Where does the EPA's Final Determination rely on the Corps' Final EIS, and where does it reach a different conclusion?

Answered from the public Pebble record · 30 cited passages on 16 pages

EPA's Final Determination says that "none of the FEIS conclusions quoted above contradict EPA's conclusions in the final determination", yet it finds that the FEIS conclusions about the lack of effects on fish habitats and fish populations "often are not supported by the available evidence".[1] EPA bases the final determination on the "measurable" impacts that the FEIS concludes will occur.[2] The FEIS finds measurable habitat loss (mine site development "would permanently remove approximately 22 miles of fish habitat") but no measurable population-level effect ("the loss of habitat is not expected to have a measurable impact on fish populations"); EPA treats the habitat loss itself as the unacceptable adverse effect, and its final determination "does not conclude that impacts to the fish-related endpoints" will be measurable.[1] · [3]

The Final Determination adopts the FEIS stream loss figure: "The FEIS identifies 99.7 miles of streambed habitat at the mine site that would be lost", matching the "removal of 99.7 miles of streambed habitat" in FEIS Section 4.24. EPA found that losing the 8.5 miles of FEIS-identified anadromous habitat "will have unacceptable adverse effects on anadromous fishery areas in the NFK watershed".[4] · [5] · [6] · [7] The wetland figures are not like for like: FEIS Section 4.22 reports "2,162 acres of wetlands and other waters" at the mine site, while EPA's finding rests on the "approximately 2,108 acres" in the SFK and NFK watersheds, part of approximately 2,113 acres across the SFK, NFK, and UTC watersheds that "PLP's CWA Section 404 application identified".[8] · [9] · [10] EPA has concerns with the methods used to predict streamflow impacts but treats the FEIS modelling as "a reasonable minimum approximation of impacts for this project".[11]

EPA departs from the FEIS on scale: the FEIS conclusions "focus on impacts to fish populations at large spatial scales", and "EPA has not made an unacceptable adverse effects determination at these larger scales".[1] EPA also treats FEIS values as "a minimum estimate of impacts to fishery areas".[1] Finally, EPA calls the significant degradation finding in the Corps' Record of Decision "consistent with EPA's final determination".[12]

	Final EIS	*EPA Final Determination*
Habitat loss (stream miles, wetland acres)	2,162 acres of wetlands and other waters, including 99.7 miles of streams[8]	approximately 2,108 acres (8.5 km2) of wetlands and other waters[13]
Population-level effect on salmon	impacts to anadromous and resident fish populations from these direct habitat losses would not be measurable[14]	would adversely affect fish habitats and populations in the SFK, NFK, and UTC watersheds[12]
Scale of analysis	not likely to be noticeable in context of the Bristol Bay watershed[15]	unacceptable adverse effects on fishery areas at the scale of the SFK, NFK, and UTC watersheds[1]

Habitat quality assumptions	not ideal spawning and rearing habitat for salmon[6]	not supported by the available information about these habitats[2]
Downstream streamflow	discernable changes in flow would be unlikely[16]	would adversely affect approximately 29 miles (46.7 km) of additional anadromous fish streams[13]
Portfolio Effect	the impact to the Portfolio Effect would not be discernable[15]	the FEIS provides no evidence to support these conclusions[12]

FIGURES IN THIS ANSWER

99.7 miles
streambed habitat lost, mine site
EPA Final Determination · p. 4-27 · note 4

8.5 miles
anadromous habitat lost, NFK watershed
EPA Final Determination · p. 4-27 · note 4

2,162 acres
wetlands and other waters, mine site, FEIS
FEIS Ch. 4.20-4.22 · p. 4.22-24 · note 8

2,108 acres
wetlands and waters, SFK and NFK only, EPA
EPA Final Determination · p. 4-36 · note 9

Sources

16 pages, in note order

1

Final Determination of the U.S. Environmental Protection Agency Pursuant to Section 404(c) of the Clean Water Act, Pebble Deposit Area,...

How Certain FEIS Conclusions Relate to EPA's Final Determination > 1. Conclusions related to "no measurable" changes, effects, or impacts of the 2020 Mine Plan > EPA...

EPA Final Determination · p. A1-3 · PDF p. 361

1 *"As explained in detail below, none of the FEIS conclusions quoted above contradict EPA's conclusions in the final determination."*

1 *"As a result, the FEIS conclusions about the lack of effects on fish habitats and fish populations often are not supported by the available evidence or are stated without acknowledgement and evaluation of the limitations and uncertainties inherent in the analyses presented to support those conclusions."*

1 *"Similarly, the final determination does not conclude that impacts to the fish-related endpoints mentioned in the quoted passages above—e. g., "adult salmon returning to the Kvichak and Nushagak river systems," "returning salmon," "harvest levels," "health or value of the Bristol Bay fishery"—will be measurable."*

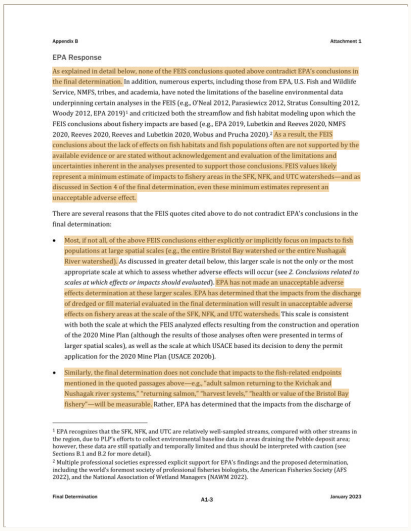
1 *"Most, if not all, of the above FEIS conclusions either explicitly or implicitly focus on impacts to fish populations at large spatial scales (e. g., the entire Bristol Bay watershed or the entire Nushagak River watershed)."*

1 *"EPA has not made an unacceptable adverse effects determination at these larger scales."*

1 *"FEIS values likely represent a minimum estimate of impacts to fishery areas in the SFK, NFK, and UTC watersheds—and as discussed in Section 4 of the final determination, even these minimum estimates represent an unacceptable adverse effect."*

1 *"EPA has determined that the impacts from the discharge of dredged or fill material evaluated in the final determination will result in unacceptable adverse effects on fishery areas at the scale of the SFK, NFK, and UTC watersheds."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=361


Appendix B Attachment 1

EPA Response

As explained in detail below, none of the FEIS conclusions quoted above contradict EPA's conclusions in the final determination. In addition, numerous experts, including those from EPA, U.S. Fish and Wildlife Service, NMFS, tribes, and academia, have noted the limitations of the baseline environmental data underpinning certain analyses in the FEIS (e.g., O'Neal 2012, Parasiewicz 2012, Stratus Consulting 2012, Woody 2012, EPA 2019)[1] and criticized both the streamflow and fish habitat modeling upon which the FEIS conclusions about fishery impacts are based (e.g., EPA 2019, Lubetkin and Reeves 2020, NMFS 2020, Reeves 2020, Reeves and Lubetkin 2020, Wobus and Prucha 2020).[2] As a result, the FEIS conclusions about the lack of effects on fish habitats and fish populations often are not supported by the available evidence or are stated without acknowledgement and evaluation of the limitations and uncertainties inherent in the analyses presented to support those conclusions. FEIS values likely represent a minimum estimate of impacts to fishery areas in the SFK, NFK, and UTC watersheds—and as discussed in Section 4 of the final determination, even these minimum estimates represent an unacceptable adverse effect.

There are several reasons that the FEIS quotes cited above to do not contradict EPA's conclusions in the final determination:

- Most, if not all, of the above FEIS conclusions either explicitly or implicitly focus on impacts to fish populations at large spatial scales (e.g., the entire Bristol Bay watershed or the entire Nushagak River watershed). As discussed in greater detail below, this larger scale is not the only or the most appropriate scale at which to assess whether adverse effects will occur (see *2. Conclusions related to scales at which effects or impacts should evaluated*). EPA has not made an unacceptable adverse effects determination at these larger scales. EPA has determined that the impacts from the discharge of dredged or fill material evaluated in the final determination will result in unacceptable adverse effects on fishery areas at the scale of the SFK, NFK, and UTC watersheds. This scale is consistent with both the scale at which the FEIS analyzed effects resulting from the construction and operation of the 2020 Mine Plan (although the results of those analyses often were presented in terms of larger spatial scales), as well as the scale at which USACE based its decision to deny the permit application for the 2020 Mine Plan (USACE 2020b).
- Similarly, the final determination does not conclude that impacts to the fish-related endpoints mentioned in the quoted passages above—e.g., "adult salmon returning to the Kvichak and Nushagak river systems," "returning salmon," "harvest levels," "health or value of the Bristol Bay fishery"—will be measurable. Rather, EPA has determined that the impacts from the discharge of

[1] EPA recognizes that the SFK, NFK, and UTC are relatively well-sampled streams, compared with other streams in the region, due to PLP's efforts to collect environmental baseline data in areas draining the Pebble deposit area; however, these data are still spatially and temporally limited and thus should be interpreted with caution (see Sections B.1 and B.2 for more detail).
[2] Multiple professional societies expressed explicit support for EPA's findings and the proposed determination, including the world's foremost society of professional fisheries biologists, the American Fisheries Society (AFS 2022), and the National Association of Wetland Managers (NAWM 2022).

Final Determination A1-3 January 2023

2

Final Determination of the U.S. Environmental Protection Agency Pursuant to Section 404(c) of the Clean Water Act, Pebble Deposit Area,...

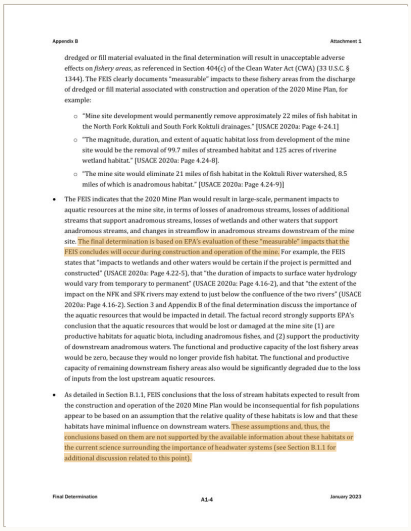
How Certain FEIS Conclusions Relate to EPA's Final Determination > 1. Conclusions related to "no measurable" changes, effects, or impacts of the 2020 Mine Plan > EPA...

EPA Final Determination · p. A1-4 · PDF p. 362

2 *"The final determination is based on EPA's evaluation of these "measurable" impacts that the FEIS concludes will occur during construction and operation of the mine."*

2 *"These assumptions and, thus, the conclusions based on them are not supported by the available information about these habitats or the current science surrounding the importance of headwater systems (see Section B.1.1 for additional discussion related to this point)."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=362



Appendix B Attachment 1

dredged or fill material evaluated in the final determination will result in unacceptable adverse effects on *fishery areas*, as referenced in Section 404(c) of the Clean Water Act (CWA) (33 U.S.C. § 1344). The FEIS clearly documents "measurable" impacts to these fishery areas from the discharge of dredged or fill material associated with construction and operation of the 2020 Mine Plan, for example:

- "Mine site development would permanently remove approximately 22 miles of fish habitat in the North Fork Koktuli and South Fork Koktuli drainages." [USACE 2020a: Page 4-24.1]
- "The magnitude, duration, and extent of aquatic habitat loss from development of the mine site would be the removal of 99.7 miles of streambed habitat and 125 acres of riverine wetland habitat." [USACE 2020a: Page 4.24-8].
- "The mine site would eliminate 21 miles of fish habitat in the Koktuli River watershed, 8.5 miles of which is anadromous habitat." [USACE 2020a: Page 4.24-9)]

- The FEIS indicates that the 2020 Mine Plan would result in large-scale, permanent impacts to aquatic resources at the mine site, in terms of losses of anadromous streams, losses of additional streams that support anadromous streams, losses of wetlands and other waters that support anadromous streams, and changes in streamflow in anadromous streams downstream of the mine site. The final determination is based on EPA's evaluation of these "measurable" impacts that the FEIS concludes will occur during construction and operation of the mine. For example, the FEIS states that "impacts to wetlands and other waters would be certain if the project is permitted and constructed" (USACE 2020a: Page 4.22-5), that "the duration of impacts to surface water hydrology would vary from temporary to permanent" (USACE 2020a: Page 4.16-2), and that "the extent of the impact on the NFK and SFK rivers may extend to just below the confluence of the two rivers" (USACE 2020a: Page 4.16-2). Section 3 and Appendix B of the final determination discuss the importance of the aquatic resources that would be impacted in detail. The factual record strongly supports EPA's conclusion that the aquatic resources that would be lost or damaged at the mine site (1) are productive habitats for aquatic biota, including anadromous fishes, and (2) support the productivity of downstream anadromous waters. The functional and productive capacity of the lost fishery areas would be zero, because they would no longer provide fish habitat. The functional and productive capacity of remaining downstream fishery areas also would be significantly degraded due to the loss of inputs from the lost upstream aquatic resources.
- As detailed in Section B.1.1, FEIS conclusions that the loss of stream habitats expected to result from the construction and operation of the 2020 Mine Plan would be inconsequential for fish populations appear to be based on an assumption that the relative quality of these habitats is low and that these habitats have minimal influence on downstream waters. These assumptions and, thus, the conclusions based on them are not supported by the available information about these habitats or the current science surrounding the importance of headwater systems (see Section B.1.1 for additional discussion related to this point).

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3

Final EIS Chapter 4, Sections 23-27 (Wildlife Values, Fish Values, Threatened and Endangered Species, Vegetation, Spill Risk)

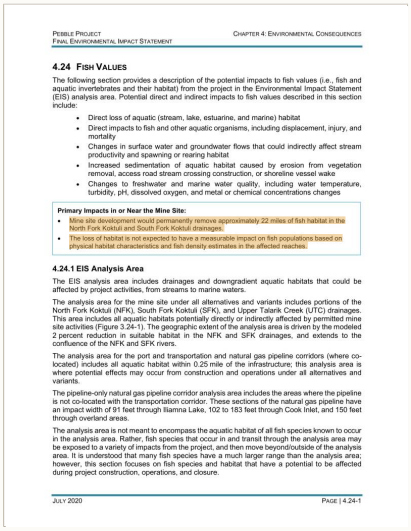
4.24 Fish Values > 4.24.1 EIS Analysis Area

FEIS Ch. 4.23-4.27 · p. 4.24-1 · PDF p. 77

3 *"Mine site development would permanently remove approximately 22 miles of fish habitat in the North Fork Koktuli and South Fork Koktuli drainages."*

3 *"The loss of habitat is not expected to have a measurable impact on fish populations based on physical habitat characteristics and fish density estimates in the affected reaches."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec23-27.pdf#page=77



Pebble Project Final Environmental Impact Statement Chapter 4: Environmental Consequences

4.24 Fish Values

The following section provides a description of the potential impacts to fish values (i.e., fish and aquatic invertebrates and their habitat) from the project in the Environmental Impact Statement (EIS) analysis area. Potential direct and indirect impacts to fish values described in this section include:

- Direct loss of aquatic (stream, lake, estuarine, and marine) habitat
- Direct impacts to fish and other aquatic organisms, including displacement, injury, and mortality
- Changes in surface water and groundwater flows that could indirectly affect stream productivity and spawning or rearing habitat
- Increased sedimentation of aquatic habitat caused by erosion from vegetation removal, access road stream crossing construction, or shoreline vessel wake
- Changes to freshwater and marine water quality, including water temperature, turbidity, pH, dissolved oxygen, and metal or chemical concentrations changes

Primary Impacts in or Near the Mine Site:

- Mine site development would permanently remove approximately 22 miles of fish habitat in the North Fork Koktuli and South Fork Koktuli drainages.
- The loss of habitat is not expected to have a measurable impact on fish populations based on physical habitat characteristics and fish density estimates in the affected reaches.

4.24.1 EIS Analysis Area

The EIS analysis area includes drainages and downgradient aquatic habitats that could be affected by project activities, from streams to marine waters.

The analysis area for the mine site under all alternatives and variants includes portions of the North Fork Koktuli (NFK), South Fork Koktuli (SFK), and Upper Talarik Creek (UTC) drainages. This area includes all aquatic habitats potentially directly or indirectly affected by permitted mine site activities (Figure 3.24-1). The geographic extent of the analysis area is driven by the modeled 2 percent reduction in suitable habitat in the NFK and SFK drainages, and extends to the confluence of the NFK and SFK rivers.

The analysis area for the port and transportation and natural gas pipeline corridors (where co-located) includes all aquatic habitat within 0.25 mile of the infrastructure; this analysis area is where potential effects may occur from construction and operations under all alternatives and variants.

The pipeline-only natural gas pipeline corridor analysis area includes the areas where the pipeline is not co-located with the transportation corridor. These sections of the natural gas pipeline have an impact width of 91 feet through Iliamna Lake, 102 to 183 feet through Cook Inlet, and 150 feet through overland areas.

The analysis area is not meant to encompass the aquatic habitat of all fish species known to occur in the analysis area. Rather, fish species that occur in and transit through the analysis area may be exposed to a variety of impacts from the project, and then move beyond/outside of the analysis area. It is understood that many fish species have a much larger range than the analysis area; however, this section focuses on fish species and habitat that have a potential to be affected during project construction, operations, and closure.

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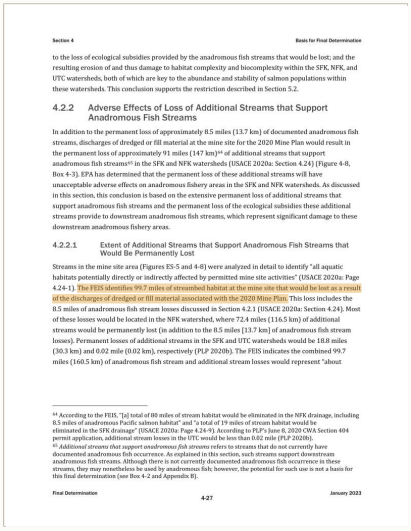
Final Determination of the U.S. Environmental Protection Agency Pursuant to Section 404(c) of the Clean Water Act, Pebble Deposit Area,...

4.2 Effects on Fishery Areas from Discharges of Dredged or Fill Material from Developing the Pebble Deposit > 4.2.2 Adverse Effects of Loss of Additional Streams...

EPA Final Determination · p. 4-27 · PDF p. 163

4 *"The FEIS identifies 99.7 miles of streambed habitat at the mine site that would be lost as a result of the discharges of dredged or fill material associated with the 2020 Mine Plan."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=163



Section 4 Basis for Final Determination

to the loss of ecological subsidies provided by the anadromous fish streams that would be lost; and the resulting erosion of and thus damage to habitat complexity and biocomplexity within the SFK, NFK, and UTC watersheds, both of which are key to the abundance and stability of salmon populations within these watersheds. This conclusion supports the restriction described in Section 5.2.

4.2.2 Adverse Effects of Loss of Additional Streams that Support Anadromous Fish Streams

In addition to the permanent loss of approximately 8.5 miles (13.7 km) of documented anadromous fish streams, discharges of dredged or fill material at the mine site for the 2020 Mine Plan would result in the permanent loss of approximately 91 miles (147 km)[84] of additional streams that support anadromous fish streams[85] in the SFK and NFK watersheds (USACE 2020a: Section 4.24) (Figure 4-8, Box 4-3). EPA has determined that the permanent loss of these additional streams will have unacceptable adverse effects on anadromous fishery areas in the SFK and NFK watersheds. As discussed in this section, this conclusion is based on the extensive permanent loss of additional streams that support anadromous fish streams and the permanent loss of the ecological subsidies these additional streams provide to downstream anadromous fish streams, which represent significant damage to these downstream anadromous fishery areas.

4.2.2.1 Extent of Additional Streams that Support Anadromous Fish Streams that Would Be Permanently Lost

Streams in the mine site area (Figures ES-5 and 4-8) were analyzed in detail to identify "all aquatic habitats potentially directly or indirectly affected by permitted mine site activities" (USACE 2020a: Page 4.24-1). The FEIS identifies 99.7 miles of streambed habitat at the mine site that would be lost as a result of the discharges of dredged or fill material associated with the 2020 Mine Plan. This loss includes the 8.5 miles of anadromous fish stream losses discussed in Section 4.2.1 (USACE 2020a: Section 4.24). Most of these losses would be located in the NFK watershed, where 72.4 miles (116.5 km) of additional streams would be permanently lost (in addition to the 8.5 miles [13.7 km] of anadromous fish stream losses). Permanent losses of additional streams in the SFK and UTC watersheds would be 18.8 miles (30.3 km) and 0.02 mile (0.02 km), respectively (PLP 2020b). The FEIS indicates the combined 99.7 miles (160.5 km) of anadromous fish stream and additional stream losses would represent "about

[84] According to the FEIS, "[a] total of 80 miles of stream habitat would be eliminated in the NFK drainage, including 8.5 miles of anadromous Pacific salmon habitat" and "a total of 19 miles of stream habitat would be eliminated in the SFK drainage" (USACE 2020a: Page 4.24-9). According to PLP's June 8, 2020 CWA Section 404 permit application, additional stream losses in the UTC would be less than 0.02 mile (PLP 2020b).
[85] *Additional streams that support anadromous fish streams* refers to streams that do not currently have documented anadromous fish occurrence. As explained in this section, such streams support downstream anadromous fish streams. Although there is not currently documented anadromous fish occurrence in these streams, they may nonetheless be used by anadromous fish; however, the potential for such use is not a basis for this final determination (see Box 4-2 and Appendix B).

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5

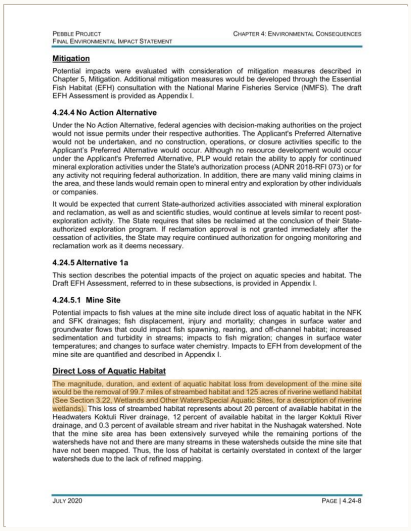
Final EIS Chapter 4, Sections 23-27 (Wildlife Values, Fish Values, Threatened and Endangered Species, Vegetation, Spill Risk)

4.24 Fish Values > 4.24.5 Alternative 1a > 4.24.5.1 Mine Site

FEIS Ch. 4.23-4.27 · p. 4.24-8 · PDF p. 84

5 *"The magnitude, duration, and extent of aquatic habitat loss from development of the mine site would be the removal of 99.7 miles of streambed habitat and 125 acres of riverine wetland habitat (See Section 3.22, Wetlands and Other Waters/Special Aquatic Sites, for a description of riverine wetlands)."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec23-27.pdf#page=84



PEBBLE PROJECT CHAPTER 4: ENVIRONMENTAL CONSEQUENCES
FINAL ENVIRONMENTAL IMPACT STATEMENT

Mitigation

Potential impacts were evaluated with consideration of mitigation measures described in Chapter 5, Mitigation. Additional mitigation measures would be developed through the Essential Fish Habitat (EFH) consultation with the National Marine Fisheries Service (NMFS). The draft EFH Assessment is provided as Appendix I.

4.24.4 No Action Alternative

Under the No Action Alternative, federal agencies with decision-making authorities on the project would not issue permits under their respective authorities. The Applicant's Preferred Alternative would not be undertaken, and no construction, operations, or closure activities specific to the Applicant's Preferred Alternative would occur. Although no resource development would occur under the Applicant's Preferred Alternative, PLP would retain the ability to apply for continued mineral exploration activities under the State's authorization process (ADNR 2018-RFI 073) or for any activity not requiring federal authorization. In addition, there are many valid mining claims in the area, and these lands would remain open to mineral entry and exploration by other individuals or companies.

It would be expected that current State-authorized activities associated with mineral exploration and reclamation, as well as and scientific studies, would continue at levels similar to recent post-exploration activity. The State requires that sites be reclaimed at the conclusion of their State-authorized exploration program. If reclamation approval is not granted immediately after the cessation of activities, the State may require continued authorization for ongoing monitoring and reclamation work as it deems necessary.

4.24.5 Alternative 1a

This section describes the potential impacts of the project on aquatic species and habitat. The Draft EFH Assessment, referred to in these subsections, is provided in Appendix I.

4.24.5.1 Mine Site

Potential impacts to fish values at the mine site include direct loss of aquatic habitat in the NFK and SFK drainages; fish displacement, injury and mortality; changes in surface water and groundwater flows that could impact fish spawning, rearing, and off-channel habitat; increased sedimentation and turbidity in streams; impacts to fish migration; changes in surface water temperatures; and changes to surface water chemistry. Impacts to EFH from development of the mine site are quantified and described in Appendix I.

Direct Loss of Aquatic Habitat

The magnitude, duration, and extent of aquatic habitat loss from development of the mine site would be the removal of 99.7 miles of streambed habitat and 125 acres of riverine wetland habitat (See Section 3.22, Wetlands and Other Waters/Special Aquatic Sites, for a description of riverine wetlands). This loss of streambed habitat represents about 20 percent of available habitat in the Headwaters Koktuli River drainage, 12 percent of available habitat in the larger Koktuli River drainage, and 0.3 percent of available stream and river habitat in the Nushagak watershed. Note that the mine site area has been extensively surveyed while the remaining portions of the watersheds have not and there are many streams in these watersheds outside the mine site that have not been mapped. Thus, the loss of habitat is certainly overstated in context of the larger watersheds due to the lack of refined mapping.

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Final EIS Chapter 4, Sections 23-27 (Wildlife Values, Fish Values, Threatened and Endangered Species, Vegetation, Spill Risk)

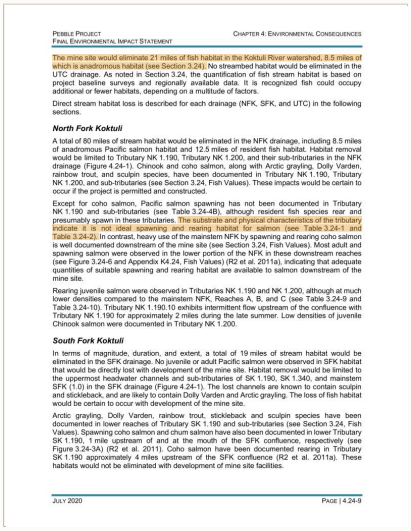
4.24 Fish Values > 4.24.5 Alternative 1a > 4.24.5.1 Mine Site

FEIS Ch. 4.23-4.27 · p. 4.24-9 · PDF p. 85

6 *"The mine site would eliminate 21 miles of fish habitat in the Koktuli River watershed, 8.5 miles of which is anadromous habitat (see Section 3.24)."*

6 *"The substrate and physical characteristics of the tributary indicate it is not ideal spawning and rearing habitat for salmon (see Table 3.24-1 and Table 3.24-2)."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec23-27.pdf#page=85



PEBBLE PROJECT CHAPTER 4: ENVIRONMENTAL CONSEQUENCES
FINAL ENVIRONMENTAL IMPACT STATEMENT

The mine site would eliminate 21 miles of fish habitat in the Koktuli River watershed, 8.5 miles of which is anadromous habitat (see Section 3.24). No streambed habitat would be eliminated in the UTC drainage. As noted in Section 3.24, the quantification of fish stream habitat is based on project baseline surveys and regionally available data. It is recognized fish could occupy additional or fewer habitats, depending on a multitude of factors.

Direct stream habitat loss is described for each drainage (NFK, SFK, and UTC) in the following sections.

North Fork Koktuli

A total of 80 miles of stream habitat would be eliminated in the NFK drainage, including 8.5 miles of anadromous Pacific salmon habitat and 12.5 miles of resident fish habitat. Habitat removal would be limited to Tributary NK 1.190, Tributary NK 1.200, and their sub-tributaries in the NFK drainage (Figure 4.24-1). Chinook and coho salmon, along with Arctic grayling, Dolly Varden, rainbow trout, and sculpin species, have been documented in Tributary NK 1.190, Tributary NK 1.200, and sub-tributaries (see Section 3.24, Fish Values). These impacts would be certain to occur if the project is permitted and constructed.

Except for coho salmon, Pacific salmon spawning has not been documented in Tributary NK 1.190 and sub-tributaries (see Table 3.24-4B), although resident fish species rear and presumably spawn in these tributaries. The substrate and physical characteristics of the tributary indicate it is not ideal spawning and rearing habitat for salmon (see Table 3.24-1 and Table 3.24-2). In contrast, heavy use of the mainstem NFK by spawning and rearing coho salmon is well documented downstream of the mine site (see Section 3.24, Fish Values). Most adult and spawning salmon were observed in the lower portion of the NFK in these downstream reaches (see Figure 3.24-6 and Appendix K4.24, Fish Values) (R2 et al. 2011a), indicating that adequate quantities of suitable spawning and rearing habitat are available to salmon downstream of the mine site.

Rearing juvenile salmon were observed in Tributaries NK 1.190 and NK 1.200, although at much lower densities compared to the mainstem NFK, Reaches A, B, and C (see Table 3.24-9 and Table 3.24-10). Tributary NK 1.190.10 exhibits intermittent flow upstream of the confluence with Tributary NK 1.190 for approximately 2 miles during the late summer. Low densities of juvenile Chinook salmon were documented in Tributary NK 1.200.

South Fork Koktuli

In terms of magnitude, duration, and extent, a total of 19 miles of stream habitat would be eliminated in the SFK drainage. No juvenile or adult Pacific salmon were observed in SFK habitat that would be directly lost with development of the mine site. Habitat removal would be limited to the uppermost headwater channels and sub-tributaries of SK 1.190, SK 1.340, and mainstem SFK (1.0) in the SFK drainage (Figure 4.24-1). The lost channels are known to contain sculpin and stickleback, and are likely to contain Dolly Varden and Arctic grayling. The loss of fish habitat would be certain to occur with development of the mine site.

Arctic grayling, Dolly Varden, rainbow trout, stickleback and sculpin species have been documented in lower reaches of Tributary SK 1.190 and sub-tributaries (see Section 3.24, Fish Values). Spawning coho salmon and chum salmon have also been documented in lower Tributary SK 1.190, 1 mile upstream of and at the mouth of the SFK confluence, respectively (see Figure 3.24-3A) (R2 et al. 2011). Coho salmon have been documented rearing in Tributary SK 1.190 approximately 4 miles upstream of the SFK confluence (R2 et al. 2011a). These habitats would not be eliminated with development of mine site facilities.

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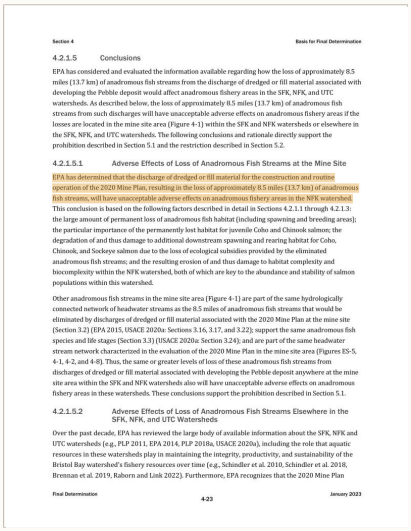
Final Determination of the U.S. Environmental Protection Agency Pursuant to Section 404(c) of the Clean Water Act, Pebble Deposit Area,...

4.2.1 Adverse Effects of Loss of Anadromous Fish Streams > 4.2.1.5 Conclusions > 4.2.1.5.2 Adverse Effects of Loss of Anadromous Fish Streams Elsewhere in the SFK,...

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7 *"EPA has determined that the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan, resulting in the loss of approximately 8.5 miles (13.7 km) of anadromous fish streams, will have unacceptable adverse effects on anadromous fishery areas in the NFK watershed."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=159



Section 4 Basis for Final Determination

4.2.1.5 Conclusions

EPA has considered and evaluated the information available regarding how the loss of approximately 8.5 miles (13.7 km) of anadromous fish streams from the discharge of dredged or fill material associated with developing the Pebble deposit would affect anadromous fishery areas in the SFK, NFK, and UTC watersheds. As described below, the loss of approximately 8.5 miles (13.7 km) of anadromous fish streams from such discharges will have unacceptable adverse effects on anadromous fishery areas if the losses are located in the mine site area (Figure 4-1) within the SFK and NFK watersheds or elsewhere in the SFK, NFK, and UTC watersheds. The following conclusions and rationale directly support the prohibition described in Section 5.1 and the restriction described in Section 5.2.

4.2.1.5.1 Adverse Effects of Loss of Anadromous Fish Streams at the Mine Site

EPA has determined that the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan, resulting in the loss of approximately 8.5 miles (13.7 km) of anadromous fish streams, will have unacceptable adverse effects on anadromous fishery areas in the NFK watershed. This conclusion is based on the following factors described in detail in Sections 4.2.1.1 through 4.2.1.3: the large amount of permanent loss of anadromous fish habitat (including spawning and breeding areas); the particular importance of the permanently lost habitat for juvenile Coho and Chinook salmon; the degradation of and thus damage to additional downstream spawning and rearing habitat for Coho, Chinook, and Sockeye salmon due to the loss of ecological subsidies provided by the eliminated anadromous fish streams; and the resulting erosion of and thus damage to habitat complexity and biocomplexity within the NFK watershed, both of which are key to the abundance and stability of salmon populations within this watershed.

Other anadromous fish streams in the mine site area (Figure 4-1) are part of the same hydrologically connected network of headwater streams as the 8.5 miles of anadromous fish streams that would be eliminated by discharges of dredged or fill material associated with the 2020 Mine Plan at the mine site (Section 3.2) (EPA 2015, USACE 2020a: Sections 3.16, 3.17, and 3.22); support the same anadromous fish species and life stages (Section 3.3) (USACE 2020a: Section 3.24); and are part of the same headwater stream network characterized in the evaluation of the 2020 Mine Plan in the mine site area (Figures ES-5, 4-1, 4-2, and 4-8). Thus, the same or greater levels of loss of these anadromous fish streams from discharges of dredged or fill material associated with developing the Pebble deposit anywhere at the mine site area within the SFK and NFK watersheds also will have unacceptable adverse effects on anadromous fishery areas in these watersheds. These conclusions support the prohibition described in Section 5.1.

4.2.1.5.2 Adverse Effects of Loss of Anadromous Fish Streams Elsewhere in the SFK, NFK, and UTC Watersheds

Over the past decade, EPA has reviewed the large body of available information about the SFK, NFK and UTC watersheds (e.g., PLP 2011, EPA 2014, PLP 2018a, USACE 2020a), including the role that aquatic resources in these watersheds play in maintaining the integrity, productivity, and sustainability of the Bristol Bay watershed's fishery resources over time (e.g., Schindler et al. 2010, Schindler et al. 2018, Brennan et al. 2019, Raborn and Link 2022). Furthermore, EPA recognizes that the 2020 Mine Plan

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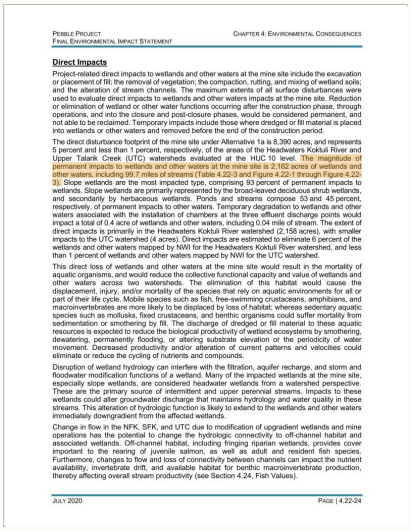
Final EIS Chapter 4, Sections 20-22 (Air Quality, Food and Fiber Production, Wetlands and Other Waters/Special Aquatic Sites)

4.22 Wetlands and Other Waters/Special Aquatic Sites > 4.22.6 Alternative 1a > Table 4.22-2: Alternative 1a - Direct Permanent Impacts to Special Aquatic Sites and...

FEIS Ch. 4.20-4.22 · p. 4.22-24 · PDF p. 54

8 *"The magnitude of permanent impacts to wetlands and other waters at the mine site is 2,162 acres of wetlands and other waters, including 99.7 miles of streams (Table 4.22-3 and Figure 4.22-1 through Figure 4.22- 3)."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec20-22.pdf#page=54



Pebble Project
Final Environmental Impact Statement

Chapter 4: Environmental Consequences

Direct Impacts

Project-related direct impacts to wetlands and other waters at the mine site include the excavation or placement of fill; the removal of vegetation; the compaction, rutting, and mixing of wetland soils; and the alteration of stream channels. The maximum extents of all surface disturbances were used to evaluate direct impacts to wetlands and other waters impacts at the mine site. Reduction or elimination of wetland or other water functions occurring after the construction phase, through operations, and into the closure and post-closure phases, would be considered permanent, and not able to be reclaimed. Temporary impacts include those where dredged or fill material is placed into wetlands or other waters and removed before the end of the construction period.

The direct disturbance footprint of the mine site under Alternative 1a is 8,396 acres, and represents 5 percent and less than 1 percent, respectively, of the areas of the Headwaters Koktuli River and Upper Talarik Creek (UTC) watersheds evaluated at the HUC 10 level. The magnitude of permanent impacts to wetlands and other waters at the mine site is 2,162 acres of wetlands and other waters, including 99.7 miles of streams (Table 4.22-3 and Figure 4.22-1 through Figure 4.22-3). Slope wetlands are the most impacted type, comprising 93 percent of permanent impacts to wetlands. Slope wetlands are primarily represented by the broad-leaved deciduous shrub wetlands, and secondarily by herbaceous wetlands. Ponds and streams compose 53 and 45 percent, respectively, of permanent impacts to other waters. Temporary degradation to wetlands and other waters associated with the installation of chambers at the three effluent discharge points would impact a total of 0.4 acre of wetlands and other waters, including 0.04 mile of stream. The extent of direct impacts is primarily in the Headwaters Koktuli River watershed (2,158 acres), with smaller impacts to the UTC watershed (4 acres). Direct impacts are estimated to eliminate 6 percent of the wetlands and other waters mapped by NWI for the Headwaters Koktuli River watershed, and less than 1 percent of wetlands and other waters mapped by NWI for the UTC watershed.

This direct loss of wetlands and other waters at the mine site would result in the mortality of aquatic organisms, and would reduce the collective functional capacity and value of wetlands and other waters across two watersheds. The elimination of this habitat would cause the displacement, injury, and/or mortality of the species that rely on aquatic environments for all or part of their life cycle. Mobile species such as fish, free-swimming crustaceans, amphibians, and macroinvertebrates are more likely to be displaced by loss of habitat; whereas sedentary aquatic species such as mollusks, fixed crustaceans, and benthic organisms could suffer mortality from sedimentation or smothering by fill. The discharge of dredged or fill material to these aquatic resources is expected to reduce the biological productivity of wetland ecosystems by smothering, dewatering, permanently flooding, or altering substrate elevation or the periodicity of water movement. Decreased productivity and/or alteration of current patterns and velocities could eliminate or reduce the cycling of nutrients and compounds.

Disruption of wetland hydrology can interfere with the filtration, aquifer recharge, and storm and floodwater modification functions of a wetland. Many of the impacted wetlands at the mine site, especially slope wetlands, are considered headwater wetlands from a watershed perspective. These are the primary source of intermittent and upper perennial streams. Impacts to these wetlands could alter groundwater discharge that maintains hydrology and water quality in these streams. This alteration of hydrologic function is likely to extend to the wetlands and other waters immediately downgradient from the affected wetlands.

Change in flow in the NFK, SFK, and UTC due to modification of upgradient wetlands and mine operations has the potential to change the hydrologic connectivity to off-channel habitat and associated wetlands. Off-channel habitat, including fringing riparian wetlands, provides cover important to the rearing of juvenile salmon, as well as adult and resident fish species. Furthermore, changes to flow and loss of connectivity between channels can impact the nutrient availability, invertebrate drift, and available habitat for benthic macroinvertebrate production, thereby affecting overall stream productivity (see Section 4.24, Fish Values).

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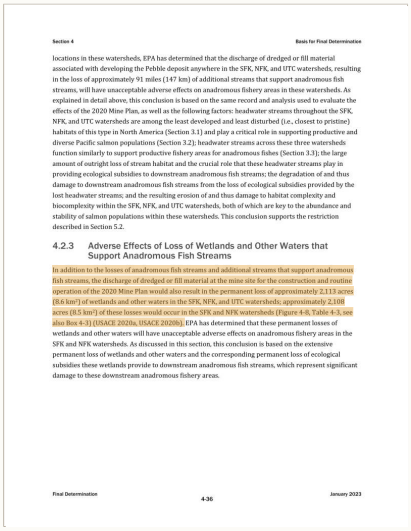
Final Determination of the U.S. Environmental Protection Agency Pursuant to Section 404(c) of the Clean Water Act, Pebble Deposit Area,...

Section 4. Basis for Final Determination > 4.2 Effects on Fishery Areas from Discharges of Dredged or Fill Material from Developing the Pebble Deposit > 4.2.3 Adverse Effects...

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9 *"In addition to the losses of anadromous fish streams and additional streams that support anadromous fish streams, the discharge of dredged or fill material at the mine site for the construction and routine operation of the 2020 Mine Plan would also result in the permanent loss of approximately 2,113 acres (8.6 km2) of wetlands and other waters in the SFK, NFK, and UTC watersheds; approximately 2,108 acres (8.5 km2) of these losses would occur in the SFK and NFK watersheds (Figure 4-8, Table 4-3, see also Box 4-3) (USACE 2020a, USACE 2020b)."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=172



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locations in these watersheds, EPA has determined that the discharge of dredged or fill material associated with developing the Pebble deposit anywhere in the SFK, NFK, and UTC watersheds, resulting in the loss of approximately 91 miles (147 km) of additional streams that support anadromous fish streams, will have unacceptable adverse effects on anadromous fishery areas in these watersheds. As explained in detail above, this conclusion is based on the same record and analysis used to evaluate the effects of the 2020 Mine Plan, as well as the following factors: headwater streams throughout the SFK, NFK, and UTC watersheds are among the least developed and least disturbed (i.e., closest to pristine) habitats of this type in North America (Section 3.1) and play a critical role in supporting productive and diverse Pacific salmon populations (Section 3.2); headwater streams across these three watersheds function similarly to support productive fishery areas for anadromous fishes (Section 3.3); the large amount of outright loss of stream habitat and the crucial role that these headwater streams play in providing ecological subsidies to downstream anadromous fish streams; the degradation of and thus damage to downstream anadromous fish streams from the loss of ecological subsidies provided by the lost headwater streams; and the resulting erosion of and thus damage to habitat complexity and biocomplexity within the SFK, NFK, and UTC watersheds, both of which are key to the abundance and stability of salmon populations within these watersheds. This conclusion supports the restriction described in Section 5.2.

4.2.3 Adverse Effects of Loss of Wetlands and Other Waters that Support Anadromous Fish Streams

In addition to the losses of anadromous fish streams and additional streams that support anadromous fish streams, the discharge of dredged or fill material at the mine site for the construction and routine operation of the 2020 Mine Plan would also result in the permanent loss of approximately 2,113 acres (8.6 km²) of wetlands and other waters in the SFK, NFK, and UTC watersheds; approximately 2,108 acres (8.5 km²) of these losses would occur in the SFK and NFK watersheds (Figure 4-8, Table 4-3, see also Box 4-3) (USACE 2020a, USACE 2020b). EPA has determined that these permanent losses of wetlands and other waters will have unacceptable adverse effects on anadromous fishery areas in the SFK and NFK watersheds. As discussed in this section, this conclusion is based on the extensive permanent loss of wetlands and other waters and the corresponding permanent loss of ecological subsidies these wetlands provide to downstream anadromous fish streams, which represent significant damage to these downstream anadromous fishery areas.

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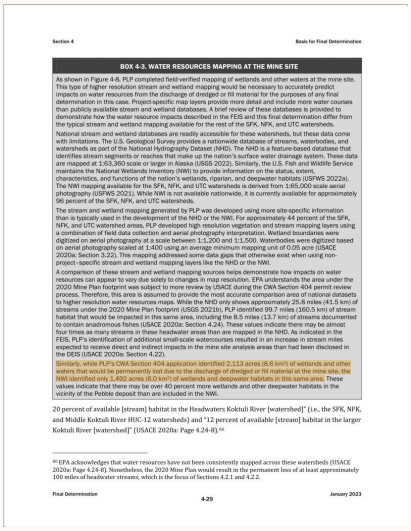
Final Determination of the U.S. Environmental Protection Agency Pursuant to Section 404(c) of the Clean Water Act, Pebble Deposit Area,...

4.2 Effects on Fishery Areas from Discharges of Dredged or Fill Material from Developing the Pebble Deposit > 4.2.2 Adverse Effects of Loss of Additional Streams...

EPA Final Determination · p. 4-29 · PDF p. 165

10 *"Similarly, while PLP's CWA Section 404 application identified 2,113 acres (8.6 km2) of wetlands and other waters that would be permanently lost due to the discharge of dredged or fill material at the mine site, the NWI identified only 1,492 acres (6.0 km2) of wetlands and deepwater habitats in this same area."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=165



Section 4 Basis for Final Determination

BOX 4-3. WATER RESOURCES MAPPING AT THE MINE SITE

As shown in Figure 4-8, PLP completed field-verified mapping of wetlands and other waters at the mine site. This type of higher resolution stream and wetland mapping would be necessary to accurately predict impacts on water resources from the discharge of dredged or fill material for the purposes of any final determination in this case. Project-specific map layers provide more detail and include more water courses than publicly available stream and wetland databases. A brief review of these databases is provided to demonstrate how the water resource impacts described in the FEIS and this final determination differ from the typical stream and wetland mapping available for the rest of the SFK, NFK, and UTC watersheds.

National stream and wetland databases are readily accessible for these watersheds, but these data come with limitations. The U.S. Geological Survey provides a nationwide database of streams, waterbodies, and watersheds as part of the National Hydrography Dataset (NHD). The NHD is a feature-based database that identifies stream segments or reaches that make up the nation's surface water drainage system. These data are mapped at 1:63,360 scale or larger in Alaska (USGS 2022). Similarly, the U.S. Fish and Wildlife Service maintains the National Wetlands Inventory (NWI) to provide information on the status, extent, characteristics, and functions of the nation's wetlands, riparian, and deepwater habitats (USFWS 2022a). The NWI mapping available for the SFK, NFK, and UTC watersheds is derived from 1:65,000 scale aerial photography (USFWS 2021). While NWI is not available nationwide, it is currently available for approximately 96 percent of the SFK, NFK, and UTC watersheds.

The stream and wetland mapping generated by PLP was developed using more site-specific information than is typically used in the development of the NHD or the NWI. For approximately 44 percent of the SFK, NFK, and UTC watershed areas, PLP developed high resolution vegetation and stream mapping layers using a combination of field data collection and aerial photography interpretation. Wetland boundaries were digitized on aerial photography at a scale between 1:1,200 and 1:1,500. Waterbodies were digitized based on aerial photography scaled at 1:400 using an average minimum mapping unit of 0.05 acre (USACE 2020a: Section 3.22). This mapping addressed some data gaps that otherwise exist when using non-project–specific stream and wetland mapping layers like the NHD or the NWI.

A comparison of these stream and wetland mapping sources helps demonstrate how impacts on water resources can appear to vary due solely to changes in map resolution. EPA understands the area under the 2020 Mine Plan footprint was subject to more review by USACE during the CWA Section 404 permit review process. Therefore, this area is assumed to provide the most accurate comparison area of national datasets to higher resolution water resources maps. While the NHD only shows approximately 25.8 miles (41.5 km) of streams under the 2020 Mine Plan footprint (USGS 2021b), PLP identified 99.7 miles (160.5 km) of stream habitat that would be impacted in this same area, including the 8.5 miles (13.7 km) of streams documented to contain anadromous fishes (USACE 2020a: Section 4.24). These values indicate there may be almost four times as many streams in these headwater areas than are mapped in the NHD. As indicated in the FEIS, PLP's identification of additional small-scale watercourses resulted in an increase in stream miles expected to receive direct and indirect impacts in the mine site analysis areas than had been disclosed in the DEIS (USACE 2020a: Section 4.22).

Similarly, while PLP's CWA Section 404 application identified 2,113 acres (8.6 km²) of wetlands and other waters that would be permanently lost due to the discharge of dredged or fill material at the mine site, the NWI identified only 1,492 acres (6.0 km²) of wetlands and deepwater habitats in this same area. These values indicate that there may be over 40 percent more wetlands and other deepwater habitats in the vicinity of the Pebble deposit than are included in the NWI.

20 percent of available [stream] habitat in the Headwaters Koktuli River [watershed]" (i.e., the SFK, NFK, and Middle Koktuli River HUC-12 watersheds) and "12 percent of available [stream] habitat in the larger Koktuli River [watershed]" (USACE 2020a: Page 4.24-8).[66]

[66] EPA acknowledges that water resources have not been consistently mapped across these watersheds (USACE 2020a: Page 4.24-8). Nonetheless, the 2020 Mine Plan would result in the permanent loss of at least approximately 100 miles of headwater streams, which is the focus of Sections 4.2.1 and 4.2.2.

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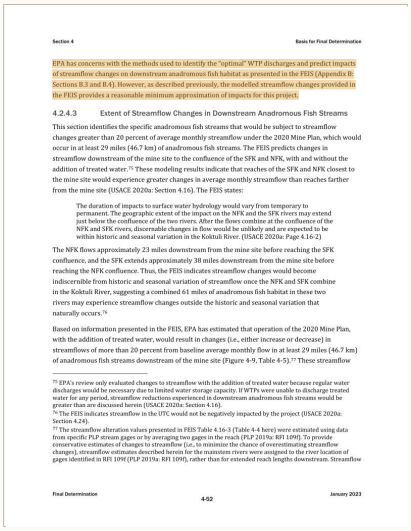
4.2 Effects on Fishery Areas from Discharges of Dredged or Fill Material from Developing the Pebble Deposit > 4.2.4 Adverse Effects from Changes in Streamflow...

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11 *"EPA has concerns with the methods used to identify the "optimal" WTP discharges and predict impacts of streamflow changes on downstream anadromous fish habitat as presented in the FEIS (Appendix B: Sections B.3 and B.4)."*

11 *"However, as described previously, the modelled streamflow changes provided in the FEIS provides a reasonable minimum approximation of impacts for this project."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=188



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EPA has concerns with the methods used to identify the "optimal" WTP discharges and predict impacts of streamflow changes on downstream anadromous fish habitat as presented in the FEIS (Appendix B: Sections B.3 and B.4). However, as described previously, the modelled streamflow changes provided in the FEIS provides a reasonable minimum approximation of impacts for this project.

4.2.4.3 Extent of Streamflow Changes in Downstream Anadromous Fish Streams

This section identifies the specific anadromous fish streams that would be subject to streamflow changes greater than 20 percent of average monthly streamflow under the 2020 Mine Plan, which would occur in at least 29 miles (46.7 km) of anadromous fish streams. The FEIS predicts changes in streamflow downstream of the mine site to the confluence of the SFK and NFK, with and without the addition of treated water.[75] These modeling results indicate that reaches of the SFK and NFK closest to the mine site would experience greater changes in average monthly streamflow than reaches farther from the mine site (USACE 2020a: Section 4.16). The FEIS states:

> The duration of impacts to surface water hydrology would vary from temporary to permanent. The geographic extent of the impact on the NFK and the SFK rivers may extend just below the confluence of the two rivers. After the flows combine at the confluence of the NFK and SFK rivers, discernable changes in flow would be unlikely and are expected to be within historic and seasonal variation in the Koktuli River. (USACE 2020a: Page 4.16-2)

The NFK flows approximately 23 miles downstream from the mine site before reaching the SFK confluence, and the SFK extends approximately 38 miles downstream from the mine site before reaching the NFK confluence. Thus, the FEIS indicates streamflow changes would become indiscernible from historic and seasonal variation of streamflow once the NFK and SFK combine in the Koktuli River, suggesting a combined 61 miles of anadromous fish habitat in these two rivers may experience streamflow changes outside the historic and seasonal variation that naturally occurs.[76]

Based on information presented in the FEIS, EPA has estimated that operation of the 2020 Mine Plan, with the addition of treated water, would result in changes (i.e., either increase or decrease) in streamflows of more than 20 percent from baseline average monthly flow in at least 29 miles (46.7 km) of anadromous fish streams downstream of the mine site (Figure 4-9, Table 4-5).[77] These streamflow

[75] EPA's review only evaluated changes to streamflow with the addition of treated water because regular water discharges would be necessary due to limited water storage capacity. If WTPs were unable to discharge treated water for any period, streamflow reductions experienced in downstream anadromous fish streams would be greater than are discussed herein (USACE 2020a: Section 4.16).
[76] The FEIS indicates streamflow in the UTC would not be negatively impacted by the project (USACE 2020a: Section 4.24).
[77] The streamflow alteration values presented in FEIS Table 4.16-3 (Table 4-4 here) were estimated using data from specific PLP stream gages or by averaging two gages in the reach (PLP 2019a: RFI 1090). To provide conservative estimates of changes to streamflow (i.e., to minimize the chance of overestimating streamflow changes), streamflow estimates described herein for the mainstem rivers were assigned to the river location of gages identified in RFI 1090 (PLP 2019a: RFI 1090), rather than for extended reach lengths downstream. Streamflow

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How Certain FEIS Conclusions Relate to EPA's Final Determination > 2. Conclusions related to the scale at which impacts or effects should be evaluated > Cited FEIS Quotes

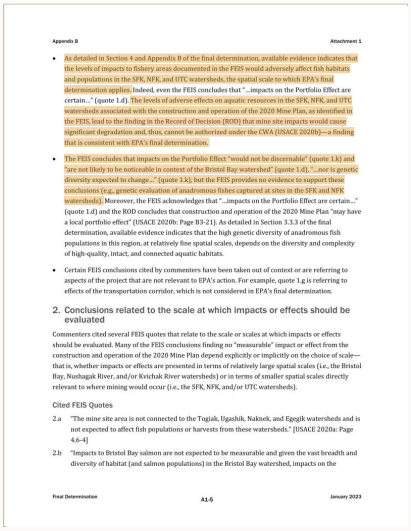
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12 *"The levels of adverse effects on aquatic resources in the SFK, NFK, and UTC watersheds associated with the construction and operation of the 2020 Mine Plan, as identified in the FEIS, lead to the finding in the Record of Decision (ROD) that mine site impacts would cause significant degradation and, thus, cannot be authorized under the CWA (USACE 2020b)—a finding that is consistent with EPA's final determination."*

12 *"As detailed in Section 4 and Appendix B of the final determination, available evidence indicates that the levels of impacts to fishery areas documented in the FEIS would adversely affect fish habitats and populations in the SFK, NFK, and UTC watersheds, the spatial scale to which EPA's final determination applies."*

12 *"The FEIS concludes that impacts on the Portfolio Effect "would not be discernable" (quote 1.k) and "are not likely to be noticeable in context of the Bristol Bay watershed" (quote 1.d), "...nor is genetic diversity expected to change..." (quote 1.k), but the FEIS provides no evidence to support these conclusions (e. g., genetic evaluation of anadromous fishes captured at sites in the SFK and NFK watersheds)."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=363



Appendix B Attachment 1

- As detailed in Section 4 and Appendix B of the final determination, available evidence indicates that the levels of impacts to fishery areas documented in the FEIS would adversely affect fish habitats and populations in the SFK, NFK, and UTC watersheds, the spatial scale to which EPA's final determination applies. Indeed, even the FEIS concludes that "...impacts on the Portfolio Effect are certain..." (quote 1.d). The levels of adverse effects on aquatic resources in the SFK, NFK, and UTC watersheds associated with the construction and operation of the 2020 Mine Plan, as identified in the FEIS, lead to the finding in the Record of Decision (ROD) that mine site impacts would cause significant degradation and, thus, cannot be authorized under the CWA (USACE 2020b)—a finding that is consistent with EPA's final determination.
- The FEIS concludes that impacts on the Portfolio Effect "would not be discernable" (quote 1.k) and "are not likely to be noticeable in context of the Bristol Bay watershed" (quote 1.d), "...nor is genetic diversity expected to change..." (quote 1.k), but the FEIS provides no evidence to support these conclusions (e.g., genetic evaluation of anadromous fishes captured at sites in the SFK and NFK watersheds). Moreover, the FEIS acknowledges that "...impacts on the Portfolio Effect are certain..." (quote 1.d) and the ROD concludes that construction and operation of the 2020 Mine Plan "may have a local portfolio effect" (USACE 2020b: Page B3-21). As detailed in Section 3.3.3 of the final determination, available evidence indicates that the high genetic diversity of anadromous fish populations in this region, at relatively fine spatial scales, depends on the diversity and complexity of high-quality, intact, and connected aquatic habitats.
- Certain FEIS conclusions cited by commenters have been taken out of context or are referring to aspects of the project that are not relevant to EPA's action. For example, quote 1.g is referring to effects of the transportation corridor, which is not considered in EPA's final determination.

2. Conclusions related to the scale at which impacts or effects should be evaluated

Commenters cited several FEIS quotes that relate to the scale or scales at which impacts or effects should be evaluated. Many of the FEIS conclusions finding no "measurable" impact or effect from the construction and operation of the 2020 Mine Plan depend explicitly or implicitly on the choice of scale—that is, whether impacts or effects are presented in terms of relatively large spatial scales (i.e., the Bristol Bay, Nushagak River, and/or Kvichak River watersheds) or in terms of smaller spatial scales directly relevant to where mining would occur (i.e., the SFK, NFK, and/or UTC watersheds).

Cited FEIS Quotes

2.a "The mine site area is not connected to the Togiak, Ugashik, Naknek, and Egegik watersheds and is not expected to affect fish populations or harvests from these watersheds." (USACE 2020a: Page 4.6-4)

2.b "Impacts to Bristol Bay salmon are not expected to be measurable and given the vast breadth and diversity of habitat (and salmon populations) in the Bristol Bay watershed, impacts on the

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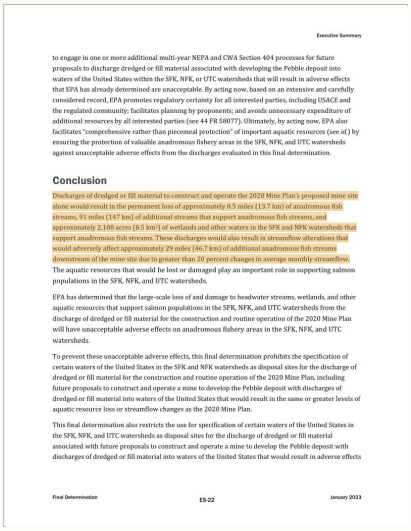
Executive Summary > Conclusion

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13 *"Discharges of dredged or fill material to construct and operate the 2020 Mine Plan's proposed mine site alone would result in the permanent loss of approximately 8.5 miles (13.7 km) of anadromous fish streams, 91 miles (147 km) of additional streams that support anadromous fish streams, and approximately 2,108 acres (8.5 km2) of wetlands and other waters in the SFK and NFK watersheds that support anadromous fish streams."*

13 *"These discharges would also result in streamflow alterations that would adversely affect approximately 29 miles (46.7 km) of additional anadromous fish streams downstream of the mine site due to greater than 20 percent changes in average monthly streamflow."*

https://www.epa.gov/system/files/documents/2023-01/Pebble-Deposit-Area-404c-FD-Jan2023.pdf#page=38



Executive Summary

to engage in one or more additional multi-year NEPA and CWA Section 404 processes for future proposals to discharge dredged or fill material associated with developing the Pebble deposit into waters of the United States within the SFK, NFK, or UTC watersheds that will result in adverse effects that EPA has already determined are unacceptable. By acting now, based on an extensive and carefully considered record, EPA promotes regulatory certainty for all interested parties, including USACE and the regulated community; facilitates planning by proponents; and avoids unnecessary expenditure of additional resources by all interested parties (see 44 FR 58077). Ultimately, by acting now, EPA also facilitates "comprehensive rather than piecemeal protection" of important aquatic resources (see id.) by ensuring the protection of valuable anadromous fishery areas in the SFK, NFK, and UTC watersheds against unacceptable adverse effects from the discharges evaluated in this final determination.

Conclusion

Discharges of dredged or fill material to construct and operate the 2020 Mine Plan's proposed mine site alone would result in the permanent loss of approximately 8.5 miles (13.7 km) of anadromous fish streams, 91 miles (147 km) of additional streams that support anadromous fish streams, and approximately 2,108 acres (8.5 km²) of wetlands and other waters in the SFK and NFK watersheds that support anadromous fish streams. These discharges would also result in streamflow alterations that would adversely affect approximately 29 miles (46.7 km) of additional anadromous fish streams downstream of the mine site due to greater than 20 percent changes in average monthly streamflow. The aquatic resources that would be lost or damaged play an important role in supporting salmon populations in the SFK, NFK, and UTC watersheds.

EPA has determined that the large-scale loss of and damage to headwater streams, wetlands, and other aquatic resources that support salmon populations in the SFK, NFK, and UTC watersheds from the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan will have unacceptable adverse effects on anadromous fishery areas in the SFK, NFK, and UTC watersheds.

To prevent these unacceptable adverse effects, this final determination prohibits the specification of certain waters of the United States in the SFK and NFK watersheds as disposal sites for the discharge of dredged or fill material for the construction and routine operation of the 2020 Mine Plan, including future proposals to construct and operate a mine to develop the Pebble deposit with discharges of dredged or fill material into waters of the United States that would result in the same or greater levels of aquatic resource loss or streamflow changes as the 2020 Mine Plan.

This final determination also restricts the use for specification of certain waters of the United States in the SFK, NFK, and UTC watersheds as disposal sites for the discharge of dredged or fill material associated with future proposals to construct and operate a mine to develop the Pebble deposit with discharges of dredged or fill material into waters of the United States that would result in adverse effects

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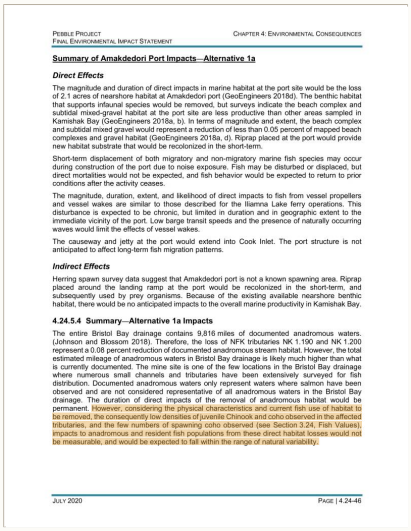
Final EIS Chapter 4, Sections 23-27 (Wildlife Values, Fish Values, Threatened and Endangered Species, Vegetation, Spill Risk)

4.24 Fish Values > Figures > 4.24.5.4 Summary - Alternative 1a Impacts

FEIS Ch. 4.23-4.27 · p. 4.24-46 · PDF p. 122

14 *"However, considering the physical characteristics and current fish use of habitat to be removed, the consequently low densities of juvenile Chinook and coho observed in the affected tributaries, and the few numbers of spawning coho observed (see Section 3.24, Fish Values), impacts to anadromous and resident fish populations from these direct habitat losses would not be measurable, and would be expected to fall within the range of natural variability."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec23-27.pdf#page=122



Pebble Project Final Environmental Impact Statement — Chapter 4: Environmental Consequences

Summary of Amakdedori Port Impacts—Alternative 1a

Direct Effects

The magnitude and duration of direct impacts in marine habitat at the port site would be the loss of 2.1 acres of nearshore habitat at Amakdedori port (GeoEngineers 2018d). The benthic habitat that supports infaunal species would be removed, but surveys indicate the beach complex and subtidal mixed-gravel habitat at the port site are less productive than other areas sampled in Kamishak Bay (GeoEngineers 2018a, b). In terms of magnitude and extent, the beach complex and subtidal mixed gravel would represent a reduction of less than 0.05 percent of mapped beach complexes and gravel habitat (GeoEngineers 2018a, d). Riprap placed at the port would provide new habitat substrate that would be recolonized in the short-term.

Short-term displacement of both migratory and non-migratory marine fish species may occur during construction of the port due to noise exposure. Fish may be disturbed or displaced, but direct mortalities would not be expected, and fish behavior would be expected to return to prior conditions after the activity ceases.

The magnitude, duration, extent, and likelihood of direct impacts to fish from vessel propellers and vessel wakes are similar to those described for the Iliamna Lake ferry operations. This disturbance is expected to be chronic, but limited in duration and in geographic extent to the immediate vicinity of the port. Low barge transit speeds and the presence of naturally occurring waves would limit the effects of vessel wakes.

The causeway and jetty at the port would extend into Cook Inlet. The port structure is not anticipated to affect long-term fish migration patterns.

Indirect Effects

Herring spawn survey data suggest that Amakdedori port is not a known spawning area. Riprap placed around the landing ramp at the port would be recolonized in the short-term, and subsequently used by prey organisms. Because of the existing available nearshore benthic habitat, there would be no anticipated impacts to the overall marine productivity in Kamishak Bay.

4.24.5.4 Summary—Alternative 1a Impacts

The entire Bristol Bay drainage contains 9,816 miles of documented anadromous waters. (Johnson and Blossom 2018). Therefore, the loss of NFK tributaries NK 1,190 and NK 1,200 represent a 0.08 percent reduction of documented anadromous stream habitat. However, the total estimated mileage of anadromous waters in Bristol Bay drainage is likely much higher than what is currently documented. The mine site is one of the few locations in the Bristol Bay drainage where numerous small channels and tributaries have been extensively surveyed for fish distribution. Documented anadromous waters only represent waters where salmon have been observed and are not considered representative of all anadromous waters in the Bristol Bay drainage. The duration of direct impacts of the removal of anadromous habitat would be permanent. However, considering the physical characteristics and current fish use of habitat to be removed, the consequently low densities of juvenile Chinook and coho observed in the affected tributaries, and the few numbers of spawning coho observed (see Section 3.24, Fish Values), impacts to anadromous and resident fish populations from these direct habitat losses would not be measurable, and would be expected to fall within the range of natural variability.

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Final EIS Chapter 4, Sections 23-27 (Wildlife Values, Fish Values, Threatened and Endangered Species, Vegetation, Spill Risk)

4.24 Fish Values > 4.24.6 Alternative 1 > 4.24.6.2 Transportation Corridor and Natural Gas Pipeline Corridor

FEIS Ch. 4.23-4.27 · p. 4.24-47 · PDF p. 123

15 *"Impacts to Bristol Bay salmon are not expected to be measurable and given the vast breadth and diversity of habitat (and salmon populations) in the Bristol Bay watershed, impacts on the Portfolio Effect1 are certain but not likely to be noticeable in context of the Bristol Bay watershed."*

15 *"No long-term measurable changes in the number of returning salmon are expected, nor is genetic diversity expected to change; therefore, the impact to the Portfolio Effect would not be discernable."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec23-27.pdf#page=123



Pebble Project Final Environmental Impact Statement — Chapter 4: Environmental Consequences

Impacts to Bristol Bay salmon are not expected to be measurable and given the vast breadth and diversity of habitat (and salmon populations) in the Bristol Bay watershed, impacts on the Portfolio Effect[1] are certain but not likely to be noticeable in context of the Bristol Bay watershed.

4.24.6 Alternative 1

Impacts attributable to Alternative 1 and variants are described below by project component.

4.24.6.1 Mine Site

The magnitude, duration, extent, and likelihood of direct and indirect impacts to fish, aquatic habitat, streamflow, productivity, sedimentation and turbidity, and fish migration due to construction and operations at the mine site would be same as those described for Alternative 1a.

4.24.6.2 Transportation Corridor and Natural Gas Pipeline Corridor

Based on field-verified stream mapping as described in Section 3.22, Wetlands and Other Waters/ Special Aquatic Sites, the Alternative 1 transportation and natural gas pipeline corridor would cross 224 waterbodies. In terms of magnitude and extent, the Alternative 1 transportation and natural gas pipeline corridor would cross fewer rivers and streams (224) compared to Alternative 1a (233).

Project roads would cross stream habitat that supports five species of Pacific salmon (Chinook, chum, coho, pink, and sockeye) and numerous resident fish species, including rainbow trout and Arctic grayling. Anadromous and resident fish species known to occur in the affected area are listed in Table 3.24-11

Potential impacts to fish values along the transportation and natural gas pipeline corridors are similar to those described for Alternative 1a: direct loss of aquatic habitat at stream crossings, at ferry terminal sites on Iliamna Lake, and along the natural gas pipeline crossings of Iliamna Lake and Cook Inlet. Other impacts include fish displacement, injury, and mortality at these locations; changes in stream surface water flows; increased sedimentation and turbidity at crossings and terminal sites; and potential impacts to fish migration. Impacts to EFH from development of the transportation and natural gas pipeline corridors are quantified and described in Appendix I, EFH Assessment.

Direct Loss of Aquatic Habitat

Mine and Port Access Roads and Overland Gas Pipeline

The magnitude and extent of habitat loss from development of the transportation corridor and onshore portions of the natural gas pipeline would be the removal of 6.1 miles of streambed habitat and 6.2 acres of riverine wetland habitat. The corridor would cross 52 waterbodies

[1] The **Portfolio Effect** is an observation that the Bristol Bay salmon run is produced from an abundance of diverse aquatic habitat; this diversity allows for a harvestable surplus even when some systems experience low abundance (Schindler et al. 2010). The term "Portfolio Effect" is taken from the concept of investment portfolios, where adding to the diversity of investments is thought to reduce risk (or the likelihood of occurrence of losses to the overall investment portfolio, even if some individual investments do not do well). Any loss of salmon production would have an effect on the Bristol Bay "portfolio," similar to the way that financial losses by individual investments would have an effect on an investor's portfolio. In this EIS, the effect to the Bristol Bay portfolio is considered by evaluating the amount of habitat and salmon production that would be lost. No long-term measurable changes in the number of returning salmon are expected, nor is genetic diversity expected to change; therefore, the impact to the Portfolio Effect would not be discernable.

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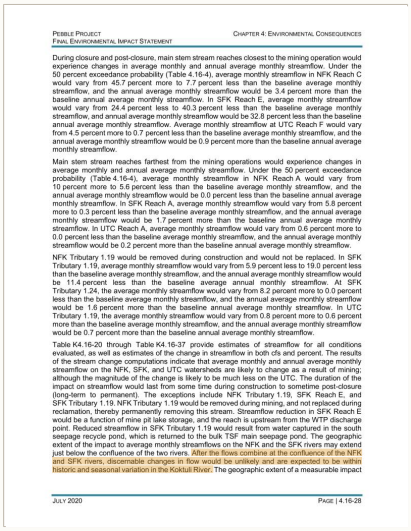
Final EIS Chapter 4, Section 16 (Surface Water Hydrology)

4.16 Surface Water Hydrology > 4.16.4 Alternative 1a > Table 4.16-4: Change in Average Monthly Streamflow between Baseline and Post-Closure (Phase 4) with Water...

FEIS Ch. 4.16 · p. 4.16-28 · PDF p. 28

16 *"After the flows combine at the confluence of the NFK and SFK rivers, discernable changes in flow would be unlikely and are expected to be within historic and seasonal variation in the Koktuli River."*

https://www.arlis.org/docs/vol1/Pebble/Final-EIS/Pebble-FEIS-ch4_sec16.pdf#page=28



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During closure and post-closure, main stem stream reaches closest to the mining operation would experience changes in average monthly and annual average monthly streamflow. Under the 50 percent exceedance probability (Table 4.16-4), average monthly streamflow in NFK Reach C would vary from 45.7 percent more to 7.7 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 3.4 percent more than the baseline annual average monthly streamflow. In SFK Reach E, average monthly streamflow would vary from 24.4 percent less to 40.3 percent less than the baseline average monthly streamflow, and annual average monthly streamflow would be 32.8 percent less than the baseline annual average monthly streamflow. Average monthly streamflow at UTC Reach F would vary from 4.5 percent more to 0.7 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 0.9 percent more than the baseline annual average monthly streamflow.

Main stem stream reaches farthest from the mining operations would experience changes in average monthly and annual average monthly streamflow. Under the 50 percent exceedance probability (Table 4.16-4), average monthly streamflow in NFK Reach A would vary from 10 percent more to 5.6 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 0.0 percent less than the baseline annual average monthly streamflow. In SFK Reach A, average monthly streamflow would vary from 5.8 percent more to 0.3 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 1.7 percent more than the baseline annual average monthly streamflow. In UTC Reach A, average monthly streamflow would vary from 0.6 percent more to 0.0 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 0.2 percent more than the baseline annual average monthly streamflow.

NFK Tributary 1.19 would be removed during construction and would not be replaced. In SFK Tributary 1.19, average monthly streamflow would vary from 5.9 percent less to 19.0 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 11.4 percent less than the baseline average annual monthly streamflow. At SFK Tributary 1.24, the average monthly streamflow would vary from 8.2 percent more to 0.0 percent less than the baseline average monthly streamflow, and the annual average monthly streamflow would be 1.6 percent more than the baseline annual average monthly streamflow. In UTC Tributary 1.19, the average monthly streamflow would vary from 0.8 percent more to 0.6 percent more than the baseline average monthly streamflow, and the annual average monthly streamflow would be 0.7 percent more than the baseline annual average monthly streamflow.

Table K4.16-20 through Table K4.16-37 provide estimates of streamflow for all conditions evaluated, as well as estimates of the change in streamflow in both cfs and percent. The results of the stream change computations indicate that average monthly and annual average monthly streamflow on the NFK, SFK, and UTC watersheds are likely to change as a result of mining; although the magnitude of the change is likely to be much less on the UTC. The duration of the impact on streamflow would last from some time during construction to sometime post-closure (long-term to permanent). The exceptions include NFK Tributary 1.19, SFK Reach E, and SFK Tributary 1.19. NFK Tributary 1.19 would be removed during mining, and not replaced during reclamation, thereby permanently removing this stream. Streamflow reduction in SFK Reach E would be a function of mine pit lake storage, and the reach is upstream from the WTP discharge point. Reduced streamflow in SFK Tributary 1.19 would result from water captured in the south seepage recycle pond, which is returned to the bulk TSF main seepage pond. The geographic extent of the impact to average monthly streamflows on the NFK and the SFK rivers may extend just below the confluence of the two rivers. After the flows combine at the confluence of the NFK and SFK rivers, discernable changes in flow would be unlikely and are expected to be within historic and seasonal variation in the Koktuli River. The geographic extent of a measurable impact

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