**Pebble EIS Draft Surface Water Hydrology Sections**
**EPA Comments**
**12/21/18**

The EPA appreciates the opportunity, as a cooperating agency, to provide you with these comments on the preliminary draft Surface Water Hydrology Sections 3.16, K3.16 and 4.16 (11/9/2018 review draft) of the Pebble EIS. Our comments are provided in table format below. Our public comments on the Draft EIS may include additional concerns or recommendations. These interagency comments or portions thereof may be protected by the deliberative process privilege.

| Page | Section | Existing text (if applicable) | Recommendation |
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| 3.16-1 | 3.16 | General comment on baseline data, analysis area, and modeling.<br><br>The baseline studies are summarized in this section and more details regarding meteorological inputs to water balance models and water balance calibration are provided in Appendix K3.16. | We have the following overall recommendations for section 3.16:<br><br>(1) Clearly define the area of analysis for the baseline studies and impact analysis for this resource for all project components and alternatives; and<br><br>(2) Describe whether there are data gaps with the existing baseline studies for the proposed action and alternatives. If there are gaps, discuss whether there will be additional monitoring, when it will occur, and when it will be included in the EIS. If no additional monitoring is planned, then describe the extent to which any data gaps affect characterization of the affected environment (section 3.16) and the impact analysis (section 4.16).<br><br>Appendix K discusses the water balance model calibration. We recommend that the appendix describe the model basis, approach, sensitivity analysis, and any uncertainties in the model output. This information was previously requested in our scoping letter and our comments submitted to the Corps on 7/24/2018. See also our similar comment on section 3.17 citing examples from Corps mining project EISs. |
| 3.16-8 | 3.16.1.1 Mine Site - Streamflow | Groundwater/surface water interaction in the mine site watersheds is controlled by glacial and fluvial deposits of varying thicknesses that occur over most of the project area below elevations of approximately 1,400 feet | We recommend including a figure that illustrates the locations of surface and subsurface drainage pathways that result in cross-drainage transfer of flow. |

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| 3.16-8 | 3.16.1.1 Mine Site-Gaging Stations, Figures 3.16-4 and 3.16-5 | Since 2004, streamflow monitoring has been conducted at gaging stations on the NFK and SFK rivers and the UTC, as well as tributary streams in each watershed. Figure 3.16-2 depicts all gaging station locations in the three watersheds and Figure 3.16-3 provides a focused view of gaging stations with regard to the mine site. | Per our previous comments submitted to the Corps on 7/24/2018, we recommend identifying which gaging stations could provide early indications of expected impacts as a result of mining operations (e.g, stations placed closest to pit or wastewater discharges), and whether additional gaging/sampling stations are proposed in the future.<br><br>In the figures, we recommend using different colors or shapes for distinguishing the gaging stations operated by the USGS and those operated by Pebble, since the instrumentation, accuracy, and validation operations might not be similar. We also note that the gaging stations appear in both Figure 3.16-4 and Figure 3.16-5 and recommend correcting the text. |
| 3.16-10 and K3.16-8 | 3.16.1.1 and K3.16 | Years of gaging stations record | We note that there is a discrepancy between the years of record for the gaging stations listed in Section 3.16 and in K3.16. In Section 3.16, different ranges of years are stated for each station, whereas K3.16 reports the years of record as 2004-2015 for all stations. We recommend correcting where necessary and/or explaining the reason for the difference. |
| 3.16-18 K3.16-1 | 3.16.1.1 | Metrological Inputs to Water Balance Modeling | Although the document discusses the meteorological data inputs to the model and calibration, it does not provide information about the water balance model itself. We recommend that the DEIS include the following information: (1) which hydrologic cycle components are included in the model; (2) whether the spreadsheet method in the water balance approach was tested at different watersheds for its applicability; (3) a description of the model sufficient to address the model's merits and limitations compared to other possible models; and (4) the size and extent of the overall watershed used in the model. We recommend that this information be included in section K3.16 |

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| | | | since this section describes the inputs in detail. |
| 3.16-18 and K3.16-4 | 3.16.1.1 and K3.16 | USGS regional regression equations were used for estimating instantaneous peak flows for the mine site… | Per previous comments submitted to the Corps on 7/24/2018, we recommend that the regression equation and description be included in K3.16. |
| 3.16-18, 3.16-23 | 3.16.1.1 | Flood Hazards: …there are no flood hazards. | We recommend that the DEIS provide additional information and analysis to support this conclusion. For example, we recommend including predictions of the possible flood hazards (including magnitude and frequency) due to potential changes in long-term weather and climate. |
| 3.16-19 | 3.16.1.2 | Limited data are available for the southern segment of the mine access road from the south ferry terminal to Amakdedori. No known surface water investigations have been conducted along the south access road. | We recommend that the DEIS discuss whether surface water data collection is planned for this area. If no additional data collection is planned, then we recommend describing the extent to which identified data gaps would be discussed and analyzed as part of the characterization of the affected environment (section 3.16) and the impact analysis (section 4.16). |
| 3.16-23 | 3.16.1.3 | No streamflow gaging stations are present in the port area (USGS 2018). | We recommend that the DEIS discuss whether surface water data collection is planned for this area. If no additional data collection is planned, then then we recommend describing the extent to which identified data gaps would be discussed and analyzed as part of the characterization of the affected environment (section 3.16) and the impact analysis (section 4.16). |
| 3.16-19 to 3.16-21 | 3.16.1.2 - 4<br><br>And 3.16.2 through 3.16-3 | General comment on identification and disclosure of streams in the analysis areas of the project and alternatives. | We recommend providing tables that list each of the streams (named and unnamed) crossed or potentially impacted by the roads, pipeline(s), and port sites for the proposed action and alternatives. In the tables, we recommend identifying the applicable project component and alternative, whether the stream would be crossed by a bridge or culvert, and whether the culvert would be designed for fish passage. Because these would be large tables, it may be appropriate to include |

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| | | | in the appendix. |
| K3.16-1 | K3.16.1 | The development of the mine site water balance model…. | Limiting the water balance model to the mine site only may be a concern because watersheds are interconnected and any activity in the mine site can affect both surface and ground water in the larger watershed. We recommend explaining the approach used to determine the boundaries of the model, or expanding the model as appropriate. |
| K3.16-1 | K3.16.1 | Month-to-month water balance approach | We recommend that the DEIS explain the rationale for using the month-to-month approach instead of a daily or event-based approach. We also note that extreme precipitation events can have significant impacts on the affected environment, which cannot be addressed by the water balance model using a month-to-month approach. |
| K3.16-8 | K3.16.2 | The watershed model was calibrated using meteorological and streamflow data for the period 2005 to 2009… | In addition to calibrating the model, we note that a validation assessment of the model is needed before applying it to the overall period of record. We recommend that some of the years of data collected be used to assess whether the calibrated model is supported by independent data in the record, excluding the calibration period data. |
| 4.16-1 | 4.16.2.1 | The water management strategies that support the development of water management plans and the design of water management facilities for operations and closure (Knight Piésold 2018a and 2018d) were based on results of predictive mine site water balance models. | As discussed in the comment above, we recommend that additional information be provided in the EIS regarding the model approach and sensitivity analysis, so that the level of uncertainty in the model predictions are disclosed for agency decision makers and the public to understand. |
| 4.16-3 | 4.16.2.1 | The selected precipitation values for the realizations are: … | We recommend that the DEIS describe the basis for the precipitation values used. |
| 4.16-5 | Table 4.16-1 | Maximum pond volumes of the Pyritic and Bulk TSFs. | Even though the maximum pond volumes vary, we recommend disclosing the range of estimated pond volumes for the TSFs for agency decision makers and the public, as was done for the water management ponds. |
| 4.16-6 | 4.16.2.1 Water Mngmt | The mine would be designed for zero-discharge of untreated contact water during construction, operations, and | We recommend providing a reference to the section in the EIS where these water management strategies can be |

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| | | closure. Water management strategies have been developed to achieve this design and maintain sufficient fresh water for ore processing and other mine site uses. | found. |
| 4.16-6 | 4.16.2.1 Water Mngmt | The average annual process water surplus during maximum operations is estimated to be 29 cubic feet per second (cfs), which would be treated and discharged throughout the year in a manner to optimize downstream fish and aquatic habitat (Knight Piésold 2018i). | We recommend providing additional information to verify that the water treatment plant has the capacity to handle the maximum flow of 29 cfs. We also recommend providing additional discussion of what is meant by the statement that the water discharge would optimize downstream habitats.<br><br>In addition, we recommend that the DEIS provide a discussion of the uncertainties/level of confidence in the 29 cfs estimate.<br><br>There are statements throughout the EIS in Chapter 2, and in Sections 4.16 and 4.17 about the physical habitat simulation system. Per our previous comments submitted to the Corps, we continue to recommend that more specific information is needed about how this system would work during mine operations and closure in order to evaluate the simulation system's effectiveness at achieving the stream flow augmentation goals described in this section. We have been unable to find information in the EIS that describes the system in a sufficient level of detail to support the conclusions made. We recommend that PLP supply the detailed physical habitat simulation system plan to include in the DEIS and that the plan and DEIS describe: (1) the locations where stream flows, water quality, fish, and habitat would be monitored; (2) the frequency of monitoring and parameters that would be monitored for both the receiving streams and treated water discharges; (3) the criteria that would be used to determine when treated water discharge flows need to be adjusted; (4) the possibility and frequency of adjusting treated water flow (i.e., the |

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| | | | discharge) to adjust to changes in the receiving streams; (5) the overall robustness of this plan (e.g., examples of how physical habitat simulation systems have been successfully used elsewhere in comparison to what is proposed for the proposed action); and (6) contingency measures should it not function as planned. |
| 4.16-6 | 4.16.2.1 Water Mngmt | Surface water quantity and distribution in the NFK and SFK watersheds would be affected during operations. | We recommend including specific information on how the surface water quantity and distribution within the watersheds are expected to be affected and the extent to which these effects would vary on a seasonal basis as well as over the life of the operation. |
| 4.16-7 | 4.16.2.1 | Table 4.16-2<br>(same comment for table 4.16-3) | To more clearly describe the nature and magnitude of streamflow changes, we recommend that the DEIS provide estimates of streamflow changes for segments of stream rather than just reporting estimated changes at specific stations. For an example of this, see the approach used by EPA in Section 7.3 (Streamflow Modification) of the Bristol Bay Watershed Assessment.<br><br>We recommend that separate tables be provided that show the magnitude and extent of stream flow changes without the treated water discharges so that the extent to which the treated water discharges would mitigate flow reductions is disclosed.<br><br>The tables provide estimated flow reductions under average annual conditions. We recommend that additional tables and discussion be provided that disclose how the stream flow reductions would change seasonally or under low flow conditions. This will enable disclosure of the range of flow reductions that could occur at low flow with and without the treated water discharges.<br><br>Also, Footnote 3 of the tables refers to a Table 1 which was not provided. |
| 4.16-8 | 4.16.2.1 | Four phase closure plan | We recommend adding information |

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| | | | regarding how TSF seepage will be managed during the four-phase closure plan. |
| 4.16-19 | 4.16.2.2 | Water withdrawal would be permitted, and would therefore meet the requirements of ADF&G and Alaska Department of Natural Resources for a water withdrawal permit. | We recommend that the DEIS summarize how PLP will demonstrate that proposed water extraction volumes and rates are within permissible limits, as per ADF&G and DNR guidance/water withdrawal permit. |
| 4.16-22 | 4.16.2.3 | Whether the seabed at or near the causeway would be susceptible (i.e., erodible) to propeller wash would depend on the composition of the seabed materials (e.g., sand, silt, rock), and on the management of lightering vessel operations. Establishment of suitable BMPs for vessel operations should be sufficient to minimize adverse impacts; namely, BMPs should include specifications for managing ferry speed (minimizing wakes) and engine power settings (minimizing bottom erosive stress) during approach and departure from the causeway berths. | This section discusses the erodibility of the seabed due to activities at the Port – such as propwash. The proposed Amakdedori barge berths are at -15' Mean Lower Low Water. No propwash analysis is provided to support the contention that propwash from tug, barge, and other traffic will not affect the seabed surrounding the facility. "Establishment of suitable BMPs" is generally mentioned. Without a sense of the possibility and breadth of impacts, it's difficult to know what BMPs would be needed, and whether they will be sufficient to counter scouring or other adverse effects to the seabed and resources adjacent to the structures. We recommend that the DEIS include additional information, including a propwash analysis and discussion of the specific BMPs that would be utilized, to support the conclusions regarding impacts to the seabed. |
| 4.16-21 | 4.16.2.3 | Amakdedori Port | The document currently lacks any discussion of the impacts of the causeway and jetty on nearshore sediment transport and littoral drift. Construction of the large causeway will affect sediment processes in the vicinity and we recommend that these be assessed by a coastal engineer to determine whether erosion or accretion will occur due to the causeway, and if so, how far the impact extends down the adjacent shorelines. Depending upon the direction and magnitude of accretion over time, maintenance dredging could be required. We recommend that this possibility also be assessed by a coastal engineer, and if |

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| | | | dredging could be necessary, the DEIS should evaluate the impacts of maintenance dredging and disposal. |
| 4.16-22 | 4.16.2.3 Amakdedori Port | Removal of the causeway at the end of the project would cause substantial increases in suspended sediment in Kamishak Bay that would persist for days to weeks after decommissioning is completed. | We recommend that the DEIS explain how potential increases of suspended sediments will be addressed during construction activities. If this information is provided in a different section of the EIS, then please provide a reference to this section. |
| 4.16-23 | 4.16.2.5 | Therefore, the intensity of the impacts to surface water resources is expected to result in changes in water quantity, likely within the limits of historic and seasonal variation. | We recommend that the DEIS summarize what changes to water quantity are expected to occur. |
| 4.16-25 | 4.16.4.3 | Diamond Point Port | Please see comments on Section 4.16.2.3 above; we recommend addressing the same issues here.<br><br>In addition, we recommend that dredging operations be discussed. For example, please clarify whether hydraulic or clamshell dredging is proposed. The minimum size of the dewatering and placement area will be dictated by volume of material and grain-size and anticipated retention time needed for dewatering (especially in the case of hydraulic dredging). A better description of sediment characteristics will inform dewatering needs as well as dredged material utility for reuse in jetty construction. Chapter 2 mentions that rock may be present in the dredged material; if rock is more than just incidental, we recommend including a description of how rock will be managed during dredging and disposal. In addition, we recommend including discussion of the amount and frequency of long-term maintenance dredging based on expected direction and magnitude of littoral drift. |
| 4.16-25 | 4.16.4.3 | This alternative would reduce the amount of WTP water released at discharge locations at the mine site by approximately 1 to 2 percent | We recommend that the DEIS discuss the basis for the 1 to 2 percent estimate. |
| General comment | | Affected Environment and Environmental Consequences related to port sites and marine environment | Additional information is needed to assess potential impacts to the marine environment. Each Port option currently |

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| | | | lacks the basic descriptive information about the marine causeways/jetties and adjacent shoreline areas (littoral transport direction, grain size, bathymetry) and the structures themselves. A Kamishak Bay 2017 multibeam survey was apparently conducted, however no bathymetry lines are provided on the figures. We also recommend that causeway fill acreage, fill volume, and basic length and width information be added for Port causeway and jetty descriptions (including cross-sections) (e.g., Figure 2-28).<br><br>In addition, no clear location and coverage area for a floating dock for ice breaking tugs is provided; we recommend that the DEIS clarify where the floating dock will be located and at what water depth. |
| General comment | | Affected Environment and Environmental Consequences related to port sites and marine environment | Additional information is needed to assess potential impacts to the marine environment. For physical reclamation and closure discussions, it is not clear what portions of the causeway and jetty structures will remain in the marine environment and for how long. We recommend adding this information, which is necessary to understand the long-term effects of the structures on adjacent marine shorelines. Also, the piling variant options might have different short- and long-term effects on sediment movement, and we recommend that these options be considered by the coastal engineering analysis. Please also ensure that all depths in the text include datums (e.g., dredging to -20' MLLW). |
| 4.16-26 | Table 4.16-5 | NFK River – Mean annual streamflow reduction from pre-mining conditions of 7% at both NK100C and NK100A (with treated water discharge). | In addition to mean annual streamflow reductions, we recommend that the table provide estimates of streamflow reductions in the North Fork Koktuli, South Fork Koktuli, and Upper Talarik Creek during low flow conditions.<br><br>We recommend that the geographic extent of steam flow reductions be |

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| | | | disclosed by providing the estimated length of streams that would be impacted.<br><br>This comment applies to both the operations and post-closure summaries. |
| 4.16-27 | Table 4.16-5 | Transportation corridor impacts | Since impacts are predicted at stream crossings, we recommend providing the number of stream culvert and bridge crossings for each alternative for the road and pipeline components so that the impacts can be compared across the alternatives. |
| 4.16-27 - 28 | Table 4.16-5 | Impact description terminology<br><br>Potential for local impacts to surface water hydrology at stream crossings. Impacts are expected to be short term, and would result in maintained surface flow system changes in water quantity that are likely within historical seasonal variation. | Rather than relying solely on descriptions such as “local” and “short term,” we recommend that additional information on geographic extent and duration be provided so that the reader understands what is meant by these terms. For example, instead of saying “local,” the DEIS could estimate how far (feet, miles?) from the transportation corridor these impacts would occur. Instead of saying “short term,” describe whether this means during construction of these features or during the entire construction and operational period (and provide estimated number of years).<br><br>This same comment applies throughout the table where these terms are used. |
| 4.16-28 | Table 4.16-5 | Port Site alternatives comparison | It is not clear why the port site alternatives have the same impacts given that they are in different locations and have different footprints. We recommend discussing the differences between the port site footprints and disclosing the number of streams, wetlands and other waterbodies impacted by each alternative, so that agency decision makers and the public understand the differences. |
| 4.16-30 | 4.16.6 Cumulative Effects | Overall, the magnitude of cumulative impacts to surface water hydrology from RFFAs in general would be expected to be minimal, with the exception of RFFA activities in the immediate mine site (e.g., Pebble Project buildout). The cumulative | We recommend that the DEIS provide an analysis to support the conclusions of cumulative impacts due to the Pebble Project buildout. It is not clear what cumulative effects are being referred to in the cited text, how those cumulative effects are expected to increase, what |

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| | | effects in the mine site footprint, expanded to include buildout development, would increase; but it is expected that controls would be in place to manage those impacts to prevent adverse effects on the outside environment | controls would be in place, and how those controls will be monitored.<br><br>We recommend that additional information and analysis be provided in the DEIS that includes estimates of the extent (miles of steams), duration, and magnitude (% reductions) of stream flow changes so that cumulative effects of the Pebble Project buildout are adequately disclosed. |
| General | 4.16 | | Section 3.16.4 addresses surface water and groundwater use in the project area, however, Section 4.16 does not address potential impacts to drinking water. Multiple surface water and groundwater sources, public and private, are used for domestic water supply in the project area. We recommend that Chapter 4 analyze the potential for impacts to drinking water sources. For example, we recommend discussing the proximity of project infrastructure to drinking water sources, the sources and nature of potential impacts (both quality and quantity), specific pollutants likely to impact those waters and a comparison to drinking water quality standards, whether the project impact analysis area overlaps any Drinking Water Protection Areas, and how PLP will work with the State of Alaska to ensure there are no impacts to DWPAs.<br><br>We note that drinking water resources are currently addressed in varying ways in the Surface Water Hydrology, Hydrogeology, and Water and Sediment Quality sections, and recommend that it may be less confusing to the reader to consolidate these in one place as part of the Water Quality section. |