigation or Monitoring Measures—Alternative Outfall Locations	Analyzing different outfall locations for discharging treated effluent was requested. Commenters specifically requested that different locations be analyzed as alternatives, and noted that EPA advocated for this during their cooperating agency review of interim alternatives deliverables.	USACE considered different outfall locations as a mitigation measure, and assessed the concept in Appendix M1.0, Mitigation Assessment. EPA agreed with this approach instead of considering different locations as alternatives. No change has been made to the EIS.
Mitigation or Monitoring Measures—BMPs Industry Standards and Permit Requirements	Comments were received regarding BMPs, industry standards, and standard permit requirements that may be required for the Pebble Project. Detailed descriptions of specific BMPs that would be used were requested.	Chapter 5, Mitigation, provides a list of standard BMPs, permit requirements, and/or industry standards that would likely be required for the Pebble Project. This is not intended to be a complete list; rather, it reflects the most predictable actions for this type of project that would be necessary to comply with regulations, and standard permit requirements designed to reduce impacts to the environment. An example of mitigation measures that are typically included as part of the action are agency-standardized BMPs, such as those developed to prevent stormwater runoff or fugitive dust at a construction site (CEQ 2011). Fully developed plans with detailed descriptions of specific BMPs and mitigation measures that would be implemented may not be available at the time of the NEPA analysis, but the analysis can factor in minimization associated with implementation of general industry standards that are designed to reduce impacts to the environment. Because industry standards and BMPs for the construction and mining industry are continually evolving, it would not be appropriate to list specific BMPs that would be used (unless the Applicant has specifically committed to them as part of their project design); it is assumed that the Applicant would use the best measures at the time. The list of standard BMPs, permit requirements, and/or industry standards in Chapter 5 has been updated for the FEIS.
Mitigation or Monitoring Measures—Comp. Mitigation Financial Assurance	Comment asserted that USACE must require a description of financial assurances in PLP's compensatory mitigation plan, and independently review the financial assurances to ensure a high level of confidence that the Compensatory Mitigation Plan (CMP) project will be successful.	This discussion would take place in the permitting phase (likely after the release of the FEIS) and the USACE would determine at that time if financial assurance is required for any aspects of the CMP. The financial assurances would be part of Section 404 permitting. No change has been made to the EIS.
Mitigation or Monitoring Measures—Compensatory Mitigation	Concern was expressed about the lack of detail for compensatory mitigation to offset environmental losses resulting from unavoidable impacts to aquatic resources. A CMP was requested that includes a level of detail commensurate with the scope and scale of the impacts, as well	Section 404 of the CWA establishes a program to regulate the discharge of dredged or fill material into WOUS, including wetlands. Activities are regulated through a permit review process. Individual permits are reviewed by the USACE, which evaluates applications under a public interest review, as well as the environmental criteria set

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	as the amount, type, and location of compensation they could potentially provide. Commenters stated that USACE should provide an opportunity for meaningful public comment on the revised CMP. Alternatively, the USACE should further explain why, considering the scope and scale of the impacts associated with the project, the CMP contains the level of detail and information required by the public notice regulations at 40 CFR Part 230.94(b)(1). In addition, the USACE should explain why the information included in the public notice provided the public or other federal agencies with an opportunity to provide meaningful comment or recommendations on the mitigation as contemplated by the regulations. The USACE should further explain why the CMP complies with the requirements under Section 404 or the NEPA requirements that mitigation measures be discussed in the EIS sections on alternatives and environmental consequences. Additionally, it was suggested that the federal decision agencies could require compensatory mitigation for unavoidable impacts to other resources (non-aquatic resources).	forth in the CWA Section 404(b)(1) Guidelines, regulations promulgated by EPA. For unavoidable impacts, compensatory mitigation may be required to replace the loss of wetland, stream, and/or other aquatic resource functions and area. The USACE is responsible for determining the appropriate form and amount of compensatory mitigation required. Although the CWA Section 404 compensatory mitigation process is separate from the NEPA process, sufficient information was provided in the DEIS for the public to comment on whether the avoidance and minimization and compensatory mitigation are sufficient to offset the negative impacts to WOUS; and to comment on opportunities for creation, restoration, and enhancement to offset unavoidable impacts to WOUS. PLP's description of measures to avoid and minimize impacts to WOUS is included in Tab 23 of the Pebble Project Department of the Army Application for Permit POA-2017-271 (PLP 2019a), and was summarized in Chapter 5, Mitigation, of the DEIS. PLP's approach for compensatory mitigation to offset environmental losses resulting from unavoidable impacts to aquatic resources was outlined in a Draft Conceptual Mitigation Plan included in Appendix M of the DEIS. All comments on the CMP are acknowledged. An updated CMP is included in Appendix M2.0, Applicant's Draft Compensatory Mitigation Plan, of the FEIS. The USACE is continuing to work with the Applicant to evaluate a full suite of available and practicable compensatory mitigation options, and a final determination on the appropriate form and amount of compensatory mitigation for unavoidable losses of aquatic resources will be documented in the ROD, if a permit is issued.
Mitigation or Monitoring Measures—Compensatory Mitigation Approach	Comments and suggestions were received regarding the compensatory mitigation approach outlined in PLP's Draft CMP. PLP's evaluation of compensatory mitigation options asserts that such options are "effectively non-existent in the Analysis Area." Although this conclusion applies to PLP's assessment of watersheds at the Hydrologic Unit Code (HUC)-10 scale, the CMP does not explain why PLP does not identify potential compensation options in larger watershed scales. As the 2018 Army/EPA AK Mitigation MOA explains, the use of larger watershed scales in Alaska (as compared to the lower 48) may be appropriate. Because the most commonly used watershed	As part of the USACE's permit decision under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899, the USACE will determine if compensatory mitigation is required to offset the impacts to WOUS. If it is determined that compensatory mitigation is required, USACE will determine if the Applicant's compensatory mitigation plan includes measures that would appropriately offset the impacts to WOUS, and/or address watershed needs that would occur as a result of the discharge of dredged or fill material into WOUS, and as a result of work in navigable WOUS. This decision will be documented in the ROD. An updated CMP is included in Appendix M2.0, Applicant's Draft

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	scale in the lower 48 is the HUC-8, the CMP should, at a minimum, assess potential in-kind options before moving to out-of-kind options. Language regarding "opportunities for fish habitat restoration in the directly affected and neighboring watersheds (Upper and Lower Kenai Peninsula, Lower Susitna River, Matanuska) through culvert rehabilitation and other fish passage improvements that have the potential to benefit the greater Bristol Bay and Cook Inlet watershed areas" is vague. The plan must describe how the scope and scale of the impacts to the aquatic resources will be offset by culvert rehabilitation and fish passage improvements in other areas. PLP asserts that the "watershed approach and on-site and in-kind compensatory mitigation are not practical to meet the project's compensatory mitigation needs." However, given the serious impacts from an expanded mine, PLP should consider, as one example of compensatory mitigation, securing preservation status in perpetuity of the surface and subsurface estate in the UTC watershed, and other areas of the deposit that will not be exploited under the project. In addition to wetlands, the CMP must also include impacts to streams, open water, and tidal water. Because compensatory mitigation is designed to offset lost aquatic resource functions, the CMP should also describe the type and magnitude of aquatic resource functions that will be lost or degraded, and assess whether the compensatory mitigation provides the same functions, including the lost wetland function of carbon sequestration. Without a functional assessment, the CMP must use a minimum 1-to-1 acreage or linear foot compensation ratio, and the USACE must require an even greater ratio if necessary. The CMP must also explain, in the absence of a functional assessment, the rationale behind any determination that the compensatory mitigation would provide sufficient offset for the lost aquatic functions. Out-of-kind mitigation is not recommended because it will not replace lost aquatic functions, and would lead to the irretrievable loss of salmon and the ecosystem.	Compensatory Mitigation Plan, of the FEIS. No other changes were made to the FEIS based on these comments.

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Topic—Subtopic	Statement of Concern	Response
	PLP's revised CMP should explain how the amount of compensation reflects the amount necessary to meet applicable requirements for the full scope of direct and secondary/indirect impacts of the discharge of dredge and fill material. This information is particularly important in light of the significance and complexity of the discharge activities associated with this project.	
Mitigation or Monitoring Measures—Cultural Resource Management Plan	Chapter 5 of the DEIS identifies development of a Cultural Resources Management Plan (CRMP) to avoid and minimize impacts to historic properties. Concerns were expressed that the CRMP is being developed as part of the Section 106 consultation process, which is separate from the NEPA process and should not be considered as mitigation in the EIS. Commenters further stated that the USACE needs to consult with tribes about appropriate ways to avoid, minimize, and mitigate impacts to the tribes' cultural heritage prior to permitting decisions, not afterwards. Comments were also received expressing concern that the mitigation measures in Chapter 5 (Table 5-2) for cultural resources are inadequate because they lack details on measures to address: potential interruption to traditional travel routes; ways to mitigate potential impacts to cultural landscapes and districts that reflect the interconnectedness of cultural resources in the region; measures that avoid and minimize disruption of cultural practices in traditional use areas and sacred places; and the role that tribes have in developing mitigation.	The Section 106 process is proceeding parallel to, and separate from, the NEPA process. Information on cultural resources and historic properties, and potential avoidance, minimization, and resolution of adverse effects to historic properties that occur as part of the Section 106 process is included in the EIS, including a draft of the Programmatic Agreement (Appendix L) that will establish the actions necessary to meet the reasonable and good faith effort standard for identification or evaluation of historic properties. USACE's position is that CRMPs developed as part of the Section 106 process are a form of impact avoidance and minimization, and therefore it is appropriate to document in Chapter 5 of the EIS as mitigation. USACE has and will continue to consult with tribes under Government-to-Government consultation, and under Section 106 of the NHPA regarding the identification and evaluation of historic properties, as well as ways to resolve adverse effects to historic properties. In addition, the Programmatic Agreement will require and spell out the process for consultation with consulting parties, including tribes, throughout the Section 106 process. The CRMP will specify the methodologies for avoidance, minimization, and resolution of adverse impacts to historic properties that are identified in accordance with the PA. Chapter 5 has been revised to state that the CRMP would define the specific actions to identify and evaluate historic properties, to avoid and minimize impacts to historic properties, as well as specific measures to resolve adverse effects to historic properties. Section 3.8, Historic Properties, has been combined with Section 3.7, Cultural Resources, and updated to include the Section 106 process to date. Section 3.7, Cultural Resources, has been revised with updated identification efforts and results, evaluation efforts and results, and refinement of known information. See related SOC: Mitigation or Monitoring Measures—Request for Proposed Management Plans.

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Mitigation or Monitoring Measures—Design Features	Mitigation measures described in the EIS are not fully included in Chapter 5, Mitigation, Table 5-2 (Applicant's Proposed Mitigation Incorporated into the Project). Commenters recommended that Table 5-2 be revised for completeness, so that a complete listing of all mitigation measures considered is available. Specific edits were also suggested on Table 5-2 measures.	Table 5-2 is intended to provide PLP's most substantive design features that would avoid and minimize impacts to resources of primary concern. Table 5-2 has been updated for the FEIS. Suggested edits to PLP's proposed mitigation measures in Table 5-2 were forwarded to PLP for consideration and PLP provided updated measures for inclusion in the FEIS.
Mitigation or Monitoring Measures—Effectiveness of Mitigation Measures	The DEIS conducts an assessment of the effectiveness and jurisdiction of each of the mitigation measures suggested during the EIS process (Table M-1). Comments were received requesting that a similar assessment be done on the BMPs and PLP's mitigation presented in Chapter 5, Section 5.2.1 and Section 5.2.2 (Table 5-2), respectively.	Appendix M1.0, Mitigation Assessment (Table M-1), includes a list of all measures identified during the NEPA process, including those suggested by the USACE, cooperating agencies, and from the public during the scoping process and DEIS public comment period. These measures have been compiled to inform agencies with permit reviews and authorizations as an outcome of the NEPA process. Because these measures are not part of the project and have not been factored into the impact analyses, they were assessed with the goal of determining the likelihood of adoption by the Applicant or implementation as a condition in a state, federal, or local permit (CEQ 1981), if issued for the project. To determine the likelihood of implementation, the suggested measures were assessed for the following three factors: 1) Effective; 2) Potential Jurisdiction; and 3) Reasonable. The BMPs, industry standards, and standard permit requirements presented in Section 5.2.1, as well as the Applicant's mitigation listed in Section 5.2.2 (Table 5-2), are avoidance and minimization measures that would be incorporated as integral components of the project. Therefore, a qualitative assessment of effectiveness and jurisdiction of each measure to determine the likelihood of implementation would not be particularity useful. USACE considers these measures to be probable of implementation. BMPs and industry standards have been designed to comply with regulations and to reduce impacts to the environment. These measures are known to be effective. Additional details associated with some of the plans in Table 5-2 have been provided through RFIs, and have been added to the appropriate sections of the FEIS (see SOC Mitigation or Monitoring Measures—Request for Proposed Management Plans). See SOC Mitigation or Monitoring Measures—Oversight of Mitigation, for a discussion of potential jurisdiction of mitigation presented in Chapter 5.

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Mitigation or Monitoring Measures—Enforcement of Additional Mitigation Measures	A commenter noted that Table M-1 in the DEIS presented some measures having "jurisdiction/enforcement" noted as "not likely to be enforceable due to remoteness of the project area." It was recommend that the EIS clarify why a requirement, if made, would be unenforceable solely because of it being a remote project. It was noted that although the project area is remote, and perhaps enforcing compliance could not be done daily, projects such as this may still be monitored and/or audited.	Table M-1 in Appendix M1.0, Mitigation Assessment, was edited for the FEIS to remove assessment of measures for enforcement by agencies with potential jurisdiction. USACE is not able to speculate if an agency with potential jurisdiction would be able to enforce a particular measure.
Mitigation or Monitoring Measures—Fugitive Dust Plan is Needed	Commenters inquired about how PLP would contain dust, and what measures would be used to minimize off-site accumulation of fugitive dust that could impact vegetation and waterbodies. Commenters suggested a fugitive dust plan be prepared, and some specific measures were suggested for consideration.	In response to an RFI, PLP has prepared a reasonably detailed Conceptual Fugitive Dust Control Plan (FDCP) (PLP 2019-RFI 134) to help inform the impact analyses for the FEIS. The FDCP identifies project design features and BMPs that would be implemented to minimize fugitive dust emissions. Detailed implementation plans would be developed based on final project designs and permit conditions. Also see SOC Mitigation and Monitoring—Request for Proposed Management Plans. Specific measures suggested by the public for controlling fugitive dust (that are not already covered by existing design features or measures in Chapter 5) have been added to Appendix M1.0, Mitigation Assessment (Table M-1), for a list of all measures identified during the NEPA process. All suggested measures have been assessed based on three factors described in Chapter 5 (Effective, Potential Jurisdiction, Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant or implemented as a condition in a federal, state, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.
Mitigation or Monitoring Measures—Inadequate Mitigation	Concerns were expressed that mitigation measures in the DEIS are inadequate because they are conceptual in nature and not the result of detailed engineering/planning. It was also noted that mitigation measures in Chapter 5 of the DEIS rely heavily on BMPs, and that PLP's mitigation measures (Chapter 5, Table 5-2) describe multiple plans that have not yet been drafted or finalized for review, and therefore their sufficiency and effectiveness cannot be evaluated.	Detailed engineering is beyond the scope of NEPA. CEQ regulations direct federal agencies to "use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions" 40 CFR Part 1500.2(e). In addition, all relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead or cooperating agencies (40 CFR Part 1500.16[h], 40 CFR Part 1500.2[c]). The NEPA document was based on engineering information submitted by the Applicant in support of the Department of the Army permit application, and fully addresses the range of potential effects for all reasonable alternatives, design features proposed by the Applicant, BMPs, and standard operating procedures required to comply with applicable laws and regulations,

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		and suggested mitigation measures from agencies and the general public to further minimize project impacts. Final design of project components would take place during the State permitting phase. For the Pebble Project, the State has the primary permitting authority that addresses detailed design and engineering features associated with the mine, which are often refined between the permit application and issuance of State permits. Mitigation will be considered throughout the NEPA process, and may be further refined and adopted after NEPA is complete. Issuing the DEIS for public and agency review was a key step in the NEPA process to identify mitigation measures to further reduce project impacts, and mitigation measures presented for discussion in the DEIS were refined as part of the normal NEPA process involving review of public comments on the DEIS, agency review of the Preliminary FEIS, and additional mitigation proposed by the Applicant in response to their review of the DEIS. PLP provided additional information on improvements incorporated into the project to further avoid and minimize impacts associated with the project, including impacts to WOUS (PLP 2019-RFI 071b). Many of the improvements are in direct response to concerns identified in public comments on the DEIS and comments from cooperating agencies during technical meetings. Information from RFI 071b has been added to the FEIS. See also SOC Mitigation or Monitoring—Request for Proposed Management Plans and SOC Mitigation or Monitoring—Effectiveness of Mitigation Measures.
Mitigation or Monitoring Measures—Oversight of Mitigation	Concerns were expressed regarding oversight and enforcement of design features and mitigation measures to ensure that these measures are implemented. Commenters suggested that the agency responsible for compliance and enforcement of these mitigation measures in Chapter 5, Table 5-2, be specified so the reader can determine the probability of the mitigation measures being implemented.	NEPA is an informative process and the FEIS does not identify the mitigation measures that USACE, or any other permitting agency, would select in their post-NEPA permit decisions. Design criteria and mitigation measures necessary to comply with Section 10 Rivers and Harbors Act and Section 404 CWA regulations, including those necessary to address Section 404(b)(1) Guidelines and to ensure that the project is not contrary to the public's interest, would be evaluated as part of the ROD and incorporated in the Department of the Army permit, if issued. Compliance with the permit would be required, and measures to ensure compliance would include monitoring, reporting, and compliance inspections. Mitigation measures proposed by the Applicant and included in the project design (see updated Chapter 5, Table 5-2) are integral components of the project, and PLP has committed to implementing

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		them as part of their project. These measures are considered voluntary; however, as mentioned above, it is possible that some of the measures may be incorporated as stipulations in post-NEPA permit decisions. The updated Appendix M1.0, Mitigation Assessment (Table M-1), includes a list of additional mitigation measures suggested by the USACE and cooperating agencies, and those identified by the public during the NEPA scoping process. These measures are assessed based on three factors (Effective, Potential Jurisdiction, and Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant or implemented as a condition in a federal, state, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.
Mitigation or Monitoring Measures—Request for proposed management plans	Comments were received requesting reasonably detailed drafts of the various management plans referred to in the DEIS be prepared and included in the FEIS. It was suggested that absent details on the management plans, the public, the USACE, and resource agencies cannot adequately analyze the ability of these plans to avoid, minimize, or mitigate the effects of the project, and that the analysis included in the EIS cannot assume successful avoidance, minimization, or mitigation. Impacts should be analyzed and disclosed in accordance in this context. Monitoring Plan Adaptive Management Plan Aquatic Resources Monitoring Plan (ARMP) Emergency Action Plan Blasting Plan Compensatory Mitigation Plan (CMP) Cultural Resources Management Plan (CRMP) Emergency Action Plan Erosion and Sediment Control Plan Facility Response Plans (FRPs) Fugitive Dust Control Plan (FDCP) Horizontal Directional Drilling Plan (HDDP) Integrated Waste Management Plan (IWMP) Long-Term Management Plan Maintenance Plan	Detailed plans, including those proposed by the Applicant or required by state regulations, would be developed in consultation with the various state agencies when the project advances through the permitting phase. PLP would be required to operate the project in compliance with all federal, state, and local requirements, including any mitigation and monitoring requirements identified in the permitting processes. The management plans listed in this SOC are included as part of the project to comply with state or federal regulations, or are proposed by the Applicant as part of their project design (see Chapter 5). Many federal agencies rely on mitigation incorporated into an Applicant's project design to reduce adverse impacts as part of the NEPA planning process. An example of mitigation measures that are typically included as part of the project are agency standardized BMPs such as those developed to prevent stormwater runoff or fugitive dust emissions at a construction site (CEQ 2011). Fully developed plans with detailed descriptions of specific BMPs and mitigation measures that would be implemented may not be available at the time of the NEPA analysis, but the analysis can factor in minimization associated with use of common BMPs and industry standards that are designed to reduce impacts to the environment. Additional details associated with some of the plans listed in this SOC have been provided through RFIs, and have been addressed in the appropriate sections of the FEIS. These include: RFI 056a—Updated Compensatory Mitigation Plan RFI 115—Reclamation and Closure Plan RFI 122—Wildlife Management RFI 123—Restoration Plan for Temporary Impacts

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	Noise Monitoring and Mitigation Plan Marine Mammal Monitoring and Mitigation Plan Mitigation Work Plan Oil Discharge Prevention and Contingency Plans (ODPCPs) Project Communications Plan Reclamation and Closure Plan (RCP) Restoration Plan Sediment Control Plan Sewage Treatment Plan Spill Prevention, Control, and Countermeasure (SPCC) Plans Storm Water Pollution Prevention Plan (SWPPP) Tailings Storage Management Plan Wildlife Management Plan Invasive Species Management Strategy	RFI 126—Operational Measures for Spill Prevention RFI 133—Invasive Species Management Plan RFI 134—Conceptual Fugitive Dust Control Plan RFI 135—Monitoring and Adaptive Management Plan
Mitigation or Monitoring Measures—Secondary Containment	A commenter stated that the DEIS should describe the secondary containment for a 1.25-million-gallon storage tank in an area where tsunamis, earthquakes, and other large-scale threats to the integrity of these tanks could occur.	As described in Section 4.27, Spill Risk, storage tanks at the port would be in secondary containment as required by the ADEC. Tsunamis, earthquakes, and other threats are analyzed in Section 4.15, Geohazards and Seismic Conditions. No change has been made to the EIS.
Natural Gas Supply—Cook Inlet Gas Supply	Concern was expressed about the availability of natural gas to supply the project, the Donlin Gold project, and existing customers in Southcentral Alaska.	Comment acknowledged; no change was made to the EIS. As stated in Section 4.1, the project would purchase natural gas on the open market from an existing pipeline. Natural gas is a commodity that is not in short supply in Cook Inlet. A study by the ADNR, titled Cook Inlet Natural Gas Availability, found that there are significant natural gas volumes in Cook Inlet potentially available through additional investment and development (Redlinger et al. 2018).
Natural Gas Supply—Impacts of Natural Gas Demand	Commenters were concerned that the Pebble Project would create competition for natural gas resources, potentially resulting in increased power costs or supply interruptions to existing users; and that these impacts need to be evaluated in the EIS. Other comments suggested the EIS should consider the environmental effects of future natural gas exploration and development.	Section 4.1 Introduction to Environmental Consequences, explains that the source of natural gas for the project is beyond the scope of the EIS. It goes on to state that gas for the project would not be from a specific source, and potential sources include any natural gas producer in Cook Inlet. A study by ADNR, titled Cook Inlet Natural Gas Availability, found that there are significant natural gas volumes in Cook Inlet potentially available through additional investment and development (Redlinger et al. 2018). No change has been made to the EIS as a result of these comments.

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Natural Gas Supply—Natural Gas from Prudhoe Bay	Comments were received suggesting that the project source natural gas from Prudhoe.	Section 4.1, Introduction to Environmental Consequences, explains that the source of natural gas for the project is beyond the scope of the EIS. It goes on to state that gas for the project would not be from a specific source, and potential sources include any natural gas producer in Cook Inlet. There is currently no system available to transport North Slope natural gas in sufficient quantities. No change has been made to the EIS as a result of these comments.
Natural Gas Supply—Public's Interest in Energy Conserve and Develop	The project would displace 18.25 billion standard cubic feet of natural gas per year from the tight supply market for Cook Inlet natural gas, and because of the importance of this energy supply for the people of southcentral Alaska for their home heating and electricity needs, the Pebble Project would be detrimental to the public's interest in energy conservation and development.	Comment acknowledged; no change made to the EIS. Section 4.1, Introduction to Environmental Consequences, explains that the source of natural gas for the project is beyond the scope of the EIS. It goes on to state that gas for the project would not be from a specific source, and potential sources include any natural gas producer in Cook Inlet. A study by the ADNR, titled Cook Inlet Natural Gas Availability, found that there are significant natural gas volumes in Cook Inlet potentially available through additional investment and development (Redlinger et al. 2018).
Navigation—Amakdedori not suitable for a port	The Amakdedori area experiences high winds and lacks protection, making it a poor location for a port.	Comment acknowledged. Additional wave and current information collected by PLP between March 2018 and March 2019 (PLP 2019-RFI 039a) has been added to Section 4.12, Transportation and Navigation. See related SOCs: Navigation—Coastal Engineering Study Needed; and Navigation—Iliamna Lake Wind and Ice.
Navigation—Coastal Engineering Study Needed	A comprehensive Coastal and Ocean Engineering analysis should be completed during project design phase, and include detailed bathymetric studies for both Iliamna Lake and Amakdedori port, and assessment of environmental conditions to which vessels will be exposed.	A new mitigation measure to conduct a Coastal and Ocean Engineering analysis for both Iliamna Lake and Amakdedori port, and assess environmental conditions to which vessels would be exposed, has been added to Appendix M1.0, Mitigation Assessment, of the FEIS. See SOC Mitigation or Monitoring Measures—Additional Mitigation for information on how specific recommendations for additional mitigation identified during the NEPA process are addressed.
Navigation—Ferry operations	The Iliamna Lake ferry route is mostly uncharted, and rocks could cause a hazard for the ferry.	Comment acknowledged. No change was made to the EIS as a result of this comment. See related SOC: Navigation—Coastal Engineering Study Needed.
Navigation—Ice Conditions	Iliamna Lake ice is poorly understood and could cause a hazard to the facilities and ferry.	Comment acknowledged. Section 4.12, Transportation and Navigation, addresses wind and ice hazards on Iliamna Lake. No change was made to the EIS as a result of this comment. See related SOC: Navigation—Coastal Engineering Study Needed.

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Navigation—Iliamna Lake Wind and Ice	Comments were received that Iliamna Lake is known for high winds and large waves, which could be a hazard for the ice-breaking ferry. Winds have been known to push ice on shore in very large piles, which could be damaging to infrastructure, most notably the north ferry terminal.	Comment acknowledged. Section 4.12, Transportation and Navigation, addresses wind and ice hazards on Iliamna Lake. No change was made to the EIS as a result of this comment. See related SOC: Navigation—Coastal Engineering Study Needed.
Navigation—Pipeline would be Anchoring Hazard	The pipeline may cause anchor damage to fishing boats and barges anchored near the mouth of Iliamna Bay, dragging anchors in a storm.	The FEIS notes that in Iliamna Lake and Cook Inlet, vessel operators would be aware of the locations of underwater pipelines, because they would be included on nautical charts. Mitigation measures would be included as permit conditions for the protection of navigation and the general public's right of navigation on the water surface, and those can include requirements to report Notice to Mariners, or to install and maintain lights or signals, as prescribed by the USCG (see Chapter 5, Mitigation). No changes were made to the EIS.
Navigation—vessel piloting	Concerns were expressed that no marine pilot sanction for deepwater docking of pilot-controlled ships has been sought or granted. Without research and sanctions from the Southwest Alaska Marine Pilot Association, which is charged with piloting all SW area waters, ships would not be able to navigate or dock in the docking areas.	Comment acknowledged; no change made to the EIS.
NEPA Process—Agency Resources	Commenters have expressed concerns that state agencies would be burdened with enforcement of permit requirements for the project, in terms of departmental budgets and organizational and institutional capacity.	The State of Alaska has a fee system for permits and inspections at mine sites. Agency budgets and staff allocation are not required analyses in a NEPA document; no change made to the EIS.
NEPA Process—Analysis Area	Concerns were expressed that the EIS analysis area should not be limited to a 1,000-foot buffer. It was specifically suggested that the analysis area should be at a watershed or landscape level.	Comments on the 1,000-foot buffer originated from imprecise text in the DEIS, and the EIS analysis areas were not limited to a 1,000-foot buffer. The text has been revised in the FEIS to eliminate references to the 1,000-foot buffer. The analysis areas differ by resource, and many are at the watershed and landscape level.
NEPA Process—Conceptual Design Level Only	Concerns were expressed that the mine plans and other project component plans as put forth by the Applicant are at a pre-design, conceptual level only. Commenters state that potential impacts cannot by properly assessed until the plans are at a more advanced design level. Some commenters called for a Supplemental EIS to evaluate impacts from a more advanced design.	NEPA does not require that engineering plans are at an advanced design level to analyze impacts; and frequently, conceptual-level design information is used. If the design changes appreciably after NEPA, USACE will evaluate if permit modifications or reevaluation under NEPA would be needed. Information sufficient for a complete application was submitted by the Applicant; therefore, USACE must evaluate the application, including proceeding with the NEPA analysis. Regarding design of mine site embankments, text has been added to Section 4.15 and Appendix K4.15, Geohazards and Seismic

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		Conditions, describing uncertainties in the impact analysis due to the conceptual-level design, and that embankment designs will be analyzed during state permitting. See related SOC Mitigation or Monitoring—Request for proposed management plans.
NEPA Process—Context as Percent of Resource Impacted	Concern was expressed about the approach used in the EIS to provide context for impacts. It was asserted that the approach used is commonly known as the "threshold approach," and that EPA has dismissed the approach as scientifically inaccurate and technically flawed.	Where practical, the EIS quantifies impacts and provides context for readers by also presenting the amount of resources that exist currently. The EIS does not present thresholds for acceptable or unacceptable impacts. This approach is not the same as the "threshold approach" referred to by the commenter as dismissed by EPA. The threshold approach criticized by EPA has been proposed by some applicants as a method to determine significant degradation to WOUS, and is not applicable to a general analysis of a proposed project's environmental impacts under NEPA. The approach has been applied to other projects to argue that because the amount of wetlands impacted in a watershed falls below the threshold, there is no significant degradation. No change has been made to the EIS as a result of these comments.
NEPA Process—Economic Feasibility Study	The project is not feasible from an economic standpoint. PLP should be required to provide an economic feasibility study before the EIS process is completed.	USACE's implementing regulations are codified at 33 CFR Parts 320-332. Procedures for conducting the public interest review are found at 33 CFR Part 320.4. In 33 CFR Part 320.4(q), it states, "When private enterprise makes application for a permit, it will generally be assumed that appropriate economic evaluations have been completed, the proposal is economically viable, and is needed in the marketplace." Therefore, no economic feasibility study is required to determine an application as complete and commence evaluation of the proposal. Before USACE can issue any permit, 40 CFR Part 230 requires a determination as to which alternative would be the Least Environmentally Damaging Practicable Alternative. Practicable is defined as " available and capable of being done taking into account cost, logistics, and technology in light of the overall project purpose." Consideration of cost does not take into account the Applicant's financial standings or market share, but rather on what would be a reasonable cost for the particular industry standards for construction. Therefore, an economic feasibility study would not be needed to inform decisions on potential alternatives; no change made to the EIS.

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NEPA Process—EIS Fails to take Hard Look at Impacts	Commenters stated that the DEIS fails to meet the regulatory standard of undertaking a "hard look" at the direct, indirect, and cumulative impacts of this massive and complex project. It was also noted that the DEIS fails to appropriately consider connected actions and RFFAs; fails to provide the necessary baseline data; underestimates the known impacts; and in some cases, simply ignores information that must be included in a legally sufficient environmental analysis.	Comment acknowledged. The DEIS was prepared to address NEPA requirements and concerns expressed during scoping, and identifies connected actions and RFFAs. The FEIS responds to comments expressed by the public and agencies on the DEIS. No change was made to the EIS as a result of this comment.
NEPA Process—EIS Method—Ecosystem as a Whole	Comments suggested that the EIS should evaluate impacts to the ecosystem more broadly, instead of individual resources. It was asserted that the method of assessing individual resources dilutes the true effects of the project.	Many of the resources evaluated in the EIS have regulatory requirements that require discrete analysis under required consultation laws, CWA Section 404(b)(1), or in the USACE Public Interest Review (e.g., endangered species, cultural resources, wetlands, surface water hydrology). Other resources that are analyzed in the EIS are indicative of broader ecosystem functions; most notably for this EIS is the section on commercial and recreational fisheries. Commercial and recreational fisheries depend on the ability of the ecosystem to produce fish; therefore, this section is based broadly on the physical and biological ecosystems. No changes were made to the EIS based on these comments.
NEPA Process—Failure to submit other permit apps.	Applicant has not submitted state and federal permit applications, including reclamation plan, water and waste management plans, and APDES permit application. NEPA/EIS should not proceed without these other applications; all permitting should be occurring simultaneously.	USACE policies for evaluating permit applications at 33 CFR Part 320.4(j) and 33 CFR Part 325.2(4) stipulate that the district engineer should process and decide on permit applications, even though other agencies that may have regulatory jurisdiction have not yet granted their authorizations; except where such authorizations are, by federal law, a prerequisite to making a decision on the Department of the Army (DA) permit application. No changes were made to the EIS based on these comments. See related SOC: Mitigation or Monitoring—Request for Proposed Management Plans.
NEPA Process—Fast tracked NEPA process	Concerns were expressed that the 2-year timeframe for NEPA process was too short to adequately address impacts.	PLP entered the permitting/NEPA phase after a robust baseline data set, and no major data gaps requiring multi-year data collection programs were identified. USACE staff and contractor staff were able to dedicate resources to conduct the analysis and prepare the EIS. These two factors allowed a more efficient document preparation process. The schedule was adjusted as necessary to make sure that the EIS informs the federal decision-makers, while at the same time, meeting USACE's obligation to the Applicant and to the public to make a timely decision on the application received. No changes were made to the EIS based on these comments.

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NEPA Process—Inconsistency with State/Local Plan and Laws	The EIS is required by 40 CFR Part 1506.2(d) to discuss any inconsistency of a proposed action with any approved state or local plan and laws (whether or not federally sanctioned). Where an inconsistency exists, the statement should describe the extent to which the agency would reconcile its proposed action with the plan or law. Specific plans and laws mentioned by commenters were the "Policy for the management of sustainable salmon fisheries" at 5 AAC 39.222, and the Bristol Bay Area Plan.	The State of Alaska provided responses to these comments in RFI 125 (SoA 2019—RFO 125). Their responses are below: 5 AAC 39.222(c) sets out principles and criteria for management of salmon fisheries, and 5 AAC 39.222(d) describes how the Board and ADF&G are to apply those principles and criteria in the limited context of salmon stock status reports and fishery management plans. Therefore, 5 AAC 39.222 is not applicable to the project, and a consistency determination with the policy is not required. The mineralized area of the current Pebble prospect was identified in the 1984 Bristol Bay Area Plan (BBAP), in the 2005 BBAP, and again in the 2013 amended version of the BBAP. According to the Alaska Constitution, state lands are to be managed for multiple use (see below). When potentially conflicting uses are designated in a management unit, the plan provides guidelines to allow various uses to occur without unacceptable consequences. State statutes require that ADNR classify state lands according to their apparent best use. The BBAP acknowledged areas where mineral resources were known, as well as habitat resources, and took that into consideration when establishing land use designations; and subsequently, classification. Areas of the project identified co-designations of Minerals and Habitat, as well as co-designations of Habitat and Public Recreation and Tourism-Dispersed, representing the uses and resources for which the area will be managed. Land co-designated and classified as Minerals and Habitat are to be managed for the exploration and development of mineral deposits, subject to state permitting requirements and the protection of sensitive habitats. Mineral development may be authorized after a robust public process and with the appropriate stipulations or measures identified as needed to protect fish, wildlife, or their habitats. At this time, the ADNR has not received applications for the various permitted aspects of the project, and any indication of consistency with BBAP would be considered pre-decisional. When applications are received for this project, the ADNR will adjudicate those applications based on our statutes, regulations, and policies. The BBAP divides the Bristol Bay area into 20 regions with management units. The mine site would be in Region 6, and the transportation corridor would be in Regions 6, 8, 9, and/or 10, depending on the alternative. Region 6 is designated for mineral development, among other uses, and managed to ensure that impacts to the anadromous and high-value resident fish streams are avoided, reduced, or mitigated as appropriate in the permitting processes.

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		Additionally, impacts to moose wintering habitat are to be taken into consideration during mine permit review, and the upper Koktuli River also is managed for recreation. Regions 8, 9, and 10 are managed for a variety of uses, including mineral exploration and development, public recreation and tourism, and protection of anadromous fish and wildlife resources and habitat. Most of the area of the mine itself is designated with the primary use of mineral development. An additional goal for this region is for the state to provide support for mining by aiding in the development of infrastructure, such as ports and roads. Clarification of land management under the BBAP has been made in Section 4.2—Lands in the FEIS.
NEPA Process—Non-Biased Review of EIS Needed	An assertion was made that all of the cooperating agencies assisting USACE with the EIS have agendas and are biased; and that USACE and EPA rules change based on the current political climate. The commenter requested that the EIS be submitted to multiple non-state, federal agency, and non-Alaskan resident experts to get an honest and unbiased review.	USACE has adhered to the requirements of NEPA by independently evaluating information and analyses included in the EIS. Specifically, information provided by the Applicant was verified and/or clarified through a Request for Information (RFI) process, and analyses prepared by the third-party contractor were guided by and independently evaluated by USACE. In addition, USACE and 11 cooperating agencies have contributed specific expertise toward the review of the potential impacts associated with the project and alternatives. USACE solicited public comments on the DEIS, which provided opportunity for additional reviews of analyses. A separate, additional review is neither necessary nor required. No changes were made to the EIS based on these comments.
NEPA Process—Public Hearings	Additional public hearings were requested to be held in Juneau, Seattle, and/or Portland; and more small villages in the Bristol Bay region, the Cook Inlet area, and Southwest Alaska and the Pacific Northwest in general. Some requested that the meetings should last longer to accommodate everyone who wanted to speak. Some said the Colonel (instead of the Deputy Colonel) should have been present at all hearings.	The USACE held public hearings in the communities closest to the mine site, as well as the hub communities of Dillingham and Naknek in the Bristol Bay. Hearings were also held in Homer and Anchorage. Additional public hearings outside of the region were not held. The public was given several additional ways to submit comments: public website, mail, email, fax, public hearing testimony, written comments submitted at public hearings, and public hearing testimony directly to a court reporter. Regardless of the method by which comments were considered, all comments were treated equally. The length of the public hearings were planned to safely conduct the hearing while allowing those that wished to speak a 3-minute slot to do so; if a commenter did not get a chance to speak, alternative methods such as speaking to a court reporter directly or submitting written comments were made available, in addition to the website, fax, mail, and email options. No changes were made to the EIS based on these comments.

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NEPA Process—Public Outreach	The USACE should provide electronic and hard copies of the DEIS translated to Native Alaska languages throughout the Bristol Bay region, and a translator should be present at all public hearings.	Prior to receiving an application in 2017, USACE solicited input from 31 tribes in Bristol Bay and Iliamna Lake regions requesting the tribes' preferred language for communication, preferred delivery method for communication, and other information to facilitate open and timely communication with the tribes and USACE. All tribes that responded indicated English was the preferred language. Regardless, USACE had a Yup'ik-speaking translator available at all scoping meetings and at the DEIS public hearings. Some people testified in Yup'ik and Athabascan, and the testimony was translated into English. No changes were made to the EIS based on these comments.
NEPA Process—Request for Supplemental DEIS	Commenters requested that a supplemental DEIS be prepared and reissued with a new public comment period.	USACE reviewed the requests for a Supplemental DEIS following the requirements of 40 CFR Part 1502.9(c)(1), and determined that there were no substantial changes to the project or any significant new circumstances or information relevant to environmental concerns. Separate SOCs have been prepared that address stated deficiencies of the DEIS. Additional information and analyses have been added to the FEIS in accordance with 40 CFR Part 1503.4.
NEPA Process—Scoping was Inadequate	The USACE failed to pursue a meaningful scoping period by failing to hold scoping meetings in several cities and towns where affected communities and stakeholders reside; failing to provide an open opportunity for public comment at some scoping meetings; and issuing a final Scoping Report that looked remarkably similar to the draft it released in the middle of the scoping comment period.	NEPA guidelines require a minimum scoping period of 30 days. The scoping period for the Pebble Project was extended beyond the minimum 30-day comment period to provide a total of 90 days for meaningful public involvement (April 1, 2018 through June 29, 2018). Public scoping meetings were held in nine communities (Naknek, Kokhanok, Homer, Newhalen, New Stuyahok, Nondalton, Dillingham, Igiugig, and Anchorage). To help advertise the scoping period, the USACE mailed a newsletter providing details on the public meeting schedule, as well as information on how to submit comments to every post office box in 33 communities, and to 140 other organizations and individuals on a mailing list. A total of 3,670 newsletters was mailed. The USACE also ran announcements in the Bristol Bay Times, the Homer News, and the Anchorage Daily News a week prior to relevant meetings. Additionally, a flyer was emailed to communities where scoping meetings were scheduled for distribution. The public could submit scoping comments through several methods: public website, mail, email, and fax, or attending a public meeting and submitting written testimony, or speaking privately to a court reporter. In Naknek, Kokhanok, Newhalen, New Stuyahok, Nondalton, and Igiugig, the USACE provided a microphone (“hot mic”) where participants could speak their comments out loud in front of other meeting attendees. Comments were transcribed by a court reporter, either during the hot mic session or individually after the session. In

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		Homer, Dillingham, and Anchorage, two court reporters were available to take comments one-on-one; therefore, no hot mic was provided. On May 18, 2019, USACE issued a Preliminary Scoping Issues Report to the cooperating agencies as an interim product, to share the types of issues that had been received to date in the scoping period. Commenters had been submitting comments on the public website since April 1, and the scoping meetings had concluded, so many issues had already been identified at the time of the Preliminary Issues Report. The Scoping Report was issued August 31, 2018, and included new issues identified following issuance of the Preliminary Issues Report. No changes were made to the EIS based on these comments.
NEPA Process—Separate EIS Documents Needed for Major Components	Commenters requested that separate EIS documents be prepared for each major component of the project (e.g., mine, roads, ferry) to better evaluate impacts.	CEQ NEPA implementing regulations (40 CFR Part 1502.4[a]) prohibit piecemeal analysis or segmentation because of the potential to underestimate project effects: "Proposals or parts of proposals which are related to each other closely enough to be, in effect, a single course of action shall be evaluated in a single impact statement." USACE regulations at 33 CFR Part 325.1(d)(2) contain similar language for DA permit applications. No changes were made to the EIS based on these comments.
Noise—helicopter	Comment expressed concern that noise caused by helicopter overflights was not included in the noise impact analysis.	Section 4.19, Noise, states that “Intermittent noise impacts from helicopters used to transport personnel to and from pipeline locations would also be expected. However, because the flight routes and vertical aircraft distances are unknown at this time, the magnitude and extent of resulting noise levels during an NSR [noise-sensitive receptor] fly-over could not be estimated.” No changes were made to the EIS based on these comments.
Non-Substantive Comments—Editorial	Comments were received asking where information was in the DEIS; some comments asserted that information that was included in the DEIS was not in the DEIS; and that readers had difficulty navigating the electronic format. Other comments were received that suggested language or style changes.	Subject matter commented on is addressed in the relevant sections of the EIS. If viewing the document electronically, readers can search for the keywords and find where that topic is covered. Ctrl+F can be used to find words in PDF documents. Comments suggesting language and style changes were considered for inclusion in the FEIS. An index is included in the FEIS.
Non-Substantive Comments—Location of Info in DEIS	Comments were received requesting information that was already in the EIS.	Clarifications were added in some instances to assist readers with finding information. Other information was readily available and in a logical location in the DEIS, and no changes were needed. An index was added to the FEIS.

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Non-Substantive Comments—Non-substantive	Comment was determined not to be substantive.	Comments that offered a general opinion or simply recommend specific decisions are not specifically responded to in the FEIS. Comments also included concerns and issues that are outside the scope of the EIS. These comments were not responded to herein and were considered non-substantive comments, and no further response is required.
NSB—Opp to Alt1—Opp to Alt 1	SOC: Comments were received in opposition to Alternative 1.	Comment acknowledged; no change was made to the EIS.
NSB—Opp to Alt2—Opp to Alt 2	Comments were received in opposition to Alternative 2.	Comment acknowledged; no change was made to the EIS.
NSB—Opp to Alt3—Opp to Alt 3	Comments were received in opposition to Alternative 3.	Comment acknowledged; no change was made to the EIS.
NSB—Support Alt1—Support Alt 1	SOC: Comments were received in support of Alternative 1.	Comment acknowledged; no change was made to the EIS.
NSB—Support Alt2—Support Alt 2	SOC: Comments were received in support of Alternative 2.	Comment acknowledged; no change was made to the EIS.
NSB—Support Alt3—Support Alt 3	SOC: Comments were received in support of Alternative 3.	Comment acknowledged; no change was made to the EIS.
NSB—Support No Action Alt—Support No Action Alt	Comments were received in support of the No Action Alternative.	Comment acknowledged; no change was made to the EIS.
NSB—Support Project—Support Project	General comments were received in support of developing a project.	Comment acknowledged; no change was made to the EIS.
Petition—Non-substantive	Petitions were received that contained non-substantive comments.	Comment acknowledged; no change was made to the EIS.
Pipeline Safety Concerns—Mitigation	Concerns were expressed over potential gas pipeline ruptures, and mitigation to contain a gas release.	A natural gas release from the pipeline is addressed in Section 4.27, Spill Risk. Additional information on natural gas spill response has been added to Section 4.27. Mainline sectionalizing valves are required by code for the onshore sections of the pipeline, while offshore segments would not be

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		equipped with the valves as allowed by federal code (49 CFR Part 192.179). The pipeline would be equipped with an automatic leak detection system. In the event of a gas release, valves would be closed to limit the gas release. An automatic shut-off valve would be installed on the eastern side of Cook Inlet near the compressor station, which would close automatically if a leak was detected. The onshore valve at the port site may be manual or automatic, and personnel would always be present on site to shut a manual valve, as needed. This would reduce the duration of any potential gas releases.
Pipeline Safety Concerns—Pipeline Engineering	Comments were received requesting that the EIS include more details on the engineering design of the pipeline, including details on trenching, installation activities, required construction area, the high-density polyethylene plastic liner, welding, integrity management, leak detection system, corrosion control, pressure testing, hydro testing, resistance to subsea erosion, and the ability to make repairs. Commenters also questioned the engineering challenges and potential impacts of constructing the pipeline in different geographic areas/for different alternatives, such as steep terrain around mountains in Pedro Bay verses low hills near Kokhanok.	PLP has committed to building the pipeline to meet federal code, and does not anticipate seeking a Special Permit from PHMSA (Special Permits are required for alternative designs that do not meet federal code). NEPA does not require that engineering plans are at an advanced design level to analyze impacts; and frequently, conceptual-level design information is used. If the design changes appreciably after NEPA, permit modifications would be needed, and would require reevaluation of environmental impacts. RFI 011a provides additional information on pipeline installation in nearshore/intertidal areas. This RFI has been added to Chapter 2, Alternatives.
Pipeline Safety Concerns—PLP Pipeline Hazard Data	The US Department of the Interior commented: "Although the DEIS contained information regarding the potential environmental effects of placing a pipeline in Cook Inlet, it does not include the detailed hazards data that Pebble Limited Partnership is still in the process of collecting to ensure that the proposed corridor has no unanticipated risks that would affect the pipeline's safe operation. The DOI does not expect this additional data to appreciably change the assessment in the DEIS; however, if the data does alter the analysis after the current comment period closes, the public would have a limited opportunity to comment on a revised assessment. As a cooperator, BSEE will continue its review of the proposed pipeline corridor and assess potential hazards prior to approving a right-of-way permit for the pipeline."	Comment acknowledged; no change was made to the EIS.

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Proposed Action and Alternatives—Additional clarification	Comment requested additional information on how location of the main water management pond ("collection pond") was determined.	PLP 2018f, Technical Note on Project Options and Screening Criteria, explains that a broad range of project options were reviewed; and describes the screening criteria used to design the project, including consequences to WOUS. Alternate locations for the main WMP have been evaluated, and are provided in the FEIS.
Proposed Action and Alternatives—Additional Information on Temporary Camps	Commenters suggested that additional information on how water and sewage would be handled at temporary camps is needed in the EIS.	The requested information has been addressed in responses to RFI 087a (PLP 2019—RFI 087a). Chapter 2, Alternatives, has been updated accordingly.
Proposed Action and Alternatives—Alternate Mining Techniques	Comments were received asking that alternatives without the open pit be explored.	Alternative mining techniques, including underground mining, were evaluated during the alternatives development process. Appendix B provides a detailed explanation of the screening criteria applied, and an explanation for why each of the many project options that were evaluated were either included as a component of one of the alternatives evaluated in detail, or eliminated from detailed analysis in the EIS. No change was made to the EIS based on these comments.
Proposed Action and Alternatives—Alternative 2 Preferred Alternative	Comments were received in support of Alternative 2 as the preferred alternative for the following reasons: Avoids the McNeil River core bear habitat area. The transportation corridor uses a portion of the existing Williamsport-Pile Bay Road. Pipeline construction is reduced by about 22 miles. Uses the already permitted port at Diamond Point. The Diamond Point Port offers better protection from the weather. Avoids construction and road traffic associated with Alternative 1 in the Upper Talarik watershed area where locals hunt and salmon spawn. Addresses concerns regarding adverse weather at Alternative 1 north ferry terminal (e.g., exposure to frequent high winds) and exposure to spills; Eagle Bay has deep water for a port and is sheltered from adverse weather. The Alternative 2 mine site access road from Eagle Bay would connect to the community of Iliamna on its way to the mine site, which would help communities benefit from the Pebble Project, such as reducing cost for power.	Comment acknowledged; no change was made to the EIS. Information gathered as part of the NEPA process will be used to inform USACE's public interest review determination, required by 33 CFR Part 320.4. Information will also be used by the USACE to make a determination of the least environmentally damaging practicable alternative under the CWA's Section 404(b)(1) Guidelines and any appropriate required compensatory mitigation for unavoidable impacts to WOUS. No discharges of dredged or fill materials are permitted to be authorized by the USACE under the CWA if there is a practicable alternative that would have less adverse impact on the aquatic ecosystem, as long as the alternative does not have other significant adverse environmental consequences. An EIS is used to inform the public and agency decision-makers, but it is not a decision document. A joint ROD by the USACE, BSEE, and USCG, issued at the conclusion of the NEPA process, will record each appropriate federal agency's decision(s); identify the alternatives considered in reaching those decision(s); and identify practicable means to avoid or minimize environmental harm, if required. USACE would identify the Least Environmentally Damaging Practicable Alternative (LEDPA) in the ROD.

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Proposed Action and Alternatives—Alternative TSF Layouts	The EIS Appendix B considers and eliminates from detailed analysis 26 alternative layouts for tailings facilities. Comments suggested that USACE should evaluate and document the potential downstream impacts in the event of a tailings dam failure to support its conclusions that there are not environmentally preferable TSF locations.	As noted by the commenter, a number of known factors were used to evaluate the feasibility and practicability of the alternative locations. The screening criteria for all alternatives were used to eliminate—or to consider in detail in the DEIS—alternatives to TSF locations. Considering that failure of the TSF is considered a remote possibility, further detailed analysis of potential downstream impacts at each of the 26 locations is not warranted. No change was made to the EIS based on these comments.
Proposed Action and Alternatives—Alternatives 2 and 3 are Not Available	Comments were received that Alternative 2 and Alternative 3 would cross private lands where the landowners have indicated the lands are not available. It was further suggested that these alternatives be removed from evaluation in the EIS.	Landowners have indicated to USACE that some or all of the land required for Alternative 2 and Alternative 3, the East Kokhanok Ferry Terminal Variant, and the Alternative 1 Airport Spur Road would not be available for the project. An EIS analyzes reasonable alternatives that may include alternatives that are not in the capacity of the Applicant. Alternatives were screened for this EIS for practicability using the Section 404(b)(1) Guidelines to define a practicable alternative as one that is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR Part 230.10(a)(2)). Land ownership agreements would not disqualify an alternative under NEPA. Per 33 CFR Part 320.4(g), a Department of the Army permit does not convey any property rights, either in real estate or material, or any exclusive privileges. Furthermore, a Department of the Army permit does not authorize any injury to property or invasion of rights or any infringement of federal, state, or local laws or regulations. The Applicant's signature on an application is an affirmation that the Applicant possesses or will possess the requisite property interest to undertake the activity proposed in the application. The district engineer will not enter into disputes, but will remind the Applicant of the above. The dispute over property ownership will not be a factor in the USACE public interest decision. USACE decided that these alternatives and variants would not be removed from the EIS, and no change was made.

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Proposed Action and Alternatives—Cargo Ship Loading	Concerns were expressed that cargo ships would not really only be loaded to half full.	This comment is addressed in PLP 2019-RFI 009c. In summary, the reason that the hold would be filled to only approximately 50 percent of capacity by volume is due to the high stowage factor of copper concentrate. Copper concentrate has a stowage factor of 0.45 cubic meter per million tons (m^3/MT), making it one of the densest cargoes bulk carriers will typically carry. The cargo volume limitation is therefore set by the ship's deadweight, and the holds cannot be loaded past this point, because that would exceed the carrying capacity of the ship. It is therefore reasonable to assume that copper concentrate would not be loaded past the 50 percent by volume level in the holds. Vessels used for bulk cargoes are required to have load line certificates, and load lines are visibly painted on the side of the ship to indicate when a vessel is approaching its fully loaded condition. As noted in the response to RFI 009c, concentrate transport using specialized containers proposed by PLP is commonly used in the mining industry. It offers reduced site infrastructure and concentrate dust emissions during transport and ship loading. Clarification has been added to Chapter 2, Alternatives, of the FEIS.
Proposed Action and Alternatives—Concentrate Container Wash Water	Comments expressed that the wash water from rinsing the concentrate containers at the port site is not an allowable discharge under the CWA.	PLP would wash the exterior of the concentrate containers to remove any concentrate dust that may have adhered during the ship-loading process. Container wash bay water would be treated through the WTP at the Amakdedori port, and discharged. It is PLP's view that this wash bay water can be treated to meet water quality standards, and then discharged. If, during state permitting, it was decided that this approach was not acceptable, the wash water would be transported back to camp for use in the process. Transporting the water would not result in a measurable increase in road truck traffic for the project; estimated to be one-third of a truck load per week (PLP 2019-RFI 159). This has been clarified in Chapter 2, Alternatives, of the FEIS.
Proposed Action and Alternatives—Concentrate Pipeline Water Discharge	The concentrate pipeline variant associated with Alternative 3 is described with an option to treat the water from the pipeline and discharge to Cook Inlet. Commenters expressed that the EPA's New Source Performance Standards Effluent Limitation Guidelines would prohibit this discharge, and the option should be eliminated from detailed consideration in the EIS.	The concern about this discharge is noted in the EIS. Should this alternative with a concentrate pipeline be selected and the project advanced, these discharges would be subject to State of Alaska wastewater permitting regulations. If the discharges are not allowed, the EIS evaluates an optional water pipeline to transport water removed from the concentrate slurry to the mine site for treatment. No change was made to the EIS based on these comments.

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Topic—Subtopic	Statement of Concern	Response
Proposed Action and Alternatives—Concentrate Pipeline with Other Alternatives	The concentrate pipeline variant with the return water pipeline should be considered for Alternative 1.	Comment acknowledged; no changes made to the EIS. The concentrate pipeline variant was only considered under Alternative 3 because the concentrate pipeline would need to be co-located with a road to allow inspections and response actions in the event of a pipeline leak/rupture. Alternative 1 includes a crossing of Iliamna Lake and a concentrate pipeline would need be laid on the lake bottom, making leak detection and response very difficult. Alternative 2 includes a segment of the natural gas pipeline that would not be co-located with a road, also complicating leak detection and response.
Proposed Action and Alternatives—Diamond Point Port and Rock Quarry	The EIS should explain that the Alternative 2 and Alternative 3 port at Diamond Point would be in the same area as the rock quarry that is currently under development. The FEIS should include a discussion of how the two projects relate, especially considering impacts to aquatic resources. Would the two projects be integrated and reduce the overall need for dredging and dredge material storage versus two separate locations?	The Diamond Point Rock Quarry project is described in Table 4.1-1 as a potential RFFA evaluated for cumulative effects in Section 4.1, Introduction to Environmental Consequences. The project was evaluated as reasonably foreseeable for development expansion. The cumulative impacts of the Diamond Point Rock Quarry project are assessed in Section 4.24, Fish Values, for Alternative 2 and Alternative 3. The Diamond Point Rock Quarry project is currently under way. Discussion in Section 4.1, Introduction to Environmental Consequences, and Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, has been updated to reflect activities. The cumulative effects section in Section 4.22 has been updated to acknowledge that the footprint of the currently authorized dock for the quarry and the PLP's dock overlap. The area of currently existing fill has been included, as well as the area of any authorized fill. Therefore, this area of fill would not be needed by PLP if Alternative 2 or Alternative 3 were constructed. There are currently no plans to integrate the projects.
Proposed Action and Alternatives—Diamond Point Port Dredging	The DEIS analysis for the Alternative 3 Diamond Point Port anticipates dredging a -20-foot MLLW channel (58 acres), producing 650,000 cubic yards of dredged material. A portion of the material would be used for dock construction, with the remainder of the material placed upland for disposal. The DEIS states that "the frequency of required maintenance dredging is unknown but could be every 5 years." A commenter stated that there is no supporting documentation for this statement, nor for the size of upland disposal areas anticipated to take initial and future volumes of maintenance dredged material, and it was recommended that a coastal engineering analysis be completed to support these dredging and disposal predictions.	NEPA does not require that engineering plans are at an advanced design level to analyze impacts; and frequently, conceptual-level design information is used. Information regarding the Diamond Point port dredging and onshore disposal was provided in response to several RFIs (PLP 2018-RFI 032; PLP 2018-RFI 063; PLP 2018-RFI 099). These RFIs were summarized and cited in Chapter 2, Alternatives. The recommended mitigation measure for completing a coastal engineering analysis for the Cook Inlet port has been added to Table M-1 in Appendix M1.0, Mitigation Assessment, of the FEIS. All suggested measures have been assessed based on three factors described in Chapter 5 (Effective, Potential Jurisdiction, Reasonable), with the goal of disclosing the likelihood that the measures would be

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		adopted by the Applicant or implemented as a condition in a state, federal, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process. See SOC Mitigation or Monitoring—Additional Mitigation.
Proposed Action and Alternatives—EIS Appendix B	Commenters recommended that USACE evaluate specific transportation corridor alternatives, which may be part of the LEDPA, and clearly explain that there are not practicable alternatives to analyzed transportation corridors that would have less adverse impacts on aquatic ecosystems. A suggested transportation alternative included a diesel pipeline following the Alternative 3 road route with a diesel terminal at the Iniskin Bay port. The USACE should explain why the existing description of alternatives analysis is sufficient to satisfy the requirements of 40 CFR Part 230.10(a).	Appendix B, Alternatives Development Process, describes the screening process for options to develop alternatives that were analyzed in the EIS. Table B-1 describes the list of over 90 options that were evaluated, including consideration of impacts to aquatic ecosystems, and dismissed per the screening criteria for the project. The suggested transportation alternative for a diesel pipeline following the Alternative 3 road route with a diesel terminal at the Iniskin Bay port is evaluated in Appendix B. New alternatives suggested during the DEIS public comment period have been added to Appendix B and evaluated.
Proposed Action and Alternatives—Expanded Mine Development should be Alt 4	Some commenters were confused by the expanded mine development scenario and suggested it should be referred to as Alternative 4.	The Applicant has proposed a 20-year mine. They have not proposed to expand and continue mining after the 20-year period; however, USACE has determined expansion is an RFFA, and has analyzed it accordingly in cumulative effects. It would not be appropriate to describe future expansion as Alternative 4, because it is not an alternative to the Applicant's 20-year project. No change has been made to the EIS as a result of these comments.
Proposed Action and Alternatives—Failure to address mine as proposed	Concerns were expressed that the DEIS failed to address the mine that was proposed, because the proposed mine was different than the one discussed during the scoping process.	Scoping was initiated based on PLP's December 2017 permit application. The scoping period ended after the updated project description was made available to the public. Scoping information is used to identify alternatives and frame the analysis. USACE works with applicants to identify additional avoidance and minimization measures that are often incorporated into a proposed project. These changes to the Applicant's project frequently result in updated project descriptions during the process. In May 2018, PLP notified USACE that it had refined the project in an effort to further avoid and minimize adverse impacts. USACE reviewed the changes, and determined the changes were not substantive enough to require a new scoping effort. The EIS was prepared in response to the application received, and incorporates analysis of avoidance and minimization measures. No change has been made to the EIS as a result of these comments.

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Proposed Action and Alternatives—HDDs Terminating Underwater	Details were requested for containing drilling fluid from HDDs that terminate underwater.	PLP committed to capturing HDD drilling fluid using techniques outlined in RFI 011a (PLP 2019—RFI 011a). This commitment has been added to Table 5-2 in Chapter 5, Mitigation.
Proposed Action and Alternatives—Insufficient Project Description	The USACE should revise the DEIS to significantly expand the project description with maps, figures, and a more detailed description of each major project element. Portions of the Project Description with accompanying figures that were provided as Attachment D to the permit application would be appropriate for this purpose. As a public review DEIS for such a significant project, the public should be provided with a clear and complete description of the entire project.	Attachment D to the permit application is PLP's Project Description, and it contains a total of 11 maps and figures. The EIS description of the project in the DEIS contained 43 maps and figures, and additional maps and figures have been added to the FEIS. The EIS description of the project attempts to strike the balance between a description of the project that is understandable to the public and decision-makers, and being encyclopedic.
Proposed Action and Alternatives—Kachemak Bay	Commenters asked if there would be connected actions in Kachemak Bay such as dock improvements to Homer Harbor.	PLP has not identified a need for nor proposed any changes to the existing infrastructure in Kachemak Bay. No change has been made to the EIS as a result of these comments.
Proposed Action and Alternatives—Kokhanok East to Eagle Bay	Comments were received in support of a variant that connects the Alternative 1 transportation corridor with the Alternative 2 transportation corridor by using the Alternative 1 Kokhanok West or the Kokhanok East variant ferry terminal with a ferry/pipeline crossing of Iliamna Lake to the Alternative 2 Eagle Bay ferry terminal. Support was also expressed for the Alternative 2 mine access road from Eagle Bay to the mine site. The common theme for support of this variant is as follows: Avoids construction and road traffic associated with Alternative 1 in the Upper Talarik watershed area where local residents hunt and salmon spawn. Addresses concerns regarding adverse weather at the proposed Alternative 1 north ferry terminal (e.g., exposure to frequent high winds) and exposure to spills; Eagle Bay has deep water for a port and is better sheltered from adverse weather. The Alternative 2 mine site access road from Eagle Bay would connect to the community of Iliamna on its way to the mine site, which would help communities benefit from the Pebble Project, such as reducing cost for power.	The DEIS considered routes and assessed impacts between the north ferry terminal and the Kokhanok west terminal (Alternative 1), and the north ferry terminal and the Kokhanok east ferry terminal (Alternative 1—Kokhanok East Ferry Terminal Variant), and also routes between the Pile Bay ferry terminal and the Eagle Bay ferry terminal (Alternative 2). After receiving these comments, USACE requested that PLP develop an option to route the ferry and natural gas pipeline across Iliamna Lake between Kokhanok and Eagle Bay (see PLP 2019-RFI 121). The icebreaking ferry would cross Iliamna Lake between Kokhanok and Eagle Bay; and the natural gas pipeline would cross Iliamna Lake from Kokhanok to Newhalen, and then be buried along a route from the lake through the vicinity of Newhalen and Iliamna, along the Newhalen River Road, and connecting with the Alternative 2 mine access road. This route is evaluated and included in the FEIS as Alternative 1a.

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Proposed Action and Alternatives—Mine Site Power Outage	It was stated that the DEIS fails to account for the cascading effects that might occur should a power loss occur. Concern was expressed that during a power loss, it may not be feasible to expect to have enough storage to hold the contaminated water, and it would also be hard to have backup power for the entire treatment plant. Multi-day power outages might force the mine operator to discharge untreated water directly into receiving waters.	Emergency backup power for the mine site would 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. This information has been added to Chapter 2, Alternatives, of the FEIS.
Proposed Action and Alternatives—New Iliamna Lake Crossing Variant	A comment was received stating that the DEIS fails to disclose to the public all of the potential variants crossing Iliamna Lake. Concern was expressed that information on a new variant for the ice-breaking ferry crossing Iliamna Lake was made available to the public at the very end of the comment period on the DEIS through a response to a Request for Information (RFI). It was stated that the new variant might prove especially problematic for the Iliamna Lake residents who use the lake ice for travel in the wintertime, and the public will not have an opportunity to comment on it unless the USACE modifies the DEIS alternatives and re-releases a revised DEIS for public comment.	The DEIS considered routes and assessed impacts between the north ferry terminal and the Kokhanok west terminal (Alternative 1), and the north ferry terminal and the Kokhanok east ferry terminal (Alternative 1—Kokhanok East Ferry Terminal Variant), and also routes between the Pile Bay ferry terminal and the Eagle Bay ferry terminal (Alternative 2). Comments received on the DEIS expressed support for an option to route the ferry and natural gas pipeline across Iliamna Lake between Kokhanok and Eagle Bay. This route would almost entirely avoid constructing the north ferry terminal and mine access road in the UTC watershed, an area important to local communities for wildlife and fish resources and subsistence activities. The option has been analyzed and included in the FEIS as the Applicant's Preferred Alternative (see also PLP 2019-RFI 121). Impacts of this new option at the two ferry terminals were analyzed in the DEIS. Impacts of ferry traffic and the natural gas pipeline were analyzed under Alternative 2 and Alternative 3, and this new route option would be proximate to the ferry and natural gas routes analyzed in the DEIS. The new route is a result of the NEPA public process, and mitigates impacts from the Applicant's original alternative. A supplemental DEIS is not required.
Proposed Action and Alternatives—No Action Alt—How USACE Can Select	Comment asserts the project cannot be implemented in a manner that avoids the potential for significant and irreversible environmental harm, yet the description of the No Action Alternative implies that USACE can only select one of the action alternatives. Specifically, the EIS description of the No Action Alternative states that the No Action Alternative would not meet the overall purpose under the 404(b)(1) guidelines.	The EIS description of the No Action Alternative also contains the following: "the No Action Alternative could be selected if USACE determines during its Public Interest Review (33 CFR Part 320.4[A]) that it is in the best interest of the public, based on an evaluation of the probable impacts of the proposed activity and its intended use on the public interest." No change has been made to the EIS as a result of these comments.

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Proposed Action and Alternatives—Plan of Operations	It was recommended that Pebble Limited Partnership (PLP) consider developing the Project Description into a more detailed draft plan of operations that includes a tailings and waste management plan, reclamation and closure plan, monitoring plan, and updated water management plan. These plans are typically supplied or required as a basis for development of State of Alaska permit applications, and provide more detailed information that is frequently used in the analysis of the impacts of large mining projects in Alaska under NEPA.	Detailed plans required by state regulations, such as a Plan of Operations, would be developed in consultation with the various state agencies when the project advances through the permitting phases. No change has been made to the EIS as a result of these comments. See related SOC: Mitigation or Monitoring—Request for Proposed Management Plans.
Proposed Action and Alternatives—Reasonable Range of Alternatives	Concerns were expressed that the DEIS did not analyze a reasonable range of alternatives. Suggestions for various project options, variants, and/or alternatives were received.	As required by NEPA implementing regulations and CEQ guidance, the EIS evaluates a range of reasonable alternatives to the proposed action. As described in Chapter 2, Alternatives, of the EIS, over 100 project options were evaluated during the alternatives development process, including alternatives for mine location and layout, mining methods, processing, throughput, gold recovery methods, power, access, concentrate transport, reclamation and closure access, tailings management, PAG waste rock storage, and water treatment. Of these, many options were eliminated from further consideration in the EIS because they did not meet the overall project purpose, were assessed as not reasonable, not practicable, or would not result in less environmental impact compared to the proposed alternative. Appendix B of the EIS provides a detailed explanation of the screening criteria applied, and an explanation for why each of the many project options that were evaluated were either included as a component of one of the alternatives evaluated in detail, or eliminated from detailed analysis in the EIS. New alternatives suggested during the public comment period for the DEIS have been added to and evaluated in the FEIS Appendix B.
Proposed Action and Alternatives—Scoping Input on Alternatives	Comment asserted that there is no description of comments made during scoping on alternatives, accounting for the number of comments received, nor discussion of how comments were considered, accepted, or dismissed.	All alternatives suggested during scoping are identified and evaluated in EIS Appendix B. Each alternative in Appendix B identifies if it was suggested during scoping, and provides rationale for eliminating or carrying forward. No change has been made to the EIS as a result of these comments.
Proposed Action and Alternatives—Support for Downstream Dam with Alternative 1	Commenters expressed support for the downstream dam (considered under Alternative 2). Some also suggested that it be combined with Alternative 1—PLP's proposed project.	USACE can ultimately select and combine components (variants) of the alternatives. Rationale for selection would be guided by USEPA's 404(b)(1) Guidelines to determine the LEDPA, and documented in the ROD. No change has been made to the EIS as a result of these comments.

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Proposed Action and Alternatives—Support for Kokhanok East	Commenters expressed support for the Kokhanok east ferry terminal.	Comment acknowledged. No change has been made to the EIS as a result of these comments.
Proposed Action and Alternatives—Support for Kokhanok West versus East	Commenters expressed support for the Kokhanok west ferry terminal rather than the Kokhanok east ferry terminal. Reasons given were that residents travel more frequently with boats and snowmachines between Kokhanok and eastern destinations, and locating the terminal west of the community would reduce conflicts.	Comment acknowledged. No change has been made to the EIS as a result of these comments.
Proposed Action and Alternatives—Transportation Corridor Alternatives	A commenter noted that the road and pipeline alignments are not water-dependent, and as a result, practicable alternatives that do not involve the discharge to wetlands and other special aquatic sites "are presumed to be available, unless clearly demonstrated otherwise." It was recommended that the EIS: More fully explain the information it considered when selecting which alternative road alignments to evaluate; and in particular, how this information relates to impacts on the aquatic ecosystem. Explain and document the information it considered for the transportation corridor alternatives to demonstrate that there are not practicable alternatives to the transportation corridors analyzed that would have less adverse impact on the aquatic ecosystem, to clarify whether impacts to aquatic resources in the proposed transportation corridors could have been avoided and minimized. Include information about how wetlands and other aquatic resources were avoided and minimized to the extent practicable, or further explain why its existing description of the alternatives analysis for the transportation corridor is sufficient.	Alternative transportation and pipeline alignments were evaluated during the alternatives development process. Appendix B provides a detailed explanation of the screening criteria applied, and an explanation for why each of the many project options that were evaluated were either included as a component of one of the alternatives evaluated in detail, or eliminated from detailed analysis in the EIS. Additional explanation of how transportation alternatives were developed has been added to FEIS Appendix B to address this comment. A description of measures to avoid and minimize impacts to WOUS is included in Tab 23 of the Pebble Project Department of the Army Application for Permit POA-2017-271 (PLP 2019a), and are summarized in Chapter 5, Mitigation, of the FEIS. The USACE regulatory process is iterative; therefore, the USACE works with applicants to identify additional avoidance and minimization measures that are often incorporated into the project. PLP provided additional information on avoidance and minimization since publication of the DEIS. This information has been incorporated where appropriate into the FEIS.
Proposed Action and Alternatives—Treatment of Bilge Water	Commenters expressed concern about the treatment of bilge water using only oil/water separators and the discharge of bilge water into Iliamna Lake. Suggestions were made that the bilge water be contained, offloaded, and further treated prior to discharge to the lake.	PLP has committed to collecting ferry bilge water in holding tanks at the ferry terminals and transporting the wastewater to one of the water treatment plants at the mine site or port (see PLP 2019—RFI 087a). Chapter 2, Alternatives, Chapter 5, Mitigation (Table 5-2), and the appropriate sections of Chapter 4, Environmental Consequences have been updated accordingly.
Proposed Project Purpose and Need—Alternative—recycling	Concerns were expressed that the purpose and need for the minerals can be satisfied with far less environmental impact through other in-ground sources, through re-use and recycling of copper products and IT equipment.	Suggested alternatives are evaluated in Appendix B of the EIS. In accordance with 33 CFR Part 325 Appendix B, the USACE has defined the purpose and need from both the Applicant's and the public's perspective. Appendix B in the FEIS has been updated to include reuse and recycling.

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Proposed Project Purpose and Need—Decisions to be Made	The Purpose and Need chapter should expand the Decisions to be Made section to describe all regulatory decisions (not just federal). The comment also stated the document needs to disclose how compliance with all authorizations will be achieved.	Section 1.3, Purpose and Need of the EIS describes the federal agencies that would use the EIS to inform their decisions, and their authorities to make permit decisions. Section 1.3 also indicates that the State of Alaska has decisions to make regarding the project. As stated in Section 1.3, the complete list of authorizations and permits that may apply to this project are listed in Appendix E. The ROD would document the three federal agencies' determinations of whether the project would comply with applicable regulations. Federal agencies make decisions based on the assumption that the permittee will comply with all permit conditions, and are empowered with enforcement tools to address non-compliance. Federal agencies would address non-compliance of permit conditions within their authority. No change has been made to the EIS as a result of these comments.
Proposed Project Purpose and Need—Expand Federal Decisions to be Made	The USACE needs to revise Section 1.3 or Section 1.4 to identify independent public review processes and opportunities for comment associated with the US Coast Guard (USCG) and Bureau of Safety and Environmental Enforcement (BSEE) decisions. Although USCG and BSEE might be the only other federal agencies with direct permitting authority, there are requirements for consultation with other federal agencies (e.g., natural resource trustees) and state agencies, as well as consultation with Alaska Native governments. State and local agencies also have a permitting role for the project. The USACE should revise the EIS to describe these other permitting processes and their relationship to the federal permitting process.	Chapter 1 has been revised. Permit decisions by federal, state, and local governments are usually made independent of each other. In general, permit decisions are not dependent on another permit to be issued. One exception is that the USACE may not issue a permit under Section 404 of the Clean Water Act if the State of Alaska denies a water quality certification for the project.
Proposed Project Purpose and Need—P and N should include preserving fisheries	Concerns were expressed that the USACE purpose and need should include preserving fisheries and minimizing impacts to WOUS.	The Applicant's purpose and need statement describes a need that the Applicant has identified, and the purpose explains how the Applicant intends to meet that need. The USACE defines the overall purpose and need while generally focusing on the Applicant's statement and defining the purpose and need for the project from both the Applicant's and the public's perspective. The EIS evaluates alternatives that would meet the overall purpose, and the environmental consequences of each of those alternatives, including impacts to fisheries, subsistence, wetlands, and other waters. No change has been made to the EIS purpose and need as a result of these comments.

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Proposed Project Purpose and Need—P and N Too Narrowly Focused	Concerns were expressed that the basic and overall project purpose and need (P&N) is too narrowly focused, and limits consideration of alternatives to the Applicant's preferred site. It was also stated that USACE's determination of the overall project purpose is silent on the agency's purpose and the public interest even though it is the agency's purpose and need for action that will determine the range of alternatives, and provide a basis for the selection of an alternative in a decision. Currently, USACE's mandate to protect water quality is not mentioned, only one mining site is considered, and the public interest is only defined by the economic benefits of mining, not the economic benefits of preserving the area, including the economic benefits to commercial fisheries. Commenters requested that USACE conduct an independent review of the P&N for the project from the perspective of the overall public interest, including considering if the project is economically viable, and whether there are public benefits to a project that would produce ore for the global market.	The Applicant is solely responsible for establishing the need for a project. In accordance with 33 CFR Part 325 Appendix B, the USACE will exercise independent judgement in defining the purpose and need for the project from both the Applicant's and the public's perspective. However, the USACE is not required to incorporate public interest factors in the purpose and need. In addition, the USACE is neither an opponent nor a proponent of any project; therefore, the agency's purpose should not be a part of the purpose and need. No specific change was made to the EIS based on this comment. The purpose and need must not be unreasonably narrow so as to preclude consideration of a reasonable range of alternatives. As described in Chapter 1 of the EIS, the purpose and need was expanded from the Applicant's proposed purpose and need. This expansion allowed for the consideration of additional alternatives. The full range of alternatives considered is described in Appendix B of the EIS. Of this range of alternatives, four alternatives are reasonable, and therefore are considered in detail in the EIS. In accordance with 33 CFR Part 320.4, as part of the public interest determination, which is documented in the ROD, the USACE will make a determination regarding the need for the project from the perspective of the public interest, including an evaluation of the economic benefits and detriments of the activities under USACE authority.
Proposed Project Purpose and Need—Project Background	EIS Chapter 1, Purpose and Need, should describe the project background, including a general description of the project area, Pebble deposit discovery, exploration, previous development proposals, EPA involvement, information about the Applicant, including their mining credentials/history, and the USACE completeness review of PLP's application.	Chapter 1 of the EIS was revised to add project location information, information about the Applicant, and confirm that the application was determined to be complete. Information on the project's proposed production is described in Chapter 2. EPA's 2014 Watershed Assessment was used to inform the analysis in the EIS. Information on the Pebble deposit exploration and previous development proposals are considered under cumulative effects analysis. Information about the Pebble deposit discovery, EPA involvement, or information about the Applicant's mining credentials/history, is not relevant to the NEPA analysis.
Proposed Project Purpose and Need—Project not needed in AK or US	Concerns were expressed that USACE's overall purpose is to develop and operate a mine in Alaska, but the Purpose and Need section does not demonstrate a need for the project to be located in Alaska or the United States. The Purpose and Need section should address the Executive Order on critical minerals; comments were received that copper, gold, and molybdenum	The Applicant is solely responsible for establishing the need for a project. In accordance with 33 CFR Part 325 Appendix B, the USACE will exercise independent judgement in defining the purpose and need for the project from both the Applicant's and the public's perspective. Also, in accordance with 33 CFR Part 320.4(q), as part of the public interest determination, which is documented in the ROD, the USACE

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	are not designated critical minerals, while other comments noted that rhenium is.	may make a determination regarding the need for the project from the perspective of the public interest. The Applicant's stated purpose does not preclude the mining of minerals identified in Executive Order 13817 (2017) on critical minerals. In addition, the mining of minerals not included in the Executive Order is not prohibited. No specific change was made to the EIS based on this comment.
Proposed Project Purpose and Need—Purpose and Need concerns	Concerns were expressed during scoping regarding the USACE Purpose and Need for the project and its relationship to selection of alternatives.	The Purpose and Need is described in Chapter 1 of the EIS and the alternatives are described in Chapter 2, Alternatives. No change has been made to the EIS as a result of these comments.
Proposed Project Purpose and Need—Significant Issues	The EIS Chapter 1 should identify the significant issues of the project.	Section 4.1.2 lists the issues that were selected for analysis in the EIS. These issues were identified through the scoping process. In addition, the Executive Summary summarizes the issues and analysis identified for inclusion in the EIS. No changes were made to the EIS.
Public Health—Baseline Health Disparities	Commenter expressed concern that the DEIS inadequately characterized baseline health disparities of low-income and indigenous communities, and how these health disparities may be exacerbated by the project.	Section 3.10, Health and Safety, provides a demographic summary of the potentially affected communities, including population percentages for Alaska Natives, median household income, and unemployment rates. The communities closest to the project reported higher Alaska Native populations (67.6 percent in the Lake and Peninsula Borough [LPB] and 72.9 percent in the Dillingham Census Area) than those communities farther way (34.6 percent in the Bristol Bay area and 7.3 percent in the Kenai Peninsula Borough and Anchorage) and for the state (14.2 percent). As discussed in Section 3.10, Health and Safety, under Health Effect Category (HEC) 4, poverty levels and rates of malnutrition, as well as cost of living/food and access to subsistence resources, have the potential to impact food security, which can impact health. Overall, approximately 15 percent of both LPB families and Dillingham Census Area and just 4 percent of Bristol Bay Borough families fell below the federal poverty level threshold. These rates are lower than those living below the poverty level threshold for Alaska Natives statewide, and fairly similar to national white levels (which is 12 percent). HECs 5, 6, 7, and 8 have the potential to be impacted by poverty levels and health disparities for indigenous communities. Baseline data were provided for infectious disease and vaccinations under HEC 5; water and

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		sanitation availability under HEC 6; non-communicable disease under HEC 7; and health services availability under HEC 8. Section 4.10 and Appendix K4.10, Health and Safety, provide a health evaluation that generally followed the HIA guidance, falling between a 'desktop' HIA (qualitative and brief assessment) and 'rapid appraisal' HIA (more in-depth than desktop), and included an evaluation and impact ranking for all eight HECs. These evaluations rely on the evaluations and findings of other sections (Section 4.3, Needs and Welfare of the People—Socioeconomics, and Section 4.9, Subsistence). Potential project-related impacts to health disparities of low-income and indigenous communities include both positive and negative outcomes. For example, positive impacts could include increased income for low-income and indigenous communities during construction and operation phases, while decreased income during the closure phase could have negative impacts related to job losses and decreased income for communities and households, who would then need to adjust to this change. See Section 4.10 and Appendix K4.10, Health and Safety. Clarification has been added to Appendix K4.10 that sensitive sub-groups such as children, the disabled, the elderly, low-income households, and indigenous communities can be disproportionately affected by impacts to social determinants of health (i.e., socioeconomics, psychosocial stress, and family stress and stability) (HEC 1); and food security (including access to, and the nutritional value, safety, and quality of traditional foods) (HEC 4). In addition, clarification has been added that HECs 5, 6, 7, and 8 have the potential to be impacted by poverty levels and health disparities for indigenous communities and other sensitive subgroups such as children, the disabled, and the elderly.
Public Health—Bioaccumulative Contaminant—Selenium	Commenter expressed that selenium, which is likely to be discharged at levels significantly higher than water quality criteria, was not listed as a bioaccumulative contaminant in the characterization of health baseline.	Section 3.10, Health and Safety, does not provide an exhaustive list of project-related bioaccumulative metals, but instead provides "example metals." Although selenium is not listed as one of the examples in Section 3.10, it is listed and evaluated under HEC 3 as a bioaccumulative project-related chemical in Appendix K4.10, Health and Safety. No changes were made to the EIS.

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Public Health—Contamination of Food	Commenters expressed concerns related to exposure to project-related chemicals through consumption of plants, fish, and other foods, including bioaccumulation in subsistence foods and not knowing if fish would be safe to eat.	A Health and Safety Assessment was completed in the DEIS and included a health assessment, consistent with NEPA requirements, for potentially affected communities "outside the fence," The health assessment generally followed the Alaska HIA guidance, and included an evaluation and impact ranking for all eight Health Effect Categories (HECs), including Exposure to Potentially Hazardous Chemicals (HEC 3), which had an evaluation of the subsistence foods exposure pathway and a focused evaluation of mercury, because it was expressed as a public concern; Food, Nutrition, and Subsistence (HEC 4); and Non-communicable and Chronic Diseases (HEC 7), which included potential impacts on cancer rates. Appendix K4.10 includes a subsistence foods exposure evaluation under HEC 3 for the project-related bioaccumulative hazardous air pollutant (HAP) metals (arsenic, cadmium, lead, mercury, nickel, and selenium) and bioaccumulative non-HAP metals (copper, silver, and zinc). The subsistence food evaluation concludes that the subsistence foods' potential exposure pathways (consumption of terrestrial vegetation impacted by mine dust deposition; and consumption of terrestrial wildlife, fish, and waterbirds with bioaccumulative metals) are considered potentially complete, but insignificant given various considerations, including that potential bioaccumulations of metals are expected to range from negligible to low in terrestrial and aquatic wildlife. Although the toxicity of mercury is an understandable public concern, it is not expected to be a health concern for this project because it is not used in processing; future concentrations are not expected to exceed current baseline levels and/or health-protective screening levels; and mine site exposure reduction plans would be in place. Please see Section 4.10, Health and Safety, and Appendix K4.10 for further details. No changes were made to the EIS analysis.
Public Health—Discharge Water-Impacts on Water Quality	Commenter stated that baseline surface water data indicate extremely low concentrations of metals under the No Action Alternative, and expressed concern that even though metals in the project discharge waters would be treated to water quality criteria, metal concentrations in surface water would be increased above current baseline levels.	Although metal concentrations may increase above current baseline concentrations due to discharges from the waste treatment plant, the discharges would be treated to meet permit requirements and be at or below Alaska water quality standards (WQS). Because Alaska WQS are protective of the environment and human health, any metal concentration increases in surface water for metals from these WTP discharges would not be expected to negatively impact human health. See Appendix K4.10. No edits were made to the document.

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Public Health—Drinking Water Protection Areas	Commenters requested that text explain how mine site fugitive dust could impact groundwater and surface water immediately outside the mine, which could be used for drinking water, and existing drinking water protection areas.	Because the dust deposition modeling used in the future media estimations in Section 4.14, Soils, and Section 4.18, Water and Sediment Quality, was based on maximum rates at the boundary of the mine site, the health evaluation used estimated future media concentrations (soil, groundwater, surface water, sediment) expected immediately outside the mine, which would be protective of potential project-related dust deposition impacts farther away, including in the existing drinking water protection areas near the project (ADEC 2018g). Section 4.10, Health and Safety, was clarified to indicate that the fugitive dust deposition evaluation of potential impacts to groundwater and surface waterbodies was conducted based on maximum rates of deposition at the boundary of the mine site, predicting potential impacts immediately adjacent to the mine site. Therefore, the evaluation is protective of the potentially affected communities, including those closest to the mine site (Iliamna, Newhalen, and Nondalton, each of which is approximately 17 miles away) and the surrounding existing drinking water protection areas. Section 4.4, Environmental Justice, was updated to reflect this information.
Public Health—Expansion Scenario and Mitigation	Commenter requested that the EIS provide additional information and mitigation measures for the RFFA for the Project Expansion Scenario to support the cumulative effects evaluation and conclusions, rather than relying on promises of future mitigation efforts.	If the Pebble Project build-out were to be pursued in the future, a separate EIS would be required, including an evaluation of health and safety. Given this, the health and safety evaluation in Section 4.10, Health and Safety, cumulative effects, was limited to generalized impacts of the expansion scenario. Clarification was added to the text in Section 4.10, Health and Safety, indicating that a separate EIS, including an evaluation of health and safety, would be required for expansion of the mine per this RFFA. In addition, text was revised to indicate that if the expanded development scenario were pursued in the future, the separate EIS would also include mitigation measures, which for the purposes of this cumulative effects evaluation, would be expected to minimize or mitigate exposure, because it would include common BMPs and industry standards that are designed to reduce impacts to the environment. PLP would be required to operate the mine in compliance with all federal, state, and local requirements, including all mitigation and monitoring requirements identified through the NEPA and permitting processes.

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Public Health—Food security	Commenter expressed that the DEIS reflected a poor understanding of the definition of food security for Alaska native people of the region, and that a more comprehensive definition and analysis is necessary because of the significant threat to health and safety of traditional foods.	A health and safety evaluation was completed in the DEIS, consistent with NEPA requirements, for potentially affected communities. The assessment relied on the evaluations and findings of other sections (Section 4.9, Subsistence, and Section 4.23, Wildlife Values). The health evaluation generally followed the Alaska HIA guidance, falling between a 'desktop' HIA (qualitative and brief assessment) and 'rapid appraisal' HIA (more in-depth than desktop), and included an evaluation and impact ranking for all eight Health Effect Categories (HECs), including Food, Nutrition, and Subsistence Activities (HEC 4). Please see Section 4.10, Health and Safety, and Appendix K4.10. Clarification has been added to Appendix K.4.10, Health and Safety, stressing the importance of the subsistence lifestyle for Alaska native peoples of the region, and that impacts to food security (actual or perceived), including subsistence activities, could negatively affect access to, and the nutritional value, safety, and quality of traditional foods, and maintaining cultural values.
Public Health—Fugitive Dust Control Plan	Commenter requested that inclusion of a written fugitive dust plan be included with the EIS.	Clarification has been added to Appendix K4.10 that PLP developed a conceptual fugitive dust control plan (FDCP) for mitigation and control of project activity–related fugitive dust emissions and wind erosion (PLP 2019-RFI 134), and has been attached to the FEIS. PLP has committed to updating the conceptual FDCP, as required, through mine permitting and operations phases. Per the conceptual FDCP, PLP would implement design features and active and passive controls to reduce fugitive dust emissions from the project. The conceptual FDCP describes the equipment, methodology, training, and performance assessment techniques that would be used to control fugitive dust from activities related to the project. Applicant-proposed measures, including the conceptual FDCP, are presented in Chapter 5, Mitigation. Specific measures suggested by the public for controlling fugitive dust (that are not already covered by existing design features or measures in Chapter 5) have been added to Appendix M1.0, Mitigation Assessment, for a comprehensive list of all measures identified during the NEPA process. All suggested measures have been assessed based on three factors described in Chapter 5 (Effective, Potential Jurisdiction, Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant or implemented as a condition in a state, federal, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.

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Public Health—Fugitive Dust Impacts on Water Quality	Commenter expressed that the DEIS did not evaluate impacts of dust from unpaved roads (as a source of contamination) on water quality and de-watering measures to minimize dust.	Increases in concentrations of metals in surface water due to fugitive dust deposition were analyzed, as described in Appendix K4.18, Water and Sediment Quality, using methods that assume an environmental increase in metals concentration due to fugitive dust, and are further discussed in Appendix K4.10, Health and Safety, HEC 3. Clarification has been added to the health baseline text in Appendix K.3.10 under HEC 3 to indicate that dust from unpaved roads may circulate contaminants that can be deposited onto surface water and further redistributed to sediments. Clarification has also been added to Appendix K4.10 that the PLP developed a Conceptual FDCP to reduce the potential for airborne dust and control fugitive dust emissions from the activities associated with the construction, operation, and closure of the mine (PLP 2019-RFI 134); this has been attached to the FEIS. PLP has committed to updating the conceptual FDCP, as required, through mine permitting and operations phases. Per the Conceptual FDCP, the PLP would implement design features and active and passive controls to reduce fugitive dust emissions from the project. The Conceptual FDCP describes the equipment, methodology, training, and performance assessment techniques that would be used to control fugitive dust from the activities of the project. The Conceptual FDCP methods to control dust from vehicle travel on unpaved roads includes application of water, speed limits, properly maintaining the roads, use of large-capacity (400-ton) haul trucks to minimize road travel, where practical, and use of approved chemical dust suppressants, when necessary. Applicant-proposed measures, including the Conceptual FDCP, are presented in Chapter 5, Mitigation. Specific measures suggested by the public for controlling fugitive dust (that are not already covered by existing design features, the Conceptual FDCP, or measures in Chapter 5) have been added to Appendix M1.0, Mitigation Assessment, for a comprehensive list of all measures identified during the NEPA process. All suggested measures have been assessed based on three factors described in Chapter 5 (Effective, Potential Jurisdiction, Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant, or implemented as a condition in a state, federal, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.

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Public Health—HIA	Commenters expressed concern that the DEIS did not include a Health Impact Assessment.	An HIA is not required under NEPA or USACE regulations or guidance. Although an HIA is not required, a Health and Safety Evaluation was completed in the DEIS to address the Public Interest Review factor of safety, scoping concerns, and to disclose potential effects on human health. The evaluation of impacts on human health and safety is a required component of the NEPA as it pertains to negative and beneficial consequences of a project on potentially affected communities. Section 4.10, Health and Safety, includes a safety discussion for mine site workers in the context of relevant regulatory requirements under OSHA, MSHA, and other types of hazard assessment and prevention. As noted above, Section 4.10, Health and Safety, also includes a health evaluation, consistent with NEPA requirements, for potentially affected communities outside the area directly affected by mine construction and operation, but potentially subject to indirect effects (“outside the fence”). The health evaluation generally followed the Alaska HIA guidance, which is not required by state law, but does provide general guidance for development in Alaska, and included an evaluation and impact ranking for all eight HECs. However, not all eight effects categories are relevant or likely for every project. Therefore, the health evaluation focused more on the four HECs (Social Determinants of Health [HEC 1]; Accidents and Injuries [HEC 2]; Exposure to Potentially Hazardous Chemicals [HEC 3]; and Food, Nutrition, and Subsistence [HEC 4]) that were considered relevant and likely to be potentially impacted by the project or expressed as a primary stakeholder concern. Under the Alaska HIA guidance, the health evaluation presented in the DEIS falls between a ‘desktop’ HIA (qualitative and brief assessment) and ‘rapid appraisal’ HIA (more in-depth than desktop), using available or accessible health information without conducting new field survey work, and including stakeholder and key informant analysis. Based on the health evaluation impact rankings, recommendations were made to maximize health benefits or minimize health risks. Please see Section 3.10 and Section 4.10, Health and Safety, and Appendix K3.10 and Appendix K4.10. Clarification has been added to Section 4.10, Health and Safety, in the FEIS explaining what level of Health and Safety Evaluation was performed, and that this section summarizes the Health and Safety Evaluation provided in Appendix K4.10.

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Public Health—HIA Research Study Not Referenced	Commenter expressed that the DEIS did not cite and evaluate research by Dr. Elizabeth Snyder, who evaluated potential human health impacts of the Pebble Mine.	A search of the internet was conducted to locate the indicated study by Dr. Elizabeth Snyder, but it was not found. It does not appear that this information is publicly available. Dr. Snyder was contacted but did not reply. No changes were made to the EIS.
Public Health—Impact Rating Footnote	Commenter requested that a footnote be added to tables throughout Appendix K4.10 (Health and Safety) to clarify the meaning of the impact rating diamonds.	Footnotes were added to the applicable tables in Appendix K4.10, Health and Safety, to clarify that the sum of the impact dimensions were used to determine the severity ranking. The severity ranking and likelihood rating determines the impact rating (1 through 4 diamonds), which indicates the corresponding overall significance impact rating category of 1, 2, 3, or 4.
Public Health—Impacts—General	Commenters on the DEIS expressed general concerns about the health impacts from the Pebble Project due to potential releases of contaminants to the environment resulting in long-term impacts on the lives of Alaskans.	An HIA is not required by Alaska state law, or under NEPA or USACE regulations or guidance, but rather serves as a set of principles through which the State of Alaska views development. A health and safety evaluation was completed in the EIS consistent with NEPA, assessing potential project impacts, both negative and beneficial, on human health for the potentially affected communities. In accordance with NEPA practice and ADHSS (2015), the scope of the health evaluation was limited to potentially affected communities surrounding the project, but not outside the mine site and other mine-related components. The health evaluation generally followed the Alaska HIA guidance, and included an analysis and impact ranking for all eight HECs, including Exposure to Potentially Hazardous Chemicals (HEC 3); Food, Nutrition, and Subsistence (HEC 4); and Non-communicable and Chronic Diseases (HEC 7), which included potential impacts on cancer rates. Please see Section 4.10, Health and Safety, and Appendix K4.10. No changes were made to the analysis in the EIS.
Public Health—Inadequate Evaluation of Antimony	Commenter stated that the DEIS reported that levels of antimony in the environment would significantly increase from dust deposition, and therefore, that health hazards of antimony should be thoroughly addressed.	Potential health impacts from project-related metals, including antimony, were evaluated as described under HEC 3 in Appendix K4.10. Antimony has not been established as carcinogenic (Alaska human health comparative action levels are based on non-cancer endpoints), nor is antimony identified as a bioaccumulative compound by ADEC. Because antimony is not considered bioaccumulative, it would not be anticipated to magnify in wildlife that could be consumed by subsistence users or recreational users. As discussed in Appendix K4.10, total HAP annual emissions, which include antimony, for all project components and phases are below the individual HAP and total HAP Title V permit thresholds, which are set at limits protective of human health. Although

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		antimony future concentrations due to fugitive dust deposition would increase relative to baseline, these future estimated media concentrations would remain below Alaska human health comparative action levels for soil. See Appendix K4.10, Health and Safety, as well as Section 4.14 Soils, and Appendix K4.18, Water and Sediment Quality. No changes were made to the EIS analysis.
Public Health—Inadequate Evaluation of Arsenic	Commenter stated that the DEIS reports that arsenic would be present in water and exceed Alaska Water Quality Standards, and requested that the FEIS include a critical assessment of arsenic exposure pathways and potential adverse health impacts, because any increase over background levels could have serious public health consequences.	Potential health impacts from project-related metals, including arsenic, were evaluated as described under HEC 3 in Appendix K4.10. Arsenic naturally occurs throughout Alaska and represents natural background concentrations, as long as there are no known anthropogenic sources. Because no contaminated site records coincided with or were in proximity to the project footprint (see Section 3.14, Soils), the baseline conditions at the project represent naturally occurring arsenic background. As discussed in Appendix K4.10, baseline mean arsenic concentrations at the project are naturally elevated above Alaska human health comparative action levels (CALs) in soil and sediment, but baseline surface water mean concentrations are below Alaska WQS. Expected arsenic concentration increases relative to baseline concentrations would be negligible. Estimated surface water arsenic concentrations would remain below ADEC WQS, and mine site discharges would be treated to meet Alaska WQS. Given the negligible increases in soil and sediment, the expected future arsenic concentrations in these media would be indistinguishable from the cancer and non-cancer risks associated with baseline conditions. Clarification has been added under HEC 3 in Appendix K4.10, Health and Safety, that baseline HAP metals, which includes arsenic, have surface water concentrations below ADEC WQS.
Public Health—Inadequate Evaluation of Mercury	Commenters expressed that the DEIS did not adequately evaluate the sources, environmental fate, and health impacts of mercury, and that a more complete assessment is needed because indigenous populations are disproportionately exposed to mercury through their traditional diet.	The anticipated sources, potential environmental fate, exposure pathways, toxicity, and health impacts of mercury are discussed in the evaluation of HEC 3, included in Appendix K4.10. For this project, mercury occurs only as a naturally occurring metal in soils and ores, and is not used as a processing chemical or reagent during any part of the mining, extraction, processing, or transportation processes. Therefore, the only source of mercury in this project would be release of naturally occurring mercury from handling of soils and ores. These releases include HAP air emissions, fugitive dust, and WTP discharges. Although the toxicity of mercury is an understandable public concern, it is not expected to be a health concern because it is

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		not used in processing; future concentrations from project releases of naturally occurring mercury in soils and ores are not expected to be distinguishable from current baseline levels and/or exceed health-protective screening levels; and mine site exposure reduction plans would be implemented. No changes were made to the EIS analysis.
Public Health—Increase in Crime and Drugs Use	Commenters stated that there is no discussion of adverse effects related to increased crime and drug use (including transport of drugs, alcohol, and other undesirable materials) associated with 2,000 employees, especially with up to 50 percent of employees being non-local.	Clarification was added to Appendix K.4.10, Public Health and Safety, that increases in crimes, violence against women and girls, and drug and alcohol use due to the workforce employed by the project are primary concerns for the potentially affected communities. Baseline information on alcohol and tobacco use was presented in Section 3.10 and Appendix K3.10, Health and Safety, under HEC 1. Potential project impacts to the potentially affected communities related to psychosocial stress are discussed under HEC 1 in Section 4.10 and Appendix K4.10, Health and Safety. Some potential health outcomes of psychosocial stress may include substance abuse, suicide, and mental health. The project would likely have a drug- and alcohol-free workplace, with a zero-tolerance policy and targeted and random drug testing. Such workplace programs may assist in decreasing existing incidence or habits of drug or alcohol overuse among employees, thereby providing a secondary benefit to their families and communities. In addition, potential decreases in rates of psychosocial stress to the potentially affected communities could also occur, due to improved economic opportunities and employment. New jobs and increased income could contribute to increased family stability, and subsequently lead to decreased rates of poor mental health and lower rates of substance abuse. Baseline information regarding crime types (i.e., all violent crimes, aggravated assault, robbery, and rapes) and rates or percentages for the potentially affected communities (available on a regional basis) was added to the FEIS under HEC 1 in Section 3.10 and Appendix K3.10, Health and Safety. Potential project impacts due to crimes was added to the FEIS under HEC 1, (e.g., increases in psychosocial stress may result in increased anger, substance abuse, and poor mental health, which in turn could lead to increases in aggravated assault and rape; conversely, decreases in psychosocial stress may do the opposite and result in decreases of violent crimes) as well as potential impacts to health and safety services under HEC 8, (access to public safety resources and emergency response services) in Section 4.10 and Appendix K4.10, Health and Safety.

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Public Health—Insufficient Characterization of Baseline	Commenter requested the EIS conduct a baseline study on the health of local residents throughout the region that can be referenced in the future during toxicology tests, including a baseline for fish and wildlife that humans consume in the region.	In general, the health analysis included in the EIS followed the Alaska HIA guidance, and included an evaluation and impact ranking for all eight HECs. Under the Alaska HIA guidance, the health evaluation presented in the DEIS falls between a 'desktop' HIA (qualitative and brief assessment) and 'rapid appraisal' HIA (more in-depth than desktop), using available or accessible health information without conducting new field survey work, and including stakeholder and key informant analysis. The purpose of the health and safety evaluation is to assess the impacts of the project and its alternatives against baseline conditions. Current baseline condition was assumed as a reasonable proxy to qualitatively evaluate the future. Although there may be some uncertainty associated with the many factors and variables that could impact the health of communities in the EIS analysis area in the future, current trends are reasonably assumed to continue in the absence of the project. Clarification has been added to Section 4.10, Health and Safety, explaining what level of Health and Safety Evaluation was performed, it also explains that Section 4.10 summarizes the Health and Safety Evaluation provided in Appendix K4.10.
Public Health—Insufficient HIA Lacking HHRA	Commenters stated that the human health evaluation in the DEIS was insufficient and lacked a human health risk assessment.	Neither an HIA nor an HHRA is required under NEPA or USACE regulations or guidance, but rather can serve as a set of principles through which to view a project. Consistent with NEPA practice, a health and safety evaluation was completed, and analyzed the potential negative and beneficial project impacts on the potentially affected communities. The health and safety evaluation relied on the analyses and findings of other sections (Section 4.9, Subsistence, Section 4.12, Transportation and Navigation, Section 4.14, Soils, Section 4.17, Groundwater Hydrology, Section 4.18, Water and Sediment Quality, Section 4.20, Air Quality, and Section 4.23, Wildlife Values). The health evaluation generally followed the Alaska HIA guidance, falling between a 'desktop' HIA (qualitative and brief assessment) and 'rapid appraisal' HIA (more in-depth than desktop), and included an evaluation and impact ranking for all eight HECs. Please see Section 4.10, Health and Safety, and Appendix K4.10. As discussed in Appendix K4.10, the evaluation of hazardous chemical exposure (HEC 3) generally followed the exposure-based evaluation used in HHRAs. This approach first identified the anticipated project sources and chemicals of potential concern (COPCs); determined if exposure

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		pathways would be incomplete or potentially complete; and then evaluated, to the extent practicable, those that were potentially complete to ascertain if they were significant or insignificant pathways. The health evaluation focused on the relevant project contaminants for each exposure pathway. For example, based on the air inhalation exposure pathway analysis, health of the potentially affected communities was not expected to be impacted by the mine site air emissions (criteria pollutants and hazardous air pollutants), with the possible exception of indirect exposure to fugitive dust deposited onto the environment; therefore, the evaluation of health impacts of dust deposition outside the mine focused on the metals present in fugitive dust. For chemical exposures to affected communities that would only potentially occur if a spill or release occurred (e.g., exposure to chemical reagents, ore concentrates, large diesel fuel spill), impacts were evaluated in Section 4.27, Spill Risk, and summarized in Section 4.10 and Appendix K4.10, Health and Safety. In this way, the health evaluation in Section 4.10 and Appendix K4.10, in conjunction with the health impacts evaluated in Section 4.27, provides a comprehensive evaluation of potential exposure and impacts for project-related chemicals, including metals. No changes were made to the EIS analysis.
Public Health—Mental Health	Commenters expressed concerns that the DEIS did not include, adequately address, or mitigate for psychosocial or mental health impacts to human health, including stress and mental health impacts related to staying engaged on the project, potential environmental impacts, land encroachment, and potential dam failure.	A Health and Safety Evaluation was completed in the DEIS, which included a health assessment, consistent with NEPA requirements, for potentially affected communities “outside the fence.” An HIA evaluates the potential health effects/consequences of a plan, project, or policy before it is built or implemented. An HIA typically does not evaluate the potential health impacts that may be related to the process to assess the project, such as potential stress that could occur due to involvement/engagement in the EIS process. The health evaluation generally followed the Alaska HIA guidance, and included an evaluation and impact ranking for all eight HECs, including Social Determinants of Health (HEC 1) and Accidents and Injuries (HEC2). Psychosocial stress, which includes mental health as an indicator, is one of the potential impacts evaluated under HEC 1, and suicide rate is one of the potential impacts evaluated under HEC 2. Potential project-related impacts on psychosocial stress and suicide rates are difficult to predict because they are influenced by complex, multi-dimensional contributing factors. In addition, the difficulty to predict potential project-related impacts on suicide rates is compounded because the baseline rates for the region

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		are based on less than 20 cases/counts, and may not be statistically reliable. Appendix K4.10 includes a discussion under HEC 1 on how the project has the potential to decrease psychosocial stress, and lead to improved mental health from increased economic opportunities and employment for the potentially affected communities, as well as likely workplace programs that may assist in decreasing existing incidence or habits of drug/alcohol overuse among employees. Appendix K4.10 also includes a discussion under HEC 1 on how there is also the potential for the project to increase psychosocial stress in the potentially affected communities, related to fear of changes in lifestyle and cultural practices, land encroachment, impact to the environment, and food security and quality. Similarly, Appendix K4.10 includes a discussion under HEC 2 regarding the potential for the project to increase and decrease suicide rates due to potential positive and negative project-related impacts to other HECs, including HEC 1 (i.e., psychosocial stress and family stability) and HEC 4 (food, nutrition, and subsistence activity). Section 4.27, Spill Risk, includes an evaluation of potential human health impacts, including psychosocial stress, from potential spills or failures. These human health impacts from potential spills or failures are summarized in Section 4.10, Health and Safety, and Appendix K4.10. No changes were made to the EIS analysis as a result of these comments.
Public Health—Mine Worker Health	Commenters expressed concern that mining towns are very dirty and do not have very healthy working conditions.	A Health and Safety Assessment was completed for the project in the DEIS, including an assessment of safety for project workers “inside the fence"; and a Health and Safety assessment “outside the fence” for affected communities near the project, which includes health-related safety (e.g., accidents and injuries). In accordance with NEPA practice and generally following HIA guidance, the scope of the health assessment is "outside the fence" for the potentially affected communities, and does not include a direct evaluation of the anticipated workforce "inside the fence," because the project is governed by relevant regulatory requirements under OSHA, MSHA, ADOT&PF, and other types of regulations and hazard assessments and preventions. However, the health assessment does consider mine site worker “crossover issues," such as areas where workers are housed, or where workforce behaviors/health result in interactions/overlap with the affected communities (i.e., Infectious Disease –HEC 2, and Health Services Infrastructure and Capacity—HEC 8). Please see Section 4.10, Health and Safety, and Appendix K4.10. No changes were made to the EIS analysis.

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Public Health—Naturally Elevated Arsenic	Commenter requested that the discussion on naturally occurring elevated arsenic be clarified to distinguish between naturally occurring and anthropogenic sources, as well as cite the August 2018 Technical Memo "Guidance on Evaluating Naturally Occurring Metals at Contaminated Sites," rather than the March 2009 Technical Memo "Arsenic in Soil."	The text in Appendix K4.10, Health and Safety, has been revised to distinguish between naturally occurring background and anthropogenic sources, including the replacement of ADEC 2009 Arsenic Technical Memo with ADEC 2018j Metals Technical Memo, as requested. The text was revised to state that the natural occurrence of elevated arsenic concentrations in soil is acknowledged. Arsenic naturally occurs throughout Alaska (i.e., from volcanic releases and natural weathering of minerals and ores), and represents natural background concentrations as long as there are no known anthropogenic sources (such as contamination from commercial and industrial processes and materials). Because no site records of contamination coincided with or were in proximity to the project footprint (see Section 3.14, Soils), the baseline conditions represent naturally occurring elevated arsenic background.
Public Health—Potential Impacts to Children	Commenter requested that the EIS specifically address the short- and long-term health and safety of children in the analyses of disproportionate impacts, cumulative effects, and socioeconomics, especially in terms of nutritional dislocations and potential exposures to environmental contaminants.	Appendix K4.10, Health and Safety, provides a health evaluation that generally followed the Alaska HIA guidance and included an evaluation and impact ranking for all eight HECs, including Social Determinants of Health (HEC 1), Exposure to Potentially Hazardous Chemicals (HEC 3), and Food, Nutrition, and Subsistence Activities (HEC 4). Sensitive subgroups, such as children, were specifically addressed under HEC 3 in the DEIS. Please see Section 3.10 and Section 4.10, Health and Safety, and Appendices K3.10 and K4.10. Clarification has been added to Appendix K.4.10, Health and Safety, that sensitive subgroups, such as children, the disabled, and the elderly, can be disproportionately affected by impacts to socioeconomic changes, psychosocial stress, family stress and instability (HEC 1), food security (including access to, and the nutritional value, safety, and quality of traditional foods) (HEC 4), and potential exposures to environmental contaminants (HEC 3), which may result in short- and long-term impacts to health.
Public Health—Protection of Public Safety	Commenter requested that the EIS include information regarding the protection of public safety.	The level of access to safety services can impact psychosocial and family stress, while response to accidents and injuries can potentially increase accident/injury severity outcomes. Potential project impacts to the potentially affected communities related to accidents and injuries was covered under HEC 2 in Section 4.10 and Appendix K4.10, Health and Safety. Baseline information regarding safety services infrastructure and capacity (e.g., safety or police officers, fire truck, ambulance transportation services, and emergency medical or trauma

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		technicians) was added to the FEIS under HEC 8 in Section 3.10 and Appendix K3.10, Health and Safety. Potential project impacts to safety services (access to public safety resources and emergency response services) under routine and large-scale emergency situations was added to the FEIS under HEC 8 in Section 4.10 and Appendix K4.10, Health and Safety. In addition, baseline information regarding crime types and rates or percentages for the potentially affected communities (available on a regional basis) was added to the FEIS under HEC 1 in Section 3.10 and Appendix K3.10, Health and Safety. Potential project impacts due to crimes were added to the FEIS under HEC 1, as well as potential impacts to health and safety services under HEC 8, in Section 4.10 and Appendix K4.10, Health and Safety.
Public Health—Spills Risk Assessment and Mitigation	Commenters expressed concern that the evaluation of spill risk underestimates and inadequately evaluates public health, and does not provide a spill risk mitigation plan.	The health and safety evaluation does not independently evaluate impacts from potential spills or failures because these releases to the environment are not a part of permitted operations. Instead, Section 4.10 and Appendix K4.10, Health and Safety, summarize the health and safety evaluation included in Section 4.27, Spill Risk. NEPA does not require evaluation of "worse case" scenarios, and it is not possible to evaluate all possible scenarios; therefore, Section 4.27, Spill Risk, focused on scenarios with low probability and high consequence, including diesel spills, natural gas releases from the pipeline, concentrate spills, tailings release, untreated contact water release, as well as cumulative effects. The same level of quantitative impacts analysis could not be provided in Section 4.27, Spill Risk, as in Section 4.10, Health and Safety. Therefore, the impacts analysis provided in Section 4.27, Spill Risk, is mostly qualitative, with quantitative data provided as available. Clarification text was added to Section 4.27 to more clearly identify potential human health hazards or risks, if a spill or release were to occur. The USACE understands that the lack of a detailed management plan(s), including a spill risk mitigation plan, is a public concern; however, detailed permitting-level plans are not always available at the time of the NEPA analysis, and are not required to analyze impacts. Detailed plans may not be available at the time of the NEPA analysis, but the analysis can factor in minimization associated with use of common BMPs and industry standards that are designed to reduce impacts to the environment. Detailed plans, including those proposed

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		by the Applicant or required by state regulations, would be developed in consultation with the various state agencies when the project advances through the permitting phase. PLP would be required to operate the project in compliance with all federal, state, and local requirements, including all mitigation and monitoring requirements identified through the NEPA and permitting processes.
Public Health—Waterbody Impacts	Commenter requested the text in Appendix K4.10, Health and Safety, be updated to discuss the impacts to freshwater and marine waterbodies due to minor releases from the transportation corridor, or change the heading, because discussion is focused on sediment contamination.	A new section titled "Transportation Corridor Minor Releases to Surface Waterbodies" was added to Appendix K-4.10 (under HEC 3), which includes a discussion of impacts to freshwater and marine waterbodies due to minor releases from the transportation corridor. The text clarified that inadvertent releases of hydrocarbons to surface waterbodies would result in a direct impact to surface water quality. However, minor hydrocarbon spills (small amounts of vehicle- or ferry-related pollutants) from transportation-related sources would be reduced through the application of BMPs and fuel-handling requirements. Should a small spill occur, it would be expected that potential impacts would be minimized or mitigated, because control measures would be immediately implemented to reduce impacts to the environment. In addition, based on the fate and transport of hydrocarbons, it would be expected that lighter-weight hydrocarbons would volatilize from the surface water, while heavier hydrocarbons would partition to sediment. Therefore, this potential exposure pathway would be considered potentially complete, but insignificant.
Public Health—Worker Safety Regulations	Commenter requested that the EIS more clearly state what is meant by "workers" and "untrained workers" in the context of OSHA regulations, and why they are treated differently.	Section 4.10, Health and Safety, includes an evaluation of safety for the anticipated workforce in the context of relevant regulatory requirements, such as OSHA. OSHA was established to ensure that employers provide safe workplace environments for employees by setting and enforcing standards. OSHA does not cover workers that are not employees. As required by OSHA, employers shall ensure that all employees are provided with relevant and appropriate training by a competent and qualified person. The text has been clarified to state that workers would be persons that would be employed by the project, and would be provided required and applicable health and safety training by a competent and qualified person, as required by OSHA. "Untrained workers" would not be employed by the project, and would not have received required training.

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Reclamation and Restoration—Disposal Plans at Closure	Questions and concerns were expressed regarding disposal of mining infrastructure and equipment at closure. Commenters suggested that mine infrastructure and equipment be decommissioned and removed at closure.	As described in Chapter 2, Alternatives, the disposal plan for closure would be developed in accordance with state regulations. Any material disposed on site would be subject to permitting approval by ADEC. PLP has provided a reasonably detailed Reclamation and Closure Plan to help inform the impact analysis for the FEIS (PLP 2019-RFI 115). Final disposal of mining infrastructure and equipment at closure is further described in PLP's Reclamation and Closure Plan. PLP's Reclamation and Closure Plan has been summarized and cited in Chapter 2 of the FEIS.
Reclamation and Restoration—Reclamation and Closure Plan	Concerns were expressed that the DEIS did not include a detailed reclamation and closure plan.	PLP has provided a reasonably detailed Reclamation and Closure Plan to help inform the impact analysis for the FEIS (PLP 2019-RFI 115). The purpose of PLP's Reclamation and Closure Plan is to provide guidelines for implementing stabilization and reclamation procedures for the various facilities associated with the project. These guidelines are based on the best available reclamation technologies and on state regulations for mine reclamation. PLP's Reclamation and Closure Plan has been summarized in Chapter 2, Alternatives, and incorporated into impact analyses in Chapter 4 of the FEIS where appropriate. An approved reclamation plan is required by the state mining regulations (11 AAC 97.300—97.350), and the reclamation plan does not become effective until a performance bond is in place, except for certain small operations. See SOC Bonding or Financial Assurance—Financial Responsibility, for a discussion of reclamation bonding.
Reclamation and Restoration—Restoration Plan	Concerns were expressed that the DEIS did not adequately describe restoration of areas temporarily impacted during construction. Commenters stated that impacted areas should be restored to their original state after construction.	PLP has provided a reasonably detailed Restoration Plan to help inform the impact analysis for the FEIS (PLP 2019-RFI 123). This restoration plan describes the processes and measures that would be implemented by PLP to restore temporarily impacted areas to a condition that resembles the pre-construction conditions, or condition of adjacent lands undisturbed by the project, after construction is completed. PLP's Restoration Plan is included in Appendix M3.0, Restoration Plan, and has been incorporated into the FEIS where appropriate.

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Recreation—Bear Viewing Impacts	Concerns were stated regarding impacts to the bear-viewing industry, including at McNeil State Game Refuge and Sanctuary, Lake Clark National Park, Katmai National Park, and Kamishak Special Use Area, particularly from the Amakdedori port and port access road. Concern that bear-viewing experience quality would decrease because habitat would be affected, the natural landscape would be disturbed, bear behavior would change, and bears would be displaced. Concerns that decreased bear-viewing experience quality would affect the brand of the bear-viewing opportunities in the area, and would result in economic impacts to the bear-viewing industry.	Bear viewing is a major recreation activity in the project area. The DEIS discussed impacts to wildlife viewing in Section 4.5, Recreation. The potential for disruption to the movement and distribution of bears, particularly in McNeil River State Game Refuge and Sanctuary and Katmai National Park and Preserve, and related impacts to wildlife viewing is discussed in Section 4.5, Recreation. Additional text has been included in Section 4.23, Wildlife Values, to further describe potential impacts of the project on bears. In conjunction, additional text has been included in Section 4.5, Recreation, regarding subsequent potential impacts to bear viewing (wildlife viewing), including long-term impacts to viewing opportunities. Impacts to the regional economy are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics.
Recreation—Impacts to National Park Visitors	Comments requested analysis of effects on air traffic, visitor use, visitors, and recreational activities and settings in the nearby national park units: Katmai National Park and Preserve and Lake Clark National Park and Preserve, and requested that impacts to park visitors be a separate section in the recreation analysis.	Impacts to recreational settings and activities that influence visitor use in Lake Clark National Park and Preserve and Katmai National Park and Preserve are discussed in Section 4.5, Recreation. Impacts to air traffic are primarily discussed in Section 4.12, Transportation and Navigation, but are also discussed in Section 4.5, Recreation, relative to the recreational setting and recreational activities, such as flightseeing tours. Current flightpaths have been added to Appendix K3.12. Impacts to the night sky are discussed in Section 4.5, Recreation, and Section 4.11, Aesthetics. Noise impacts are discussed in Section 4.19, Noise. Impacts to the regional economy are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics.
Recreation—Inadequate Analysis	Concerns were expressed that the analysis presented in Section 3.5 and Section 4.5, Recreation was incomplete or used subjective terms.	Section 3.5 and Section 4.5, Recreation, have been edited for accuracy. Visitor use estimates are included in Section 3.5, Recreation, for the areas that have such information. However, because most recreation in the project area is very dispersed, visitor use estimates are not available for many areas. NEPA requires analysis of the best available data, and extensive recreational surveys to gather use information for a relatively low-use area would not be warranted for this EIS. Rationales are provided for the estimated level of recreation use in Section 3.5, Recreation. Rationales for the magnitude of impact are provided in Section 4.5, Recreation; and impacts are quantified when appropriate. Impacts to the regional economy are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics.

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Recreation—Recreation Setting Baseline	Commenters requested a discussion of the importance of the area, use of a systematic inventory method, and noted the lack of inventory information, including the number of recreational sites and visitor estimates. Commenters also provided additional information on lodges, special designations, fishing, and national park visitation.	The recreation areas and activities in the project area are discussed in Section 3.5, Recreation. Recreation inventory information is not readily available for most of the project area, but has been included for the facilities for which it is available. Visitor use estimates are included in Section 3.5, Recreation, for the areas that have such information. However, because most recreation in the project area is very dispersed, visitor use estimates are not available for many areas. NEPA requires analysis of the best available data, and extensive recreational surveys to gather use information for a relatively low-use area would not be warranted for this EIS. Additional information provided by commenters was reviewed and incorporated as appropriate.
Recreation—Recreation Setting Impacts	Concerns were expressed that the project, particularly visual and noise impacts, would negatively affect the recreational setting and experiences, resulting in negative effects on the economy (jobs, lodges, tour operators, etc.) and on the image of the area, which would affect tourism. Concern was also expressed that aesthetic impacts would displace recreation, thereby decreasing recreational use.	Impacts to the recreational setting and experiences from the project, including noise, reduction in habitat, changes to wildlife movements, visible development, night sky lighting, etc., are discussed in Section 4.5, Recreation. This section draws heavily on other sections in the EIS, such as Section 4.6, Commercial and Recreational Fisheries, Section 4.11, Aesthetics, Section 4.19, Noise, and Section 4.23, Wildlife Values. Impacts to the economy are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. Impacts to sportfishing are described in Section 4.6, Commercial and Recreational Fisheries. Aesthetic impacts are not anticipated to be such that displacement of visitors would result in a decrease in overall recreational use. As discussed in Section 4.5, there may be displacement of recreational visitors from one area to another, resulting in a shift in recreational use from one area to another; but overall, recreational use is not anticipated to decrease because there are readily available areas for displaced visitors near impacted areas. The EIS states the impacts that would occur to recreation; impacts to the public's perception of the area for recreation activities is beyond the scope of the EIS. No changes were made to the EIS.
Recreation—Use increase	Commenters expressed concern that the DEIS fails to identify the impacts of non-planned creation of ATV trails from recreational and subsistence users on overland transportation roads and bridges to access state lands and waters.	As stated in Section 4.5, Recreation, limited access to the roadways and ferry terminals would be available to local residents and businesses only. Therefore, the transportation corridor facilities would induce only a small amount of recreation, and expose some previously inaccessible areas to public access and use from a few residents near the mine and port access roads. There was no change to the analysis in the EIS.

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Recreational Fisheries—Data and Process	Commenters suggest that recreational fishing data used in the analysis are inadequate and not representative of actual angler effort.	The EIS uses both the Statewide Harvest Survey (SWHS) and Freshwater Guide Logbook data collected by ADF&G. These data sets are the only comprehensive estimates of recreational angling effort available, and are used by ADF&G, the Alaska Board of Fish, and the federal bodies such as the North Pacific Fishery Management Council for their decision-making processes. No other estimates of angling effort exist to include in the analysis. No changes were made to the EIS analysis.
Recreational Fisheries—Impacts—General	Comments expressed concern that general impacts to recreational fisheries were not addressed.	Impacts to the recreational fisheries are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries. No changes were made to the EIS analysis as a result of these comments.
Recreational Fisheries—Impacts from Spills	Commenter noted that how the DEIS presented information that adult and juvenile fish are relatively mobile with respect to a diesel spill may not be accurate, and requested correcting the information.	This portion of Section 4.27, Spill Risk, was modified to focus on the lack of a long-term impact from a diesel spill, because the impacts analysis finds no expected long-term population-level impacts.
Recreational Fisheries—Impacts- Fiscal	The commenter requested a clarification of the term "not necessarily" in the context of changing municipal revenues with respect to changes in recreational fishing effort.	Section 4.6, Commercial and Recreational Fisheries, has been edited to avoid using that term, and simplify the sentence referenced.
Recreational Fisheries—Inadequate Analysis	Commenters were concerned that the EIS should do a better job of characterizing the economic value of, and impacts to, recreational fishing, including the lodging and guiding industries. The EIS should use recreational fishing data that are more relevant. This is important because of the status of Bristol Bay as a destination location for recreational anglers that is known for its remote, uncrowded, and wild setting.	Section 3.6, Commercial and Recreational Fisheries, incorporates the most relevant sources of angler effort and expenditures available. This includes data from ADF&G's Statewide Harvest Survey and Guide Logbook Program, as well as inflation-adjusted expenditure data from the EPA's 2014 Watershed Assessment. These data were used when analyzing the impacts to recreational fishery. Section 4.6, Commercial and Recreational Fisheries, also relies on the information provided in Section 4.24, Fish Values, to determine the implications of fish impacts to recreational fishing. Impacts to the recreational setting are discussed in Section 4.5, Recreation. Recreational fisheries in Section 3.6, Commercial and Recreational Fisheries, has been edited to add more information on baseline conditions to better characterize impacts discussed in Section 4.6. Impacts to the setting of recreational fishing are discussed in Section 4.5, Recreation, and the results of that analysis are used in Section 4.6, Commercial and Recreational Fisheries to determine potential impacts. Text has been added to further clarify.

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Recreational Fisheries—Inadequate Analysis- Existing Conditions	The commenters expressed concern that the DEIS does not adequately capture the economic contribution of recreational fishing in the Bristol Bay region, including guiding and lodges. The significance of some sport fisheries in the area, like the Nushagak River and Lower Talarik Creek, has not been made particularly clear.	Section 3.6, Commercial and Recreational Fisheries, incorporates the most relevant sources of angler effort and expenditures available. This includes data from ADF&G's Statewide Harvest Survey and Guide Logbook Program, as well as inflation-adjusted expenditure data from the EPA's 2014 Watershed Assessment. Additional information has been included in Section 3.6, Commercial and Recreational fisheries, to better characterize baseline conditions.
Recreational Fisheries—Mulchatna Area T/S Error	Commenters noted an error in Section 3.6, Commercial and Recreational Fisheries, in the DEIS where the Mulchatna River was stated as being in statewide harvest survey Area S instead of Area T.	Section 3.6, Commercial and Recreational Fisheries, has been corrected to show that the Mulchatna River is in Area T.
Recreational Fisheries—Nushagak Effort	The Area T description and accompanying tables in Section 3.6, Commercial and Recreational Fisheries, should include greater mention of the Nushagak River.	Section 3.6, Commercial and Recreational Fisheries, has been edited to include a more specific reference to Nushagak fishing effort. Accompanying tables in the section and in Appendix K3.6 already highlight the Nushagak River.
Recreational Fisheries—Pipeline Construction impacts to traffic	Commenter requested additional discussion regarding the natural gas compressor station north of the Anchor River and its impacts on recreational fishing.	Section 3.6, Commercial and Recreational Fishing, has been edited to note that the facility would not be expected to affect angling in the area except minor increases in construction traffic during the construction phase.
Recreational Fisheries—Recreation Displacement-Effect on Other Areas	Commenter is concerned that the project could lead to recreation displacement, affecting other resources.	Recreational fishing and displacement are discussed in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries. Anglers may choose to substitute other sites for current sites, but the amount of displacement would be expected to be low relative to available opportunities, and substitutes as noted in Section 3.6 and Section 4.6, Commercial and Recreational Fisheries, and Section 4.27, Spill Risk. No changes were made to the EIS analysis.
Recreational Fisheries—Recreation Setting Impacts	Commenters expressed concern that the document did not adequately address the issue of quality perception and impacts on the number of recreational angling days.	Impacts from the project to recreational fishing days are discussed in Section 4.6, Commercial and Recreational Fisheries. An additional discussion was added to this section to note that some anglers may be sensitive to the idea that a mine is operating in the area regardless of whether they would experience any activity or disturbance associated with the mine.

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Section 106 Compliance—Data and Process	The USACE should conduct a robust NHPA Section 106 process to identify important historic properties, and use that information to inform the review of potential impacts to cultural resources.	The USACE applies the Procedures for the Protection of Historic Properties (33 CFR Part 325, Appendix C) to guide its process of complying with Section 106 (54 USC 306108) of the NHPA (54 USC 300101 et seq.) and its implementing regulations, "Protection of Historic Properties" (36 CFR Part 800). Section 3.8, Historic Properties, has been combined with Section 3.7, Cultural Resources, and discusses relevant portions of 33 CFR Part 325, Appendix C. As part of this process, identification and evaluation of historic properties has occurred and continues to occur, in consultation with the Advisory Council on Historic Preservation, the Alaska State Historic Preservation Officer, tribes, and other consulting parties. The information gathered as part of the NHPA Section 106 process has informed the analysis of impacts to cultural resources. The NHPA Section 106 process is occurring parallel to, but separate from the NEPA process. The analysis of impacts to historic properties and cultural resources is described in Section 4.7, Cultural Resources. The information in Section 3.7 and Section 4.7, Cultural Resources, has been updated with additional information acquired over the 2019 field season. This includes refined data for the interview-identified cultural resources, status of determinations of eligibility, and site survey results.
Section 106 Compliance—Inadequate Consultation	Commenters were concerned that the USACE NHPA Section 106 consultation process is inadequate.	USACE must comply with Section 106 of the NHPA. As part of Section 106 consultation, USACE has conducted meetings with the consulting parties, provided summaries of the meeting discussions, and solicited comments as part of the meeting summaries review process. In addition, USACE has provided opportunities for private consultation while in the Bristol Bay region. USACE has provided and will continue to provide opportunities to participate in the Section 106 process. The information gathered as part of the Section 106 process has informed the analysis of impacts to cultural resources. The analysis of impacts to historic properties and cultural resources is described in Section 4.7, Cultural Resources. No changes were made to the EIS analysis.
Section 106 Compliance—Participation	Trout Unlimited and the LPB inquired about participation in the NHPA Section 106 process.	As the lead federal agency, the USACE initiated consultation pursuant to Section 106 of the NHPA, 36 CFR Part 800.3(f)(2), 33 CFR Part 325 (Appendix C). In August 2017, the USACE invited participation as a consulting party to the Section 106 process from federal, state, city, and borough governments; as well as tribes, regional and village native corporations, and other organizations that may attach religious and

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		cultural significance to historic properties or have a demonstrated interest in the undertaking. The LPB was invited to participate. Although the USACE recognizes that Trout Unlimited and its members have a general interest in the undertaking, we disagree that Trout Unlimited has demonstrated a formal consulting party interest under Section 106 based on the nature of Trout Unlimited's legal or economic relationship to the potentially affected properties. Fishing, hunting, and conservation activities of Trout Unlimited members in the Bristol Bay region are not sufficient to demonstrate Trout Unlimited's economic relation to the undertaking. No changes were made to the EIS.
Socioeconomics Impacts—Alternative Job Creation	Commenter requested additional research and information about jobs in the area alternative to those that would be created by the project.	The EIS evaluates the impacts of the project, part of which is the creation of jobs. Alternatives to the project that meet the same purpose and need were evaluated as part of the NEPA process. As presented in Chapter 1, Purpose and Need, the Applicant has stated that the project's purpose is to produce commodities, including copper, gold, and molybdenum, from the Pebble deposit. Because job creation was not a component of the purpose, alternatives that could create jobs (or provide jobs) for residents of the local communities were not evaluated. Jobs created from the project and evaluated alternatives are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. No changes were made to the EIS.
Socioeconomics Impacts—Borough Requirements	The LPB would expect commitments from PLP related to transportation (road access and winter route marking), employment (designating communities where employees would travel to the project site), and education (vocational training).	PLP has stated a willingness to work with communities on use of the road and trail marking, hiring local workers, and supporting educational initiatives. The items listed are outside of the USACE's authority. Appropriate suggestions have been added to Appendix M1.0, Mitigation Assessment. Some commitments from PLP regarding marking winter travel routes are discussed in Section 4.12, Transportation and Navigation.
Socioeconomics Impacts—Economic Impact—Adverse	Commenters expressed concern that the project would have adverse effects to the economy, including to the recreation and tourism industries.	Anticipated impacts to Socioeconomics, both adverse and beneficial, are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. PLP has stated that they would work with all local communities to identify the best solutions for use of the access roads and ferry for community transportation, which would provide the opportunity to reduce transportation costs and lower the high cost of living in the rural communities.

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		The project would not be expected to affect Bristol Bay commercial fisheries, and therefore, would not be expected to affect the economy associated with commercial fisheries, as discussed in Section 4.6, Commercial and Recreational Fisheries. The EIS further identifies that action alternatives could affect commercial fishing near port sites in Lower Cook Inlet. Impacts to the availability of resources that are used for subsistence by communities are discussed in Section 4.9, Subsistence; and impacts to recreational experiences are discussed in Section 4.5, Recreation. No changes were made to the EIS.
Socioeconomics Impacts—Economic Impact—Beneficial	Commenters are supportive of the project because of the beneficial economic impacts to the communities. Potential benefits include increased year-round local employment, job training, and increased revenue to the State of Alaska and the LPB.	Comment acknowledged. Anticipated impacts to socioeconomics, both adverse and beneficial, are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. Some benefits would include the following: the mine would help reduce the seasonal fluctuation in employment; during operations, the mine is anticipated to employ 250 people from local communities near the mine; through increased infrastructure, there is the potential for decreases in transportation costs and the cost of living; and the project would generate millions of dollars annually in taxes and royalty payments, which can be used to support local services. No changes were made to the EIS.
Socioeconomics Impacts—Economic Impact—Employment Context to State	In relation to employment gains from the project, the commenter is concerned that the EIS does not put this number of jobs in a context in which their relative importance to the well-being of Alaskans can be evaluated. The comment presents data showing that the employment gains from the project are insignificant compared to the overall employment in the state, and minor when compared to the annual number of jobs created across the state.	The EIS evaluates the impacts of the project, part of which is the creation of jobs. The employment data presented in the EIS were based on current state and federal data sources, which are identified with each table where the data are presented. The EIS presents data for the potentially affected communities, boroughs, and the state, but the focus is on impacts to the communities. Although the estimated increase in employment related to the project may not be large in comparison to total employment across Alaska, it would have an impact on the small communities near the project. The project is anticipated to employ 250 people from local communities, which would help reduce the higher unemployment rate and the large seasonal fluctuations in employment that are prevalent in these communities. Employment data used in the EIS for the potentially affected communities, boroughs, and state are presented in Section 3.3. Needs and Welfare of the People—Socioeconomics. Therefore, no changes were made to the EIS analysis. The impacts to the potential affected communities are presented in Section 4.3.

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Socioeconomics Impacts—Economic Impacts—High Risk	Commenters expressed concerns about the risk of a spill and/or other contamination, and the resulting negative impact on the fishing industry in Alaska. The fishing industry is a major employer for the region, and the long-term risks are too high compared to the short-term gains of the project.	The socioeconomic impacts as a result of spills are discussed in Section 4.27, Spill Risk. Due to the localized nature of most types of spills and the anticipated spill response, socioeconomic impacts would likely be localized and of brief duration. The analysis has been expanded to address commenters' concerns. As discussed in Section 4.6, Commercial and Recreational Fisheries, the project would not be expected to affect Bristol Bay commercial fisheries, and therefore, would not be expected to affect the economy associated with commercial fisheries. The EIS further identifies that alternatives could affect commercial fishing near port sites in Lower Cook Inlet. The availability of resources that are used for subsistence by communities is discussed in Section 4.9, Subsistence, and impacts to recreational experience are discussed in Section 4.5, Recreation.
Socioeconomics Impacts—Economic Impacts—Unrealistic Estimates	Commenters stated that the revenue projections to the state and/or wage benefits to the local workforce and/or municipal and state revenue projection from the project were unrealistic or based on unreliable data, leading to misleading estimates of the potential benefits.	The data used to evaluate the impacts of the project were based on information provided by PLP, existing reports, and government data sources. PLP provided projected employment estimates and goals for construction and operation activities. The project is anticipated to employ 250 people from local communities, which would help reduce the higher unemployment rate and the large seasonal fluctuations in employment that are prevalent in the potentially affected communities. The wage rates provided in the EIS are based on other mining operations across Alaska and are considered appropriate for comparing alternatives. Revenue projections for municipalities and the state are based on an analysis prepared by IHS in 2011. Because the design of the project has changed since 2011, the revenue projections in the EIS were revised to better reflect the project. Because details are not available, the revenue projections were adjusted based on differences in employment estimates between the project design in 2011 and the project in the EIS. Employment estimated and revenue projection for the project and evaluated alternatives are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics.
Socioeconomics Impacts—Inadequate Analysis—Cumulative Effects	Commenter was concerned that the cumulative impacts in Section 4.3, Needs and Welfare of the People—Socioeconomics, did not address impacts for some of the identified RFFAs, and the relationship between the project and the RFFA projects was not discussed.	The cumulative effects section in Section 4.3, Needs and Welfare of the People—Socioeconomics, groups similar RFFAs and discusses the potential cumulative impacts for the projects identified in the comment. The section has been edited to provide additional detail on the RFFAs listed in the comments, and clarify that from a socioeconomic perspective, the cumulative impacts of the RFFAs and the project are primarily associated with generation of 1) employment/service opportunities and potential competition for employees/support services; and 2) generation of additional state and local revenues.

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Topic—Subtopic	Statement of Concern	Response
Socioeconomics Impacts—Inadequate Analysis—EBD	In their comment, the commenter provides a technical evaluation of Chapter 21, Socioeconomics, of the EBD. The commenter has concerns with the demographic data presented in the EBD, and states "The demographic data on which many of the descriptions are based are outdated and most of the economic and other descriptions are too general to be informative or useful." The commenter discussed multiple ways that the EBD is outdated.	The demographic data presented in the EIS were based on current state and federal data sources and not the EBD. The sources of the data are identified with each table where demographic data are presented. The EBD was not used to obtain the demographic data for the EIS. Demographic data used in the EIS for the potentially affected communities, boroughs, and state are presented in Section 3.3, Needs and Welfare of the People—Socioeconomics. The impacts to the potential affected communities are presented in Section 4.3, Needs and Welfare of the People—Socioeconomics. No changes were made to the EIS.
Socioeconomics Impacts—Inadequate Analysis—Greater Detail	Commenters requested that greater detail on the socioeconomic impacts of the project be incorporated into the analysis.	Socioeconomic impacts to the region are described in Section 4.3, Needs and Welfare of the People—Socioeconomics. The amount of detail in the EIS is considered sufficient for a NEPA analysis, and allows reviewers to evaluate the differences between alternatives. Therefore, no changes were made to the EIS analysis.
Socioeconomics Impacts—Inadequate Analysis—Long-term	Commenters expressed concern that the analysis does not evaluate the long-term impacts to the communities, especially when the mine closes, nor does it address the impacts that would occur to communities from an influx of people during operations. The EIS should address these "boom and bust" impacts.	Long-term impacts to communities, including the potential for and impact of a 'boom and bust' cycle, are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. No changes were made to the analysis.
Socioeconomics Impacts—Inadequate Analysis—Outside Study Area	Commenters expressed concerns that the DEIS did not evaluate the impacts to communities further from the mine site (e.g., Homer, Aleutians East Borough).	Although the project would have an impact on all residents of Alaska, the communities selected to be evaluated in the EIS were those where the project would be anticipated to have the greatest impact on the community. Not every community could be included in the EIS. As discussed in Section 4.6, Commercial and Recreational Fisheries, the project would not be expected to affect Bristol Bay commercial fisheries, and therefore, would not be expected to affect the economy associated with commercial fisheries, such as coastal communities. As discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics, PLP has stated an emphasis on hiring local workers. A study by Loeffler and Schmidt (2017) found that during pre-development activities, communities near the mine site provided a much higher percentage of local labor than more distant communities, such as those in the Dillingham Census Area or other coastal communities. It is anticipated that a similar pattern/distribution of employment would occur with the operation of the mine. Therefore, although there will likely be employment opportunities for people in more distant communities, it would have less of an overall impact on that community.

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		Employees and perishable goods would travel through Anchorage. Homer has not been discussed as a staging point. Refer to Chapter 2, Alternatives, for more information. The rationale for the EIS analysis area in Section 3.3, Needs and Welfare of the People—Socioeconomics; and Section 3.4, Environmental Justice, has been clarified.
Socioeconomics Impacts—Inadequate Analysis—Spills	Commenters are concerned that the EIS does not evaluate the socioeconomic impacts and required compensation related to a dam failure at the mine, and resulting impacts to fisheries and livelihoods.	The socioeconomics impacts as a result of spills are discussed in Section 4.27, Spill Risk. Because all potential spill scenarios addressed in the EIS are hypothetical, the section cannot provide the same level of quantitative impacts analysis as is provided in other sections of the EIS. Analyses conducted for the EIS indicate that due to the localized nature of most types of spills and the anticipated spill response, the impacts of the spills would likely be localized and of brief duration. As a result, there would be few, if any, socioeconomic impacts. The text in the Socioeconomic portions of Section 4.27, Spill Risk, has been revised to state (where appropriate) that any impacts would likely be localized and of brief duration. In addition to natural resources, impacts to Commercial and Recreational Fishing, Subsistence, and Health and Safety are discussed in Section 4.27.
Socioeconomics Impacts—Inadequate Analysis—Value Ecosystem Services	Commenters request a more comprehensive economic analysis be completed to compare the benefits and costs of lost ecosystem, commercial fisheries, and/or recreational businesses. The loss of the ecosystem services and business opportunities caused by the mine should be valued, and a benefit-cost analysis completed to show the full impacts of the project.	Valuation of ecosystem services is often used for decisions where there are tradeoffs in managing and allocating resources. In addition, estimating the value of the services can range widely depending on the data available and features accounted for, which can lead to a high level of uncertainty in the results, and limit the utility of the valuation. It should be noted that valuation of ecosystem services is often conducted as part of a cost-benefit analysis; however, NEPA guidance at 33 CFR Part 325 Appendix B.9 states "[T]he Corps shall not prepare a cost-benefit analysis for projects requiring a Corps permit." The EIS concludes that although there is likely to be some level of impact to aspects of the ecosystem used for commercial fisheries, recreation, and subsistence, the projected magnitude and duration of potential impacts does not involve tradeoffs between uses of the ecosystem. In addition, a cost-benefit analysis will not be conducted. Therefore, the valuation of ecosystem services is not necessary, and the analysis in the EIS was not changed. Impacts to the existing ecosystem, commercial fisheries, and recreation-supported businesses related to the project are discussed in Chapter 4, Environmental Consequences.

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Topic—Subtopic	Statement of Concern	Response
Socioeconomics Impacts—Infrastructure—Adverse	Commenter is concerned that infrastructure improvements (e.g., road, gas lines) would create increased demand for goods and services, which may increase the cost of living.	The anticipated impacts to socioeconomics, both adverse and beneficial, are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. No changes were made to the EIS.
Socioeconomics Impacts—Infrastructure—Beneficial	Commenters are in general support of the project due to the increased infrastructure and potential for lower cost of living. The beneficial impacts could last longer than the expected mine production if the infrastructure stays in place after closure.	Comment acknowledged. Anticipated impacts to socioeconomics, both adverse and beneficial, are discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics. No changes were made to the EIS analysis.
Socioeconomics Impacts—Local Support Policies	Comments are requesting that policies or guarantees be put in place to support local communities through expansion of services, infrastructure development, and/or hiring local workers.	As discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics, PLP has stated an emphasis on hiring local workers. It is anticipated that during operations, 250 people from the local communities would be hired to work at the mine. A study by Loeffler and Schmidt (2017) found that during pre-development activities, communities near the mine site provided a much higher percentage of local labor than more distance communities, such as those in the Dillingham Census Area or other coastal communities. It is anticipated that a similar pattern/distribution of employment would occur with the operation of the mine. PLP has supported training and education programs in Alaska, which would be anticipated to increase the potential opportunities of local community members for employment at the mine. Although PLP has stated an emphasis on hiring local workers, no federal entity has the authority to require PLP to hire locally. As was found through experience with the Red Dog Mine and supported through a study by the LPB, it is anticipated that there would only be a small population increase associated with the project, which would likely be due to a reduction in out-migration as opposed to increased in-migration. Therefore, in most communities, it is unlikely that community infrastructure (e.g., schools, emergency services, health care) would be significantly impacted. Information was added to Section 4.3, Needs and Welfare of the People—Socioeconomics.
Socioeconomics Impacts—Local Workforce	The commenters disagreed with the analysis on the projection of local workforce and/or requested clarification to the text discussing the local workforce. Specific concerns include: Study describing workforce during pre-construction activities was misapplied in the DEIS to describe the impacts to the local workforce during project construction and operation. Local workforce may not have the education or training to take advantage of the jobs at the mine.	As discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics, PLP has stated that its objective is to maximize opportunities for local hire; first, directly to residents of the EIS analysis area, or those with close ties to the area; and then to Alaska residents in general. A study by Loeffler and Schmidt (2017) found that during pre-development activities, communities near the mine site provided a much higher percentage of local labor than more distance communities, such as those in the Dillingham Census Area or other coastal communities. As stated in the EIS, it is anticipated that a similar pattern/distribution of employment would occur with the operation of

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Topic—Subtopic	Statement of Concern	Response
	Local economies would not be able to absorb the benefits of the indirect spending/employment. Requests that a reference to the local workforce in Section 4.4, Environmental Justice, be clarified to state that the local workforce would be 250 workers out of an estimated 2000 for construction.	the mine; specific employment estimates for each community were not provided in the DEIS, nor would they be appropriate. PLP has supported training and education programs in Alaska, which would be anticipated to increase the potential opportunities of local community members for employment at the mine. Section 4.4, Needs and Welfare of the People—Socioeconomics, describes how, through local hire, reduced out-migration, and opportunities for support services, local communities could absorb benefits of indirect impacts. Section 4.4, Environmental Justice, has been edited to state that PLP has estimated that of the 850 workers needed during operations, 250 of them would come from surrounding communities. Similar statements are also presented in Section 4.3, Needs and Welfare of the People—Socioeconomics.
Socioeconomics Impacts—Mineral rights/extraction fees too low	Commenter feels that the mineral rights and extraction fees paid to the State are too low.	Comment acknowledged. The State of Alaska regulates the fees and lease agreements paid by companies for mineral rights and extraction. No changes were made to the EIS.
Socioeconomics Impacts—Population Impacts	A study conducted by the LPB forecasts a small increase in population in the project area as a result of the mine.	Comment acknowledged. The findings of the study conducted by the LPB are consistent with the small population increase associated with the operation of the Red Dog Mine, which also found that the increase was primarily due to a reduction in out-migration as opposed to increased in-migration. Additional text has been added to Section 4.3, Needs and Welfare of the People—Socioeconomics, discussing the impacts to population (including discussion of anticipated population increases from a reduction in out-migration).
Soils—Baseline Data	Concerns were expressed that the baseline data presented in the EIS are incomplete and inadequate to assess potential effects, including chemical and physical impacts, and effects on construction. In particular, concerns were expressed regarding the use of the Exploratory Soil Survey (ESS) of Alaska in lieu of site-specific soil data, lack of analysis for the mine site, transportation corridor, and port sites, lack of identification of permafrost, and lack of a figure highlighting where soil samples were collected and used for analysis in the EIS.	Baseline soils information contained in the EIS, including data from the ESS and site-specific sources, is adequately representative of conditions at the mine site, in the transportation corridor, and at the port sites to support the necessary analysis of alternatives. Native soils are not planned for use in construction of critical containment elements (e.g., dams), and those critical structures are to be constructed on competent subsurface materials; therefore, additional detail on specific soil physical characteristics such as ash content and load-bearing capacity is unnecessary for evaluation of those project elements. Additional field characterization of soils, including characterization of permafrost conditions, is not considered warranted because there is limited to negligible anticipated impact to baseline soil chemistry from the project, and the area is not conducive to permafrost formation. Section 3.14 and Appendix K3.14, Soils, address the occurrence of permafrost. No changes have been made to the EIS as a result of the SOC. See also SOC: Soils—Permafrost Evaluation Insufficient.

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Soils—Construction	Concerns were expressed regarding construction schedule and whether frozen or wet/thawing conditions are considered. Comment expressed concern about ash content of soil and related aluminum deposition in dust.	A general construction schedule is provided in RFI-037, which is referred to in the updated Section 4.14, Soils. Timing of construction requiring earthwork and stream crossings (e.g., installation of bridges, culverts) would be governed by environmental considerations and subject to State of Alaska, ADNR permitting requirements and stipulations. In addition, Section 4.15, Geohazards and Seismic Conditions, under Quality Assurance/Quality Control, explains that a Construction QA/QC Plan would be developed to address construction and operations in accordance with approved designs and specifications. Furthermore, discussion of frost action processes and soil susceptibilities were added to Section 4.14, Soils. NRCS descriptors were also provided for frost action (where available) in Appendix K3.14 for soil types at the mine site and on the transportation corridor (where applicable). See also SOC: Soils—Dispersion Model for Dispersion, for a discussion of aluminum.
Soils—Copper in dust	Comments expressed concern that copper was not included in the fugitive dust constituents of concern for mine site dust dispersion modeling presented in Section 4.14, Soils. Comments expressed concern that there would be copper in the dust generated by project-related vehicle traffic along the transportation corridor (outside the mine site).	The DEIS addressed total potential criteria pollutants and HAPs. Copper is not a criteria pollutant or HAP, and was not modeled for the DEIS. Subsequently, PLP provided maximum modeled deposition results for copper using the same specific areas and time periods modeled for the HAPs deposition table provided in the DEIS (PLP 2019-RFI 009b). Copper in dust model results for the mine site were provided in PLP 2019-RFI 009b, and incorporated into Section 4.14, Soils. Figure 4.14-1 has been added to the EIS to depict dust deposition rate in grams per square meter per year during operations. See SOC: Soils—Fugitive Dust Control Plan for discussion of control of (copper-bearing) concentrate dust at the mine site, and measures to prevent transport of concentrate dust outside the mine site (PLP 2019-RFI 134). See SOC: Soils—Dispersion Model for Dispersion.
Soils—Dispersion Model for Deposition	Comment suggested the dust deposition model should be independently reviewed. Comment expressed concern that inadequate explanation was provided regarding determination of the mine site dust deposition rate, meteorological dataset, and the assumed PM_{10} particle size distribution in the dispersion model for deposition for fugitive dust sources.	The dispersion model for deposition is described in PLP 2018-RFI 009b and provides details regarding the model such as rationale for input (e.g., meteorological dataset), particle size determination, density, and deposition rates for use in the model for deposition. Refer to PLP 2018-RFI 009b for a discussion of the modeling and results. In addition, PLP 2019-RFI 141 provides further explanation regarding the PM_{10} particle size distribution assumed in the dispersion model.

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	Comment expressed concern that detailed information on the dust deposition model was not in the main body of the EIS, but provided in RFI responses or a technical appendix. Comments also suggested explanation of the statement that fugitive dust would be greatest in the summer, and requested including aluminum in the dispersion model for dust deposition.	Placement of technical information in appendices or referenced in available RFI responses is consistent with organization of the EIS as a whole, so the body of the EIS, intended for the general reader, can focus on discussion of results and potential impacts, rather than details of technical analysis. Regarding "independent" review, USACE has independently evaluated information provided by PLP. Further explanation is provided in response to SOC: NEPA Process—Non-Biased Review of EIS Needed. Meteorological data records from nearby monitoring locations and data meet the quality assurance requirements for an on-site meteorological monitoring program and data completeness criteria established under EPA guidance. Section 4.14, Soils, notes wind erosion throughout the project area would likely be greatest during the summer, and is not specific to road dust. The aluminum concentrations are limited to silty sandy loams associated with volcanic ash deposits present in overburden (this is reflected in background concentrations for the mine site, and upland soils along the transportation corridor). Aluminum was not modeled as part of the deposition model, because it is not classified as a HAPs metal, and therefore not required for the analysis. Copper was added to the analysis (see SOC Soils—Copper in Dust). Regarding impacts to soils, sediments, and surface water due to deposition of metals such as aluminum, based on the particulate deposition analysis, it is not anticipated that particulate deposition would be of a magnitude great enough to result in any additional exceedance of soil, sediment, or water quality criteria for aluminum. No specific changes were made to the EIS based on these comments.
Soils—Erosion	Comments expressed concern that Section 4.14, Soils, does not adequately describe methods on preventing, minimizing, and mitigating erosion. Comment noted that the potential for erosion caused by construction along the pipeline corridor on the western side of Cook Inlet was not addressed in the DEIS: sources such as temporary spoils piles, open-cut stream crossings, surface water runoff in exposed trenches, disposal of hydrostatic test water, and potential for frost heave after construction is completed. Comment expressed concern about the term "slight" water erosion hazard in Section 3.14.	Section 4.14, Soils, has been revised to include reference to BMPs and mitigation measures that could prevent, minimize, and mitigate erosion effects (including sediment control) in the transportation corridor and during pipeline construction (e.g., including temporary soil stockpiles) (See Chapter 5, Mitigation). Chapter 5, Table 5-2, lists mitigation measures for erosion and sediment control that would be incorporated into the project. The term "slight" used in the context of severity of potential for water erosion has been explained in Section 4.14, Soils, of the EIS. In Section 4.14, under Soil Quality, Dust Control has been revised to explain that spigoted tailings would be wet, but portions of the tailings

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	Comment noted that Section 4.14, describing the potential for wind erosion of bulk tailings at the bulk TSF, did not include mitigation measures such as spigoted tailings, keeping the tailings wet, and mitigating potential for fugitive dust. Comment raised concern that analysis of impacts from erosion did not account for possible lack of compliance with State of Alaska stormwater pollution and prevention requirements.	beach could be expected to decrease in moisture between spigot discharge locations on a temporal basis. Mitigation measures, such as watering to prevent or reduce fugitive dust at these locations, would be implemented (See Chapter 5). The basis of the analysis for the EIS is the assumption that the Applicant would comply with permit and stipulation requirements, including stormwater pollution prevention plans.
Soils—Fugitive Dust Control Plan	Comments noted concern that airborne dust (fugitive dust) distribution along the transportation corridor and along the pipeline construction corridor was not addressed. Comments noted concern that concentrate dust from the mine site could be adhered to haul truck or other service vehicles that subsequently would deposit concentrate dust along the transportation corridor and port area.	Potential impacts of fugitive dust along the transportation corridor are addressed in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites and Section 4.27, Spill Risk. There was no fugitive dust plume modeling conducted for the transportation corridor. PLP has developed a Conceptual FDCP (PLP 2019-RFI 134) for the project, and committed to implementing BMPs for dust from vehicle traffic on unpaved roads, material handling, and wind erosion at disturbed areas. Section 4.14 has been updated accordingly. Control measures would include truck wash stations at the mine site and port, speed limits, use of approved chemical dust suppressants, and application of water. Section 4.14, Soils, describes typical measures to control dust that would be implemented at the mine site. Chapter 5, Table 5-2, lists the Applicant's mitigation measures that would be incorporated into the project.
Soils—Fugitive Dust Impacts	Concerns were expressed regarding impacts and analysis associated with project fugitive dust along the transportation corridor. Specifically, concerns regarding the potential for airborne contaminants such as selenium, asbestos, arsenic, and vehicle brake dust. Additional concerns were expressed that a dust plume model was not created for the transportation corridor, and that there is no analysis of non-vehicle dust sources, such as quarries, wind-borne erosion material sites, and storage piles along the transportation corridor.	The potential fugitive dust plume was not modeled along the transportation corridor; rather, a corridor of 330 feet on each side of the corridor was assumed to be impacted as described in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites. PLP has committed to mitigating fugitive dust through implementation of the FDCP (conceptual FDCP is provided in PLP 2019-RFI 134), and BMPs and mitigation measures described in Chapter 5. Section 3.14, Soils, includes an expanded discussion of conditions that affect soil susceptibility to wind and hydraulic erosion. Regarding the potential for occurrence of selenium, asbestos, and arsenic in fugitive dust in the transportation and pipeline corridor: 1) See SOC "Geology—Asbestos"; 2) analysis of impacts associated with selenium and arsenic in fugitive dust at the mine site (as a conservative comparison for potential impacts along the transportation corridor) are discussed in Section 4.14, Soils.

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		Brake and Tire Wear: PLP 2019-RFI 007b addresses the concern about brake and tire wear emissions and fugitive dust impacts along the transportation corridor during construction and operation as follows: In December 2003, EPA revised AP-42 Section 13, Equation 1b, subtracting the brake wear and tire wear portion from the emission factor. EPA included a recommendation to use MOVES to generate the fugitive PM emission factor for brake wear and tire wear. EPA did not revise AP-42 Section 13, Equation 1a. As a result, whether emissions due to brake wear and tire wear are included or excluded from AP-42 Section 13, Equation 1a, is unclear. Fugitive PM_{10} and $PM_{2.5}$ emissions from mobile equipment were calculated using AP-42 Section 13, Equation 1a, and were included in PLP 2018-RFI 007. Brake wear and tire wear emission factors were generated in MOVES2014b for on-road equipment. MOVES2014b does not include calculating fugitive PM_{10} and $PM_{2.5}$ emissions from brake wear and tire wear as an option for off-road equipment. Potential annual emissions from brake wear and tire wear were calculated to demonstrate brake wear and tire wear emissions are orders of magnitude smaller than potential annual fugitive emissions presented in PLP 2018-RFI 007. Potential annual fugitive emissions from brake wear and tire wear for on-road equipment are provided in PLP 2019-RFI 007b, Table 1.7 and Table 1.8. As shown in these two tables, the brake wear and tire wear fugitive PM_{10} and $PM_{2.5}$ emissions are three to four orders of magnitude smaller than the potential fugitive PM_{10} and $PM_{2.5}$ emissions due to vehicle movement. Therefore, the fugitive PM_{10} and $PM_{2.5}$ emissions due to brake wear and tire wear, if not already included in AP-42 Section 13, Equation 1a, would not impact the previously calculated potential PM_{10} and $PM_{2.5}$ emissions due to the mobile equipment or the ambient air quality analysis.
Soils—Fugitive Dust Impacts in Post-Closure	Comment suggested text to be added to acknowledge duration of impacts from fugitive dust is expected to last beyond the closure of the mine, because service vehicles could disperse dust over the long-term.	Section 4.14, Soils, has been updated to include a qualitative discussion of potential fugitive dust impacts in closure and post-closure phases.

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Soils—Fugitive Dust Mitigation and Planning	Concerns were expressed regarding the potential range of mine site dust dispersion and mitigation measures. Concern was expressed specifically about dust generated from the "mine grinding" process and truck traffic along the transportation corridors (roads) during construction and operation. Additionally, comments expressed concerns regarding dust control and mitigation measures pertaining to loading of concentrate onto barges at Diamond Point port site.	Additional clarification and information has been added to Section 4.14, Soils, regarding modeled dust dispersion and deposition, including Figure 4.14-1 of the EIS for the mine site during operations. An FDCP has been developed for the project (PLP 2019-RFI 134), and PLP has committed to implementing BMPs for fugitive dust management (See Chapter 5, Mitigation). Mitigation and dust controls for bulk handing of concentrate, loading of concentrate containers, and transport of concentrate containers is described in the FDCP. Concentrate is loaded into cleaned (exterior) containers via a closed conveyer system at the mine site. A similar system would be used for the Diamond Point port location for loading dewatered concentrate into concentrate containers (Alternative 3, concentrate pipeline variant). Dust control measures for loading of concentrate at lightering locations is described in Section 4.27, Spill Risk (Fugitive Dust Control Measures: Copper-Gold Concentrate). The concern expressed about dust from the "mine grinding" appears to refer to the ball mill facility. The grinding (rock crushing) would occur inside ball mills (rotating enclosed cylinders with steel grinding balls), which would be in an enclosed building in the mine site. The enclosed nature of the milling process prevents generation of fugitive dust outside the facility.
Soils—Material Source Characterization	Commenters stated that there was a need for geochemical testing of material sites to be used in road construction.	Based on information provided in PLP 2018-RFI 035, field review of material sites has not indicated that PAG materials are present. If PAG is identified (through geologic observation and characterization of mineralogy) at a material site, another material site would be selected for use in road construction. The road corridor is well outside the mineralized area of the Pebble deposit, and is not expected to contain PAG material. Explanation of methods to evaluate potential for PAG or metals leaching is in Section 4.18, Water and Sediment Quality, under Transportation Corridor. No additional changes have been made to the FEIS for this SOC.
Soils—Permafrost Evaluation Insufficient	Concerns were expressed that baseline surveys in the project area were insufficient to supporting the absence of widespread permafrost or permafrost development as described in Section 3.14, Soils.	Multiple physical surveys have been conducted in the project area using various direct and indirect methodologies. Physical survey results support findings in reviewed literature that wide-spread permafrost occurrence or development does not exist. Physical surveys that directly or indirectly evaluated for the presence of permafrost throughout the project area include, but are not limited to, soil and groundwater thermistor (temperature) profiles, soil test pits, soil borings, and surface and near-surface soil sample locations.

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		As stated in Section 3.14, Soils, "Although such conditions do not preclude the occurrence of small localized areas of permafrost, current conditions do not support permafrost development or wide-spread occurrence." Appendix K3.14.2 further states that permafrost distribution estimates on the western side of Cook Inlet are considered to be isolated occurrences that vary from 0 to 10 percent of the landscape subsurface (Jorgenson et al. 2008). No changes were made to the EIS.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Acid Generation	Commenters questioned the potential for acid generation from spilled concentrate and tailings, and asked for clarification on acid generation rates across variable conditions. Commenters asked that the EIS clarify the potential for acid generation in flowing water, and in lake and intertidal waters where there is significant circulation. Commenters also noted there could be areas where low water levels could expose spilled settled concentrate or tailings to the air, further promoting acid generation.	Acid generation potential from spilled tailings and concentrate is addressed in Section 4.27, Spill Risk. Additional details have been added to Section 4.27 to augment the discussion. The section states that "A small amount of oxygen gas can be held in flowing water [compared to oxygen in the air], and almost no oxygen gas would be present in still water." The section acknowledges that unrecovered spilled tailings or concentrate could generate acid in area streams, but that the timescale of the acid generation, in conjunction with heavy dilution from stream water, would likely not cause exceedance of water quality criteria. Estimates of the onset of acid generation vary with conditions between field and laboratory conditions. Due to the cold climate in the project area, acid generation would be expected to be relatively slow, because frozen conditions for most of the year retard this chemical processes. Particle size also plays a role in this chemical process. Fine particles such as tailings and concentrate have a large surface area relative to their size, and therefore can be chemically reactive on a faster time scale than larger exposures of rock. Section 4.27, Spill Risk, uses a conservative estimate of "years to decades" for the onset of acid generation. Text was added to Section 4.27 noting the average levels of dissolved oxygen (DO) in local streams, as well as noting that circulating lake water and intertidal waters can be well oxygenated, and can therefore contribute to generation of acid from spilled concentrate or tailings. Text was also added to the EIS stating that in areas where water levels drop seasonally, some concentrate could be exposed to the air for part of the year, increasing the potential for acid generation. These additions to the text do not modify the impacts analysis. After a spill, the Applicant could monitor downstream water quality. If lower pH (elevated acid) was detected downstream of the spill site, additional dredging of impacted sediment could be carried out to remove additional spilled materials.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate—Red Dog Mine data	Commenters noted that the volume of concentrate that could spill from the Applicant's hauling method by triple-trailers would be much greater than the volume likely to spill at Red Dog Mine, where fewer trailers are used, and suggested that Red Dog is not a valid data analogue for concentrate spills. Comments also questioned the citation of ADEC Red Dog spill data, and noted that spills that occurred prior to 1995 are not included in the ADEC spills database. There was also a comment questioning the calculation of the spill rate applied for the concentrate truck rollover scenario.	Transport of concentrate by truck at Red Dog is cited as an example/ data analogue of concentrate transport by truck in Alaska, as described in Section 4.27, Spill Risk. No changes were made to the EIS regarding use of these data. Concentrate is not hauled by truck in three separate trailers at Red Dog, as has been proposed by the Applicant. The USACE recognizes that the Red Dog operation is distinct from the Applicant's operation. The probability of a spill from Red Dog concentrate trucks is not stated as being equal to the probability of a spill at the project. Red Dog Mine concentrate spills addressed in Section 4.27 are spills from trucking mishaps. ADEC Spills database reports full recovery (in pounds of spilled concentrate)/no ongoing investigation for most documented concentrate spills from trucks onto land. The EIS states that spills that occurred prior to 1995 are not included in the ADEC spills database. Calculations of the spill rate have been verified. Fugitive dust releases are addressed in the SOC Spill Risk (Fuel/ Natural Gas/Concentrate/Reagents)—Fugitive Dust Impacts.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Pipeline	Commenters expressed concern about spills from the concentrate pipeline and downstream impacts, stating that the EIS does not adequately assess the potential impacts. Commenters had specific requests for additions to the EIS, including: • Analysis of larger spill volumes in the concentrate pipeline release scenario. • Details on the effectiveness of the leak detection system and the speed of closing isolation valves, especially in an earthquake. • Clarification on the difference between spill impacts from the "dry" concentrate solids and the concentrate slurry. • Clarification of failure rates for concentrate pipelines versus oil and gas pipelines. • Details on the probability of pipeline failure over time, with adjusted failure rates based on the corrosive nature of the concentrate.	Potential impacts of spills from the concentrate pipeline are addressed in Section 4.27, Spill Risk. This section has been augmented with additional details on the concentrate pipeline. The potential volume of concentrate that could be spilled from a pipeline rupture is minimized by the narrow-diameter pipeline (6.25 inches), as well as the use of an automated leak detection system and manual isolation valves, which would be no more than 20 miles apart, as well as on both sides of bridge crossings, where the pipeline is attached to bridge infrastructure. Text in Section 4.27 was clarified regarding the 5-minute shut-off of the concentrate flow in the pipeline. The automated leak detection system would detect the leak, at which point it would take approximately 1 minute to shut off the pumps feeding the concentrate into the pipeline. This would reduce the pressure of the flow of concentrate in the pipeline, so that the slurry would likely not readily flow out of the pipe for more than approximately 5 minutes. It would then require approximately 30 minutes for personnel to respond on the scene and close the surrounding manual isolation valves. The release volume in the scenario accounts for residual concentrate that may initially remain

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	• Details about the liner of the concentrate pipeline, and its resistance to corrosion.	in the pipe and continue to be released. The USACE acknowledges that if the automated leak detection system were to fail, then the volume of release could be significantly larger. Section 4.27 describes the different fate and behavior of dry concentrate solids and concentrate slurry, and analyses impacts from both substances. There are limited data on failure rates of concentrate pipelines, so failure rates for oil and gas pipelines are used as a proxy. Text in Section 4.27 has been augmented to address this. The corrosive nature of concentrate slurry would be mitigated by the use of an internal high-density polyethylene liner to prevent internal corrosion, as well as heavy wall pipe or casing for the aboveground sections (PLP 2018-RFI 066), which would reduce the failure rate. A concentrate pipeline would not contain concentrate slurry in perpetuity, but only during active mine operations. Pipeline would use new specialized pipe expected to maintain full integrity during the operational life of the mine. Section 4.27 states that "The 6.25-inch steel pipeline would contain an internal high-density polyethylene liner to prevent internal corrosion." Text was added to Section 4.27 to clarify the corrosive nature of the concentrate slurry.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Recovery	Comments were received requesting more details on how concentrate recovery would be accomplished, including clarification of on-land/in-water recovery efforts; differences in recovery of dry concentrate spills and concentrate slurry spills; and recovery under adverse environmental conditions such as heavy rain, snow, and wind that could spread fugitive dust from the spilled concentrate. Comments also noted that recovery efforts could have additional impacts. Some comments requested analysis of impacts assuming no recovery of spilled concentrate.	The recovery of spilled concentrate is addressed in Section 4.27, Spill Risk. Text has been augmented with additional details on concentrate spills and recovery. Recovery of spilled concentrate on land would be straightforward, with any spilled concentrate recovered back into the containers by heavy equipment. Data from Red Dog Mine suggest that most concentrate spills on land are fully recovered (although these data do not account for dust release prior to recovery). Recovery of dry concentrate and concentrate slurry spilled on land would be similar. Spills of either dry concentrate or concentrate slurry that enter waterbodies, especially flowing water, would be difficult to impossible to recover, because concentrate could be dispersed downstream. The following text was added to the EIS to define "in-water" recovery efforts: "In-water recovery efforts refer to dredging/excavating of spilled concentrate within waterbodies." The EIS notes that recovery efforts would vary seasonally, and addresses recovery during frozen conditions. The following text was

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		added to the EIS: "Recovery efforts under adverse environmental conditions such as heavy rain or snow could complicate recovery, and strong winds could spread fugitive dust from the spilled concentrate prior to recovery." The EIS states that dredging of streambeds to remove spilled concentrate could be damaging to the habitat, and may not be justified. The impacts analysis in Section 4.27 acknowledges that recovery of spilled concentrate that has entered flowing water would be difficult to impossible. Text describing the dry concentrate truck spill scenario has been clarified to note that only a small portion of spilled concentrate would enter flowing water. In the concentrate pipeline spill scenario, all of the released concentrate slurry enters a stream below the pipeline.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Spill—Seasonal conditions	Commenters have expressed concern about the fate of spilled concentrate during various seasonal conditions, including: • Seasonal changes in water levels • Concentrate spill on frozen waterbodies, suggesting that it may not collect on ice and be easily recovered; but rather, spilled concentrate could break through ice into the waterbody below.	Concentrate spill scenarios are addressed in Section 4.27, Spill Risk. Seasonal changes in water levels are addressed in Section 4.16, Surface Water Hydrology; and summarized where relevant in Section 4.27. Impacts were considered across a wide range of water levels. High water levels would cause more dilution and mobilization of spilled concentrate, while low water levels would result in lower dilution, but potentially aid in recovery of spilled concentrate. Very low water levels/dry conditions could periodically leave residual concentrate exposed to the air, which would increase the potential for acid generation from oxidation of sulfide minerals. Text in Section 4.27 has been expanded to note this. Text has been added to Section 4.27 noting that in some situations, spilled concentrate could penetrate ice on a frozen waterbody, allowing concentrate to spill into the waterbody below.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate spill downstream impacts	Concerns were expressed that impacts of metals leaching and acid generation (including reactivity in porewater), elevated Total Suspended Solids (TSS), and fugitive dust from concentrate spills are not adequately described, and/or are underestimated in the EIS; particularly the impacts to an *enclosed* waterbody. Comments questioned the stated short duration of impacts to fish, including how fish eggs could be smothered by concentrate with no impact to downstream fish harvest. Commenters specifically requested consideration of lethal/sublethal and indirect effects of metals on fish.	Potential impacts of a concentrate spill are addressed in Section 4.27, Spill Risk. Section 4.27 has been augmented to provide additional detail on potential impacts of a concentrate spill. The EIS states that unrecovered concentrate spilled into an enclosed waterbody (i.e., a waterbody or wetland that would not experience the natural flushing that would occur in a stream) could generate metals and acid over years to decades that could cause exceedances in water quality criteria, which could in turn impact aquatic organisms. If spilled into a small enclosed waterbody, such as a pond, recovery of concentrate would likely be effective. If spilled into a large enclosed waterbody, such as Iliamna Lake, any acid generated or metals

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		leached would be so heavily diluted it would not be expected to result in exceedances of water quality criteria. Concentrate that buries fish eggs would likely smother the eggs, but this impact would be localized, and would not be expected to have measurable impacts on downstream fish harvest in subsequent runs. Text in Section 4.24, Fish Values, and Section 4.27, Spill Risk, has been augmented to further address the potential impacts of metals on fish.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Spill Response Plan	Concerns were expressed that the response plan for a potential spill of concentrate is inadequate, and that a draft spill response plan be included or referenced in the EIS. Comments also requested that the EIS include information on how BMPs could help minimize impacts from spills and spill recovery.	The USACE acknowledges that no detailed information is provided on a concentrate spill response plan, because the Applicant has not provided any plan at this point. General spill response procedures are outlined in Section 4.27, Spill Risk. Minor clarifications have been added to the text regarding concentrate spills and recovery. See also SOC "Spill Risk (Fuel/Natural Gas/Concentrate/Reagents)—Concentrate Recovery."
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Spills—Cumulative Impacts	Commenters requested consideration of the cumulative impacts of multiple unrecoverable concentrate spills during the life of the project.	Impacts of concentrate spills are addressed in Section 4.27, Spill Risk. Minor clarifications were added to the text. As stated in the EIS, concentrate spilled into streams may not be recoverable, because the very fine-grained material may be readily flushed downstream. Also as stated in the EIS, unrecovered concentrate could generate metals and acid on a timescale of years to decades. Natural dilution would likely maintain acid and metals levels below water quality criteria exceedance, though this would be dependent on site-specific conditions. These same impact parameters would apply for multiple spills of concentrate throughout the life of the project; however, multiple high-volume spills would be more likely to cause exceedances of water quality criteria. Mitigation measures could include long-term downstream monitoring of water quality, which could identify areas in a waterbody where spilled concentrate may be generating metals or acid. These areas could be dredged/excavated to remove concentrate, although these recovery efforts may cause additional impacts.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Spills Impacts Analysis/ Modeling	Commenters have stated that the impacts analysis of concentrate spills is too qualitative, and some commenters have requested quantitative modeling of concentrate spill scenarios. Commenters have stated that the analysis does not provide enough specific detail, such as variable water flow and stream velocity. Commenters have requested more details on spill impacts, particularly for spills along the road corridor, on Iliamna Lake, and at the port, and spills to wetlands.	Section 4.27, Spill Risk, addresses potential impacts of spilled concentrate. Quantitative modeling of a concentrate release was not conducted due to the limited volumes of potential concentrate spills, as compared to a larger-volume tailings release. The potential volume of concentrate that could be spilled from a truck rollover is constrained by the volume transported, which would be a maximum of 228,000 pounds of concentrate in three containers/on three trailers. In the event that a concentrate haul truck rolled over, it is very unlikely that all the concentrate would spill out of the containers, due to the locking lids, as well as the physical behavior of the dense fine sediment. In the scenario of a spill of 80,000 pounds of concentrate from a truck rollover, it is highly unlikely that all of the spilled concentrate would enter a stream. Most of the spilled concentrate would likely be adjacent to the truck along the roadside. The potential volume of concentrate that could be spilled from a pipeline rupture is minimized by the narrow-diameter pipeline (6.25 inches), the use of an automated leak detection system, and manual isolation valves, which would be no more than 20 miles apart. The specific impacts analyzed are for the two concentrate spill scenarios addressed. The scenarios are not specific to one location or season, because impacts are analyzed for a wide range of different waterbodies, stream sizes, water levels, seasonal conditions, etc. Additional information is provided on general fate and behavior of concentrate that is released into the environment. The EIS acknowledges that impacts would be more severe in the event that a large-volume spill was not recovered. Potential impacts from metals leaching and acid generation are addressed in Section 4.27, including the potential for metals toxicity. Text has been expanded for clarification, but no additional quantitative analysis was added to Section 4.27. The section on potential impacts to wetlands has been augmented.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Spills in Kamishak Bay	Commenters have stated that the EIS lacks sufficient information on the impact of a concentrate spill in Kamishak Bay, including the nearshore/intertidal environment, and the spill response. Commenters stated that sedimentation, metals leaching, and acid generation could have impacts on wildlife in the area, noting that intertidal waters can be well-oxygenated, contributing to acid generation from sulfide oxidation. Commenters also noted that there could be economic impacts of such a spill based on the perception of the quality and the value of seafood produced in this region.	Concentrate spills in Kamishak Bay are addressed in Section 4.27, Spill Risk, under "Marine Vessel Concentrate Release." Text in this section has been modified to clarify potential for recovery of different-sized spills. A concentrate spill in Kamishak Bay could potentially be recovered to some extent, because water depths in the area are shallow. However, the material would be very fine-grained, and readily mobilized by waves, tides, and currents, so that any concentrate spill recovery in Kamishak Bay would be a partial recovery only. A spill of concentrate into Kamishak Bay would introduce fine sediment into the Bay, which would be dispersed by waves, tides, and currents. Spilled concentrate would have the potential to generate acid and leach metals over years to decades. Text has been augmented to note that shallow, intertidal waters can be well oxygenated, which would facilitate the generation of acid from spilled concentrate. Constant dilution and mixing of marine waters, combined with the slow rates of acid generation and metals leaching, would limit these potential impacts on water quality, fish, and wildlife. The EIS does not analyze the economic impacts of a concentrate spill into Kamishak Bay. Perception of the quality and the value of seafood produced in this region could be impacted by such a spill. The State of Alaska has temporarily closed fisheries when spill events threatened seafood quality.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Concentrate Transport	Commenters expressed concern about concentrate spills during transport from the mine site to the marine vessels by way of trucks, ferry, and barges. The potential for concentrate dust release, especially in Cook Inlet, was a particular concern; comments suggested that additional meteorological data are necessary to analyze potential dust impacts. Comments asked for additional details on the design of the concentrate shipping containers, the process for loading concentrate into the marine vessels, and proper distribution of concentrate into the cargo holds for ship stability. Some commenters also suggested including spill statistics from Greens Creek mine, where ore concentrate is transported by truck.	Section 4.27, Spill Risk, describes the Applicant's spill prevention measures, including specialized concentrate containers with locking lids. The container lids would be locked at the mine site, and the containers would not be unlocked until the container is overturned deep in the ship's hold. Containers would employ a locking mechanism to lock them in place on trucks, ferry, and barges. The potential for concentrate dust release in Cook Inlet is also addressed in Section 4.27. See the SOC "Soils—Dispersion Model for Deposition" and RFI 009b for discussion of meteorological dataset relevant to fugitive dust impacts. Text has been expanded in Section 4.27 to clarify the space available for concentrate containers to be lowered to sufficient depth in the hold of the bulk vessel prior to overturning and lid release. The operators would allow concentrate to fall less than 10 feet in the ship's hold to reduce the

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		generation of fugitive dust. Concentrate would be distributed in the hold to maintain ship stability, and the moisture content of the concentrate would be controlled to prevent liquefaction of the cargo. The EIS cites concentrate transport at Red Dog Mine as an example, where concentrate is also transported by truck.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Cultural Resources Analysis	Comments were received requesting inclusion of spill impact assessments on cultural resources in the EIS, as was done for other recent EISs.	Section 4.27, Spill Risk, has been expanded to evaluate potential impacts to cultural resources from spills.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Cumulative impacts of spills	Commenters expressed concern that the EIS did not address the cumulative impacts of multiple and/or simultaneous spills of materials over the life of the project. Other commenters asked for additional details on spill quantities and magnitudes of impacts for a more quantitative analysis of cumulative impacts. More details were requested on potential for corrosion of the concentrate pipeline during the expanded mine scenario.	Cumulative impacts sections have been expanded throughout the EIS. The cumulative impacts of small-volume, high-probability spills are addressed in the relevant resource sections (Section 4.14, Soils and Section 4.18, Water and Sediment Quality) as part of the Pebble Mine Expansion RFFA. The cumulative impacts of low-probability, higher-volume spill events are addressed in Section 4.27, Spill Risk, as part of the Pebble Mine Expansion RFFA. Because spills (unintended releases) associated with project construction and operation are not a planned or routine event, they are not typically analyzed for cumulative effects as an element of a specific RFFA, other than the expanded mine RFFA. No quantitative information on the mode of failure, probability, and volume of potential spills associated with other RFFAs is available, or is based on assumptions that are not relevant or have not been substantiated. The cumulative effects of unintentional releases associated with Pebble Mine Expansion would be similar to those already addressed in Section 4.27 with regard to the potential method of failure, likelihood, behavior, and response. However, they would potentially involve larger volumes over a slightly larger geographic area. The cumulative impacts analysis is qualitative, not quantitative, because it is based on potential hypothetical scenarios. It would be speculative to discuss specific probability or volumes of a potential spill associated with the expanded mine development scenario. Additional information was added to Section 4.27 on the potential for corrosion of the concentrate pipeline during the expanded mine scenario.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel Fate and Behavior	Comments requested that the diesel fuel fate and behavior section consider more environmentally relevant conditions for Alaska, including the persistence and evaporation of diesel, the rate of microbial degradation, the likelihood of diesel permeating soil surfaces, and fuel dispersion in frozen waterbodies.	Fate and behavior of spilled diesel is addressed in Section 4.27, Spill Risk, and considers relevant cold climate conditions. • The EIS provides data on evaporation and dispersion rates for winter and summer conditions, and provides rates specific to cold water. • The EIS acknowledges that the rate of microbial breakdown would vary locally, and would be a slower process in cold climates. • The EIS also states that that during frozen conditions, diesel is more likely to pool up on frozen ground and frozen waterbody surfaces; that diesel can permeate into frozen materials to a limited depth; and that snow may slow the spread of spilled diesel on land. • The individual impacts sections for each resource also consider seasonal variation. No changes were made to the EIS regarding diesel fate and behavior.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel spill impacts	Commenters stated that diesel spill impacts to various resources may be lacking or underestimated in the EIS, and that the EIS needs to more fully address topics including: Components of diesel that could persist after most fuel has evaporated. Entrainment of diesel components in turbulent water. Analysis of impacts assuming a maximum spread of diesel/ maximum extent of sheen. Impacts when diesel is not recovered. Economic impacts of a marine diesel spill based on the perception of the quality and the value of seafood produced in this region. Inclusion of Environmental Sensitivity Index data. Analysis of spill from a diesel pipeline in shallow groundwater and waterbodies.	Potential impacts of diesel spills are addressed in Section 4.27, Spill Risk. Text in Section 4.27 has been expanded to address: • Components of diesel that could persist after most fuel has evaporated; • The potential for entrainment of diesel components in turbulent water; • A reference to Environmental Sensitivity Index data that were reviewed for the impacts analysis; and • Potential economic impacts of a marine diesel spill based on the perception of the quality and the value of seafood produced in this region. The analysis of impacts for the marine diesel spill considered a reasonable spread of diesel/extent of sheen based on previous modeling efforts (SLR 2018). The EIS analyzes impacts based on a reasonably expected spill response, and cannot assume no response, because this is very improbable. The EIS, however, acknowledges that much of the diesel would evaporate or dissipate prior to recovery, and this is considered in the impacts analysis. The cumulative effects analysis in Section 4.27 addresses impacts of a spill from a diesel pipeline.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel spill impacts to fish	Commenters requested coverage of impacts to marine larval transport, which would require information on currents. Commenters noted that the EIS analysis does not recognize that diesel spilled into a typical stream in the project site is likely to be entrained into the water column via water turbulence (e.g., at stream riffles), and that components of diesel, when entrained into the water column, are known to be highly toxic, particularly to early life-stages of fish, such as eggs and sac-fry.	Discussion of potential impacts of a diesel spill on fish and aquatic resources has been augmented in Section 4.27, Spill Risk. Scientific literature on diesel spill impacts documents uncertainty regarding laboratory versus field exposures. Spill prevention and response actions described in Section 4.27 would reduce volume and exposure times. As stated in the EIS, there is potential for injury and mortality to local fish and invertebrate communities.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel spill probability	Commenters requested that the EIS acknowledge that diesel spills will occur on a regular basis. Commenters questioned the spill rates used in calculating diesel spill probability, and suggested analyzing spills of various size classes. Commenters also stated that probability of diesel spills in Kamishak Bay did not consider increased vessel traffic. Various comments were received on the use of historical diesel spill data, including: Suggested use of historical data to estimate the frequency and magnitude of diesel spills that may occur based on the quantities estimated to be transported and used in the project. Suggested use of spill data from the Pile Bay to Williamsport-Pile Bay Road. Historic spills are likely under-reported, to the extent that using historic data leads to underestimates of spill probability. Suggested use of diesel spill data from Red Dog mine, due to similarities with a shallow port with offshore mooring sites, lightering boats, and challenging conditions. The unprecedented scale and aerial extent of the project and remote nature of the areas affected do not lend themselves to comparison to other existing or historic projects in Alaska.	High-probability, low-volume diesel spills during operations are addressed where relevant in individual resource sections throughout the EIS. Section 4.27, Spill Risk, addresses low-probability, high-volume diesel spills. The EIS acknowledges that diesel spills are a common occurrence around the world. No changes were made to the EIS. Spill risk data used in Section 4.27 include historical data, site-specific studies, and project-specific information. Cook Inlet diesel spill rates were selected as the most site-specific data available. Text has been added to Section 4.27 noting that marine diesel spill incident rate data were based on spill risk in Cook Inlet, and are not specific to Kamishak Bay; and that Kamishak Bay may have varied spill risk compared to Cook Inlet as a whole. A large size class marine spill scenario was selected to address a greater extent, magnitude, and duration of potential impacts than would analysis of smaller spills. No changes were made to the document. Marine diesel spill rates used in Section 4.27 were determined based largely on Cook Inlet data. Text was expanded to note that Kamishak Bay would have different vessel traffic patterns than Cook Inlet under the project. Diesel fuel barges would arrive in Kamishak Bay four times per year. Comments on the use of historical data were reviewed, but no changes were made to the document.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel Spill Response	Commenters requested more details on diesel spill response, including adequacy of response equipment; adequacy of spill response training of operations staff; how spill response would occur under challenging weather conditions (e.g., diesel spill on frozen streams, marine and lake ice, high winds and waves, snow, etc.); enforcement/Applicant liability for the cleanup; details on shoreline cleanup; details on State versus Federal regulation for cleanup; and capability to rehabilitate wildlife that may be oiled. Comments were also received requesting specific additions to the EIS text.	Diesel Spill Response is addressed in Section 4.27, Spill Risk. Section 4.27 has been expanded with additional spill response details. Complete spill response plans are not required by NEPA for impacts analysis, but would be required prior to the start of construction/ operations. Suggested text edits were considered, and incorporated into the EIS as appropriate.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel spill scenarios	Various comments suggested additions and revisions to the diesel spill scenarios analyzed, including: • Analysis of smaller spills, because statistically, smaller spills are more frequent than larger spills. • Comments state that by addressing only large spills, the EIS underestimates the probability of spills. • Analysis of diesel spills from the ferry, at the port, and at a tank farm. • Analysis of a spill from overfill of tanks. • Analysis of impacts of the sinking of a vessel loaded with diesel. • Analysis of larger diesel spills. • More emphasis on scenarios in adverse winter weather conditions, including frozen streams. • Analysis of spills of heavy fuels and other chemicals used by vessels. • Analysis of spills from a wider variety of vessels. • Analysis of different types of beach substrate (e.g., sand, gravel.) • Quantitative modeling of diesel behavior, such as entrainment and dissipation, in the spill scenarios. • Analysis used to select scenarios for evaluation should be presented. • Commenters noted that the analyzed scenarios are not relevant across all alternatives.	Diesel spill scenarios are addressed in Section 4.27, Spill Risk. The EIS acknowledges that small spills are more frequent, while large spills are less common. The USACE selected large diesel spills with low probability as a conservative measure to cover the wide range of potential impacts from diesel spills. Due to mitigation measures, including use of double-hulled vessels, the probability of a vessel full of diesel sinking is so low as to be considered worst-case scenario, and not required for NEPA analysis. See "Mitigation/Avoidance and Minimization" under Diesel Spills in Section 4.27 for further details. It is beyond the scope of NEPA for an EIS to address multiple hypothetical spill scenarios for each substance across each possible alternative. Acknowledgement of additional diesel spill scenarios was added to the EIS, but no additional scenarios were analyzed.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel transport by Marine Vessel	Comments were received with suggestions on mitigation, such as use of double-hulled vessels and compliance with OPA 90 requirements, to reduce the risk of diesel spills into marine waters. One comment suggested that tug-barges carry emergency tow gear. Other commenters requested more information on mitigation-related design features of the marine tug-barges, such as use of electronic chart display and information systems, or automatic identification systems, to enhance collision prevention. Commenters had requests for descriptions of the typical causes of tug-barge incidents, as well as questions regarding ownership of marine tug-barges to be used in the project.	Mitigation measures to reduce the risk of diesel spills by marine vessels are listed in Section 4.27, Spill Risk, including the use of double-hulled vessels, water-tight compartments, use of marine radar, etc. No changes were made to the document.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Diesel transport by Truck	Commenters noted that the potential for diesel spills along the road corridor is higher than what is stated in the EIS, citing the large-scale and remote nature of the project; past diesel spills from trucks in the area; and the Applicant's use of three trailers per truck. Commenters also suggested that the potential impacts of the diesel spill scenarios are understated in the EIS. Commenters also requested more information on conditions on the Dalton Highway (a diesel truck transport data analogue), to better compare estimates of spills and spill recovery; the steel frames of the International Organization for Standardization (ISO) tanks, and whether ISO tanks are leak-proof; and risk analysis for each individual stream crossing from Kokhanok to Amakdedori.	Diesel transport by truck on the road corridor is addressed in Section 4.27, Spill Risk. The probability of diesel spills was calculated based on historical diesel spill data and project-specific information. AECOM 2019a provides full details on calculated spill rates. Triple trailer loads are uncommon in Alaska; therefore, incident data are not available. Incident rates for the triple trailer loads may not be directly comparable to incident rates for trucks hauling single or double trailers. Text was expanded to acknowledge that the use of triple trailers may increase spill risk compared to single or double trailers. Information on conditions on the Dalton Highway was expanded in Section 4.27. Steel frames would protect the internal ISO tanks. No storage mechanism can be guaranteed "leak proof," but ISO tanks are considered the industry standard, and the most robust storage/ transport method available. Risk analysis for diesel spills from haul trucks was conducted for the road corridor. Limited data are available for individual stream crossings along the road corridor; therefore, potential impacts are described in general for various types of waterbodies that may be intersected by the road.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Failure of water treatment systems	Comments requested that the EIS analyze potential impacts from contaminated water that bypasses water treatment systems.	Water treatment systems are addressed in Section 4.18, Water and Sediment Quality. As described in Section 4.18, if the water treatment system has unexpectedly high volumes to process, or if there is a failure of the water treatment system, untreated contact water would be pumped into the main WMP. The main WMP has very high capacity (freeboard) for additional/emergency storage. Section 4.17, Groundwater, and Section 4.18, Water and Sediment Quality, have been augmented to more fully address potential seepage of untreated contact water.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Fugitive Dust Impacts	Comments stated that the impacts of fugitive dust from a concentrate spill were understated in the EIS. Comments suggested that the EIS analyze impacts from release of fugitive dust during bulk carrier loading operations. Commenters also noted the fugitive dust released from concentrate haul trucks along the transportation corridor at the Red Dog Mine.	Probability of and potential impacts from release of concentrate-generated fugitive dust are addressed in Section 4.27, Spill Risk. Section 4.27 has been augmented with additional details on fugitive dust mitigation measures. The Applicant has proposed transporting concentrate in specialized containers with locking lids specifically designed for the mining industry that would greatly minimize potential for release of fugitive dust along the road corridor. During loading of bulk carriers, containers would not be opened until they are deep in the ship's hold, greatly reducing the potential for escape of fugitive dust. See Section 4.27 for complete details on mitigation measures. The impact of a fugitive dust release from a concentrate spill on land would be temporary, and limited in spatial extent because the concentrate would be cleaned up. The EIS notes that spilled concentrate would be moist, which would reduce dust generation. The EIS acknowledges that some spilled concentrate may be circulated by wind prior to recovery. Concentrate spilled into water would not generate dust, and is addressed in Section 4.27. As described in Section 4.27, documentation of concentrate spills on the road corridor at Red Dog Mine shows that most concentrate spills onto land are fully recovered, while spills into water may have lower rates of recovery. The USACE acknowledges that the release of fugitive dust from concentrate trucks along the Red Dog Mine transportation corridor resulted in adverse environmental impacts. Red Dog Mine began the process of transporting concentrate in uncovered loads in 1989, thereby releasing significant metal-laden dust until the operation began to cover loads of concentrate in 2002. The Applicant would not haul concentrate in uncovered loads, and would use a wide variety of mitigation measures to avoid fugitive dust release, as outlined in Section 4.27.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Fugitive Dust Mitigation and Planning	Concerns were expressed that particles of concentrate dust could escape from the concentrate containers as they were overturned into the holds of the marine vessels, and that the fugitive dust control measures would be susceptible to human error, equipment function/maintenance issues, and weather issues. Comments suggested that a more robust fugitive dust prevention approach be required.	Section 4.27, Spill Risk, has been expanded to provide more details on the mitigation measures/design features that would be employed to avoid/minimize generation of fugitive dust. The copper-gold concentrate would be moist (8 percent moisture), which would help to reduce dust generation. The concentrate containers would have locking lids that would only be opened once the containers are lowered deep in the ship's hold. Section 4.27 text has been expanded to describe that crane operators would be responsible for lowering the container deep enough into the hold so that the concentrate falls less than 10 feet, and the discharge elevation would be 20 feet or more below the hatch. See RFI 009c for more information on concentrate loading. A Conceptual FDCP has been developed for the project (PLP 2019-RFI 134), and BMPs would be implemented for fugitive dust management.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Metals Toxicity	Commenters requested more information on toxicity of metals, particularly copper, and the impacts of copper and other potentially leached metals from an unrecoverable concentrate spill to fish and aquatic organisms, including discussions of chemical factors affecting toxicity (e.g., valence state, levels of dissolved oxygen, pH, concentration of dissolved and particulate organic carbon; and buffering capacity); modeling to predict bioavailable copper concentrations in water and fish from an unrecovered concentrate spill (e.g., EPA's Biotic Ligand Model) in streams, lakes, wetlands, Iliamna Lake, and Cook Inlet.	Potential toxicity of metals from an unrecovered spill of concentrate is addressed in Section 4.27, Spill Risk. A range of toxicological effects to individual fish due to metals and other pollutants has been reported in the literature, but implications of each toxic mode of action remain unclear with respect to population-level impacts. Typically, only the apical endpoints such as survival, growth, and reproduction are used in regulatory ecological risk assessments. Due to its significance on homing capabilities of salmon, fish olfactory impairment due to copper has been addressed in Section 4.24, Fish Values, and those discussions have been augmented by inclusion of more recent literature. Potential impacts through bioaccumulative metals (such as mercury, selenium, and cadmium) by fish and other wildlife have also been discussed, as applicable.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Mitigation	Comments were received questioning the mitigation measures that would be in place to avoid spills and minimize spill impacts.	Mitigation for avoidance and minimization of spills is addressed in Section 4.27, Spill Risk, and covers detailed design features for storage and transport of diesel, concentrate, natural gas, and reagents. The Applicant has committed to design features, including specialized tanks for storage and transport; specialty lids and locking mechanisms on containers; secondary containment; ice-rated and double-hulled marine vessels; pipeline leak detection systems; and specialized staff training. Some additions to mitigation measures have been made in Section 4.27. Information on avoidance and minimization of spills has also been augmented in Chapter 5, Mitigation.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Molybdenum concentrate	Commenters stated that impacts of molybdenum along the road corridor are underestimated because a spill of molybdenum concentrate is not addressed.	Section 4.27, Spill Risk, addresses the fate and behavior of spilled molybdenum concentrate, including the potential for sedimentation and TSS, fugitive dust generation, acid generation, and metals leaching. Molybdenum concentrate would comprise approximately 2.5 percent of the project's total concentrate, and therefore would be subject to a much lower potential for a spill. Additionally, it would be transported in secondary containment, and in much smaller volumes than the copper-gold concentrate, so that the probability of a significant spill is very low. Therefore, a spill of molybdenum concentrate is not fully analyzed in detail, as was done for copper-gold concentrate. No changes were made to the EIS.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—More quantitative analysis of spills impacts	Comments were received requesting more thorough and quantitative analysis of spills impacts, better statistical analysis to determine spill rates, and more statistics to support statements in the Spill Risk section. Comments stated that spill risks were not fully evaluated for Iliamna Lake, Cook Inlet (especially the port and lightering operations locales), transfer points between transportation modes, storage facilities, and the transportation corridors, including alternatives.	Potential impacts of various spills are addressed in Section 4.27, Spill Risk. Portions of Section 4.27 have been augmented to provide more detail, as available; however, no additional quantitative analysis has been added to the section. Quantitative analysis (modeling) was conducted for releases of tailings and untreated contact water, due to scoping concern and the potential for high-volume releases. Spills of most other materials would be limited in volume, and impacts would therefore be minimized and localized (with the exception of the marine diesel spill scenario). It is beyond the scope of NEPA to conduct quantitative modeling for all possible spill scenarios. Spill scenarios for tailings releases were selected by a Failure Modes and Effects Analysis workshop, as outlined in Section 4.27. Spill scenarios for other substances were selected to disclose potential impacts of the more common types of historic spills. Although spill risks were not fully evaluated for every potential locale and spill scenario, the probability analysis of spill risk in the EIS is appropriate for NEPA-level impacts analysis.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—NaHS	Comments noted that the EIS text contained an error stating that decomposition products of sodium hydrogen sulfide (NaHS) are nitrogen oxides and sulfur oxides, when in fact the decomposition products are sodium oxides and sulfur oxides. Another comment requested that the EIS consider impacts from NaHS that could break down into H_2S.	Text in Section 4.27, Spill Risk, has been revised to correct the error, and now states "The decomposition products include sodium oxides and sulfur oxides (Cayman Chemical Company, 2013)." Text in 4.27 has been added stating that NaHS can break down into H_2S when pH is more acidic than neutral, and that H_2S is highly toxic to fish. Text has been expanded to further address the presence of residual reagents in both concentrate and tailings.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Natural Gas Release	Comments have expressed concern about the impacts of natural gas leaks or releases from the pipeline, particularly the impact on fish and aquatic resources in Cook Inlet or Iliamna Lake, including cumulative impacts. Of specific concern is methane release to the atmosphere, and dissolved methane creating an oxygen-depleted area in the water near the spill. Some comments suggested that the impacts analysis in the EIS was understated, and that impacts could be longer in duration, and could include health and safety concerns. Commenters stated that if there were a pipe explosion, control of adjacent pipes would be lost, and large areas could be contaminated. Concerns were also raised about the ability to repair leaks in a timely manner, citing the long-term gas leak from the Hilcorp pipeline in Cook Inlet in 2017.	Potential impacts of a natural gas release from the pipeline are addressed in Section 4.27, Spill Risk. EIS text has been expanded to note that the potential accumulation of methane and depletion of oxygen near a leak would be a temporary, localized impact. The following text has been added to Section 4.27, Spill Risk, regarding natural gas spill response: "The natural gas pipeline would be constructed of new pipe specifically designed for natural gas transmission in a cold climate through diverse terrain, including marine and lake water. The pipeline would be equipped with a leak detection system. In the event of a release, shut-off valves would be closed to limit the extent of the natural gas release. On the east side of Cook Inlet, near the compressor station, an automatic shut-off system would be installed. On the west side of the Inlet, at the port site, either an automatic or manual shut-off valve would be installed. Port personnel would always be on site and able to respond with manual shut-off if needed." It is not valid to compare the natural gas pipeline with the Hilcorp pipeline that recently leaked into Cook Inlet. The Hilcorp pipeline was over 50 years old, and was designed and used as an oil pipeline, not a gas pipeline. The sheen that resulted from the Hilcorp leak was from residual oil previously transported in the pipe, not from natural gas. Hilcorp was not able to turn off the flow of natural gas in a timely manner, due in part to repurposing of the older pipeline. Modern gas pipelines designed to current industry standards have the ability to be shut off to limit any potential gas release.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Reagents	Commenters requested that an impacts analysis of reagent spills and a spill response plan for spills of chemical reagents be included in the EIS. Particular concern was noted regarding spills of sodium ethyl xanthate and polyacrylic acid. Comments also asked for more details on the presence of reagents in tailings. Comments were also received on potential impacts of cyanide.	Chemical reagents that would be used by the project are addressed in Section 4.27, Spill Risk. A full impacts analysis of spills from each reagent is not provided, but information on the fate and behavior of the spilled material is provided for each reagent. The risk of a serious spill of reagents was determined to be low due to the use of secondary containment for the transport and storage of reagents. Additionally, any spill of chemical reagents would be relatively small in volume, with localized impacts. The Applicant would provide a spill response plan prior to the start of operations. EIS text has been augmented regarding the presence of residual reagents in both concentrate and tailings.

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		As stated in Section 4.27, no mercury or cyanide would be used for the project. If cyanide were to be used in the expanded mine scenario, it would be destroyed on site. The cumulative effects section in Spill Risk has been expanded to address this.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Sodium Ethyl Xanthate	Commenters asked that EIS text be edited to clarify citations from the EPA's Bristol Bay Watershed Assessment regarding sodium ethyl xanthate.	The reagent sodium ethyl xanthate is addressed in Section 4.27, Spill Risk. Text in Section 4.27 has been revised to acknowledge the EPA's statement in the BBWA that a spill of undiluted sodium ethyl xanthate into a stream would cause a fish kill. The EIS states that the substance is highly toxic to aquatic organisms. The EIS does not analyze impacts from a direct spill of undiluted sodium ethyl xanthate into a stream because of the extremely low probability of such a spill. Text in Section 4.27 has been augmented to address the presence of residual reagents including sodium ethyl xanthate in concentrate.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Spill Response	Concerns were raised that spill response plans were not specified in the EIS, and resources required for response are not identified. One commenter suggested preparation of a response viability analysis. Commenters were concerned about liability for clean-up operations. Commenters also noted that climate should be considered when considering recovery rates of various resources after a spill.	Spill response is addressed in Section 4.27, Spill Risk. The USACE acknowledges that existing spill response capacity is limited. The Applicant would be liable for any necessary spill response. Local climate was taken into consideration when considering post-spill recovery of resources. Section 4.27 has been expanded to include more detail on the Applicant's spill response plans, where available.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Spill Scenarios	Comments were received on the spill scenarios presented in Section 4.27, Spill Risk, stating that: • Scenarios should address a wider range of spill volumes. • The EIS should describe why substances were/were not selected for analysis in the scenarios. • Analysis of only very large spills resulted in the DEIS underestimating the likelihood of spills occurring. • Many of the scenarios are theoretical. • Should include spill scenarios at the port and lightering operations, transfer points, from the natural gas pipeline, and concentrate container storage. • Some scenarios have few existing studies from which to draw comparable assumptions.	Impacts analysis of spill scenarios of various materials are addressed in Section 4.27, Spill Risk. The section was augmented to provide additional detail, as available, but no additional spill scenarios were analyzed. • The EIS acknowledges that small spills are more frequent, while large spills are less common. • As stated in Section 4.27, the substances analyzed were selected based on their spill potential and potential spill consequences. • A large diesel spill with low probability was selected for analysis as a conservative measure, to cover the wide range of potential impacts from such a spill. Spill volumes analyzed were also selected based on historic spill volumes of substances such as concentrate.

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	• Many of the scenarios are circumstantial (severity would depend on timing, location, etc.). • Scenarios do not explore secondary and tertiary impacts on affected ecosystems. • Scenarios should include analysis of a release from the open pit lake/pit wall failure.	• The spills section is a qualitative, theoretical section, because it is analyzing hypothetical scenarios. • It is beyond the scope of NEPA for an EIS to address multiple hypothetical spill scenarios for each substance. Section 4.27 has been augmented to more fully address spills across the alternatives. • Limited data are available for some scenarios. • Scenarios are necessarily hypothetical, and impacts will always vary based on a given scenario. • Secondary and tertiary impacts analysis on ecosystems is beyond the scope of a qualitative spills section, although such impacts are addressed where relevant. • Additional modeling of an open pit lake/pit wall failure was conducted. A release from such a failure is considered highly improbable. Text in Section 4.15, Geohazards and Seismic Conditions, was expanded to address this issue.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Spills from Ferry	Concerns were raised that the ice-breaking ferry would be prone to accidents, spills, and leaks; with increased spill risk due to severe weather and extreme conditions. Comments requested the following additional information be added to the EIS: More information on how the ferry would deal with severe weather, such as icing prevention. Impacts analysis of spills of diesel, concentrate, and other materials into Iliamna Lake, including cumulative impacts. Analysis of a ferry sinking scenario. Information on spill response capability, and recovery of spilled materials. Oil spill planning analysis (identifying areas of environmental concern or potential places of refuge on Iliamna Lake). More historical ferry incident data in the EIS, to increase sample size for spill risk calculations. More information on the statistical analysis used to determine probabilities of diesel spills from ferries.	The potential for spills from the ice-breaking ferry is addressed in Section 4.27, Spill Risk. Text in Spill Risk has been augmented to address more details on potential spills from the ferry. Based on historical data on other specialized ferries in operation in similar northern climates, the probability of a significant spill from the ferry was determined to be so low as to be a worst-case situation, and was therefore eliminated as a reasonable scenario for impacts analysis. Potentially higher probability but limited, lower-consequence spills were also eliminated due to nominal or de minimis risk. See the Transportation Spill Scenario Probabilities Memo (AECOM 2019a) for statistical analysis on the probabilities of spills from ferries. The ferry would be custom-built specifically for Iliamna Lake conditions, and for hauling diesel, concentrate, and other mine materials. The assembled ferry would be subject to the same inspections as vessels constructed in an established shipyard. The operation of the ferry would be more secure and regulated than that of marine barges, because it would travel on a set route, and be operated only by Applicant employees or contractors.

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	Supporting information for the statement that the operation of the ferry would be more secure and regulated than that of marine barges.	Although subject to potentially extreme weather conditions, the operational environment in Iliamna Lake is expected to be generally less harsh than the marine environment affecting marine barges (Section 3.16, Surface Water Hydrology). Section 4.27 addresses the mitigation measures that would be employed to reduce and/or minimize the risk of spills from the ferry, including a 1-inch-thick heavy steel shell; multiple watertight compartments that would reduce the chance of sinking; two fully independent engine rooms; and a locking system employed on the deck that would secure tanks and containers. Text has also been added to Spill Risk and Appendix M1.0, Mitigation Assessment, stating that additional potential mitigation identified during the EIS process includes a coastal and ocean engineering analysis for both Iliamna Lake and the port, which would help ensure that project vessels are fit-for-purpose.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Spills to Frying Pan Lake	One comment noted that the EIS does not address potential impacts from accidental discharge to Frying Pan Lake, especially wastewater discharges.	Wastewater management is addressed in Section 4.18, Water and Sediment Quality. That section has been expanded with additional information on water management. PLP has stated that if the wastewater management system has unexpectedly high volumes to treat, or if there is a problem with the water treatment system, excess wastewater would be pumped into the main WMP, which has very high capacity (freeboard) for additional/ emergency storage. The probability of wastewater being discharged into Frying Pan Lake is very low.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Subsistence Impacts	Commenters asked for more details on how potential spills could impact subsistence activities, subsistence resources, and perception of subsistence resources, in the short-term and long-term.	Impacts of spills on subsistence activities and resources is addressed in Section 4.27, Spill Risk. Due to the localized nature of these types of spills and the anticipated spill response, impacts on subsistence activities would likely be localized and of brief duration. Impacts to the perception of subsistence resources from a cultural perspective are discussed in Section 4.7, Cultural Resources. No changes were made to Subsistence impacts analyses. Section 4.27 has been expanded with analyses of potential impacts to Cultural Resources.

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Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Suggested Reference	Some commenters suggested incorporating specific references into the Spill Risk section.	Suggested references have been reviewed by SMEs, and material has been incorporated in Section 4.27, Spill Risk, where appropriate.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Vessel Traffic	Commenters questioned if there would be an increased risk of spills in Cook Inlet due to an increase in vessel traffic from project operations.	The probability of marine vessel spills in Cook Inlet as described in Section 4.27, Spill Risk, considered the anticipated level of vessel traffic during project operations. No changes were made to the EIS analysis.
Spill Risk (Fuel/ Natural Gas/ Concentrate/ Reagents)—Wetlands—Spills	Commenters recommended discussing the potential impacts from metals in the fluid portions of concentrate and tailings releases, in particular regarding the seasonal variation in potential for uptake of contaminants to wetland vegetation.	Potential impacts on wetlands from concentrate and tailings spills are addressed in Section 4.27, Spill Risk. Seasonal variation of contaminant uptake is considered in the impacts analysis. Section 4.27 was augmented with additional consideration of dissolved metals in the fluid portions (aqueous phase) of the concentrate, on wetlands and other resources. For concentrate spills, the magnitude of the impact depends on the season. Dormant vegetation is much less likely to be affected than actively growing plants. If the spill occurs during non-frozen conditions, especially during the growing season, the magnitude of impacts would be increased compared to during frozen conditions. For tailings spills, the magnitude of the impact would be high regardless of the timing, because this type of spill would affect both dormant and actively growing vegetation through physical removal from erosion or burial.
Subsistence—Access	Commenters asked for clarification and more information on how the project would impact subsistence users' access to resources, and how these impacts could change seasonally.	Section 3.9 and Section 4.9, Subsistence, and Appendix K3.9 discuss the impacts to subsistence resources, and access to these resources in communities near Iliamna Lake, in the Kvichak and Nushagak river drainages, and on the southwestern coast of the Kenai Peninsula. Seasonally variable impacts, such as disruption of snowmachine travel, interrupted winter travel routes caused by the ice-breaking ferry, and new access created by the transportation corridors and pipeline rights-of-way are also discussed. Text was not revised in response to this SOC.

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Topic—Subtopic	Statement of Concern	Response
Subsistence—Adaptation	Commenters questioned the assumption that subsistence users would shift their harvesting patterns to adapt to changes in resource access and availability. Commenters suggested adding references to support this assumption, and also pointed out the impact such adaptations/adjustments could have on traditional knowledge and practices.	Section 4.9, Subsistence, notes that impacts to fish and wildlife would not be expected to impact harvest levels, because there would be no population-level decrease in resources. The effects of project activities on resource availability and access would be in the vicinity of project facilities and operational activities. Clarification was added about the impacts associated with adapting subsistence harvest patterns. Corresponding edits were made to Section 4.4, Environmental Justice.
Subsistence—Analysis Area	Commenters expressed concern that the DEIS did not consider the impacts of the Bristol Bay and Alaska Peninsula communities downstream of the project, and how they would be affected by contamination if this project is permitted or if there is a major failure.	The EIS analysis area for subsistence was selected to include the resources that could be affected by the mine site (including material sites), port, transportation corridor, and natural gas pipeline corridor for each alternative. This includes habitat and migration routes for subsistence resources, community subsistence search and harvest areas, and areas used by harvesters to access resources. The EIS analysis area in Section 3.9 and Section 4.9, Subsistence, and Appendix K3.9 is inclusive of subsistence resources in communities near Iliamna Lake, in the Kvichak and Nushagak river drainages, and on the southwestern coast of Kenai Peninsula. These areas would be the most likely to be impacted by the project, and also major failures. Outside of those areas, there would be no expected impacts from normal operations or failures, and they were excluded from analysis. No changes were made to the EIS. Section 3.6 and Section 4.6, Commercial and Recreational Fisheries, and Appendix K3.6 discuss the impacts to commercial and recreational fishing. Section 4.27, Spill Risk, describes the impacts to subsistence from spills/failures.
Subsistence—Baseline Data	Commenters emphasized that baseline data used in the subsistence analysis is outdated, and could be unrepresentative of actual use. Commenters suggested conducting new subsistence surveys.	The USACE recognizes that many of the subsistence studies cited in Section 3.9, Subsistence, are more than 15 years old. These comprehensive community-wide subsistence surveys employed consistent methods across all the communities discussed in Section 3.9 and Appendix K3.9, Subsistence, and provide high-quality data on which to base the discussion of the affected environment. The 10-year mapping study was designed to account for year to year variation. For additional analysis of this data gap, see tables in Section 3.1. Additional references suggested by commenters have been reviewed and incorporated into Section 3.9, Subsistence, as appropriate.

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Subsistence—Believed Contamination	Commenters provided feedback for clarifying and augmenting the discussion of impacts to subsistence users from believed contamination of subsistence resources.	Section 4.9, Subsistence, describes how there could be concerns regarding potential contamination and the safety of subsistence resources in communities and downriver from the analysis area. These impacts would be long-term, potentially lasting post-closure, and likely to occur if the project is permitted and constructed. It is likely users would perceive contamination, and these types of perceptions have been demonstrated to result in changes to subsistence harvest practices. Impacts from spills to subsistence resources and to subsistence activities are discussed in Section 4.27, Spill Risk. Language in Section 4.9 was clarified in response to comments.
Subsistence—Chinook Salmon	Commenters were concerned about the project's impact on Chinook salmon, particularly those that spawn in the North and South forks of the Koktuli River. Chinook salmon are a prized subsistence resource that are shared and traded with people in other communities that do not have nearby sources of Chinook salmon.	Impacts to Chinook salmon in the North Fork and South Fork of the Koktuli River are analyzed in Section 4.24, Fish Values. As noted in Section 4.9, Subsistence, no change in the availability of Chinook salmon is expected. Text on the topic of Chinook salmon being shared with Kvichak/Iliamna Lake communities by Nushagak River communities was added to Section 3.9 as an example of inter-community sharing.
Subsistence—Combine with Another Section	Commenters thought the EIS should be reorganized to better assess the impacts of the project. Suggestions included combining Subsistence with Needs and Welfare of the People—Socioeconomics, combining the subsistence fishery information with the commercial and recreational fisheries analysis, and improving crossover between the Recreation and Subsistence sections.	The EIS was organized based on the issues carried forward for analysis for the USACE's Public Interest Review. Text has been added to Section 3.3 and Section 4.3, Needs and Welfare of the People—Socioeconomics to better describe the relationship between subsistence and economics, and to Section 3.7, Cultural Resources, to describe the cultural value of subsistence resources.
Subsistence—Competition	The EIS does not adequately assess the impacts of increased competition for subsistence resources, both from the influx of project workers and increased accessibility to the area from project transportation and pipeline corridors.	The potential for additional competition is reduced by limiting the access to the transportation corridor. Additionally, the remoteness of the area limits the amount of recreational increase in the area. Impacts from competition between recreational hunting and fishing and subsistence uses are discussed in Section 4.9, Subsistence. This section has been edited for clarity. PLP would provide housing for their workers; PLP would prohibit employees from engaging in subsistence activities while they are on their work shift, as stated in Section 4.3, Needs and Welfare of the People—Socioeconomics, and Section 4.9, Subsistence. As discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics, the project could lead to a reduction in community out-migration, but is not anticipated to substantially increase the population via outside individuals moving to the communities in the region.

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Subsistence—General Impacts	Commenters expressed concern about impacts to subsistence resources, the subsistence way of life in general, and expressed that the DEIS does not adequately address the impacts.	Impacts to the availability, abundance, and access to subsistence resources from the project are discussed in Section 4.9, Subsistence, and the analysis relies on the information provided in other sections (such as wildlife and fish). A description of the subsistence way of life and sociocultural elements are discussed in Section 3.9, Subsistence. Additional analysis on impacts to culture and way-of-life has been added to Section 4.7, Cultural Resources; and additional discussion of socio-cultural context has been added to Section 4.3, Needs and Welfare of the People—Socioeconomics. Text in the Executive Summary and Section 3.3, Needs and Welfare of the People—Socioeconomics, relating to subsistence has been corrected and clarified. Impacts to fish, wildlife, and plants are analyzed and discussed in Section 4.24, Fish Values; Section 4.23, Wildlife Values; Section 4.25 Threatened and Endangered Species; and Section 4.26, Vegetation. Impacts to subsistence activities and subsistence resources from spills are analyzed and discussed in Section 4.27, Spill Risk.
Subsistence—Iliamna Seal Impacts	Commenters emphasized the importance of the freshwater seal population in Iliamna Lake and wanted additional information and impact analysis on this unique subsistence resource.	Section 3.23 and Section 4.23, Wildlife Values, discuss Iliamna Lake seals and the impacts to this resource. Subsistence harvest patterns, including harvest estimates of marine mammals, are described in Section 3.9, Subsistence. Impacts to the subsistence harvest of Iliamna Lake seals are described in Section 4.9, Subsistence, for each alternative. Additional detail regarding the Iliamna Lake seals has been added to Section 3.9, and clarifications have been made to Section 4.9, Subsistence.
Subsistence—Increased Costs	Comments raised the issue of increased costs to subsistence users from additional fuel and time needed to reach displaced subsistence resources, as well as the costs of replacement foods from the grocery store when traditional foods are less available. Commenters suggested the EIS include an analysis of replacement costs from reduced subsistence harvest.	The potential for increased costs to subsistence users is discussed in Section 4.9, Subsistence. This section also notes that impacts to fish and wildlife would not be expected to substantially impact harvest levels, because there would be no population-level decrease in resources. The effects of project activities on resource availability and access would be primarily localized in the vicinity of project facilities and operational activities. Subsistence harvest is not expected to be reduced, and an analysis of replacement costs would be speculative. Additional description of costs associated with increased travel to subsistence resources has been added to Section 4.9, Subsistence.

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Topic—Subtopic	Statement of Concern	Response
Subsistence—Jobs Hurt Culture	Commenters are concerned that the increase in jobs will hurt the local culture by either making the local people less attached to the land and traditions, or by the negative characteristics of people from other areas who come for the work.	Changes in sociocultural dimensions and impacts from the project, including the adverse and beneficial impacts that cash-paying jobs can have on subsistence harvests and traditions, are discussed in Section 4.9, Subsistence. Some additional detail was added to Section 4.9, Subsistence, in response to comments. Additional text regarding impacts from cash-paying employment to culture has been added to Section 4.7, Cultural Resources.
Subsistence—Mulchatna Caribou Herd	Commenters had specific concerns regarding the population and migration patterns of the Mulchatna Caribou Herd, as well as project-related impacts to the herd.	Additional information in Section 3.23 and Section 4.23, Wildlife Values, as well as information and references provided by commenters, was reviewed and incorporated into Section 3.9, Subsistence; and Section 4.9, Subsistence.
Subsistence—Native Allotments	Commenters expressed concern that the EIS does not analyze the impacts to Native Allotments and how their value to families and tribes is uniquely tied to their use as subsistence harvesting locations.	Section 3.9, Subsistence, and Section 4.7, Cultural Resources, were edited to acknowledge Native Allotments and their cultural and subsistence value. Likewise, impacts to Native Allotments near project infrastructure and activities was added to Section 4.9, Subsistence. Impacts to the availability, access, and abundance of subsistence resources are discussed in Section 4.9, Subsistence.
Subsistence—Pedro Bay	A commenter provided suggestions for improving the description of subsistence use in Pedro Bay in Section 3.9, Subsistence. Since 2010, the population has declined by more than 35 percent, with much of that decline associated with the school closing in 2010.	Text in Section 3.9, Subsistence, was updated to note the changes in population in Pedro Bay.
Subsistence—Sharing and Social Networks	Commenters asserted that the discussion of the sharing and social networks, which are integral to the subsistence economy, were not adequately discussed in the EIS.	Section 3.9, Subsistence, describes subsistence harvest estimates for the six communities nearest the project infrastructure, and includes data for the percentages of households giving and receiving resources. Section 4.9, Subsistence, describes how impacts to fish and wildlife would not be expected to substantially impact harvest levels, because there would be no population-level decrease in resources. The effects of project activities on resource availability and access would be primarily localized in the vicinity of project facilities and operational activities. Therefore, sharing and social networks would be minimally impacted. Section 4.9, Subsistence, has been edited to clarify impacts to sharing and social networks. A reference suggested by commenters, Calloway 2012 from Keystone, is not available for review.

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Topic—Subtopic	Statement of Concern	Response
Subsistence—Socio-cultural	Commenters raised a variety of concerns related to the socioeconomic, cultural, and spiritual impacts of the project. Concerns include the following: the EIS fails to account for the ways in which subsistence practices contribute to community health and well-being beyond the volume and nutritional value of pounds harvested; the spiritual value of subsistence resources; and the socioeconomics of a community as relates to subsistence uses should be subject to a different evaluation.	The relationship between the cash economy and the subsistence way of life is presented in Section 3.9, Subsistence, as the sociocultural context. Sociocultural impacts from the project are discussed in Section 4.9, Subsistence, Section 4.3, Needs and Welfare of the People--Socioeconomics, and the contribution of subsistence to well-being is discussed in Appendix K4.10, Health and Safety. Additional information on culture, spirituality, and way of life has been added to 4.7, Cultural Resources. Additional discussion of impacts to sociocultural conditions, culture, and way of life have been added to Section 4.3, Needs and Welfare of the People—Socioeconomics; and Section 4.7, Cultural Resources. Text in the Executive Summary relating to subsistence has been corrected and clarified.
Subsistence—TEK	The EIS sees traditional ecological knowledge (TEK) as a body of knowledge about climate, landscapes, and subsistence resources, and including a historical perspective; but this characterization does not capture its cultural significance. Because TEK is an accumulation of data acquired over thousands of years, the depth and breadth of this knowledge is vast. Comments compiled from public meetings and consultations do not adequately document TEK. There is little cultural context; and in many cases, seems more like recent observations than TEK passed down over generations. If the EIS intends to recognize all the impacts of the project on sociocultural dimensions of subsistence, it must more fully incorporate possible interruptions and discontinuities in implementation and transmission of TEK.	USACE obtained TEK from public scoping comments and comments on the DEIS, the EPA Watershed Assessment, the Pebble Environmental Baseline Document on Subsistence (SRB&A 2011b), community interviews on cultural resources sites, ADF&G Subsistence Reports, and meeting notes from government-to-government meetings. These sources of TEK are similar to what has been done in other NEPA documents. Information that was collected can be found in Appendix K3.1, and incorporated in Section 3.9 and Section 4.9, Subsistence. The EIS has been edited to acknowledge limitations in incorporating TEK that was available. Additional text regarding Alaska Native culture and spirituality has been added to Section 3.7, Cultural Resources.
Subsistence—Traditional learning	Commenters emphasized the social, cultural, and informational value of passing traditional knowledge from generation to generation. Commenters expressed concern that the project would impact the transmission of traditional knowledge.	Sociocultural impacts from the project, including to the ability of the older generations to pass on subsistence skills, knowledge, and traditions to the younger generations, are discussed in Section 4.9, Subsistence. Additional text on how subsistence knowledge and skills are learned through hands-on practice and instruction from and observation of elders, family members, and local experts has been added to Section 4.9.
Subsistence—Traditional Use Areas	A commenter asked that the term "traditional use area" be defined in Section 3.9, Subsistence, and that a consistent definition be used throughout the EIS.	Terminology used in Section 3.9, Subsistence, has been revised.

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Topic—Subtopic	Statement of Concern	Response
Subsistence—Upper Talarik Creek	Commenters expressed concern that the location of the north ferry terminal under Alternative 1 would be in the vicinity of the UTC, which has been used for generations for hunting, fishing, and camping.	Impacts to the availability, abundance, and access to subsistence resources from the project are discussed in Section 4.9, Subsistence, including in the vicinity of UTC. No changes were made to the EIS analysis.
Surface Water Hydrology—2014 Watershed Assessment is Biased	A quoted comment on the 2014 EPA Watershed Analysis report was received embedded in a comment submittal as follows: — David Atkins, hydrologist and expert in mine hydrology and geochemical assessment "Some of the assumptions appear to be somewhat inconsistent with mines in Alaska. In particular, the descriptions or effects of stream flows from dewatering and water use do not account for recycling process water, bypassing clean water around the project, or treating and discharging collected water."	Commenter quoted portions of a peer-review statement regarding the 2014 EPA Watershed Assessment. No changes were made to the EIS.
Surface Water Hydrology—Additional clarification	Comment noted concern about the statement in Section 3.16: "Most of the mine site is hydrologically connected to Bristol Bay via the NFK and SFK rivers, which join the Mulchatna River west of the mine site" and that potential impacts would extend into Upper Talarik Creek. Commenter recommended that the magnitude, duration, and extent of the streamflow reduction associated with Alternative 3 be quantified so the magnitude of the reduction can be compared to the reduction associated with other alternatives. Regarding Table 4.16-5, key issues summary table: Commenter suggested that a summary of the changes due to extreme conditions (high and low flows) be added to the table so that the magnitude and extent of streamflow changes is fully summarized. In addition, comment stated that some of the differences among the alternatives described in the text are not provided in the key issues table (such as streamflow changes for the Alternative 3 concentrate pipeline variant) and recommended that these be added to the table. Comment also recommended summarizing the uncertainty associated with these flow estimates in the table.	With regard the comment on Section 3.16, Surface Water Hydrology, the statement "Most of the mine site is hydrologically connected to Bristol Bay via the NFK and SFK rivers, which join the Mulchatna River west of the mine site" is correct. No changes were made to the EIS. The information necessary to quantitatively evaluate the reduction in streamflow based on Alternative 3 is not available. A qualitative statement about potential reduction in streamflow as compared to Alternative 1 is included in the DEIS Section 4.17, Groundwater Hydrology, under Alternative 3. No changes made to EIS. No changes made to Table 4.16-5. This is a summary table and provides a high-level review of potential impacts to facilitate comparison of alternatives as described in more detail in the narrative. Discussion of uncertainties were reviewed, and Section 4.16 and Appendix K4.16, Surface Water Hydrology, were expanded based on new information provided by the Applicant through the RFI process. Additional discussion of uncertainties has been provided in the groundwater sections of the EIS. See SOC Groundwater Hydrology—GW model uncertainty analysis.
Surface Water Hydrology—Analysis Area	Concern was expressed that the surface water hydrology analysis limited the EIS analysis area to a 1,000-foot buffer around the mine site.	Section 4.16 describes the surface water hydrology EIS analysis area, which includes watersheds with numerous streams, lakes (including Iliamna Lake), and marine water (Cook Inlet) that have the potential to be impacted by the project. The FEIS has been edited to remove references to a 1,000-foot analysis area.

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Topic—Subtopic	Statement of Concern	Response
Surface Water Hydrology—Baseline Data	Comments noted concern that insufficient baseline data are available for analysis of impacts to Iliamna Lake, water crossings along the transportation corridor, or marine environment at Amakdedori. Comment stated that at an agency meeting (prior to initiation of the EIS process) Jamie Cathcart, a consultant to PLP, stated that the meteorology stations were under-representing precipitation, presumably due to wind interference, and that he estimated the mean annual precipitation at the mine site was 45 to 50 inches. The commenter implied that the precipitation levels used to develop the analyses for the DEIS are low.	With regard to the baseline data for waterbodies crossed by the road and pipeline, suggested mitigation measures have been added to Appendix M1.0, Mitigation Assessment, regarding a coastal and ocean engineering analysis for both Iliamna Lake and the port locations as design proceeds. With regard to the comment about under-catch at the precipitation gauges, the gauge data used in the EIS analyses were corrected for under-catch (see Section 3.1 in Knight Piésold (2018g) and Section 2.3 in Knight Piésold (2019g).
Surface Water Hydrology—Climate Change-Gen	Concerns were expressed that the EIS should provide a more complete discussion of the reasonably foreseeable effects that changes in the climate may have on: 1) streamflow; 2) infrastructure design and operation during mining, closure, and post-closure; 3) the impact of the mine on the environment; and 4) the mitigation measures. Several comments specifically addressed the lack of consideration given to the long-term increases in temperature and precipitation, and the change in type and timing of precipitation (particularly as it relates to the winter months) predicted by a number of the climate change models. One comment requested that an adaptive management plan be prepared and provided in the EIS that included the monitoring and specific measures to manage and mitigate impacts that could result from changes in the climate. With regard to infrastructure design, concerns were expressed that the effects of climate change had not been considered in the infrastructure design. Commenters noted that they did not think the 76-year synthetic record was sufficient for design, because they did not think it was likely to be representative of future conditions. Commenters indicated that to fully understand the risk associated with the project, climate change must be considered. Risks mentioned included: (1) increased flooding and erosion, infrastructure failure (e.g. dams, stormwater features, culverts, bridges, pipelines river crossings), and impacts to streamflow. Commenters also expressed concern that changing climatic conditions would impact the results of the water balance modeling and that flows might differ significantly	The EIS addresses the impact of climate change on the magnitude and frequency of the extreme weather events that would be used for hydrologic design in: 1) Section 4.16, Surface Water Hydrology, under the mine site section, subsection Long-Term Climate Change; 2) Section 4.16 under the mine site section, subsection Long-Term Climate Change, and Appendix K3.16, Surface Water Hydrology, under Long-Term Climate Change. Studies by Knight Piésold, National Weather Service (NWS), and the USGS are discussed. With regard to precipitation changes, Knight Piésold (2009) found that there was no common trend in the annual total precipitation at three long-term weather stations near the mine site. Knight Piésold (2009, 2018g) also evaluated the likelihood of a trend in the magnitude of the annual 1-day maximum daily precipitation at Iliamna, and concluded that there may be a trend of increasing magnitude. A study by the NWS (2012) indicated that there probably was not a trend of either increasing or decreasing annual 1-day maximum daily precipitation at the three sites closest to the mine site, or in the state of Alaska as a whole. With regard to changes in streamflow, Knight Piésold (2009) evaluated the discharge records for three long-term USGS sites in the region, and found no common trend in the magnitude of the mean annual discharge. Similarly, the USGS made an evaluation of the peak-flow data associated with 387 stream gauge stations throughout Alaska, and found no universal trend. The incorporation of uncertainty in hydrologic design is discussed in Section 4.16, under the Mine Site section, subsection Long-Term Climate Change. Additional discussion and clarification were added to the text of the EIS to more fully describe some of the commonly accepted changes that

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Topic—Subtopic	Statement of Concern	Response
	from those suggested in the DEIS. Commenters also expressed concern that changing precipitation patterns will change the water treatment requirements over time, and could potentially result in treatment capacities being exceeded and a release in untreated water. Additionally, by not considering the effects of climate change in the design of the water treatment program, the impacts to streamflow might be different than predicted in the DEIS. Concerns were also expressed regarding the effect of a changing climate on the design of stream crossings, suggesting the likelihood of washouts, accidental spills, and pipeline ruptures might be higher than anticipated. Additionally, one commenter questioned whether or not the USGS 2016 regression equations that might be used to compute the design discharge accounted for climate change. With regard to the modeling, it was suggested that a fully integrated (coupled), physically based hydrologic model be used for the analysis of impacts, as opposed to the decoupled models used to prepare the results for the DEIS. It was also suggested the methods for dealing with water in a low, middle, and high climate change scenario be evaluated, based on a site-specific downscaled model of climate change. Another commenter suggested that if climate change is not considered in more detail than was presented in the DEIS, the EIS should explain why the methods that were used are adequate. With regard to surface water/groundwater interaction, it was suggested that the DEIS should discuss surface and groundwater interaction in the context of reasonably foreseeable future changes in precipitations and temperature due to climate change (including extreme precipitation), and address potential environmental impacts associated with the changed climate.	may occur as a result of climate change, such as an increased potential for winter precipitation to occur as rain. There is no evidence from the analysis conducted for the EIS that construction or operation of the mine would contribute to climate change in terms of hydrology. See also SOC Climate Change—Project Contribution to Climate Change, for a discussion of GHG emissions considered in the EIS. Monitoring during operations would be expected to detect changes in precipitation that may impact the hydrologic design of mine site infrastructure. Because changes would be expected to occur as a trend, rather than a sudden change, adaptive management practices would be applied to accommodate hydrologic changes. Therefore, additional climate scenarios were not analyzed in the EIS for operations, closure, or post-closure phases. See also SOC Mitigation and Monitoring—Request for Proposed Management Plans.
Surface Water Hydrology—coastal engineering analysis	Comment indicated Chapter 2, Alternatives, did not adequately address the port facilities at Amakdedori regarding currents, wave heights, etc., and the effects on beach deposition. Concern was noted that sheet pile gravel cell docks in the Nushagak Bay appear to greatly change silt deposition at their bases, and begin to render the docks less effective. Comment noted concern that there is a lack of information regarding tides,	Chapter 2, Alternatives, describes the facilities associated with alternatives and variants, and does not address potential impacts. Chapter 3.16, Surface Water Hydrology, includes description of coastal processes in the vicinity based on available information; Section 4.16, Surface Water Hydrology, describes potential impacts to the natural processes that could be caused by port facilities.

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Topic—Subtopic	Statement of Concern	Response
	current, and storm surge; and no information about current to enable review of impact that might be caused from a concentrate spill on marine invertebrates.	A detailed coastal engineering study was added as a recommended mitigation measure in Appendix M1.0, Mitigation Assessment, of the FEIS. Information from a coastal engineering study (including aspects such as shoreline sediment transport processes erosion, accretion, and substrate characteristics among others), if this measure is adopted by the Applicant or incorporated as a permit condition, would help ensure the port facilities are properly designed for conditions, and project vessels are fit-for-purpose, as well as provide more baseline data on which to analyze impacts to marine life in the event of a concentrate spill. See related SOCs Proposed Action and Alternatives—Diamond Point Port Dredging and Navigation—Coastal Engineering Study Needed. See also Section 4.27, Spill Risk.
Surface Water Hydrology—Conceptual Design Level Only	Concern was expressed that the Amakdedori design port does not account for storm surge, wave run-up, or "any information on how facility design elevations were determined."	See also SOC: NEPA Process—Conceptual Design Level Only. USACE regulations for public notices at 33 CFR Part 325.3 require a brief description of the activity, its purpose, and intended use to provide sufficient information concerning the nature of the activity to generate meaningful comments. The port component is in conceptual design phase, an early phase, where general location and main features are known and depicted in drawings, but many details would be added to adjust the design to the existing metocean conditions and include a Factor of Safety. The figures depicting the layout of Amakdedori port in the EIS (Chapter 2, Alternatives) are conceptual (including the digital renderings), and do not represent the final design. Additional information on ocean conditions was included in Section 4.16, Surface Water Hydrology.
Surface Water Hydrology—coupled versus separate models	Comments expressed concern that the groundwater-surface water exchange requires a more sophisticated modeling approach than PLP had developed for the DEIS, and suggest the use of a coupled hydrologic model.	Information provided in PLP 2019-RFI 109i: Prucha 2019—Comments Potentially Applicable to New Groundwater Model (BGC 2019a) has been reviewed, and appropriate information regarding the recent modeling approach has been included in Section 3.16 and Section 4.16, Surface Water Hydrology.
Surface Water Hydrology—Design engineering	Comment noted concern about extreme cold temperatures and how this would affect the piping and water storage facilities	The design of water piping and water storage facilities for cold temperatures is a detailed design issue, and beyond the scope of the EIS. The design presented in the EIS is a conceptual-level design. See also SOC Surface Water Hydrology—Conceptual Design Level Only. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Surface Water Hydrology—Erosion	Comment suggested including discussion of erosion and potential changes in surface water hydrology and erosion from pipeline installation (applies to impacts along Transportation Corridor). Comment suggested that considering hydrologic impacts independent of other habitat factors underestimates road impact to aquatic habitat.	Section 4.16, Surface Water Hydrology, has been revised to include a discussion of erosion and potential changes in surface water hydrology and erosion from pipeline installation along the transportation corridor. The erosion discussion in Section 4.16 has added cross-references to other applicable sections in the EIS (e.g., Section 4.14, Soils).
Surface Water Hydrology—flood hazards	Comment requested including additional discussion in the EIS to support the conclusion that baseline conditions throughout the project area include zero risk of flood hazard. Comment recommended that other potential factors such as soil moisture content and extreme precipitation events be considered. Comment stated that risks associated with locating project facilities in floodplain[s] should be assessed, and that the mitigation measures needed to manage those risks should be discussed.	With regard to the comment about no flood risk in an undeveloped area, Section 3.16, Surface Water Hydrology, subsection Flood Hazards stated: "For the purpose of this document, a flood hazard exists when existing infrastructure is subject to inundation during a 100-year flood (i.e., probability of inundation in any given year is 1 percent)." This does not imply there is no risk of flooding. However, as "Flood Hazard" is typically used, it refers to the potential hazard to infrastructure and humans. Section 4.16, Surface Water Hydrology, has been revised to address the risks associated with locating facilities (e.g., mine site, transportation corridor) in the floodplain. Typically a flood hazard analysis is conducted during detailed design, and structures in the floodplain are designed accordingly.
Surface Water Hydrology—Freeboard	Comment stated that the DEIS should provide numerical values related to the inflow design flood (IDF) and freeboard in feet for the WMPs, SCPs, and TSFs (see Table 4.16-1), or otherwise show that these facilities are designed with adequate freeboard and factors of safety. Comment inquires as to whether storm surge and wave runup have been considered in the design of the structures.	The designs presented in the EIS are conceptual; therefore, exact values for the freeboard are not available at this time. (See SOC NEPA Process—Conceptual Design Level Only.) Table 4.16 provides hydrologic criteria for the design of the structures. A footnote to the table states: "Each water management pond would include an additional freeboard allowance for wind-generated wave height and potential seismic deformation. Freeboard is the water level, usually expressed in feet, that is determined by the factor of safety used in engineering design." No change was made to the EIS as a result of this SOC.
Surface Water Hydrology—Modeling	Comment stated that PLP has not adequately described the model basis, approach sensitivity analysis, or uncertainties in model output. In addition, comment expressed concern that there is not internal consistency across models. Comment noted concern that a more "sophisticated" modeling is needed than that used for the DEIS to estimate streamflow changes. In addition, commenter refers to a model developed by Prucha (2019) using Mike SHE.	Since the DEIS, numerous comprehensive RFI (e.g., the RFI 109 series, RFI 138, RFI 021g) responses have been received and evaluated. The EIS has been expanded with updated and additional information to include a comprehensive discussion of models, model relationships, sensitivity analysis, and uncertainties in model output.

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Topic—Subtopic	Statement of Concern	Response
Surface Water Hydrology—Streamflow reduction	Concern was expressed about the amount of dewatering in the upper reach(es) of the Koktuli, NFK, SFK, and UTC. Commenter expressed concern that the drainages would "dry up."	Section 4.17, Groundwater Hydrology, described pit dewatering and the area of influence with respect to surface water flow reduction. Section 4.16, Surface Water Hydrology, describes the impacts to surface water flow from the project, and considers the project water management plans and effects of discharge of treated water into the three watersheds. Both sections have been expanded with additional information. As explained in these sections, the noted watersheds would not "dry up" as a result of the project.
Surface Water Hydrology—suspended sediment	Commenter questioned source of statement in DEIS regarding suspended sediment concentrations that would occur during trenching or HDD, and that the maximum concentrations would not be larger than what would occur during severe storm conditions. Comment stated that if this claim is to be made, the EIS should estimate and quantify the localized sedimentation likely to be encountered from both trenching and HDD, and compare it to storm suspended sedimentation data and cite the source. Comment noted that the DEIS describes impacts from suspended sediment in Iliamna Lake in the immediate vicinity of pipeline construction at the shoreline transition (at the ferry terminals), but does not provide specifics about construction methods that would cause suspended sediment.	Statements in the EIS about suspended sediment concentrations were based on experience with similar construction activities in similar environments. A comprehensive coastal engineering analysis would include the effects of excavation and trenching on potential re-suspension and transport of sediment by these construction activities in Iliamna Lake and port location. Trenching during construction at the pipeline shoreline transition is addressed in the FEIS. This would cause temporary impacts from suspended sediments at the shoreline of the lake. Text has been expanded to clarify this issue, and additional information has been added regarding lake substrate. A detailed coastal engineering study has been added as a recommended mitigation measure in the FEIS, Appendix M1.0, Mitigation Assessment. Information from the coastal engineering study would help define baseline conditions; ensure the port facilities are properly designed and project vessels are fit-for-purpose; and provide more baseline data on which to analyze impacts to marine life in the event of a concentrate spill. See Section 4.27, Spill Risk.
Surface Water Hydrology—SW/ GW Interchange	Comment expressed concern that surface water/groundwater relationships described in the EIS are not clearly supported.	Responses to RFI 109g (Comprehensive Water Modeling System) and RFI 109i (Prucha 2019-Comment Potentially Applicable to New Groundwater Model) provide more information on the connection between the watershed model and the groundwater model, and why a dynamically linked model may not be necessary. These RFIs, and response to RFI 109k (Potential Headwaters Stream Dewatering), better explain the connection between streamflow and the groundwater, including the impact of pumping the pit lake. The EIS has been updated using information from the RFI responses to include appropriate detail, and better explain the surface water/groundwater interaction and model relationships.

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Topic—Subtopic	Statement of Concern	Response
Surface Water Hydrology—Water Balance Model	With regard to the water balance, the commenter states that the water balance model is flawed, because the inputs and outputs of the watershed model do not balance, and between 9 percent and 66 percent of the precipitation falling on the site is unaccounted for. Comment expressed concern that using the precipitation, evapotranspiration, and streamflow data quoted in the DEIS, there is approximately 25 percent more water entering the system than leaving it. Additionally, comment indicates discrepancies in the amount of flow discharged from the water treatment plant as an indication that the post-closure water balance is flawed. Comment expressed concern water management plan needs to provide a detailed water balance evaluation for the mine during the full "lifecycle," including water flow patterns for surface water, water use, land application and discharge systems, pond storage and discharge, and seasonal changes during base flow, steady state, and peak flow conditions. Comment recommended a “full uncertainty” analysis for water balance estimates, given uncertainties in mine plan layout and operation, precipitation, infiltration evaporation, transpiration, and dewatering rates. Commenter requested detailed schematic depicting water balance changes through the project phases.	With regard to the comment regarding between 9 percent and 66 percent of the precipitation that falls on the site is "unaccounted for," a rather simple computation (area multiplied by net precipitation divided by time) was used by Wobus (2019) to draw the conclusion. The computations referenced by the commenter did not consider issues such as orthographic effect, local precipitation factor for each sub-basin (accounts for rain shadow and wind transfer of snow), and groundwater flows leaving each sub-catchment (see PLP 2019-RFI-138), that were accounted for in the model used for the DEIS. With regard to the comment implying that using the precipitation, evapotranspiration, and streamflow data quoted in the DEIS, there is approximately 25 percent more water entering the system than leaving it, [This is from page 8 of the Wobus 2019 document] the RFI-138 response demonstrates that the commenter made several mistakes in his analysis, and also reveals a mistake in the post-closure watershed model results presented in the DEIS. The watershed model and mine plan water balance model have been updated since the DEIS, and the revised results presented in the EIS. With regard to the discrepancy in the post-closure water balance, there was an error in the watershed model that was discovered after the DEIS had been prepared. The original mine-affected flow values did not properly account for the reclamation of the bulk TSF and the resulting diversion of runoff from the NK119A basin to the NK119B basin. Instead, the model directed diverted runoff out of the NFK basin, and thereby overestimated the losses in the NFK system (PLP 2019-RFI-138). This issue has been corrected in the EIS. A detailed water balance evaluation for the mine during the full lifecycle, water balance information was provided for critical periods in the mine's life and at a level of detail sufficient for preparation of the EIS. Additional information on uncertainty has been provided in the EIS based on information received through the RFI process since the DEIS. For depicting water balance changes, the actual numbers representing the flows have been added to the water balance figures in the EIS.

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Topic—Subtopic	Statement of Concern	Response
Surface Water Hydrology—water extraction	Comments noted concern that no analysis of impact was conducted to address water extraction sites at the mine site and along the transportation corridor.	Impacts to surface water hydrology and groundwater hydrology from pumping groundwater to dewater the pit area are described in Section 4.16, Surface Water Hydrology, and Section 4.17, Groundwater Hydrology. Commenter seems confused between the "water extraction" needed to dewater the pit area and the other permitted temporary water use sites (water extraction sites). Although both sections were expanded in the FEIS, no changes were made based on this SOC. Final estimated quantities for specific uses would be determined during final design (PLP 2018-RFI 022), and is regulated by the State of Alaska. Temporary water use authorizations (TWUA) would be applied for from ADNR by either the appropriate contractor or PLP (11 AAC 93.035 (a)(b) and 11 AAC 93.220). TWUA permit application requires an estimate of area, depth, and volume of a potential withdrawal source, including bathymetry if available.
Surface Water Hydrology—Water Management Plan	Comment stated the Water Management Plan needs to provide a detailed water balance evaluation during all phases of the project.	A detailed mine plan water balance was provided for critical periods in the life of the mine. Schematics and tables showing the results of the Mine Plan Water Balance were provided in Appendix K4.16 of the DEIS. Based on information provided as response to RFI 021g (Knight Piésold 2019s), the schematics and tables have been updated in K4.16. The revised schematics include flow values to make it more readily understood by the reader.
Surface Water Hydrology—Watershed model calibration	Comments expressed concerns about uncertainty associated with the flow estimates between measured and calculated streamflows. Comment noted concern that calibration of the watershed model indicated that cumulative flows were over-predicted in the first 2 calibration years, and under-predicted in the remaining 3 years. Comment suggested consideration of EPA guidance on evaluation, application, and reporting of environmental models for impact prediction (EPA/100/K-09/003, Guidance Document on the Development, Evaluation, and Application of Environmental Models).	The DEIS used information provided in PLP 2018-RFI 104 (Watershed Model Documentation) and indicated that the model often underestimates streamflow during the higher flows, and overestimates streamflow during lower flows. Since the DEIS, the watershed model has been recalibrated, and predictive abilities of the model are improved. PLP 2019-RFI 109g (Item 4) (Knight Piésold 2019n) addresses uncertainty associated with the flow estimates from the watershed model. The EIS has been updated with the current information. Guidance in EPA/100/K-09/003 has been incorporated and considered during revisions to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Surface Water Hydrology—watershed model computational method	Comments expressed concern that the watershed model computational methods were not adequate and cannot be used to predict project impacts. Comments stated the modeling scheme used for the DEIS renders water that is unaccounted for between models and is not internally consistent. AET calculations appear overly simplistic, unrealistic, and unjustified. Comments expressed concern that the model may not be able to predict the lowest flows, and the uncertainty associated with the monthly flow estimates.	Response to RFI 109g (Knight Piésold 2019n) provided explanation about the use of a lumped parameter model rather than a discrete process model. The adequacy of the size of the catchment basins used is also explained. Values assigned to the watershed model are described in Knight Piésold 2019a, g, i; and in Section 3.16, Surface Water Hydrology, under Mine Site/Water Balance and in Appendix K3.16. Since the DEIS, unaccounted for water between models has been addressed by response to supplemental questions submitted by email and addressed in Knight Piésold 2019t. There was an error in the watershed model that has since been corrected, and new streamflow results are provided in the EIS. Response to RFI 109i (BGC 2019g) addresses the AET calculation and the use of monthly soil moisture changes lumped across entire catchments. Response to RFI 109g (Knight Piésold 2019n) addresses the concern about the model not being able to predict lowest flows. The comprehensive responses received since the DEIS have been reviewed, and information necessary to inform analysis has been incorporated into the EIS.
Surface Water Hydrology—Watershed Model downstream impacts	Comment noted concern that the DEIS fails to adequately assess downstream impacts, and there is a substantial discrepancy in the post-closure water balance. Comment stated that the monthly streamflow change reported in the DEIS appears to substantially underestimate streamflow. Comment raised question about whether the water management pond will be used to buffer streamflow changes into perpetuity.	With regard to the apparent discrepancy in the post-closure water balance and the monthly streamflow reported in the DEIS: Information received through response to RFI-138 (Knight Piésold 2019s) provided explanation, and adequately described the differences and cleared up apparent discrepancies. Text in the EIS has been revised. With regard to the WMP, the pond feature would not be present post-closure.
Surface Water Hydrology—watershed model time-step	Several comments stated an hourly (event level) time-step should be used to adequately predict project impacts, including impacts from storm events.	The impacts to biological resources have now been evaluated based on a daily time step (Section 4.24 and Appendix K4.24, Fish Values). Use of a monthly time step is likely satisfactory for an evaluation of the mine site water balance because of the storage capacity available in the mine site to handle day-to-day variances. Please see SOC Groundwater Hydrology—GW model recharge method (item 5) for additional rationale. No change to text in EIS.

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Topic—Subtopic	Statement of Concern	Response
Tailings Dam Failures—Acid Generation and Metals Leaching	Comments were received expressing concern about the generation of acid and leaching of metals from spilled tailings in downstream waterways, which could occur over years to centuries. Some commenters asked for clarification on the rate of acid generation and metals leaching.	Potential impacts from spilled tailings are addressed in Section 4.27, Spill Risk. The processes of acid rock drainage (ARD) and metals leaching (ML) are described in Section 3.18, Water and Sediment Quality, and summarized in Section 4.27. Additional discussion of factors influencing ARD and ML, such as climate, pH, and dissolved oxygen, has been added to Section 4.27. The generation of acid from PAG materials requires exposure of the sulfide minerals to oxygen. When the minerals are exposed to air, this process happens on a timescale of years to decades, depending on conditions. The process of acid generation is greatly minimized when the PAG material is submerged under water, depending on the levels of oxygen present in water (very little oxygen in still water; some oxygen present in flowing/circulating water). The metals present in solid tailings particles are not immediately soluble in water, and therefore not immediately bioavailable. Leaching of metals from spilled tailings would require years to decades, depending on conditions. If spilled tailings are recovered in a timely manner, any potential leaching of metals would be so minor as to not cause water quality criteria exceedance, largely due to constant dilution. Where tailings are not recovered, metals could be leached on a timescale of years to decades, and could cause water quality criteria exceedance. Estimates of ARD and ML onset vary with conditions between field and laboratory conditions. Due to the cold climate in the project area, ARD and ML would be expected to be relatively slow, because frozen conditions for most of the year retard these chemical processes. Particle size also plays a role in these chemical processes. Fine particles such as tailings have a large surface area relative to their size, and therefore can be chemically reactive on a faster time scale than larger exposures of rock. Section 4.27 uses a conservative estimate of "years to decades" to cover the potential for ARD and ML. As tailings particles are flushed downstream and remobilized, they would continue to be capable of generating acid and metals in the downstream environment, depending on conditions. As described in Section 4.27, the processes of ML and ARD are relatively slow, and any acid or metals generated would be constantly diluted, so that impacts would likely not be measurable above background variation.

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Topic—Subtopic	Statement of Concern	Response
Tailings Dam Failures—Alternative Dam Construction	Commenters have questioned the use of earthen dam materials, and some have suggested that the tailings dams be constructed of concrete rather than earthen materials.	It is industry standard practice to construct tailings dams with earthen materials rather than concrete for the following reasons, which have been added to Appendix B of the EIS: • Tailings dams must be flexible so that they can deform as the tailings loads change. Concrete is rigid and cannot deform, but is subject to cracking, which must be prevented. • Tailings dams are typically built in stages as mining progresses, and concrete structures are not as amenable to staged construction as are earth fill or rock fill dams. • Earth fill and rock fill dam construction require readily available equipment, labor, and materials; while concrete structures require specialty equipment and labor, and imported materials. • Imported materials for concrete would require huge transportation of cement and other concrete additives, which would have a significant impact on transportation needs. • Manufactured aggregate for concrete would require large on-site screening and batch plants plus material stockpiles and infrastructure that would require considerable land. • Concrete batch plants would need to shut down each winter and be re-commissioned each summer for the construction season. • Concrete production would require a fleet of specialty concrete trucks that would be idle during the non-construction season, while regular soil and rock haul trucks could be used year round. • A fleet of concrete trucks would require their own maintenance shop and winter storage facility, which will further impact the mine site footprint area. • Mine sites are typically remote, so tailings dams are most economically built by using on-site materials, as opposed to hauling in large quantities of materials. • Concrete is much more expensive than earth fill or rock fill, especially in remote cold climates.

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Tailings Dam Failures—Blasting agents	One comment noted that nitrate and ammonia, residues from blasting agents, could be present in TSF supernatant water, and recommended including these residues in the spills impacts analysis.	Section 4.27, Spill Risk, has been corrected to state: "Bulk tailings would also contain residues of Ammonium Nitrate and Fuel Oil (ANFO), an emulsion-based blasting agent (explosive). ANFO may cause long-term adverse effects to the aquatic environment (Orica 2015). Ammonium Nitrate is widely used as a fertilizer and applied to the soil in agricultural areas. Ammonium Nitrate may be hazardous to water quality but is biodegradable (New Jersey Dept. of Health 2016)." The impacts analysis has been updated to note the potential hazard of residual ANFO. Due to the small amount of ANFO released, coupled with dilution in the downstream environment, impacts would likely be localized and of low magnitude.
Tailings Dam Failures—Bulk tailings not inert	Commenters have noted that the bulk tailings would be capable of generating acid and leaching metals, and are therefore not inert. Commenters do not approve of the term "relatively inert" used in the DEIS text.	The single incidence of the term "relatively inert" has been removed from Section 4.27, Spill Risk. The section describes bulk tailings as having a "low potential for ARD and ML" as compared to pyritic tailings.
Tailings Dam Failures—Centerline versus Downstream dams	Commenters requested that the EIS include additional discussion on centerline versus downstream dam construction methods, including the difference in footprint, cost, safety, and whether lining the downstream face of the downstream dam would increase the safety factor.	Downstream versus centerline construction methods are addressed in terms of spill risk in Section 4.27, Spill Risk, and addressed in terms of technical engineering design in Section 4.15, Geohazards and Seismic Conditions. Details on the footprints of the two dam designs are provided in Chapter 2, Alternatives. There is no available information on the cost of the two dam designs. Downstream dam lift methods involve placement of dam materials on top of the existing dam, extending the dam up and outward in the downstream direction. Centerline dam lift methods involve placement of dam materials partially on top of the existing dam, and partially on top of tailings, so that the dam grows higher with a lesser increase in dam footprint. The Applicant would construct dams built by either method to a factor of safety rating of 1.9 to 2.0. Section 4.15, Geohazards and Seismic Conditions, has been expanded to provide additional information on TSF design. The mine site layout is designed to reduce water levels in the bulk TSF, with the large main WMP storing the majority of the excess fluid. Lining of the downstream face of the downstream (north) dam would allow fluid levels to rise in the TSF, reducing the stability of the dam and increasing the consequences of potential failure. Because the bulk tailings are predominantly non-PAG material, a subaqueous cover is not required.

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Tailings Dam Failures—Dam Failure Downstream Modeling	Comments were received on the downstream modeling conducted for the dam failures, including: HEC software used to model the dam failures is not state-of-the-art, and better hydraulic modeling software should be used for detailed modeling. Impacts should be addressed for low and high stream flow levels, not just the mean annual discharge (MAD). Include discussion of uncertainties associated with the modeling, and how the uncertainties could impact model results. Include information on how the volume of pyritic tailings released was selected. Clarify how dilution of untreated contact water was determined. Include information on choice of modeling Newtonian versus non-Newtonian fluid flow. The modeling process was rushed.	Section 4.27, Spill Risk, describes the Hydrologic Engineering Center’s River Analysis System (HEC-RAS) two-dimensional hydraulic model used to model flood wave propagation and attenuation. The model was developed by the USACE for modeling open-channel flows, and is FEMA-approved. In addition, hydrodynamic modeling was used to assess the propagation and attenuation of flows from the failed pipelines. Because it was not practicable to run three separate models for each scenario, the MAD was selected for the quantitative analysis of impacts. Lower and higher stream flow levels are addressed in the EIS qualitatively. Uncertainties with the modeling are addressed in Knight Piésold Failure Model Bulk TSF (Knight Piésold 2018o) and Knight Piésold Failure Model Pyritic TSF (Knight Piésold 2018p). To determine the volume of pyritic tailings released in the scenario, the FMEA workshop participants determined by consensus a reasonable thickness of settled tailings that would become entrained in the supernatant as it drained from the TSF. A 1-foot thickness was determined appropriate, and the volume was then calculated based on that thickness (1 foot across the entire surface area of the TSF). It was recognized that a greater thickness of tailings would likely be entrained near the dam breach, and lesser amounts on the opposite side of the facility. Downstream dilution of untreated contact water and supernatant fluids was determined based on drainage-specific hydrologic data using MAD water levels (Knight Piésold 2018o; Knight Piésold 2018p; Knight Piésold 2018q). Modeling flow as Newtonian or non-Newtonian is very case-specific, depending on the exact viscosity of the fluid/solids content, as well as any potential dilution of the solids content in the downstream environment. Due to the concentration of solid tailings particles in the release scenarios, combined with the downstream streamflow, modeling the failures with Newtonian flow was appropriate. The modeling process was conducted in an efficient but reasonable timeframe. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Tailings Dam Failures—Downstream Impacts	Commenters expressed concern that a tailings release would negatively impact resources in the downstream environment (besides fish and wildlife resources, which are covered in separate SOCs). Concerns were expressed for impacts on villages, Native Allotments, downstream drinking water, subsistence resources, sediment, commercial fisheries, wetlands and other vegetation, the ecosystem in general, etc. Some commenters questioned the duration of impacts. Many commenters felt that this topic required more analysis in the EIS. For downstream safety concerns from flooding/tailings deposition see the SOC: Flooding Danger Downstream.	Potential downstream impacts from two tailings release scenarios on various resources are addressed in Section 4.27, Spill Risk. Portions of this section have been expanded with additional detail. Appendix K4.27 has been added to clarify how the design of the bulk TSF with no water cover decreases the probability of a large-scale release of tailings. The primary impacts to the downstream environment from the analyzed scenarios would be a temporary reduction in water quality, including an increase in total suspended solids (TSS) and levels of metals that would exceed water quality criteria. Because these impacts would be temporary and localized, the reduced water quality would not be expected to have measurable impacts on most other resources. The EIS notes that no downstream communities have been documented as using impacted surface water as a drinking water source (ADEC 2018f). Text was added to Section 4.27, noting that it is unknown/not documented if private users use surface water as a drinking water source. The primary immediate impact of a tailings release would be elevated TSS and sedimentation from the solid tailings particles, which could bury/alter streambed habitat and potentially smother fish eggs and benthic organisms. Recovery of spilled tailings would minimize the duration of this impact, depending on the size of the spill. See also SOC: "Tailings Dam Failures—Acid Generation and Metals Leaching."
Tailings Dam Failures—Downstream Impacts to Fish	Comments have suggested that the impacts of a tailings release to fish and aquatic resources have been underestimated in the EIS. Concerns were raised about the impacts of increased TSS, elevated metals, and bioaccumulation of metals. Elevated copper levels were a particular concern, including potential impacts of copper on the ability of fish to navigate.	Potential impacts of a tailings release on fish and aquatic resources are addressed in Section 4.27, Spill Risk. A range of toxicological effects to individual fish due to metals and other pollutants has been reported in the literature, but implications of each toxic mode of action remain unclear with respect to population-level impacts. Typically, only the apical endpoints such as survival, growth, and reproduction are used in regulatory ecological risk assessments. Due to its significance on homing capabilities of salmon, fish olfactory impairment due to copper has been discussed in Section 4.24, Fish Values. Those discussions have been augmented by inclusion of more recent literature, and summarized in Section 4.27. Discussion of potential impacts through bioaccumulative metals (such as mercury, selenium, and cadmium) by fish and other wildlife has also been expanded in Section 4.23, Wildlife Values, and Section 4.24, Fish Values, as applicable. Revised discussions of turbidity and TSS impacts have also been included in the EIS.

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Tailings Dam Failures—Downstream Impacts to Wildlife	Concerns were expressed about the impacts to birds and wildlife downstream of a potential tailings or untreated contact water release.	Potential impacts to birds and wildlife from a release of tailings or untreated contact water have been addressed in Section 4.27, Spill Risk. Minor additions have been made to the text to provide more detail on impacts.
Tailings Dam Failures—Dry Stack Tailings	Comments were received that encourage consideration of dry stack storage of the tailings. Some commenters noted that dry stack or dry storage of tailings is the only storage method that would prevent tailings releases.	The option to store tailings in the dry stack method was considered in the Preliminary List of Project Options Being Considered (see Appendix B, Alternatives Screening). This method was only considered to be an option for the bulk tailings, because the pyritic tailings would require subaqueous storage to minimize the potential for generation of acid. The dry stack method was ruled out as not practicable due to logistics, largely due to the high volume of tailings that would require processing/ filtering. No change has been made to the EIS as a result of these comments.
Tailings Dam Failures—Erosion from tailings release	Commenters noted that a tailings release would erode streambanks, destroy riparian vegetation, and could cause channel evulsion. The commenters request that the EIS consider long-term habitat losses from erosion and sedimentation, noting that it could take decades for streambanks to stabilize, and request analysis of chronic erosion and sedimentation.	Section 4.27, Spill Risk, addresses the potential impact of erosion due to spills of bulk and pyritic tailings. The inundation modeling that was conducted for the tailings release scenarios calculated the bed shear stress downstream of the release to determine the potential erosive forces of the fluid and solid tailings. Erosion of streambeds, riverbanks, and surrounding soils where overbank flooding occurs is addressed for both release scenarios. As outlined in the spill response sections, the Applicant would repair erosion damage in the impacted tributaries and at the downstream confluence with the NFK and SFK, if required. For the bulk TSF release, the EIS acknowledges that localized erosion and resultant sedimentation and elevated TSS downstream could continue for months to years during stream stabilization efforts. For the higher-energy pyritic TSF release, the EIS acknowledges that chronic bank erosion could result until the banks stabilize, and that months to years may be required to stabilize the altered stream morphology. Section 4.27 of the EIS also states that erosion from the higher-energy pyritic tailings release scenario, in particular, would cause localized wildlife habitat loss and high-intensity impacts to fish habitat. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Tailings Dam Failures—Expanded Mine Scenario	Comments suggested that the EIS consider the risk of TSF failure during an expanded mine scenario. Commenters requested additional risk analysis for the expanded mine scenario, and impacts analysis of expanded mine scenario dam failures. Commenters expressed concern that in the expanded mine scenario, the pyritic tailings would not be submerged in a subaqueous environment, and would be generating acid and leaching metals over time.	The Cumulative Effects section in Section 4.27, Spill Risk, has been revised. Impacts of potential failures in an expanded mine scenario are addressed qualitatively in comparison with the quantitative impacts analyzed for the two main TSF failure scenarios. The EIS states that spills during an expanded mine scenario could potentially involve larger volumes over a larger geographic area. The FMEA risk analysis considered risk of failure during operations and closure, but did not specifically address risks for the expanded mine scenario. In the expanded mine scenario, a second pyritic TSF would be constructed to store additional pyritic tailings. Both pyritic TSFs would continue to maintain PAG tailings in subaqueous conditions. At the close of mining after 78 years, the contents of both pyritic TSFs would then be emptied into the open pit. The open pit would be allowed to fill with water (as previously described for the project) to maintain the PAG material under subaqueous cover in perpetuity. Therefore, in the expanded scenario, pyritic and PAG materials would remain under subaqueous cover, minimizing the generation of acid.
Tailings Dam Failures—Fate and Behavior of Released Tailings	Commenters requested that the EIS provide more information on the ability of fluid-saturated tailings in the bulk TSF to flow. Comments also requested information on the sediment quality of the tailings.	Section 4.27, Spill Risk, addresses the chemical and physical properties of the tailings stored in the two TSFs, including their ability to flow and their chemistry. Appendix K4.27 has been added and provides additional information on the level of saturation of tailings and the behavior of thickened tailings.
Tailings Dam Failures—Flooding Danger Downstream	Commenters have expressed concern about human safety downstream of tailings release floods, including risk to people and infrastructure from the tailings fluids and solids.	Potential safety impacts from tailings release scenarios are addressed in Section 4.27, Spill Risk. The nearest downstream community from the mine site is the village of New Stuyahok, which is 105 river miles downstream from the mine site by way of the NFK, and 113 miles downstream by way of the SFK. Modeling of the release scenarios presented in Section 4.27 show that at that distance from the mine site, there would be no observable rise in water levels. Modeling results of the release scenarios show deposition of tailings on approximately 46 acres of floodplains downstream of the bulk TSF release site, and 220 acres of floodplains downstream of the pyritic tailings release site. No deposition of tailings would be expected on floodplain areas as far downstream as New Stuyahok, even in a much larger release scenario.

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Topic—Subtopic	Statement of Concern	Response
		Under regulations in 11 AAC 93.164(b), certification of the embankments by the ADSP would require an Emergency Action Plan that may include dam failure analysis and/or inundation mapping. Inundation mapping would demonstrate the potential for flooding hazards prior to certification of dam construction, and would include the potential extent of flooding below a dam after failure; downstream structures or other development at risk; flood wave depth and arrival times; roads, evacuation routes, safe zones, and staging areas; and other information needed to minimize danger to life and property. No changes were made to the EIS.
Tailings Dam Failures—FMEA	Comments were received on the FMEA workshop, including the importance of risk assessment to characterize probability and consequences of tailings dam failures; objectives of the risk assessment; decisions on workshop participants; risk assessment is not possible when engineering plans are at a conceptual level only; the workshop did not consider a wide range of failure scenarios; post-closure failure of the bulk TSF was not considered; the workshop made incorrect conclusions based on limited information; the FMEA was biased due to the presence of Applicant representatives; and the FMEA process was rushed.	The EIS-Phase Failure Modes and Effects Analysis (FMEA) workshop is described in Section 4.27, Spill Risk. The full EIS-Phase FMEA Report is provided in AECOM 2018l. The USACE acknowledges the importance of risk assessment for tailings dams. The EIS-Phase FMEA was conducted for EIS purposes, to select appropriate scenarios for impacts evaluation. FMEA participants were professional engineers with extensive technical experience in the mining industry. It would not be useful or beneficial to open up such a workshop to attendees without relevant engineering expertise. NEPA does not require advanced engineering plans to evaluate potential impacts. See also the SOC: "NEPA Process—Conceptual Design Level Only." The FMEA addressed a wide range of failure scenarios (failure modes). Scenarios selected for analysis were those with relatively low probability and relatively high consequences. The FMEA did address the risk of bulk TSF failure in post-closure. As addressed in Section 4.27, failure rates for TSFs decline after the close of operations, when materials are no longer being added to the facilities. Failure rates for tailings in dry closure are particularly reduced compared to typical water-covered tailings ponds. Therefore, the likelihood of bulk TSF failure in post-closure was rated to be extremely low. The conclusions drawn from the FMEA workshop were based on decades of professional experience with tailings dam construction, operations, management, etc. The information available for the workshop was appropriate for an EIS-Phase FMEA. Additional risk

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		assessment would be conducted based on more advanced engineering design level. It was necessary to include members of the engineering firm hired by the Applicant to provide relevant project details that may not have otherwise been available. The FMEA participants also included state regulators and third-party environmental professionals. The FMEA process allowed adequate time to meet workshop objectives. No changes were made to the EIS.
Tailings Dam Failures—Full Tailings Dam Breach Analysis	Concerns were expressed that the EIS evaluates only small-scale releases of tailings, and requests were received to evaluate impacts from a large-scale tailings release/catastrophic failure/full dam breach. Commenters suggested that the impacts of a full tailings dam breach would be catastrophic.	Section 4.27, Spill Risk, addresses the probability and potential impacts of two tailings release scenarios that were selected for analysis based on project-specific design information. See Section 4.27 and SOC: "Tailings Dam Failures—FMEA" for more information. Appendix K4.27 has been added to the EIS to address the probability and potential impacts of a full tailings dam breach of the bulk TSF, based on project-specific design information. This Appendix clarifies that the bulk TSF has not been designed as a water-inundated facility; fluid would freely drain from the main embankment of the TSF, promoting unsaturated conditions in the stored tailings. Appendix K4.27 provides additional review of historic dam failures, noting that the majority of failures were from water-inundated TSFs, which held wet tailings slurries behind upstream dams, as compared to the thickened and drained tailings that would be stored behind downstream and centerline dams. Appendix K4.27 also provides a review of existing full dam breach models, which assume a water-inundated TSF, and describes how these models are relevant/not relevant to the project.
Tailings Dam Failures—Historic Dam Failures	Commenters cited downstream environmental impacts from historic tailings dam failures, particularly the 2014 Mt. Polley tailings dam failure in Canada and the two recent tailings dam failures in Brazil, and suggested that similar impacts could occur from a dam failure at the project. Commenters requested that the EIS include more historical analysis of tailings dam releases, and stated that the EIS descriptions of recent mining releases understate the level of damage to watersheds. Commenters also asked for examples of other mines that had successful tailings recovery after a spill.	Section 4.27, Spill Risk, provides historical examples of tailings dam failures, including the 2014 Mt. Polley failure. This section has been augmented with additional discussion of recent failures. Appendix K4.27 has been added to the EIS, which includes additional review of historic dam failures, including the Mt. Polley failure and the Samarco and Brumadinho failures in Brazil. Many historic tailings dam failures in the 20th century had no spill response/tailings recovery efforts. Tailings left in place in downstream drainages were able to generate acid and leach metals over periods of decades, causing adverse impacts to downstream watersheds. In

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		modern times, spilled tailings are more readily recovered where practicable, reducing the long-term impacts of tailings spills. The Mt. Polley dam failure is the most recent relevant example in which tailings that were considered "recoverable" were recovered. Water quality downstream of the Mt. Polley release was reduced for approximately 6 to 9 months, after which time the water quality returned to baseline (Nikl et al. 2016). Salmon in the Quesnel Lake watershed downstream of the Mt. Polley release returned to spawn in high numbers in 2018, 4 years after the spill (Williams Lake Tribune 2018). This information has been added to Section 4.27.
Tailings Dam Failures—Human Error	Commenters cited reports stating that virtually all historic tailings dam failures could have been prevented by proper design and/or maintenance. Commenters state that tailings dams are complex systems whose reliability is contingent on flawless planning, geotechnical investigation, design, construction, operations, monitoring, regulation, and risk management; and that all of these are subject to human error.	The observed causes of historic tailings dam failures are summarized in Section 4.27, Spill Risk, and addressed in more detail in Appendix K4.27. The EIS acknowledges that human error is the ultimate cause of most tailings dam failures, stating that: "The only common factor in all major TSF failures has been human error, including errors in design, construction, operations, maintenance, and regulatory oversight." This recognition has led regulators to increasingly recommend that mine operators use an "Independent Tailings Review Board" (ITRB) made up of experts in dam engineering to review the design and operation of tailings dams and TSFs. ADNR Dam Safety draft guidelines state: "ADNR Dam Safety recommends that the technical services team manager retain and maintain an independent engineering review board to review the design and operation of tailings dams and TSFs at a mine." The Applicant has agreed to employ an ITRB in accordance with current accepted practice and ADNR draft guidelines, as stated in the EIS in Section 4.15, Geohazards and Seismic Conditions. See also Topic: Tailings Dam Failures/Subtopic: ITRB Mitigation. No change has been made to the EIS as a result of these comments.
Tailings Dam Failures—Impact-BB Extended Marine Fisheries	Comments were received stating that impacts to the downstream marine environment (Bristol Bay and the Bering Sea) were not addressed in the tailings release scenarios.	No impacts to Bristol Bay and the Bering Sea would be expected from the analyzed tailings spill scenarios. Text in Section 4.27, Spill Risk, has been clarified to note this. Sedimentation and elevated metals impacts were modeled as far downstream as the mouth of the Nushagak River, where it feeds into Bristol Bay. Where the river drains into Bristol Bay, the TSS and metals

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		content would be immediately diluted to within the most stringent water quality criteria. See Section 4.27, Spill Risk. Tailings particles would be fine-grained (mostly silt and clay-sized). These small particles would be flushed into the ocean water and rapidly redistributed by waves, tides, and currents. Tailings particles flushed into the marine environment would be subaqueous (under water), and would therefore not generate acid. Some of the metallic tailings particles could leach metals on a timescale of years to decades. In the marine environment, any metals leached would be so heavily diluted by seawater over such a long timescale, that the impact would not be measurable, compared to natural background variation.
Tailings Dam Failures—Impacts Analysis	Commenters suggested that stated impacts were underestimated or that impacts analysis was unclear for some resources. Commenters also requested analysis of impacts using different assumptions, such as increased deposition of tailings, more rapid generation of acid and leaching of metals from spilled tailings, and subsequent greater impacts to water quality. Commenters questioned the rate of dilution of large-volume releases into small headwater streams. Comments also suggested specific edits to the text.	Impacts analysis of tailings dam failures is addressed in Section 4.27, Spill Risk. Acid generation and metals leaching rates cited in the EIS are addressed in Section 3.18, Water and Sediment Quality, and summarized in Section 4.27. Rate of dilution of released tailings was based on quantitative downstream modeling, which took into account the local stream conditions under MAD conditions. Specific comments on text edits to the impacts analysis were considered, and EIS text was revised where appropriate.
Tailings Dam Failures—Impacts to UTC and Iliamna Lake	A comment was received noting the groundwater exchange between the South Fork Koktuli and Upper Talarik Creek watersheds, and requesting that the EIS address the potential for a tailings dam release to impact Upper Talarik Creek and Iliamna Lake.	Section 4.27, Spill Risk, states that there is groundwater exchange between the SFK and UTC watersheds. The section states that: "Some surface water flow in the SFK naturally seeps into a shallow groundwater aquifer several miles south of the pyritic TSF. This aquifer releases an estimated annual average of 22 cfs [cubic feet per second] into the Upper Talarik Creek (UTC) basin (Knight Piésold 2018p). There is potential for some fluid with elevated metals from the pyritic release to permeate shallow groundwater aquifers in losing stretches of the SFK watershed. If this were to occur, there is potential for some of this contaminated groundwater to flow into the UTC watershed. Inundation modeling does not model potential seepage of the pyritic tailings release into the shallow aquifer (Knight Piésold 2018p). Due to the strong dilution from surface water and the distance from the release site, however, it is likely that any metals entering groundwater would be diluted to below ADEC groundwater cleanup levels.

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		Measurable impacts to groundwater quality in the UTC drainage basin are not likely from this scenario." No changes were made to the EIS.
Tailings Dam Failures—ITRB Mitigation	Commenters have encouraged that the Applicant adopt an Independent Tailings Review Board[1] (ITRB) to independently review the design, construction, and operation phases of the tailings dams at appropriate milestones. One comment noted that these technical reviews do not ensure that failings dam failures would not occur. [1]Also referred to as an Independent Engineering Review Board (IERB).	The Applicant has agreed to employ an independent review board in accordance with current accepted practice and ADNR draft guidelines, as stated in the EIS in Section 4.15, Geohazards and Seismic Conditions. ADNR Dam Safety draft guidelines state: "ADNR Dam Safety recommends that the technical services team manager retain and maintain an independent engineering review board to review the design and operation of tailings dams and TSFs at a mine." An IERB was not required for the EIS. No changes were made to the document.
Tailings Dam Failures—Large size of dams	Comments were received expressing concern about the large scale of the TSFs and embankments, stating that some of the facilities are unprecedented in scale. Commenters cited statistics that suggest that more recent dam failures have higher consequences due to the larger sizes/higher storage capacity of modern TSFs, necessitated by the mining of lower grades of ore and resultant higher volumes of tailings. Other commenters provided references which state that significant tailings dam failures are becoming more common as the size of TSFs increases, at the same time as cost-cutting measures are implemented.	Design of the TSFs is addressed in Chapter 2, Alternatives, and summarized in Section 4.27, Spill Risk. Low-grade ore open pit mines require the processing of a high volume of rock, therefore producing a high volume of tailings. The USACE acknowledges that the tailings storage facilities and the main water management pond are very large in scale. No changes were made to the EIS.
Tailings Dam Failures—Main WMP Probability of Release	Commenters noted that the probability of release from the Main WMP is not presented because there are no known precedents for such a large lined WMP, and therefore no reliable statistics on their failure rates are available. Commenters recommend that the EIS provide information on known failure rates for ponds that approach the same size (or the largest that is common), either with or without a liner, to support the EIS analysis. Other comments requested impacts analysis of a full breach scenario and a higher rate of leakage from the Main WMP release scenario.	The probability of failure of the Main WMP is addressed in Section 4.27, Spill Risk. The USACE acknowledges that the main WMP would be among the largest known water management ponds, as well as one of the largest known lined water management ponds. Limited data are available on failures of such large facilities, so that no meaningful failure rates could be determined. Section 4.27, Spill Risk, has been augmented to include additional information on dam failures. A full breach scenario from the Main WMP was rated as a very low probability, and therefore was not appropriate for NEPA impacts analysis. Rate of leakage from the facility could vary greatly, so a rate was selected that would have reasonable probability of occurrence and relatively high consequences to analyze for potential impacts.

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Tailings Dam Failures—No pyritic tailings in open pit	Commenters have noted that placing pyritic tailings back into the pit at closure is contrary to standard mining practices and would foreclose future mining of 88 percent of the remaining deposit. Commenters go on to state that by analyzing impacts for the project, the USACE has forgone completing an impacts analysis on the failure of the pyritic tailings facility post-closure.	Comment acknowledged. No change has been made to the EIS as a result of these comments. The Applicant has proposed to backfill the pit. The expanded mine scenario for cumulative effects includes an assumption that the pyritic tailings and PAG waste rock would not be returned to the open pit at the end of the 20-year mine. The expanded mine scenario assumes the pyritic TSF would be maintained until the end of the expanded mine development period, and then returned to the open pit for perpetual subaqueous storage.
Tailings Dam Failures—No Recovery of Spilled Materials	Comments requested that the EIS analyze impacts assuming incomplete recovery or no recovery of spilled tailings and other materials.	Recovery of spilled materials is addressed in Section 4.27, Spill Risk. Across large-scale industries such as the mining industry, it is standard practice to recover spilled materials to the extent possible/practicable. Spill response and recovery are integral components of these industries. Various private companies and governmental organizations specialize in spill response and recovery. Section 4.27 acknowledges the difficulty of recovering spilled materials. In scenarios where full recovery of spilled materials would be difficult to impossible, the EIS acknowledges this, and states the impacts, assuming that some portion of the spilled materials would not be recovered. Clarifying text was added to Section 4.27 where appropriate.
Tailings Dam Failures—Probability of Failure	Concerns were raised about the probability of failure of the tailings dams, during both operations and closure, and the methods used to determine that probability. Some commenters stated that the probability of dam failure increases with dam lifetime. Other commenters noted that the failure rate of tailings dams has increased in recent years.	The probability of tailings dam failure is addressed in Section 4.27, Spill Risk. Additionally, Appendix K4.27 was added to provide more background information on the reduced risk of significant tailings spills from the bulk TSF compared to historic water-inundated TSFs. No further changes were made to the EIS. An FMEA risk assessment workshop was conducted by a team of experts in dam design/construction/operation and failures. The FMEA rated the probability and consequences of a wide range of potential failure modes during both operations and closure, based on project-specific engineering design, historical data, local site conditions, etc. The final report from the FMEA provides further details (AECOM 2018l). ADNR Alaska Dam Safety Program approval is required to “construct, enlarge, repair, alter, remove, maintain, operate or abandon” a dam. Tailings dams would all be constructed to the Class I hazard classification (highest potential hazard) and constructed with Factors of

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		Safety of 1.9 to 2.0. The Applicant has committed to employing an ITRB in accordance with current accepted practice and ADNR draft guidelines (AECOM 2018k). Based on global tailings dam failure data, the probability of tailings dam failure occurs near the end of the active mining period, when tailings dams contain the highest volume of material, including solid tailings and supernatant fluid, and are still being actively raised. After active mining ceases and no additional tailings are added to the TSFs, the rate of tailings dam failures declines. Text in Section 4.27 has been added noting the increased failure rate of tailings dams in recent years.
Tailings Dam Failures—Process Hazards Analysis	One commenter noted that a Process Hazards Analysis (PHA) would be performed after completion of more detailed engineering design, and had suggestions on how to perform the PHA.	Hazard operations review, such as a PHA, are a standard step in the engineering process that would take place at a later phase in the permitting process to inform a detailed design of the process plan. No change has been made to the EIS as a result of this comment.
Tailings Dam Failures—Recovery of Tailings	Commenters questioned how recovery of tailings and remediation would be achieved in the event of a large tailings spill. Comments also stated that cleanup and recovery activities in the remote, roadless area would result in additional damage to the environment.	Recovery of spilled tailings is addressed in Section 4.27, Spill Risk. The section outlines the remedial actions that the Applicant would take in the event of a release. The following information has been added to Section 4.27: "The State of Alaska does not have specific requirements for clean-up of spilled mine tailings. As per Alaska Statute 27.19.02, the mine site must be returned to a stable condition, compatible with the post-mining land use (AS 27.19.02)." Section 4.27 notes that excavation or dredging to recover spilled tailings could cause erosion and/or damage to vegetation, and that recovery of the tailings may not be justified in all areas, depending on the thickness of deposited tailings. This discussion has been augmented to note that habitat restoration could be required after tailings recovery activities.
Tailings Dam Failures—Release Scenarios	Commenters stated that the scenarios analyzed were limited, and had suggestions for additional/modified scenarios, including full tailings dam breach, larger volume releases, large-scale dam overtopping event, additional/larger liner failure releases, large post-closure earthquake-induced failure, failure of the pyritic TSF into the Main WMP, long-term discharge of leachate from the TSFs and the water management ponds, leaks from seepage collection ponds, leaks from the open pit from delayed	Tailings release scenarios are addressed in Section 4.27, Spill Risk. An EIS-Phase FMEA workshop was conducted to determine appropriate release scenarios to be evaluated for potential impacts. A team of experts in dam design/construction/operation and failures rated the probability and consequences of a wide range of potential failure modes during both operations and closure, based on project-specific engineering design, historical data, local site conditions, etc. Scenarios

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	spill response scenarios, and releases from the other, smaller embankments, some of which have lower water quality. Some commenters compared the analyzed release scenarios to those applied in EPA and Lynker tailings dam failure models.	were selected that were relatively low probability with relatively high consequences. It would be beyond the scope of NEPA to analyze impacts from numerous hypothetical release scenarios. The scenarios analyzed were selected based on their probability of occurrence and the severity of consequences. USACE analyzed impacts from the embankments that would hold the largest volume of materials to cover the most severe range of potential impacts. Note that the impacts reported in the EIS are similar to the impacts reported from the Lynker model, the main difference being the total volume of release. The volume of release applied in the Lynker model was based on historic failures from water-inundated facilities, and not the permeable TSF design proposed by the Applicant, which would have no water cover. Appendix K4.27 has been added to the EIS to more fully address the Applicant's TSF design; provide additional review of historic failures; and address the relevance of the EPA and Lynker failure models.
Tailings Dam Failures—Risk of TSF Failure in Perpetuity	Concerns were expressed that the DEIS addresses the risk of a tailings dam failure only during the 20 years of mine life, and that this risk needs to be addressed for tailings that would be stored in perpetuity. Some commenters stated that the risk of failure would increase over time, noting that damaging earthquakes could occur in the project area in perpetuity.	Section 4.27, Spill Risk, addresses the fate of pyritic and bulk tailings in post-closure. Pyritic tailings would be removed from the pyritic TSF at the close of operations and placed in the open pit. The pyritic TSF tailings pond would therefore not exist in perpetuity. The open pit would be allowed to fill in with water, so that the pyritic tailings would be in subaqueous storage, thereby minimizing the potential for generation of acid from the PAG material. Bulk tailings would remain in place in perpetuity in "dry storage." The bulk tailings would not be covered by water in perpetuity, and would therefore not be in a conventional "tailings pond" in perpetuity. The bulk tailings would be vegetated, allowed to drain, and would exist in perpetuity as a landform. A geomembrane liner may also be applied over the tailings to increase stability and reduce water infiltration into the tailings. Risk analysis for a bulk TSF failure considered perpetual dry storage. Tailings storage in dry closure versus in a conventional tailings pond reduces the risk of a dam failure. Based on global statistics, the probability of tailings dam failure does not increase linearly over time. The highest probability of failure occurs

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		near the end of the active mining period, when tailings dams contain the highest volume of material, and the embankments are still being actively raised. After active mining ceases and no additional tailings are added to the TSFs, the rate of tailings dam failures declines. The USACE acknowledges that the probability of an earthquake that could impact the bulk TSF does increase over time. No changes were made to the EIS.
Tailings Dam Failures—Seasonal Impacts	Commenters requested more details on how potential impacts of a tailings release would vary during specific seasons; for example, during high snow conditions, and frozen river conditions. Commenters also questioned how seasonal conditions would affect recovery efforts. One comment stated that tailings recovery would be more difficult during frozen conditions.	Potential impacts of a tailings release during frozen and non-frozen conditions are addressed in Section 4.27, Spill Risk. The section also notes how recovery efforts would be impacted by different seasonal conditions; for example, frozen and non-frozen. No changes were made to the EIS.
Tailings Dam Failures—Secondary Metal Salts	Commenters request that the EIS address the formation of secondary metal salts on the deposited tailings as a long-term, seasonal source of contaminated leachate.	Impacts from deposited tailings are addressed in Section 4.27, Spill Risk. Text has been augmented to note that the formation of secondary metal salts is not likely from the release scenarios, but that if they were to form, the potential impacts from their dissolution would be similar to impacts from metals already described in the EIS.
Tailings Dam Failures—Sedimentation and TSS	One comment noted that sedimentation and TSS from spilled tailings could overwhelm the amount of water present in a given channel, in which case, solid tailings would be in contact with the water for a long period of time. The comment requested that the amount of TSS that could be expected to be generated throughout the water system should be estimated for comparison to water quality criteria, and to evaluate impacts on aquatic life.	Section 4.27, Spill Risk, addresses sedimentation and TSS impacts from spilled tailings. Large, thick deposits of tailings that overwhelm water present in the channel would be recovered by excavation and/or dredging. Excavation of streambeds could have additional impacts on habitat. Modeling of the tailings release scenarios presented in Section 4.27, Spill Risk, includes modeled levels of TSS that were compared to water quality criteria. These values were used to evaluate impacts on aquatic life and other resources, as reported in the EIS. No changes were made to the document.
Tailings Dam Failures—Spill Response	Commenters requested more information on spill response measures, noting that the area is very remote, and mobilizing a spill response would be very difficult. Some commenters suggested that a draft emergency action plan (EAP) be included or referenced in the EIS. Other commenters requested post-spill mitigation and monitoring information, particularly for groundwater.	Spill response measures that the Applicant has described for the tailings release scenarios are outlined in Section 4.27, Spill Risk. The section has also been augmented with additional spill response measures committed to by the Applicant. As noted in Section 4.27, Spill Risk, an EAP would be required by the State of Alaska Dam Safety Program to permit the Class I and Class II dams for the mine site. The EAP would be available to direct

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		appropriate response measures in the event of a failure, or in anticipation of such failure. The EAP would include response measures to adequately protect life and property, and provide coordination of emergency responders in the community (including mine personnel and downstream residents).
Tailings Dam Failures—Suggested Mitigation	Commenters have made various suggestions on mitigation for the mine site, including: Returning bulk tailings to the open pit at the close of mining, eliminating the perpetual open pit lake. Installing additional secondary containment beneath the TSFs to capture spilled tailings in the event of a release. Thicker retaining walls on TSFs.	Specific recommendations for additional mitigation (that are not already covered by measures in Chapter 5, Mitigation, or previously evaluated in Appendix B, alternatives development process) have been added to Appendix M1.0, Mitigation Assessment, for a comprehensive list of all measures identified during the NEPA process. All suggested measures have been assessed based on three factors as described in Chapter 5 (Effective, Potential Jurisdiction, Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant or implemented as a condition in a state, federal, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.
Tailings Dam Failures—Suggested Reference	Commenters submitted various reference materials (documents, articles, websites, videos, etc.) that they recommended using in EIS preparation.	Suggested references have been reviewed by Subject Matter Experts and incorporated into Section 4.27, Spill Risk, where appropriate.
Tailings Dam Failures—TSF Water Management	Comments expressed concern about TSF dam instability and overtopping due to excess fluid storage, including concerns about flooding, and increased precipitation (including rain-on-snow events) in the future due to climate change. Commenters also questioned the long-term stability of the bulk tailings in post-closure "dry closure," expressing concerns that tailings would actually remain saturated, and would be unstable due to excessive moisture in the high precipitation climate.	Water management in the TSFs is addressed in Section 4.27, Spill Risk. Additionally, Appendix K4.27 has been added to more fully describe the permeable "flow-through" design of the bulk TSF. The Applicant has stated that the main WMP would generally operate only partially full, with excess freeboard available. The average volume of anticipated contact water stored in the main WMP would be approximately 1,470 million cubic feet, with maximum storage of approximately 2,440 million cubic feet. If fluid levels in the TSFs rise, the excess fluid would be pumped into the main WMP, treated, and released. Bulk tailings would remain in place in perpetuity in "dry storage." The bulk tailings would not be covered by water in perpetuity, and would therefore not be in a conventional "tailings pond." The bulk tailings would be covered with a liner, vegetated, allowed to drain, and would exist in perpetuity as a landform. Risk analysis for a bulk TSF failure considered perpetual dry storage. Tailings storage in dry closure versus in a conventional tailings pond reduces the risk of a dam failure.

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Tailings Dam Failures—Unprecedented Bulk TSF design	Commenters have questioned the "flow through" design of the bulk TSF, stating that the design is unproven and unprecedented. Comments have also questioned the methodology and effectiveness of the bulk TSF "dry closure," including the effectiveness of the geomembrane, particularly due to the wet climate and need for perpetual water management. Comments have noted that the water table/ phreatic surface in the bulk TSF would remain high in post-closure, so that most of the tailings may remain saturated. Requests were made for the EIS to state requirements for water elevations in the TSFs that would trigger a stoppage of mining activities. Commenters have requested successful examples of similar TSF designs and examples of the dry-closure design being applied at other mines. Commenters also requested details on cost/funding mechanisms for perpetual water management of the bulk TSF.	The bulk TSF design is addressed in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, and summarized in Section 4.27, Spill Risk. These sections of the EIS have been augmented with additional design information and modeling results that provide new information on stability of the facility in closure and post-closure. In addition, Appendix K4.27, Spill Risk, has been added to the EIS to more fully describe the bulk TSF design, and its implications for probability of dam failure. The bulk TSF would be closed with a low-permeability cover to reduce infiltration of precipitation in post-closure, which would reduce tailings saturation, and cause the phreatic surface, or "water table" in the TSF to lower over time. New seepage modeling results confirm that the phreatic surface would be expected to decline in early closure, resulting in more stable embankment conditions in post-closure (PLP 2019-RFIs 006b, 008h, 130). This information has been incorporated into revised seepage analysis text in Section 4.15 and Appendix K4.15, Geohazards and Seismic Conditions, and Section 4.17, Groundwater Hydrology. Text has also been added to Chapter 5, Mitigation, to describe additional details that would continue to be developed as design progresses through the ADSP permitting process. Section 4.15 of the EIS acknowledges that at this early phase in the design, there remains uncertainty as to the final functionality of the design. The Applicant has committed to further advances in design. Significant additional engineering details on the bulk TSF design would need to be provided to the ADSP prior to application for a Certificate of Approval to Construct a Dam. Water management operational details such as requirements for water elevation that would trigger a stoppage of mining activities would be determined at a later phase in the project under the authority of ADSP. There are examples of flow-through centerline dams worldwide that are comparable in design, height, and seepage to the bulk TSF main embankment, and are operating successfully. These include the Gibraltar and Brenda mines in British Columbia and the Continental Mine in Montana. See Section 4.15 for more details. Mine reclamation financial assurances would be in place to account for post-closure management of the TSF. These financial assurances are intended to fund the implementation of the approved Reclamation and Closure Plan, including long-term care, monitoring, and maintenance

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		activities. See the SOC "Bonding or Financial Assurance—Financial Responsibility" for more information. For earthquake-related stability issues, see the SOC "Earthquakes or seismic concerns—Post-closure embankment stability," and Section 4.15, Geohazards and Seismic Conditions.
Threatened and Endangered Species (Federally Listed)—Analysis Area	Concerns were raised about why potential effects to threatened and endangered species are not analyzed for the mine site (or other terrestrial components of the project). Concern was expressed about how other factors of the mine's existence (i.e., soil displacement and pollution) may degrade or otherwise adversely affect listed species' habitat, and therefore the species.	Section 3.25, Threatened and Endangered Species, has now been updated to clearly state that no TES are known to occur in the terrestrial components of the mine site, and that only TES that occur in Cook Inlet are discussed. The analysis area has been updated and expanded to include all of Kamishak Bay and all project-related shipping traffic in Cook Inlet outside of regular shipping lanes. The analysis area is clearly defined and shown on Figure 3.25-1. Text in Section 4.25, Threatened and Endangered Species, has also been updated to ensure it reflects the update to the analysis area. Additionally, Section 4.27, Spill Risk, discloses the potential impacts to threatened and endangered species as a result of upset conditions. To address the impacts of soil displacement, acreages that represent the amount of fill material that would be placed in northern sea otter and Cook Inlet beluga whale critical habitat are included in Section 4.25.
Threatened and Endangered Species (Federally Listed)—Birds-Short-tailed Albatross impacts	Concerns were expressed about Short-tailed Albatross and how their distribution might change over the project timeline with the species recovery and effects from climate change. Concerns were expressed that the wrong document (Audubon Alaska 2017) was used to identify the species range compared to the analysis area. Concerns were expressed about how contamination from the Pebble Project—whether through routine spill, seismic rupture, catastrophic tailings dam failure, or other means—might affect short-tailed Albatross prey; and, in turn, the birds themselves.	Section 3.25, Threatened and Endangered Species, assesses current baseline environmental conditions. The EIS analysis area is outside the historical breeding range of Short-tailed Albatross; and even though individuals expand their foraging areas during the nonbreeding season, there is no indication that Cook Inlet was ever part of their historical foraging area (therefore, species recovery does not indicate they would forage in Cook Inlet). The species spends its life out at sea over the open ocean and only comes ashore to breed. Current breeding range is restricted to islands in Japan and Hawaii. Therefore, the species' potential to occur is extremely rare and Cook Inlet is outside its historical range, and therefore it is not discussed in the EIS. The Alaska Audubon 2017 citation is a reference to the Ecological Atlas of the Bering, Chukchi, and Beaufort Seas. The citation has been updated to Smith et al. 2017. This atlas depicts locations of Short-tailed Albatross and shows their geographic range. Additional references (Suryan and Kuletz 2018 and USFWS 2008c) have been added to Section 3.23 to show that Cook Inlet is outside of the geographic range of the species.

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Threatened and Endangered Species (Federally Listed)—Birds-Steller's eider impacts	Concerns were expressed that impacts to Steller's eiders were not fully expanded or detailed. Concerns were expressed about eiders flying over and through the mine site, landing on the pit lake and tailings dam, colliding with vessels and mine infrastructure, impacts of an oil spill on eider prey items, etc. Concerns were expressed that the biological assessment only assessed the impacts of construction. Concerns were expressed that the DEIS did not look at the presence of Steller's Eiders in Bristol Bay, and the impacts analysis should include the potential for a catastrophic tailings dam failure. The DEIS also fails to properly analyze impacts to Steller's Eiders in the event of an oil spill, including the potential for a heavy fuel oil spill, and how habitat loss and prey availability will interface with climate change (e.g., habitat modification and impacts to the eider's prey base through warming temperatures and ocean acidification). Furthermore, concerns regarding contamination through hydrological connectivity and internal oiling were not addressed. Comments on the biological assessment (related to analysis of construction vessels) were interspersed with comments directed at the DEIS.	Potential impacts to Steller's eiders, detailed in this SOC, are addressed in Section 4.25, Threatened and Endangered Species. The EIS analysis area does not extend to Bristol Bay; therefore, potential impacts to Steller's eiders in Bristol Bay are not discussed in the EIS. Due to the species' range in their molting and wintering area, they are not expected to fly through the mine site, and are therefore unlikely to contact the tailing pond or pit lake. In multiple years of biological surveys by many qualified biologists, no Steller's eiders were detected at the mine site, and are considered absent. Steller's eiders are typically not found more than 60 miles inland, putting the mine site outside the normal range of the species. Potential climate change trends (warming ocean temperatures and ocean acidification) are discussed Section 4.25 in light of their potential to impact Steller's eiders prey in the ocean in. In regard to potential spill scenarios, Section 4.27, Spill Risk, details the methodology used to determine potential scenarios that were analyzed and their potential impacts to Steller's eiders (such as internal oiling), their habitats, and prey. This did not include a catastrophic tailings dam failure or heavy fuel oil spill, but included analysis of the pyritic tailings dam failure and a 300,000-gallon ultra-low diesel spill. The biological assessments have been updated to include both construction and operations for the life of the project.
Threatened and Endangered Species (Federally Listed)—Fish-Impacts-Port	Concerns were expressed that fish (particularly salmon) movement would be disrupted by the port, particularly the causeway. This may affect the prey base for marine mammals.	The latest project description in Chapter 2 has been updated to include a caisson-supported causeway that will allow fish to pass between caissons. Therefore, there is expected to be no disruption of movement for fish in marine waters from the port. No impact to the prey base of marine mammals is expected.

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Threatened and Endangered Species(Federally Listed)—Impacts from shipping	Concerns were expressed about the risk of TES mortality via ship strike and the potential for behavioral changes (e.g., reduced foraging opportunity due to avoidance of areas with high noise levels) due to vessel noise from increased shipping traffic in Cook Inlet beyond the lightering location trips. Concerns were expressed that the activities would add 330 vessel trips to Cook Inlet annually, which would represent a 58 percent increase in vessel traffic in Cook Inlet compared to 2010 levels (up from 297 vessel trips; Eley 2012).	Impacts to TES from an increase in shipping (including behavioral avoidance of areas while ships are passing by and risk of injury and mortality) in Cook Inlet are recognized in Section 4.25. The potential for behavioral changes, such as reduced foraging while ships are passing, are detailed in Section 4.25, Threatened and Endangered Species. Clarifying text has been to better describe the potential impacts from increased shipping. Details of current shipping levels in Kamishak Bay and projected levels are detailed in Section 4.12, Transportation. The project description details that annually there would be 27 concentrate vessels, 33 supply and fuel barges, and it takes 10 lightering trips to fill each concentrate vessel. That equals an increase in 303 vessel trips annually (27 x 10 + 33 = 303), not 330 vessel trips. Additionally, the Eley 2012 document on page 3 of the executive summary clearly cites 480 ship port calls or transits in 2010, not 297. Furthermore, most of the vessel traffic increase would only occur between Amakdedori Port and the lightering locations as lightering vessels transit back and forth, filling the concentrate vessels. Only the 27 concentrate vessels and 33 supply barges would leave Kamishak Bay on an annual basis.
Threatened and Endangered Species (Federally Listed)—Mitigation	The BA (in Appendix G) provides multiple mitigation measures for TES; however, the DEIS does not include many of these. The DEIS only includes a reduction in vessel speed as a mitigation measure in Table 5-2. It is unclear which measures will be formally implemented. It was suggested that the Biological Opinion for Lease Sale 244, just to the north of the Amakdedori Port portion of the project area, be reviewed for examples of mitigation that could be included to avoid or minimize impacts to listed species.	The FEIS includes the mitigation measures that have been proposed by the Applicant, standard permit conditions and BMPs, and those additional measures suggested during the NEPA process that could reduce environmental impacts. However, because NEPA is an informative process, the FEIS does not identify which of those additional mitigation measures USACE, or any other permitting agency, would select in their post-NEPA permit decisions. USACE is continuing to work with the Applicant and the USFWS/NMFS on the Biological Assessments. The Biological Opinions will outline final mitigation measures and reasonable and prudent measures to avoid and minimize impacts on listed species. Mitigation measures necessary to comply with Section 10 Rivers and Harbors Act and Section 404 Clean Water Act (CWA) regulations, including those necessary to address 404(b)(1) guidelines, and to ensure that the project is not contrary to the public's interest, would be evaluated as part of the ROD, and incorporated in the Department of the Army permit, if issued. Appropriate mitigation from the Biological Opinion for Lease Sale 244 for avoiding and minimizing impacts to listed species has been added

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		to Appendix M1.0, Mitigation Assessment. Appendix M1.0, Mitigation Assessment, includes a list of additional mitigation measures suggested by the USACE and cooperating agencies, and those identified by the public during the NEPA scoping process. These measures were assessed based on three factors (Effective, Potential Jurisdiction, and Reasonable), with the goal of disclosing the likelihood that the measures would be adopted by the Applicant or implemented as a condition in a state, federal, or local permit by the responsible agencies as part of their permit decisions following completion of the NEPA process.
Threatened and Endangered Species (Federally Listed)—TES-Project Infrastructure Impacts	Concerns were raised about the potential impacts to threatened and endangered species (Cook Inlet beluga whale and its critical habitat, northern sea otter, humpback whales, etc.) from the construction of project infrastructure, including the natural gas pipeline across Cook Inlet.	Potential impacts to threatened and endangered species from the construction and operations of the natural gas pipeline across Cook Inlet are addressed in Section 4.25, Threatened and Endangered Species. Additionally, the biological assessments for consultation with the USFWS and NMFS address potential impacts (including impacts from construction of project infrastructure) to federally listed species, and are included as Appendix G and Appendix H of the EIS. The BA and EIS have been revised to better describe the potential impacts to threatened and endangered species from relevant project components.
Threatened and Endangered Species (Federally Listed)—TES-General Impacts	Concerns were expressed that mine construction and operations would harm species listed under the Endangered Species Act (ESA), including the southwestern stock of the northern sea otter, Steller's eider, humpback whale, and fin whale. Additionally, Cook Inlet beluga whales (and other species) may experience an increased risk of ship strikes and increased stress from project activities (such as a decrease in prey populations). There was concern that the DEIS focuses mainly on construction impacts and not on operations for the life of the mine. Citations should be included to back up impact assertions. There was a concern that impacts, both temporary and permanent, were incorrectly addressed. There was concern for an increase in vessel traffic and how species may react, because there is currently low vessel activity in Kamishak Bay and species may not be habituated. Concerns were expressed about construction and maintenance of the port (the need to conduct dredging) in relation to impacts to the benthic marine environment. Additional concerns include an inadequate assessment of shipping impacts (diesel fuel and concentrate	Section 4.25, Threatened and Endangered Species, addresses potential construction and operational impacts from the project (including ship strikes, increased vessel and aircraft activity in Kamishak Bay, increased stress, and loss of benthic marine habitat) on federally listed species for all project alternatives with a potential to occur in the EIS analysis area. Section 4.25 includes a revised discussion of behavioral disturbance (which can be a result of stress) to threatened and endangered species (TES) from project activities for all alternatives, including during both construction and operations. Citations have been added to back up assertions. Temporary and permanent impacts have been addressed. Impacts from construction and operations, such as maintenance dredging under Alternative 2 and Alternative 3 have been included in Section 4.25. Concerns about potential shipping impacts and cumulative impacts are addressed in Section 4.25. Potential impacts from wastewater treatment are discussed in Section 4.18, Water and Sediment Quality. Potential impacts from spills (including a tailing dam failure scenario, oil spills, and impacts on prey [salmon populations]) are addressed in Section 4.27, Spill Risk.

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	spills), a catastrophic tailings dams failure (which may result in food system collapse and long-term toxicity of food sources), wastewater treatment (impacts from failure of proper treatment of contaminants), impacts of road construction, failure to look at the full timeline and scale of the project (DEIS assessed only a 20-year mine when expansion is reasonably foreseeable), and impacts of increased air traffic. Concerns were expressed that the DEIS did not address potential impacts to California sea lions (which are being sighted in Alaskan waters). Clarification on which stocks and distinct population segments are listed under the ESA versus the Marine Mammal Protection Act need to be rectified. The DEIS does not address abundance, density, or seasonality for all of the marine mammal stocks likely to be affected by the project, and does not include sighting details such as number of marine mammals observed by species, location, group size, age/sex class, seasonality, behavior, etc. The DEIS does not provide the information necessary to determine if impacts are significant under NEPA, nor does it address any indirect effects from the project. It does not consider that permanent threshold shift (PTS), which is auditory injury, could occur. It also does not use the best available data to identify marine mammal hearing capabilities (e.g., the Cook Inlet beluga whale section does not cite NMFS [2018]). There is a lack of noise modeling in Appendix K4.25, and the effectiveness of mitigation measures is not discussed. Finally, concerns were expressed that the Biological Assessments do not fully discuss the operational impacts of the project (only focus on construction).	Additional pertinent information on TES marine mammal stocks and distinct population segments have been included in Section 4.25, where applicable. Concerns about California sea lions and their range expansion has been added to Section 3.23, Wildlife Values, because they are not a TES. Text has been clarified regarding species' federal listing status. Section 4.25 has been updated to inform the public of potential impacts, including indirect effects from the project. Section 4.25 considers the potential for permanent threshold shift from various noise sources, and Appendix K4.25 has been greatly expanded to include additional information on marine mammal hearing capabilities. Mitigation measures are presented in Chapter 5, Mitigation, and applicable measures are mentioned at the beginning of Section 4.25. Additionally, the biological assessments for consultation with the USFWS and NMFS have been updated to address potential impacts (from construction, operations, and decommissioning) to federally listed species in much greater detail, and are incorporated by reference and included in the EIS as appendices.
Threatened and Endangered Species (Federally Listed)—TES Noise Impacts	Concerns were expressed that a 2019 scientific paper (Castellote et al. 2019) on anthropogenic noise impacts to Cook Inlet beluga whales in upper Cook Inlet had not been included in the DEIS. Concerns were expressed about the extent of underwater noise impacts, noise modeling, noise impacts from thruster use during dynamic positioning of barges, and noise impacts from pile-driving. Concerns were expressed that Appendix K4.25 warranted updating the discussion of pile-driving, taking water depth and pile size into consideration; and vessel operations should reflect the range of sound source	Section 4.25, Threatened and Endangered Species, has been updated to reference the 2019 scientific paper on anthropogenic noise impacts to Cook Inlet Beluga whales (Castellote et al. 2019) where applicable. Additional information on underwater noise and impacts have been included in Section 4.25 and Appendix K4.25. Further clarification on why detailed noise modeling is not included in the EIS and Appendix K4.25 has been disclosed in the EIS. Ireland et al. (2016) was reviewed, and text where it was referenced has been revisited for accuracy. Further clarification on noise sources from project activities (pile-driving and dynamic positioning) have been included in

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	levels likely to occur from dynamic positioning, as discussed in Ireland et al. (2016).	Appendix K4.25, along with the potential impact on marine mammals in the analysis area. Furthermore, the project has been updated to include a caisson dock that would reduce impacts of underwater noise during port construction. It has been included as part of the Applicant's Preferred Alternative.
Threatened and Endangered Species (Federally Listed)—Wildlife-Beluga whale impacts	Concerns were expressed about lack of inclusion of relevant data from published sources (Castellote et al. 2016) and reports of beluga whales in Alternative 2 action area since 2011. Concerns were expressed about downplaying the importance of critical habitat in Kamishak Bay, because Cook Inlet Beluga whales do not normally occur in that area during the summer months. Additional concerns were expressed about cumulative impacts to Cook Inlet Beluga whales in the analysis area; even though the population is low, there is a potential the population will expand more into lower Cook Inlet and the analysis area. Even impacts with a "low" potential may cause population-level impacts, because the population is currently at low levels. Concerns were expressed that beluga whales swimming up the Nushagak River were not included in the EIS. Comments were received requesting scientific citations be included to support statements in the EIS. Concerns were expressed about impacts to Cook Inlet beluga whales from underwater vessel noise (during both construction and operations), vessel collisions, increase in contaminants including PAHs and other pollutants, spills, decrease in prey base, etc.	Section 3.25, Threatened and Endangered Species, has been updated to establish the baseline that Cook Inlet beluga whales are rare in Kamishak Bay, especially during summer, when impacts from construction may occur. The most recent publicly available data on Cook Inlet beluga whale detections for the western side of lower Cook Inlet have been included in Section 3.25 and shown on Figure 3.25-2. Information from Castellote et al. 2016 has been included, where appropriate. Potential impacts to Cook Inlet beluga whales have been revised in Section 4.25, Threatened and Endangered Species, to address many of the concerns expressed, including an expanded discussion on cumulative impacts. A caisson dock variant has been included (and is part of the Applicant's Preferred Alternative) that greatly reduces noise disturbance and loss of habitat. The NMFS database was searched along with other survey reports for the analysis area, and no recent beluga whale sightings have occurred since the mid-2000s. Beluga whales in Bristol Bay are not federally listed, and therefore not discussed in Section 3.25 and Section 4.25. Impacts from vessel noise and collisions and potential impacts to food resources are included in 4.25. Impacts from any spill-related topic or concern are included in Section 4.27, Spill Risk.
Threatened and Endangered Species (Federally Listed)—Wildlife-Biological Assessment	Comments were received that were specific to the USFWS and NMFS biological assessments (Appendices G and H, respectively).	All comments specific to the USFWS and NMFS biological assessments (Appendices G and H, respectively) were reviewed to determine if comments applied to the EIS. Although the comments made textual edits and additional analyses that were specific to the biological assessments, the EIS was checked to determine if similar text needed to be updated. Based on comments on the biological assessments, the language in the EIS relating to Shaw Island as a recognized haulout location and updated information from the Alaska ship strike database were included.

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Topic—Subtopic	Statement of Concern	Response
Threatened and Endangered Species (Federally Listed)—Wildlife-diesel spill impacts	Concerns were expressed about the lack of analysis related to tanker truck diesel spills on land/shore that may enter the marine environment (such as a spill over a stream, adjacent to Cook Inlet). Additionally, concerns included an underestimate of the ability to contain spills and prevent listed species (particularly Steller's eiders, humpback, and fin whales) from contacting diesel in the ocean (i.e., impacts from becoming oiled and ingesting oiled/contaminated prey were minimized). Additional concerns were expressed about the lack of detail and analysis regarding both short-term and long-term effects of a spill and multiple spills (cumulative effects) that adversely impact the ecosystem (through food chain reduction).	Section 4.27, Spill Risk, has been updated to include additional potential impacts from ULSD spills on TES if they were to occur on land, nearshore environments, and in Cook Inlet. Potential impacts to federally listed species (Steller's eider, humpback and fin whales) and their prey—both short-term and long-term—have been updated.
Threatened and Endangered Species (Federally Listed)—Wildlife-duration of impacts	Concerns were expressed that the duration of impacts was incorrect in terms of classifying some impacts as "temporary," when they should be considered "permanent," especially if they last for the life of the mine. Operations of the port need to be considered across the entire 20-year life of the mine, and possibly longer.	Section 4.25, Threatened and Endangered Species, has been revised to include the operations of the port as occurring for the life of the project. The potential impacts analysis in Section 4.25 has been revised accordingly.
Threatened and Endangered Species (Federally Listed)—Wildlife-humpback whale impacts	Concerns were expressed that multiple threats to humpback whales may be exacerbated by the project, including entanglement, ship strike, acoustical disturbance, increase in vessel presence/disturbance, physical structures, industrial activities and byproducts, dredging and disposal, contaminants, cumulative impacts, climate change, and mining runoff. Particular concern was expressed about the increase in vessel activity in Kamishak Bay (over the life of the project), where there is currently low vessel activity.	Section 4.25, Threatened and Endangered Species, has been expanded to include additional information on entanglement risk, ship strikes, increased vessel noise and presence in an area with low vessel activity, acoustical disturbance, impacts to food sources, and other impacts. Potential impacts from contaminants and spills are discussed in Section 4.27, Spill Risk. Additional scientific literature has been included to support conclusions.
Threatened and Endangered Species (Federally Listed)—Wildlife-northern sea otter impacts	Concerns were expressed about the lack of information in Section 4.23 on sea otters and the incorrect use of a citation (USFWS 2016b). Concerns were expressed that operations of the project (>20 years of disturbance at port locations) were not adequately addressed, and that the assumption of otter habituation to vessels was premature and unsubstantiated. Concerns were expressed that qualitative descriptions such as short-term, no population-level impacts, temporary, intermittent, and short duration trivialize the impacts. Concerns were expressed about the potential impacts associated with habitat	Impacts to northern sea otters are not discussed in Section 4.23, Wildlife Values, because northern sea otters are federally listed, and are discussed in Section 4.25, Threatened and Endangered Species. The non-listed sea otter population is discussed in Section 4.23. The reference to USFWS 2016b has been corrected. Impacts to northern sea otters from vessels, habitat loss, prey availability, disturbance to foraging areas, and other impacts have been updated in Section 4.25. Impacts from climate change are discussed in Section 3.23, Wildlife Values, in conjunction with non-listed marine mammal species.

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Topic—Subtopic	Statement of Concern	Response
	loss, climate change, oil spills, prey availability, disturbance to foraging areas, water quality, and contamination on northern sea otters. Concerns were expressed that Figure 3.25-1 did not depict the most updated northern sea otter data (from Garlich-Miller et al. 2018). Additional scientific literature citations were provided and requested to support statements in the EIS. Concerns were raised that the phrase "population-level effects" minimized potential effects on individual sea otters. Comments on Appendix K expressed a lack of discussion on noise impacts from aircraft and other above-water sources. Finally, comments were provided that updated citations about sea otter population densities in areas along the Katmai Coast and between Anchor Point and Clam Gulch.	Impacts to northern sea otters from spills have been updated in Section 4.27, Spill Risk. Figures in Section 3.25 have been updated to show the most recent survey data from spring and summer 2019 northern sea otter surveys conducted for the project. The Garlich-Miller et al. 2018 data are not displayed on figures because the 2019 data were collected in the same general area; were project specific; and show similar northern sea otter densities (there is a high density of sea otters west of Augustine Island and throughout Kamishak Bay). Additional scientific literature has been incorporated where applicable. The use of "population-level effects" has been removed. Appendix K has been updated to include aircraft noise.
Threatened and Endangered Species (Federally Listed)—Wildlife-Steller Sea Lion Impacts	Additional clarification was requested regarding the listing status of the Steller sea lion distinct population segments. Concerns were expressed that the year-round disturbance >20 years in Kamishak Bay as a result of operations (including underwater and airborne noise) at Amakdedori Port or Diamond Point (including dredging) needs to be considered for all direct effects to Steller sea lions. Additional consideration was requested regarding pipeline construction, vessel traffic and strikes, impacts to the sea lion prey, impacts on water quality, the risk and potential for spills and accidental discharges, and indirect and cumulative impacts. Clarifying the area of use (islands, islets, etc.) by Steller sea lion (both inside and beyond the analysis area) where impacts (including oil spills) may occur was requested.	The listing status of the various Steller sea lion distinct population segments has been clarified in Section 3.25, Threatened and Endangered Species. Potential impacts to Steller sea lions from construction and operations of the port (including underwater and airborne noise impacts), lightering location, natural gas pipeline, shipping, etc., have been reassessed and expanded in Section 4.25, Threatened and Endangered Species. Potential impacts of dredging at the port under Alternative 2 are discussed in Section 4.25. Potential impacts from spills are addressed in Section 4.27, Spill Risk. Additional indirect impacts to Steller sea lion (impacts to prey, water quality, discharges, cumulative impacts, etc.) are included in Section 4.25. Steller sea lion areas of use in the analysis area (Shaw Island) are described in Section 3.25, and these areas are tied back to spill risk in Section 4.27.
Transportation—Airport Impacts	There was concern about no coordination with the ADOT&PF on the improvements of state-operated airports, such as the one in Pedro Bay that could be impacted by the project or alternatives.	There are no improvements expected at the Pedro Bay airport, but agreements between the State of Alaska and the Applicant over any improvements of state-managed airports would occur if needed. No changes were made to the EIS.
Transportation—Baseline Data	Baseline wind and wave weather data were requested for Iliamna Lake, including the extent to which airport stations may be sheltered from high winds.	The existing data are sufficient for determining impacts from the project and comparing alternatives. Navigation in Iliamna Lake and project-related impacts to current air transportation systems are discussed in Section 3.12, Transportation and Navigation. No changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Transportation—Employee Transportation on Roads	Commenter noted that the project description states that non-resident personnel would stay at the work site for the duration of the work period, but personnel that live in towns connected by road would be transported daily to the work site.	Section 4.12, Transportation and Navigation, has been edited to clarify that non-resident workers would remain at the mine site during their 2-week work shifts, and personnel who live locally would be transported daily via shuttle bus.
Transportation—Expanded Development RFFA Traffic	It was requested to state the amount of additional truck traffic that could occur for the Pebble Project expansion RFFA.	For the Expanded Development RFFA, truck traffic along the transportation corridor would decrease in frequency due to diesel and copper concentrate being transported through pipelines instead of by road. Duration of use of the transportation corridor roads would extend. This has been clarified in Section 4.12, Transportation and Navigation, in the discussion about cumulative effects.
Transportation—Funding for Road and Airport Maintenance	Commenter expressed concern that the public will pay for maintenance of roads and village airstrips using tax-payer-funded projects. They asked about the increased costs to the infrastructure from project road and air traffic, and the upgrades to the Kokhanok airport, and who would be responsible for the funding.	PLP has committed to developing a transportation plan with the State of Alaska and the LPB outside of the NEPA process that will address use, funding, and access. The plan has been added to Table 5-2 showing Applicant-proposed mitigation incorporated into the project. PLP is proposing that new project roads (i.e., mine access and port access roads) would be private, and therefore PLP would be responsible for maintenance. The public would continue to maintain public roads. Impacts to existing transportation systems from the project are discussed in Section 4.12, Transportation and Navigation.
Transportation—General Impacts	Commenters asked about traffic volume, and impacts of the increased volume on the surrounding communities, and how existing traffic on the Williamsport-Pile Bay Road would be accommodated.	See the Transportation section in Chapter 2, Alternatives, for the description on traffic volume; and Section 3.12, Transportation and Navigation, for the impacts of the traffic volume on communities. How traffic on Williamsport-Pile Bay Road would be affected is discussed in Section 4.12, Transportation and Navigation. Improvement of the existing road would occur to ensure that all traffic could be accommodated. This section has been edited for clarity.
Transportation—Ice-Breaking Impacts	Commenters were concerned about the effects of an icebreaking ferry on winter travel over the ice in years of full ice cover, and how the broken ice would be monitored.	The ice breaking ferry would disrupt cross-lake snowmachine routes during years of full ice cover, and create potential safety hazards. PLP would work with communities (and supply funding) to mark and maintain snowmachine trails between communities across Iliamna Lake when lake ice is thick enough to support such traffic. Impacts would be long-term. After mine closure, the icebreaking ferry would be removed and supplies would be transported across the lake using a summer barging operation. The effects of the ice-breaking ferry on winter transportation methods are discussed in Section 4.12, Transportation and Navigation. No additional discussion has been added to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Transportation—Impacted Runways	The second runway in Port Alsworth, Wilder/Natwick Runway, was stated in a comment to have as much or more air traffic as the Port Alsworth (TPO) runway, and therefore should be added to the table in Section 3.12, Transportation and Navigation, for potentially affected airports.	Information found on Wilder/Natwick LLC (05K) Airport is as follows, according to AirNav 2019. Owner: Wild Air, LLC Use: Private Average Annual Operations: 31 Runway Surface: Gravel Runway Lighting: None Based Aircraft: 25 The annual operations listed are significantly less than Port Alsworth Airport (which has an annual operations of 1,300). Nonetheless, Wilder/Natwick LLC Airport has been added to the table in Section 3.12, Transportation and Navigation.
Transportation—Pipeline Construction impacts to traffic	A comment mentioned that traffic delays from construction of the pipeline and compressor station on the Kenai Peninsula would be cumulative to other traffic elements that exist in that area, and therefore should be regarded as an impact to traffic.	Section 4.12, Transportation and Navigation, has been edited to reflect that the construction of this portion of the pipeline could be cumulative with other local delays.
Transportation—Road Access	Commenters asked about how access would be controlled on the mine access roads and if there would be a charge to use the transportation corridor roads. There is also a concern that the roads could create an avenue for unplanned offshoot off-road vehicles and snowmachine trails to access resources. A question was raised of what would happen to the roads after project closure.	A description of road access control can be found in Section 4.12, Transportation and Navigation (Alternative 1, Surface Transportation, Transportation Corridor). Spur roads would be gated to prevent unauthorized vehicles from using the mine access road and port access road. Additional access would be coordinated between the State of Alaska, the LPB, PLP, and landowners. PLP has committed to marking known trail crossings, and implementing traffic controls for safety (PLP 2018-RFI 027). Charging for road access is unlikely on state land, but would be negotiated with landowners on private land in the use agreements. Section 4.12, Transportation and Navigation, has been edited to note that people using off-road vehicles and snowmachines could potentially create unauthorized trails from the roads or ROWs to access lands and waterbodies, but this would likely be infrequent, because access to the roads would be regulated, and therefore limited. Post-closure use of the roads would result from agreements between PLP, the landowners, and LPB.

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Topic—Subtopic	Statement of Concern	Response
Transportation—Road Feasibility	Concerns were raised about the location and grade of roads, as well as the climate and weather impacting the road safety and feasibility of construction and maintenance.	PLP would design the road to meet necessary specifications, and would have a plan of operations for long-term maintenance. No changes were made to the EIS.
Transportation—Vessel Traffic	There were concerns about how dredging and lightering operations would impact existing fishing vessel and cargo vessel traffic in Iliamna Bay under Alternative 2 and Alternative 3.	Data on current vessel traffic in Iliamna Bay could not be acquired. Potential impacts to any existing vessel traffic are discussed in Section 4.12, Transportation and Navigation. The Diamond Point port under Alternative 2 and Alternative 3 would not block the route of vessels calling on Williamsport, and existing navigation of the waterway would be maintained. No additional information has been added to the EIS.
Vegetation—Veg-Dust	Concerns were expressed about the impacts from fugitive dust on vegetation, and the inadequacy of the analysis area for indirect impacts of fugitive dust on vegetation. Suggestions were given for references to be incorporated into the discussion and analysis.	Section 4.26, Vegetation, has been revised to expand on the potential impacts from dust on vegetation, incorporating suggested references as applicable. Clarifying text has been added to explain the area of analysis for fugitive dust in the document. See also SOC Wetlands-Fugitive Dust, and SOCs in Soils that discuss fugitive dust concerns.
Vegetation—Veg-Erosion	Concerns were expressed about the amount and degree of impacts from erosion due to vegetation removal and subsequent sediment loads.	Temporary increases in sediment load are addressed in Section 4.18, Water and Sediment Quality. The location of vegetation disturbance would be limited to the road/pipeline corridors, which would be subject to BMPs and industry practices during the permitting phase to prevent erosion and increases to sediment load. Section 4.26, Vegetation, has been revised to better describe the potential impacts from vegetation removal for all project components. Additionally, temporary disturbances from construction activities would be restored per the restoration plan provided by PLP (RFI 123).
Vegetation—Vegetation- Lichen Impacts	Concerns were expressed that the importance of lichen in the region and the impacts that any changes in lichen would have on caribou herds in the region were not adequately described. Specific concerns include slow recovery time and potential long-term impacts to caribou, because lichen is a primary food source.	Lichen importance is discussed in Section 4.26, Vegetation, and in Section 4.23, Wildlife Values. Text has been expanded, and clarified with provided reference materials where applicable.
Vegetation—Vegetation-AE-Habitat Cover	Concerns were expressed that the habitat classes used to characterize vegetation types in the EIS analysis area were too general, and not detailed enough to effectively analyze potential impacts from project development, especially for lichen types that may be sensitive to mine construction and operations.	Comments Noted. Vegetation classification methodology is described in Section 4.26, Vegetation. A cross-walked table of vegetation types is provided in Appendix K4.26. An additional three vegetation types were added to Section 3.26, Vegetation, and Section 4.26. Finer-scale

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Topic—Subtopic	Statement of Concern	Response
	Suggestions were given to analyze data at a finer scale, with less general vegetation type classes, at the mine site.	classification was not used at the mine site, because existing mapping and analysis are adequate to compare alternatives. Text was added to identify which higher-level vegetation classes contain lichen, and to acknowledge that these classes may be more susceptible to dust impacts.
Vessel Traffic—Construction	Concern was expressed that the number and size of vessels that would be operating during the construction phase were not incorporated into the impact assessment. Concern was expressed that there would be project-related vessels operating in Kachemak Bay and Homer Harbor during construction.	Small barges would be used during construction of the Iliamna Lake ferry as described in Chapter 2, Alternatives. In response to this SOC, additional description of construction vessel traffic in Cook Inlet has been added to Chapter 2. Specific vessels to be used would not be known until procurement; therefore, the size of vessels is not precisely known. Although the number of vessels to be used and the number of trips has not been quantified, these activities have been considered in the impact analysis. Barges shipping fuel and consumables will come principally from West Coast ports, but some use of existing commercial facilities in the Homer/Kachemak Bay area would be anticipated (Appendix G).
Vessel Traffic—Ice-breaking ferry design	Concerns have been expressed that the ice-breaking ferry for Iliamna Lake could not safely operate on the lake.	The ice-breaking ferry would be designed as a "purpose-built" vessel—meaning the design and construction would be based on design criteria, as determined through analysis of existing conditions (e.g., wind, wave height) and operations requirements (i.e., purpose). The USCG would inspect the ferry during construction, and the vessel will not be able to operate until a USCG Certificate of Inspection is issued. The Coast Guard would also periodically inspect the vessel over the course of its operational service to ensure it remains in compliance with all applicable regulations. In addition, there would be vessel operating, training, and safety policies and plans developed for the ice-breaking ferry on the lake. PLP 2018-RFI-013, PLP 2018-RFI-029, and PLP 2018-RFI-052 provide more information about the ferry construction and operations. There are no changes to the EIS.
Vessel Traffic—Impacts-Transportation Corridor- General	Concern was expressed that operation of the ice-breaking ferry on Iliamna Lake could cause erosion of the shoreline at the ferry terminals.	Section 4.16, Surface Water Hydrology, under Iliamna Lake, Vessel Operations, describes the potential for impacts to the shoreline from ferry wake or propeller wash. BMPs would include specifications for management of ferry speed and engine power settings during approach and departure from the ferry terminals. See also PLP 2018-RFI 013, PLP 2018-RFI-029, and PLP 2018-RFI-052 for more information about the ferry design and operations. There are no changes to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Vessel Traffic—Marine	Comments expressed concern that the DEIS does not address the difficult operating environment in Kamishak Bay, including wave height, wave period, bathymetry, ice, or wave shoaling. Comments also pointed out that there is very little existing vessel traffic in Kamishak Bay.	The EIS acknowledges the concern that was expressed during scoping for the Amakdedori operating environment, and describes the marine conditions in Section 3.16 and Section 4.16, Surface Water Hydrology. Following the DEIS, PLP provided data from a full year of wave and current measurements in Kamishak Bay (RFI 039a-PLP 2019), and this information has been summarized in the FEIS. Additionally, the FEIS evaluates a mitigation measure in Appendix M1.0, Mitigation Assessment, to conduct a coastal and ocean engineering analysis for the port (and Iliamna Lake) to ensure the port facilities are properly designed for conditions and project vessels are fit-for-purpose. Section 4.12, Transportation and Navigation, has been edited to disclose that the project-related vessel traffic would be in an area with little existing traffic.
Water and Sediment Quality—(APDES) permit requirements	Concerns were expressed that the EIS incorrectly refers to an applicable State of Alaska water discharge permit as the Alaska Pollutant Discharge Elimination System (APDES) Mine Site General Permit for stormwater, which should be titled Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity, Permit Number AKR06000. Commenters also recommend integrating discussion of the discharge permit requirements into the applicable sections of the EIS that relate to protecting land and water resources during construction and operation of the pipeline.	References to State of Alaska discharge permit requirements in Section 4.18, Water and Sediment Quality, have been revised to use the correct permit title, and discussion of discharge permit requirements have been integrated as appropriate into water and sediment impact discussions. Reference to applicable general permit authorities related to construction and operation of a natural gas pipeline has been added to Section 4.18 under Natural Gas Pipeline Corridor.
Water and Sediment Quality—Acid Generation and Metal Leaching	Concerns were expressed that the potential for acid rock drainage (ARD) is not adequately assessed, that the timeframe for generation of acid may not be reflective of actual conditions, and that the effects and duration of ARD in the future will be greater and much longer than is currently described in the EIS. Additionally, concern was expressed that tailings stored subaqueously still have the potential to continue to oxidize and generate ARD, and this is neglected in the analysis. Comment stated these ARD conditions will lead to impacts to surface water quality.	Section 4.18, Water and Sediment Quality, has been revised to strengthen the discussion regarding the potential for ARD, the currently predicted time for acid generation, and the duration of ARD into the future. Although the potential for oxidation of subaqueously stored tailings is low because water limits the diffusion of oxygen to the tailings, additional discussion has been provided in the FEIS to describe how subaqueous disposal minimizes the tailings oxidation potential and acid generation.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—ANFO/ Nitrogen/Ammonia effects	Concerns have been expressed that water quality impacts from residual ammonia and nitrates originating from Ammonium Nitrate-Fuel Oil (ANFO) explosive mixtures are not adequately evaluated in the EIS; that effects are underestimated; and that planned monitoring of runoff for ANFO residue should be clarified.	Nitrates from explosives have been accounted for in the geochemical source terms used in the mine site water quality model used to predict influent chemistry to the WTPs and design of treatment appropriate processes (Knight Piésold 2019s; SRK 2019e; PLP 2019-RFI 021g). Text in the FEIS (Section 4.18, Water and Sediment Quality) has been clarified regarding the anticipated effects of ANFO residue on surface water quality. Specific reference to monitoring of runoff has been revised for accuracy.
Water and Sediment Quality—Ballast Water Discharge	Concerns were expressed regarding the impacts to Amakdedori Creek and Cook Inlet from vessel discharge, such as ballast water.	Ballast water would not be discharged at any nearshore location. Ballast water discharge is regulated under AS 46.03.750 Ballast Water Discharge and EPA 2013 Vessel General Permit (VGP), with interim requirements as continued through the Vessel Incidental Discharge Act (VIDA) (December 4, 2018), which requires the EPA to develop new national standards of performance for commercial vessel incidental discharges; and the USCG to develop corresponding implementing regulations (anticipated in 2022) https://www.epa.gov/npdes/vessels-vgp. This information was in the DEIS, Appendix E, and remains in the FEIS. No change has been made to the document. See also SOC Invasive Species—Invasive Species Plan. In the EIS, the potential effects of invasive species (all taxa) are discussed in Section 4.26, Vegetation.
Water and Sediment Quality—Baseline Water Quality	Concerns have been expressed that the analysis of baseline data does not adequately consider spatial and temporal variability in water quality conditions, and the potential sources of cyanide reported in baseline samples is not adequately evaluated.	Discussion of cyanide detections reported in baseline data have been revised to include relevant context on potential anthropogenic or natural sources (Section 3.18, Water and Sediment Quality). See also: SOC Water and Sediment Quality—Data and Process for response regarding spatial and temporal variability in water quality conditions. Mine site discharges would be below water quality criteria, indicating that seasonal differences would not result in exceedance of the most stringent State of Alaska water quality standards. No changes to the EIS have been made regarding the seasonality of water quality.
Water and Sediment Quality—Combined PWZ + PEZ Dataset	Concerns were expressed that the use of combined Pebble East (PEZ) and West (PWZ) data for geochemical characterization does not yield results that are representative of the mine site as currently planned.	SRK 2019a was received with the response to RFI 021f, and provides additional quantitative rationale for the use of a combined dataset. The 95th percentile of the combined dataset was used for geochemical characterization of the mine site. The use of the 95th percentile, as opposed to an average, was used to ensure a conservative estimate of geochemical release rates. Under basic conditions, the 95th percentile data of the combined data set are similar to those of the PWZ alone.

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Topic—Subtopic	Statement of Concern	Response
		Under acidic conditions, the use of the 95th percentile of the combined dataset yields higher release rates (SRK 2019a, Figure 1). The EIS has been updated to include pertinent information from RFI 021f, disclosing rationale and supporting the use of a combined dataset.
Water and Sediment Quality—Construction	Concerns were expressed that insufficient detail is provided regarding construction methods of dams and BMPs that would be used to avoid and mitigate impacts from sedimentation to assess potential effects. Additionally, concerns were expressed regarding the use of certain classes of PAG for embankment construction of the pyritic TSF, and the resulting potential for acidic runoff.	Additional discussion has been added to Section 4.18, Water and Sediment Quality, regarding the potential for sedimentation impacts during dam construction, and the BMPs that would be used to avoid or minimize effects. Conflicting information regarding the use of PAG rock in construction has been reviewed and clarified. Only non-PAG rock would be used in construction, including on the northern embankment of the pyritic TSF.
Water and Sediment Quality—Cumulative Effects Analysis	Concerns have been expressed that the cumulative effects analysis under the expanded mine scenario is based primarily on the expanded footprint of the mine site, and fails to fully consider the increased volumes and storage requirements of geochemically reactive materials (tailings and waste rock) and associated impacts to water and sediment quality.	The discussion of cumulative effects on water and sediment quality in Section 4.18, Water and Sediment Quality, has been reviewed and revised to provide more specific analysis of potential effects from leaching of metals and potential PAG rock that would be stored under the expanded mine scenario. See also SOC Cumulative Effects Analysis—geochemical risk.
Water and Sediment Quality—Data and Process	Concerns have been expressed that the EIS does not adequately address the quality and limitations of data used in the analysis of baseline conditions, including detailing the types of samples used to generate data, apparent trends in data, field data collection methods, and potential anomalies in some data (e.g., dissolved oxygen and pH). Additionally, concerns were expressed regarding whether outliers in the data were included into the analysis and skewing baseline data.	The EIS has been updated to include the range of detects, including the minimum, maximum, median, and standard deviation for baseline water quality data where possible to provide better insight into data quality and range/variability of baseline data. Additionally, mine site discharges would be below water quality criteria, indicating that seasonal differences would not result in exceedance of the most stringent State of Alaska water quality standards. No changes to the EIS have been made regarding the seasonality of water quality. For detailed data information regarding date and time of samples, refer to referenced source documents. Additionally, the text has been updated in Appendix K3.18, Water and Sediment Quality, to provide further information regarding data quality and assurance, as well as baseline data collection methodology. A citation has been included to provide source information for data sampling methods and data quality. Water quality exceedances were determined by comparing data to the appropriate water quality standards indicated in Table K3.18-1; and impacts to aquatic life is described in Section 4.24, Fish Values.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Diamond Point Port Site Water treatment	Concerns have been expressed that water treatment processes that would be required at the Diamond Point Port site under Alternative 3 are not adequately detailed to assess effects, and as a result the EIS fails to assess those effects.	Additional information provided in RFI 021e regarding water treatment processes that would occur at the Amakdedori port and the Diamond Point port under Alternative 3 has been added to Section 4.18, Water and Sediment Quality, and specific technical details have been included in Appendix K4.18.
Water and Sediment Quality—Downstream Impacts	Concern has been expressed that downstream impacts beyond the mine site have not been adequately analyzed, including chemical impacts and physical impacts from changes in temperature or sedimentation characteristics; and that assessment of effects does not cover the full geographic area that would be affected.	Downstream water quality impacts are described in Section 4.18, Water and Sediment Quality. All contact water would be captured in the mine site and treated to meet the most stringent water quality criteria prior to discharge (Table K3.18-1). Treated water would be strategically discharged to optimize aquatic habitat downstream of the mine site, as described in Section 4.24, Fish Values. Downstream impacts to water and sediment quality have been analyzed for all phases of the project. Discussions of sediment supply effects from fill placement in upstream tributaries and surface water quality impacts at stream crossings in the transportation corridor have been reviewed and revised in the FEIS to enhance clarity in Section 4.18.
Water and Sediment Quality—Drinking Water	Concerns were expressed that the EIS does not address potential impacts to drinking water sources from copper or other mine-related contaminants, and the baseline sampling conducted by the Applicant does not adequately assess conditions in existing public water system source waters.	Description of baseline drinking water data for the mine site and transportation corridor is provided in Section 3.18, Water and Sediment Quality. Community drinking water wells were sampled in communities north of Iliamna Lake, and results are included in the analysis of baseline water quality. Analysis of potential impacts to groundwater and surface water drinking water sources, as well as anticipated drinking water wells to be located at the mine site to support operations, are discussed in Section 4.18, Water and Sediment Quality. All available baseline drinking water data were analyzed and incorporated into the development of the EIS. No additional changes were made to the document.
Water and Sediment Quality—Drinking Water Protection Areas	Concerns were expressed that the analysis does not indicate which waters will be protected as drinking water, and an assessment on potential impacts to municipal waters should be completed as part of or supplemental to the EIS analysis.	Discussion in the EIS Section 4.18, Water and Sediment Quality, regarding surface water and groundwater quality impacts on drinking water sources, and protection of potential drinking water sources, has been reviewed and clarified to address specific concerns expressed in comments regarding Bristol Bay villages. See also SOC Water and Sediment Quality—Drinking Water.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Dust Impacts Amakdedori	Concerns were expressed regarding fugitive concentrate dust at Amakdedori as a result of transporting concentrate to the port, and lightering and offloading concentrate to offshore bulk carriers.	Methods to prevent or minimize the potential for concentrate fugitive dust are described in Section 4.18, Water and Sediment Quality; Chapter 5, Mitigation; and PLP 2019-RFI 134 (Conceptual Fugitive Dust Control Plan). This information has been incorporated into the EIS.
Water and Sediment Quality—Effluent Discharge Limits	Concerns were expressed that relevant water quality discharge limits and standards were not included in the EIS.	Relevant water and sediment quality standards are included in Table K3.18-1 and discussed in Appendix K3.18. No changes were made to the EIS.
Water and Sediment Quality—Ferry operations	Concerns have been expressed that the quantified impacts of suspended sediment in Iliamna Lake from ferry operations are not adequately supported.	Discussion of the expected effects of spatial distribution of suspended sediment from ferry operations has been reviewed and revised in Section 4.18, Water and Sediment Quality, to reflect uncertainty in effects and relationship to sediment, available information on lake substrate and shoreline conditions, and water conditions (e.g., depth).
Water and Sediment Quality—Frying Pan Lake Water Quality	Concerns were expressed that the EIS includes little to no baseline water quality data specific to Frying Pan Lake, and is unclear regarding whether WTP #1 and WTP #3 would discharge directly into Frying Pan Lake.	Baseline water quality data for Frying Pan Lake has been included in Tables K3.18-7 and Table K3.18-10. Baseline data for Frying Pan Lake is presented in Schlumberger et al. 2011a. Additional field studies documented in ERM 2018a did not directly sample Frying Pan Lake, but provided water quality sample data at sampling location SK100F in the SFK River immediately downstream of the Frying Pan Lake drainage. Discharge locations of WTP #1 and #3 would be directly upstream from Frying Pan Lake. WTP #1 and #3 discharge locations have been clarified in the FEIS.
Water and Sediment Quality—Fugitive Dust Impacts	Concerns were expressed that impacts of fugitive dust from mine site and transportation corridor activities do not adequately assess impacts to water and sediment quality; do not evaluate copper impacts; and underestimate the impacts of fugitive dust deposition to surface water. Additionally, comments expressed concerns regarding the contributions to fugitive dust emissions from vehicle brake and tire dust resulting at the mine site. Concerns were expressed regarding dust deposition at Amakdedori as a result of transporting concentrate containers and loading of concentrate into bulk carriers.	Modeling was conducted to assess the potential for increases in concentration of HAPs metals in water and sediment from fugitive dust deposition. Dust modeling methodology, results, and impacts associated with fugitive dust are included in Section 4.18 and Appendix K4.18, Water and Sediment Quality. The dust deposition analysis has been updated to include an analysis of copper in fugitive dust and potential associated impacts. Contributions to mine site fugitive dust due to brake and tire emissions were examined, and determined to be of negligible contributions to mine site fugitive dust. Fugitive dust is not anticipated to result in exceedance of the most stringent water and sediment quality standards. Increases of metals concentrations in surface water due to fugitive dust deposition were analyzed using methods that assume a proportionate baseline environmental increase in metals concentration due to dust.

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Topic—Subtopic	Statement of Concern	Response
		For the estimation of increase in metals concentrations in soils and sediment, the model assumes 100 percent deposition. Estimation for surface water increase used a sediment partitioning approach described in Appendix K4.18. Additional modeling was conducted to assess impacts of fugitive dust deposition to surface water quality in conjunction with discharge from WTP #1. This model examined Frying Pan Lake as a proxy for analyzing impacts, assuming 100 percent of fugitive dust is deposited into the lake body, and remains fully entrained in the surface water. Details of the approach and modeling are provided in Technical Memorandum AECOM 2019h, and have been incorporated into Section 4.18 and Appendix K4.18. Procedures for handling, cleaning, transporting, and emptying concentrate containers into the bulk carriers are described in Section 4.18, Water and Sediment Quality. Section 4.27, Spill Risk, describes the risk and potential impact of concentrate spills and fugitive dust emissions as related to transport of concentrate containers.
Water and Sediment Quality—Geochemistry/ Source Terms	Concerns have been expressed that the geochemical analysis of the mine site does not adequately characterize the potential for acid generation or metals leaching from waste rock and mine tailings. Commenters were concerned that this would result in under-predictions and inaccuracies/uncertainties in the water quality modeling. Additionally, concerns that the temperature correction applied to the HCT barrel tests was inappropriate, and will underestimate leaching rates. Comments expressed concerns over the use of a cyanide leach circuit, and that the terminology describing tailings is confusing.	SRK 2019a (response to RFI 021f) provides additional quantitative support to demonstrate the representativeness of the geochemical characterization of acid generation and metals leaching. SRK 2019a also provided additional rationale and details regarding the temperature corrections applied to HCT barrel tests. The additional information and rationale has been incorporated into Section 3.18, Water and Sediment Quality, as appropriate to strengthen the discussion on the ARD and ML characterization representativeness. The use of cyanide in mineral processing is not proposed for the project (PLP 2020d). The EIS has been updated to clarify tailings terminology, and to disclose uncertainty and variability in the project water quality modeling.
Water and Sediment Quality—Groundwater Impacts from Dredged Material Disposal	Concerns have been expressed that the potential impact to groundwater from upland disposal of dredged material at Diamond Point port (Alternative 2 and Alternative 3) does not adequately consider the effect of maintenance dredging that would be required, and the storage of dredge material in disposal areas.	The EIS has been updated to include a discussion of potential impacts to groundwater quality as a result of the storage of disposed dredged material at Diamond Point.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Groundwater Quality	Concerns were expressed that the EIS does not adequately support the assumption that groundwater quality in the immediate vicinity of the mine site would improve over time in closure and post-closure, and lacks discussion of contingencies if improvement in groundwater quality is not observed.	Section 4.18, Water and Sediment Quality, has been reviewed and revised to provide context on specific monitoring and mitigation actions that would be applied based on the response to RFI 135.
Water and Sediment Quality—HDDs Terminating Underwater	Comment asked for explanation of how total containment and proper disposal can occur for HDD operations where one end begins above ground and the other end comes out under water.	PLP 2019-RFI 011a addresses the comment, including description of design and methodology for drilling methods and monitoring during drilling to prevent and minimize the risk of drill fluid leakage. The pipeline crossing design and execution methodology would be finalized during detailed design and state permitting. Information provided in PLP 2019-RFI 011a has been incorporated into EIS Section 4.18, Water and Sediment Quality.
Water and Sediment Quality—Lower Cook Inlet	Concerns have been expressed that baseline data on marine sediment quality at port locations under Alternatives 1, 2, and 3 are insufficient to assess effects, and that erosional and depositional conditions in Kamishak Bay are overgeneralized with the broader Lower Cook Inlet, which could affect local accumulation of contaminants in sediments.	Additional discussion of baseline data pertaining to marine sediment characterization of the cook inlet and port locations has been added to Section 3.18, Water and Sediment Quality. The discussion of potential effects on sediment quality in Section 4.18, Water and Sediment Quality of the EIS has been reviewed and revised for clarity.
Water and Sediment Quality—Material Source Characterization	Concern was expressed that the EIS does not indicate how material used for construction of roads, dams, or other mine-related features will be assessed for potential acid generation or metal leaching.	Assessment of material sources prior to use would be conducted to assess potential for acid generation and metal leaching, as described in Section 4.18, Water and Sediment Quality. No change has been made to the EIS.
Water and Sediment Quality—Mercury	Concerns were expressed that the DEIS does not discuss all potential sources of mercury contaminants, or how mercury will be removed in the wastewater treatment facilities, and the effects of mercury on downstream water is not adequately addressed.	The EIS (Section 4.18, Water and Sediment Quality) has been revised to discuss the lack of significant mercury in mine materials, other natural and anthropogenic mercury sources (e.g., atmospheric deposition), and how mercury will be removed in the wastewater treatment facilities. A discussion of the potential impacts of mercury releases to the environment, particularly surface water, has been included, and addresses the potential for the formation of methylmercury.
Water and Sediment Quality—methylmercury	Concerns have been expressed that the EIS does not adequately address the potential for methylmercury in surface water.	The EIS has been revised (Section 4.18, Water and Sediment Quality) to discuss the lack of significant mercury in mine materials, other natural and anthropogenic mercury sources (e.g., atmospheric deposition), and the low potential for methylmercury in surface water, considering the low concentrations of mercury anticipated at the site and the likely geochemical conditions found in site surface waters.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Natural Gas Pipeline Impacts to Water Quality	Concerns were expressed that surface water impacts associated with the natural gas pipeline were not adequately assessed. Commenters requested further analysis of effects of trenching and HDD into Cook Inlet and Iliamna Lake; interception of overland surface flows by the pipeline ditch; monitoring and mitigation until the disturbed areas have been stabilized; release of hydrostatic waters into fish-bearing waterbodies; and erosion and sedimentation from exposed trench spoils and frost heaving.	Discussion of the effects of pipeline construction on surface water quality in Section 4.18, Water and Sediment Quality, has been reviewed and revised to provide more specific analysis of potential effects.
Water and Sediment Quality—NK119A and SK100F for background characterization	Concerns have been expressed that the use of data from sites NK119A and SK100F in characterizing background water quality conditions is not adequately justified in the EIS, because one of those locations (SK100F) is not in the specific mine site footprint.	NK119A and SK100F were used for characterization of baseline water quality because they are in the immediate vicinity of the NFK river and SFK river WTP discharge locations, respectively. Surface water sample location SK100F is immediately downstream of Frying Pan Lake and in the major drainage boundary, making it a useful sampling location for analyzing baseline water quality. Surface water sample location NK119A is immediately upstream of the NFK discharge location. These sampling stations provide useful insight into the baseline water quality of receiving waterbodies to which treated effluent would be discharged. No changes have been made to the EIS.
Water and Sediment Quality—NP/AP Ratio	Concerns were expressed regarding the calculation of the NP/AP ratio, and commenters suggested a more conservative NP/AP ratio be used to distinguish PAG from non-PAG waste rock.	The currently specified NP/AP ratio (1.4) is believed to be reasonable based on the results of geochemical characterization conducted to date; and is comparable to NP/AP ratios developed for other similar porphyry copper deposits in western US and Canada. The current discussion provided in Section 3.18 and Appendix K3.18 includes additional information regarding the 1.4 NP/AP ratio, as per SRK (2019f) (response to RFI 021f). The State of Alaska would determine the final NP/AP ratio to be applied. Regardless of the NP/AP ratio, however, the project proposes to manage all waste rock that has ML potential by submergence to limit oxidation (PLP 2018a; PLP 2019-RFI 021f, RFI 110). Text in Chapter 2, Alternatives, has been augmented for clarity.
Water and Sediment Quality—Number of WTP Discharge Locations	Commenters suggested that additional work should be done to determine if multiple discharge points are needed, or if a single discharge point may be preferable.	The Applicant's Project Description, December 2018 (PLP 2018d) outlines the planned discharge of treated water to a variable combination of three discharge points to optimize downstream habitat, based on a habitat model (Physical Habitat Simulation System) and in accordance with ADF&G permit conditions. The availability of multiple potential discharge points is a critical element of the discharge process, allowing for diversion of discharges to various watersheds as appropriate based on model outputs. No change has been made to the EIS as a result of these comments.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Permit Exceedances	Concerns were expressed that the analysis of impacts to water and sediment quality is inadequate, because it does not address unexpected/accidental permit infringements, accidental discharges, or failure of the water capture system to collect seepage, resulting in exceedances of water quality standards. Commenters noted that no BMP or operational control is 100 percent effective, and suggested that the analysis use APDES permit violations and WQC exceedances from existing mines as a guide for the analysis.	The evaluation of environmental effects considers project design elements that would manage impacts on surface water and sediment quality, including hydraulic containment, capture and treatment of contact water, containment of mine tailings and waste rock, and BMPs applied during all project phases to prevent unexpected upset conditions. Upset conditions are discussed in the EIS in Section 4.27, Spill Risk. No change has been made to the EIS as a result of these comments.
Water and Sediment Quality—Pit Lake Chemistry and Stratification	Concern has been expressed that the potential for pit lake mixing due to sidewall sloughing or other mechanisms is not addressed in the EIS; that discrepancies in predicted pit water quality exist between Lorax 2018 and the Pebble Mine Site—Closure Water Management Plan (Knight Piésold 2018d) reference documents; and that predictions of pit lake water quality do not reflect leaching of material from pit walls.	Pit lakes are generally deep, have relatively small surface areas sheltered by pit walls, and often contain saline water. As a consequence, pit lakes are candidates for meromixis, in which the salinity stratification is sufficiently strong to inhibit mixing between the surface and deep water. Pit lake stratification can be disturbed by factors such as groundwater inflow, sludge deposition, pit wall failure, and water transfers as a result of mine site management. Other factors can increase or enhance meromixis, including salinity, salt exclusion from ice, and runoff. Additional discussion has been included in the EIS regarding the above processes on pit lake mixing and stratification. Discrepancies between Lorax (2018) and the Pebble Mine Site—Closure Water Management Plan (Knight Piésold 2018d) and their significance have also been addressed.
Water and Sediment Quality—Pit Lake Management in Closure/Post Closure	Concerns were expressed regarding how the pit lake will be managed in closure and post-closure to ensure that the pit lake maintains a level that promotes hydraulic containment, protects groundwater, and maintains an anoxic zone for PAG storage. Commenters requested additional information regarding how these needs will be balanced, the depth required to satisfy these needs, and plans for monitoring the water level.	Additional detail regarding the management of the pit lake following closure has been included in the EIS (Section 4.17, Groundwater Hydrology). The discussion has been strengthened to emphasize the level needed to maintain hydraulic containment, the freeboard needed to maintain a factor of safety, the depth of water needed to minimize oxidation of PAG stored in the pit, and the water level monitoring plan. See also SOC Groundwater Hydrology—groundwater permanent sink.
Water and Sediment Quality—Pit Lake Wildlife Effects	Concerns have been expressed that the conditions in the pit lake during closure and post-closure will be hazardous to waterfowl and other wildlife, and that those hazards have not been evaluated. Concerns were expressed that the pit lake may create another "Berkeley Pit" in an area that is critical habitat for migratory birds, caribou, and other forms of wildlife.	Concerns regarding the pit lake, water quality levels, and its impact on wildlife are discussed in Section 4.23, Wildlife Values. Information on the Berkeley Pit in comparison to the pit lake is provided in Section 4.23. Methods of deterring wildlife from accessing the pit are included as recommended mitigation measures, should they be determined necessary, and have been added to Appendix M1.0, Mitigation Assessment. No additional changes have been made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Port Location Sediment Characterization	Commenters requested that additional information regarding sediment characterization from 2018 field studies be included into Section 3.18 of the EIS (GeoEngineers 2018).	Text in Section 3.18, Water and Sediment Quality, has been updated to include information from field studies described in GeoEngineers 2018c, providing additional information regarding marine sediment at port locations.
Water and Sediment Quality—Power Plant Impacts	Concerns were expressed that the EIS does not analyze the potential impacts to water and sediment quality due to increased temperature of water resulting from power plant operations.	PLP has proposed that cooling water used in the power plant would be in a closed-loop system that cycles through a cooling tower. No direct discharge of heated water to the environment would occur, therefore no increased temperature effects on surrounding streams from power plant operations are expected. No changes have been made to the EIS.
Water and Sediment Quality—Reference Material Comments	Comments were received on a reference document from Section 4.18, Water and Sediment Quality that is no longer in use (HDR 2012).	The reference (HDR 2012) is not cited in the FEIS, and is not listed on the project website as a referenced document. HDR 2012 was reviewed during preparation of the preliminary DEIS, but is not a cited reference in the DEIS. No changes were made to the EIS.
Water and Sediment Quality—Relevant Water Quality Criteria	Concerns were expressed regarding the adequacy of the State of Alaska Water Quality Criteria (Table K3.18-1), and suggested that federal water quality criteria and/or site-specific criteria be used instead. Additionally, commenters suggested including further description of which water quality criteria were selected for comparison, and why they were selected.	The appropriate water quality standards to be used are the Alaska Water Quality Standards, State of Alaska Department of Environmental Conservation Water Quality Standards (18 AAC 70). No changes were made to the EIS.
Water and Sediment Quality—Sample Representativenes s	Concerns were expressed regarding representativeness of samples used for geochemical characterization, development of model source terms, and model predictions.	Based on information provided in RFI 021f, the samples selected for geochemical characterization are representative of the Pebble deposit and its varied major geologic units. The 95th percentile of the geochemical characterization results, which is conservative, was used to develop model source terms. Therefore, the model predictions are also likely conservative. A citation to RFI 021f has been added for clarity in Section 4.18, Water and Sediment Quality.
Water and Sediment Quality—Sediment Quality Monitoring Plan	Concerns were expressed regarding the sediment quality monitoring plan. Commenters recommended a monitoring plan be provided in the EIS that explains how these sediment baseline concentrations will be used when compared to operational and closure monitoring data to assess whether sediments have been impacted by the mine.	Based on information provided in RFI 135, Preparation of a Sediment Quality Monitoring Plan has been added to Chapter 5, Mitigation.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Selenium	Concerns were expressed that the concentration of selenium in ore rock and in ore concentrates is not adequately assessed, and that the water treatment process will not reduce selenium concentrations in discharged water sufficiently to meet discharge requirements. The result will be impacts to water quality and aquatic life as a result of selenium exceedances of water quality criteria, as well as increased water temperature due to the water treatment process for selenium removal.	Response to RFI 021e and follow-up RFI 021h provide additional information pertaining to the individual treatment systems and expected effluent water quality from each facility; relevant information has been incorporated into the EIS in Section 4.18, Water and Sediment Quality. In particular, the concern about treatment of selenium in the water treatment process is addressed, and potential for impacts disclosed for the current stage of design. All current information available regarding the water treatment plant systems, processes, and design have been incorporated into or cross-referenced in the EIS. The water treatment process design will continue as the project advances, and would be required to comply with applicable regulatory requirements of the State of Alaska—ADEC in particular.
Water and Sediment Quality—Selenium/Silver Sediment Criteria	Commenters suggested including Washington State's sediment quality criteria for silver and selenium in the absence of a State of Alaska sediment criteria for these elements.	The appropriate water quality and sediment quality standards are the Alaska Water Quality Standards, State of Alaska Department of Environmental Conservation Water Quality Standards (18 AAC 70), and the National Oceanic and Atmospheric Administration sediment quality screening criteria. Applicants cannot be held to meet Washington State Water or Sediment Quality Criteria; therefore, it would be inappropriate to include in the EIS. No changes were made to the EIS.
Water and Sediment Quality—Sensitivity Analysis	Commenters expressed concerns regarding uncertainties and variability of groundwater, water quality, and geochemistry models in the EIS. Commenters suggested a sensitivity and uncertainty/uncertainty analysis be performed and included in the analysis.	A review of the groundwater quality model to assess revisions to inputs from the water balance model and geochemical source terms has been completed, and the revised predictive outputs of the water quality model and corresponding sensitivity analysis provided in RFI021g have been incorporated into Appendix K4.18, Water and Sediment Quality.
Water and Sediment Quality—Stormwater Management	Commenters expressed concerns regarding the magnitude of stormwater generation assumed at the mine site, and how treatment systems will be accommodated in the existing footprint; maintenance of the transportation corridor; and the potential impacts from snow management.	Discussion of the ability of water treatment processes to manage suspended sediment loads under varying anticipated conditions is discussed in Appendix K4.18. Additional review of potential effects of runoff from snow piles has been conducted, and applicable discussion of transportation corridor effects have been added to Section 4.18, Water and Sediment Quality.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Table K4.18-2	Commenters expressed concern regarding baseline exceedance of the most stringent water quality criteria, including mercury, in Table K4.18-2.	Table K4.18-2 provides modeled estimates of the quality of water resultant from various geochemical sources at the mine site. Data provided in this table do not represent the quality of water that would be released into the environment; but rather, the quality of water that may be treated at the water treatment plants. All effluent discharge water would be treated to meet the most stringent water quality criteria (Table K3.18-1), and the predicted water quality of treated effluent discharge is available in Table K4.18-13. No changes were made to the EIS.
Water and Sediment Quality—Temperature of Treated Water Discharge	Concerns were expressed that water treatment processes could cause/require an increase in water temperature (for selenium treatment in particular) and result in downstream impacts to fish that are not adequately analyzed in the DEIS. Additionally, commenters requested the DEIS include a discussion of whether or not temperature impacts exceeded regulatory standards (ADEC regulations at 18 AAC 70.020(b)(10)). Commenters also expressed concerns that temperature modeling was performed using inadequate data, and may result in inaccurate temperature predictions.	Additional discussion of the effects of discharge water temperature on receiving waters, including discussion of water quality standard compliance, has been added to Section 4.18, Water and Sediment Quality. The evaluation of temperature effects considers information provided in RFI-021e and RFI 145. The effects of water temperature changes are analyzed in Section 4.24, Fish Values. Temperature modeling was performed using available baseline data and the most current project design. Data quality is addressed in the SOC "Water and Sediment Quality—Data and Process."
Water and Sediment Quality—Testing of the Water Treatment System	Concerns were expressed that the water treatment system is untested and unproven to be effective in treating the project wastewater volume or to meet the relevant water quality standards.	RFI 021e provided additional information pertaining to the individual treatment systems and expected effluent water quality from each facility. Relevant information from RFI 021e and follow-up RFI 021h has been incorporated into the EIS, as appropriate. All current information available regarding the water treatment plant systems, processes, and design have been incorporated into or referenced in the EIS. The water treatment process design will continue as the project advances, and would be required to comply with applicable regulatory requirements of the State of Alaska; ADEC in particular.
Water and Sediment Quality—Use of Dissolved/Filtered Water Concentrations	Concerns were expressed regarding the use of dissolved water concentrations rather than whole water concentrations as inputs into the water quality model, suggesting that use of dissolved concentrations may result in an under-prediction of resulting water quality.	Additional information and rationale regarding the use of dissolved water concentrations as opposed to whole water concentrations for the water quality model was included in SRK 2019a in response to RFI 021f. Dissolved concentrations were used to quantify the dissolution of metals and minerals into water quality. Additionally, suspended constituents would be the result of physical erosion, and would be filtered out in the water treatment processes to ensure the relevant water quality criteria are met prior to discharge into the environment (SRK 2019a). Section 4.18, Water and Sediment Quality, has been updated to disclose rationale and include pertinent information from RFI 021f.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Use of Predicted pH	Concerns were expressed regarding the pH values presented in Section 4.18 and used in water quality models. Commenters requested further clarification on how the presented range of pH was selected and to provide the value of pH used for input to the pit model; include support for statements regarding pH of the pit water; and discuss limitations on discussions and conclusions made based on use of the non-modeled pH.	The mass balance model evaluated for the EIS cannot explicitly model pH; therefore, a pH range of 7 to 8 was assumed in the water quality model, and is believed to be conservative because the waters have sufficient buffering capacity to resist acidification. The discussion in the EIS (Appendix K4.18, Water and Sediment Quality) has been clarified to indicate that the pH was assumed and not explicitly modeled, and that the assumed pH is conservative given the buffering capacity provided by carbonate minerals and the native waters.
Water and Sediment Quality—Waste Rock Management Plan	Comments suggested details regarding criteria or thresholds to distinguish PAG from non-PAG and ML from non-ML rock, and that procedures for separating these materials be included in the EIS.	The EIS has been revised to include details regarding the criteria for distinguishing PAG and non-PAG and ML and non-ML waste rock and tailings based on the geological characteristics and geochemical characterization results. Information presented in RFI 021f regarding the currently defined NP/AP ratio (1.4) that distinguishes PAG from non-PAG rock, as well as criteria to segregate ML from non-ML rock, are included in the EIS. The State of Alaska would determine the final NP/AP ratio to be applied. Regardless of the NP/AP ratio, however, the project proposes to manage all waste rock that has ML potential by submergence to limit oxidation (PLP 2018a; PLP 2019-RFI 021f, RFI 110).
Water and Sediment Quality—Waste Water Discharge Volume	Concerns have been expressed that the volume of water requiring treatment is unprecedented in current mining operations, and the EIS underestimates or fails to adequately evaluate the water quality effects of discharging large volumes of treated water from water treatment plants.	Responses to RFI 021e and RFI 021h provided additional information pertaining to the individual treatment systems and expected effluent water quality from each facility. Section 4.18, Water and Sediment Quality, has been updated to incorporate relevant information from these RFIs. All current information available regarding the water treatment plant systems, processes, and design have been incorporated into the EIS. The water treatment process design will continue as the project advances, and would be required to comply with applicable regulatory requirements of the State of Alaska—ADEC in particular.
Water and Sediment Quality—Water Management Plan	Concerns were expressed that the EIS does not include a Water Management Plan for the project.	A Water Management Plan for both operations and closure phases of the project has been prepared by the Applicant, and was reviewed and incorporated through reference into the EIS analysis. Specific relevant documents include Pebble Mine Site Operations Water Management Plan (Knight Piésold 2018a), Pebble Mine Site Closure Water Management Plan (Knight Piésold 2018d), and updates to the Water Balance Model based on the revised Groundwater Model (Knight Piésold 2019s; PLP 2019–RFIs 021g, 109f).

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Water Quality Exceedances in Impoundments	Concerns have been expressed that water in mine site ponds during operations will exceed State of Alaska water quality criteria, and the EIS fails to provide a full assessment of impacts of this condition. Concern noted DEIS text in Section 4.18 implies the main WMP could leak and contaminated groundwater could flow outside the mine site.	Predicted water quality for specific impoundments is provided in Appendix K4.18. Impacts to birds and other wildlife are addressed in Section 4.23, Wildlife Values. Water in the mine site, which may contain exceedances of the most stringent water quality criteria, would be hydraulically contained (see Section 4.17, Groundwater Hydrology) and subject to mitigation measures (Chapter 5, Mitigation) to avoid and mitigate impacts. No changes were made to the EIS. The EIS has been updated in Section 4.17 and Appendix K4.17 to enhance descriptions of underdrains, expected hydraulic gradients around these facilities, and expected destinations for leaked water from the facilities based on updated groundwater model analysis. With these underdrains included in the project, flow of contaminated groundwater through gaps between monitoring/pumpback wells is considered improbable; risks to groundwater associated with leakage from the facilities (including seismic risks) are considered low; and a quantitative risk assessment is not considered to be warranted. See also SOC Groundwater Hydrology—groundwater leakage from TSFs and WMPs.
Water and Sediment Quality—Water Quality in Closure and Post Closure	Concerns were expressed regarding water quality in closure and post-closure phases; the need to treat water into perpetuity; financial assurances in closure and post-closure phases; and that the analysis does not consider potential water quality impacts over a long enough time period.	Responses to RFI 021e (HDR 2019g) and PLP 2019-RFI 021h (follow-up to RFI 021e) provide additional information pertaining to the individual treatment systems and expected effluent water quality from each facility, and has been incorporated into the EIS in Section 4.18 and Appendix K4.18, Water and Sediment Quality. Anticipated effluent concentrations have been updated and included in Appendix K4.18 for operations and closure phases of the project. All current information available regarding the water treatment plant systems, processes, and design have been incorporated into the EIS. The water treatment process design would continue if the project advances. State of Alaska regulations require submittal of design information for approval during the State of Alaska permitting process.
Water and Sediment Quality—Water Quality Model	Concerns have been expressed that the Water Quality Model developed to assess project impacts on surface water quality and predict constituent concentrations in wastewater streams lacks an adequate sensitivity analysis, uses unsupported geochemical assumptions, and underestimates resultant water quality. Comment noted concern about capture zone not being maintained, and gave Buckhorn Mine in Washington state as an example.	The Water Quality Model has been updated to include the changes in the new groundwater model (see Section 3.17 and Section 4.17, Groundwater Hydrology). Updated water quality data and a sensitivity analysis for the water quality model provided in RFI 021g have been included in discussion in Appendix K4.18, Water and Sediment Quality. See also SOC Groundwater—GW Effects of faults, which addresses the concern about Buckhorn Mine and capture zone.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Water Treatment—Selenium/Salt Buildup	Concerns have been expressed that the buildup of selenium and salts in the water treatment influent stream will overwhelm the treatment system, resulting in an inability of the treatment system to meet discharge requirements.	RFI 021e and RFI 021h provided additional information pertaining to the individual treatment systems, expected effluent water quality from each facility, and project water/mass balance. Section 4.18, Water and Sediment Quality, has been updated to incorporate relevant information. All current information available regarding the water treatment plant systems, processes, and design have been incorporated into the EIS. The water treatment process design will continue as the project advances, and would be required to comply with applicable regulatory requirements of the State of Alaska—ADEC in particular.
Water and Sediment Quality—Water Treatment in Closure/Post Closure	Concerns were expressed that the DEIS did not provide an adequate description of water treatment plant design, processes, and consumables needed to maintain effective water treatment in closure and post-closure phases.	RFI 021e and RFI 021h provided additional information and detail pertaining to the individual treatment systems and expected effluent water quality from each facility, and has been incorporated into Section 4.18, Water and Sediment Quality. All current information available regarding the water treatment plant systems, processes, and design has been incorporated into the EIS. The water treatment process design would continue if the project advances into State of Alaska permitting.
Water and Sediment Quality—Water Treatment of Hydrocarbons	Concern was expressed that an oil/water separator at the mine site truck shop complex may not be adequate for water treatment, and that water quality standards would be exceeded if water was directly discharged to the environment. Another concern was expressed about long-term contamination of waterbodies from fuel transfer activities.	Water from an oil/water separator would be required to meet ADEC water quality discharge standards prior to discharge to the environment. BMPs and industry standards would be implemented, including Oil Discharge Prevention and Contingency Plans (ODCPCs), Spill Prevention, Control and Countermeasure (SPCC) Plans, and Facility Response Plans (FRPs). See Chapter 5, Mitigation, for mitigation measures committed to by the Applicant. Mitigation measures have been added to Appendix M1.0, Mitigation Assessment (under Spill Risk) regarding preventive procedures during fuel or hazardous substance transfer to ensure that secondary containment is placed under all inlet and outlet points, hose connections, and hose ends. The project SPCC Plan would outline requirements for fuel transfer. Mitigation measures described in Appendix M1.0, Mitigation Assessment, that are adopted by the Applicant will be moved to Chapter 5 for the FEIS. Small spills of hydrocarbons and their potential cumulative effects are addressed in Section 4.14, Soils; and Section 4.18, Water and Sediment Quality. No additional changes were made to the EIS.

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Topic—Subtopic	Statement of Concern	Response
Water and Sediment Quality—Water treatment plant ops	Concerns were expressed that the DEIS fails to provide a sufficient description of the purpose, location, operations, processes, and discharge points of the water treatment plants, and does not adequately assess the effectiveness of treatment to meet discharge requirements.	The EIS has been updated in Section 4.18 and Appendix K4.18, Water and Sediment Quality, to include additional detail on the water treatment plants process, and the process based on response to RFI 021e and RFI 021h. All current information available regarding the water treatment plant systems, processes, and design have been incorporated into the EIS. The water treatment process design would continue if the project advances to State of Alaska permitting.
Water and Sediment Quality—Zero Effluent Discharge into UTC	Comments expressed concern regarding effluent discharge into the UTC, and expressed interest in removing the treated water discharge point from the UTC to avoid potential impacts to the UTC, Iliamna Lake, and associated watershed.	Effluent discharged from WTPs would be required to meet the most stringent water quality criteria prior to discharge. Additionally, discharge of treated water would be done strategically to mitigate impacts of stream-flow reduction caused by the open pit groundwater sink and to optimize downstream aquatic habitat (PLP 2018d). Impacts of WTP discharge are detailed in the EIS in Section 4.18, Water and Sediment Quality. No changes were made to the EIS.
Wetlands—Wetlands-Analysis Area	Concerns were expressed about the size of the EIS analysis area in general, and that the size of the EIS analysis area was inadequate to analyze impacts to wetlands. Recommendations were given to apply the same scale as in Section 3.24 and Section 4.24, Fish Values; and to apply finer NWI classes with more precise GIS information to better describe wetlands.	The wetlands and other waters EIS analysis area is the geographic area where the maximum extent of direct and indirect impacts to wetlands and other waters are likely to occur under project standard operating procedures. The scale of analysis is described in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, including a revised explanation of the scale of NWI classes applied. The wetlands EIS analysis area considers the following impact factors in determining its geographic extent: the direct disturbance footprint, the area of indirect impacts from fragmentation of wetlands and other waters, the area for indirect impacts from dust, and the area indirectly impacted by dewatering (i.e., zone of influence, see also Section 4.17, Groundwater Hydrology).
Wetlands—Wetlands- Data Analysis and Reporting	Concerns were expressed that the wetlands analysis methodology and context were insufficient, unclear, or inadequate to determine direct and indirect wetland impacts. Impacts were said to be underestimated and not sufficiently described to make a determination of significant degradation, including impacts to related resources such as fish, wildlife, and water quality. The scale of mapping was said to be too coarse to assess impacts. Data gaps described in the DEIS would need to be met in the FEIS, and data would need to be collected using the same approach and methodology as previously	The analysis methodology for assessing potential direct and indirect impacts to wetlands and other waters by the four factors—magnitude, duration, extent, and likelihood—is provided in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, to explain relative assessments of abundance. The section analyzes direct, indirect, and cumulative impacts to wetlands and other waters based on the methodology described. See also SOC Wetlands-Cumulative Effects. Text was clarified in sections on indirect impacts to better portray the interrelated impacts to other resources including fish, wildlife, and water quality. Note that a functional assessment was not required or

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Topic—Subtopic	Statement of Concern	Response
	collected data, because NWI data were not sufficient. The age of data applied to the DEIS and the Preliminary Jurisdictional Determination was questioned. Field data sheets and additional delineation information was requested to be included in the EIS, and suggestions were provided as to how to better portray direct impacts.	prepared for this project or accompanying EIS. There is no existing functional assessment tool or methodology that covers the EIS analysis area. See also SOC Wetlands-Functions. Detailed wetland delineation maps in the EIS analysis area are provided in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, and in Appendix K4.22. Data sources for delineations, including data points and field data sheets, are cited in the document in Section 3.22 and Section 4.22. The wetland mapping and classification methodology is described in Section 3.22. The analysis in the EIS to determine numbers of impacted acres is provided in Section 4.22, along with detailed tables of acres by component by alternatives and variants. Text and tables were clarified to better portray and explain direct impacts. The scale of mapping was considered sufficient for USACE to compare alternative, so no change was made. Data gaps in the DEIS were met with field data collected in the 2019 field season, to provide data on all three action alternatives and variants. In cases where NWI or ALOS PULSAR data were used in the DEIS, these gaps were met in the FEIS with the same scale of mapping as the rest of the project data.
Wetlands—Wetlands- Fugitive Dust	Concerns were expressed about the impacts from fugitive dust on wetlands and other waters, and the inadequacy of the analysis area for indirect impacts of fugitive dust on wetlands and other waters. Suggestions were given for references to be incorporated into the discussion and analysis.	Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, has been revised to expand on the potential impacts from dust on vegetation, incorporating suggested references where applicable. Clarifying text has been added to explain the area of analysis for fugitive dust in the document. See also SOC: Soils—Fugitive Dust Impacts.
Wetlands—Wetlands-Mitigation	The document should explain how mitigation would account for any significant degradation of aquatic resources. Commenters also wanted to see differences between the DEIS and the FEIS clearly delineated, and inclusion of any mitigation or reclamation plans in the analysis and document.	Appendix M of the EIS includes the Applicant's draft compensatory mitigation plan for unavoidable impacts (Appendix M2.0, Applicant's Draft Compensatory Mitigation Plan), restoration plan for temporary impacts (Appendix M3.0, Restoration Plan), and reclamation and closure plan (Appendix M4.0, Reclamation and Closure Plan). The FEIS has been updated to include wetlands data collected in 2019 to meet data gaps described in the DEIS. Mitigation is discussed in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites. A final compensatory mitigation plan will be considered as part of the 404(b)(1) guidelines analysis and public interest review, as will be documented in the Record of Decision.

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Wetlands—Wetlands-Cumulative Effects	Concerns were expressed about the calculation and assessment of cumulative effects to wetlands and other waters, and that cumulative effects for a 78-year mine expansion scenario should be quantified for wetlands and other waters, including rivers and streams.	The wetlands cumulative effects section has been revised. Quantification has been included for wetlands and other waters (including streams) for the Pebble Expanded Mine Scenario described in Section 4.1, Introduction to Environmental Consequences; however, the document discloses that the wetlands and streams data available for the area of the expanded mine scenario differ in level of detail from project-specific mapping.
Wetlands—Wetlands-Downstream-Indirect Effects	Concerns were expressed that the geographic extent of all of the types of secondary/indirect effects, particularity in regard to downstream effects, fugitive dust, fragmentation of habitats, and habitat degradation, is not accurately estimated.	The EIS analysis area for direct and indirect effects to wetlands and other waters/special aquatic sites is described in Section 3.22 and Section 4.22, Wetlands and Other Waters/Special Aquatic Sites. Fragmented habitat text has been clarified in Section 4.22; calculations of acres of fragmented habitat have been revised. Text has been clarified on discussion of habitat degradation. Clarifying text has been added to further explain fugitive dust impacts to wetlands and vegetation in Section 4.22, and in Section 4.26, Vegetation. Clarifying text has been added to tie impacts to groundwater in Section 4.17, Groundwater Hydrology, with impacts to downstream effects in Section 4.22.
Wetlands—Wetlands-Fragmentation	Concerns were expressed about the discussion and calculation of fragmented wetlands as an indirect effect to wetlands, including downstream impacts.	Wetland fragmentation calculations and accompanying discussion has been clarified in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, including discussion of downstream surface water hydrology, groundwater hydrology, and mitigation measures by the Applicant to maintain hydrologic connectivity (see Section 3.4, Needs and Welfare of the People—Socioeconomics, Figure 3.1, and Knight Piésold 2018a). Downstream impacts to wetlands and other waters due to disrupted hydrology are analyzed and discussed in the Dewatering impact analysis in Section 4.22, Wetland and Other Waters/Special Aquatic Sites.
Wetlands—Wetlands-Functions	Concerns were expressed that the EIS analysis does not include a functional assessment. Concerns were expressed about the lack of functions applied to aquatic resources, including stream reaches, lakes, or ponds potentially affected by the project. It was asserted that the EIS could not assess direct, indirect, or cumulative impacts without assessing wetland functions with a functional assessment. It was recommended the FEIS include the full array of functions currently performed	The USACE will not require a functional assessment for the project, because there is no USACE-accepted methodology for a functional assessment in this area of Alaska, although there are accepted methodologies for other parts of the state. Data collection is not considered sufficient by USACE to develop a functional assessment. A functional assessment is not required for an EIS.

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	by the potentially affected streams, lakes, and ponds, as well as the degree to which they are currently performing each function. It was also suggested that data that had been collected for the project would support development of a functional assessment, and that USACE apply Credit Debit Methodology using function or condition data to quantify functional losses or gains between current and future conditions to inform compensatory mitigation decisions.	The EIS has been revised to more clearly: 1) characterize the nature and extent of effect that the project discharge would have on the structure and function of the aquatic resources, and the aquatic ecosystem; and 2) characterize the extent to which each of the functions provided by each of the potentially affected aquatic resources would change as a result of the direct, indirect (also referred to as secondary), and cumulative effects of the project.
Wetlands—Wetlands-Regional Significance	Questions were raised about how regionally important wetlands were defined in the DEIS. A recommendation was made that a detailed analysis be conducted on the functions provided by each of the aquatic resource types as a basis for determining the value of what would be lost due to impacts from the project.	Criteria for qualification as a regionally important wetland have been revised to provide a more robust selection method that is driven by NWI codes, and will add transparency to the calculation of impacts. Substantive changes from the DEIS are the addition of Estuarine wetlands (i.e., salt marshes) as a regionally important type, and the removal of Palustrine bogs (i.e., peatlands) as a regionally important type. Estuarine wetlands were added, because these are locally rare types that are sensitive to disturbance; this type occurs only under the most recent alignments of Alternative 2 and Alternative 3; and for this reason, were not identified in the DEIS. Palustrine bogs were removed from consideration, because these comprise approximately 20 percent of analysis area wetlands, and are therefore not locally rare. Culturally important plants were identified from an ethnobotanical study from the Yukon-Kuskokwim region (Jernigan no date). Of the 73 plant species listed, 12 vascular plant species are recognized as obligate wetland species. Discussion of their traditional uses has been included in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites.
Wetlands—Wetlands-Stream Channel Extent	Concerns were expressed about uncertainties in applying National Hydrological Dataset (NHD) data to determine stream lengths potentially impacted by the project. NHD data were thought to not capture all stream courses, and may underestimate channel sinuosity, resulting in underestimates of affected stream length.	NHD data are no longer used to determine stream length extents. All project components and alternatives now have field-verified mapping. Section 3.22 and Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, have been revised accordingly.
Wetlands—Wetlands-Thresholds	It was asserted that the methodology applied to assess impacts to wetlands and other waters incorrectly applied a threshold approach, which resulted in an inaccurate assessment of wetland impacts, and an inadequate understanding of other related resource impacts due to wetland impacts. It was suggested that the EPA concerns in a white paper on thresholds provided to USACE (EPA 2018) supported the idea	Methodology of impact assessment for wetlands and other waters is described in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites. The context of analysis factors for NEPA is described, and includes magnitude, duration, and extent. Text has been clarified to better describe the methodology in context. USACE methodology and approach to assess impacts to wetlands is considered sufficient for the EIS. Where practical, the EIS quantifies impacts and provides context

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	that thresholds should not be applied, and that the USACE should adopt a methodology that allows assessment of significant degradation, and whether compensatory mitigation should be required. The Impervious Cover Model (ICM) model was suggested.	for readers by also presenting the amount of resources that exist currently. The EIS does not present thresholds for acceptable or unacceptable impacts. The determination whether, and how much, compensatory mitigation is necessary to offset impacts to aquatic resources would be documented in the ROD.
Wildlife—Bears—McNeil River State Game Sanctuary	Concerns were expressed that the DEIS does not adequately address the potential impacts to bears that use the McNeil River State Game Sanctuary and the surrounding areas (including Katmai, Lake Clark, etc.). This covers many concerns, including public safety, changes to recreation and tourism, disregard for the "Sanctuary," impacts of noise, vessel and vehicle activity (including potential for a barrier to bear movement), visual impacts, short-term, long-term, and cumulative impacts, etc. More details of the "Wildlife Management/Interaction Plan" that would be implemented are needed. There are assertions that the Refuge boundary is as close as 250 feet from the natural gas pipeline and transportation corridor for Alternative 1. There are also concerns that McNeil River State Game Sanctuary and Refuge are outside of the EIS analysis area, and because bears move large distances, the EIS analysis area is too small, and should be expanded to include the home range of the bears at McNeil instead of a 3-mile buffer around the port access road and Amakdedori port. There are also concerns about how fish populations would be affected, and how bears that feed at MikFik Creek and McNeil may be impacted by changes to fish populations, and their ability to access these feeding locations.	Many concerns were expressed about potential impacts to brown bears at McNeil State Game Sanctuary and Refuge, Katmai National Park and Preserve, and Lake Clark National Park and Preserve. These concerns were assessed, and Section 4.23, Wildlife Values, has been revised to expand on the potential impacts on brown bears. Project details have been updated in Chapter 2, and included in the effects analysis in Section 4.23. The measures in the Wildlife Interaction Plan (PLP 2019-RFI 122) are discussed in Section 4.23 and Chapter 5, Mitigation. Additional mitigation measures are included in Appendix M1.0, Mitigation Assessment. Section 4.5, Recreation, has been revised to expand on the potential impacts on bear viewing at McNeil River State Game Sanctuary and Refuge.
Wildlife—Bears-Impacts-General	General concerns were expressed about the potential impacts from the project on brown bears and brown bear habitat outside the EIS analysis area. Specific concerns include changes in food availability, managing food wastes from the project, driver awareness education along the transportation corridor, use of bear spray instead of firearms, monitoring plan to inform management decisions, too narrow of a geographic extent for a large-ranging species (EIS analysis area is too small), impacts of the port access road, etc. Furthermore, concerns were expressed about impacts to brown bear habitat, especially denning habitat and how an access road through denning	General concerns expressed in this SOC regarding impacts to brown bears have been addressed in the effects analysis of the EIS in Section 4.23, Wildlife Values. Further clarification regarding the extent of the EIS analysis area has been included in Section 4.23. The framework for a wildlife interaction plan (PLP 2019-RFI 122), which includes some potential minimization and mitigation measures, has been included in Section 4.23. Furthermore, additional scientific papers have been included to disclose potential negative impacts from the project on brown bears, including at the population level.

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	habitat may impact brown bear populations. Several comments were received citing various scientific articles, including one by L. H. Suring (2019) that discusses how brown bear populations in the area may be negatively impacted by the project.	
Wildlife—Beaver Impacts	Concerns were expressed in Section 3.23, Wildlife Values, that because of the importance of beaver activity to juvenile salmonid rearing habitat, accurate characterization of beaver habitat along the transportation and natural gas pipeline corridor is essential to a robust assessment of environmental impacts.	Additional information regarding beaver survey data and detections along the transportation and natural gas pipeline corridors for all alternatives has been provided in Section 3.23, Wildlife Values.
Wildlife—Caribou-Impacts	General concerns were expressed about the project's potential impacts on caribou and caribou habitat around the mine site area. Concerns include impacts of noise and light pollution on behavioral disturbance to caribou, quality of forage, etc. Concerns were expressed that the limitations of caribou data from radio-collared animals in the Mulchatna caribou herd were not adequately included in the DEIS.	Section 3.23, Wildlife Values, has been revised to include a discussion of the limitations of using radio-collared data to determine estimated populations and preferred use areas by the Mulchatna caribou herd. Additional information on habitat conditions documented during baseline surveys has been included. Section 4.23, Wildlife Values discloses the potential impacts to caribou from the project. As described in this section, it is anticipated that caribou would avoid the mine site area due to behavioral disturbance. The extent of impacts may stretch beyond the mine site and transportation corridor, including additional avoidance of areas due to increased noise, presence of humans and equipment, and other sources of disturbance.
Wildlife—Fugitive Dust Impacts to Ecological Receptors	General concerns were expressed about the potential direct, indirect, and cumulative impacts from fugitive dust on wildlife resources (salmon, bears, and other wildlife), including those on Katmai.	Potential impacts from fugitive dust on biological resources are disclosed in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, Section 4.23, Wildlife Values, Section 4.24, Fish Values, Section 4.25, Threatened and Endangered Species, and Section 4.26, Vegetation. The Fugitive Dust Control Plan has been drafted and is now referenced in Section 4.23 of the FEIS. Fugitive dust modeling in Section 4.20, Air Quality, has been added to the FEIS Section 4.23. Measures would be taken to minimize dust emissions in compliance with air quality permits. Potential impacts from fugitive dust to specific locations, such as Katmai, are not addressed in the FEIS. Rather, impacts are discussed broadly in relation to the specific project component.

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Wildlife—Impacts from shipping	Concerns were expressed that the DEIS needs to express how many marine mammals are likely to be impacted by the increased traffic in Kamishak Bay, and whether suitable equivalent habitats exist in other areas with capacity to absorb any displaced population.	Section 4.23, Wildlife Values, has been revised to better describe the potential physical and behavioral impacts from increased shipping in Kamishak Bay. An exact number of marine mammals that may be impacted is not provided in the EIS. This type of quantification is typically provided during the application for an Incidental Harassment Authorization under the Marine Mammal Protection Act consultation.
Wildlife—Migration Barriers	General concerns were expressed about the transportation corridor being a migration barrier to wildlife (including noise impacts). Have specific wildlife corridors been identified along the transportation corridor?	Section 4.23, Wildlife Values, details how the transportation corridor, especially the port access road under Alternative 1, has the potential to cause wildlife to avoid the transportation corridor, because it is a new landscape feature. Several studies (referenced in the EIS) have documented how roads can cause wildlife avoidance, depending on the intensity of use by vehicles. Although the transportation corridor may cause temporary avoidance by wildlife (especially during construction), it is possible that wildlife may tolerate/habituate to the presence of the road. Bridges over the Newhalen River and Amakdedori Creek would allow wildlife movement along these major waterways under the transportation corridor. Design measures at Diamond Point port have been updated for the FEIS to include a caisson-supported causeway and dock, which would allow wildlife to pass between caissons underneath the causeway to prevent blocking wildlife. This information has been updated in Section 4.23.
Wildlife—Risk Assessment for Wildlife	Concerns were expressed that an impact assessment be conducted that is specific to address potential leaching effects on wildlife from mine tailings into the surrounding environment and water sources when containment systems and processes fail.	Impacts from potential leaching of mine tailings are addressed in Section 4.18, Water and Sediment Quality. Section 4.27, Spill Risk, describes the potential impacts from spills. Information in Section 4.18 has been expanded, but no changes were made as per this SOC.
Wildlife—Road Access	Concerns were expressed about how roads would be maintained for local resident use (especially for hunting and fishing) during and post-mining.	Details regarding road use are included in Chapter 2, Alternatives, and Section 4.12, Transportation and Navigation. Information has been added to better describe road maintenance post-mining.
Wildlife—Suggested Reference	Concerns were expressed that many studies that show impacts of large industrial development projects on brown bears were ignored in the DEIS (for example, Saunders and Sprague 1967, Dube et al. 2005, Cristescu 2012, Boulanger and Stenhouse 2014). This includes negative impacts on salmon (Miller et al.	Additional references that identify potential impacts from the project have been included where applicable in the FEIS in Section 4.23, Wildlife Values, and Section 4.24, Fish Values.

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	1993; Hilderbrand et al. 1999, 2004, 2018a,b), direct habitat loss and population fragmentation (Chruszcz et al. 2003, Mace 2004, Apps, et al. 2009, Proctor et al. 2012, Cristescu et al. 2016), indirect loss of habitat caused by bears avoiding mine-related disturbances and activities (Swenson et al. 1997, Wakkinen and Kasworm 1997, Wickham 2013, Cristescu et al. 2016), and increased human-caused mortalities of bears and risks of injury to persons from food-conditioned bears (e.g., Nielsen et al. 2004, Schwartz et al. 2005).	
Wildlife—Wildlife-Affected Environment	Concerns were expressed about the level of research conducted at the mine site and transportation corridor, and the level of analysis for wildlife species in the entire Bristol Bay region. Concerns were expressed that the EIS does not include a full analysis of the potential mining impacts to the Bristol Bay watershed, and the terrestrial and marine species that occur there. Additional concerns were expressed about the geographic extent of the analysis area and lack of comprehensive analysis of impacts across the broad geographical region. Concerns were expressed that the EIS should be revised to include a larger area of study that reflects the migration, habitat, and ranges of wildlife in Bristol Bay, Iliamna Lake, and western Cook Inlet. The revised DEIS should include a more accurate depiction of wildlife, including multi-season and multi-year studies and baseline data collection on the presence, abundance, distribution, migratory patterns, food access, overwintering, denning, breeding, and rearing habitat in and around the port site, road corridor, Iliamna Lake, and mine site, and each alternative for all wildlife species that occur.	Section 3.23 and Section 4.23, Wildlife Values, detail the baseline surveys conducted by Alaska Biological Resources, Inc, and state and federal entities in the mine site, transportation corridor, and port facilities for all alternatives. Studies were conducted at the watershed level, which included both Bristol Bay and Cook Inlet. Species that occur in both watersheds are discussed collectively in the EIS. The EIS states that wildlife may move into and out of the analysis area, and the analysis area is the extent of potential impacts under permitted conditions. Multi-year studies were collected for several groups of species; however, not all species received the same level of baseline studies. Data from other sources (such as state and federal entities) were used to supplement the environmental baseline data collected by PLP. The EIS analysis area does not include the entire Bristol Bay region, because impacts (under permitted conditions) are not anticipated to extend that far southwest, apart from various hypothetical spill scenarios detailed in Section 4.27, Spill Risk. Species that may be affected further downstream in Bristol Bay are discussed in Section 4.27. The reason for selection of the EIS analysis area for wildlife species has been revised, and is detailed in Section 3.23 and Section 3.25, Threatened and Endangered Species.
Wildlife—Wildlife-MM- Vessel Disturbance	Concerns were raised about the impacts analysis provided in Section 4.23 and Section 4.25 in regard to the magnitude, extent, and intensity of aircraft and vessel disturbance, especially noise, on marine mammals. Specific concerns were raised about the potential for aircraft and vessel disturbance to separate mom/pup harbor seals and sea otters.	Section 4.23, Wildlife Values, has been revised for the FEIS to further analyze potential impacts from aircraft and vessel disturbance on marine mammals in the analysis area. The impacts discussion includes an analysis of potential impacts on harbor seals during sensitive life stages. Section 4.25, Threatened and Endangered Species, has been updated to reflect potential impacts to northern sea otters (including mom and pup separation).

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Wildlife—Wildlife-barriers to movement/wildlife crossings	Concerns were expressed that the high frequency of traffic along the transportation corridor with no periods of reduced activity would effectively make the roads a barrier to wildlife. Commenters asserted that localized population effects may occur due to large-scale habitat fragmentation. Concerns were also expressed that wildlife crossings were not included in the list of mitigation.	Potential impacts from the construction and use of the transportation corridor are disclosed in Section 4.23, Wildlife Values. Currently, no wildlife crossings are proposed; however, they have been included in Appendix M1.0, Mitigation Assessment, the list of potential mitigation measures to be considered. Traffic on the roads, particularly the port access road, is anticipated to be phased somewhat due to timing of the ferry crossing, which may provide longer gaps in traffic to permit wildlife to cross the port access road. Section 4.23 has been updated to discuss potential traffic phasing, and Appendix M1.0, Mitigation Assessment, has been updated to include traffic phasing and quite periods (free of traffic) as measures to reduce the potential barrier to movement from the port access road.
Wildlife—Wildlife-bear data limitations	The text in Section 4.23 needs to acknowledge that due to poor timing and difficult sightability during bear den survey(s), the resulting estimate is conservative and should be seen as a minimum. Limitations of all bear survey data should be included in the text when describing brown bear use of the area. Furthermore, the section does not include or make any conclusion statements regarding the magnitude, duration, or extent of these impacts to brown bear. Concerns were expressed that because the port access road traverses high-quality brown bear denning habitat, it may be necessary to relocate the road.	Section 4.23, Wildlife Values has been updated to disclose the limitations of bear survey data, and the data represent a minimum estimate of brown bear dens. The section discloses that the magnitude and extent of impacts on brown bears, especially their denning areas, are unknown. The estimated duration of impacts has been updated in Section 4.23. No change has been made to the document regarding relocating the port access road.
Wildlife—Wildlife-concentrate spill impacts	Concerns were expressed that there are no data or analyses to support the conclusion that a concentrate spill into a stream "would impact a small fraction of the total salmonid eggs in a stream"; that there would be no measurable impacts on salmon populations; and that the duration of potential impacts would be "days to weeks" for wildlife and "will not extend longer than 1 year" for fish.	Impacts to wildlife from a concentrate spill are detailed in Section 4.27, Spill Risk. Additional discussion and clarification has been included in the EIS to support the predicted magnitude, duration, and extent of impacts.
Wildlife—Wildlife-cumulative effects	Concerns were expressed that the cumulative effects section was too broad and does not adequately detail the potential cumulative effects of all past, present, and in particular, reasonably foreseeable projects on brown bears.	Cumulative effects have been expanded and discussed in greater detail in FEIS Section 4.23, Wildlife Values.

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Wildlife—Wildlife-diesel spill impacts	Multiple concerns were expressed about the potential impacts on wildlife from diesel spills. Questions were raised about the magnitude, duration, and geographic extent of the diesel spill impacts analysis. Additional concerns were expressed about the spill risk scenarios and the need to include additional scenarios.	Potential impact of diesel spills on wildlife are addressed in Section 4.27, Spill Risk. This section has been updated to discuss and elaborate on the concerns expressed by commenters. Section 4.27 has also been expanded to address the potential impacts of the marine diesel spill at the Diamond Point port location. No additional diesel spill scenarios have been included. Section 4.27 addresses the rationale on selection of spill scenarios.
Wildlife—Wildlife-executive summary details	This executive summary section is currently missing any review of impacts to wildlife.	The Executive Summary intentionally focuses on the most important issues identified during scoping, and does not include wildlife impacts. Chapter 3, Affected Environment; and Chapter 4, Environmental Consequences, of the EIS, however, analyze potential impacts to many other resources, including wildlife. No change has been made to the FEIS as a result of these comments.
Wildlife—Wildlife-fugitive dust impacts	Concerns were expressed that the DEIS fails to consider the unique biology of lichen and the lichen-to-caribou-to human subsistence food chain in its analysis of the impact of fugitive dust released from the mine site. Additional concerns focused on impacts to bears from fugitive dust and bioaccumulation of heavy metals and other pollutants. These risks include contaminant-laden fugitive dust, run-off from bridges, culverts and roads, and the bioaccumulation of heavy metals and other pollutants in the area food web.	Section 4.23, Wildlife Values, has been updated in the FEIS to detail potential impacts from fugitive dust, and incorporates the Fugitive Dust Control Plan (PLP 2019-RFI 134) along with dust modeling for the mine site. Section 4.26, Vegetation, addresses the potential impacts to lichen from fugitive dust emissions.
Wildlife—Wildlife-habitat fragmentation	Concerns were expressed that the fragmentation of a species' habitat could threaten that species' survival for a variety of reasons, including reduction of total habitat area, vulnerability during dispersal to other patches of habitat, isolation of a species population, edge effects, and changes in microclimate.	The text in Section 4.23, Wildlife Values, has been updated in the FEIS to ensure potential impacts to wildlife from fragmentation are addressed.
Wildlife—Wildlife-habitat loss-marine mammals	Clarification is needed for which project components would cause loss of marine habitat, including the type of impact/ duration (temporary or permanent) and acreage for all components (port, lightering locations, navigation buoys, etc.).	The text in FEIS Section 4.23, Wildlife Values, has been updated to clearly detail which components of the project would cause temporary and permanent habitat loss in the marine environment.
Wildlife—Wildlife-Iliamna Lake Seal Impacts	Concerns were expressed that the DEIS fails to account for the unique biological importance of the islands in northeast Iliamna Lake to freshwater seals and spawning sockeye in the evaluation of Alternative 2 relative to the possible impact of a ferry-assisted ore transportation route. The environmental and	FEIS Section 3.23, Wildlife Values, has been revised to provide more detailed information about the Iliamna Lake seals, including information on their winter ecology. Baseline information as described in Brennan et al. 2019 has been included where applicable. A greater assessment

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Topic—Subtopic	Statement of Concern	Response
	overall economic value of the islands through which the ferry must pass is unique; and a thorough analysis should be undertaken of the consequences of a serious ferry mishap that may cause the release of hazardous materials into the waters of Iliamna Lake in this location. Additionally, there is baseline information regarding Iliamna Lake harbor seals (*Phoca vitulina*) that has been published in the peer-reviewed literature, and should be included in the baseline description of the seals and incorporated into the assessment of impacts (Brennan et al. 2019). Finally, the DEIS does not provide sufficient baseline data on Iliamna Lake seal winter ecology, feeding ecology, pupping, noise response, distribution, and lake use patterns. There is also a need to consider interactions between resident seal populations and the ice-breaking ferry, with regard to how maintaining open water ferry channels may increase the potential for seal-vessel interactions.	of potential impacts from the ferry have been included in Section 4.23, Wildlife Values.
Wildlife—Wildlife-Impacts-General	General concerns were expressed about the potential ecological impacts from the project, including both short-term and long-term impacts for all species. Concerns broadly include: Oversimplification of impacts and an incorrect assumption that there will be no population-level impacts when the current population levels of most species are not fully known. There was insufficient time to review the Wildlife Management/ Interaction Plan during the comment period. What will be the impacts of roads, traffic, noise, trash, spills, etc. on wildlife? Many of the surveys are from 2004 and 2005, and should be updated, particularly for short-lived species, to provide accurate baseline data. There is insufficient information to enumerate the long-term effects the mine will have on wildlife. Impacts to wildlife must be considered over the 20-year life-span of the mine and beyond during and after the reclamation and mitigation phases. There is little mention of impacts to wildlife from loss of wetland habitats.	Many of the concerns expressed are valid, and Section 4.23, Wildlife Values, and Section 4.25, Threatened and Endangered Species, have been updated to address concerns expressed in this SOC. Although mitigation measures will not eliminate all concerns, the Wildlife Interaction Plan (PLP 2019-RFI 122) has been incorporated into the mitigation measures to address some of the concerns.

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Topic—Subtopic	Statement of Concern	Response
	Bioaccumulation, biomagnification, and biotransport of contaminants, including metals and hydrocarbons, should be explicitly considered. There is an inadequate assessment of long-term impacts on species from loss of salmon and salmon streams. There will be an increase in disturbance from noise pollution, vehicle and vessel traffic, etc. that will scare wildlife away and reduce hunting opportunities. There will be a disruption of wildlife movement corridors and a severing of connectivity.	
Wildlife—Wildlife-Marine Mammals-Impacts- Gen	Concerns were expressed that include: The statement that the physical presence of this project (including vessel traffic) would not result in increased impacts to marine mammals, and that the physical presence of the project would not change the behavior of marine mammals is unsupported. Separation of mom/pup harbor seal pairs due to disturbances is possible. The potential to separate mom/pup pairs (harbor seals and sea otters), which can lead to abandonment and death (to the pup), should be included in the summary of effects table. Entanglement in mooring lines or other lines in the water (or marine debris generated from the project) is also anticipated. There is a need to include operational noise levels from the port, because they will last for the life of the project. Additional disturbance from low-flying aircraft and helicopters can disturb marine mammals. USACE must analyze how impacts from mining-related activities might travel to marine areas (e.g., contamination traveling via groundwater or surface water) and affect marine mammals, their prey, and their habitat. USACE must expand the geographic scope of its marine mammal analysis in the DEIS and BAs to include Bristol Bay. Impacts to fin whales are not fully discussed, or lacking in many ways.	Valid concerns were included and discussed in Section 4.23, Wildlife Values, and Section 4.25, Threatened and Endangered Species, depending on the species of marine mammal. Additional information to guide the reader regarding potential impacts of the project was included.

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Topic—Subtopic	Statement of Concern	Response
	An environmental baseline for heavy metal and hydrocarbon tissue contaminants in marine mammals in Kamishak Bay needs to be completed prior to completion of the DEIS. The addition of California sea lions (*Zalophus californianus*) in the FEIS. The DEIS does not address abundance, density, or seasonality for all of the marine mammal stocks likely to be affected by the project. Sighting details such as number of marine mammals observed by species, location, group size, age/sex class, seasonality, behavior, etc., should be included. Chapter 3 could be improved by better describing habitat use (e.g., spatio-temporal preferences, foraging, reproduction, haul-outs) and importance compared to the species' home ranges. Chapter 4 does not provide the information necessary to determine if impacts are significant under NEPA, nor does it address any indirect effects from the project. Chapter 4 in the DEIS limits its marine mammal injury assessment to vessel strikes, and does not consider that permanent threshold shift (PTS), which is auditory injury, could occur. It also does not use the best available data to identify marine mammal hearing capabilities (e.g., the Cook Inlet beluga whale section does not cite NMFS (2018), which is necessary to assess the impacts of acoustic exposure on hearing), nor does it include any acoustic modeling or analyses. Because there is no acoustic analysis, it is unclear how the potential (or lack thereof) for PTS or the potential degree of hearing threshold shifts from the activities was determined. Information referenced in the BAs should be included in the EIS. The DEIS does not appear to discuss how effective the mitigation will be at minimizing impacts to marine mammal populations.	
Wildlife—Wildlife-MM-Contamination	Concerns were expressed about the lack of tissue contaminant baseline data for marine mammals. Additional concerns were raised about the DEIS not including an analysis of potential contamination impacts on marine mammals from mine operations.	Marine mammals contaminant baseline studies are not included, or required, in the EIS. The potential for contamination of marine mammals from standard project operations is not considered a reasonably foreseeable action. Spill Risk, Section 4.27, analyzes the potential impacts on wildlife, including marine mammals, from multiple spill scenarios. No change has been made to the EIS as a result of these comments.

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Topic—Subtopic	Statement of Concern	Response
Wildlife—Wildlife-noise impacts general	Concerns were expressed about the effects of increased noise on birds and mammals (in particular caribou, brown bears, and marine mammals), especially during breeding, nesting, and calving seasons, as well as all other life phases. Concerns focused on noise from blasting and from the port. Additional concerns were expressed regarding what types of noise are considered temporary versus permanent.	Section 4.23, Wildlife Values, of the FEIS has been updated to include an expanded analysis of potential noise impacts to wildlife, with particular emphasis on caribou, brown bears, and marine mammals from both temporary and permanent noise sources, including blasting from the pit and material sites. Noise impacts to marine mammals that are federally listed as threatened or endangered are discussed in Appendix K4.25.
Wildlife—Wildlife-pipeline stringing impacts	Concerns were expressed that the EIS does not address the potential behavioral changes nor physical disturbance to wildlife movement due to prolonged periods of pipeline stringing; and the potential injury, entrapment, and disruption of wildlife movement (including potential barriers) due to open ditches from pipeline construction.	Section 4.23, Wildlife Values, has been updated to include project details on pipeline construction and a discussion of how implementation of the Wildlife Interaction Plan would reduce impacts to wildlife during pipeline construction.
Wildlife—Wildlife-selenium impacts	Concerns were expressed that the EIS fails to identify the specific species at risk from exposure to elevated selenium in discharges from the Pebble Mine. The DEIS and supporting documentation are insufficient to determine species at risk: fish and aquatic birds known to incubate, nest, rear, and/or spawn on or near ponds, and wetlands and streams in close proximity to discharge locations. The species that nest and rear broods in the mine area, particularly near water treatment plant effluent discharge sites, are not sufficiently considered for potential individual and population-level impacts of elevated selenium concentrations resulting from discharge. The DEIS also fails to describe or assess the site-specific factors that will determine the concentration of selenium at which particular species and downstream ecosystems will suffer adverse impacts. Despite well-documented toxic effects, no ecotoxicity studies or analyses necessary to predict and consider potential ecotoxic effects have been conducted on water treatment plant discharge water in the DEIS or otherwise to determine the potential for biological impacts for the project. Additional concerns were expressed that birds, wood frogs, and Iliamna Lake seals may be impacted by increased selenium concentrations in the waterways. This includes impacts of elevated selenium in tailings water that could be released if there was a spill or failure incident. Finally, effects of mercury, cadmium, and selenium, and certain persistent hydrocarbons such as polycyclic aromatic hydrocarbons (PAHs) are not described adequately in the EIS.	Section 4.23, Wildlife Values, has been updated to elaborate on potential impacts from selenium and other metals on a variety of wildlife species. A description of the potential impacts of selenium loading in the streams, its bioaccumulation, trophic transfer, and toxicity in fish and wildlife at the predicted concentrations in discharges/effluents (provided in Appendix K.14) has been provided in greater detail in Section 4.24, Fish Values.

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Topic—Subtopic	Statement of Concern	Response
Wildlife—Wildlife-Small Mammals	Concerns were expressed that the DEIS lacks information on the number of species of small mammals that use the project area, or on the project-area population levels of those species.	Section 4.23, Wildlife Values, references small mammal species known or with a potential to occur in the analysis area based on surveys done by Alaska Biological Resources. An estimation of population levels of small mammal species is beyond the scope of this EIS. No changes have been made to the EIS to address this comment.
Wildlife—Wildlife-waste management	Concerns were expressed about the impact of attracting predators and scavengers. Attraction, habituation, food-conditioning, and predator population augmentation are well-understood impacts of industrial development in Alaska, with numerous sources and mitigation measures available. This information should be included here.	Section 4.23, Wildlife Values, has been updated to include the potential impacts from predators and scavengers from various project features, including waste management locations. The Wildlife Interaction Plan (PLP 2019-RFI 122) and mitigation measures detailed in Chapter 5, Mitigation, provide additional measures to reduce the potential for impacts to wildlife.
Wildlife—Wildlife-Wildlife Interaction Plan	Concerns were expressed that the DEIS does not adequately address what measures will be used to minimize vehicular collisions with wildlife. Furthermore, there is currently no discussion in the document about landfill construction requirements and methods that will be used to minimize wildlife conflicts.	The EIS has been revised to include Applicant-committed mitigation measures (PLP 2019-RFI 122) that are designed to minimize wildlife conflicts and reduce vehicular collisions with wildlife. Landfill construction requirements are stipulated by state permit conditions.
Wildlife—Wildlife-Wood Frog-Impacts	Concerns were expressed that the entire discussion of impacts to wood frogs is lumped together into a few paragraphs that discuss generic impacts to small terrestrial invertebrates. Additionally, there were no surveys for wood frogs for the transportation and natural gas pipeline corridors or the ports.	Section 4.23, Wildlife Values, recognizes that there will be impacts to wood frogs from habitat loss and alteration. Because wood frogs are the only amphibian in the area, the analysis is included with that of small terrestrial vertebrates. It is correct that no focused wood frog surveys were conducted for the transportation and natural gas pipeline corridors or the port. However, because wood frogs were detected in many of the waterbodies in the mine survey area, wood frogs are assumed to be present in many of the waterbodies in the transportation and natural gas pipeline corridors. No changes were made to the EIS.