EPA RECOMMENDED ADDITIONAL MITIGATION MEASURES TABLE

The following are additional EPA-recommended minimization measures utilizing the format of EIS Table 5-2

#	Description of Measure	Description of Impact Being Mitigated	Project Component	Project Phase	Primary Resources Affected
EPA-1	**Enclose the primary crusher and include dust emission control equipment** The greatest sources of fugitive dust emissions at the mine site during mine operations are blasting, rock crushing, transfer emissions, and vehicles on unpaved surfaces. Enclosing the primary crushers and the transfer point between the crushers and ore conveyor and including air control equipment in the crusher building would greatly reduce fugitive dust from crushing operations.	Reduce fugitive dust from crushing operations	Mine Site	Operations	Air quality; water and sediment quality; fish values; soils; health and safety; vegetation; wetlands and other waters/special aquatic sites
EPA-2	**Whole effluent toxicity (WET) testing on effluent, WET trigger limits, and response actions** RFI-135 included PLP's Monitoring Summary (August 2019) which identified selected management and monitoring plans that would be developed for the project, including a Water Quality Monitoring Plan (WQMP) and an Aquatic Resources Monitoring Plan (ARMP) The Monitoring Summary indicated that these plans would include adaptive management (plan, act, monitor, evaluate, adjust). The WQMP and ARMP identified a number of parameters and components that would be monitored, but did not include WET. We have the following recommendations related to WET testing and control: - WET testing at all outfalls - EPA approved WET methods are recommended for use that should include organisms as close as possible to those in the receiving waters	Prevent or reduce aggregate toxic effects from pollutants in the WTP effluents by establishing monitoring, trigger limits, and response actions.	Mine Site	Construction, Operations and Closure	water and sediment quality; fish values; wetlands and other waters/special aquatic sites

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	- Develop trigger limits for WET testing reflective of no toxics in toxic amounts. - Develop an adaptive management plan that identifies the trigger limits and actions that would be taken, if trigger limits are exceeded, to investigate the cause of toxicity and reduce toxicity.				
EPA-3	**Bioaccumulation monitoring, limits, and response actions.** PLP's Monitoring Summary indicated that the ARMP would include sediment monitoring for metals to identify changes in trophic levels. The WQMP includes water quality monitoring for metals. We have the following recommendations related to bioaccumulation monitoring and control: - In addition to sediment monitoring, develop site-specific bioaccumulation factors for the receiving streams so that effluent concentrations can be used as a measure of bioaccumulation. - Develop effluent limits based on bioaccumulation factors. - Develop a specific adaptive management plan that identifies actions that would be taken if limits are exceeded. Actions should include reduction of mercury and selenium in the discharges.	Prevent or reduce metals bioaccumulation in sediments and fish by establishing monitoring, limits specific to bioaccumulation protection, and response actions.	Mine Site	Construction, Operations and Closure	water and sediment quality; fish values; wetlands and other waters/special aquatic sites
EPA-4	**Bulk TSF tailings dam construction using downstream technology** The EIS identifies that downstream dam construction would provide a marginal stability increase as compared to the centerline dam. The downstream dam would have a greater footprint as compared	Reduce the potential for bulk TSF dam failure and associated severe impacts to water quality and aquatic resources.	Mine Site	Operations, Closure	water and sediment quality; fish values; soils; health and safety; vegetation; wetlands and other waters/special aquatic sites

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	to the centerline dam. We believe that even a slight increase is stability is worthwhile for this project for two reasons: (1) the exceptional value of aquatic resources that would be impacted in the event of dam failure; (2) if permitted, the project life would likely be much longer than proposed due to the documented ore resource which means that the bulk TSF dam would be operational much longer than the proposed mine life of 20 years with consequent increase in potential for dam failure.				
EPA-5	**Cyclone bulk TSF tailings to allow for selective placement of fines and sands in the bulk TSF** An EIS reference document (AECOM 2019n) identified an uncertainty regarding whether the thickened tailings could segregate enough to promote a reduction of the phreatic surface, which is a key factor in maintaining dam stability. Cycloning tailings before disposal in the TSF will allow tailings to be segregated by size and will allow the operator to control where coarse and fine tailings are placed. Revised EIS Table M-1 acknowledges that this mitigation measure could result in better control of the phreatic surface, pore pressure dissipation, and improved embankment stability. Revised EIS Table M-1 indicates that the measure would not be reasonable since it would be difficult, clumsy, and unsafe because it would need fines discharge piping located over the continually rising loose sands that workers and equipment cannot safely access. However, the EIS notes that this technology is used for other mine sites (where sands are needed for other purposes). If this technology is safely used at other sites, it is not clear why it cannot be adapted safely for the Pebble Project. We	Reduce the potential for bulk TSF dam failure and associated severe impacts to water quality and aquatic resources.	Mine Site	Operations, closure	water and sediment quality; fish values; soils; health and safety; vegetation; wetlands and other waters/special aquatic sites

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	recommend further discussions to determine whether the implementation issues could be overcome by, for example, placing the fines behind the sands instead of on top of the sands and/or using automatic tailings pipeline and spigotting control that does not rely on equipment and workers being on top of the tailings during deposition.				
EPA-6	**Manage treated effluent discharges to maintain the baseline hydrograph and water chemistry/temperature of receiving waters** Manage treated effluent discharges on a daily timestep using the modeled changes to the baseline hydrograph for each receiving water/reach without effluent as the discharge cap. Treated discharges would be used to restore the modeled flow losses and maintain the baseline hydrograph in each receiving water/reach. For example, discharges to the NFK would be managed based on the modeled change without effluent of NFK Reach A discharge. Maintaining the flow pattern within NFK Reach A would automatically maintain the hydrograph of downstream reaches. Maintaining the hydrographs of receiving waters would require storing some treated effluent for discharge later. For example, storage of treated effluent in April for discharge during May. Proposed storage in the water management ponds may be enough to meet this need. Additional storage capacity could be developed by constructing wetlands north and south of the mine site. Storing treated effluent in constructed wetlands prior to discharge to receiving waters would facilitate maintaining the	Reduce functional impacts to NFK, SFK, and UTC from treated effluent discharges. Reduce the variation from pre-project daily flows to reduce potential for: altering sediment transport processes that might result in elevated levels of suspended particulates, scour or siltation of spawning sites, increased egg mortality; reduce changes to the percentage of groundwater and chemical signature of stream flows that may result in impacts to imprinting and homing behaviors of anadromous fish and bioaccumulation of contaminants for resident fish; and reduce temperature changes that may accelerate egg incubation and result in early emergence, higher energetic costs relative to baseline conditions and increased juvenile mortality. Aquatic organisms are adapted to the chemical, physical and biological characteristics and functional processes associated with	Mine Site	Operations, closure, post-closure	water and sediment quality; fish values; wetlands and other waters/special aquatic sites Secondary impacts associated with treated effluent discharges are addressed in the following parts of the factual Determination Matrix: Subpart C – 230.20, 230.21, 230.22, 230.23, 230.24, Subpart D -230.31, and Subpart E – 230.45.

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	baseline hydrographs and: replace some wetland functional losses, replace some lost aquifer recharge, moderate the chemistry and temperature of treated effluent to more closely reflect the receiving waters. The constructed wetlands could be designed to have a surface connection with receiving waters during periods of high flow/high runoff, providing off-channel habitat and reducing erosion/sediment/scour impacts from point source discharges.	the hydrograph and alterations result in numerous impacts.			