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July 1, 2019

Via U.S. Mail, E-Mail, and Web-Portal:

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Re: Comments on the Draft Environmental Impact Statement and Public Notice of Application for Permit Reference Number POA-2017-00271 for the Proposed Pebble Project

Dear Mr. McCoy:

Trustees for Alaska and the Sierra Club Environmental Law Program submit these comments on behalf of The Alaska Center, Alaska Community Action on Toxics, Alaska Wilderness League, Audubon Alaska, Cook Inletkeeper, Defenders of Wildlife, Earthworks, Fairbanks Climate Action Coalition, Friends of Alaska Wildlife Refuges, Friends of McNeil River, McNeil River Alliance, National Parks Conservation Association, Natural Resources Defense Council, Sierra Club, and Wild Salmon Center. The comments address the U.S. Army Corps of Engineers (Corps) Draft Environmental Impact Statement (DEIS) and Public Notice of Application for Permit for Pebble Limited Partnership's (PLP) proposed Pebble Mine.[1] This public process, required by the National Environmental Policy Act (NEPA) and the Clean Water Act (CWA), helps to ensure that the Corps fully understands, discloses, and analyzes the effects of the proposal. This is especially important here, because the proposed Pebble Mine would industrialize the headwaters of the world's largest remaining sockeye salmon fishery and bisect the habitat of the world's largest concentration of brown bears. The impacted watershed supports more than 190 species of birds, 40 species of mammals, and 29 species of fish, and a thriving subsistence culture.[2] If approved, the proposed Pebble Mine would be one of the most damaging,

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[1] *See* 83 Fed. Reg. 13,483–84, Dep't of the Army, Corps of Eng'rs Intent to Prepare an Envtl. Impact Statement (EIS) for the Pebble Project (NOI), Mar. 29, 2018; Public Notice of Application for Permit, May 30, 2019, Ref. # POA-2017-00271.
[2] *See* Environmental Protection Agency, *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay Alaska,* EPA 910-R-14-001ES at E5, ES-8 and ES-25 (2014) (Watershed Assessment or BBWA).

if not the most damaging, project ever permitted under the CWA.[3] The Bristol Bay headwaters is simply not the place for largescale, industrial mining.

The proposed Pebble Mine poses an unacceptable and unprecedented threat to the land, water, fisheries, animals, and people of Bristol Bay. The mine would destroy salmon habitat, threaten the world's largest sockeye salmon fishery and the economies that rely on it, disturb wildlife, destroy wetlands, threaten several world class brown bear viewing areas and the economy that depends on them, and permanently alter the way of life for those in the region that depend on salmon as food and the cultural thread that weaves through their communities.

The sheer scale and magnitude of impacts places the Pebble deposit in a category all its own. Whether looking at the chimera that is the proposed 20-year mine or the more likely mine that will last for at least a century, the impacts are enormous. PLP pitches the 20-year mine as a "small mine." That is a farce. The "small mine" would destroy approximately 30 miles of salmon supporting streams and another 75 miles of tributaries. The indirect impact would lead to the loss of another 10 miles of salmon streams and 25 miles of tributaries. 3,500 acres of wetlands would be destroyed, according to PLP, while another almost 2,000 acres would be impacted, plus water treatment that would be required forever. The dire nature of destroying critical headwaters grows with the larger, more likely version of the mine that would be in production for an estimated 78 years, with a 20-year closure plan. This mine would extract approximately 55% of the deposit, indicating that there could be another mine expansion after 78 years. The 78-year mine would destroy 125 miles of salmon supporting streams, 337 miles of tributaries and approximately 15,000 acres of wetlands. Surface water impacts would expand the indirect impacts upwards of 45,000 acres. That is approximately 70 square miles, a size that mirrors Washington, D.C.

Development and operation of the mine would require the construction of a 77 mile industrial road — with a second 82 mile corridor after twenty years — and a new industrial port facility in the waters of Cook Inlet. Turning what is currently a pristine, undeveloped area, home to the world's largest concentration of brown bears and unparalleled salmon habitat into a major industrial zone will have far-reaching, extreme, and catastrophic impacts.

While the U.S. Environmental Protection Agency (EPA) took years to prepare a comprehensive, science-based review of potential impacts, the Corps is proceeding at an unprecedented rate with this NEPA review. Even more troubling, the Corps is reviewing a deficient application. PLP has asked the Corps to conduct its analysis and permit what would be the largest mine ever allowed under the CWA while the company continues to redesign its plans and conduct relevant field work. Inexplicably, the Corps has gone along with this, and has rushed to complete its review. In its haste, the Corps has prepared a DEIS that violates both NEPA and the CWA. As Dr. Daniel Schindler noted in testimony before the Alaska House Resources Committee:

> [I]n a nutshell, Alaskans should be dismayed. Alaska's leaders should be outraged. The Army Corps of Engineers should be ashamed of themselves, and

[3] Schweisberg, Matthew, May 14, 2019, *Pebble Mine: Anticipated Adverse Impacts to Wetlands*, A Report Prepared for Trustees for Alaska (Schweisberg, 2019a) at 1 (report and references included as attachments to these comments).

> embarrassed, if they're going to put this [EIS] forward as a piece of credible science. It is not.[4]

The following are just some of the flaws found in the DEIS:

- The DEIS does not include reasonable alternatives, including the more probable 78-year mine;
- The DEIS contains no information demonstrating that this proposed project is economically feasible;
- The DEIS fails to consider direct, indirect, and cumulative impacts to wetlands, water quality, fish, birds, and wildlife;
- The DEIS overestimates economic benefits to local communities and underestimates costs to the State of Alaska;
- The DEIS ignores impacts to brown bears and the wildlife watching businesses that will be substantially hurt by the proposed Pebble Mine;
- The DEIS fails to consider the impacts from a Tailings Storage Facility that would be operated in perpetuity, and has a high probability of failure;
- The DEIS assumes the proposed mine could capture 100% of all contaminated water;
- The DEIS fails to acknowledge the experimental nature of the proposed water treatment system;
- The DEIS fails to acknowledge the extensive water quality impacts the proposed mine would have to the aquatic ecosystem;
- The DEIS lacks any reclamation or post-closure plans;
- The DEIS does not demonstrate that this proposed project can meet the requirements of the CWA.

The American Fisheries Society, on behalf of its 7,500 professional fishery scientists and resource managers, found that the DEIS "fails to meet basic standards of scientific rigor."[5] And three former EPA administrators who served under Presidents Nixon, Reagan, George H.W. Bush, and George W. Bush have told the Army Corps of Engineers "[w]e oppose the Trump administration's efforts to sweep nearly a decade of science and Clean Water Act review under the rug."[6]

Even the mining industry has shied away from this proposed project. Since 2011, four major mining companies have withdrawn their support, including Anglo American who took a

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[4] *See* Christy Fry, *Seawatch: Committee Gets Earful on Pebble*, Homer News, Apr. 11, 2019. https://www.homernews.com/news/seawatch-committee-gets-earful-on-pebble/ (included as an attachment to these comments) (testimony by Dr. Daniel Schindler, a professor in the School of Aquatic and Fishery Sciences at the University of Washington who has spent 20 years in the field in Alaska, before the Alaska House Resources Committee).

[5] *See* American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019) (included as an attachment to these comments).

[6] William Ruckelshaus, William K. Reilly, Christine Todd Whitman, & Bruce Babbitt, June 24, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers*.

$500 million loss to move on and away from the Pebble Mine.[7] PLP has failed to demonstrate that its proposal to mine the Pebble deposit for only 20 years is economically feasible. While pitching the smaller mine to Alaskans, PLP is touting its proposed project to investors as the world largest undeveloped copper and gold resource, supporting a mine that would operate for a century or more.

The application under review lacks any economic information that would demonstrate that the Pebble Mine could even be built. A former Rio Tinto employee raised concerns that, "[i]f the base case mine plan assumed for the EIS is not economic, then the entire permitting process risks being compromised because the impacts and risks being evaluated are much smaller than those required for a full-scale economically viable project."[8]

The number of problems with the DEIS is staggering. The scope of analysis is completely inadequate to account for impacts to ecosystems. The baseline documents are inadequate. There are far too many data gaps to allow for a thorough review at this time. Some of the underlying assumptions are flat out wrong. There is no meaningful cumulative impacts analysis reviewing how each of the independent stressors to the environment interacts with one another. The Corps cannot comply with NEPA or the CWA based on these documents.

The comments attached to this letter, along with the included technical reports, references and administrative documents, demonstrate that Corps cannot legally move forward based on the information before it. It must withdraw the DEIS from further review and reject PLP's application. Only when there is a complete application, demonstrating economic feasibility and including all required baseline data, could the Corps reissue a revised DEIS.

Sincerely,

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[7] The other three companies were Rio Tinto, Mitsubishi Corporation, and First Quantum Minerals.

[8] Borden, Richard, March 28, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers on Pebble Mine Project Economics* (Borden, 2019a) at 5 (included as an attachment to these comments). Richard Borden is an independent consultant at Midgard Environmental Services. He was Head of Environment for Rio Tinto and employed at Rio Tinto for over 20 years. *See* Richard Borden Curriculum Vitae, 2019 (included as an attachment to these comments).

Comments on the Draft Environmental Impact Statement and Public Notice of Application for Permit Reference Number POA-2017-00271 for the Proposed Pebble Project

Prepared by Trustees for Alaska and Sierra Club Environmental Law Program
Submitted to the U.S. Army Corps of Engineers
July 1, 2019

Photo by Amy Gulick

Comments submitted on behalf of The Alaska Center, Alaska Community Action on Toxics, Alaska Wilderness League, Audubon Alaska, Cook Inletkeeper, Defenders of Wildlife, Earthworks, Fairbanks Climate Action Coalition, Friends of Alaska Wildlife Refuges, Friends of McNeil River, McNeil River Alliance, National Parks Conservation Association, Natural Resources Defense Council, Sierra Club, and Wild Salmon Center.

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LIST OF ACRONYMS

ADF&G	Alaska Department of Fish and Game
APDES	Alaska Pollution Discharge Elimination System
BBNC	Bristol Bay Native Corporation
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
DEC	Alaska Department of Environmental Conservation
DEIS	Draft Environmental Impact Statement
DNR	Alaska Department of Natural Resources
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
HUC	Hydrologic Unit Code
MOA	Memorandum of Agreement
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NWI	National Wetlands Inventory
PHABSIM	Physical Habitat Simulation System
PJD	Preliminary Jurisdictional Determination
PLP	Pebble Limited Partnership
RFI	Requests for Information
RGL	Regulatory Guidance Letter

I. THE WRONG PLACE FOR THE WRONG MINE.

A. The Proposed Pebble Project Threatens the World's Largest Sockeye Salmon Fishery.

The Bristol Bay watershed is a pristine and intact environment. EPA has documented the outstanding ecological, cultural, and economic importance of Bristol Bay. The *Proposed Determination of the U.S. Environmental Protection Agency Region 10 Pursuant to Section 404(c) of the Clean Water Act: Pebble Deposit Area, Southwest Alaska* (Proposed Determination) highlights that

> Alaska's Bristol Bay watershed . . . is an area of unparalleled ecological value, boasting salmon diversity and productivity unrivaled anywhere in North America. As a result, the region is a globally significant resource with outstanding value. The Bristol Bay watershed provides intact, connected habitats—from headwaters to ocean—that support abundant, genetically diverse wild Pacific salmon populations. These salmon populations, in turn, maintain the productivity of the entire ecosystem, including numerous other fish and wildlife species.
>
> The Bristol Bay watershed's streams, wetlands, and other aquatic resources support world-class, economically important commercial and sport fisheries for salmon and other fishes, as well as a more than 4,000-year-old subsistence-based way of life for Alaska Natives. Each year Bristol Bay supports the world's largest runs of sockeye salmon, producing approximately half of the world's sockeye salmon.
>
> These sockeye salmon represent the most abundant and diverse populations of this species remaining in the United States. Bristol Bay's Chinook salmon runs are frequently at or near the world's largest, and the region also supports significant coho, chum, and pink salmon populations. Because no hatchery fish are raised or released in the watershed, Bristol Bay's salmon populations are entirely wild. Bristol Bay is remarkable as one of the last places on Earth with such bountiful and sustainable harvests of wild salmon. One of the main factors leading to the success of this fishery is the fact that its aquatic habitats are untouched and pristine, unlike the waters that support many other fisheries.[9]

As the former EPA Regional Administrator noted, the streams, rivers, wetlands, lakes, and other waters of Bristol Bay "comprise one of the most productive, pristine, valuable and

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[9] Environmental Protection Agency, Proposed Determination of the U.S. Environmental Protection Agency Region 10 Pursuant to Section 404(c) of the Clean Water Act: Pebble Deposit Area, Southwest Alaska, 2014, at ES–1 (Proposed Determination or PD), http://www2.epa.gov/sites/production/files/2014-07/documents/pebble_pd_071714_final.pdf; *see also* 79 Fed. Reg. 42314 (July 21, 2014).

vulnerable ecosystems remaining in North America today."[10] In the summer of 2017 alone, the fishery produced 60 million wild salmon.[11] In 2018, Bristol Bay saw its highest numbers ever, recording 62.3 million wild sockeye salmon.[12] It was the largest sockeye salmon run returning to Bristol Bay on record, dating back to 1893.[13]

In stark contrast, the DEIS fails to describe the habitat as "unparalleled" or "unrivaled" as the EPA's Bristol Bay Watershed Assessment (Watershed Assessment) does so clearly. Nor does the DEIS note that the salmon resource of Bristol Bay is "a globally significant resource with outstanding value." These omissions illustrate how the Corps has taken painstaking steps to diminish the value of this incredible resource in the DEIS.

1. The exceptional Bristol Bay sockeye fishery is vital to a subsistence way of life for people in the region.

Residents of Bristol Bay rely heavily on subsistence resources in the region, including those in the area of the proposed Pebble Project. The importance of subsistence to the region is highlighted in EPA's Watershed Assessment:

> The economy of the Bristol Bay is a mixed cash-subsistence economy, where subsistence activity requires labor inputs without exchange of money for the labor performed. Subsistence creates non-cash jobs to local residents of the region who are pursuing subsistence activities to support their families' need for food. The

[10] Dennis McLerran, Letter, EPA Regional Administrator, to Thomas Collier, et al., Feb. 28, 2014 (previously provided as an attachment with Trustees for Alaska's scoping comments). Trustees for Alaska submitted a large number of attachments with its scoping comments. After reviewing the Pebble Project EIS Project Library (available at https://pebbleprojecteis.com/documents/library), it is unclear whether the Corps has included, let alone reviewed, those attachments as part of the record. As of April 2019, only 21 of 131 identified attachments were found in the project library. *See* Trustees for Alaska, Spreadsheet of Attachments found in Pebble Project Library, Apr. 19, 2019 (included as an attachment with these comments). Of 598 references previously provided by twelve commenting agencies, only 68 of those are in the project library. Consequently, we are resubmitting the scoping attachments with these comments to ensure they are part of the record. The Corps has included only 6% of the references included in EPA's Watershed Assessment. John Schoen, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* at 4, June 11, 2019.

[11] *See* Suzanna Caldwell, *Bristol Bay Red Salmon Run Smashes Records*, Anchorage Daily News, Dec. 2, 2017, https://www.adn.com/outdoors-adventure/fishing/2017/07/28/bristol-bay-red-salmon-run-smashes-records/ (previously provided as an attachment with Trustees for Alaska's scoping comments).

[12] *See* Avery Lill, *62.3 Million: Bristol Bay's 2018 Salmon Season the Largest Ever*, KDLG Public Radio, Oct. 8, 2018, https://www.kdlg.org/post/623-million-bristol-bay-s-2018-salmon-season-largest-ever#stream/0 (included as an attachment with these comments); ADF&G, *News Release – 2018 Bristol Bay Salmon Season Summary*, Sept. 18, 2018, http://www.adfg.alaska.gov/static/applications/dcfnewsrelease/989536277.pdf (included as an attachment with these comments).

[13] *Id.*

subsistence economy provides a direct link between the health of the Bristol Bay salmon ecosystem and human well-being. Subsistence is integral to the local way of life in the Bristol Bay region.[14]

Photo: Bob Waldrop. Salmon provides the cultural thread that connects people to their communities and traditions.

The EPA's Proposed Determination also recognizes the vital role salmon play for the people of Bristol Bay:

In the Bristol Bay region, the subsistence way of life is irreplaceable. Subsistence

[14] Environmental Protection Agency, *An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska*, app. E, at 191 (2014) (EPA 910-R-14-001C) (BBWA). *See generally id.* app. E–J. (The entire BBWA and its appendices were previously provided as an attachment with Trustees for Alaska's scoping comments).

> resources provide high-quality foods, foster a healthy lifestyle, and form the basis for social relations. Alaska Natives are the majority population in the Bristol Bay region, and salmon has been central to their health, welfare, and culture for thousands of years.[15]

Even the DEIS recognizes that the

> non-monetized economy includes subsistence hunting and fishing, which is an important component of the socioeconomic and sociocultural system of rural Alaska communities. The subsistence way of life is a significant contributor to household and community welfare, social relationships, and cultural importance of the people who live or use subsistence resources near the project area . . . .[16]

Many of those in the Bristol Bay region lead a subsistence way of life, dependent on the fisheries and wildlife of the Bristol Bay watershed for over 4,000 years.[17] This way of life is not encompassed entirely by the consumption of food, but extends through the entire social and cultural foundation that defines these tribes and organizations.[18] EPA recognizes this in the Proposed Determination, stating, "for Alaska Natives today, subsistence is much more than the harvesting, processing, sharing, and trading of foods. Subsistence holistically subsumes the cultural, social, and spiritual values that are the essence of Alaska Native cultures. Traditional and more modern spiritual practices place salmon in a position of respect and importance."[19]

2. The salmon fishery resources of Bristol Bay support a thriving and sustainable economic engine for Alaska.

The Bristol Bay watershed supports the largest sockeye salmon fishery in the world.[20] Nearly half of the world's sockeye salmon catch comes from Bristol Bay.[21] The fishery is considered one of that last, great salmon fisheries on this planet. And it supports a sustainable and thriving industry, year after year. "[T]he Bristol Bay salmon fishery creates thousands of jobs and hundreds of millions of dollars in economic activity and wages."[22]

Not only is it the largest, the Bristol Bay sockeye salmon fishery is also "the world's most valuable wild salmon fishery."[23] It "typically supplies almost half of the world's wild sockeye

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[15] PD at 3–39.
[16] DEIS at ES–25.
[17] BBWA at 1–1.
[18] *Id.* at 5–36.
[19] PD at 3–43.
[20] DEIS at ES–48; BBWA at 1-1.
[21] *Id.*
[22] DEIS at 3.6–4.
[23] Knapp, Gunnar, Guettabi, Mouhcine & Goldsmith, Scott, *The Economic Importance of the Bristol Bay Salmon Industry*, Apr. 2013, at 1, http://www.iser.uaa.alaska.edu/Publications/2013_04-TheEconomicImportanceOfTheBristolBaySalmonIndustry.pdf (previously provided as an

salmon. In 2010, harvesting, processing, and retailing Bristol Bay salmon and the multiplier effects of these activities created $1.5 billion in output or sales value across the United States."[24] Between 1998 and 2017, the Bristol Bay processing sector produced approximately $7 billion of first wholesale value seafood products.[25] Of that, approximately 90% came from sockeye salmon.[26] The wholesale value for sockeye salmon has grown from $197 million in 1998 to $542 million in 2017 — a 275% increase.[27] In short, the Bristol Bay fishery is unparalleled and drives the regional economy, with far-reaching impacts throughout Alaska down to the lower-48. "The drivers of this economic contribution are the quantity of the salmon harvest and the value of that product on the world market."[28]

The region also supports a prolific outdoor recreation industry dependent on the thriving fishery. Anglers from around the world take roughly 37,000 fishing trips annually to Bristol Bay, generating $60 million in economic activity and supporting another 850 full and part time jobs.[29]

B. The Bristol Bay Watershed Assessment and Proposed Determination Establish that Mining the Pebble Deposit Would Jeopardize Bristol Bay.

EPA decided to conduct an ecological risk assessment to scientifically document "the significance of Bristol Bay's ecological resources and evaluate the potential impacts of large-scale mining on th[ose] resources."[30] The Watershed Assessment is the result of those efforts. It is the product of "three years of study, two rounds of public comment, and independent, external peer review."[31] The Watershed Assessment later became the factual and scientific support for the EPA's Proposed Determination. And, despite the Corps preparation of the DEIS, the Watershed Assessment remains the source for the best science regarding the ecological values of Bristol Bay and the potential threats of mining the Pebble deposit. Its technological and scientific findings remain unrefuted, and EPA's Proposed Determination based on those findings remains in place.

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attachment with Trustees for Alaska's scoping comments); *see also* DEIS at 3.6–4 (referencing the 2013 ISER study).

[24] Knapp, Gunnar, Guettabi, Mouhcine & Goldsmith, Scott, *The Economic Importance of the Bristol Bay Salmon Industry*, Apr. 2013, at 1.

[25] DEIS at 3.6–13.

[26] *Id.*

[27] *Id.* at 3.6–13 to 3.6–14.

[28] *Id.* at 3.6–5.

[29] 43 Senators and Congressman, Letter, to President Trump, Oct. 11, 2017 (previously provided as an attachment with Trustees for Alaska's scoping comments).

[30] BBWA at ES-1.

[31] *Id.* at ES-3. *See also* BBWA at xxv, 1–7 and PD at 2–7, 2–9 to 2–10.

1. The Bristol Bay Watershed Assessment provides the best science regarding Bristol Bay and the threats posed by the Pebble Mine.

The Watershed Assessment assessed how "mining-related stressors . . . would affect ecological resources in the watershed."[32] The Watershed Assessment examines the potential impacts of mining on the watershed, not one specific mine:

> [the Watershed Assessment] is not an in-depth assessment of a specific mine, but rather an examination of potential impacts of reasonably foreseeable mining activities in the Bristol Bay region, given the nature of the watershed's mineral deposits and the requirements for successful mine development.[33]

In the Watershed Assessment, EPA identified three mining scenarios that "reflect[ed] the general characteristics of mineral deposits in the watershed, modern conventional mining technologies and practices, the scale of mining activity required for economic development of the resources, and the infrastructure needed to support large-scale mining."[34] The three mining scenarios "represent different stages of mining at the Pebble deposit, based on the amount of ore processed: Pebble 0.25 (approximately .25 billion tons . . . of ore over 25 years), Pebble 2.0 (approximately 2.0 billion tons . . . of ore over 25 years), and Pebble 6.5 (approximately 6.5 billion tons . . . of ore over 78 years).[35] The major components of the hypothetical mines included an open pit mine, waste rock piles, and one or more tailing storage facilities, and an 86–mile transportation corridor within the Kvichak River watershed that includes a gravel-surfaced road, four pipelines and a port.[36] These scenarios were based on "preliminary mine details put forth in [Pebble]'s *Preliminary Assessment of the Pebble Mine* (Ghaffari et al. 2011)" and scientific information from mines around the world.[37]

[32] BBWA at ES–10.
[33] *Id.* at ES–5
[34] *Id.* at ES–10.
[35] *Id.*
[36] *Id.*
[37] *Id.* at 6–1.

Photo: Carl Johnson. Bristol Bay, Alaska. Bristol Bay fisheries support one of the world's largest fisheries, and contains two of the world's largest sockeye salmon-producing rivers.

EPA recognized that "[t]he exact details of any future mine plan for the Pebble deposit or for other deposits in the watershed will differ from our mine scenarios."[38] The uncertainty about the specific future mine plans was irrelevant because EPA's "scenarios reflect[ed] the general characteristics of mineral deposits in the watershed, modern conventional mining technologies and practices, the scale of mining activity required for economic development of the resource, and the infrastructure needed to support large-scale mining."[39] As a result, the three mining scenarios considered in the Watershed Assessment "realistically represent the type of development plan that would be anticipated for a porphyry copper deposit in the Bristol Bay watershed."[40]

The Watershed Assessment considered a variety of potential impacts from the identified mining scenarios. Table 6-9 of the Watershed Assessment provides a summary of the mining-related "stressors" that EPA identified as impacting the Bristol Bay watershed, including: removal of streams and wetlands, filling of streams and wetlands, reduced flow, changes in water temperature, copper and other metals entering wetlands and streams, acidification of receiving waters, spillage of processing chemicals, sedimentation impacts to streams and wetlands, diesel fuel spills, natural gas leaks, inhibition of fish passages, and downstream siltation, among other

[38] *Id.* at ES–10.
[39] *Id.*
[40] *Id.*

things.[41]

The Watershed Assessment quantified the impact of these stressors based on the three different mining scenarios. In doing so, the Watershed Assessment considered both impacts from routine mining operations and several failure scenarios.[42] Table ES-2 and ES-3 of the Watershed Assessment quantify the impacts to streams and wetlands from each of the three mining scenarios.[43] Under the smallest scenario evaluated, EPA found that the Pebble 0.25 mine would:

- Eliminate, block or dewater 38 kilometers of streams;
- Eliminate, block or dewater 8 kilometers of anadromous steams;
- Alter 20% or more of streamflow in 15 kilometers of stream;
- Result in directly toxicity to invertebrates in 21 kilometers of stream;
- Result in the loss of 4.9 square kilometers of wetlands, lakes, and ponds from the mine footprint;
- Result in an unquantifiable loss of streams from reduced streamflow below the mine footprint, and
- Impact 4.7 square kilometers of wetlands, lakes, and ponds from the access road.[44]

Table ES-4 of the Watershed Assessment quantifies the risk and potential consequences from failure scenarios.[45] The consequences from failures include:

- A tailings dam failure would destroy or degrade more than 29km of salmonid streams for decades;[46]
- Concentrated spills, return water pipeline spills, and diesel pipeline spills into streams or wetlands would result in acute and chronic exposure to fish and invertebrates;[47]
- Tailings storage facility spillway releases are known to occur and are sufficiently frequent to justify routine spillway construction.[48] Spilled supernatant from the tailings storage facility could result in toxicity to invertebrates and fish avoidance for the duration of the event;[49] and
- Post-closure collection and treatment failures are very likely to result in release of untreated or incompletely treated leachates for days to months, but the water would be less toxic due to elimination of potentially acid-generating waste rock.[50]

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[41] *Id.* at 6–37.
[42] *Id.* at ES–18.
[43] *Id.*
[44] *Id.* at ES–11
[45] *Id.* at ES–19.
[46] *Id.*
[47] *Id.*
[48] *Id.*
[49] *Id.*
[50] *Id.*

2. *The Proposed Determination's technical and scientific rindings remain unrefuted.*

The Watershed Assessment is a scientific assessment. It did "not discuss or recommend policy, legal, or regulatory decisions."[51] The Proposed Determination concludes, based on the scientific findings in the Watershed Assessment, that mining on even the smallest logistically-practicable scale will pose unacceptable adverse impacts to the watershed.

The Proposed Determination characterized the potential adverse impacts identified by the Watershed Assessment as an underestimate because EPA only considered "the footprint impacts associated with the mine pit, [tailing storage facilities], and waster rock piles" and not the additional support facilities necessary for mining in the region.[52] The EPA also did not consider impacts "from potential accidents and failures as a basis for its findings" despite the "high likelihood" that a failure would occur.[53]

Nevertheless, based on these underestimated impacts, EPA determined that "mining of the Pebble deposit at any of [the three mining scenarios identified] even the smallest, could result in significant and unacceptable adverse effects on ecologically important streams, wetlands, lakes, and ponds and the fishery areas they support."[54] As a result, EPA proposed restricting "the discharge of dredged or fill material related to mining the Pebble deposit into waters of the United States within the potential disposal site that would, individually or collectively, result in any of the following:"

1. Loss of streams
    a. The loss of 5 or more linear miles of streams with documented anadromous fish occurrence; or
    b. The loss of 19 or more linear miles of streams where anadromous fish are not currently documented, but that are tributaries of streams with documented anadromous fish occurrence;

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[51] BBWA at ES–1.
[52] PD at 2–17.
[53] BBWA at ES–6. *Compare with* Bowker, Lindsey N. & Chambers, David, *In the Dark Shadow of the Supercycle Tailings Failure Risk & Public Liability Reach All Time Highs*, Bowker Associates Science & Research in the Public Interest & Center for Science in Public Participation, Oct. 21, 2017 (previously provided as an attachment with Trustees for Alaska's scoping comments) at 3 ("It is irrefutable that the frequency and consequence of Very Serious Failures and of Serious Failures is continuing to increase at alarming rates, that the trend emerged and grew post 1990 and that it is in large part a consequence of conscious decisions made at the mine-level to make up for fundamental mine and miner specific economic disadvantages viz. global economics."). The PD noted that a tailings dam failure associated with Pebble mine scenario 0.25 would have devastating consequences including "near-complete loss of [North Fork Koktuli] fish populations downstream of the [tailings storage facility]," an inability to "support salmonids in the short term (less than 10 years)," and a resulting "low-quality and rearing habitat for a period of decades." PD at 4–64 to 4–69.
[54] BBWA at ES–5.

or

2. Loss of wetlands, lakes, and ponds. The loss of 1,100 or more acres of wetlands, lakes, and ponds contiguous with either streams with documented anadromous fish occurrence or tributaries of those streams; or

3. Streamflow alterations. Streamflow alterations greater than 20% of daily flow in 9 or more linear miles of streams with documented anadromous fish occurrence.[55]

Photo: Amy Gulick. Brown bear and spawning sockeye salmon, Margot Creek, a tributary of Naknek Lake, Bristol Bay Watershed, Alaska. In Bristol Bay, Alaska, salmon are a life force that feeds something at every stage of their lives: bears, birds, marine mammals, people, cultures, and communities.

EPA based these restrictions on the 0.25 mining scenario, which is the smallest mine scenario that the agency considered.[56] The EPA-reviewed 0.25 mining scenario includes the same locations for the mine pit, waste rock and tailing facility as that found in PLP's current 404 Application and Technical Note.[57] The 0.25 mining scenario included a 20-year mining plan,

[55] *Id.* at ES–6.
[56] *Id.*
[57] *See* Tom Collier, CEO, PLP Presentation to the Alaska Resource Development Council, Oct. 5, 2017, at 33 (EPA 0.25 Mine Scenario) and 35 (PLP Current Plan),

extracting 31,100 tons of ore per day.[58] The total surface area, which includes the mine pit, waste rock pile and tailings storage facility is 10.6 sq. kilometers or 4.09 sq. miles.[59] The Proposed Determination states that "[m]ine alternatives with lower environmental impacts at the Pebble deposits are not evaluated" and thus, any proposal that had impacts below these proposed restriction would proceed to 404 permitting.[60] The project put forth in PLP's 404 Application is significantly larger than the 0.25 billion ton mining scenario evaluated by EPA.[61] In addition, while PLP's current application limits its tailings locations to the North Fork Koktuli, the 0.25 mine scenario also limited siting of the tailing facility to the North Fork Koktuli drainage.[62]

Even the smallest mine scenario would have unacceptable adverse impacts. A mine at this scale "would eliminate or dewater nearly 5 miles of streams with documented occurrence of anadromous fish."[63] EPA found that "[t]he greatest impacts would be at the [tailings storage facility] location in the North Fork Koktuli watershed. Coho salmon spawn or rear in nearly 50% of the stream length within the [tailings storage facility] footprint."[64] Moreover, because the loss of these streams is at the headwaters of the North Fork Koktuli, EPA emphasized that the impacts would be far-reaching: "Thus, the coho salmon streams that the Pebble 0.25 stage mine would eliminate or dewater likely play an important role in the life cycle of that species in all three watersheds."[65]

According to EPA, the Pebble 0.25 mine scenario would result in the largest destruction of anadromous waters in the history of Corps 404 permitting in Alaska.[66] EPA highlighted that the

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http://www.akrdc.org/assets/Breakfasts/collier2017.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
[58] PD at 2-16 (Table 2-2 Mine stage parameters).
[59] *Id.*
[60] *Id.* at ES–7.
[61] Pebble Description at 1 (proposing a 1.2 billion ton mine) and James Fueg, Memorandum, PLP to Shane McCoy, U.S. Army Corps of Engineers, *Technical Note on Updates to PLP's Proposed Project*, (Technical Note), May 11, 2018, at 2 (increasing the size of the mine to 1.5 billion tons).
[62] *See* BBWA at 6–21. Moreover, the BBWA took a conservative view of the size of the tailing facilities. For example, according "to Ghaffari et al. (2011), the total area of direct impact for a 25-year mine at the Pebble deposit would cover approximately 125 km^2; in comparison, the mine footprint for the 25-year mine scenario (Pebble 2.0) considered in this assessment covers approximately 45 km^2 (Table 6-6)." *Id.* at 6–3. *See also* Ghaffari, Hassan, et al., *Preliminary Assessment of the Pebble Project, Southwest Alaska*, Feb. 17, 2011 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[63] PD at 4–4.
[64] *Id.*
[65] *Id.* at 4–6.
[66] *Id.* at 4–61 ("based on EPA's records, there do not appear to be any examples of past projects, in the Bristol Bay watershed or the rest of Alaska, where [the Corps] authorized losses to documented anadromous waters of the nature and magnitude associated with the Pebble 0.25 stage mine."); *id.* at 4–19 ("By itself, the elimination, dewatering, or fragmenting of approximately 19 miles (30 km) of tributaries of anadromous fish streams as the result of a CWA Section 404 permit would be an unprecedented impact in Alaska. . . . The loss of these subsidies could degrade downstream salmon habitat, local salmon populations, and fisheries well beyond

elimination or dewatering of at least 4.7 miles of salmon-bearing streams would be "unprecedented in the context of the Clean Water Act Section 404 regulatory program in Alaska."[67] EPA also noted concern about the impacts of a 20-25 year mine regarding the return of salmon post-mining:

> areas that do not support salmon for many years are not likely to become productive again (Reeves et al. 1991a, Reeves et al. 1991b, Paulsen and Fisher 2005, Katz et al. 2007). Both the 20-year life of the Pebble 0.25 stage mine and the 40 years or more during which dewatering would persist are many times longer than the 2- to 5-year life span of coho and Chinook salmon. Thus, as successive year classes of salmon return and are unable to reach their natal spawning grounds and produce fry, the cycle of spawning would be interrupted. Displaced spawners that attempt to return to lost habitat for the first few generations after the loss and that do not die without spawning may stray elsewhere to spawn, but success will depend on availability of suitable spawning habitat and its capacity to support additional fish. The substantial spatial and temporal extent of stream habitat losses to the Pebble 0.25 stage mine suggest that these losses would reduce the overall capacity and productivity of Chinook, and particularly coho, salmon in the [South Fork Koktuli], [North Fork Koktuli], and [Upper Talarik Creek] watersheds.[68]

Impacts are not limited to the loss of the important headwaters of the North Fork Koktuli. The EPA found that loss of the headwaters would

> fundamentally alter surface and groundwater hydrology and, in turn, the flow regimes of receiving—or formerly receiving—streams. Such alterations would reduce the extent and frequency of stream connectivity to off-channel habitats, as well as reduce groundwater inputs and their modifying influence on the thermal regimes of downstream habitats (Section 4.2.4). These lost streams also would no longer support or export macroinvertebrates, which are a critical food source for developing alevins, juvenile salmon, juvenile northern pike, and all life stages of other salmonids and forage fish.[69]

EPA concluded that "the discharge of dredged or fill material associated with the Pebble 0.25 stage mine could have unacceptable adverse effects on fishery areas in the [South Fork Koktuli], [North Fork Koktuli], and [Upper Talarik Creek] watersheds, as well as downstream fishery areas."[70] Further, EPA found that while "it cannot be certain of the full extent of the implications of these losses, it is apparent that impacts of this magnitude could *compromise the sustainability of fish populations within the [South Fork Koktuli], [North Fork Koktuli], and [Upper Talarik*

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the Pebble 0.25 stage mine footprint, compromising the overall diversity and productivity of the [South Fork Koktuli], [North Fork Koktuli], and [Upper Talarik Creek] watersheds (Section 4.2.1)").

[67] *Id.*

[68] *Id.* at 4–7.

[69] *Id.* at 4–9.

[70] *Id.* at 4–13.

Creek] watersheds, as well as downstream fishery areas."[71] Due to the outright loss of nearly 5 miles of habitat; the importance of that habitat to juvenile salmon; the degradation of downstream rearing and spawning habitat; loss of genetic diversity, which is key to the Bristol Bay salmon stocks; and the strong connection between an intact headwaters and the thriving, healthy salmon stocks of Bristol Bay, EPA found that the impacts are unacceptable.[72]

EPA also found that the 0.25 mine scenario would result in the elimination, dewatering, or fragmenting of approximately 19 miles of tributaries to anadromous fish streams.[73] This too would be "an unprecedented impact in Alaska" and while the loss of tributaries may be nearly 3% of mapped streams in the three watersheds, the "effects of their loss would reverberate to downstream habitats and affect species such as coho, Chinook, sockeye, and chum salmon."[74] EPA went on to note that the "magnification of impacts would arise from the vital role headwater streams play in maintaining diverse, abundant fish populations, via the provision of surface and groundwater inputs and food sources critical to the survival, growth, and spawning success of downstream fishes."[75] EPA concluded that this loss "could degrade downstream salmon habitat, local salmon populations, and fisheries well beyond the Pebble 0.25 stage mine footprint, compromising the overall diversity and productivity of the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds."[76]

Photo Bob Waldrop. The Proposed Pebble Mine would eliminate many miles of salmon habitat, and degrade downstream habitat.

In addition to the devastating impacts to salmon bearing streams and their tributary headwaters, the 0.25 mine scenario would eliminate, dewater or fragment more than 1,200 acres

[71] *Id.* (emphasis added).
[72] *Id.*
[73] *Id.* at 4–19.
[74] *Id.*
[75] *Id.*
[76] *Id.*

of wetlands, lakes, and ponds, of which approximately 1,100 of those acres are contiguous with anadromous streams or their tributaries.[77] The loss of these wetlands, lakes and ponds would be "a very large and unprecedented impact under the Clean Water Act Section 404 regulatory program in Alaska."[78] In addition to the direct loss of these waters, the 0.25 mine would consume large volumes of water drawn from surface and groundwater sources.[79] The Watershed Assessment calculated that the 0.25 mine would reduce flow in more than 45 miles of streams.[80] The adverse impacts from streamflow alteration "could jeopardize the long-term sustainability of these fisheries."[81] EPA found that drawdown would alter streamflows by more than 20% in approximately 9 miles of stream and that such a chance could pose unacceptable adverse impacts to the salmon fisheries of both the South Fork Koktuli and North Fork Koktuli.[82]

As part of the process that led to the Proposed Determination, EPA provided PLP and the State of Alaska (the State) an "opportunity to submit information that demonstrated either that no unacceptable adverse effects would result from discharges associated with mining the Pebble deposit or that actions could be taken to prevent unacceptable adverse effects on fishery areas."[83] In response, PLP and the State submitted scientific and technical information to the agency.[84] However, nothing submitted by PLP or the State demonstrated "to the satisfaction of EPA Region 10 that no unacceptable adverse effects on fishery areas will occur should the disposal of dredged or fill material associated with mining the Pebble deposit proceed."[85] This is not surprising as the Proposed Determination states that "known compensatory mitigation techniques are unlikely to adequately offset anticipated impacts."[86]

The Proposed Determination does identify certain mining technologies that *might* reduce adverse impacts, which were not contemplated by the Watershed Assessment. These include: technologies that have a greater than 99% capture efficiency for leachate;[87] daily road inspections including "stops to inspect each end of each culvert;"[88] using "impact-resistant containers;[89] "unconventional or even novel mitigation measures, such as dry stack tailings disposal or the use of armored containers on the trucks carrying process chemicals to the site;"[90] streamflow

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[77] *Id.* at 4–20.
[78] *Id.* at 4–21.
[79] *Id.* at 4–22.
[80] *Id.* at 4–23.
[81] *Id.* at 4–27.
[82] *Id.* at 4–28.
[83] *Id.* at ES–5.
[84] *Id.*
[85] *Id.*
[86] *Id.* at 4–58.
[87] *Id.*; *see also* BBWA at 8–54 ("Additional measures might include lining the waste rock piles, reconfiguring the piles, or processing more of the waste rock as it is produced.").
[88] BBWA at ES–17.
[89] *Id.*
[90] *Id.* at ES–27 ("These practices may be unconventional because they are expensive, unproven, or impractical. However, these obstacles to implementation might be overcome and justified by the large mineral resource and the highly valued natural and cultural resources of the Bristol Bay watershed.").

alterations less than 20%;[91] subsistence leave policies;[92] and more. Ultimately, however, EPA determined that "even if the mining and mitigation practices described in the mine scenarios were performed perfectly, an operation of this size would inevitably destroy or degrade habitat of salmonids"[93] and known compensatory mitigation techniques are unlikely to adequately offset anticipated impacts.[94]

Nothing in PLP's 404 application resolves or addresses the findings of either the Watershed Assessment or the Proposed Determination. In fact, PLP's most-recent project proposal — as defined in its 404 application — remains significantly larger than the EPA 0.25 mine scenario. And as discussed below, it is clear PLP simply intends to *start* with a mine at the proposed scale and then expand.[95] Similarly, the DEIS only sporadically and infrequently references the Watershed Assessment. The DEIS fails to address the Watershed Assessment in whole or make a clear statement regarding the assessment's findings. The DEIS also fails to indicate whether it either incorporates or takes issue with any of the Assessment's findings. PebbleWatch prepared a more comprehensive comparison.[96] PebbleWatch found that "[a]fter two rounds of independent peer review, the final Bristol Bay Watershed Assessment listed approximately 747 reference documents. Comparing it to the DEIS, we found 42 references in common. This means that under 6% of the referenced items in the Bristol Bay Watershed Assessment ended up in the DEIS."[97] To date, neither PLP nor the Corps have made a supportable scientifically-defensible argument that the findings in the Watershed Assessment are irrelevant or inaccurate. Any assertion that the DEIS is thorough contradicts the simple fact that there is scant discussion of the Watershed Assessment. The fact that the DEIS only cites to 42 of the 747 references in the Watershed Assessment is outstanding and indefensible.

Because the findings have not been rejected, even the most-recent and misleading titled "small mine" will pose unacceptable adverse impacts and significant degradation to waters of the United States, rendering it unpermittable under the CWA.

3. *The Proposed Determination remains in place.*

In July 2017, the EPA proposed to withdraw the Proposed Determination restrictions. EPA's notice highlighted that the withdrawal proposal was the result of a legal settlement with

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[91] *Id.* at 7–57 ("Although the loss of salmonid production has not been estimated, streamflow alterations greater than 20% would be expected to have substantial effects.").
[92] *Id.* at 12–13.
[93] *Id.* at 14–17.
[94] *Id.* at 4–57 to 4–59.
[95] In fact, only five months after submitting its application, PLP has increased the size of the mine from 1.2 billion tons to 1.5 billion tons. *See* Technical Note at 2.
[96] *See* BBNC, PebbleWatch, Website, *Source documents*, Mar. 17, 2019, https://pebblewatch.com/source-documents/ (included as an attachment with these comments); *see also* BBNC, PebbleWatch, Website, *Shared documents: DEIS and Bristol Bay Watershed Assessment*, Mar. 17, 2019, https://pebblewatch.com/shared-documents-deis-and-bristol-bay-watershed-assessment/ (included as an attachment with these comments).
[97] *Id.*

PLP.[98] Over 675,000 comments were submitted on the Proposed Determination, with the significant majority supporting EPA's proposed restrictions.[99]

In February 2018, EPA issued a decision, suspending the proposal to withdraw the Proposed Determination.[100] EPA elected to "leave[] that Determination in place pending further consideration by the Agency of information that is relevant to the protection of the world-class fisheries contained in the Bristol Bay watershed."[101] During the comment period for EPA's proposal to withdraw the Proposed Determination, it received an overwhelming number of comments, far exceeding the number of comments received on EPA's original Proposed Determination. EPA noted that:

> During the public comment period, EPA received more than one million public comments regarding its proposal to withdraw. An overwhelming majority of these commenters expressed opposition to withdrawal of the Proposed Determination. EPA also held two public hearings in the Bristol Bay watershed on the proposal to withdraw; approximately 200 people participated in the hearings. Of the 119 participants who testified, an overwhelming majority also expressed opposition to withdrawal of the Proposed Determination. Similarly, the vast majority of tribal governments and ANCSA Corporation shareholders who consulted with EPA expressed opposition to the proposed withdrawal.[102]

Seven Alaska Native Corporations, 44 Tribal Governments, five local Bristol Bay governments, 43 national elected officials, five Alaska elected officials, 354 businesses, 38 experts in fisheries biology, ecology, geology, oceanography, etc. (including former EPA, U.S. Fish and Wildlife Service (FWS), and State of Alaska Department of Natural Resources employees), all asked EPA to keep the Proposed Determination in place.[103] Of the 1,019,595 comments received regarding EPA's proposal to withdraw the Proposed Determination, 99.9% supported keeping the Proposed Determination in place.[104]

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[98] *See* 82 Fed. Reg. 33,123 (July 19, 2017) ("EPA agreed to initiate this proposed withdrawal process as part of a May 11, 2017 settlement agreement with [PLP].").
[99] *See* PD Comments for the complete collection of all comments submitted on the Proposed Determination (previously provided as an attachment with Trustees for Alaska's scoping comments). *See also* https://www.regulations.gov/docket?D=EPA-R10-OW-2014-0505.
[100] *See* 83 Fed. Reg. 8668 (Feb. 28, 2018).
[101] *Id.*
[102] *Id.*
[103] *See* EPA Docket # EPA-R10-OW-2017-0369, https://www.regulations.gov/docket?D=EPA-R10-OW-2017-0369.
[104] The following entities have expressed opposition to withdrawing the Proposed Determination: **Opposing Bristol Bay Based Entities:** Alaska General Seafoods; Alaska Net and Supply; City of Aleknagik; Aleknagik Natives Limited; Aleknagik Traditional Council; Bristol Bay Economic Development Corporation; Bristol Bay Heritage Land Trust; Bristol Bay Native Association; Bristol Bay Native Corporation; Choggiung Village Corporation; Chignik Bay Tribal Council; Chignik Lake Village Council; Clark's Point Village Council; Curyung Tribal Council; Dillingham, City of; Ekuk Village Council; Ekwok, City of; Ekwok Natives Limited; Ekwok Village Council; Greater Nushagak Setnetters Association; Howard Fabrication; Icicle Seafoods;

Continued from footnote 104:
Iliamna Fish Company; Koliganek Natives Limited; Koliganek Village Council; Leader Creek Fisheries, LLC; Levelock Natives Limited; Levelock Village Council; Manokotak, City of; Manokotak Natives Limited; Manokotak Village Council; Matrix Marine Inc.; Naknek Family Fisheries; New Stuyahok, City of; New Stuyahok Traditional Council; Nondalton, City of; Nondalton Tribal Council; Nunamta Aulukestai; Nushagak Young Fishermen Coalition; Pedro Bay Village Council; Peter Pan Seafoods-Dillingham; Pilot Point Native Corporation; Pilot Point Tribal Council; Port Heiden, City of; Portage Creek Village Council; Pride of Bristol Bay; Representative Bryce Edgmon, Alaska House Speaker; Saquyaq-Clarks Point Village Corporation; Sea Inn Inc.; Seattle-Marine & Fishing Supply Co.-Naknek; Stuyahok Limited; Sustaining Bristol Bay Fisheries; Togiak Natives Limited; Traditional Council of Togiak; Tundra Love, LLC; Twin Hills Native Corporation; Twin Hills Village Council; and United Tribes of Bristol Bay
Opposing Tribes: Akutan Traditional Council; Aleut Community of St. Paul Island; Allakaket Tribal Council; Alutiiq Tribe of Old Harbor; Anvik Tribal Council; Atmautluak Traditional Council; Chickaloon Native Village Council; Chuathbaluk Traditional Council; Chuloonawick Native Village; Eek, Native Village of; Emmonak Tribal Council; Evansville Tribal Council; Eyak, Native Village of; Holy Cross Village Council; Huslia Tribal Council; Kasigluk Traditional Council; Kenaitze Indian Tribe; Kongignank Traditional Council; Napakiak, Native Village of; Nenana Native Council; Northway Village Council; Petersburg Indian Association; Platinum Traditional Village; Port Graham, Native Village of; Qwalangin Tribe of Unalaska; Sitka Tribe of Alaska; Southeast Alaska Indigenous Transboundary Commission; Sun'ag Tribe of Kodiak; Tazlina, Native Village of; Unalakleet, Native Village of; Wainwright, Village of; and Wrangell Cooperative Association
Opposing Lodges/Outfitters: Alagnak Lodge; Alaska Alpine Adventures LLC; Alaska Fishing Unlimited, Inc.; Alaska Fly Anglers, Inc.; Alaska Fly Out; Alaska Rainbow Adventures; Alaska Rainbow Lodge; Alaska Sportsman's Lodge; Alaska Trophy Fishing Safari's; Alaska West; Alaska's Enchanted Lake Lodge; Alaska's Legend Lodge; Alaska's Valhalla Lodge; Angler's Alibi; Angry Eagle Lodge and Outfitter's; Bear Claw Lodge; Bear Trail Lodge; Beyond Boundaries Expeditions; Blue Fly Bed & Breakfast and Guide Service; Blue Mountain Lodge; Brightwater Alaska, Inc.; Bristol Bay Adventures; Bristol Bay Lodge; Bristol Bay Sportfishing, Inc.; Cinder River Lodge; Chinook Tours; Crystal Creek Lodge; EPIC Angling & Adventure, LLC; Fishing Bear Lodge; Frontier River Guides; Goodnews River Lodge; Grizzly Skins of Alaska; Igiugig Lodge, LLC; Jake's Nushagak Salmon Camp; Katmai Air, LLC; Katmailand, Inc.; Kulik Lodge; Kvichak Lodge; Mission Lodge; No See Um Lodge, Inc.; Ouzel Expeditions Inc.; Royal Coachman & Copper River Lodges; Rainbow River Lodge; Rapids Camp Lodge; Reel Wilderness Adventures, Inc.; Royal Wolf Lodge; Tikchik Narrows Lodge; Togiak River Outfitters, LLC; Wild River Guide Co.; and Women's Flyfishing®
Opposing Alaska Entities: Alaska Bering Sea Crabbers; Alaska Independent Tendermen's Association; Alaska Longline Fishermen's Association; Alaska Marine Conservation Council; Alaska Trollers Association; Alward Fisheries LLC; Anchorage Audubon Society; Arctic Light Gallery and Excursions; Battle River Wilderness Retreat; Bristol Bay Fishermen's Association; Bristol Bay Regional Seafood Development Association; Commercial Fishermen For Bristol Bay; Cook Inletkeeper; Copper Country Alliance; Copper River Boats and Permits; Eyak Preservation Council; Kachemak Bay Conservation Society; Kenai River Watershed Foundation, Inc.; Northline Seafoods; Pioneer Alaskan Fisheries Inc.; Rainy Dawn Service F/V Miss Gina; Rising

In the accompanying news release, former EPA Administrator Pruitt noted that "it is my judgment at this time that **any mining projects in the region likely pose a risk to the abundant natural resources that exist there**. Until we know the full extent of that risk, **those natural resources and world-class fisheries deserve the utmost protection**."[105] The Administrator went on to noted that PLP's "application must clear a high bar, because EPA believes the risk to Bristol Bay may be unacceptable."[106] The Administrator concluded:

> Today's action is important for several reasons. First, **EPA has serious concerns about the impacts of mining activity in the Bristol Bay Watershed**. From public comments to community meetings, stakeholders stressed the importance of balancing a singular mine venture with the risk to one of the world's largest commercial fisheries. Second, **for EPA not to express an environmental position at this stage would be disingenuous**. This action demonstrates the Agency's commitment to both the rule of law and process, and upholding the EPA's core mission of environmental stewardship.[107]

The Proposed Determination's proposed restrictions are based on sound science that remains valid. There has been nothing to date offered that substantively and soundly refutes the underlying science that supports the Proposed Determination. Despite PLP's assertions to the contrary, it has not offered any science that disputes or undermines the science of the Watershed Assessment [108] or Proposed Determination. Notably, even EPA, under a process it initiated to

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Tide Communications; Salmon Sisters; Salmon State; Southeast Alaska Conservation Council; Southeast Herring Conservation Association; United Cook Inlet Drift Association; United Fishermen of Alaska; and Wild Alaska Direct.

[105] *See* Environmental Protection Agency, News Release, EPA Administrator Scott Pruitt Suspends Withdrawal of Proposed Determination in Bristol Bay Watershed, Will Solicit Additional Comments, Jan. 26, 2018, https://www.epa.gov/newsreleases/epa-administrator-scott-pruitt-suspends-withdrawal-proposed-determination-bristol-bay (emphasis added) (previously provided as an attachment with Trustees for Alaska's scoping comments).

[106] *Id.*

[107] *Id.* (emphasis added).

[108] In response to requests from Northern Dynasty Minerals and a request from members of Congress, EPA's Office of Inspector General underwent a review "to determine whether the EPA conducted the assessment in a biased manner; predetermined the outcome; and followed policies and procedures for ecological risk assessment, peer review and information quality." *See* EPA, Office of Inspector General, *EPA's Bristol Bay Watershed Assessment: Obtainable Records Show EPA Followed Required Procedures Without Bias or Predetermination, but a Possible Misuse of Position Noted*, Jan. 13, 2016, https://www.epa.gov/sites/production/files/2016-01/documents/20160113-16-p-0082.pdf (included as an attachment to these comments). EPA concluded that "Based on available information, we found no evidence of bias in how the EPA conducted its assessment of the Bristol Bay watershed, or that the EPA predetermined the assessment outcome. We also found that the EPA's assessment appropriately included sections on the three primary phases discussed in the agency's ecological risk assessment guidelines. Further, the EPA met requirements for peer review, provided for public involvement throughout the peer review process, and followed procedures for reviewing and verifying the quality of information in

withdraw the Proposed Determination, did not make a single statement that any of the science found in the Watershed Assessment or Proposed Determination is unsound. The science stands and must be a part of the Corps' review.[109]

C. There Remains Widespread Opposition to This Project.

For more than a decade now, there has been constant and growing opposition to the proposed Pebble Mine. Bristol Bay residents oppose the mine, Alaskans oppose the mine, and millions of Americans have spoken up to oppose the mine. The Alaska Native tribes and communities of Bristol Bay have overwhelming opposed this project for years. In 2014, the voters of Alaska spoke clearly with a 65% majority passing a statewide initiative to protect the region's salmon from dangerous mining projects like Pebble.[110] Stakeholders who make up the $1.5 billion dollar commercial fishery have expressed concerns about the risk the mine poses to the fishery for years.[111] Sport fisherman from all over the world have expressed their opposition.[112] Bristol Bay businesses, operators, lodges, and guides that depend on the thriving fishery for their sport fish related enterprises have spoken out in opposition.[113] Businesses including Whole Foods, PCC

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the assessment before releasing it to the public." *Id.* at i; *see also* Ken Brouwer, President, Letter, PLP to Dennis McLerran, Regional Administrator, EPA, Apr. 29, 2014 (opposing EPA's initiation of the CWA Section 404(c) process) (included as an attachment to these comments). In response to the Inspector General's report, EPA Regional Administrator McLerran stated, "We're very pleased that at the end of the day they concluded that the science was done consistently with all of our guidance and procedures and requirements. . . . And we feel that the science that we've done up there is rock solid and this is an indication of that." Erica Martinson, *Federal Report Finds No Bias in EPA's Review of Potential Alaska Gold and Copper Mine*, Anchorage Daily News, May 31, 2016, https://www.adn.com/politics/article/federal-report-finds-no-bias-epas-review-potential-alaska-gold-and-copper-mine/2016/01/13/ (included as an attachment with these comments).

[109] *See infra* Section VI.Y.

[110] Timothy Cama, *Alaska Votes to Restrict Large Mine*, The Hill, Nov. 5, 2014. http://thehill.com/policy/energy-environment/223119-alaska-votes-to-restrict-large-mine (previously provided as an attachment with Trustees for Alaska's scoping comments).

[111] *See* Pacific Seafood Processors Association, Letter, to Shane McCoy, U.S. Army Corps of Engineers, Mar. 26, 2018 (previously provided as an attachment with Trustees for Alaska's scoping comments); National Fisheries Institute, Letter, to Shane McCoy, U.S. Army Corps of Engineers, Apr. 4, 2018 (previously provided as an attachment with Trustees for Alaska's scoping comments); Commercial Fishermen for Bristol Bay, Letter, to EPA Administrator McCarthy, Jan. 21, 2014 (previously provided as an attachment with Trustees for Alaska's scoping comments); Pacific Seafood Processors Association, *Position on the Pebble Mine Project*, Jan. 2014 (previously provided as an attachment with Trustees for Alaska's scoping comments); Food Marketing Institute, Letter, to EPA Regional Administrator McLerran, Mar. 1, 2012 (previously provided as an attachment with Trustees for Alaska's scoping comments).

[112] *See e.g.*, 1,102 hunting and angling organizations and businesses, Letter, to EPA Administrator McCarthy, Jan. 18, 2014 (previously provided as an attachment with Trustees for Alaska's scoping comments).

[113] *See e.g.*, 35 Bristol Bay lodge owners, guides, operators and business, Letter, to U.S. Army Corps Assistant Secretary R.D. James, June 19, 2018 (asking the Corps to suspend the NEPA

Community Markets, Seattle Restaurant Alliance, Coastal Transportation, Patagonia, Orvis, Leader Creek Fisheries, and more than 200 others have spoken out in opposition.[114] Jewelry retailers representing nearly $1 billion in sales have pledged support for permanent protections in Bristol Bay.[115] In 2014, EPA received "over 850,000 requests from citizens, tribes, Alaska Native corporations, commercial and sport fisherman, jewelry companies, seafood processors, restaurant owners, chefs, conservation organizations, members of the faith community, sport recreation business owners, elected officials and others asking EPA to take action to protect Bristol Bay."[116]

Continued widespread opposition has been evident during the scoping and DEIS public comment periods. In the summer of 2018, polling reflected that 80% of people in the Bristol Bay region oppose the mine.[117] At hearings during the DEIS comment period, 80% of testimony in Bristol Bay and Homer was against the mine. In Anchorage, 65% of the over 120 people who spent eight hours testifying opposed the mine. In Anchorage, over five hundred Alaskans gathered on a rainy weekday evening to rally against the mine, and the public hearing was cut off with dozens of angry people left waiting to testify. Polling in 2019 indicates that the majority of Alaskans oppose Pebble Mine.[118] As EPA's general counsel noted on a visit to the region in June

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process until Pebble provides more details and information to support its application and NEPA review) (previously provided as an attachment with Trustees for Alaska's scoping comments); 49 sportfishing lodge owners, guides, bear viewing outfitters, lodge operators, air taxi business owners and other organizations, Letter, to U.S. House of Representatives in support of Huffman Amendment (#90) to Minibus appropriations bill, June 17, 2019 (included as an attachment with these comments).

[114] *See* Businesses for Bristol Bay & Commercial Fisherman for Bristol Bay, News Release, *American Access to Wild Salmon on the Line as Risky Mining Project in Bristol Bay Advances through Federal Permitting*, Apr. 25, 2018 (included as an attachment with these comments).

[115] *See* Earthworks, News Release, *Jewelry Retailers' Opposition to Pebble Mine Gains Momentum*, Sept. 30, 2009 https://earthworks.org/media-releases/jewelry_retailers_opposition_to_pebble_mine_gains_momentum/ (previously provided as an attachment with Trustees for Alaska's scoping comments). The following jewelry businesses have expressed opposition to the Pebble Mine: Tiffany & Co.; Zale Corp.; Helzberg Diamonds; Ben Bridge; Jostens; Herff-Jones; Blue Nile; Goldsmiths; Mappin & Webb; Watches of Switzerland; Commemorative Brands; and Beaverbrooks.

[116] *See* Environmental Protection Agency, News Release, *EPA Moves to Protect Bristol Bay Fishery from Pebble Mine*, Feb. 28, 2014, https://archive.epa.gov/epapages/newsroom_archive/newsreleases/118c5b777db3be0785257c8d006637d0.html (previously provided as an attachment with Trustees for Alaska's scoping comments).

[117] *See* United Tribes of Bristol Bay, News Release, *Local Polling by Tribes Shows Regional Opposition to Pebble Mine*, July 19, 2018 (included as an attachment to these comments).

[118] *See* Everette Anderson, *Alaskans Remain Opposed to the Proposed Pebble Mine*, Anchorage Daily News, Apr. 28, 2019, https://www.adn.com/opinions/2019/04/28/alaskans-remain-opposed-to-the-proposed-pebble-mine/ (included as an attachment with these comments); *see also* Strategies 360, *A Survey of Registered Voters in the State of Alaska Conducted April 1–7, 2019*, https://www.bbnc.net/wp-content/uploads/2019/04/BBNC-Polling-Toplines.pdf (included as an attachment with these comments).

of 2019, "[i]t's important to hear people's views on all sides of the issue. . . . And here in Dillingham I can tell right away that people are opposed to the project."[119]

Despite this widespread opposition to the project, PLP and the Corps are proceeding at an unprecedented pace to complete the NEPA review. In addition, the Corps is ignoring the demands of the communities and individuals most likely to be impacted by this ill-conceived project.

Photo: Cristina Mittermeier. Viewing opportunities like this support a growing local bear viewing economy.

D. In Even its Smallest Form, the Proposed Pebble Mine Would Have Unacceptable Impacts to the Bristol Bay Fishery and Surrounding Region.

The Pebble Mine claim lies within the headwaters of the Nushagak and Kvichak watersheds, two of the world's largest sockeye salmon-producing rivers.[120] The mineral deposit is a "large, low-grade porphyry copper deposit (containing copper-, gold-, and molybdenum-bearing

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[119] Alex Hager, *EPA Officials Visit Dillingham to Gather Opinions on Pebble Mine*, Alaska Public Media, June 17, 2019, https://www.alaskapublic.org/2019/06/17/epa-officials-visit-dillingham-to-gather-opinions-on-pebble-mine/ (included as an attachment with these comments).

[120] Woody, Carol Ann & O'Neal, Sarah Louise, Dec. 2010, *Fish Surveys in Headwater Streams of the Nushagak and Kvichak River Drainages, Bristol Bay, Alaska, 2008-2010*, at 12 https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/alaska/sw/cpa/Documents/WON.2010.FSHS.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* Pebble Project POA-2017-271 Clean Water Act Section 404 Permit Application, Attachment D, Project Description (2018 Project Description) at 21 (Figure 2-1, *Mine Site Hydrology*, locating the mine site at the headwaters of the North and South Forks of the Koktuli watershed and adjacent to the Upper Talarik Creek watershed).

minerals) . . . ."[121] The current proposal is for a mine with a life of approximately 20 years. If permitted at the extremely limited scale currently proposed, the Pebble Project would mine 1.4 billions tons of material over the 20-year life of the mine.[122] The DEIS identifies that the 20-year mine, as proposed, would result in the following:

- direct permanent loss of 3,560 acres of wetlands and other water bodies;
- direct permanent loss of 81.1 miles of streams (73.2 miles of streams in the mine area and 7.9 miles of streams in the transportation corridor);
- direct temporary loss of 510 acres of wetlands; and
- potential indirect loss of 1,866 acres of wetlands.[123]

The reasonably foreseeable future expansion to develop the 78-year mine would increase the acres of wetlands and waters impacted by an estimated 12,445 acres.[124] The DEIS fails to quantify the miles of streams that would be directly or indirectly impacted by the 78-year mine expansion.

The 20-year mine proposal is a moving target. PLP continues to submit significant changes to its proposed project, even though the Environmental Impact Statement (EIS) process is well underway. Also, it is clear from public statements that the current proposal is a stalking horse, and that PLP intends to develop a significantly larger mine.

1. The Proposed Project is a moving target and the Corps must deem PLP's application incomplete.

The Notice of Intent to Prepare an EIS states that PLP is proposing to develop the porphyry deposit as an open-pit mine, with a project mine life of approximately 20 years.[125] The project includes several major components:

- An open pit that is 6,800 feet in length, 5,600 feet in width and 1,970 feet in depth;
- A bulk tailings impoundments that will hold approximately 1.14 billion tons of tailings;
- A lined pyritic tailings impoundment that will hold 155 million tons of acid-generating pyritic tailings and 50 million tons of potentially acid generating or metal leaching waste rock for at least the first 20 years, and beyond 78 years if the mine expands;
- An open pit overburden stockpile, a tailings storage facility overburden stockpile and growth medium stockpiles;
- Seven sediment ponds;
- Three seepage recycle ponds and two seepage collection systems;
- A mill facility processing approximately 180,821 tons of ore per day (66 million tons per year);

[121] PD at ES–2.
[122] *See* 2018 Project Description at 1; *see also* Technical Note.
[123] DEIS at ES–60 to ES–61.
[124] DEIS at ES–65.
[125] 83 Fed. Reg. at 13,483.

- A natural gas-fired power plant with a total connected load of 270 mega-watt (MW);
- A 188-mile natural gas pipeline across Cook Inlet and Iliamna Lake to the Mine Site;
- An 83-mile transportation corridor including a 30-mile road from the Mine Site to a ferry terminal on the north shore of Iliamna Lake, an 18-mile crossing with an ice-breaking ferry to a terminal on the south shore of Iliamna Lake, and a 35-mile road to the proposed Amakdedori Port on Cook Inlet; and
- A port facility and jetty with docking for lightering and supply barges. [126]

The proposed mine and related facilities would have a total footprint of approximately 5.9 square miles.[127]

However, 43 days into the 90-day scoping period, PLP provided the Corps with a *Technical Note on Updates to PLP's Proposed Project*.[128] PLP's Technical Note is a substantial amendment to the proposed project with significant changes. The scant five-page memorandum includes the following substantive changes:

- Total mined material increases from 1.2 billion tons to 1.5 billion tons (an increase of 25%);
- Tailings tonnages increase. For the pyritic tailings storage cell, the increase is from 135 million tons to 150 million tons. For the bulk tailings storage cell, the increase is from 950 million tons to 1,150 million tons;
- Pit dimensions increase and the pit outline changes in an unspecified manner;
- The location of the open pit water management pond moves to the south;
- The location of the lined pyritic tailings storage facility moves from the North Fork Koktuli West site to an unspecified North Fork Koktuli East site location;
- The powerplant capacity increases from 230MW to 270MW;
- Annual concentrate production increases cause a ~10% increase in road and marine traffic; and
- LNG pipeline size increases from 10-inch diameter to 12-inch diameter.[129]

Remarkably, PLP notified the Corps of these substantial changes but did not amend its application or revise its Project Description until months later. Similarly, despite changing the proposed project in substantial ways, PLP failed to provide sufficient details, schematics, diagrams, or other requisite information about the changes (similar to that previously provided in its original application) until January 2019.[130] PLP took more than half a year after submitting its Technical Note to submit an updated application confirming the changes it proposed in its Technical Note.

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[126] 2018 Project Description at 1–2 and Figs. 1–4, 1–5.
[127] *Id.*
[128] *See* Technical Note.
[129] *See* Technical Note.
[130] *See* Chambers, David M., June 13, 2018, Memorandum Re: Technical Note on Updates to PLP's Proposed Project, James Fueg, Pebble Limited Partnership, May 11, 2018 (previously provided as an attachment with Trustees for Alaska's scoping comments); see also Welker,

Since submitting its revised application, PLP has made additional substantive changes. After being unable to obtain a land lease and right-of-way for the Iliamna spur road, PLP has proposed a new route to connect Iliamna (and its existing road system) to the mine site.[131] In addition to rerouting the spur road, PLP has proposed a variant for the north terminal location.[132] PLP has proposed a second location at Eagle Bay as a technologically feasible and practical option.[133] The Eagle Bay terminal would require an access route from Eagle Bay to the mine site. PLP has not obtained or provided data regarding the newly proposed area. For example, PLP states

> As noted above, footprint impacts and impacts to wetlands for the alternatives cannot be accurately calculated yet. PLP will provide this information as soon as it is available. . . . PLP has begun work to produce an updated footprint for the Eagle Bay road and material sites that better reflects the requirements of this alternative and will substantially reduce its footprint. **Updated wetlands mapping is also not complete for the Eagle Bay route.** The revised impacts footprint comparison, including impacts to wetlands, will be provided once those updates are complete.[134]

Also, relevant fieldwork is currently ongoing. The data obtained through ongoing and future fieldwork is necessary to fully comprehend the environment that would be impacted by this project and, under an adequate NEPA process would help influence what options are on the table from alternatives, to variants, to measures that can avoid, minimize, or mitigate impacts. Alternatives, including variants, should be identified prior to releasing a DEIS for review. Survey work of the project area should be completed prior to preparing a DEIS, not during or subsequent to releasing the document. This survey work, as well as substantive changes to alternatives, is being conducted well after submission of PLP's revised application and publication of the DEIS, despite the fact that this information is critical to understanding the impacts of the project.

2. The Corps must require PLP to revise its application materials to reflect the actual size of the anticipated project.

Looking at the size of the deposit, Pebble is on a scale entirely of its own. According to Northern Dynasty Minerals, "Pebble is the world's largest <u>un</u>developed copper **and** gold resource."[135] Among the world's copper mines, Norther Dynasty Minerals lists the Pebble deposit

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Molly, June 18, 2018, Scoping Comments for the Pebble Project USACE Permit Application no. POA 2017-271 (Welker Scoping Comments, 2018) at 1 (noting that Pebble's significantly larger main Water Management Pond comes with no schematic drawings or details) (previously provided as an attachment with Trustees for Alaska's scoping comments). The only substantive details regarding the mine layout are found in RFI 032 and barely exceed two pages.

131 *See* RFI 112.

132 *Id.*

133 *Id.* at 4, 17.

134 *Id.* (emphasis added).

135 *See* The Pebble Partnership, *The Pebble Project, The Future of U.S. Mining & Metals, A Fresh Start*, June 2018, at 6 (emphasis in original).

as the 8th largest.[136] Northern Dynasty Minerals lists the Pebble deposit as the world's largest resource for precious metals.[137] While size alone does not determine impacts, it does play a critical role when looking at typical mine impacts. The proposed Pebble Mine is a low grade, high-volume copper mine.[138] The Pebble Mine's ore contains only scattered specks and tiny veins of copper mineralization: approximately 0.34% copper, 0.023% molybdenum, and 0.01 ounces of gold per ton.[139] Extracting one pound of Pebble's copper requires pulverizing and chemically processing 294 pounds of ore. As a result, the mine will produce an incredible amount of waste and tailings.[140] With more tailings, the typical problems and concerns associated with large hardrock mines are increased. For example, acid producing potential, scale of tailings failures, challenges associated with water management, potential impacts to water quality and quantity downstream, and impacts to the world class fishery are all exponentially exacerbated by what is reasonably foreseeable: an enormous mine.

The proposal for a mine with a 20-year lifespan is a thinly veiled attempt to portray the project as a smaller mine to reduce permitting requirements. The idea that the mine will operate for only 20 years is a fallacy and should be dismissed as an unviable alternative. It is implausible that any mining company would actually limit a mine at this location to 20 years and only 11% of the estimated resources. For several years, PLP and Northern Dynasty Minerals have consistently touted the extensive, 11 billion ton deposit. And even as PLP is in the middle of the permitting process for a 20 year mine, it continues to highlight the much-longer life span of this mine to potential investors at mining conferences.

Since at least 2004, PLP has been developing plans to exploit the Pebble deposit. PLP has made a variety of pronouncements regarding the manner in which the porphyry would be extracted and how the mine would handle and store the massive amounts of mine tailing waste. The sole remaining owner in PLP — Northern Dynasty Minerals — submitted plans to the U.S. Securities and Exchange Commission in 2011 that "outline[d] several stages of mine development, the smallest being a 2.0-billion-ton mine and the largest being a 6.5-billion-ton mine . . . . "[141] The 2.0 billion ton mine would take 28 years to extract; the 6.5 billion ton mine 78 years.[142]

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136 *Id.*
137 *Id.*
138 *See* Levit, Stuart & Chambers, David, 2012, *Comparison of the Pebble Mine with Other Alaska Large Hard Rock Mines*, Center for Science and Public Participation (Levit & Chambers), 2012) at 3 (previously provided as an attachment with Trustees for Alaska's scoping comments).
139 *Id.* (Calculated from resource information given in Table 21.1, "Technical Report on the 2009 Program and Update on Mineral Resources and Metallurgy Pebble Copper-Gold- Molybdenum Project Iliamna Lake Area Southwestern Alaska, U.S.A.," J. David Gaunt, et al., for Northern Dynasty Minerals Ltd, Mar. 17, 2010).
140 Lottermoser, Bernd. G, 2010, Mine Wastes, Third Edition, Characterization, Treatment, and Environmental Impacts at 205 http://kamceramics.com/wp-content/uploads/2017/02/Bernd_G._Lottermoser_Mine_Wastes_CharacterizatiBookZZ.org_.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
141 PD at ES–2.
142 *Id.*

PLP has also consistently touted the extensive size of the porphyry. The most recent example can be found in a Northern Dynasty Minerals presentation from June of 2019.[143] PLP reiterates under "Investment Highlights" that the Pebble deposit is a world class-Tier 1 resource, "among the world's greatest stores of mineral wealth" and "the world's most extensive mineral system."[144] PLP continues to state that the resource includes 6.5 billion tons of measured and indicated resources and 4.5 billion tons of inferred resources.[145] "The Pebble Project is thought to be the world's most significant undeveloped source of both gold and copper in the world. However, that doesn't even scratch the surface when it comes to the amount of material that could be in this mine."[146] PLP has also emphasized that the "exploration potential is high" and that "Pebble may host other major deposits."[147] Northern Dynasty Minerals's Pebble Project Overview webpage notes that "[t]he Pebble deposit is one of the greatest stores of mineral wealth ever discovered, and the world's largest undeveloped copper and gold resource. The Pebble Project's tonnes, grade, metallurgy and geometry have the potential to support a modern, long-life mine."[148] In a September 29, 2017 webcast presentation at the Denver Gold Forum, CEO Ron Thiessen noted that Pebble has "about 500 sq. miles of mineral titles" and that "the reality is this represents development for many years, perhaps centuries into the future and when you build the infrastructure in there and you've got a concentrator you can feed it forever."[149] And in January 2018, CEO Ron Thiessen stated

> Well, I don't know too many mines that start off at a scale and don't change over time. I mean, one of the things is, you know, today I can't stand up here and tell you after 20 years what will be the **next mining method**. Will it be open pit, will it be underground, will we want to expand the concentrator, will we want to put a

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[143] *See* The Pebble Partnership, *The Pebble Project, The Future of U.S. Mining & Metals, Advancing the Permitting Process*, June 2019, https://www.northerndynastyminerals.com/site/assets/files/4617/northern_dynasty_june_2019-web.pdf (included as an attachment to these comments); *see also The Pebble Project, The Future of U.S. Mining & Metals, A Fresh Start*, June 2018, at 3, http://wsw.com/webcast/dgf17/ndm.to/presentationDownload.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments); The Pebble Project, A Pathway to Permitting, Denver Gold Forum, Sept. 2017, The Pebble Partnership at 3, http://wsw.com/webcast/dgf17/ndm.to/presentationDownload.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

[144] *See* The Pebble Project, *The Future of U.S. Mining & Metals, Advancing the Permitting Process*, at 3, 26, and 28.

[145] *Id.* at 5 and 32.

[146] Joshua Rodriguez, *Northern Dynasty Minerals (NAK) Stock: The Good, The Bad, The Ugly!*, CNA Finance, June 11, 2018, https://cnafinance.com/northern-dynasty-minerals-nak-stock-the-good-the-bad-the-ugly/19625 (previously provided as an attachment with Trustees for Alaska's scoping comments).

[147] *See* The Pebble Project, *The Future of U.S. Mining & Metals, Advancing the Permitting Process*, at 36–37.

[148] *See* Northern Dynasty Minerals Pebble Project – Project Overview, http://www.northerndynastyminerals.com/pebble-project/project-overview/ (previously provided as an attachment with Trustees for Alaska's scoping comments).

[149] *See* The Pebble Project, *A Pathway to Permitting*, Denver Gold Forum, Sept. 2017.

> gold circuit in. . . . At 160,000 tons a day, **the resource that we have actually could last for 200 years.** I'll conclude with that.[150]

In a version of PLP's website from last fall, PLP confirmed that this is no small mine, stating "[w]e know that the Deposit is large enough, and rich enough, to sustain production for 20–25 years, and quite possibly operate for generations. . . . Our initial approach is for a 20–25-year mine. "[151] PLP reiterates this point, stating again on its website that "[o]ur *initial* approach is for a **20–25-year mine**. We believe it's possible that the project could extend for decades—**the Deposit may hold a century's worth of minerals**."[152] In Northern Dynasty Minerals's most recent *Management's Discussion and Analysis*, which accompanies its audited yearly financial statement, Northern Dynasty Minerals states "[t]he proposed project uses a portion of the currently estimated Pebble mineral resources. This does not preclude development of additional resources *in other phases of the project in the future*."[153]

Rather than placing this project on an expedited track for NEPA and CWA permitting, the Corps must deem the application incomplete. The Corps should (1) deny the current application and direct PLP to amend the application if it wishes to proceed with the project, (2) review any subsequent amended application for completeness, (3) initiate a new scoping period when there is a completed application, and then (4) prepare a revised DEIS, based on a complete, amended application. The Corps' failure to require a complete application and adequate baselines is a clear example of the hasty approach the Corps has taken in the review of this major project. If the Corps refuses to require a complete application, it nonetheless, must revise the DEIS given the numerous inadequacies in its review, as detailed below.

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150 *See* NDM Presentation by CEO Ron Thiessen at the Vancouver Resource Investment Conference, Jan. 22, 2018, https://www.youtube.com/watch?v=pBs1dnP_9eo at 28:14.

151 *See* The Pebble Partnership Plan, https://www.pebblepartnership.com/plan.html (as visited Oct. 2017) (previously provided as an attachment with Trustees for Alaska's scoping comments). The current webpage has replaced "20–25-year mine" with a "20 year mine," but continues to assert that the mine could "quite possibly operate for generations." The Pebble Partnership Plan, https://www.pebblepartnership.com/plan.html (as visited June 28, 2018) (previously provided as an attachment with Trustees for Alaska's scoping comments).

152 *See* The Pebble Partnership Plan, https://www.pebblepartnership.com/plan.html (as visited Oct. 2017) (emphasis in original) (previously provided as an attachment with Trustees for Alaska's scoping comments).

153 *See* NDM, Management's Discussions and Analysis, Consolidated Financial Statements: Year Ended December 31, 2018 at 8 (included as an attachment with these comments); *see also* NDM, Management's Discussions and Analysis, Consolidated Financial Statements: Year Ended December 31, 2017, Mar. 29, 2018, at 11 ("The project proposed as envisaged in the Project Description uses a portion of the currently estimated Pebble mineral resources. This does not preclude development of additional resources in other phases of the project in the future.") (emphasis added) (previously provided as an attachment with Trustees for Alaska's scoping comments).

II. LEGAL BACKGROUND

A. The National Environmental Policy Act

The purpose of the EIS is to "provide full and fair discussion of significant environmental impacts and [to] inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."[154] The EIS must provide a description of the underlying need and purpose to which the agency is responding in proposing the alternatives including the proposed action.[155] The EIS must succinctly describe the environment of the area(s) that will be affected by the project and alternatives.[156] The EIS must "[r]igorously explore and objectively evaluate all reasonable alternatives[.]"[157]

The alternatives requirement is "the heart" of the EIS.[158] To satisfy the alternatives requirement, the EIS must consider all reasonable alternatives to a given project, and it must rigorously explore and objectively evaluate those alternatives.[159] This consideration must "sharply defin[e] the issues" and "provid[e] a clear basis for choice among [the] options."[160] "An agency must look at every reasonable alternative" within the "nature and scope of the proposed action."[161] Whether the agency's "selection and discussion" of the alternatives "fosters informed decision-making and informed public participation" provides the "touchstone" for the Court's analysis of the sufficiency of alternatives considered by the agency.[162] Descriptions must be given for any alternatives eliminated from detailed study.[163] The EIS must include a discussion of the environmental consequences of the proposed action and alternatives, including the environmental impacts of each alternative, any adverse environmental effects that cannot be avoided if the proposal is implemented, and any irreversible and irretrievable commitments of resources.[164]

The EIS must address the direct and indirect, including cumulative, effects of the proposed project on the human environment, as well as means to mitigate adverse environmental impacts.[165] The effects and impacts to be analyzed include ecological, aesthetic, historical, cultural, economic, social, and health impacts.[166] Direct effects are those that are caused by the project and that occur in the same time and place.[167] Indirect effects are those that are somewhat

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[154] 40 C.F.R. § 1502.1.
[155] 40 C.F.R. § 1502.13.
[156] 40 C.F.R. § 1502.15.
[157] 40 C.F.R. § 1502.14.
[158] *Id.*
[159] 40 C.F.R. § 1502.14(a).
[160] *Id.*
[161] *Friends of Yosemite Valley v. Kempthorne*, 520 F.3d 1024, 1038 (9th Cir. 2008) (quoting *Alaska Wilderness Recreation & Tourism Ass'n v. Morrison*, 67 F.3d 723, 729 (9th Cir. 1995)).
[162] *California v. Block*, 690 F.2d 753, 767 (9th Cir. 1982).
[163] *Id.*
[164] 40 C.F.R. § 1502.16.
[165] 40 C.F.R. §§ 1502.16, 1508.25(c).
[166] 40 C.F.R. § 1508.8.
[167] 40 C.F.R. § 1508.8(a).

removed in time or distance from the project, but nonetheless reasonably foreseeable.[168] "Cumulative impact" is defined as:

> [T]he impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.[169]

"Cumulative actions" are those "which when viewed with other proposed actions have cumulatively significant impacts."[170] The proposal must be analyzed as it relates to other actions that are individually minor but collectively significant.[171] NEPA requires that the agency conduct analysis of environmental consequences "as soon as it can reasonably be done."[172]

The purpose of cumulative impacts review is to provide "useful analysis" so that significant cumulative effects can be minimized.[173] An agency must ensure that its cumulative impacts analysis is "more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects."[174] In considering cumulative impacts, an agency must provide "some quantified or detailed information; . . . [g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided."[175] The EIS must provide enough information concerning the impacts from cumulative actions to allow the decisionmaker to decide whether or how to allow the project to proceed.[176] A cumulative impacts analysis must not only identify the impacts of the proposed project and other past, present, and reasonably foreseeable future actions, but must also analyze the overall impact that can be expected from the accumulation of such individual impacts.[177] Simply adding together the effects on the resource value from each action may not provide an accurate picture of cumulative impacts.[178] There are cases in which the

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[168] 40 C.F.R. § 1508.8(b).
[169] 40 C.F.R. § 1508.7.
[170] 40 C.F.R. § 1508.25(a)(2).
[171] *See* 40 C.F.R. § 1508.27(b)(7).
[172] *Kern v. U.S. Bureau of Land Mgmt.*, 284 F.3d 1062, 1072 (9th Cir. 2002).
[173] *Id.* at 1075; Council on Environmental Quality, Considering Cumulative Impacts Under the National Environmental Policy Act, Jan. 1997 (CEQ Guidebook), https://ceq.doe.gov/publications/cumulative_effects.html at 45.
[174] *Ocean Advocates v. U.S. Army Corps of Engineers*, 402 F.3d 846, 868 (9th Cir. 2005); *Kern*, 284 F.3d at 1075; *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 810 (9th Cir. 1999).
[175] *Ocean Advocates*, 402 F.3d at 868 (*citing Neighbors of Cuddy Mountain v. U. S. Forest Serv.*, 137 F.3d 1372, 1379 (9th Cir. 1998)).
[176] *City of Carmel-by-the-Sea v. U.S. Dep't of Transp*., 123 F.3d 1142, 1160-1161 (9th Cir. 1997).
[177] *See* CEQ Guidebook at 41 (primary goal is to "determine the magnitude and significance of the environmental consequences of the proposed action in the context of the cumulative effects of other past, present, and future actions") (emphasis added).
[178] *Id.* at 42.

impacts of multiple actions taken together may be greater than the sum of each separate action.[179] For example, as impacts increase, the affected resource may experience exponential adverse effects if particularly sensitive.[180]

The EIS must also consider actions that are connected with, or closely related to, the project in question.[181] Actions are connected for the purpose of EIS analysis if they are automatically triggered by the proposed action, cannot or will not proceed without the proposed action, or, together with the proposed action, are interdependent parts of a larger action.[182] Connected and cumulative actions must be considered together to prevent an agency from "dividing a project into multiple 'actions,' each of which individually has an insignificant environmental impact, but which collectively have a substantial impact."[183]

An EIS must provide a "full and fair discussion of significant environmental impacts."[184] The environmental information made available to the public "must be of high quality."[185] "Accurate scientific analysis" proves "essential to implementing NEPA."[186] An EIS must clearly present information and analysis of the environmental consequences that form the scientific and analytic basis for consideration of reasonable alternatives.[187] NEPA requires an agency to ensure "scientific integrity" in the analyses contained in an EIS.[188] In so doing, the agency must identify the methodologies used, and must explicitly refer to the scientific and other sources of information relied upon for conclusions set forth in the EIS.[189] The agency must also discuss responsible opposing views.[190] At the same time, EISs should not be encyclopedic, but rather "concise, clear, and to the point, and . . . supported by evidence that agencies have made the necessary environmental analyses."[191] Impacts should be discussed in proportion to their significance, and "data and analyses in a statement shall be commensurate with the importance of the impact" of the proposed action or its alternatives.[192] The EIS must consider "both short- and long-term effects."[193] For the purpose of evaluating significant impacts in the EIS, if there is relevant information that is lacking and the information is "essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant," the information must be included in the EIS.[194] If obtaining the information is too costly or infeasible, the agency can

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179 *Id.*; *see Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt.*, 387 F.3d 989, 994 (9th Cir. 2004).
180 CEQ Guidebook at 42.
181 40 C.F.R. § 1508.25(a)(1).
182 *Id.*
183 *Thomas v. Peterson,* 753 F.2d 754, 758 (9th Cir. 1985).
184 40 C.F.R. § 1502.1.
185 40 C.F.R. § 1500.1(b).
186 *Id.*
187 40 C.F.R. §§ 1502.14, 1502.16.
188 40 C.F.R. § 1502.24.
189 *Id.*
190 40 C.F.R. § 1502.9(b).
191 40 C.F.R. §§ 1500.2(b), 1502.1.
192 40 C.F.R. §§ 1502.15, 1502.2.
193 40 C.F.R. § 1508.27(a).
194 40 C.F.R. § 1502.22(a).

forego its collection, in which case the agency must include in the EIS: (1) A statement that the information is incomplete or unavailable; (2) a statement of the relevance of the incomplete or unavailable information; (3) a summary of relevant "existing credible scientific evidence;" and (4) the agency's evaluation of impacts based on "theoretical approaches or research methods generally accepted in the scientific community."[195] Under NEPA's implementing regulations, a DEIS must be revised when the existing "draft statement is so inadequate as to preclude meaningful analysis."[196] In preparing the EIS and complying with NEPA, all agencies of the Federal Government shall "recognize the worldwide and long-range character of environmental problems."[197]

B. Section 404 of the Clean Water Act and the 404(b)(1) Guidelines

Congress enacted the CWA in 1972 to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."[198] The Act sets several goals, including attainment and preservation of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife . . . ."[199] To further its goals, the Act prohibits "discharge of any pollutant" into navigable waters except in accordance with the CWA terms.[200]

The Corps issues permits for the discharge of dredged or fill material pursuant to section 404 and subject to the Corps' and EPA's 404(b)(1) Guidelines (Guidelines).[201] Corps regulations governing the issuance of 404 permits declare that "[m]ost wetlands constitute a productive and valuable public resource, the unnecessary alteration or destruction of which should be discouraged as contrary to the public interest."[202]

The Guidelines impose important limitations on when a section 404 permit may be issued.[203] The Guidelines prohibit the permitting of any discharge of dredged or fill material: (1) if a practicable alternative to the proposed discharge would have less adverse impact on the aquatic ecosystem; (2) if the discharge will cause or contribute to significant degradation of the environment; (3) if the discharge will cause or contribute to violations of water quality standards; and (4) unless all appropriate steps have been taken to minimize potential adverse impacts.[204]

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[195] 40 C.F.R. § 1502.22(b).
[196] 40 C.F.R. § 1502.9(a).
[197] 42 U.S.C. § 4332(F).
[198] 33 U.S.C. § 1251(a).
[199] 33 U.S.C. § 1251(a)(2).
[200] 33 U.S.C. § 1311(a). The term "pollutant" encompasses not only chemical and biological materials but also, rock and sand. 33 U.S.C. § 1362(6). Pollutants are known as "fill material" when their discharge either replaces any portion of a water of the United States with dry land or changes the bottom elevation of a water body. *See* 33 C.F.R. § 323.2(e)(1); 40 C.F.R. § 232.2. The term "dredged material" means "material that is excavated or dredged from waters of the United States." 33 C.F.R. § 323.2(c); 40 C.F.R. § 232.2.
[201] 33 U.S.C. § 1344; 40 C.F.R. pt. 230.
[202] 33 C.F.R. § 320.4(b)(1); *see also id.* § 320.4(b)(2) (identifying eight types of wetland functions important to the public interest).
[203] 40 C.F.R. pt. 230.
[204] *Id.* § 230.10.

In addition, the Corps must also conduct a public interest review.[205] The Corps must follow these general criteria in evaluating every permit application: (1) the relative extent of the public and private need for the proposed structure or work; (2) where there are unresolved conflicts as to resource use, the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed structure or work; and (3) the extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work may have on the public and private uses to which the area is suited.[206] The Corps must consider twenty-one broad environmental areas as well as their cumulative impact in the public interest review, which include:

- conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, consideration of property ownership, and, in general, the needs and welfare of the people.[207]

The Corps must balance these areas and weigh the benefits likely to result from the proposed activity against the reasonably foreseeable disadvantages.[208] The Corps cannot authorize a discharge without "sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with [the section 404(b)(1)] Guidelines."[209]

III. THIS NEPA PROCESS IS INADEQUATE.

The Corps' NEPA review is fundamentally flawed. Richard Borden, a former mining environmental scientist and manager, with over 23 years working with the global mining company Rio Tinto, summarized his review of the DEIS by stating that

> the document and associated analysis is fatally flawed. The DEIS contains an unacceptable number of deficiencies, omissions and errors for such a large, complex project in an extremely sensitive environment. Due to the global significance of the salmon fishery, any EIS within the Bristol Bay watershed should be held to the highest standard, but the Pebble DEIS does not even meet industry standard practice. . . . Much of the analysis contains insufficient detail to determine if the planned actions are adequate or practicable; the DEIS commonly understates potential impacts; essential analyses and designs are deferred to the post-EIS permitting period; and in a number of significant instances, the conclusions are clearly wrong. . . . The DEIS was completed in less than half the time typical for other mining projects, so it is unsurprising that it bears many of

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205 *See generally* 33 C.F.R. § 320.4 (Corps must balance all factors in light of the public interest).
206 *Id.*
207 33 C.F.R. § 320.4(a)(1).
208 *Id.*
209 40 C.F.R. § 230.12(a)(3)(iv); *see* 33 C.F.R. §§ 320.2(f), 320.4(a)(1).

> the hallmarks of an overly rushed process.[210]

Dr. Daniel Schindler, a professor in the School of Aquatic Fisheries at the University of Washington who has worked in Bristol Bay for thirty years, notes that

> the DEIS is not a rigorous scientific assessment of the risks of the Pebble project . . . . Through a series of faulty assumptions and assessment approaches, the DEIS has arrived at the premature conclusion that there are no long-term substantial risks . . . to Bristol Bay ecosystems. This conclusion is not supported by the science that should be under consideration. It is undeniable, based on the data and information available, that the long-term risks of the Pebble project to the Nushagak and Kvichak watersheds are substantially higher than the DEIS has concluded.[211]

By failing to properly undertake a NEPA review, the Corps is not satisfying the intent or mandates of the CWA or NEPA. Given the incomplete application, lacking baseline data and information, acknowledged data gaps, and inadequate and rushed assessment,[212] the Corps should require PLP to amend its application and re-start the NEPA process at the scoping stage. At the very least, the Corps must revise the DEIS.[213]

A. The Scoping Process was Inadequate.

Federal agencies "must use scoping to engage State, local and tribal governments and the public in the early identification of concerns, potential impacts, relevant effects of past actions and possible alternative actions."[214] The Corps failed to pursue a meaningful scoping period by:

- Failing to hold scoping meetings in several cities and towns where affected communities and stakeholders reside;
- Failing to provide an open opportunity for public comment at some scoping meetings;
- Improperly determining that PLP's 404 application is complete;

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[210] Borden, 2019a at 1–2.
[211] Schindler, Daniel E., June 17, 2019, *Scientific Concerns About the Draft EIS for the Proposed Pebble Mine* (Schindler, 2019) (report and references included as attachments with these comments).
[212] *See infra* Section III.B, The Accelerated EIS Schedule Precludes Meaningful Public Participation, Analysis, and Assessment.
[213] *See* 40 C.F.R. § 1502.9(a) ("If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion."); *see also* Borden, Richard, June 18, 2019, *Subject: Pebble Mine Draft Environmental Impact Statement Summary Comments* (Borden, 2019b) at 2 (included as an attachment to these comments). ("Given the substantial flaws in the DEIS, I would strongly urge the Army Corps of Engineers to restart the process with an analysis based on an economically-credible mine plan, supported by an independent, rigorous economic analysis demonstrating that the project is the least environmentally damaging practicable alternative.").
[214] 43 C.F.R. § 46.235(a).

- Not requiring all existing and necessary baseline documents prior to scoping;
- Not requiring PLP to amend its application including its Project Description after PLP submitted its Technical Note; and
- Issuing a final Scoping Report that looked remarkably similar to the draft it released in the middle of the scoping comment period.

In correspondence with the Corps, cooperating agencies also expressed concerns regarding the scoping process. For example, in response to the revised scoping report, the Alaska Department of Fish and Game (ADF&G) expressed that they "had limited time to review the draft scoping report and based on the way comments were generalized, found it hard to tell if previously submitted state scoping comments were fully incorporated in the report."[215]

B. The Accelerated Schedule Precludes Meaningful Public Participation, Analysis, and Assessment.

The Corps' fast-track NEPA schedule sacrifices public process and the thorough type of analysis that NEPA requires. Cooperating agencies have expressed concern at the breakneck pace the Corps is pushing. And even Congress has weighed in, noting that "the [Corps] should not move forward with permitting the Pebble Mine — let alone fast-tracking it under the current schedule. The agency's EIS schedule seeks to expedite the NEPA process, estimating a final EIS and Record of Decision (ROD) by 2020."[216] On June 19, 2010, Congressman Huffman spoke on the floor of the House of Representatives to introduce an amendment to prohibit the Corps from proceeding with its flawed analysis.[217] Rep. Huffman stated

> the Federal permitting process for the Pebble Mine has been wholly insufficient. The rushed environmental review process has sparked wide-scale opposition from throughout the country. Fishermen, Tribes, sportsmen groups, businesses, conservation organizations, all of them have weighed in in opposition to this shoddy, wrongheaded Corps project.[218]

The FWS noted back in October 2018 that "[t]he [Corps] proposed an accelerated schedule for development of the EIS, anticipating a final EIS by the end of 2019, with a Record of Decision by April 2020."[219] A letter from 64 retired state and federal agency employees stated

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[215] *See* Kyle Moselle, Assoc. Dir., Email, DNR to Shane McCoy, U.S. Army Corps of Engineers, Aug. 08, 2018 (included as an attachment to these comments).
[216] 54 U.S. Members of Congress, Letter, to R.D. James, Assistant Secretary of the Army for Civil Works and Col. Phillip J. Borders, Commander, U.S. Army Corps of Engineers, Alaska Dist., June 11, 2019 (included as an attachment to these comments).
[217] *See* Cong. Rec. H4747, June 18, 2019 (included as an attachment to these comments).
[218] *Id.* Rep. Huffman offered Amendment No. 90 to H.R. 2740, Departments of Labor, Health and Human Services, and Education, and Related Agencies Appropriations Act, 2020, *see* https://www.congress.gov/bill/116th-congress/house-bill/2740. The amendment passed 233 to 201 on a bipartisan vote.
[219] Mary Colligan, Asst. Reg. Dir., Fisheries and Ecological Services, Letter, FWS to Shane McCoy, U.S. Army Corps of Engineers, October 1, 2018 (included as an attachment with these comments).

that "[w]e are quite familiar with the EIS process, and despite the recent request to add 30 days to the comment period, we believe the Pebble DEIS is being rushed through, without ample time for agency personnel or Alaskans to comment meaningfully on it."[220] Back in March, Borden noted that "[t]hese short time frames are unprecedented for such a large, complex mining project which will have unavoidable, material and long-term impacts to a sensitive globally significant ecosystem. I believe these short time lines will almost certainly compromise the technical rigor and reliability of the EIS outcomes."[221] Dr. Chambers, who has reviewed numerous EISs for mines in Alaska and elsewhere noted:

> The Draft EIS is clearly a time-driven document. I have a great deal of sympathy for the technical personnel at AECOM[222] who, on multiple occasions, asked for detailed information to assist in their reviews, only to be told by PLP that the requested information would be made available when applications were made for additional permits. This is not how the EIS process has worked in the past. EIS preparation has been a data-driven exercise, not a time-driven one. It is obvious that the message to those preparing the EIS was 'do what you can within the given time frame, and that will be sufficient.' That is obviously not the way to conduct a comprehensive and through review.[223]

The Corps provides an unreasonably short period of time for comments on the DEIS, meaningful review of those the comments, incorporating changes, responding to comments, and completing an FEIS. The Corps proposes to complete its review of comments and issue an FEIS in a matter of eight or so months.[224] This expedited NEPA review is counter to the purpose of NEPA. It will not result in a fully informed decision and will not allow for meaningful public participation or a thorough analysis of the impacts from the proposed project.

The purpose of an EIS is to "provide full and fair discussion of significant environmental impacts and [to] inform decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment."[225] This project poses significant impacts to the world's largest sockeye run and waters it depends on. The Project includes the destruction of approximately 3,560 acres of wetlands, indirect loss of 1,866 acres of wetlands, a temporary loss of 510 acres of wetlands, and the loss of 81 miles of streams.[226]

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[220] 64 Retired State and Federal Employees, Letter, to Senators Murkowski & Sullivan, Apr. 30, 2019 (included as an attachment with these comments).
[221] Borden, Richard, Mar. 4, 2019, *Subject: Pebble Project Environmental Impact Statement Schedule* (Borden, 2019c) at 1 (included as an attachment to these comments).
[222] AECOM is the third-party contractor preparing the DEIS for the Corps.
[223] *See* Chambers, David M., May 20, 2019, *Comments on the Pebble Draft Environmental Impact Statement*, Center for Science and Public Participation (Chambers, 2019) at 1 (report and references included as an attachment with these comments).
[224] *See* Pebble Project EIS Schedule, https://pebbleprojecteis.com/schedule (identifying a target date of early 2020 for the FEIS).
[225] 40 C.F.R. § 1502.1.
[226] *See* DEIS at ES–60 to ES–61.

The Council on Environmental Quality recognizes that "universal time limits for the entire NEPA process are too inflexible" and agencies should base timing for NEPA analyses as "appropriate to individual actions."[227] The Corps must consider input from a variety of federal, state and local agencies as well as tribes, and potentially affected communities and stakeholders and allow sufficient time to do so.

Under the proposed timeline there will not be sufficient time for consultation with affected tribal entities or input from all affected communities and stakeholders. Further, the hastened review and assessment will preclude PLP from gathering requisite data and information, including studies pertaining to the newly identified transportation corridor, port location, and power plant. In a rush to attempt to cure its data gap problems, PLP is still gathering data that is critical for a review of the project and alternatives.[228] This overly strict timeline limits the chance for multiple-year surveys that have yet to be conducted, but are needed to understand impacts to fish and wildlife populations and habitat, recreational use trends, economic impacts, adverse health impacts on local communities, and subsistence impacts inherent in this proposed project. For example, to fully understand the impacts to salmonids, it is necessary to have baseline studies over the entire life cycle of the affected salmonid populations (a period of at least five years). Yet PLP only identified the new transportation corridor in 2017 and conducted its first year of study in the affected transportation corridor in 2017.

C. The Draft EIS and Underlying Documents Lack Sufficient Detail.

Information must be included in an EIS where it is "essential to a reasoned choice among alternatives and the overall costs of obtaining it are not exorbitant."[229] This project is fatally flawed with an incomplete application, including a number of lacking plans, and inadequate baseline information. Despite the fact that this would be a massive mining project, PLP provided scant information in its permit application about the project design. Dr. Chambers, who has 40 years of experience in mineral exploration and development, notes,

> [t]he technical support provided for the Pebble Project Draft EIS is the weakest analysis of a major mining proposal I have seen in over 20 years. It is clearly inadequate in terms of comparison with other EIS documents for major mines, both in Alaska and nationally. As can be seen from my comments below, there are so many "we promise to do later statements that if an applicant is allowed to merely promise to do the detailed work at a later date, is it really worth doing an environmental assessment at all?[230]

The lack of substantive information in the permit application and supporting documents raises serious questions about PLP's ability to move forward with this project in an environmentally responsible manner.

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[227] 40 C.F.R. § 1501.8.
[228] *See infra* Section III.C.2.iv, PLP is still gathering data from the field.
[229] 40 C.F.R. § 1502.22(a).
[230] *See* Chambers, 2019 at 1.

The lack of adequate information precludes the Corps, cooperating agencies, and the public from meaningfully evaluating the potential impacts from the project such that the release of the DEIS was premature. Without a complete application and submission of the requisite information, the Corps' analysis cannot meet the requirements of NEPA and the CWA. The Corps is in no justifiable position to determine whether the project complies with the 404(b)(1) guidelines and is in the public interest. The data gaps reflect an incomplete analysis that precludes the Corps from taking the hard look required by NEPA, as it makes it impossible for the Corps to be fully informed and capable of truly considering the impacts. These data gaps are critical to a comprehensive and meaningful review. Providing the lacking information would shed necessary light on the full scope and scale of impacts from the project and potential alternatives.

The following examples illustrate the type of information that is currently lacking and precludes the Corps from preparing a legally sufficient DEIS.

1. The Corps cannot rely on permit stipulations that have yet to be developed or identified.

PLP will be required to obtain a number of state permits.[231] PLP has not yet submitted applications for these permits and approvals. This precludes meaningful review of the proposed project because the details required for many of these permits are not included in the DEIS.

For example, Alaska Pollution Discharge Elimination System (APDES) permits must contain effluent limitations for any discharged pollutants based on applicable technological standards (technology-based effluent limits), as well as any more stringent effluent limitations needed to ensure compliance with state water quality standards.[232] In addition, these permits contain monitoring and reporting requirements,[233] standard conditions,[234] and special conditions.

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[231] *See* DEIS App. E at E–15 to E–20.
[232] *Id.* at §§ 1311(b)(1)(A), 1311(b)(1)(C), 1312(a), 1314(b). Dischargers must meet water quality-based effluent limitations if they release pollution that may contribute to, cause, or have the reasonable potential to cause violations of water quality standards. *Id.* at §§ 1311(b)(1)(C), 1312(a), 1313(e)(3)(A); 40 C.F.R. § 122.44(d).
[233] Permittees are required to monitor their own discharges and report the results of their monitoring in Discharge Monitoring Reports (DMRs) submitted to EPA. 40 C.F.R. § 122.41(1)(4). The APDES permit identifies the pollutant parameters that must be analyzed, the place where sampling must be conducted, the frequency of sampling, the type of samples that must be taken, the method to be used to analyze the samples, and the frequency of reporting.
[234] 40 C.F.R. § 122.41–42 sets forth "boiler-plate" conditions that must be included in all NPDES permits including: (1) an express duty to minimize or prevent any permit violation that has a reasonable likelihood of adversely affecting human health or the environment; (2) a duty to properly operate and maintain the facility and its treatment equipment; (3) a duty to allow the permitting authority to enter and inspect the premises, take samples, and have access to records; (4) a requirement to report planned changes to the facility, anticipated noncompliance, and transfers to new owners or operators; (5) a prohibition on bypassing any portion of the treatment facilities unless necessary for essential maintenance; and (6) a provision authorizing a permittee to raise as an affirmative defense to a permit violation the occurrence of an upset, if the reporting conditions of 40 C.F.R. § 122.44(n) are met.

To obtain an APDES permit, PLP must provide the location of outfalls, identification of receiving waters, the sources of pollution and treatment technologies.[235] In addition to providing effluent characteristics for those pollutants or parameters identified in 18 AAC 83.135(b),[236] the applicant must provide the estimated daily maximum, daily average and source of that information for each outfall for all the conventional and nonconventional pollutants in Table IV of Appendix D to 40 C.F.R. Part 122, adopted by reference in 18 AAC 83.010, as well as those identified in 18 AAC 83.360(b)(3), if the applicant knows or has reason to believe any of the pollutants will be present.[237] PLP has not yet submitted an APDES application, and has failed to provide information about the amount of waste water PLP intends to discharge, how much of that discharge will go to each outfall, and whether PLP will meet existing water quality standards or seek a waiver through establishment of site-specific criteria.[238]

The DEIS also pushes off any serious effort to analyze the risk of seismic hazards, stating that such matters will be analyzed in the Alaska Dam Safety Program process:

> Estimates of horizontal and vertical displacement for mine site embankments would be analyzed further for current embankment designs during future seismic analysis as part of the detailed design work undertaken in fulfillment of the [Alaska Dam Safety Program] review process. That work is anticipated to be performed after the EIS is complete.[239]

These are not isolated examples. The list of required state permits that PLP has yet to apply for includes:

- Alaska Solid Waste Program Integrated Waste Management Permit (Alaska Department of Environmental Conservation (DEC));
- Alaska Solid Waste Program Solid Waste Disposal Permit (DEC);
- Clean Air Act Air Quality control Permit to Construct and Operate — Prevention of Significant Deterioration (DEC);
- Clean Air Act Title V Operating Permit (DEC);
- CWA Section 402 APDES Permit (DEC);
- CWA Section 402 Stormwater Permit (DEC);
- CWA Section 401 Certificate (DEC);
- Oil Discharge Prevention and Contingency Plan (DEC);
- Fish Habitat Permit (ADF&G);

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[235] 18 AAC 83.360(a).
[236] 18 AAC 83.315(b) requires dischargers to include quantitative data for the following pollutants or parameters: biochemical demand, total suspended solids, and oil and grease, among others.
[237] 18 AAC 83.360(b)(2)–(3).
[238] *See* DEIS at 4.18–8 ("Water quality of discharge from the open pit [water treatment plant] is the subject of ongoing engineering analysis."); 2-36 ("Modifications might be required to address the process requirements for the long-term water treatment from the open pit."); 2-37 ("Water quality would be closely monitored, and changes and adjustments to the treatment process would be made as needed.").
[239] DEIS at Appendix K, Section 4.15.

- State land leases including a Tidelands Lease, Upland Mining Lease (Alaska Department of Natural Resources (DNR));
- Miscellaneous Land Use Permit (DNR);
- Rights-of-Way Leases (DNR);
- Utility permits (Alaska Department of Transportation and Public Facilities);
- Temporary Water Use Authorizations and Water Rights Authorizations (DNR);
- Alaska Dam Safety Program Certificates to Construct and Operate a Dam (DNR);
- Plan of Operations Approval (DNR);
- Reclamation Plan Approval (DNR); and
- Bonding Approval (DNR).

Despite the fact that PLP has yet to file these applications, the DEIS relies on yet to be issued permit stipulations for these yet to be applied for state permits. For example, the DEIS asserts that impacts would be mitigated because "ADF&G Fish Habitat Permit stipulations would be designed to minimize impacts to all life stages, including eggs, juveniles, and adults."[240] And that "permit stipulations *may include* season restrictions on instream activities to avoid impacts to habitat during species critical life stages (e.g. spawning and egg development)."[241] Or that "ADF&G permit conditions (if issued) would likely stipulate timing windows for construction to avoid impacting migrating anadromous fish in Cook Inlet."[242]

The DEIS cannot rely upon yet unknown stipulations as support for findings that the project will not have significant impacts or that impacts will be adequately mitigated. "Implicit in NEPA's demand that an agency prepare a detailed statement on 'any adverse environmental effects which cannot be avoided should the proposal be implemented,' is an understanding that the EIS will discuss the extent to which such adverse effects can be avoided."[243] Accordingly, an EIS must discuss appropriate mitigation measures.[244] Those measures "must be discussed in sufficient detail to ensure that environmental consequences have been fairly evaluated."[245] Simply identifying mitigation measures, without analyzing their effectiveness, violates NEPA. Rather, an "essential component of a reasonably complete mitigation discussion" must include "an assessment of whether the proposed mitigation measures can be effective."[246] In addition, the

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[240] DEIS at 4.24–6.
[241] DEIS at 4.24–22; *see also* DEIS at 4.23–6 (similar assessment for bridge crossings).
[242] DEIS at 4.24-23.
[243] *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 351–52 (1989) (quoting 42 U.S.C. § 4322(2)(C)(ii)).
[244] *See* 40 C.F.R. §§ 1502.14(f), 1502.16(h), 1508.25(b). 40 C.F.R. § 1508.20 defines mitigation to include: (1) Avoiding the impact altogether by not taking a certain action or parts of an action; (2) Minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) Rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and (5) Compensating for the impact by replacing or providing substitute resources or environments.
[245] *Neighbors of Cuddy Mountain v. U.S. Forest Serv.*, 137 F.3d 1372, 1380 (9th Cir. 1998) (quotations and citation omitted).
[246] S. Fork Band Council of W. Shoshone of Nevada v. U.S. Dep't of Interior, 588 F.3d 718, 727 (9th Cir. 2009).

"possibility of mitigation" should not be relied upon to avoid further environmental analysis.[247] In sum, if the DEIS wants to assess mitigation of impacts from Best Management Practices or permit stipulations, it needs to have actual measures and stipulations to assess. It does not.

2. Extensive data gaps preclude the Corps from satisfying its statutory mandates.

A primary purpose of NEPA is to obviate the need for speculation by ensuring that available data is gathered and analyzed prior to implementing the proposed action.[248] To achieve this purpose, NEPA requires agencies to make reasonable attempts to obtain information necessary to fulfill their statutory responsibilities.[249] This includes the requirement that federal agencies provide missing information unless the costs of doing so are exorbitant.[250] In the face of scientific uncertainty, the Corps must: disclose the scientific uncertainty; complete independent research and gather information if no adequate information exists (unless the costs are exorbitant or the means of obtaining the information are not known); and evaluate the potential, reasonably foreseeable impacts in the absence of relevant information. In addition, stale or outdated information is insufficient for a NEPA hard look or cumulative impacts analysis.[251]

The Corps' analysis under NEPA and the CWA suffers from significant data gaps. Some of the concerns regarding baseline analysis were raised several years ago but have not been adequately addressed.[252] The Corps errs by releasing a DEIS when critical information has not

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[247] Council on Environmental Quality, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, Mar. 23, 1981; see also Davis v. Mineta, 302 F.3d 1104, 1125 (10th Cir. 2002).
[248] *See* National Parks Conservation Ass'n v. Babbitt, 241 F.3d 722 (9th Cir. 2001).
[249] *Birckhead v. Fed. Energy Regulatory Comm'n*, No. 18-1218, 2019 WL 2344836, at *5 (D.C. Cir. June 4, 2019) (*citing Delaware Riverkeeper Network v. Fed. Energy Regulatory Comm'n*, 753 F.3d 1304, 1310 ("While the statute does not demand forecasting that is not meaningfully possible, an agency must fulfill its duties to the fullest extent possible."); *Barnes v. U.S. Dep't of Transp.*, 655 F.3d 1124, 1136 (9th Cir. 2011) ("While foreseeing the unforeseeable is not required, an agency must use its best efforts to find out all that it reasonably can.").
[250] 40 C.F.R. § 1502.22.
[251] *Lands Council v. Powell*, 395 F.3d 1019, 1031 (9th Cir. 2005) ("[L]ack of up-to-date evidence on this relevant question prevented the Forest Service from making an accurate cumulative impact assessment of the Project on the habitat and population of the Westslope Cutthroat Trout" (*citing Seattle Audubon Soc'y v. Espy,* 998 F.2d 699, 704–05 (9th Cir.1993) (overturning an agency decision when it rested on "stale scientific evidence")). *See also N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1086–87 (9th Cir. 2011) ("In summary, the Board relied on stale data during the environment impact analysis process of TRRC III and failed to properly update the data with additional studies and surveys. We hold that such faulty reliance does not constitute the 'hard look' required under NEPA.").
[252] *See e.g.*, Woody, Carol Ann, June 25, 2012, *Assessing Reliability of Pebble Limited Partnership's Salmon Escapement Studies*, Fisheries Research and Consulting (Dr. Woody found a lack of data to determine salmon escapement) (included as an attachment with these comments); Parasiewicz, Piotr, June 2012, *A Review of PLP Environmental Baseline Documents: Instream and Off-Channel Habitat Distribution and Modeling*, Rushing Rivers, Inc. (Dr. Parasiewicz found

the instream and off-channel habitat distribution and modeling inaccurate and inappropriate) (included as an attachment with these comments); Higman, Bretwood, 2012, *Critique of Pebble Limited Partnership's Seismic Hazard Assessmen*t, Ground Truth Trekking (Dr. Higman found the seismic hazard assessment severely flawed) (included as an attachment with these comments); Stratus Consulting, May 25, 2012, *Review of Pebble Limited Partnership's (PLP's) Environmental Baseline Document (EBD): Hydrologic Characterization* (Stratus Consulting found that there was insufficient hydrologic data to determine potential impacts on downstream waters) (included as an attachment with these comments); Zamzow, Kendra, May 2012, *A Review of PLP Environmental Baseline Documents: Water Quality*, Center for Science in Public Participation (Dr. Zamzow found the quality of surface water and groundwater sampling to be unreliable and unrepeatable) (included as an attachment with these comments); Stratus Consulting, May 18, 2012, *Review of Pebble Limited Partnership's Environmental Baseline Document (EBD): Geochemical Characterization* (Stratus Consulting found that the geochemical characterization was not representative of the deposit as a whole) (included as an attachment with these comments); O'Neal, Sarah, Apr. 2012, *A Review of PLP Environmental Baseline Documents: Resident Fish and Juvenile Salmon Habitat, Distribution and Assemblage*, Fisheries Research and Consulting (Ms. O'Neal found that the fisheries studies were "unrepeatable, uninterpretable, and useless for detecting future changes") (included as an attachment with these comments); O'Neal, Sarah, Apr. 2012, *A Review of PLP Environmental Baseline Documents: Aquatic Macroinvertebrates (Bristol Bay Drainages)*, Fisheries Research and Consulting (Ms. O'Neal also found that the studies for aquatic macroinvertebrates was likely insufficient and inaccurate) (included as an attachment with these comments); Wobus, Cameron et al., Oct. 8, 2012, *Potential Hydrologic and Water Quality Alteration from Large-scale Mining of the Pebble Deposit in Bristol Bay, Alaska: Results from an Integrated Hydrologic Model of a Preliminary Mine Design*, prepared for The Nature Conservancy (Dr. Wobus found that streamflows could decrease 60% and quality could be effected within days of a system failure) (included as an attachment with these comments); Environmental Protection Agency, *Final Peer Review Summary Report: External Peer Review of Wobus et al. Potential Hydrologic and Water Quality Alteration from Large-scale Mining of the Pebble Deposit in Bristol Bay, Alaska*, Nov. 2, 2012 (included as an attachment with these comments); Chambers, David M. & Higman, Bretwood, Oct. 2011, *Long Term Risks of Tailings Dam Failure* (previously provided as an attachment with Trustees for Alaska's scoping comments) and Levit & Chambers, 2012 (Reports have concluded that there is a high risk of tailings dam failure); Environmental Protection Agency, *Final Peer Review Summary Report: External Peer Review of Chambers and Higman 2011(Long Term Risks of Tailing Dam Failure) and Levit and Chambers 2012 (Comparison of the Pebble Mine with other Alaska Large Hard Rock Mines)*, Dec. 30, 2012 (included as an attachment with these comments); Environmental Protection Agency, Nov. 15, 2012, *Final Peer Review Summary Report: External Peer Review of Kuipers et al. 2006 (Comparison of Predicted and Actual Water Quality at Hardrock Mines) and Earthworks 2012 (U.S. Copper Porphyry Mines Report)*, Nov. 15, 2012 (included as an attachment with these comments); Kuipers, James et al., 2006, *Comparison of Predicted and Actual Water Quality at Hardrock Mines: The Reliability of Predictions in Environmental Impact Statements*, Kuipers & Associates and Buka Environmental (Kuipers, 2006) (included as an attachment with these comments); Earthworks, 2012, *U.S. Copper Porphyry Mines: The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures and Water Collection and Treatment Failures* (Earthworks, 2012) (studies on the predicted and actual water quality at mines) (previously provided as an attachment been provided by the applicant. Without this information, the Corps cannot satisfy its statutory mandates to:

- take a hard look at direct, indirect, and cumulative impacts;
- provide a quantified and detailed assessment of cumulative impacts;
- ensure the alternatives are reasonable and practicable;
- ensure the project has taken all possible steps to avoid, minimize, and mitigate impacts;
- determine whether the project is likely to cause or contribute to significant degradation;
- assess whether the project is likely to cause or contribute to water quality violations; and
- evaluate whether the project is in the public interest.

Specifically, project details and designs are lacking, the environmental baseline documents contain outdated, stale, or insufficient information, RFI are incomplete, and PLP is still gathering data from the field that should be included in the analysis of the project. These significant data gaps increase the uncertainty surrounding potential impacts of the project and prevent the Corps from complying with its statutory duties.

The large majority of the data gaps will not be resolved until long after the close of the comment period on the DEIS. As a result, the public will never have the opportunity to comment on this critical and relevant new information, in violation of NEPA.

i. Project details and designs are lacking.

PLP has failed to provide sufficient information with its application to support a thorough analysis under NEPA and the CWA. The following are key documents, plans, or designs that are either incomplete, conceptual, or non-existent at this time:

- compensatory mitigation plan that includes actual mitigation measures;[253]
- functional assessment of wetlands and streams;[254]
- economic feasibility analysis;[255]

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with Trustees for Alaska's scoping comments); Woody, Carol Ann & O'Neal, Sarah Louise, Dec. 2010, *Fish Surveys in Headwater Streams of the Nushagak and Kvichak River Drainages, Bristol Bay, Alaska, 2008 – 2010*; and Woody, Carol Ann & Higman, Bretwood, July 10, 2011, *Groundwater as Essential Salmon Habitat In Nushagak and Kvichak River Headwaters: Issues Relative to Mining* (fish survey and salmon habitat studies that found that the area has hundreds of unstudied streams that could provide a major source of salmon habitat) (included as an attachment with these comments).

[253] *See infra* Section VIII.E.2, PLP has only proposed conceptual compensatory mitigation measures.

[254] *See infra* Section VIII.E.3, PLP has not assessed the functions and services of potentially impacted wetlands.

[255] *See infra* Section III.C.3, PLP has failed to prepare an up-to-date preliminary economic assessment, pre-feasibility, or feasibility study.

- post-closure reclamation plan;[256]
- financial assurances or bonding;[257]
- geotechnical data, seismic analysis, and drain engineering for the tailings dams;
- health impact assessment;[258]
- bench or pilot testing of the water treatment system;
- aquatic resources monitoring plan;[259]
- fugitive dust control plan;[260]
- wildlife management plan;[261]
- waste management plan;[262] and
- water management plan.[263]

As one court noted, "[w]here an EIS fails to contain a detailed mitigation plan, the agency fails to meet its touchstone obligation of fostering informed decisionmaking *and* informed public

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[256] *See* DEIS at 3.1-8 to 3.1-9. In comments submitted on the DEIS, Borden noted that "[c]losure strategies and commitments are key components of mining Environmental Impact Statements because significant post-operational impacts and risks may persist for centuries after a relatively brief mine life. For this reason, it is common practice for mining projects to complete a Reclamation and Closure Plan during the EIS process. A review of several mining Environmental Impact Statements completed over the past three years shows that five out of six had released closure plans before the EIS was completed. The Donlin Gold Project in particular completed a 458-page Reclamation and Closure Plan with a detailed cost estimate during its EIS process, which was led by the Army Corps of Engineers." Borden, Richard, May 31, 2019, *Subject: Pebble Mine Draft EIS Comments on Reclamation and Closure* (Borden, 2019d) at 1 (included as an attachment with these comments).

[257] *See infra* Section VI.Q, Reclamation, Post-Closure Monitoring, Long-Term Management, and Financial Assurances.

[258] *See* DEIS at 3.10-3; *infra* Section VI.K, Public Health.

[259] *See* DEIS at 5-9 ("An Aquatic Resource Monitoring Plan would be developed for the project . . . . as part of the plans of operation during state permitting.").

[260] *See* DEIS at 4.18-11 ("PLP is developing a fugitive dust control plan for mitigation and control of fugitive dust and wind erosion related to project activities.").

[261] *See* DEIS at 4.23-3 ("PLP's proposed mitigation incorporated into the project includes development of a Wildlife Management Plan. The plan would be developed for the project prior to commencement of construction."). There is a significant lack of analysis regarding brown bears. The DEIS does not: (a) cite to recent bear literature, (b) synthesize the literature, (c) include periodic population estimates, or (d) include data on landscape-use patterns. *See* Suring, Lowell H., April 2019, *The Pebble Project and McNeil River Brown Bears*, Northern Ecological LLC, Tech. Bulletin 2019-1 (Suring, 2019) at 16 (report and its references are included as attachments to these comments).

[262] DEIS at 5-25 to 5-26 ("For examples, plans prepared to support the state permitting process, such as a . . . Integrated Waste Management Plan . . . would identify specific monitoring requirements and/or the requirement for the development of a monitoring plan specific to that approval.").

[263] DEIS at 2-31 ("A mine site water management plan is essential to understanding fresh water and mine process water requirements . . . . Additional detail would be developed and included in updates to these plans as the project proceeds through the state permitting process.").

participation."[264] The same holds true whether it is a mitigation plan, or other substantive plan pertaining to the project and the ways in which it will avoid, minimize, or otherwise address impacts.

The Corps is attempting to address some of these omissions through RFI, as discussed below in Section III.C.2.iii. But this information will not be provided prior to the close of the DEIS comment period for public review, and the Corps has not even requested information on several of the missing items yet.

The DEIS fails to address a number of outstanding questions regarding the design, construction, and operation of the proposed project. This precludes a substantive review. The following sections highlight only some of the missing information.

a. Mine Site and Facilities

Regarding the mine site and its facilities, the DEIS notes on several occasions that either information will be furnished at a later time or that, because there is lacking information, impacts cannot be fully assessed. For example, the DEIS states that "final engineering designs and construction and operations plans are finalized during the successive state permitting phase."[265] If the project is going to be modified after the Corps reviews the current designs, any modifications to the design need to be assessed by the Corps through a subsequent revised DEIS.

Also, the DEIS notes that "[t]he current level of embankment design for the proposed project is at a very early phase, considered a conceptual phase. Site investigation and engineering plans are still ongoing. The [Alaska Dam Safety Program] would require additional risk assessment prior to issuing a *Certificate of Approval to Construct a Dam* (ADNR 2017a)."[266] Conceptual designs of the embankment preclude a meaningful review by the Corps.

Regarding the bulk tailings storage facility, "[l]ocations, alignments, configurations, sizes, capacities, and other details of the underdrains would be developed following more detailed site-specific geotechnical and geological investigations and observations made during the preliminary and detailed designs, in accordance with the Alaska Dam Safety Program guidelines."[267] How can the DEIS possibly assess impacts of this project if the bulk tailings storage facility may be moved, realigned, reconfigured, or changed in other dramatic ways after the DEIS is issued? This is particularly egregious where the bulk tailings facility "will be among the tallest tailings storage facilities on Earth and will almost certainly be taller than 99% of the tailings impoundments constructed to date."[268]

The DEIS notes that "[p]reliminary testing of quarried material was completed in 2018 and confirmed suitability of the material. . . . Further detail would need to be developed in support of state permitting and the Reclamation Plan Approval requirements, and Closure Cost Estimate

[264] *Friends of the Earth v. Hall*, 693 F. Supp. 904, 939 (W.D. Wash. 1988) (emphasis in original).
[265] DEIS at 5–5.
[266] DEIS at 4.27–71.
[267] DEIS at 2–22.
[268] Borden, Richard, May 13, 2019, *Pebble Mine Draft EIS Comments on Geotechnical and Spill Risks* (Borden, 2019e) (included as an attachment with these comments).

and bonding requirements."[269] For the reasons identified above in Section III.C.1, absence of state permits, and the requisite information to support review of those permits, prevents the Corps from fully understanding the project design and its anticipated impacts.

Water management is an incredibly important issue in evaluating impacts from mines.[270] As the DEIS notes:

> A mine site water management plan is essential to understanding fresh water and mine process water requirements in relation to natural runoff timing and open pit dewatering requirements; to design water management and treatment systems; and to minimize the potential for an uncontrolled discharge of untreated contact or tailings water. Pebble has developed mine site management plans for operations (Knight Piésold 2018a) and closure (Knight Piésold 2018d) to support the NEPA analysis. Additional detail would be developed and included in updates to these plans as the project proceeds through the state permitting process."[271]

Any additional details that are a requisite for state permits must also be a requisite for the Corps to conduct a hard look analysis. As such information becomes available, any associated changes or revelations regarding impacts that were not sufficiently assessed would render this DEIS inadequate.

In some cases, the DEIS identifies things that "could" happen. Because there is so little data about this project, the DEIS guesses at possible outcomes. For example, "[s]ome of the seepage from the bulk [tailings storage facility] tailings that enters shallow groundwater beneath the tailings *would be expected* to flow laterally and report to the [seepage collection pond]. Seepage water could also flow vertically downwards into deeper bedrock fractures."[272] The fact that seepage could flow into bedrock requires the Corps to gather requisite information about how water is being managed and where it is going so it can evaluate the actual impacts of anticipated seepage. At this time, the likelihood of this outcome is unclear.

The DEIS also fails to require mine details that allow the Corps to meaningfully evaluate how and to what effect PLP will control wastewater. For example, the DEIS states:

> Based on the current mine plan, it is possible that gaps exist along the main [water management pond] embankment that would allow potentially affected groundwater to flow through areas where wells are limited (e.g., along the southwestern side of the embankment; see Section 4.16, Surface Water Hydrology, Figure 4.16-1). As discussed in the EIS-Phase [Failures Modes and Effects Analysis], the final location and spacing of pump-back wells would be determined based on additional hydrogeologic investigation as design progresses,

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[269] DEIS at 2–18.
[270] *See e.g., infra* Sections VI.B, Water Quality, VI.C, Hydrologic Analysis, Water Balance and Water Management, VI.M, Tailings Storage Facility Failures, and VI.N, Acid Rock Mine Drainage.
[271] DEIS at 2–31.
[272] DEIS at 4.17–14 (emphasis added).

to minimize the likelihood of this occurrence.[273]

Having the requisite information regarding the embankments, groundwater flow, and pump-back well placement is critical to assessing potential impacts from wastewater.

b. Transportation Corridor and Port

The details for the transportation corridor and port are equally lacking. For example, "[a]s with the sheet-pile dock, detailed engineering analysis has not been completed in support of initial design."[274] As discussed below, sheet-pile design can significantly impact on belugas. Failure to have sufficient design elements at this stage precludes a meaningful review.

PLP's survey work is so lacking, and its design work so conceptual, that it cannot even tell the Corps how many water crossings are involved in their proposed design: "[t]he Alternative 1 design currently estimates 86 culverts; of these, 41 would be designed as fish passage culverts. *The exact number and design of waterbody crossings would be determined during final design and permitting*."[275] And PLP has not even bothered to study the "[g]roundwater/surface water interactions . . . in the transportation corridor or at port sites."[276]

The Corps asserts that "[t]he evaluation of impacts from construction of roads, bridges, culverts, and pipelines on surface water hydrology is *based on an understanding of planned mitigation in the form of engineering design, and the planned maintenance* that can also significantly reduce impacts."[277] Yet the current designs are conceptual at best and PLP hasn't offered any meaningful details about how it will maintain the transportation corridor.

This lack of information has forced the Corps to evaluate impacts based on what a "typical road" might look like: "[a]lthough *a final design has not been completed*, a typical road section is presented in Figure 2-16."[278] But the Corps must analyze this project's planned roads, not a "typical road," which is itself undefined. The analysis of bridges is likewise lacking: "[a]lthough *specific bridge design details would vary* with stream size and hydrologic properties, a typical bridge schematic is presented on Figure 2-17."[279] The DEIS cannot average out impacts from bridges based on what a typical design may be. It must look at actual bridge designs for this project. This is not the kind of information that is too expensive to obtain or otherwise not required for an adequate NEPA review — the only reason it is missing from the DEIS is because PLP has failed to submit a complete application. The information will be available before PLP can build the bridges, it is affordable (assuming the project is affordable) and attainable, and should be provided for review in the DEIS.

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[273] DEIS at 4.18–15.
[274] DEIS at 4.15–14.
[275] DEIS at 2–42 (emphasis added).
[276] DEIS at 3.17–25.
[277] DEIS at 4.16-26 (emphasis added).
[278] *Id.*
[279] DEIS at 4.16–27 (emphasis added).

The failure to include these design details is not inconsequential. The analysis in the DEIS currently estimates the severity of anticipated impacts on whether the design is good or bad. But with no actual designs, the DEIS makes unsupported assumptions. For example, "*[i]f not properly designed,* constructed, and maintained, culverts and bridges could constrict natural streamflow enough to significantly increase the water velocity at the downstream end of the structure."[280] The Corps predicates its determination regarding impacts to criteria and design standards: "[t]he magnitude of impact of a bridge on the stream being crossed is *directly related to the criteria used to design the bridge*, and the extent to which the bridge was constructed according to the design."[281] The DEIS offers the same statement for culverts: "[t]he magnitude of the impact of the culvert on the stream being crossed would be *directly related to the criteria used to design the culvert*, and the extent to which the culvert is constructed according to the design."[282] The DEIS goes on to discuss flood probabilities for culvert designs despite the fact that PLP has not identified whether it will design for 25-, 50- or 100- year floods:

> *[i]f the culverts are designed for the 25-year flood-peak discharge,* the probability of experiencing a flood equal to or greater than the design flood, one or more times in 20 years, is 56 percent. The probability of experiencing the design flood, one or more times in 70 years, is 94 percent. *If the culverts are designed for the 50-year flood-peak discharge,* the probability of experiencing a flood equal to or greater than the design flood one of more times in 20 and 70 years, is 33 and 76 percent, respectively. *If the culverts are design for the 100-year flood*, the probability would be as described above for the bridges.[283]

The purpose of the DEIS is not to evaluate hypothetical or typical designs. While the DEIS could evaluate alternatives based off of PLP's design, the DEIS still must be tethered to a project designed by the applicant. PLP needs to offer their designs so the EIS can evaluate *those* designs.

The DEIS also inappropriately defers analysis to yet-to-be-determined best management practices or stipulations in permits. For example, the DEIS notes that

> The magnitude and extent of stream sedimentation that could result from such disturbance *would depend on the effectiveness of required state-of-the-process [Best Management Practices]* under stormwater pollution prevention regulations implemented, monitored, and maintained during all phases of the project. [Best Management Practices] are designed to mitigate the intensity of surface runoff, erosion, and sediment loads in stream channels. *A range of [Best Management Practices]*, including silt fences, bale check dams, sediment retention basins, cross bars and ditches, runoff interception and diversions, gabions and sediment traps, mulching of disturbed surfaces and stockpiles, and other measures, would be implemented and monitored along the mine site road corridors and at all bridge and culvert crossings to ensure minimization of potential impacts from erosion

[280] DEIS at 4.16–26 (emphasis added).
[281] DEIS at 4.16–27 (emphasis added).
[282] DEIS at 4.26–29 (emphasis added).
[283] *Id.*

and sedimentation.[284]

Another Corps analysis bases its determination of impacts of typical Best Management Practices and designs:

> There is potential for increased stormwater runoff to reach drainages crossed by the roads. *Based on typical [Best Management Practices]* for this type of work *and the typical designs proposed for the project*, the magnitude of the impact would be small to medium, and would decrease as vegetation reestablishes itself on disturbed and freshly constructed surfaces.[285]

PLP needs to provide actual Best Management Practices for the Corps to analyze.

In other instances, the Corps admits that it cannot assess impacts because of missing information. For example:

> With increased erosion comes increased sediment transport and increased sediment deposition. An increase in erosion and deposition can lead to a change in channel morphology. *Because there is no information on how much the bridges would restrict streamflow, the magnitude, duration, and geographical extent of the impacts cannot be accurately predicted.* However, for a well-developed design based on the 100-year flood and a limited backwater, the magnitude of the impacts due to erosion, sediment deposition, and sediment transport discussed above would likely be relatively small.[286]

The Corps makes a similar statement regarding culverts:

> The more the culvert restricts streamflow (i.e., the greater the backwater), the higher the velocity through the culvert. The higher the velocity through the culvert, the greater the probability that excessive riverbed erosion (scour) would occur downstream of the culvert; and the greater the probability of excessive river bank erosion downstream of the culvert. With increased erosion comes increased magnitude of sediment transport and increased magnitude of sediment deposition. An increase in erosion and deposition can lead to a change in channel morphology. *Because there is no information available on the extent to which the culverts would restrict streamflow, the magnitude, duration, and geographical extent of the impacts cannot be accurately predicted*. However, for a well-developed design based on a 50-year flood and a headwater-to-diameter ratio of no more than 1, the probability, magnitude, duration, and geographic extent of the impacts would be similar to a culvert design by ADOT&PF.[287]

There is no reason that the Corps cannot require PLP to provide this information.

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[284] DEIS at 4.24–20 (emphasis added).
[285] DEIS at 4.16–26 (emphasis added).
[286] DEIS at 4.16–28 (emphasis added).
[287] DEIS at 4.26–30 (emphasis added).

The lacking information and design details are critical to understanding the full scale, scope, magnitude, extent, and duration of the potential impacts from the proposed project. Without this missing information, the application is not complete, and the Corps cannot take the requisite hard look or meet the requirements of NEPA and the CWA.

ii. The DEIS is based on outdated, stale, and insufficient information and environmental baseline documents.

Courts have consistently held that agency reliance on data that is stale or inaccurate invalidates environmental review.[288] Most of the data provided in the environmental baseline documents is now over 10 years old.[289] PLP has still not completed the requisite baseline work for its proposed project.[290] Without current information, the Corps cannot adequately evaluate the project.

The meteorological data provided by PLP is insufficient to adequately characterize future climate and hydrologic extremes.[291] Underestimating hydrologic extremes can result in catastrophic outcomes.[292] Extreme weather predictions must be conservative to ensure plans are adequate, especially the water management plan and design plans for tailing facilities.[293] Because meteorological data sets are limited, the DEIS must quantify the uncertainty in the extreme precipitation calculations.

Based on a review of the database provided in the Pebble Project EIS Project Library, there has been no surface water quality, groundwater quality samples, macroinvertebrate, fish tissues, sediment samples, or marine water samples collected after 2014.[294] This data must be updated.

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[288] *See, e.g.*, *Northern Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1085–86 (9th Cir. 2011) (found that ten-year old survey data for wildlife "too stale," thus reliance on it in the EIS was arbitrary and capricious); *Lands Council v. Powell*, 395 F.3d 1019, 1031 (9th Cir. 2005) (six year-old survey data for cutthroat trout was "too outdated to carry the weight assigned to it" and reliance on that data violated NEPA); *Seattle Audubon Soc. v. Espy*, 998 F.2d 699, 704–05 (9th Cir. 1993) (reliance on "stale scientific evidence" regarding owl population data without adequate discussion of scientific uncertainty violated NEPA).
[289] Welker Scoping Comments, 2018 at 15.
[290] *See infra* Section III.C.2., Extensive data gaps preclude the Corps from satisfying its statutory mandates.
[291] *See* Wobus, Cameron, June 22, 2018, Preliminary review of 2017 Pebble Project permit application POA-2017-271 and recommendations for USACE on issues to consider in the Environmental Impact Statement for a proposed mine (Wobus Scoping Comments, 2018), 5–6 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[292] *Id.*
[293] *Id.* at 6.
[294] *Id.*

Much more information regarding waterbodies and fish presence must be collected. PhD student Sarah O'Neal submitted comments during scoping and made the following recommendations:

- Stream courses should be accurately documented using light detection and ranging (LIDAR) or other best available technology. The Application relies largely on National Hydrography Dataset, which is outdated and overlooks important tributary habitat;
- Evaluate all streams crossed by the road corridor for fish presence (including documentation of species, life stages, and abundance);
- Quantify salmon populations in the North Fork Koktuli, South Fork Koktuli, Upper Talarik Creek, and their tributaries, as well as all stream crossings in the transportation corridor, with at least five years of data;
- Collect sediment cores from suitable lake environments to estimate historic and recent magnitudes and variability of sockeye salmon returns;
- Update aquatic macroinvertebrate studies; and
- Salmon baseline data that includes downstream migration of juvenile sockeye and smolt and upstream migration of sockeye spawners, including presence in Lake Iliamna.[295]

These issues have not been addressed. In her comments on the DEIS, O'Neal restated that the environmental baseline document "poorly characterizes salmon spawning (Woody 2012), rearing (O'Neal 2012b), and habitat data (O'Neal 2012a, Parasiewicz 2012, Stratus 2012a, Stratus 2012b, Zamzow 2012)."[296] The environmental baseline document's methodology to estimate escapement is not standardly accepted.[297] The resulting data is "imprecise, biased and incomparable to methods used . . . by [ADF&G]."[298] This lacking analysis leads to an underestimate for escapement.[299] O'Neal concludes that:

> Methods for estimating juvenile abundance were similarly unrepeatable and uninterpretable from their presentation in the [environmental baseline document] (PLP 2011, O'Neal 2012b). Moreover — because they were conducted only from 2004-2008 — limited indices and underestimates of spawner and juvenile abundance in PLP's [environmental baseline document] ignore the variability in population abundance inherent to salmon populations in general, which ultimately lead to their overall sustainability (Figure 1, Schindler et al. 2010, Brennan 2019b).
> With respect to characterizing salmon (and other fishes and aquatic life) habitat,

[295] *See* O'Neal, Sarah, May 31, 2018, Pebble Project Department of the Army Application for Permit POA-2017-271 (O'Neal Scoping Comments, 2018) at 27–28 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[296] *See* O'Neal, Sarah, July 1, 2019, Technical Comments Regarding Fish and Aquatic Habitat in the Pebble Project Draft Environmental Impact Statement (O'Neal, 2019) at 3 (report and references included as an attachment to these comments).
[297] *Id.*
[298] *Id.*
[299] *Id.*

> the PLP [environmental baseline document] failed to robustly describe important flow data (Stratus 2012b), potential impacts to water chemistry (Stratus 2012a), loss of 'essential fish habitat' in the proposed project area (Parasiewicz 2012, Mouw 2018, and detailed comments below), and food web-mediated impacts (O'Neal 2012a). **These oversights result in vast underestimates in the DEIS of potential impacts to fishes, their habitat, and their overall sustainability**.[300]

The application also lacks the requisite environmental baseline documents and studies for a significant portion of the port and transportation corridor. The baseline data needs to support an analysis of the full scope of direct, indirect and cumulative impacts. PLP must provide environmental baseline data that address:[301]

- Meteorological and climate data (for multiple years) for the port and offshore mooring locations;
- Biological, hydrological, and on shore and near shore environmental data, including flora (aquatic and terrestrial), fauna, and wetlands for the port and offshore mooring locations;
- Suspended sediment and turbidity concentrations for the port and offshore mooring locations;
- Shore zone mapping and offshore navigational data including bathymetry, tidal and current information for the port and offshore mooring locations;
- Geotechnical information regarding the sub-bottom profiles for the port and offshore mooring locations;
- Terrestrial and marine vegetation;
- Meteorological data for Iliamna Lake (including precipitation (e.g. snowfall on the lake in winter), air temperature, ice thickness and seasonal dates for ice formation to ice melt on the lake, and wind speeds and directions);
- Annual changes in lake temperature and circulation patterns;
- Current and wave climatology data for Iliamna Lake;
- Iliamna Lake chemistry/water quality;
- Physical and chemical characteristics of the Iliamna Lake bottom sediments;
- Iliamna Lake bathymetry;
- Iliamna Lake freshwater seals population and habitat assessments;
- Iliamna Lake resident and anadromous fish species, fish patterns, rearing, spawning, feeding and assessment of larval, juvenile and adult presence and migration patterns;
- Aquatic resources including macroinvertebrates, mussels, zooplankton, phytoplankton, insects, benthic environment, and aquatic vegetation for Iliamna Lake and Amakdedori Bay;[302]

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[300] *Id.* (emphasis in original).
[301] The bulleted list includes baseline data needs compiled by Molly Welker. *See* Welker Scoping Comments, 2018.
[302] *See* O'Neal Scoping Comments, 2018 at 28; O'Neal, 2019 at 3–4.

- Avian species that utilize habitat in the vicinity of Iliamna lake, the transportation corridor, the gasline route, and the Port site;
- Large and small terrestrial wildlife (e.g., brown and black bear, moose, caribou, wolverines, and amphibians); and
- Marine fish (e.g., herring, halibut, cod, all five species of Pacific salmon), marine mammals (e.g., sea otters, sea lions, Cook Inlet beluga whales, orca whales, harbor seals, harbor porpoise), marine invertebrates (e.g., king crab, scallops), and marine phytoplankton.

These issues were flagged in scoping but PLP has failed to provide adequate or sufficient data through the Request for Information (RFI) process to satisfy its burdens as the applicant to fully assess the areas impacted through baseline documents. In addition, O'Neal notes that

> While population abundances should also be robustly characterized, anadromous fish presence is arguably the simplest and most fundamental information to collect in order to protect salmon streams. Data characterizing fish presence and habitat were collected only one summer, are generally insufficient, and ultimately result in underestimates of potential impacts to fish habitat. [ADF&G] expressed similar concerns about the lack of characterization of anadromous fish habitat in their scoping comments . . . . Along the southern access road corridor in particular, only very cursory presence studies were conducted in 76 of an estimated (in all likelihood **under**estimated given inadequacies of the National Hydrology Dataset) 173 stream crossings along the 56 km (35 mile) portion of the road (R2 2018a, R2 2018b). Some of the electrofishing and snorkeling surveys lasted less than five minutes in duration (as opposed to shock time), and the median survey time for both methods was 22 minutes or less. Thus, **surveys conducted to date along the southern access road are simply insufficient for determining fish presence and thus even cursorily protecting fish habitat**. Moreover, **the preferred alternative transportation corridor would virtually bisect the Kvichak watershed including Lake Iliamna, the world's largest sockeye salmon nursery** (Woody 2018).[303]

iii. Numerous Requests for Information remain incomplete.

The following table documents RFI identified by AECOM in a March memorandum that were not completed prior to the release of the DEIS.[304] The RFIs include outstanding RFI-related information, new RFIs for data gaps identified in the DEIS, as well as entirely new RFIs developed by AECOM.[305]

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303 *Id.* at 3–4 (emphasis in original).
304 The majority of these RFIs are identified by AECOM in a March 1, 2019 memo. Elizabeth Bella, Memorandum, AECOM to Shane McCoy, Corps, March 1, 2019 (included as an attachment to these comments).
305 *Id.*

RFI Topic	RFI #	Rationale for Request – Required for NEPA Review	Date Response Requested by
Geotechnical Boring Program Report	14a	"The report, along with the data, would help inform the impact analysis for the Preliminary Final EIS."	03/15/19
2019 Offshore Cultural Resources Survey Data	25a	"required engineering and archaeology reports to BSEE for the proposed pipeline ROW"	07/15/19
Metocean Buoy Measurement Program Data	39a	"site-specific metocean data for the detailed design phase of the port. Results of this program are needed to update the affected environment description in Section 3.16 (Surface Water Hydrology) of the Final EIS."	07/01/19
Final Compensatory Mitigation Plan	56a	"A compensatory mitigation plan (CMP) will be used in our determination whether the proposal is in compliance with the 404(b)(1) guidelines and the public interest review, and to inform the NEPA analysis."	08/01/19
Update of Applicant's Proposed Mitigation for Analysis in the EIS	71b	"Mitigation measures included in the project design are integral components of the proposed action, are implemented with the proposed action, and therefore should be clearly described as part of the proposed action."	08/01/19
Groundwater Model Validation and Sensitivity Analysis	109d	"The requested information is necessary to help inform the impact analysis for the Preliminary Final EIS."	03/15/19
Cultural Data Refinement	113	"In order to make plans for the upcoming 2019 field season, as well as move forward with potential National Register of Historic Places eligibility determinations, these data must be reviewed and refined to consolidate potential duplicate sites."	03/15/19
Detailed Reclamation Plan	115	"help inform the impact analysis for the Preliminary Final EIS."	06/01/19
Wetlands 2019 Field Verified Data	116	"The final EIS will need to precisely disclose the amount and type of wetlands and other waters and vegetation that would be impacted by the project and how those impacts vary among the alternatives and variants. Field-verified wetlands and other waters data is requested for locations where data were not available for inclusion in the draft EIS."	Field data in GIS form 7/15/19; Full report by 08/15/19

Cultural Resources Field Data	117	"Portions of the direct permit area (project footprint) have had no archeological surveys conducted, and there has been no field verification for the interview-identified cultural resources collected by Stephen R. Braund and Associates. Per input provided by the State Historic Preservation Office and other consulting parties, and in accordance with both NEPA and NHPA, expanding the identification and evaluation of cultural resources in the project footprint is required to better compare alternatives and discuss impacts on cultural resources associated with each."	03/31/19
Surface Water Hydrology	118	"There is limited information on surface water hydrology in project component areas outside the mine site."	08/01/19
Eligibility Determinations Effort	119	"Evaluations are needed to complete the assessment of impacts on historic properties under NEPA for the EIS…"	05/01/19

While the March 1, 2019 AECOM identified 12 outstanding RFIs, PLP has responded to 15 RFIs since the DEIS was released.[306] In addition to the RFIs identified above, PLP responded to RFIs 114, 109b, 120, 62a, 8g, 121, 122, and 123.[307] The Corps issued RFI 14a to "help inform the impact analysis for the preliminary Final EIS."[308] PLP's responded, stating that "PLP is not proposing to complete the final field report for the geotechnical boring program this year. The report will be updated following collection of additional data from the instrumentation installed in the borings and is not anticipated to be available prior to completion of the FEIS."[309] For responses in RFIs 113, 117, and 119, all related to identifying cultural resources and historic properties through survey work, the RFI responses simply note that survey work will happen in summer 2019, that PLP will incorporate recommendations on where to survey "into PLP's 2019 field program *if possible*,"[310] and "PLP notes that field survey completion may be affected by consultant availability, weather conditions, and land access agreements."[311] These responses are not substantive and fail to contain any quantifiable data and analysis for the public to review on the issue of cultural resources and historic properties. Complete and substantive responses to these requests will not be available and disclosed until after the close of the Draft EIS comment period, precluding any opportunity for public review. Further, the late submission of information deemed necessary by the Corps for it to conduct a NEPA analysis will come at the 11th hour,

306 *See* PLP Project Library screen capture, June 23, 2019 (included as an attachment to these comments).
307 *See id.*
308 RFI 14a.
309 *Id.*
310 *See e.g.* RFI 119.
311 RFI 117.

hardly giving the agency time to review and assess the information, consider the information's impacts on the range of alternatives, and provide the agency with the opportunity to conduct the requisite hard look.

iv. PLP is still gathering data from the field.

Several of the data gaps and RFIs not only involve a response from PLP, but actually require PLP to conduct additional fieldwork. This type of work should have been completed prior to the Corps deeming PLP's application complete. As of May 13, 2019, PLP still needs to gather baseline data for:[312]

- Geophysical surveys-Cook Inlet pipeline route
  - Fieldwork to be completed in June 2019.
- Geophysical surveys-Iliamna Lake pipeline route
  - Anticipated surveys in July/August 2019
- Geotechnical investigation-Cook Inlet pipeline
  - Planned for early June 2019
- Marine mammal surveys Cook Inlet
  - Surveys running from March to late fall 2019
- Wetlands field verification work
  - Planned for July 2019
- Cultural surveys
  - Mine site – June 2019; Ferry terminals – July 2019
- Hydrologic surveys of road bridge crossings only
  - Processing results spring 2019
- Hydrology drilling and pump tests
  - Tentatively planned for September/October 2019
  - Feasibility and timing of work (this year or next year) will not be confirmed until later this summer

The Corps notes that its analysis is incomplete because of this missing information. For example, the DEIS wetlands analysis is limited by a failure to map the entire analysis area:

- "portions of the EIS analysis areas [are] lacking field-verified mapping" for wetlands;[313]
- "Remaining wetland data gaps would be addressed during the 2019 field season for reporting in the Final EIS (FEIS).";[314] and
- "Information provided in the DEIS may not be precise enough to make a [CWA Section 404] permit decision . . ."[315]

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[312] *See* James Fueg, Email, PLP to U.S. Army Corps of Engineers and AECOM, 2019 Field Work Plans, May 13, 2019 (included as an attachment to these comments).
[313] DEIS at 3.22–5.
[314] *Id.*
[315] DEIS at 3.1–10.

The Corps also cannot provide an accurate assessment of impacts to subsistence due to lacking information:

- Pertaining to subsistence activities in Bristol Bay drainages, some information is "unavailable, older, or limited" and in Cook Inlet drainages, "the extent of subsistence harvest activity, particularly fishing, in the project area on the western side of Cook Inlet has not been documented and limited information is available;"[316] and
- "Updated information would provide a more current picture of subsistence use in the immediate vicinity of the mine site, transportation corridor, port, and natural gas pipeline facilities."[317]

Nor can the Corps provide an accurate assessment of impacts to cultural resources due to lacking information:

- "the transportation route from the mine site to Amakdedori has not been field surveyed;"[318]
- "it is possible that there are undiscovered cultural resources sites, particularly in areas that have not been subject to a field survey…. additional field surveys may occur while the EIS is being completed;"[319] and
- according to the Advisory Council on Historic Preservation: "Overall, the chapters on cultural resources and on historic properties demonstrate the incomplete nature of the effort to identify cultural resources and historic properties that may be affected by the referenced undertaking."[320]

In addition to the grossly inadequate wetland surveying and mapping in the analysis area, state agencies have pointed out a number of survey deficiencies related to the transportation corridor and gasline:

- ADF&G: "Additional surveys should be conducted in 2019 . . . ."[321]
- ADF&G: "There are several productive sockeye salmon spawning streams in this area and adult sockeye salmon are frequently observed staging in the near shore areas of this portion of the lake. Site specific studies should be conducted for this area so the extent of resources and potential impacts can be described."[322]

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[316] *Id.*
[317] DEIS at 3.1–11.
[318] DEIS at 3.1–12.
[319] *Id.*
[320] Jaime Loichinger, Acting Assistant Dir., Federal Permitting, Licensing, and Assistance Section, Letter, Advisory Council on Historic Preservation to Sheila Newman, Program Manager, U.S. Army Corps of Engineers, Dec. 21, 2018, at 1 (included as an attachment with these comments).
[321] ADF&G, Pebble Project EIS Consolidated Comments Table at 17 (included as an attachment with these comments).
[322] *Id.* at 14.

- ADF&G: "fish sampling along the south portion of the access road was just initiated in 2018 and surveys should continue in 2019;"[323] and
- Alaska DNR: "Clarify that only a small amount of the on-land natural gas pipeline corridor and transportation corridor has been surveyed."[324]

Because of the significant gaps in data, FWS provided the following caveat with its comments:

> Many of the chapter sections contained notations that 2018 and 2019 field data are pending, and an analysis of those data will be added to the EIS when available. Due to a lack of current data for the affected environment, the Service is not able to provide comprehensive analysis of the environmental consequences of the proposed project on fish and wildlife resources.[325]

If the FWS is limited in its ability to provide a comprehensive review, then certainly other agencies as well as the public are limited by the lack of data and information provided by PLP and included in the DEIS.

v. Lacking data increases uncertainty regarding project impacts.

Due to the dearth of requisite data and information, there is significant acknowledged uncertainty about potential impacts. For example, the DEIS recognizes "[i]n reviewing these estimates*, it should be noted that the predictions presented above may be subject to significant uncertainty, due in part to uncertainties associated with the input from the groundwater module.*[326] This uncertainty has significant bearing on determining impacts because

> [i]f groundwater flow into the pit is greater than anticipated, the pumping rate to dewater the pit would be greater than anticipated. This would cause more water to be treated and released to the streams, but would also potentially cause an increase in the loss of streamflow to the dewatering effort. This could cause the magnitude of changes in streamflow to be greater or less than predicted above; and could cause reaches to be impacted that at present are thought to be un-impacted.[327]

The DEIS expresses doubt on its analysis regarding water treatment due to this uncertainty:

> In reviewing the water balance estimates, it should be noted that the predictions may be subject to significant uncertainty, due in part to uncertainty associated

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[323] *Id.* at 16.
[324] State of Alaska Cooperating Agency Comments Table, Pebble Project Preliminary Draft EIS, Dec. 21, 2018 at 4 (included as an attachment with these comments).
[325] Mary Colligan, Assistant Regional Director, Letter, FWS to Shane McCoy, Program Manager, U.S. Army Corps of Engineers, Dec. 21, 2018 at 2 (included as an attachment with these comments).
[326] *See* DEIS at 4.16–11 (emphasis added).
[327] *Id.*

> with the input from the groundwater module (see Section 4.17, Groundwater Hydrology and Appendix K4.17). At this time, it is believed that the predictions of groundwater flow to the pit would be more likely to be low than high. If this is true, it would mean that the [water treatment plants] would need to process and discharge more water than currently anticipated.[328]

The DEIS is unable to adequately determine the geographic scope of impacts due to these uncertainties:

> The geographic extent of the impact on the [North Fork Koktuli] and the [South Fork Koktuli] rivers may extend below the confluence of the two rivers, but not past the Koktuli River. . . . The geographic extent of the impact on [Upper Talarik Creek] is most likely to be in the upper reaches of the stream. In reviewing these estimates, it should be noted that the predictions presented above may be subject to significant uncertainty, due in part to uncertainties associated with the input from the groundwater module (see Section 4.17, Groundwater Hydrology).[329]

The DEIS recognizes that its dewatering analysis may underestimate impacts due to uncertainty: "*[c]onsidering the model uncertainties, the actual results of dewatering the pit may differ from projections described above*. It is expected that the amount of water produced during pit dewatering could be larger than simulated, and the capture zone and zone of influence could be larger."[330] The same uncertainty regarding the pit dewatering calls into question the analysis of impacts to wetlands:

> In terms of magnitude and extent, areas of wetlands indirectly affected by drawdown in post-closure would also shrink from those affected in operations, as shown on Figure 4.22-2 (acreages are provided in Section 4.22, Wetlands and Other Waters/Special Aquatic Sites). Duration of impacts would be long term, because impacted wetlands in the operations drawdown area outside of the post-closure area would be expected to recover after the final pit lake level is reached (PLP 2018-RFI 082). Uncertainty associated with these model projections is similar to those described as pertaining to the pit dewatering at the end of operations, as described in more detail in Appendix K4.17.[331]

This uncertainty is significant because the "estimated extent of the capture zone in post-closure would be about 1,800 acres."[332] And "[t]he duration of impacts would be more than 100 years, and the geographic extent could occur beyond local project component areas within the EIS analysis area."[333] The Corps' analysis is so tied to uncertain modeling that it becomes virtually impossible to understand what the anticipated impacts are: "[d]ewatering impacts are considered

[328] DEIS at 4.16–8. *See also* DEIS at 4.16–19.
[329] DEIS at 4.16–23.
[330] DEIS at 4.17–6 (emphasis added).
[331] DEIS at 4.17–10.
[332] *Id.*
[333] *Id.*

highly likely to occur with implementation of the project, although modeling of the severity of impacts has some uncertainty associated with it."[334]

Elsewhere, the DEIS makes conclusions about impacts and then contradicts itself by saying there is too much uncertainty to assess the impacts. For example, the DEIS states that salmon productivity in the Mulchatna drainage is "unlikely to be affected, but greater uncertainty exists about the magnitude and duration of these effects."[335] This is baffling. How can the Corps assert that salmon productivity is unlikely to be affected but then in the same sentence say that extent and duration of impacts is not known?

3. PLP has failed to prepare an up-to-date preliminary economic assessment, pre-feasibility, or feasibility study.

The proposed Pebble Mine is the only proposed large mining project in Alaska that has proceeded to the DEIS stage without a pre-feasibility or feasibility study.[336] While PLP prepared a preliminary assessment[337] in 2004 and in 2011, it subsequently stated in a 2019 Technical Report that

> the economic analysis included in **the 2011 Preliminary Assessment is considered by Northern Dynasty to be out of date such that it can no longer be relied upon**. In light of the foregoing, the Pebble Project is no longer an advanced property for the purposes of NI 43-101, as **the potential economic viability of the Pebble Project is not currently supported by a preliminary economic assessment, pre-feasibility study or feasibility study**.[338]

The 2018 Technical Report goes on to state that

> the Company has not completed a current comprehensive economic analysis of the Pebble Project but anticipates that having a complete understanding of, and being able to properly assess all of the proposed alternatives that the [Corps] will be considering as part of the scoping process conducted during the initial phase of the EIS will provide additional clarity with respect to the project to be evaluated so that an economic analysis can be completed.[339]

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[334] DEIS at 4.22–13.
[335] DEIS at 4.27–111.
[336] *See* Chambers, 2019 at 11.
[337] Preliminary economic assessments include an economic analysis of the potential viability of mineral resources. Unlike a pre-feasibility or feasibility study, the preliminary economic assessment can only demonstrate the *potential* viability of mineral resources. *See* Chambers, David M. & Levit, Stuart, Mar. 28, 2018, *Report Re: Feasibility Studies for Alaska Mines*, Center for Science and Public Participation (previously provided as an attachment with Trustees for Alaska's scoping comments).
[338] 2018 Technical Report on the Pebble Project, Southwest Alaska, USA, Northern Dynasty Minerals Ltd., Effective Date – December 22, 2017, Issued date Feb. 22, 2018 (emphasis added) (previously provided as an attachment with Trustees for Alaska's scoping comments).
[339] *Id.*

Analyzing this statement, Chambers notes that "[t]his suggests that, unlike the Wardrop report, either the engineering for the Proposed Project is not sufficient to produce even an Order of Magnitude Feasibility study, or that the economics of the project have changed sufficiently so that the smaller project is no longer economic."[340]

Further, since the release of the 2018 Technical Report, scoping has been completed and PLP has revised its proposed action, but PLP still has not completed an economic analysis. In a *Consolidated Financial Statements* submitted by Northern Dynasty Minerals for 2017 and 2018, PLP stated that it "is in the process of exploring and developing the Pebble Project and has not yet determined whether the Pebble Project contains mineral reserves that are economically recoverable."[341]

PLP's failure to take the typical and appropriate step of preparing economic assessments and pre-feasibility or feasibility studies stands in stark contrast to other mines in Alaska. Nixon Fork, Greens Creek, Fort Knox, Red Dog, Pogo, Kensington, Rock Creek, and Donlin mines all took steps to prepare an economic assessment of feasibility analysis — often preparing both — prior to permit review.[342] For Donlin, Barrick Gold prepared a preliminary economic assessment in 2002, a second preliminary economic assessment in 2006, an initial feasibility study in 2007, an update to the feasibility study in 2009, and a second update in 2011, which was amended in January 2012.[343] Donlin began the EIS process a year later in December of 2012.[344]

The need for a feasibility study is further warranted given PLP's current strained financial position. In May of 2018, the fourth mining company to partner with Northern Dynasty Minerals pulled out of PLP.[345] In December of 2017, PLP had signaled that First Quantum Minerals, Ltd., would buy into PLP over the coming four years.[346] But in May 2018, only five months after

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[340] Chambers, 2019 at 12; *see also id*. at 11 n.1 (explaining that Order of Magnitude Feasibility studies are "an initial financial appraisal of an inferred mineral resource, and are developed by copying plans and factoring known costs from existing projects completed elsewhere and are accurate to within 40%–50%.").

[341] Northern Dynasty Minerals Ltd., *Consolidated Financial Statements for the Years Ended December 31, 2018 and 2017*, April 1, 2019, https://www.northerndynastyminerals.com/site/assets/files/4752/year_end_2018_financial_report.pdf (included as an attachment to these comments); *see also* Northern Dynasty Minerals Ltd., *Consolidated Financial Statements for the Years Ended December 31, 2015, 2014 and 2013*, https://www.sec.gov/Archives/edgar/data/1164771/000106299316008770/exhibit99-1.htm (previously provided as an attachment with Trustees for Alaska's scoping comments).

[342] *See* Chambers, David M. & Levit, Stuart, Mar. 28, 2018, *Report Re: Feasibility Studies for Alaska Mines*, Center for Science and Public Participation.

[343] *Id.*

[344] *See* Donlin EIS Schedule, http://www.donlingoldeis.com/EISSchedule.aspx (previously provided as an attachment with Trustees for Alaska's scoping comments).

[345] *See* Avery Lill, *Pebble Mine Loses Funding from First Quantum Minerals*, Alaska Public Media, May 25, 2018, https://www.alaskapublic.org/2018/05/25/pebble-mine-loses-funding-from-first-quantum-minerals/ (previously provided as an attachment with Trustees for Alaska's scoping comments).

[346] *Id.*

entering into a framework agreement, First Quantum walked away. Northern Dynasty Mineral's stock "plummeted after the collapse of a pact with First Quantum Minerals Ltd. to finance the controversial Pebble mining project in Alaska."[347] First Quantum followed the same path as three of the largest mining companies in the world — Mitsubishi Corporation, Anglo American, and Rio Tinto.[348] All four companies have made financial decisions that led them to walk away from this project. As Copper Investing News states, "[t]he company has been struggling to find a partner to fund the project since 2013, when major miner Anglo American withdrew, leaving Northern Dynasty on the project alone."[349] Given the fact that every company that has engaged in some form of partnership with Northern Dynasty Minerals has ultimately walked or run away from this project, the Corps must require PLP to provide a pre-feasibility study.

Failing to provide any viable assessment of feasibility study undermines the entire review process under NEPA and the CWA. The Corps needs PLP to submit a pre-feasibility study for the Corps to be able to determine the scope of alternatives to be reviewed in the EIS.[350] To that end, on two occasions, AECOM submitted RFIs for optimization study data, cost/feasibility studies, and estimated costs necessary to complete permitting and construction.[351] Instead of substantively responding to these requests, PLP provided the 2011 Wardrop report, with no corresponding statement that the 2011 Wardrop report is out of date and cannot be relied upon.[352] Not only did PLP not disclose the fact that it had previously stated that the report cannot be relied upon, but stunningly provided AECOM with conclusions that can be drawn of the 2011 preliminary economic assessment.[353] In PLP's response to RFI 070, it stated that "the capital costs associated with the Initial Development Case in the 2011 [preliminary economic assessment] (approximately

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[347] *See* Danielle Bochove, *Northern Dynasty Sinks Along with First Quantum Alaska Deal*, Bloomberg, May 25, 2018, https://www.bloomberg.com/news/articles/2018-05-25/northern-dynasty-crashes-pre-market-as-first-quantum-pact-ends (previously provided as an attachment with Trustees for Alaska's scoping comments).
[348] *See* Avery Lill, *Pebble Mine Loses Funding from First Quantum Minerals, Alaska Public Media*, May 25, 2018.
[349] *See* Scott Tibballs, *Northern Dynasty Sinks Like a Rock After First Quantum Drops Pebble*, Copper Investing News, May 25, 2018, https://investingnews.com/daily/resource-investing/base-metals-investing/copper-investing/first-quantum-drops-pebble/ (previously provided as an attachment with Trustees for Alaska's scoping comments).
[350] *See* Wobus Scoping Comments, 2018 at 2 (recommending that the Corps require a feasibility study that demonstrates that mining 10% of the resource is viable); *see also* Joan Kuyek, *Behind the Pebble Mine: Hunter Dickinson Inc., The Canadian Mining Company You've Never Heard Of*, Mining Watch Canada, Feb. 2, 2018 at 3 ("Northern Dynasty represents a level of risky speculative investment unprecedented even amongst other junior mining companies.") (previously provided as an attachment with Trustees for Alaska's scoping comments).
[351] *See* RFI 059, July 19, 2018, and RFI 070, Sept. 05, 2019.
[352] 2018 Technical Report on the Pebble Project, Southwest Alaska, USA, Northern Dynasty Minerals Ltd., Effective Date – December 22, 2017, issued Feb. 22, 2018.
[353] *See* RFI 059 Response, *Technical Note on Optimization Studies*, Aug. 6, 2018 at 3 ("This assessment, based on comprehensive information developed for the 2011 PEA that has been scaled using standard industry metrics, demonstrates the following: . . . Project economics improve with increasing throughput above 180k tons per day.") (included as an attachment to these comments).

US$5.5 billion) can be considered representative."[354] Again, PLP made no reference to its previous February 2018 Technical Report that said the 2011 preliminary economic assessment could no longer be relied upon. Rather, PLP asserted that the construction costs from a report that is 8 years old and based on a different configuration (e.g., not including a ferry system) has accurate cost estimates.

Richard Borden raised concerns about the lack of a feasibility assessment and questioned the viability of a 20-year mine.[355] Given the significant upfront costs for this mine, Borden estimates that the 20-year mine has a negative Net Present Value of approximately three billion dollars.[356] A negative Net Present Value raises significant questions about whether the proposed project is viable on its own. If the project cannot stand on its own as a 20-year mine, and must require expansion to make the mine economically viable, then the proposed project is not a reasonable or practical alternative, in its own right. As Borden notes, "[i]f the base case mine plan assumed for the EIS is not economic, then the entire permitting process risks being compromised because the impacts and risks being evaluated are much smaller than those required for a full-scale economically viable project."[357] Borden concludes that "[a]t a minimum relative capital costs for different development and design options need to be evaluated by the Army Corps of Engineers so a meaningful options analysis can be conducted on practicable alternatives."[358]

As Chambers concludes, "[t]he Proposed Project's ability to provide a reasonable return on investment has not been demonstrated, and is in reasonable doubt. Based on the rationale stated by the [Corps], the Proposed Project does not meet the criteria for analysis in an EIS."[359]

IV. THE PURPOSE AND NEED STATEMENT IS FLAWED.

The Council on Environmental Quality's regulations implementing NEPA require all EISs to contain a statement that briefly specifies the underlying purpose and need for which the agency is responding to when proposing alternatives to the proposed action.[360] The statement of purpose and need is crucially important because its dictate the range of reasonable alternatives to the proposed action.[361] The purpose and need statement cannot be so narrow as to limit the range of reasonable alternatives.[362] The Seventh Circuit explained the fundamental importance of ensuring that agencies do not avoid NEPA's requirements by unreasonably restricting the statement of purpose:

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[354] RFI 070, Sept 5, 2018.
[355] Borden, 2019a.
[356] *Id.* at 4–5; see also Borden, Richard, June 17, 2019, *Subject: Pebble Mine Draft EIS Comments on Alternative Analyses, Cumulative Effects, Water Management, Wetlands Mitigation, and Air Quality* (Borden, 2019f) at 2–3 (included as an attachment to these comments).
[357] *Id.* at 5.
[358] *Id.*
[359] Chambers, 2019, at 12.
[360] 40 C.F.R. § 1502.13.
[361] *City of Carmel-By-The-Sea*, 123 F.3d at 1155.
[362] *Id.* at 1155 ("The stated goal of a project necessarily dictates the range of reasonable alternatives and an agency cannot define its objectives in unreasonably narrow terms."); *see also Nat'l Parks & Conservation Ass'n v. Bureau of Land Mgmt.*, 606 F.3d 1058, 1070 (9th Cir. 2010).

> One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). The federal courts cannot condone an agency's frustration of Congressional will. If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency satisfy the Act.[363]

An applicant's purpose must be "legitimate."[364] The Ninth Circuit highlights that "an applicant cannot define a project in order to preclude the existence of any alternative sites and thus make what is practicable appear impracticable."[365] While the Corps is permitted to take the applicant's purposes into consideration, it cannot adopt private interest to draft a narrow purpose statement that restricts the consideration of alternatives.[366] In addition, the Corps' regulations indicate that purpose and need statements will be defined from both the public and the applicant's perspective.[367] Federal courts have routinely found that NEPA prevents federal agencies from effectively reducing the discussion of environmentally sound alternatives to a binary choice between granting and denying an application.[368]

PLP's stated purpose is "to produce commodities, including copper, gold, and molybdenum, from the Pebble Deposit in a manner that is commercially viable using proven technologies that are suitable for the project's remote project location."[369] PLP's stated need is "to meet increasing global demand for commodities such as copper, gold, and molybdenum."[370]

The Corps must use its independent judgment to define the purpose and need of the project. This requires the Corps to critically evaluate the purpose and need.[371] The Corps found PLP's stated purpose too narrow because it limited the proposed development to the Pebble deposit.[372] The Corps properly found that the "public's interest in commodities such as copper, gold, and molybdenum does not dictate a particular source of these commodities."[373] The Corps

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363 *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997); *Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991) ("an agency may not define the objectives of its action in terms so unreasonably narrow that only one alternative from among the environmentally benign ones in the agency's power would accomplish the goals of the agency's action").
364 *Friends of the Earth v. Hintz*, 800 F .2d 822, 833 (9th Cir. 1986).
365 *Sylvester v. U.S. Army Corps of Engineers*, 882 F.2d 407, 409 (9th Cir. 1989).
366 Nat'l Parks & Conservation Ass'n, 606 F.3d at 1072.
367 33 C.F.R. § 325 App. B(9)(b)(4).
368 *See e.g., Save Our Cumberland Mountains v. Kempthorne*, 453 F. 3d 334, 345 (6th Cir. 2006).
369 DEIS at ES–3, 1–3.
370 DEIS at ES–3.
371 *See Friends of the Earth,* 800 F.2d at 835–836 (9th Cir. 1986) (recognizing the Corps must rely on information provided by the applicant but must not do so "uncritically").
372 DEIS at 1–4.
373 *Id*.

has defined the overall project purpose as "to develop and operate a copper, gold, and molybdenum mine in Alaska to meet current and future demand."[374]

While the Corps was correct to find that PLP's purpose was too narrow because it limited the alternatives to the Pebble deposit, the Corps' stated overall project purpose is also too narrow. As discussed in Thomas Yocom's report, *The Corps Determination of Basic and Overall Project Purposes Improperly Eliminates Consideration of Potentially Less Environmentally Damaging Practicable Alternatives*, "[t]his determination defines the basic and overall project purposes so narrowly as to effectively limit consideration of alternatives to the applicant's preferred site."[375] The Corps rightfully notes that the "public's interest in commodities such as copper, gold, and molybdenum does not dictate a particular source of these commodities," but errs by then limiting the purpose to the geographic boundary of Alaska. If the purpose does not dictate a particular source, then there is no defensible reason to limit this project to Alaska. Copper is found throughout the world and because the need is focused on bringing copper to market, Alaska has no place in the limit of the defined overall purpose.

The DEIS also states that "PLP's (the applicant) stated need for the proposed project is, 'to meet the increasing global demand for commodities such as copper, gold, and molybdenum.' From the broad, macroeconomic scale, the project need is reflected in the worldwide demand for copper."[376] Any assertion by the Corps that the mine in Alaska would benefit the public interest of Alaskans and therefore part of the purpose of the project is misplaced. Public interest is not a factor in determining the purpose. Rather, as discussed in Section VII.F, below, the public interest review is a wholly separate analysis.[377]

The Corps also errs by including molybdenum as a resource that must be in the ore deposit. PLP discovered molybdenum mineralization in the Pebble deposit after it had acquired its mining rights.[378] Because PLP never sought molybdenum as a resource, it is inappropriate to define the purpose to a deposit that includes copper, gold, **and** molybdenum.

As the Eighth Circuit recognized, "[t]he cumulative destruction of our nation's wetlands that would result if developers were permitted to artificially constrain the Corps' alternatives analysis by defining the projects' purpose in an overly narrow manner would frustrate [NEPA] and its accompanying regulatory scheme."[379] Because the overall purpose is to mine for copper, the overall purpose does not need to be any more restrictive than that. The Corps has defined the purpose in a manner that "preclude[s] the existence of any alternative sites and thus make what is

[374] DEIS at ES-3, 1–4.
[375] Yocom, Thomas G., June 6, 2019, *Determining the least damaging Practicable Alternative for the Proposed Pebble Project: Potentially less damaging practical alternatives are improperly dismissed in the DEIS*, (Yocom, 2019a) at 1 (report and references included as attachments to these comments). Thomas Yocom formerly served as National Wetlands Expert for the Environmental Protection Agency. *See id*. at 1, n.1.
[376] DEIS at 1–3.
[377] *See infra* Section VII.F, The Pebble Project is Not in the Public Interest, and Yocom, 2019a at 7–8.
[378] Yocom, 2019a at 1, 4 n.22
[379] *Nat'l Wildlife Fed'n v. Whistler,* 27 F.3d 1341, 1346 (8th Cir. 1994).

practicable appear impracticable."[380] Because the purpose determines which alternatives should be considered, the DEIS must be completely revised with a new evaluation of potential alternatives based on a legitimate purpose statement. The Corps' purpose should be redefined to allow for an alternatives review that meets the requirements of both the CWA and NEPA.

V. THE DEIS FAILS TO EVALUATE A REASONABLE RANGE OF ALTERNATIVES.

The DEIS's alternatives analysis falls far short of what NEPA requires. The Corps is obligated to study in depth and disclose the environmental consequences of reasonable alternatives to the agency's preferred course of action. The DEIS must "[r]igorously explore and objectively evaluate all reasonable alternatives[.]"[381] The assessment of alternatives is "the heart" of the EIS.[382] To satisfy the alternatives requirement, the DEIS must consider all reasonable alternatives to a given project, and it must rigorously explore and objectively evaluate those alternatives.[383] Descriptions must be given for any alternatives eliminated from detailed study.[384] The Council on Environmental Quality states that "[r]easonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."[385] The DEIS must also include a discussion of the environmental consequences of the proposed action and alternatives, including the environmental impacts of each alternative, any adverse environmental effects that cannot be avoided if the proposal is implemented, and any irreversible and irretrievable commitments of resources.[386]

The DEIS's range of reasonable and practicable alternatives includes the no action alternative and three action alternatives. However, the action alternatives only differ when it comes to how the mine area is accessed. All three alternatives are simply versions of where to put the port and how to connect the port with the mine site. And for reasons discussed in greater detail in Section VII.B, two of the three alternatives are not practical due to land owners who have no interest or intent to allow access to Pebble.

As noted above, the project purpose cannot be defined in a manner that "unduly restrict[s] a reasonable search for potential practicable alternatives."[387] Because the purpose is too narrow,

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380 *See Sylvester*, 882 F.2d. at 409. In addition, the purpose is not consistent with the Corps' 2009 Operating Procedures. The 2009 Operating Procedures provide that "[t]he overall project purpose should be specific enough to define the applicant's needs, but not so restrictive as to constrain the range of alternatives that must be considered under the 404(b)(1) Guidelines." *See* U.S. Army Corps of Engineers, Memorandum for Commanders, Major Subordinate Commands and District Commands, *Updated Standard Operating Procedures for the U.S. Army Corps of Engineers Regulatory Program*, July 1, 2009, at 15 (included as an attachment to these comments).
381 40 C.F.R. § 1502.14.
382 *Id.*
383 *Id.* at § 1502.14(a).
384 *Id.*
385 Council on Environmental Quality, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, 46 Fed. Reg. 18026, Mar. 23, 1981.
386 40 C.F.R. § 1502.16.
387 *See Sierra Club v. Flowers*, 423 F. Supp. 2d 1273, 1353 (S.D. Fla. 2006) (*citing Old Cutler Bay* Permit 404(q) Elevation (Sept. 13, 1990); *Sylvester*, 882 F.2d at 409 ("an applicant cannot

the range of alternatives unduly restricts inclusion of other potential reasonable and practicable alternatives.

A. A Reasonable Range of Alternatives Includes a Number of Options that Have Not Been Considered.

The alternatives analysis is utterly lacking because it only has two actual alternatives — an action alternative and the no action alternative. This does not satisfy NEPA's requirements for a reasonable range of alternatives.[388] A reasonable range of alternatives must include more than just a few variants on how the mine is accessed.

A reasonable range of alternatives should include alternatives that consider ore deposits beyond the Pebble deposit. For the reasons discussed in Section VII.A, alternatives should consider mining of ore deposits beyond the Pebble deposit. Section VII.A highlights the opportunities available to Northern Dynasty Minerals and PLP at the time PLP entered the market that have been improperly excluded from consideration.

The degree to which an EIS is limited to evaluating alternatives at the Pebble deposit, the DEIS should have included a range of alternatives pertaining to:

- Mine pit location;[389]
- Tailings locations;
- Tailing facilities[390] (including dry closure tailings, slurry,[391] thickened tails, dry stack,[392] paste tails,[393] cover options for reclaimed tailings areas, a lined and blended tailings storage facility,[394] and a lined bulk tailings storage facility);[395]

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define a project in order to preclude the existence of any alternative sites and thus make what is practicable appear impracticable").

[388] *Muckleshoot Indian Tribe*, 177 F.3d at 814 (finding that the review of two virtually identical action alternatives and a no action alternative was not sufficient under NEPA).

[389] *See* Environmental Protection Agency, Comments on Pebble Preliminary Alternatives Development Process, Oct. 3, 2018 at 2 ("We recommend that the EIS assess whether there are other locations that may be farther away (but within the distance that tailings could be pumped) that could result in a more compact footprint or lesser impacts. If that analysis has already occurred, then we recommend that it be included in this document.") (included as an attachment with these comments).

[390] *See* Chambers, David M., June 22, 2018, *Department of the Army Permit Application POA-2017-271 Scoping* (Chambers Scoping Report, 2018), Center for Science in Public Participation (highlighting that one of the clear recommendations of the Mt. Polley Expert Panel was that all tailings impoundments should be closed as dry facilities) (previously provided as an attachment with Trustees for Alaska's scoping comments); Zamzow, Kendra, June 22, 2018, *Department of the Army Permit Application POA-2017-271 Scoping*, (Zamzow Scoping Comments, 2018), Center for Science in Public Participation at 4, 17 (previously provided as an attachment with Trustees for Alaska's scoping comments).

[391] The EPA noted in October of 2018 that "[i]t is unclear why Slurry Tailings Storage is listed as dismissed, given that it is the proposed option for pyritic tailings. We recommend that the document clarify if it is dismissed for bulk tailings only." EPA Comments on Pebble Preliminary

- Tailings dam construction (including downstream construction and slope ratios);[396]
- Mine rate and mine strip ratio;[397]
- Waste rock segregation methods;[398]
- Gold recovery methods;[399]
- Mine camp and logistical support facility location;
- Energy sources, including wind, diesel, solar, hydroelectric, and geothermal;
- Pipeline route;
- Water discharge locations;
- Use of bridges rather than culverts;
- Compensatory mitigation options;

Alternatives Development Process, Oct. 3, 2018 at 4. The DEIS has not provided justification for the refusal to consider slurry tailings storage.

392 The EPA expressed concerns that the Corps was removing dry stack tailings from the list of alternatives because of size. However, EPA provided the Corps with the example of the Resolution Copper mine, which is of similar size and included dry stack alternatives. *See* EPA Comments on Pebble Preliminary Alternatives Development Process, Oct. 3, 2018 at 4. The DEIS does not provide any indication that the Corps reviewed the Resolution Mine EIS alternatives and how that mine considered dry stack tailings.

393 *See* Borden, 2019f at 5 (noting that "[t]he rationale provided for the elimination of a paste tailings option from consideration is incorrect in several ways. Interest in large-scale use of paste and filtered tailings has been growing in recent years in response to several high-profile tailings dam failures. . . . Both Toromocho in Peru and Minera Centinela in Chile are using paste tailings technology for their surface tailings dams at production rates of 120,000 and 100,000 tpd respectively. The use of paste tailings at Pebble would also provide significant environmental benefits by reducing the initial volume of stored water within the tailings mass by fifteen percent or more compared to conventionally thickened tailings.").

394 EPA requested that the Corps address blended tailings of bulk and pyritic waste and for explanations from the Corps about why a lined facility could not be dewatered and covered at closure. *See* EPA Comments on Pebble Preliminary Alternatives Development Process, Oct. 3, 2018 at 5. The DEIS does not provide answers to these questions.

395 EPA identified that lining of the bulk tailings storage facility should be considered. *See* EPA Comments on Pebble Preliminary Alternatives Development Process, Oct. 3, 2018 at 5. This option was dismissed because connected drains to bottom liners have not been proven at a similar scale. *Id.* This argument would preclude Pebble's water treatment option, as it is experimental and not been implemented at the scale Pebble proposes. Pebble cannot have it both ways, eliminating some options because of scale while refusing to acknowledge the experimental nature for others. The DEIS must consider these options and take a hard look at the technological concerns before dismissing an option based on an unanalyzed statement by the applicant. *See infra* Section VI.B. (commenting on the proposed experimental water treatment technology).

396 *See* Zamzow Scoping Comments, 2018 at 5, 16.

397 *See* Zamzow Scoping Comments, 2018 at 1–2. The EIS must fully evaluate proposed mine strip ratios and compare them with previous estimates. The current application's strip ratio is change of an order of magnitude from the 2011 Wardrop estimate. *Id.* at 1.

398 *Id.* at 3. The EIS must evaluate where segregation based on acid potential has and has not worked. *Id.*

399 *Id.*

- Tailings failure scenarios (including liquefaction releases at a range of different percentages of total tailings storage);[400]
- Best available mine technologies; and
- Mine ore processing methods.

Such a robust review is supported by Northern Dynasty Minerals itself, who stated:

> [t]he NEPA EIS process requires a *comprehensive 'alternatives assessment' be undertaken to consider a broad range of development alternatives* and, as such, the final project design and operating parameters for the Pebble Project and associated infrastructure may vary significantly from the proposed project described in the Project Description.[401]

This clearly is not the case. Given the fact that there are no variations or alternatives for the mining site and all the facilities at the mining site, it is not true to say that the final project design for the mine area will look different than what is presented in all three options in the DEIS.

The alternative screening criteria used to determine the range of alternatives should have been used to ensure that the least environmentally damaging alternative is assessed at each component stage. Such review could have ensured that the project involves an alternative that includes the least environmentally damaging alternative for the mine location, tailings location, type of tailings storage facility, road alignment, port location, pipeline route, etc.[402] Each alternative for each component would clearly set out the impacts to the terrestrial and aquatic ecosystems. It would be clear which alternative poses the least impacts to fish, wildlife, subsistence and socio-cultural resources, and people who rely on the resources of Bristol Bay. But the Corps does not adopt this approach.

For each alternative, the Corps should have included a general life cycle economic cost analysis. Without such analysis, it is not possible for the Corps, cooperating agencies and tribes, and the public to review and comment on what is/is not a viable alternative. As noted above, the Corps must independently verify any economic projections provided by the applicant. The Corps fails to provide any such cost analysis to frame what is or is not practicable.

B. Alternatives Were Improperly Dismissed.

Several alternatives, variants, or options were inappropriately dismissed/screened out on grounds that they were not economically viable.[403] This is ironic given the fact that PLP has failed

[400] *Id.* at 17.
[401] *See* Northern Dynasty Minerals, Ltd., Management's Discussions and Analysis, Year Ended December 31, 2017, Mar. 29, 2018, at 11.
[402] *See e.g.*, O'Neal, 2019 at 2 (noting that "the consideration of potential project alternatives in the DEIS are insufficient. None of the alternatives describe significant changes to the mine footprint and potential downstream impacts of the footprint itself, which are likely to create some of the greatest impacts to fish and aquatic habitat from the project.").
[403] DEIS App. B at B–2.

to demonstrate that its own 20-year mine proposal is economically feasible.[404] For example, the screening criteria removed the Pyramid project from review on the grounds that there were no "assurances that the resources exist in the necessary quantity and quality" and therefore no investment in the mine.[405] In utilizing commercially viability in determining whether alternatives are reasonable, the Corps must undertake an independent analysis.[406] The Corps has failed to meet this burden and cannot meet this burden until PLP prepares an economic assessment.

EPA called into question the decision to reject alternatives based on a reasonable rate of return. As EPA notes,

> **LAY-005 and TPD-002:** These options are dismissed because they would not provide a "reasonable rate of return." As discussed at the August 22, 2018 cooperating agency meeting, more information is needed describing what is considered a reasonable rate of return and how it compares with the rate of return of the proposed action. Otherwise the basis for dismissing these options is not substantiated.[407]

and

> **TPD-002**: This option was dismissed based on an optimization study that showed it would not have a "positive net present value" or "reasonable return on investment." If these indicators are being used to screen out alternatives, then this same information should be provided for the proposed action. Please provide more information that defines: (1) the thresholds for positive net present value and reasonable return on investment; (2) the net present value and return on investment for the proposed action; and (3) the estimated net present value and return on investment for options that are eliminated based on these factors.[408]

Borden also called into question the dismissal of Option LAY-005, noting that "no reasonable smaller mine options that were sized between this extremely small case and the proposed full plan were even considered."[409] Borden laid out that a 16-year mine, with the same throughput, would only reduce the net present value by roughly 10%.[410] Yet, Borden notes that the extent of impacts could be substantially reduced:

> The environmental benefits of producing only 1050 million ton of ore instead of 1300 million tons could be substantial including: 1) a potential two square mile

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[404] *See* Borden, 2019f at 2–4 (evaluating the net present value for the 20-year proposed mine and finding that it "would almost certainly fail the DEIS alternatives screening criteria" because it is not "practical or feasible from the technical and economic standpoint.").
[405] DEIS App. B at B–7.
[406] *Utahns for Better Transp. v. U.S. Dep't of Transp.*, 305 F.3d 1152, 1187 (10th Cir. 2002).
[407] *See* EPA Comments on Pebble Preliminary Alternatives Development Process, Oct. 3, 2018 at 2.
[408] *Id.* at 3.
[409] *See* Borden, 2019f at 4.
[410] *Id.*

> (>1200 acre) reduction in total disturbed footprint for the bulk tailings storage facility, the pyrite tailings storage facility, the open pit, water management ponds and the quarry sites; 2) a substantial reduction in the final height of the bulk tailings impoundment which will reduce the in perpetuity risk of catastrophic failure; 3) a substantial reduction in water treatment requirements during operation and after closure; 4) a reduction in dewatering impacts associated with the open pit; 5) a reduction in impacts to surface water quality, flow regime and temperature due to water extraction, use and discharge 6) a roughly 20% reduction in the mass of pyritic tailings and potentially acid forming waste rock that must be returned to the open pit at closure; and 7) a shortening of the period of operational risk associated with spills, leakage, noise, air and greenhouse gas emissions from 20 to 16 years.[411]

However, the DEIS excludes review of any mine smaller than that proposed by PLP on the grounds that it would not have a favorable rate of return. As Borden highlights, even small changes could have substantial impacts and that the reductions would lead to an alternative that is less environmentally damaging. The DEIS fails to justify why such an alternative is not practical.

As discussed above, PLP has failed to prepare and release either a pre-feasibility or feasibility study.[412] Without a feasibility study, it is impossible at this time to define the range of alternatives under the currently drafted purpose and need. Any applicant assertion regarding design criteria and what is or is not economically viable or prohibitively expensive must be rigorously assessed and verified by the Corps. While commercial viability is a factor, it should not be the primary reason for excluding alternatives from review when there are no benchmarks or sideboards to determine what is or is not viable. Because PLP has offered nothing to support the assertion that mining the Pebble deposit is economically viable, it is improper to take PLP's word that other options, like Pyramid, would not be viable.

In addition, for the reasons identified in Section VII.B, several other alternatives were improperly dismissed on unsubstantiated grounds. For example, rejecting consideration of "massive sulfide deposits in Alaska" because they "do not contain molybdenum" is improper. Requiring molybdenum as an element of the purpose statement makes the practical impractical.

C. The 20-Year Mine Scenario Includes an Impractical Closure Plan.

PLP proposes to backfill the pit with acid-generating tailings and waste rock after twenty years of mining. PLP does not identify, and the Corps does not address, that placing this acid-generating pyritic waste in the pit after twenty years would comprise future mining. This action would sterilize the mineral resource.[413] Chambers states that "[t]he effect would prohibit any future open pit mining because the pit would not only need to be drained of any accumulated water, but the backfilled tailings and waste rock would need to be removed. This would probably be prohibitively expensive for the foreseeable future."[414]

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[411] *Id.*
[412] *See supra* Section III.C.3.
[413] *See* Chambers, 2019 at 10.
[414] *Id.*

Including the 20-year mine scenario as proposed as an alternative is neither reasonable nor practical. No mining company would jeopardize current or future investor partnerships with a plan that intentionally sterilizes 88% of the mineral resource. PLP offers no valid reason for why it would only mine for twenty years and store its toxic waste in a manner that would preclude any future development. The DEIS should not have considered a plan that substantially jeopardizes the likely and reasonably foreseeable future development as reasonable. While it may be reasonable to mine for only twenty years, the plan to store the waste in the pit is not and should not be considered as part of the proposed project. PLP must revise its twenty-year plan with a post-closure waste storage plan that is both practical and reasonable.

D. The DEIS Should Consider the 78-Year Mine as an Alternative.

As discussed above, PLP has consistently told investors and the mining world that it is sitting on a resource that could support mining for generations and hundreds of years.[415] Since withdrawing its feasibility assessment, there has been nothing that PLP can rely on to support the assertion that the 20-year mine is viable. However, there is significant evidence to the contrary. Because there are no feasibility studies, it is improper to rely on PLP's word that it only wants to mine for 20 years. The DEIS must consider the 78-year mine, not just as a reasonably foreseeable event, which it clearly is, but as an actual alternative. This would require PLP to provide more data and information about the real project and would allow for a more informed analysis of how this project is likely to impact the environment. As an alternative in its own right, the Corps would have to consider the direct and indirect impacts and evaluate those impacts alongside other alternatives.

The EPA has encouraged the Corps to consider the 78-year mine as an alternative:

> Even though the larger mine size will be considered as a reasonably foreseeable future activity, given that "Northern Dynasty has communicated to shareholders that expanded development is possible," we recommend that possible expansion be considered in the design and layout of the alternatives. For example, a mine size/time period extension could extend the period that [potentially acid-generating] waste and tailings are stored and exposed to the atmosphere (oxygen and precipitation), which increases the potential for the material to begin generating acidity and leaching metals. If a longer period of [potentially acid-generating] storage outside of a completed pit is anticipated, mitigation measures to keep the materials from becoming acidic over this time should be considered in the original design or alternatives. We recommend that the analysis of indirect and cumulative effects consider how management of wastes during operations might need to change to mesh with goals for closure management under the extended mine life/size (cumulative effects) scenario.[416]

There are several reasons why a 78-year mine is more than just reasonably foreseeable:

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[415] *See* Section I.D.
[416] *See* EPA Comments on Pebble Preliminary Alternatives Development Process, Oct. 3, 2018 at 3.

- Northern Dynasty Minerals has made numerous statements to investors about mining for a much longer period of time and how the 20-year mine is just the "initial" phase;[417]
- there is no feasibility analysis for the small mine;[418]
- the 20-year mine would only extract 11% of the deposit;[419]
- the infrastructure costs are approximately $9 billion dollars;[420]
- operational costs over the twenty years are approximately $14.7 billion dollars;[421]
- 20-year mine closure costs are likely to exceed $1.5 billion dollars;[422] and
- with the significant upfront costs, it is likely that the 20-year mine has a negative net present value.[423]

By only seeking a permit for the first 20 years of mining, PLP and the Corps are unlawfully segmenting the NEPA analysis. In development projects where it "would be irrational, or at least unwise, to undertake the first phase if subsequent phases were not also undertaken," the EIS must consider the larger project.[424] From the vantage point of Northern Dynasty Mineral shareholders, it would be unwise and completely irrational to invest upwards of $24 billion dollars only to recover 11% of the deposit. The DEIS provides no assessment of anticipated costs, net present

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[417] *See supra* Section I.D.2.
[418] *See supra* Section III.C.3.
[419] *See supra* Section I.D.2.
[420] *See* NDM, Press Release, *Northern Dynasty Refutes Short Seller Claims*, Feb. 17, 2017 at 8, *available at* https://www.sec.gov/Archives/edgar/data/1164771/000106299317001035/exhibit99-1.htm ("a review of a preliminary draft US$13 billion mine planning scenario by an independent engineering firm commissioned by Northern Dynasty identified issues with that study and identified savings that reduced the preliminary capital estimate by US$4 billion.") (included as an attachment with these comments). While the Wardrop report estimated $6 billion in initial capital costs, it estimated a sustaining capital requirement of $3.2 billion, estimating a $9+ billion dollar cost in 2011. *See* NDM, Press Release, *Northern Dynasty Receives Positive Preliminary Assessment Technical Report for Globally Significant Pebble Copper-Gold-Molybdenum Project in Southwest Alaska*, Feb. 23, 2011, at 10–12 *available at*: https://www.sec.gov/Archives/edgar/data/1164771/000106299311000722/exhibit99-1.htm (included as an attachment with these comments).
[421] The Wardrop report states that "operating costs" are $11.16 per ton milled. *See id*. At the Project Description milling rate of 66 million tons per year (Draft EIS Appx. N, page 1), the operating cost is $736,560,000 per year. Multiplied out over the 20 years, the operating costs are estimated at $14,731,200,000 for the life of the mine. These figures are in US dollars and were estimates in 2011. The actual cost can only be expected to increase over time. As a result, these estimates are conservative.
[422] *See* Borden, 2019d at 1, 7–10 ("Should mining be initiated, there will undoubtedly be intense financial pressure to defer these closure expenditures by continued mining as the uneconomic 20-year mine plan approaches its end.").
[423] *See supra* Section III.C.3.
[424] *See Trout Unlimited v. Morton*, 509 F.2d 1276, 1285 (9th Cir. 1974); *see also Cady v. Morton*, 527 F.2d 786, 793–95 (9th Cir. 1975) (finding EIS that evaluated first five years of a mining project inadequate, noting that capital investments are relevant to a determination of the interdependence of staged activities and ultimately requiring that an EIS assess the entire project).

value, or a pre-feasibility analysis. The Corps has an independent duty to evaluate PLP's proposal. It has utterly failed to satisfy its obligations under the CWA and NEPA.

VI. THE DEIS FAILS TO TAKE A "HARD LOOK" AT DIRECT, INDIRECT, AND CUMULATIVE IMPACTS.

The EIS must assess the direct, indirect, and cumulative effects of the proposed project on the human environment, as well as means to mitigate adverse environmental impacts.[425] The effects and impacts to be analyzed include ecological, aesthetic, historical, cultural, economic, social, and health impacts.[426] Direct effects are those that are caused by the project and that occur in the same time and place.[427] Indirect effects are those that are somewhat removed in time or distance from the project, but nonetheless reasonably foreseeable.[428]

The EIS must consider actions that are connected with, or closely related to, the project in question.[429] NEPA requires that "connected actions" and "cumulative actions" be considered together in a single EIS.[430] "Connected actions" are defined as actions that: automatically trigger other actions which may require EISs; cannot or will not proceed unless other actions are taken previously or simultaneously; or are interdependent parts of a larger action and depend on the larger action for their justification.[431]

Indirect effects "are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable."[432] In contrast, "cumulative impact" is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."[433] "Cumulative impacts" include those impacts "which when viewed with other proposed actions have cumulatively significant impacts."[434] Such impacts can result from individually minor but collectively significant actions taking place over a period of time.[435]

In its cumulative impacts analysis, the Corps must take a "hard look" at all past, present and reasonably foreseeable future actions:

> [A]nalysis of cumulative impacts must give a sufficiently detailed catalogue of past, present, and future projects, and provide adequate analysis about how these projects, and differences between the projects, are thought to have impacted the

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[425] 40 C.F.R. §§ 1502.16, 1508.25(c).
[426] *Id.* at § 1508.8.
[427] *Id.* at § 1508.8(a).
[428] *Id.* at § 1508.8(b).
[429] *Id.* at § 1508.25(a)(1).
[430] *Id.* at § 1508.25.
[431] *Id.* at § 1508.25(a)(1).
[432] *Id.* at § 1508.8(b).
[433] *Id.* at § 1508.7.
[434] *Id.* at § 1508.25(a)(2).
[435] *Id.*

> environment . . . . Without such information, neither the courts nor the public . . . can be assured that the [agency] provided the hard look that it is required to provide.[436]

"Effects are reasonably foreseeable if they are sufficiently likely to occur that a person of ordinary prudence would take [them] into account in reaching a decision."[437] In an EPA NEPA guidance document, EPA noted:

> [P]rojects need not be finalized before they are reasonably foreseeable. "NEPA requires that an EIS engage in reasonable forecasting. Because speculation is . . . implicit in NEPA, [] we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry." *Selkirk Conservation Alliance v. Forsgren*, 336 F.3d 944 (9th Cir. 2003). As the [EPA] also has noted, "reasonably foreseeable future actions need to be considered even if they are not specific proposals.[438]

The Corps may not rely solely on the one-sided information and conclusions contained in PLP's permit application. As the lead agency responsible for developing the EIS, the Corps is obligated to obtain appropriate baseline data for the project area and do a thorough analysis of potential impacts from the proposed project.

For most of the resources reviewed in the DEIS, the Corps has failed to take a hard look at direct, indirect, and cumulative effects. The DEIS fails to appropriately consider connected actions and reasonably foreseeable future actions. The DEIS fails to provide the necessary baseline data, underestimates the known impacts, and in some cases simply ignores information that must be included in a legally sufficient environmental analysis. A few of the problems addressed in this section include the DEIS's failure to consider direct, indirect, and cumulative impacts to wetlands, water quality, fish, birds, and wildlife; the DEIS overestimation of economic benefits to local communities and underestimation of costs to the State of Alaska; The DEIS's failure to include all impacts to brown bears and its failure to consider the wildlife watching businesses that will be substantially hurt by the proposed Pebble Mine; the DEIS's failure to consider the impacts from a Tailings Storage Facility that will be operated in perpetuity, and has a high probability of failure; and the DEIS's failure to acknowledge extensive water quality impacts to the aquatic ecosystem. The DEIS assumes, incorrectly, that the proposed mine could capture 100% of all contaminated water and it lacks many important components, including reclamation or post-closure plans.

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[436] *Te-Moak Tribe of W. Shoshone v. Dep't of Interior*, 608 F.3d 592, 603 (9th Cir. 2010) (rejecting NEPA review for mineral exploration operation that failed to included detailed analysis of impacts from nearby proposed mining operations).
[437] *EarthReports Inc. v. Federal Energy Regulatory Commission*, 828 F.3d 949, 955 (D.C. Circuit 2016).
[438] Environmental Protection Agency, *Consideration of Cumulative Impact Analysis in EPA Review of NEPA Documents*, Office of Federal Activities, May 1999, at 12–13, https://www.epa.gov/sites/production/files/2014-08/documents/cumulative.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

A. Wetlands and Aquatic Ecosystem

The Pebble project would cause devastating adverse impacts to the wetland and other water resources at the mine site and its associated components. The DEIS identifies that the project will destroy 3,560 acres of wetlands, indirectly impact another 1,896 acres of wetlands, temporarily destroy 510 acres of wetlands and destroy 81 miles of streams.[439] For reasons discussed below in Section VI.Y, the DEIS underestimates actual loss of wetlands and streams. Were this project to receive a Section 404 permit from the Corps, it would be the largest and most damaging project ever authorized under the CWA.

1. The project site is located among pristine headwaters.

As highlighted above in Section I.A, the Bristol Bay watershed is a pristine and intact environment. The Pebble deposit sits at the headwaters of tributaries to the Nushagak and Kvichak Rivers. As Matthew Schweisberg, former EPA Region 1 Chief of Wetlands Protection Program and Senior Wetlands Ecologist, states:

> These headwater systems provide high-quality habitat for numerous fish species and supply water, invertebrates, organic matter, and other resources to larger downstream waters. Because of their crucial influence on downstream water flow, chemistry, and biota, the importance of headwater systems reverberates throughout entire watersheds downstream (Freeman *et al*. 2007, Meyer *et al*. 2007).
>
> Headwater streams and spring (headwater) wetland habitats are particularly important in establishing and maintaining fish and wildlife diversity. These habitats support assemblages that include both resident and migrant fish, and provide spawning and nursery areas for fish species that use larger streams, rivers, and lakes for most of their freshwater life cycles (e.g., Pacific salmon and rainbow trout) (Quinn 2005). The use of headwater streams and wetlands by a variety of fish and wildlife species has been observed in many aquatic ecosystems (see Meyer *et al*. 2007 for a thorough review).
>
> Headwater streams and wetlands play a vital role in maintaining diverse, abundant fish populations—both by providing high-quality fish habitat themselves and by supplying energy and other resources needed to support fish in connected downstream habitats. Headwater streams and wetlands are abundant in the Pebble deposit area and likely play a crucial role in supporting local and downstream fish populations (PD, July 2014). [440]

Schweisberg also highlights the interconnected ecological value of these headwaters and the pristine nature of the aquatic ecosystem, noting,

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[439] DEIS at 4.22-33, Table 4.22-10.
[440] *See* Schweisberg, 2019a at 2.

> One component of the watershed's physical setting, however, is particularly important to note: the watersheds draining to Bristol Bay provide intact, connected habitats from headwaters to ocean. Unlike most other areas supporting Pacific salmon populations, the Bristol Bay watershed is undisturbed by significant human development and impacts. It is located in one of the last remaining virtually roadless areas in the United States (BBA, January 2014, Chapter 6). Large-scale, human-caused modification of the landscape is absent, and development in the watershed consists of only a small number of towns, villages, and roads. The Bristol Bay watershed also encompasses Iliamna Lake, the largest undeveloped lake in the United States.[441]

In considering the impacts of filling wetlands and streams at the headwaters of important Bristol Bay tributaries, the pristine nature of this area is a fact that cannot be over-emphasized.

2. Lack of field-verified wetlands mapping precludes a hard look at direct, indirect, and cumulative impacts to wetlands.

As discussed above, in Section III.C.2, there are numerous data gaps. Among the most critical and egregious data gaps is the lack of wetlands mapping. Because PLP is seeking a CWA 404 application for one of, if not the, largest wetlands fill projects in the United States, the Corps cannot conduct the required hard look analysis without the results of rigorous on-the-ground surveys for every impacted area. But neither PLP nor the Corps has gathered this critical information. PLP's failure to do such elemental work indicates that PLP was not ready to submit a CWA 404 application and that the Corps should not have deemed the application complete.

The Corps acknowledges the lack of this critical information in section 3.22 of the DEIS:

> [f]or Alternative 1, PLP's preferred alternative, field-verified wetland mapping through 2018 covers the entire project footprint except for the pipeline crossing of Cook Inlet, and the 0.5-mile pipeline corridor and compressor station near Anchor Point on the Kenai Peninsula.[442] For these areas, the Cook Inlet Lowlands wetland project prepared by the Kenai Watershed Forum (Gracz 2013) was applied. Wetland and waterbody data, not including the Kenai Peninsula, was confirmed in the [PJD] (Appendix J).
>
> The analysis area for the Kokhanok East Ferry Terminal Variant of Alternative 1 also lacks field verified mapping, and [National Wetlands Inventory (NWI)] data

[441] *Id.* at 4.
[442] It is also noteworthy that PLP's field data for the mine site are considered out-of-date by the Corps' national policy (*see* U.S. Army Corps of Engineers Regulatory Guidance Letter 16-01, Oct. 2016) (included as an attachment to these comments), given that those data were collected in 2004, 2007, and 2008. Only the transportation corridor between the mine site and Cook Inlet, via Iliamna Lake, was evaluated recently enough to be considered current under Corps national policy. *See also* Yocom, June 17, 2018, *Questioning the Corps' Preliminary Jurisdictional Determination for POA-2017-271* (Yocom, 2018a) (previously provided as an attachment with Trustees for Alaska's scoping comments).

> is not available for this area; this area is approximately 1,300 acres. Wetland mapping for this area was obtained from publicly available synthetic aperture radar satellite data (the Advanced Land Observing Satellite Phased Array type L-band Synthetic Aperture Radar, also referred to as ALOS PALSAR) (Clewley et al. 2015). Wetlands were mapped at 100-meter resolution. *This data provides a coarse estimate of wetland boundaries compared to either field-verified mapping or NWI mapping* .
>
> The EIS analysis areas for Alternatives 2 and 3 include areas that lack complete field-verified wetland mapping. These include:
>
> - Alternative 2 natural gas pipeline overland corridor lacks field-verified mapping for 579 acres (35 percent) of the analysis area of 1674 acres.
> - Alternative 3 natural gas pipeline overland corridor lacks field-verified mapping for 285 acres (95 percent) of the analysis area of 299 acres, mostly from Ursus Bay to Diamond Point.
> - Alternatives 2 and 3 Diamond Point port lack field-verified mapping for 299 acres (90 percent) of the analysis area of 333 acres.
> - Alternative 2 transportation corridor lacks field-verified mapping for 1,287 acres (21 percent) of the analysis area, mostly for the Pile Bay ferry terminal and access road, and Eagle Bay ferry terminal and access road.
> - Alternative 3 transportation corridor lacks field-verified mapping for 676 acres (8 percent) of the analysis area of 9,010 acres.
>
> For portions of the EIS analysis areas lacking field-verified mapping, NWI data was analyzed (NWI 2018). The NWI maps provide a reconnaissance-level depiction of the location, type, and size of wetlands; NWI data do not provide the level of detail of field-verified mapping. For purposes of this analysis, NWI wetland types have been grouped to match the project units used for the environmental baseline study program. Remaining wetland data gaps would be addressed during the 2019 field season for reporting in the Final EIS (FEIS). See Section 3.1, Introduction to Affected Environment, for discussion on data gaps analysis for the Draft EIS (DEIS).[443]

The DEIS identifies that upwards of 95% of the wetlands in the northern corridor have not been mapped. And the DEIS correctly notes that NWI data cannot serve as a proxy for field-verification. The absence of this critical data precludes the fully informed decisionmaking and public participation required by NEPA. As Schweisberg concludes:

> the DEIS explains that the extent of wetlands and wetlands affected adversely by the mine project are likely under-estimated, perhaps significantly. If these data gaps will not be addressed till this year's field season, the DEIS contains inaccurate and unreliable information. The DEIS should not have been issued absent this key information.[444]

[443] DEIS at 3.22-4 to 3.22-5 (emphasis added).
[444] Schweisberg, 2019a at 3.

3. *The DEIS fails to accurately assess wetland classification and ecological functions.*

The discussion in the DEIS of wetland functions and values "are 'text book' general,"[445] and violate NEPA's requirement of fully informed decisionmaking. The assessment fails to actually define the ecological functions of the wetlands in the study area. As Schweisberg notes, "[a]ttributing specific ecological functions by generic NWI or [hydrogeomorphic approach (HGM)] class is both indefensible and a substantial misuse of the both schemes."[446] NWI is not designed to attribute specific ecological functions to specific wetlands.[447] While HGM can be useful for discerning different wetland types across a landscape, it is limited to "broad-based ecological functions."[448] Schweisberg notes that the usefulness of HGM is limited without developing associated functional assessments.[449] As discussed in greater detail in Section VII.E.3, PLP does not plan to develop a functional assessment. Absent such an assessment, HGM "should not be used to prescribe specific ecological functions to specific wetlands."[450] Schweisberg concludes that

> The DEIS only provides a description of wetlands by general class and the percentage of that class that would be affected as compared to the total amount of wetlands, which is of little use in understanding the actual adverse impacts that accrue from development and operation of the Pebble Mine project. Field assessment of ecological functions for the wetlands (or a representative sample) that would be adversely affected should have been performed.[451]

Even if the Corps' broad-brush approach to wetland classification were permissible under NEPA (which it is not), this assessment would still be fatally undermined by the lack of verified data. Section 4.22 of the DEIS, assessing the environmental consequences to wetlands and other waters and special aquatic sites, is rife with acknowledgments of critical missing data:

- "Riffle and pool complexes occur in an undetermined portion of the upper perennial and intermittent stream channels."[452]
- "The extent of riverine wetlands in the watershed is not known."[453]
- "The total extent of bogs and fens within the watershed was not mapped and remains unknown."[454]
- "The extent of bogs in the watershed is not known."[455]

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[445] *Id.* at 4.
[446] *Id.*
[447] *Id.* at 5.
[448] *Id.*
[449] *Id.*
[450] *Id.*
[451] *Id.*
[452] DEIS 4.22-5, 4.22-21, 4.22-28
[453] *Id.* at 4.22-9, 4.22-15.
[454] *Id.* at 4.22-9
[455] *Id.* at 4.22-16

By omitting critical data about the extent of certain wetland types and special aquatic sites, the DEIS fails to provide decisionmakers and the public with information that is critical to understanding the project's impacts on wetlands, other waters, and special aquatic sites.

4. *The DEIS misuses threshold analysis to determine impacts on wetlands.*

i. The DEIS inappropriately focuses on percentage of wetlands and streams lost.

In the DEIS, the Corps repeatedly references the loss of wetlands as they relate to the total amount of wetlands in Bristol Bay. For example, the DEIS states that:

> The magnitude of impacts to wetlands and other waters was assessed relative to *their perceived importance and extent within a watershed*. Impacts to high-value wetlands, such as riverine wetlands, were deemed to be of greater magnitude, even when a relatively small proportion (i.e., greater than 5 percent) of these wetlands would be disturbed within a particular watershed. *To assess the relative magnitude and extent of impacts within an ecological context, project impacts were compared to the relative proportion of common wetland types in each watershed*. USGS Hydrologic Unit Code Tenth Level (HUC 10) watersheds were used for this purpose.[456]

In the chapter assessing impacts to wetlands, the DEIS utilizes this approach, finding:

> In terms of magnitude and extent, mine site activities would directly affect 2,665 acres of shrub wetlands, and 691 acres of herbaceous wetlands in the Headwaters Koktuli River watershed (Table 4.22-1). **This represents approximately 12 percent and 7 percent, respectively, of shrub and herbaceous wetlands in the watershed**. No forested wetlands and less than 0.1 acre of aquatic bed wetlands would be affected.
>
> Riverine wetlands are considered regionally important in the watershed based on their connections to important fish and wildlife species (see Section 3.22, Wetlands and Other Waters/Special Aquatic Sites). The magnitude of impacts would be that a total of 236 acres of riverine HGM-class wetlands in the Headwaters Koktuli River watershed would be directly affected by activities at the mine site. The extent of riverine wetlands in the watershed is not known. They account for approximately 3 percent of the mine site analysis area. Using this percentage for the entire watershed, there would be roughly 5,000 acres of riverine wetlands. Therefore, **the extent of impacts to riverine wetlands from mine site activities would represent approximately 5 percent of all riverine**

[456] DEIS at ES-59. For reasons identified by Dr. Gracz, HUC 10 is an inappropriate scale to assess impacts. Gracz, Michael, May 24, 2019, *Is a Finding of Significant Degradation in a 404(b)(1) Analysis of the Pebble Project Scientifically Supportable?*, prepared for the Wild Salmon Center (Gracz, 2019) at 2–3 (report and references included as attachments to these comments).

> **wetlands in the watershed**. Less than 1 acre of riverine HGM-class wetlands in the [Upper Talarik Creek] watershed would be directly affected by activities at the mine site.
>
> Bogs and fens are a regionally important subclass of shrub wetlands (see Section 3.22, Wetlands and Other Waters/Special Aquatic Sites). Based on vegetation and wetland mapping for the project, 375 acres of bogs and fens within the Headwaters Koktuli River watershed would be directly affected by activities at the mine site. The total extent of bogs and fens within the watershed was not mapped and remains unknown. They account for approximately 3.5 percent of the mine site analysis area. Using this percentage for the entire watershed, there would be roughly 6,000 acres of bogs and fens in the watershed. Therefore, **impacts to bogs and fens would represent approximately 6 percent of all bogs and fens in the watershed**. Approximately 30 acres of bogs and fens in the [Upper Talarik Creek] watershed would be directly affected by activities at the mine site. This is estimated to be roughly 1 percent of bogs and fens in the watershed.
>
> Based on NWI mapping, the Headwaters Koktuli River watershed is estimated to contain approximately 3,640 acres of lakes and ponds, and 1,160 acres of rivers and streams. In terms of magnitude and extent, mine site activities would directly affect 47 acres of ponds, and 47 acres of rivers and streams. **These impacts represent roughly 1 percent of all lakes and ponds, and 4 percent of all rivers and streams in the watershed**. There are an estimated 488 miles of stream channels in the watershed, based on the National Hydrography Dataset. Approximately 73 miles of stream channels would be directly impacted by mining activities. **These impacts represent roughly 15 percent of all stream channel length in the watershed.**[457]

The DEIS cumulative impacts analysis for wetlands states:

> The Pebble mine expanded development scenario mine site footprint would impact approximately 29,632 acres, compared to 8,086 acres under Alternative 1. The total number of wetlands potentially affected under this scenario would amount to an additional 12,445 acres. This calculation assumes that 42 percent of the new affected area (29,632 acres) is wetlands, based on the Alternative 1 wetlands analysis. This additional 12,445 acres of potential wetlands disturbance represents 0.5 percent of the estimated 2,696,000 acres of wetlands in the analysis area.[458]

PLP's draft Conceptual Compensatory Mitigation Plan utilizes the same approach, measuring the percent of wetlands or other water bodies lost as a result of fill.[459]

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[457] DEIS at 4.22-8 to 4.22-9 (emphasis added).
[458] DEIS at 4.22-39 to 4.22-40.
[459] *See* DEIS App. M at M2.0, Pebble Draft Conceptual Compensatory Mitigation Plan at 22–25.

Focusing on percentages of lost wetlands and streams as compared to a watershed indicates that PLP and the Corps intend to use the threshold approach to assess impacts, including whether the loss of the thousands of acres of headwater wetlands and tens of miles of streams would cause or contribute to significant degradation.[460] The threshold approach is based off a body of scientific literature that utilizes the amount of disturbed land cover to determine significant degradation.[461] The literature has evaluated the "negative relationship between watershed urbanization and various indicators of aquatic resource quality."[462] The "percent urbanization or impervious cover (IC)" serves as a surrogate to measure impacts.[463] EPA summarizes the scientific literature, noting:

> Studies evaluating these relationships have reported variable results, depending primarily on the particular indicators and parameters assessed, as well as various watershed-specific and site-specific characteristics. However, general conclusions from the body of literature have been summarized by permit applicants using the threshold approach, stating that "the consensus among aquatic scientists and landscape ecologists is that statistically significant impacts to the aquatic resources and functions of a watershed occur once approximately 10% of land within a watershed is urbanized. . . . Applicants adopting the threshold approach have specifically referenced the Impervious Cover Model (ICM), first introduced in 1994 as a conceptual model to describe the negative relationship between impervious cover (IC) and various indicators of stream health and to predict the severity of stream degradation in developing watersheds. Developed from an extensive body of research, the ICM projects that hydrological, habitat, water quality, and biotic indicators of stream health decline at around 10% IC. [464]

In the analysis of the DEIS provided by Dr. Gracz, Dr. Gracz notes that

> [t]hresholds for measurable declines in stream quality have been identified in many studies, although there is only one study that has been conducted in Alaska, by Ourso and Frenzel (2003). Ourso and Frenzel report that impervious cover at the lower end of the range, between 4-5%, produces measurable declines in water quality in Anchorage watersheds. This lower percentage suggests that stream quality in boreal watersheds may be more sensitive to impervious cover.[465]

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[460] *See* Gracz, 2019 at 2.
[461] *See* Environmental Protection Agency, White Paper, Technical Review of a Threshold-based Approach for Determining Significant Degradation in Alaska, July 5, 2018, at 3 (included as an attachment to these comments); *see* Gracz, 2019 at 2 (noting that "The analysis of developed land or impervious cover as a method that could be used to inform a finding of significant degradation is supported by a body of scientific literature. That literature describes a range of between 2–15% cover of impervious surface in a watershed before declines in stream quality become measurable. . . .").
[462] *Id.* at 1.
[463] *Id.*
[464] *Id.* at 4 (citations omitted).
[465] Gracz, 2019 at 2.

Dr. Gracz re-evaluated the loss of wetlands from the Pebble Project at the HUC 12 scale, providing a more accurate depiction of what the loss looks like in the watershed.[466] His analysis was conservative because it it is performed in a pristine watershed at an extent nearly three times larger than the upper range of the model domain (~35,000 vs. 12,500 acres). Therefore, percentages of impacted wetlands at the scale of the 12-digit HUC should be interpreted as minimums. Some watersheds at sizes within the model domain of the ICM will exhibit larger percentages of impacted wetlands because the impacts are not uniformly distributed in the 12-digit HUC.[467]

Dr. Gracz's analysis found "[u]nder alternative 1 and variants,18% of the wetlands mapped by NWI in the Groundhog Mountain HUC will be unavoidably and permanently impacted. Countering the Corps' contention that HUC 12 analysis would not benefit the reader,[468] Dr. Gracz found the analysis beneficial to predict significant degradation.[469] Dr. Gracz noted that if the analysis was done in a manner that matched the watershed size to the model domains, "unavoidable impacts would almost certainly exceed 50%."[470] Dr, Gracz found that conducting the ICM analysis at the appropriate scale indicates that "the extent of these impacts will place that watershed surrounding the tributary firmly within or above the limit of the "Nonsupporting" category of the ICM."[471]

ii. The Threshold Approach is inappropriate for evaluating impacts from the Pebble Project.

While the analysis by Dr. Gracz shows extensive loss of wetlands, as compared to the HUC 10 analysis performed by the Corps, it is inappropriate to rely on the ICM approach to determine impacts from the loss of wetlands. The Corps' reliance upon a determination that loss of less than a certain percentage (e.g. 10% of wetlands) in a watershed demonstrates that the project will not significantly degrade the aquatic environment or have significant impacts is misplaced. As Schweisberg notes, "[the threshold] approach completely misuses the concept of percentages and thresholds, which primarily were developed to better understand the adverse effects on water quality in streams, ponds, and lakes located in urban and suburban setting."[472] The approach has been called out by EPA on several occasions and by individuals asked to

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466 *Id.* at 5.
467 *Id.*
468 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.22 – Wetlands and Other Waters/Special Aquatic Sites, at Corps Response to EPA Comment #1, at 1 ("The analysis uses the USGS 10-digit hydrologic unit code (HUC) as a standard watershed scale. Dividing the analysis area into sub-watersheds (12-digit hydrologic units) would greatly multiply the amount of data to convey, without providing a benefit to the reader.") (included as an attachment to these comments in a combined collection of all cooperating agency documents, titled, 2018-2019 Cooperating Agency DEIS Comments and Corps Response Matrix).
469 Gracz, 2019 at 5.
470 *Id.*
471 *Id.*
472 Schweisberg, 2019a at 5.

review the DEIS. For the reasons discussed below, relying on the threshold approach to assess impacts to wetlands and stream is arbitrary under both the CWA and NEPA.

a. EPA raised concerns in the Proposed Determination.

In the Proposed Determination, EPA dismissed a similar approach of marginalizing impacts. PLP had argued that loss of aquatic resources from fill was "inconsequential when put into the context of the overall Nushagak/Kvichak drainages and Bristol Bay region."[473] PLP had used the same percentage approach to defend the 0.25 mine scenario on the grounds that it would only destroy 0.05% and .004% of the streams and wetlands in the Bristol Bay watershed, respectively.[474] However, EPA rejected this approach:

> This perspective is flawed because it assumes that these habitats are less ecologically valuable than streams, wetlands, and other aquatic habitats elsewhere in the watershed and ignores the important role that individual streams or stream reaches, wetlands, lakes, ponds, and other aquatic habitats can play in protecting the genetic diversity of Bristol Bay's salmon. In the Bristol Bay region, hydrologically diverse riverine and wetland landscapes provide a variety of salmon spawning and rearing habitats. Environmental conditions can differ among habitats in close proximity, and recent research has highlighted the potential for local adaptations and fine-scale population structuring in the Bristol Bay and neighboring watersheds (Quinn *et al*. 2001, Olsen *et al*. 2003, Ramstad *et al*. 2010, Quinn *et al*. 2012). Losses that eliminate local, unique populations would erode the genetic diversity that is crucial to the stability of the overall Bristol Bay salmon fisheries (Hilborn *et al*. 2003, Schindler *et al*. 2010, EPA 2014a: Appendix A, EPA 2014b).[475]

Moreover, the Proposed Determination pointed out that,

> PLP's approach is also problematic because it is inconsistent with [Corps] guidance in effect since 1989. In this 1989 guidance, [Corps] Headquarters specifically criticizes New Orleans District [Corps]'s assertion that wetland losses associated with a project under review were "inconsequential" because ". . . project alterations of wetlands represents a very small portion of similar habitat within the project vicinity and coastal Louisiana . . . only 2.39% of the saline marsh on Grand Isle and only 0.005% of the saline marsh in coastal Louisiana . . . ." The 1989 guidance finds that this approach ignores the fact that the cumulative effects of many projects could add up to very significant wetlands loss and notes that the proposed destruction of 22 acres of special aquatic sites in the case under review by New Orleans District could not simply be "dismissed as unimportant" ([Corps] 1989).[476]

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[473] PD at 2–12 (quoting PLP).
[474] *Id.*
[475] *Id.*
[476] *Id.* at 2–12 to 2–13 citing U.S. Army Corps of Engineers 404(q) permit elevation, May 9, 1989

Commenting on a preliminary draft of the DEIS, the EPA recommended that the Corps not utilize the threshold approach:

> We recommend that, instead of the threshold approach, the EIS describe the amount of different types of wetlands impacted across the alternatives without comparison to an arbitrary threshold. Please see the white paper that EPA sent to the AK District in July 2018 that outlines scientific concerns regarding this kind of threshold approach. If the Corps continues with use of these thresholds, we recommend that the DEIS identify the scientific basis for the thresholds proposed in this paragraph and clarify how these thresholds are being used in the impacts analysis. We also recommend that the DEIS clarify how the approach proposed in this paragraph is similar to the approaches used in the Point Thompson and Donlin Mine EISs. We recommend that this clarification include the history of the approach, the exact approach used in the referenced documents, supporting scientific literature, how the geographic location of each project lends the ability for similar analysis, and adequacy of information available to make these comparisons. We also recommend that the DEIS clarify what is meant by "within a particular watershed." We note that later sections refer to a 10-digit HUC. We recommend that the DEIS explain throughout what scale is used and why.[477]

The Corps' response to EPA was that "[t]he use of thresholds, and the concept of regionally important wetlands, meets the impact assessment framework for magnitude assessment for this EIS, per the Council on Environmental Quality's NEPA guidance."[478] The Corps' response fails to adequately address the concerns raised by EPA in its comments and the white paper referred to in EPA's comments.

b. *EPA raised concerns in a white paper in 2018.*

EPA's 2018 white paper, *Technical Review of a Threshold-Based Approach for Determining Significant Degradation in Alaska*, is an "objective evaluation of a threshold approach for assessing the severity of aquatic resource impacts (i.e., potential for significant degradation) from development projects in the state of Alaska permitted under Section 404. . . ."[479] EPA issued the white paper because the Alaska District of the Corps has "previously pointed to low levels of developed land cover within a project's watershed" and because "the development and application of this approach by project proponents appears to be based on guidance from the Alaska District itself."[480] EPA's main conclusion is that

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(included as an attachment to these comments).

[477] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.22 – Wetlands and Other Waters/Special Aquatic Sites, at EPA Comment #5, 3–4 (emphasis added).

[478] *Id.*

[479] *See* Environmental Protection Agency, Technical Review of a Threshold-based Approach for Determining Significant Degradation in Alaska, at 1.

[480] *Id.* at 3, citing to U.S. Army Corps Permit Decision re POA-1980-307-M5 (Oct. 22, 2015) (included as an attachment to these comments); Alaska Stand Alone Gas Pipeline, Draft

> [r]eview of the scientific literature, reveals that the proposed threshold approach is based on misinterpretations and misapplications of the literature. These findings lead not only to the conclusion that *the approach is technically flawed and not supported by the science, but also to the determination that the implementation of such an approach is not suitable for evaluating significant degradation*.[481]

In its analysis, EPA provides important clarifications regarding the determination of significant degradation:

> Although the regulations do not identify the degree of impact that constitutes 'significant degradation', *nothing in the regulatory language suggests that the threshold of significance is high*. The preamble to the Guidelines states that significance is "more than trivial" and *should be considered in the conceptual rather than the statistical sense*.[4] The regulations also do not require any specific quantitative analysis to make determinations regarding significant degradation and *do not include any formulas or defined thresholds for determining significance* (e.g., all fills >10 acres are significant). Therefore, *determinations* regarding significant degradation *are to be made on a case-by-case basis using factual site-specific information*, and the level of analysis and documentation should correspond to the scope and scale of the impacts.[482]

The Corps' analysis in the DEIS utterly misses the mark. Instead of following EPA's recommendations, the Corps' analysis is completely framed by statistical formulas of percent lost over the total NWI mapped wetlands in a particular watershed. Such an approach provides no meaningful analysis regarding the particular wetlands lost, the site location, or the value of wetlands in the aquatic ecosystem. In other words, the DEIS fails to conduct an actual "site-specific" analysis.

In assessing whether the approach is consistent with the 404(b)(1) Guidelines, the EPA identifies concern that

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Compensatory Mitigation Plan, Nov. 10, 2016) at 2 ("Where impacts within a watershed are deemed to be substantive based on the aggregate level of existing disturbance and new project wetlands impact (>7.5% development), appropriate and practicable compensatory mitigation would be applied by AGDC to replace functional losses of aquatic resources and functions.") (included as an attachment to these comments); and U.S. Army Corps of Engineers, Alaska District Internal Guidance Document for Compensatory Mitigation Decisions, July 9, 2014, at 4 n.4 ("Greater than 5% impervious surface within the watershed is one method of identifying degradation in watersheds that do not have an approved [watershed] plan.") (included as an attachment to these comments); s*ee also id.* at 4–6 (referencing the Alaska Stand Alone Gas Pipeline project and inappropriate use of the threshold approach) (*citing* U.S. Army Corps of Engineers & Bureau of Land Management, Alaska Stand Alone Gas Pipeline, Joint Record of Decision, March 4, 2019 (included as an attachment to these comments) and U.S. Army Corps of Engineers & Bureau of Land Management, Alaska Stand Alone Gas Pipeline, Joint Record of Decision Appendices (included as an attachment to these comments)).

[481] *Id.* at 1 (emphasis added).

[482] *Id.* at 2 (emphasis added).

> [w]hen applied alone, the approach does not evaluate the comprehensive suite of direct, secondary, and cumulative impacts needed to support the factual determinations regarding significant degradation, as required by the 404(b)(1) Guidelines. The loss of aquatic resources at impact sites located in watersheds where disturbed land cover is less than the designated threshold are summarily dismissed as insignificant, regardless of the existing quality of these aquatic resources, the functions they provide on the landscape, the degree to which those functions would be impacted, or the duration of those impacts. In other words, if impacts occur in watersheds below the designated threshold the resources themselves are not characterized, and the direct, secondary, and cumulative impacts resulting from their loss or degradation are not evaluated. Therefore, sufficient information needed to determine whether impacts could cause or contribute to significant degradation and whether compensatory mitigation should be required to address potential concerns regarding significant degradation is not provided.[483]

The EPA's dismissal of the threshold approach raises significant concerns for the manner in which the DEIS addresses the direct, indirect, and cumulative impacts to wetlands and streams in the DEIS. Just as EPA cautions, when this approach is used alone, it fails to "evaluate the comprehensive suite" of impacts.[484] Or, in other words, it fails to take the requisite hard look. By framing the issue as a matter of not losing a significant amount of wetlands measured as a percentage of the total amount of wetlands in the watershed, the DEIS fails to account for the "loss of aquatic resources," and fails to evaluate the functions that the lost wetlands and streams provide or "the degree to which those functions would be impacted."[485]

In addition to raising the concerns above regarding the application of the threshold approach, EPA also raised concerns about applying the approach in an undeveloped watershed as compared to the urban watersheds where much of the science regarding this approach was developed.[486] The EPA cautions that "misinterpretation or misapplication of the scientific literature is likely to result in the development of a technically flawed approach, unsuitable for the purpose of determining significant degradation, regardless of how conservative of a threshold value is designated."[487]

It is important to highlight the manner in which the Corps seems to be utilizing this approach, which seems to be a consistent application of a particular percentage lost (e.g., 10%) despite the particular site-specific aspects of the waters and wetlands that are impacted. The literature indicates that an abrupt threshold (i.e., a bright line like 10%) represents an average

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[483] *Id.* at 6.
[484] *See id.*
[485] *See id.*
[486] *See id.* at 6 ("concerns include the application of published thresholds that: 1) have identified levels at which complete loss has already occurred, 2) were developed in other ecoregions, which have a long legacy of human settlement, 3) are only able to reliably predict responses at the subwatershed scale, and 4) evaluate the response of aquatic resources from watershed development but not specifically from aquatic resource loss itself.").
[487] *Id.*

response to a number of indicators, and therefore may fail when applied in specific circumstances to account for aspects like impacts to sensitive species. For example, EPA identifies that

> [t]his is particularly important when considering sensitive species such as trout and salmon, since it is likely that the habitat requirements for many sensitive species are determined by the most sensitive stream quality indicators, rather than the average behavior of all indicators (CWP, 2003; Schueler *et al.,* 2009). Accordingly, the general consensus is that aquatic ecosystems rarely exhibit abrupt nonlinear thresholds, but rather display a continuous gradient of stream degradation as watershed development increases (Booth and Jackson, 1997; May *et al.,* 1997; Booth *et al*., 2004; Schueler *et al.,* 2009; Utz *et al*., 2009; Hilderbrand *et al.,* 2010).[488]

Understanding the approach in the context of incremental impacts to a watershed is critical. EPA notes that

> because degradation is continuous and any well-defined thresholds typically identify endpoints where complete loss has already occurred, the scientific literature cautions against managing up to a threshold, as doing so could be catastrophic for biodiversity and lead to irreversible loss of aquatic-system function (Booth and Jackson, 1997; Hilderbrand *et al*., 2010).

EPA draws an important distinction between hitting a threshold marker versus leading up to one and how loss below a particular threshold (e.g., 10%) fails to capture the impacts to the aquatic ecosystem:

> Degradation leading to such losses is more complex. For example, degradation of waters may result in lower fertility, lower success in recruitment of juveniles, and increased predation pressures. Any of these factors could depress populations, significantly degrading waters for the aquatic life use support. *Therefore, applying a threshold based on complete loss in order to determine when impacts may cause or contribute to significant degradation is not only arbitrary but contrary to the intent of the Guidelines*.[489]

The concerns regarding the significant limitations of the threshold approach are heightened when the approach is applied in pristine environments.[490] An evaluation of 35 research studies regarding the Impervious Cover Model found detection of stream degradation across a wide range of 2 to 15%.[491] The wide range may be influenced by the character of the land in the watershed, explaining why lower IC thresholds appear to be associated with predevelopment land cover characterized by extensive forest or natural vegetation compared to higher ICs associated with

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[488] *Id.* at 7.
[489] *Id.* at 8 (emphasis added).
[490] *Id.* at 9.
[491] *Id.*; *see also* Gracz, 2019 at 3.

land cover characterized by cultivation or range management.[492] EPA notes that the Impervious Cover Model has been reformulated to reflect these findings and that

> [t]his modification to the [Impervious Cover Model] suggests that IC should not be the sole metric used to predict impacts to stream biotic communities when IC is very low (Steedman, 1988; Horner and May, 1999; Booth, 2000); indeed, it is not at all clear that imperviousness is even relevant in non-urban/suburban catchments. Furthermore, given the variability in response among regions, ecological thresholds reported in the literature are not necessarily transferable.[493]

EPA concludes that "the published literature does not support use of these thresholds in undeveloped regions of Alaska."[494]

Finally, EPA expresses concern that the approach leads to a failure to evaluate and consider aquatic resource loss in terms of functions:

> The mechanisms and processes which result in degradation are unique; and therefore, evaluating the severity of these impacts requires separate consideration. Both wetlands and streams support a range of ecosystem functions within the greater watershed; however, the specific types of functions and the degree to which they are performed can vary greatly, depending on the type of aquatic resource and its location within the watershed network (Vannote *et al*., 1980; Brinson, 1993). Headwater streams, for example, are disproportionately important in performing nutrient export to downstream areas, largely because the ratio of land contributing allochthonous inputs to stream surface is much higher than in downstream reaches. . . . Therefore, the location of impacts within a watershed can significantly influence the severity of those impacts, in addition to impact size or relative proportion. . . . although direct impacts to aquatic resources may be associated with watershed development, both the effects and the magnitude of those impacts is largely dependent upon the impact location and cannot be

[492] Environmental Protection Agency, Technical Review of a Threshold-based Approach for Determining Significant Degradation in Alaska, at 9.
[493] *Id.* at 9–10.
[494] *Id.* at 10. EPA also states that the use of the approach is inappropriate at a HUC-10 watershed level because development could result in significant impacts to a sub-watershed but not approach the 10% threshold, resulting in unacknowledged impacts to the sub-watershed. EPA concludes that "consideration of impacts at multiple scales may be necessary to make appropriate assessments of significant degradation, and in such cases applying a threshold at a single broad scale is arbitrary." *Id.* at 11; *see also* Gracz, 2019 at 3. Dr. Gracz notes that "at the site of the proposed mine, the ~35,000-acre size of the 12-digit HUC is much closer to the model domain than the ~170,000-acre 10-digit HUC watershed size, or the sizes of the much larger Mulchatna, Nushagak, or Bristol Bay basins. Use of the ICM or similar analyses at those watershed sizes is well outside the predictive capacity of the ICM. . . . Using the size of the 12-digit HUC produces a conservative analysis, because, unless impacts are distributed uniformly across the 10-digit HUC, higher percentages of developed land will occur within some of the smaller watersheds nested within the 12-digit HUC, at the sizes more appropriate for the model domain." *Id.*

> predicted from percent IC alone.[495]

The Corps fails to take any of this into account when applying the threshold approach in the Pebble DEIS. The DEIS provides no meaningful analysis of the functions of the lost wetlands and waters. There is no substantive analysis of the aquatic resources associated with these headwaters. Instead, the Corps takes the overly-simplistic approach of assessing headwater wetlands and salmon streams as a mere statistical figure representing a percentage of an entire watershed, as if all wetlands within the watershed have similar value, and as if there's a bright line below which lost wetlands will not affect ecological functions.

EPA concludes:

> Aquatic resources are variable and dynamic ecosystems; consequently, impacts leading to the degradation of aquatic resources are also variable and complex. Because the magnitude of degradation resulting from aquatic resource loss or conversion is highly dependent on the aquatic resource type, its relative abundance, and location within the watershed, determinations of significant degradation cannot be determined solely on a single arbitrary threshold at a single arbitrary scale. Recognizing this complexity, the Guidelines require that determinations of significant degradation consider the direct, secondary, and cumulative effects of permitted impacts on a case-by-case basis. Therefore, the use of this threshold-based approach for the purpose of determining significant degradation is an inappropriate oversimplification of the impact analysis required by the Guidelines.[496]

The reasons for why the approach cannot support a finding under the CWA regarding significant degradation are also applicable to whether the Corps has meet its obligations under NEPA to take a hard look at impacts. Assessing impacts based on percentage lost fails to account for the pristine environment, the aquatic resource functions that will be lost, and the sensitivity of species — such as salmon — that will be impacted.

c. Dr. Utz raises concerns about the application of the threshold approach to the Pebble Project.

In a comprehensive report on the use of threshold approach, Dr. Ryan Utz discusses the threshold approach and explains why it is inappropriate for determining whether the project will significantly degrade the environment.[497] Dr. Utz is an aquatic ecologist at Chatham University, who focuses on urban streams, salmonids, ecological restoration, and detecting environmental trends at broad spatio-temporal scales.[498] Dr. Utz has authored several papers on the application of

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[495] *Id.* at 12.
[496] *Id.* at 13.
[497] Utz, Ryan M., June 19, 2019, Misapplication of an environmental threshold in an ecosystem with exceptionally rich fisheries (Utz, 2019) (report and references included as attachments with these comments)
[498] *Id.* at 8.

the threshold approach/ICM.[499] Dr. Utz was also one of three peer-reviewers of the EPA's July 2018 paper on the misuse of the threshold approach in Alaska.[500]

As similarly discussed in Section VI.A.4.ii, Dr. Utz sets out the underlying bases of ecological thresholds. Dr. Utz provides additional background beyond that provided by EPA, noting that the models depend heavily on "sustained scientific efforts using abundant data resources and implementation within explicitly predefined spatiotemporal scales."[501] As EPA cautions, Dr. Utz also identifies the limitations of threshold modeling, noting that

> applying an ecological threshold in a new management plan . . . outside the scope and conditions in which that threshold was developed, as is the case in assessing the environmental impacts of the proposed Pebble [Project], represents a risk that is not an appropriate use of the threshold approach and may result in substantial unanticipated degradation.[502]

Dr. Utz reiterates concerns identified by EPA stating that

> [a]pplying the 10% IC threshold in any substantive analysis of impact mitigation invites significant risks due to the flawed nature of this often-cited concept. Doing so for the [Pebble mining project], where the ecosystem represents a vastly different setting from where the 10% IC threshold was developed and where likely environmental impacts span many disparate stressors beyond hydrologic alteration, is flatly inappropriate.[503]

Dr. Utz goes on to provide a detailed history of the 10% impervious surface cover threshold, and concludes that

> [d]espite strong words of caution against applying such a threshold by these reviews, 10% [impervious surface cover] has become the *de facto* metric to define minimal impact and is now mentioned in many watershed management plans. . . . Contrary to such assertions, a wealth of work has identified substantial biodiversity loss, geomorphic impact, and surface water chemistry changes driven by [impervious surface cover] at far lower levels than 10%.[504]

Just as EPA identified, Dr. Utz confirms that a variety of factors influence how stream ecosystems respond to impervious surface cover.[505] "[F]actors complicat[ing] the relationship between

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499 *See* Utz Lab of Applied Ecology, Falk School of Sustainability, Chatham University, *Publications*, 2019 (including studies dating back to 2009 that address threshold response to impervious cover) (included as an attachment to these comments).
500 *See* Environmental Protection Agency, Technical Review of a Threshold-based Approach for Determining Significant Degradation in Alaska, at 1 n.1; *see also* Gracz, 2019 at 1.
501 Utz, 2019 at 2.
502 *Id.*
503 *Id.* at 3 (emphasis added).
504 *Id.* at 4 (citations omitted),
505 *Id.* at 4–5.

[impervious surface cover] and ecological condition" include spatial configuration of impervious surface cover, direct physical connections to stream channels, land use history, and variations in hydrologic regimes, among other things. Dr. Utz concludes that "accurately predicting the impact of new [impervious surface cover] within a watershed requires abundant *a priori* knowledge. . . ."[506] Dr. Utz concludes that

> [i]n light of such complexity, the assumption that ecological changes would not be expected until watershed [impervious surface cover] reaches 10% greatly oversimplifies the challenge and implementing such a concept could invite the substantial loss of ecosystem function. Even in the context where the threshold approach is most commonly applied, studies investigating [impervious surface cover] impacts have highlighted the deficiencies in the approach and the significant potential for underestimating impacts.[507]

Analyzing the application of the impervious surface cover approach to the Pebble Project, Dr. Utz identified a number of concerns, in addition to the ones recognized above. For example, "most research pertaining to the effects of impervious surface cover on stream ecosystems was conducted" in ecosystems that have seen disturbance.[508] The Pebble Project is in a pristine environment. Dr. Utz notes that the

> analogs of many important ecosystem services provided by Bristol Bay rivers that currently exist in a uniquely intact state, particularly the salmon fisheries, may not even exist in most watershed science concerning [impervious surface cover]. Where relatively pristine ecosystems have been studied, findings often suggest that low levels of environmental stress can result in irreversible resource loss (Stanford et al. 2019).[509]

Dr. Utz further explains that application of impervious surface cover is inappropriate because modeling impervious cover will not represent the suite of impacts from the project:

> More importantly, percent [impervious surface cover] represents only a small portion of the total drivers of potential environmental impacts from the [Pebble Project], and therefore a threshold approach lifted from the [impervious surface cover] context is wholly inappropriate. Development of the [Pebble Project] would likely involve environmental risks that would prove far more consequential than any hydrologic or sediment regime changes induced by [impervious surface cover].[510]

Impacts or risks like elimination, blocking, or dewatering of hundreds of stream kilometers; contamination of surface and groundwater; diesel fuel spills; concentrate spills; and barriers to fish migration are factors that are not represented in the impervious surface cover

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[506] *Id.* at 5.
[507] *Id.*
[508] *Id.* at 6.
[509] *Id.*
[510] *Id.* at 6–7.

estimate.[511] Dr. Utz notes that "[i]nteractions among multiple stressors can render threshold-based management inadequate."[512] Dr. Utz goes on to state that "[c]onsequently, emphasizing metrics of [impervious surface cover] for watersheds impacted by the [Pebble Project] greatly misrepresents the environmental challenges associated with preserving the globally unique ecosystem services of watersheds draining into Bristol Bay."[513] For these reasons, Dr. Utz concludes that

> applying the threshold approach far beyond the bounds in which it was developed will almost certainly lead to unintended consequences. In the case of the [Pebble Project], the profound ecological services at stake should warrant nothing short of applying the most rigorous science available developed for the specific ecosystem and environmental stressors pertinent to the challenge.[514]

5. The DEIS fails to take a hard look at direct impacts to wetlands at the mine site.

As noted above, the DEIS identifies that the 20-year mine, as proposed, would directly destroy 3,560 acres of wetlands and other water bodies and 81.1 miles of streams.[515] These wetlands and the ecological functions they provide would be permanently destroyed.

The loss of wetlands would have an impact on several wildlife species.[516] Several wetland-dependent small mammals (e.g., shrew (*Sorex spp.)*) and medium size mammals (mink (*Neovison vison*), river otter (*Lontra canadensis*), beaver (*Castor canadensis*) muskrat (*Ondatra zibethicus*) would suffer the greatest harm from the loss of breeding, rearing, feeding, denning, escape and resting habitat.[517] Brown bear (*Ursus arctos*), which depend heavily on salmon as a food source, also would suffer significant impacts from the direct loss of miles of salmon-rich streams and rivers, as well as impacts from the road corridor and port, as discussed below.[518]

A number of avian species would be impacted from the loss of wetlands. Wetland-dependent raptors and waterfowl, especially bald eagle (*Haliaeetus leucocephalus*), Tundra swan (*Cygnus columbianus*), harlequin duck (*Histrionicus histrionicus*), American wigeon (*Anas*

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[511] *Id.* at 7.
[512] *Id.* at 8.
[513] *Id.* at 7.
[514] *Id.*; Schweisberg comes to the same conclusion noting "[t]he approach sought to deal with impervious surfaces in those settings and to be aware of "tipping points" where, once impervious surfaces reached a certain percentage of a watershed or sub-basin, unacceptable water quality degradation would occur. Many studies and real-life applications have been performed, especially in the northeast and mid-Atlantic U.S. The concept of thresholds in this sense was not intended, and is not applicable to situations such as the Bristol Bay Watershed, where virtually no degradation to stream and river water quality has occurred because of its near pristine status." Schweisberg, 2019a at 6.
[515] DEIS at ES–60 to ES–61; 4.22–4 to 4.22–5.
[516] Most, though not all, surveys for wildlife were conducted 7 to 15+ years ago; the results are outdated and should have been updated for the DEIS. *See supra* Section III.C.2.ii.
[517] Schweisberg, 2019a at 7.
[518] *See infra* Section VI.F.2.

americana), northern pintail (*Anas acuta*), and scaup (*Aythya* sp.), red-breasted merganser (*Mergus serrator*), green-winged teal (*Anas carolinensis*) would lose extensive and valuable nesting, rearing, feeding, cover, and perching habitat.[519] In addition, shorebirds such as sandpiper (*Calidris minutilla*), black-bellied plover (*Pluvialis squatarola*), whimbrel (*Numenius phaeopus*), and American golden-plover (*Pluvialis dominica*), Hudsonian godwit (*Limosa haemastica*), lesser yellowlegs (*Tringa flavipes*), and short-billed dowitcher (*Limnodromus griseus*), would lose thousands of acres of key habitat.[520]

The loss of such a large amount of wetlands and water bodies would result in the loss of particularly important habitat for fish. The headwaters destroyed by this project "provide valuable ecological functions that are particularly important in establishing and maintaining fish diversity."[521] The mine would destroy important "spawning and nursery areas for fish species" and "reduce the capacity and productivity of stream habitats."[522] Loss of stream habitat will lead "to losses of local, unique populations would erode the population diversity that is crucial to the stability of the overall Bristol Bay salmon fishery (Hilborn et al. 2003, Schindler et al. 2010)."[523]

In addition to the direct impacts to fish and wildlife due to the loss of habitat, the destruction of thousands and thousands of acres of wetlands at the headwaters of the Nushagak and Kvichak watersheds would result in the loss of a number of critical wetland ecological functions, including: (1) nutrient production and export, (2) carbon storage and sequestration, and (3) groundwater discharge.[524]

Schweisberg concludes that

> headwater streams and wetlands, all of which are abundant at the mine site, play a vital role in maintaining diverse, abundant fish and wildlife populations—both by providing high-quality habitat themselves and by supplying energy and other resources needed to support fish and wildlife in connected downstream habitats.[525]

The DEIS identifies the extent of direct and some (but not nearly all) indirect adverse impacts. It does not evaluate and describe how those impacts would affect the wetlands and other aquatic resources. Simply identifying the amount of acres of wetlands that would be filled is insufficient. There is no analysis of the harm that would be caused by the loss of those wetlands. The DEIS fails to acknowledge or analyze the ecological role of these impacted habitats and what the loss of these water bodies means for the overall ecological functions of these headwaters. As a result, the DEIS fails to take the requisite hard look at the significant adverse impacts from the loss of headwater wetlands and water bodies.

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[519] Schweisberg, 2019a at 7.
[520] *Id.*
[521] *Id.*
[522] *Id.*
[523] *Id.*
[524] *Id.* at 7–8
[525] *Id.* at 8

6. The DEIS fails to take a hard look at indirect impacts from loss of wetlands at the mine site.

The direct adverse impacts to wetlands and other waters described above would lead to substantial indirect adverse impacts to those aquatic resources.[526] The outright permanent and temporary direct destruction of 4,976 acres of wetlands and miles of streams would irreparably alter both surface and ground water regimes in adjoining and nearby wetlands and streams.[527]

The DEIS identifies the following indirect or secondary impacts to wetlands or other waters: (a) 957 acres from fugitive dust; (b) 449 acres from dewatering; and (c) 462 acres from fragmentation, for a total of 1,868 acres.[528]

While the DEIS provides estimated acreage of impacts from dewatering, it fails to assess how alterations in streamflow and groundwater will affect hydrologically-connected wetlands, depending on the duration and timing of surface water connectivity with stream habitats, distance from main channels, and/or physical and chemical conditions.[529] The alterations to the complex hydrology will have indirect impacts on wetlands and streams that are not adequately evaluated in the DEIS.

The DEIS also fails to assess the impacts on riparian floodplain habitat. As the project impacts hydrologic connectivity, "an unquantified area of riparian floodplain wetland habitat . . . would either be lost or suffer substantial changes in hydrologic connectivity with streams because of reduced streamflow from the mine footprint."[530]

Destroying or removing stream habitat, wetlands, lakes, and ponds will also have indirect impacts through loss of "their fish habitat support functions, such as supplying nutrient and detrital inputs and maintaining base flows, for both abutting and downstream waters."[531] As described in Section 4.2.1 of the Proposed Determination, the loss of food resources and overwintering habitat could reduce overall salmonid rearing capacity in the South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek watersheds and adversely affect the valuable commercial, subsistence, and recreational fisheries downstream of the proposed mine. The DEIS fails to adequately assess these indirect impacts from destroying headwater streams and wetlands.

While the DEIS minimizes the extent of impacts, Schweisberg notes that "[t]he extent of wetland, lake, and pond losses under the 20-year Pebble mine could be at a level that the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds may not be able to afford."[532] As previously discussed, the headwaters provide habitat and are a source of "groundwater inputs, nutrients, and other subsidies crucial to salmon productivity (PD, July 2014,

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526 *Id.*
527 *Id.*
528 DEIS at 4.22–33, Table 4.22–10.
529 Schweisberg, 2019a at 9.
530 *Id.*
531 *Id.*
532 *Id.*

Section 3.2.3)."[533] Schweisberg concludes that the "loss of wetlands, lakes, and ponds due to the discharge of dredged or fill material associated with Pebble's proposed mine would likely have unacceptable adverse effects on fishery areas both within and downstream of the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds."[534]

Dr. Schindler also raises similar concerns noting that

> the DEIS assumes that there are no downstream effects on water quality and habitat. Wetlands are widely known to have a variety of important effects on downstream ecosystems through processes such as moderating temperatures and flows, intercepting silt, and modifying water chemistry. The American Fisheries Society recently published a review of such widely known effects in the scientific literature (Colvin et al. 2019). The DEIS ignores nearly all of these effects and assumes that the loss of wetlands and headwater streams will result in only trivial impacts to the ecosystems of this region, largely because they don't acknowledge the effects on downstream aquatic habitats. This conclusion is completely incorrect.[535]

Further, the DEIS does not adequately assess how reduced stream flows may, in turn, "dewater an unquantifiable but extensive area of riparian wetlands along affected streams."[536] Wetlands could be dewatered to the point where they no longer possess a hydrologic regime sufficient to support wetland habitat.[537] These "dewatered streams and wetlands would fragment wildlife habitat and would pose a barrier to movement for fish, amphibians, some water birds, and some small and medium size mammals."[538] The DEIS fails to assess the extent or impact of dewatering from reduced stream flows.

7. *The DEIS fails to take a hard look at direct and indirect impacts to wetlands from the transportation corridor.*

The direct impacts from construction of the transportation corridor include the permanent loss of 75 acres of wetlands, 11 acres of other waters, and 7.9 miles of streams.[539] Fugitive dust would adversely affect 892 acres of wetlands adjacent to the roadway.[540]

Indirect impacts from fill of wetlands to create a road corridor include adverse impacts to adjacent soils, fluctuations in surface water flow movement and streamflow, increased upstream

[533] *Id.*
[534] *Id.* at 9–10.
[535] Schindler, 2019 at 5; *see also* American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019), at 3–4 ("Headwater streams provide numerous services that are essential to ecosystems and are key to the sustainability of fish stocks in both upstream and downstream waters (Colvin et al. 2019). When the natural flow regimes of headwater streams are altered, downstream water quality is impaired.").
[536] Schweisberg, 2019a at 10.
[537] *Id.*
[538] *Id.*
[539] DEIS at 4.22–33, Table 4.22-10.
[540] *Id.*

and downstream flooding, increased erosion and sedimentation, increased sediment load, increased turbidity, changes to water temperature, changes in pH, changes in soil and water chemistry, addition of heavy metals into the environment, introduction of hydrocarbons to the environment, disruption to wildlife, truncation of fish migrations due to passage barriers, adverse impacts to water quality from road-derived pollutants, and dispersal of invasive species, among other things.[541] Schweisberg notes that

> [t]hese various alterations interact in complex cause-and-effect chains. Darnell *et al*. (1976) identified common, general long-term outcomes that include 1) permanent loss of natural habitat; 2) increased surface runoff and altered groundwater flow; 3) channelization or structural simplification of streams and hydrologic connectivity; and 4) persistent changes in the chemical composition of water and soil.[542]

Barrier to fish passage is one of the most significant indirect impacts from constructing roads in wetlands and across streams.[543] Schweisberg concludes that

> [h]ere, where small headwater streams are the lifeblood of rivers and lakes, they sustain processes and natural communities that are critically and inextricably linked to water quality, habitat and ecosystem processes that sustain downstream resources (Lowe and Likens 2005). The direct dependence of salmon on headwater streams for habitat is just one example of these linkages. When road crossings block fish passage—as they often do (Harper and Quigley 2000, Gucinski *et al*. 2001, FSSSWP 2008), the isolated population(s) immediately lose migratory (anadromous or freshwater migrant) species and life history types. Resident species that remain are also at risk of permanent extirpation because barriers can hinder their dispersal and natural recolonization after floods, drought, or other disturbances.[544]

The DEIS's analysis of impacts to fish passage is inadequate.[545] The DEIS fails to take a hard look at the direct and indirect impacts of the road on fish passage because it assumes unidentified best management practices will avoid or minimize such impacts.

8. The DEIS fails to take a hard look at the cumulative impacts from a 78-year mine expansion.

For the reasons identified in sections V.D.1 and VII.B.3.vii, the DEIS should evaluate the 78-year mine as an alternative, assessing the direct, indirect and cumulative impacts of the 78-year mine. Nonetheless, looking solely at the cumulative impacts analysis for the 78-year mine

[541] *See* Schweisberg, 2019a at 13–15; *see also infra* Sections VI.B, Water Quality, VI.D, Fish, VI.F, VI.P, Spills, VI.U, Fugitive Dust, and VI.Z, Bioaccumulation.
[542] Schweisberg, 2019a at 15.
[543] *Id.*
[544] *Id.*
[545] *See infra* Section VI.D.11 (addressing issues related to culverts and fish passage).

expansion, the analysis fails to meet the basic NEPA requirements of providing a quantified and detailed analysis.

i. The cumulative impacts assessment must be quantified and detailed.

The impacts to wetlands from the 78-year mine scenario are extensive and significant. Schweisberg notes that

> [u]nder the 78-year mine, wetland losses would increase from 4,976 acres to in excess of 17,400 acres. An expansion of this nature would cause a concomitant or greater increase in the adverse impacts described above. Such colossal adverse impacts to wetlands and other waters would be catastrophic for this mostly roadless, undisturbed, and nearly pristine area of the Bristol Bay watershed.[546]

In the report, *Direct loss of salmon streams, tributaries, and wetlands under the proposed Pebble Mine compared with thresholds of unacceptable adverse effects in the EPA Proposed Determination pursuant to Section 404(c) of the Clean Water Act,* (Albert 2019), an analysis of wetlands with the Preliminary Jurisdictional Determination (PJD) study area estimated that the 78-year mine scenario would result in the loss of:

- 34 miles of salmon streams;
- 218.8 – 407.2 miles of tributaries; and
- 7,208 – 14,994 acres of contiguous wetlands.[547]

It is important to note that the cumulative effects analysis of impacts to wetlands is limited, in part, because PLP provided insufficient data. The ranges provided above are

> attributed to variation between available datasets that estimate the distribution of streams and wetlands in the Pebble area. The most detailed data are only available for a limited area, but they suggest that data available for the wider area underestimate the extent of streams and wetlands, and therefore impacts to these resources, by around half.
>
> Inasmuch as the 78-year mine scenario extends beyond this PJD study area, the actual extent of potential impacts to streams and jurisdictional wetlands remains unknown. Nonetheless, the ratios of mapped-to-unmapped streams and wetlands within the PJD study area can serve as a coarse-scale estimate of potential impacts within the larger 78-year mine scenario. The [Corps] Draft EIS did not evaluate the adequacy of available data to estimate effects of the 78-year mine scenario, or directly compare potential impacts to the criteria developed by EPA in the Proposed Determination. Data inadequacies, such as jurisdictional mapping of

[546] Schweisberg, 2019a at 10.
[547] Albert, David M., June 21, 2019, *Direct loss of salmon streams, tributaries, and wetlands under the proposed Pebble Mine compared with thresholds of unacceptable adverse effects in the EPA Proposed Determination pursuant to Section 404(c) of the Clean Water Act*, The Nature Conservancy (Albert, 2019) at 1 (included as an attachment with these comments).

> streams and wetlands within the 78-year mine scenario, should be overcome in order for [the Corps] to thoroughly evaluate the environmental impact of the current permit application by PLP, because this reasonably foreseeable scenario is sufficiently likely that it will be needed for an accurate assessment of cumulative effects.[548]

Regardless of whether one looks at the low or high end of these ranges, the numbers are outstanding. While discussed in greater detail in Section VI.Y, the impacts regarding direct and indirect loss associated with the 78-year mine expansion far exceed what EPA found unacceptable in its Proposed Determination. For example, stream loss would be 581% above the Proposed Determination benchmark of 5 miles.[549] Tributaries lost under the 78-year mine expansion would be 416% to 2, 042% above the Proposed Determination benchmark of 19 miles.[550] Loss of contiguous wetlands would range from 555% to 1,263% above the Proposed Determination benchmark of 1,100 acres of wetlands.[551]

These figures are massive and warrant a much more detailed analysis than provided in the DEIS. The DEIS states that "[t]he total number of wetlands potentially affected under this scenario would amount to an additional 12,445 acres."[552] This falls within the range of predicted loss of contiguous wetlands, although the projections from Albert 2019 were only for contiguous wetlands at the mine site, while the DEIS estimate includes total impacts to all wetlands (contiguous and non-contiguous to salmon-bearing waters) and includes the wetland loss from building a second corridor along the northern route for the concentrate pipeline, as well as the second port site at Diamond Point.[553] Schweisberg concludes:

> If the 78-year mine were authorized, the combined adverse impacts over time to wetlands and other waters from the Pebble Mine and the RFFAs listed above would likely result in tens of thousands of acres of additional adverse impacts to

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548 *Id.*
549 *Id.* at 8.
550 *Id.*
551 *Id.*
552 DEIS at 4.22–39 to 4.22–40.
553 DEIS at 4.22–40 (cumulative impacts from Alternative 1 "would cause the most impacts to wetlands among the project alternatives. This is because the ground disturbance associated with the diesel and concentrate pipelines, and associated service road, would be constricted in an area not affected by the Proposed Alternative. There would be two pipeline/road corridors operating between the mine site and Cook Inlet, rather than the one corridor that would exist under this scenario with either Alternatives 2 or 3: one in the south associated with the proposed project, and an additional one in the north associated with the expanded development. The additional pipeline/road corridor would require disturbance of an additional 1,022 acres. Similar wetland types (primarily deciduous shrub wetlands) are expected to be affected by the new road pipeline corridors, with acreages similar to the Alternative 3 Concentrate Pipeline Variant, which would permanently affect 108 acres of wetlands and waterbodies (see Table 4.22-8), including 75 acres of wetlands (predominantly deciduous shrub) and 33 acres of waterbodies. Impacts would be permanent, because the road would remain to facilitate long-term post-closure water treatment and monitoring.").

> wetlands and other waters. Unprecedented and uncompensable, adverse impacts of this scope, scale, and degree would significantly and irreversibly damage the exceptional ecological value of the fisheries and wildlife resources in the Bristol Bay watershed.[554]

Despite this, the Corps fails to provide a detailed analysis of what the loss of 12,000 or more acres of wetlands means for the overall health and functional capacity of the aquatic ecosystem. Instead, the DEIS makes vague and general statements about increased impact. For example, the DEIS provides generic statements like:

- "Pebble mine expansion would increase the amount of wetlands and other waters removal and fill, fugitive dust, and potential changes in wetland hydrology, and these impacts would be additive to those of the project."[555]
- "Project construction activities would continue to disturb soil, alter surface water flow, and physically injure wetland vegetation."[556]
- "Excavation, filling, and clearing of wetlands would alter or remove their capacity to provide hydrologic, biogeochemical, and biological functions. Construction on or through wetlands would result in increased habitat loss, fragmentation, and degradation."[557]
- "The placement of gravel to construct project facilities could alter local hydrologic regimes, resulting in adverse effects on wetlands."[558]
- "Erosion from construction activities could result in sedimentation of wetland communities and alter functional capacity."[559]
- "These impacts would be additive to those of the proposed project."[560]
- "The expansion would increase the magnitude, duration, and geographic extent of the wetland impacts described under Alternative 1."[561]
- "The magnitude of impacts from this alternative would be the highest, because it would affect the largest area of wetlands of all the alternatives. It also involves the most acres of wetlands permanently removed, because it includes two permanent roads rather than one."[562]

The DEIS downplays the impact of losing such a large number of wetlands by errantly relying on the threshold approach. For example, the DEIS asserts that the loss of 12,445 acres is only 0.5 percent of the estimated 2,696,000 acres of wetlands in the analysis area. The DEIS defines the analysis area for wetlands and other waters at the mine site as:

> **Mine Site** – The analysis area for the mine site includes the direct disturbance

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[554] Schweisberg, 2019a at 17.
[555] DEIS at 4.22–37.
[556] *Id.*at 4.22–40.
[557] *Id.*
[558] *Id.*
[559] *Id.*
[560] *Id.*
[561] *Id.*
[562] *Id.*

> footprint; areas of indirect disturbance due to habitat fragmentation; a 330-foot zone around the direct disturbance footprint to account for fugitive dust impacts; and the zone of influence to account for impacts from dewatering.[563]

This raises significant questions about "analysis area." Elsewhere in Chapter 4.22, the analysis area is different. For example, when evaluating the direct impacts of the mine site (section 4.22.5.1), the DEIS references the "Headwaters Koktuli River watershed"[564] in multiple instances to assert the loss of wetlands in percentage to total wetlands in the headwaters Koktuli River watershed. The headwaters Koktuli watershed is approximately 171,000 acres.[565] The first, and only, instance to the figure of 2,696,000 acres is when the DEIS assesses the loss of wetlands under the 78-year mine expansion. There is no discussion or reference to why the analysis area changes from 171,000 acres to the larger 2,696,000 watershed.

Regardless, the only analysis offered in the cumulative impacts section for loss of wetlands from mine expansion is what is referenced above. This fails to satisfy the requirements of NEPA. First, for reasons discussed in greater detail in Section VI.A.4, the threshold analysis (the percentage based approach of loss of wetlands as compared to total wetlands in a watershed) to determine impacts is inappropriate in this pristine environment. Second, there is absolutely no analysis beyond asserting that the loss of more than 12,000 acres of wetlands in the headwaters of the world's largest sockeye fishery is just 0.5 percent of total wetlands in the Nushagak watershed.

Generic statements of "increased," "continued," or "additive" impacts is not a quantified and detailed analysis of cumulative impacts. It is obvious that the loss of an additional 12,445 acres would result in increased impacts. This is self-evident. There are no statements about how the aquatic ecosystem will or will not continue to function. There are no statements about what type of wetlands will be lost. Are they higher functioning wetlands? What role do they play in the ecosystem? What will the loss of these wetlands and streams mean for downstream aquatic health? It is comical that the Corps thinks it can describe the cumulative impacts of a project that would result in the largest loss of wetlands ever allowed under a 404 permit in a matter of one page.[566] An analysis totaling a single page in the 1600 page DEIS describes the cumulative impacts from the 78-year mine expansion on wetlands. It seems absurd that one must point out that the DEIS doesn't even attempt to determine the loss of stream miles.

The analysis is woefully and utterly deficient. Courts have again and again rejected such conclusory analyses. In a cumulative impact analysis, an agency must take a "hard look" at all actions.[567] "[I]n considering cumulative impact, an agency must provide 'some quantified or detailed information; . . . [g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more

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563 *Id.* at 4.22–1.
564 *See e.g.*, *id*. at 4.22–6, 4.22–8, 4.22–9, 4.22–11, 4.22–15 and Tables 4.22–1 and 4.22–4
565 *Id.*at 4.22–8.
566 *Id.* at 4.22–40. To be fair, the analysis includes an additional two lines of analysis on page 4.22–39.
567 *Te-Moak Tribe of W. Shoshone of Nevada*, 608 F.3d at 603.

definitive information could not be provided.'"[568] The analysis "must be more than perfunctory; it must provide a useful analysis of the cumulative impacts of past, present, and future projects."[569] The Corps' cumulative impacts analysis is a textbook example of a perfunctory analysis. Simply providing a number of acres that may be impacted is insufficient.[570] The DEIS fails to provide a quantified and detailed analysis of the impacts from mine expansion on wetlands and the downstream aquatic ecosystem.

ii. Other mining development is reasonably foreseeable.

The DEIS fails to adequately assess the reasonably foreseeable proliferation of roads and associated development, including mining. With a port on the shores of Cook Inlet and a roadway, access to future mine sites becomes more practical and economically feasible. As Schweisberg notes,

> [t]he first major road incursion (the transportation corridor) into a roadless region inexorably delivers more roads and increases the likelihood of more development, *e.g.*, further industrial, and commercial development that is now more accessible and economically feasible over a much larger area. Additional mine development is the most obvious result. . . .[571]

The same concern was highlighted in the Watershed Assessment:

> In evaluating the environmental impact of any road, it is important to recognize that the development of a new road is often only the first step toward industrial or commercial development of the landscape in general, including the proliferation of additional roads (Trombulak and Frissell 2000, Angermeier et al. 2004). Additional large-scale landscape development, facilitated by the initial road, is a reasonably foreseeable impact of road construction in a roadless area. Essentially, finance and construction of the initial road subsidizes future developments that rely on that road to route traffic, particularly when that initial road connects to a possible trade hub, such as a deep-water port. The environmental impact of the ensuing development can dwarf by orders of magnitude the direct, local effects of constructing the initial road segment (Angermeier at al. 2004).[572]

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568 *Ocean Advocates*, 402 F.3d at 868, *quoting Neighbors of Cuddy Mountain*, 137 F.3d at 1379–80.

569 *Klamath-Siskiyou Wildlands Ctr.*, 387 F.3d at 993–94.

570 *Great Basin Mine Watch v. Hankins*, 456 F.3d 955, 972 (9th Cir. 2006); *Klamath-Siskiyou Wildlands Ctr.*, 387 F.3d at 995 ("A calculation of the total number of acres to be [impacted by other projects] in the watershed is a necessary component of a cumulative effects analysis, but it is not a sufficient description of the actual environmental effects that can be expected from logging those acres.").

571 Schweisberg, 2019a at 13.

572 *See* BBWA, App. G, Foreseeable Environmental Impact of Potential Road and Pipeline Development on Water Quality and Freshwater Fishery Resources of Bristol Bay, Alaska at 6; *see also* Jack Stanford, June 13, 2018, *Efficacy of the EPA Pebble Mine Assessment in Context of a Mining Permit Appl. to the U.S. Army Corps of Eng'rs (ACoE, POA-2017)*, 2–3 (previously provided as an attachment with Trustees for Alaska's scoping comments).

The DEIS fails to adequately account for many of the reasonably foreseeable actions that would likely result from the proposed transportation corridor road into a large roadless region that is rich in natural resources. The DEIS provides vague statements like "[t]ransportation, infrastructure, energy, and utility RFFAs would also contribute to the slow transition of land use toward a more developed land use scenario with more prevalent industrial, commercial, and transportation land uses."[573] The DEIS also recognizes that "Alternative 1 would expand the transportation infrastructure in the region once the transportation corridor and ferry/port facilities are complete."[574]

However, the DEIS rejects consideration of future mining by Northern Dynasty Minerals or others conducting exploration on the grounds that RFFAs "must be anticipated to enter the permitting process based on project documentation; . . . have identified indicated resources/reserves sufficient to develop a project; or have advanced exploration activities under way within the timeframe being used for assessment."[575] The DEIS states that

> [t]he following parameters were used to evaluate the categories of RFFAs listed above and identify specific RFFAs for the cumulative effects analysis in the EIS: **Timeframe –** Typically, only projects with dedicated funding, currently in or scheduled to undergo federal, state, or local permitting, and with a medium to high probability of occurring, are included.[576]

In dismissing review of multiple mining projects in the area, the DEIS states for each of those projects that the "[r]esource delineation has not progressed sufficiently to forecast development with regard to identifying measured or indicated resources, and a project is not subject to development permitting or in a planning document."[577]

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[573] DEIS at 4.2–15.
[574] *Id.* at 4.3–5.
[575] *Id.* at 4.1–5.
[576] *Id.* at 4.1–6.
[577] *Id.* at 4.1–9 to 4.1–16, Table 4.1–1 (development of mining projects was excluded from the cumulative impacts analysis for Pebble South, Big Chuck South, Big Chunk North, Fog Lakem Groundhog, Shotgun, and Johnson Tract).

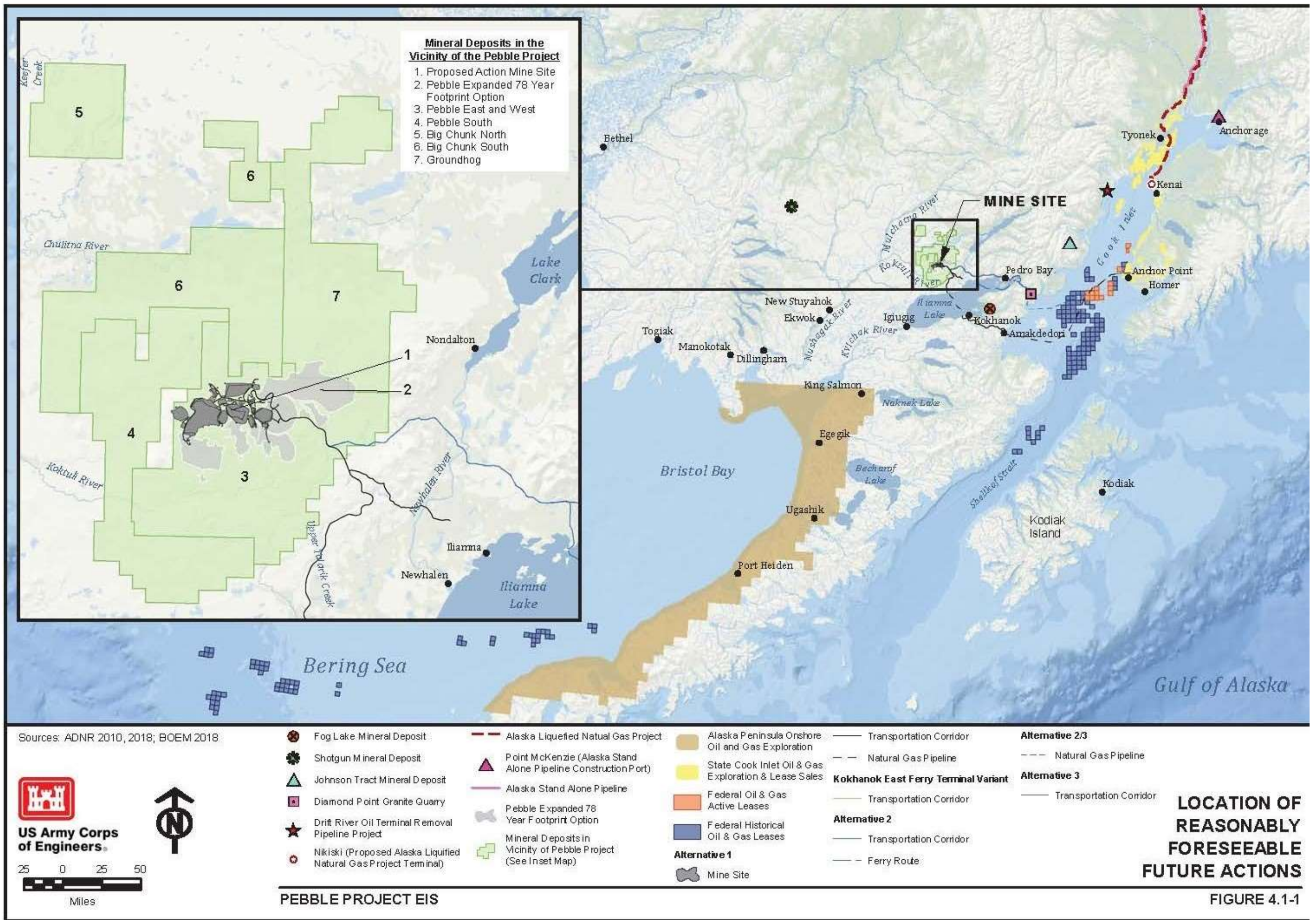

Figure 4.1–1 from the DEIS identifies surrounding mineral deposits. It becomes readily apparent that exploration of these other deposits surround the Pebble deposit and would benefit from PLP’s infrastructure.

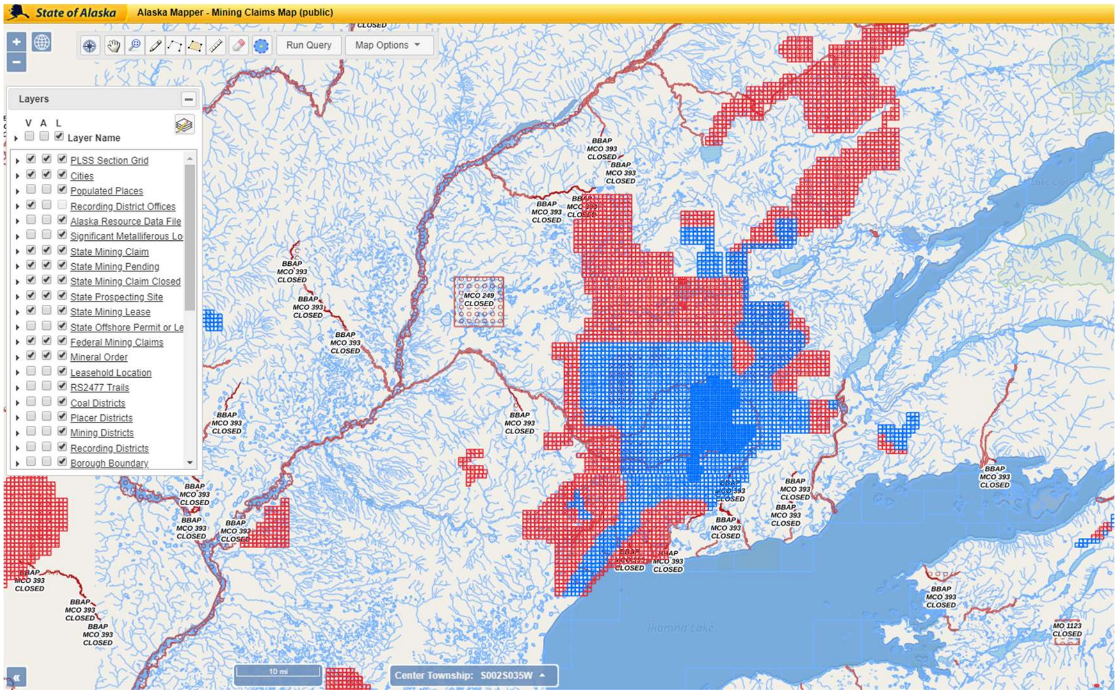

Figure A: Screenshot of active and closed mine claims in the Bristol Bay region. Red claims are closed/abandoned. Blue claims are active.[578]

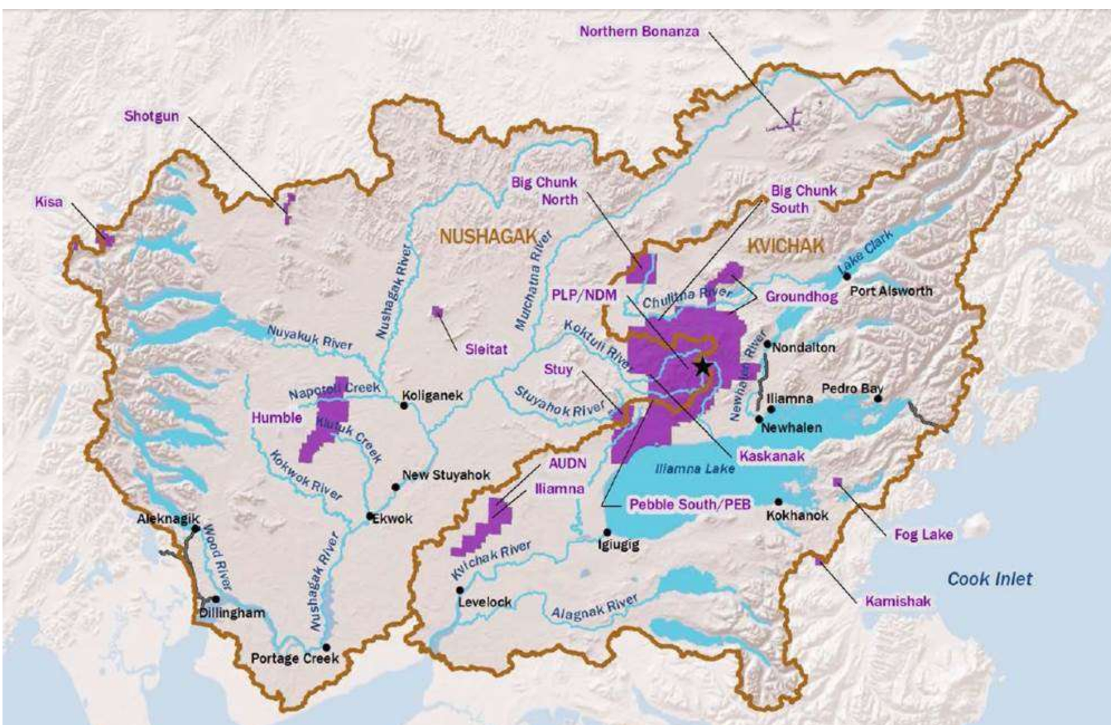

Figure B: Claim blocks EPA considered in the Watershed Assessment chapter on cumulative risks of multiple mines.[579]

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578 Map created on June 23, 2019 via the State of Alaska, DNR Alaska Mining Claims Mapper, http://akmining.info/.
579 *See* BBWA at 13–4.

Table 13-8. Streams, water bodies, and wetlands potentially eliminated by additional large-scale mines in the Nushagak and Kvichak River watersheds.

Mine	Claim Block Size (km²)	Mine Area[a] (km²)	Streams: Density (km/km²)	Streams: Length Eliminated[b] (km)	Water Bodies: Density (%)	Water Bodies: Area Eliminated (km²)	Wetlands: Density[c] (%)	Wetlands: Area Eliminated (km²)
Pebble South/PEB[d]	1,380	3.87	1.07	4.1	3.14	0.12	18.3	0.71
							30.5	1.18
Big Chunk South[e]	142	3.87	1.18	4.6	6.11	0.24	6.1	0.24
							83.5	3.23
		10.7		12.6		0.65	6.1	0.65
							83.5	8.93
Big Chunk North	119	3.87	1.45	5.6	4.18	0.16	4.2	0.16
							57.2	2.21
		10.7		15.5		0.45	4.2	0.45
							57.2	6.11
Groundhog	317	3.87	1.23	4.8	1.24	0.05	15.8	0.61
							17.0	0.66
		10.7		13.2		0.13	15.8	1.69
							17.0	1.82
AUDN/Iliamna	183	10.7	1.19	12.7	6.01	0.64	57.3	6.13
							75.3	8.05
Humble	280	10.7	1.07	11.4	0.66	0.07	0.7	0.07
							9.1	0.97
TOTALS	2,420	36.9		43.2		1.28		7.9
		57.4		69.5		2.06		27.1

Notes:
[a] Mine area is based on the Pebble 0.25 scenario and includes footprint of major mine components (mine pit, waste rock piles, and tailings storage facility). Where two values are presented for a mine, the small value represents the footprint assuming the mine uses an existing tailings storage facility at the Pebble deposit, whereas the larger value represents the footprint assuming the mine uses its own tailings storage facility.
[b] Length eliminated = footprint of major mine components x stream density.
[c] For claim blocks with NWI coverage (i.e., Pebble South/PEB, Groundhog, and AUDN/Iliamna), minimum density = NWI wetland density and maximum density = (differential between National Wetlands Inventory (NWI) wetland density and National Hydrography Dataset (NHD) water body density in area of NWI wetland coverage) x NHD water body density for entire claim block. For claim blocks with no NWI coverage, minimum density = NHD water body density and maximum density = (maximum differential between NWI wetland density and NHD water body density) x NHD water body density.
[d] Claim block size for entire PLP/NDM block; water body density includes portion of Iliamna Lake.
[e] Water body density includes portions of Nikabuna Lakes.

Figure C: Watershed Assessment Table identifying claim blocks and potential mine area and streams and wetlands that could be destroyed.[580]

These maps and figures illustrate the extensive mining potential in the area surrounding the Pebble mine. Since Pebble's establishment, seven different operators have established claims and initiated leases covering 793 square miles.[581] The majority of these claims cannot be exploited without development of the Pebble mine infrastructure.[582]

The DEIS erroneously downplays likelihood of future development on the premise that only exploration is foreseeable and subject to a cumulative impacts assessment at this time.[583] This is not consistent with the requirements of NEPA. EPA has stated that "reasonably foreseeable future actions need to be considered even if they are not specific proposals."[584] The Ninth Circuit has spoken to this issue, noting that

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580 *See* BBWA at 13–21.

581 *See* Dave Chambers, Ph.D., Robert Moran, Ph.D., & Lance Trasky, *Bristol Bay's Wild Salmon Ecosystems and the Pebble Mine: Key Considerations for a Large-Scale Mine Proposal*, Wild Salmon Center and Trout Unlimited (Jan. 2012), at 3 https://www.wildsalmoncenter.org/content/uploads/2016/02/PM-Report.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

582 *Id.*

583 DEIS at 4.1–5, 4.1–8 to 4.1–16.

584 Environmental Protection Agency, Report, *Consideration of Cumulative Impact Analysis in EPA Review of NEPA Documents*, Office of Federal Activities (May 1999) at 12-13 (included as an attachment with these comments).

> projects need not be finalized before they are reasonably foreseeable. "NEPA requires that an EIS engage in reasonable forecasting. Because speculation is . . . implicit in NEPA, [ ] we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry.[585]

Additionally, the federal courts have routinely required the agencies to review the impacts from future, not-yet-proposed mineral activity when preparing environmental assessments or EISs for mineral leasing projects. For example, the Northern District of California found

> BLM finally argues that at this stage, the exact scope and extent of drilling that will involve fracking is unknown, so NEPA analysis, if any, should be conducted when there is a site-specific proposal. But "the basic thrust" of NEPA is to require that agencies consider the range of possible environmental effects before resources are committed and the effects are fully known. "Reasonable forecasting and speculation is thus implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.'"[586]

The Corps errs by dismissing consideration of actual mining development as a cumulative impact. While some project may be further into exploration that others, the Corps is aware that (1) there are numerous entities that have mining leases and are engaged in active exploration, (2) the Pebble deposit is considered one of the largest in the world and Pebble will only scratch the surface with its proposed project, and (3) an existing port capable of shipping ore and a road system makes other projects much more feasible.

While current exploration does not indicate that a company will indeed go to development, it is reasonably foreseeable that some of these mining companies would develop if PLP builds the requisite infrastructure to make mining more economically feasible for these other entities. The DEIS must consider a scenario where one or more of these other mines goes to development as part of the cumulative impacts analysis.

B. Water Quality

To comply with NEPA, the DEIS must fully and accurately assess both the projected impacts to water quality if the Pebble Mine operates as expected, as well as the potential for even greater harm to the environment should any of the assumptions on which the projections are based prove to be unfounded. The DEIS fails in both regards. It fails to acknowledge that discharges

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[585] *Northern Plains Resource Council, Inc.*, 668 F.3d at 1078–79 *quoting Selkirk Conservation All. v. Forsgren*, 336 F.3d 944, 962 (9th Cir. 2003).

[586] *Center for Biological Diversity v. Bureau of Land Management*, 937 F.Supp.2d 1140, 1157 (N.D. Cal. 2013) *citing City of Davis v. Coleman*, 521 F.2d 661, 676 (9th Cir. 1975) and *Northern Plains*, 668 F.3d at 1079. *See also, Connor v. Burford*, 848 F.2d 1441 (9th Cir. 1988) (future impacts of drilling must be analyzed when preparing NEPA document for oil and gas lease); *Colorado Environmental Coalition v. Office of Legacy Management*, 819 F.Supp.2d 1193, 1209–09 (D. Colo. 2011) (impacts from future, as-yet-unproposed mining must be considered when preparing NEPA document for leasing decision).

from the mine are likely to exceed water quality standards even under the projected scenario. The DEIS also fails to acknowledge all of the factors that are likely to produce discharges with higher pollutant concentrations than projected — through failure of the proposed containment systems to capture all seepage, through failure of the proposed treatment systems to reduce pollutant concentrations, or from a catastrophic release — and fails to assess or describe the devastating impacts to downstream ecosystems that would result.

NEPA requires that federal agencies carefully consider the direct, indirect, and cumulative effects of federal actions.[587] "The purposes of an EIS are to provide decisionmakers with sufficiently detailed information to aid in determining whether to proceed with the action in light of its environmental consequences and to provide the public with information and an opportunity to participate in the information gathering process."[588] The proposed Pebble Mine will generate significant quantities of waste water contaminated by toxic chemicals. This contaminated waste water will cause or contribute to violations of state water quality standards and will cause or contribute to significant degradation of the environment. This contaminated waste water will also have significant adverse effects on aquatic life and other water dependent wildlife; aquatic ecosystem diversity, productivity, and stability; and on recreational, aesthetic and economic values. PLP's proposal to contain and treat this contaminated waste water fails to minimize these impacts because it relies on untested and unproven technologies, and fails to assess the consequences that would result from a failure of these technologies. Even if the treatment system works exactly as planned (which would be counter to the experience of similar facilities) the water discharged to the receiving streams will contain harmful concentrations of toxic chemicals, including selenium, causing significant adverse effects for aquatic life and aquatic ecosystems.

PLP's failure to acknowledge the degree of uncertainty around the proposed waste water treatment technology that it relies on to reduce the concentration of pollutants in its discharges is a clear violation of NEPA. An EIS must "expose scientific uncertainty concerning safety and environmental risk of a proposed action."[589] It is especially important that the EIS contain a rigorous evaluation of the proposed waste water treatment technology, because a technology failure would cause substantial impacts for aquatic life and ecosystems.[590] The DEIS violates the CWA and NEPA by not disclosing the risk of failure of the proposed water treatment system, and by not describing or assessing the devastating environmental impacts that would result from such a failure.

The need for the DEIS to fully account for the water quality impacts of the Pebble Mine is particularly great because once construction of the proposed mine begins, contaminated contact water will be produced. And it will be a volume of contaminated water that would far exceed the capacity of the mine to store on site. Contaminated water will then continue to be produced as

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[587] 40 C.F.R. §§ 1502.16, 1508.25(c).
[588] *Nw. Res. Info. Ctr., Inc. v. Nat'l Marine Fisheries Serv.*, 56 F.3d 1060, 1064 (9th Cir. 1995).
[589] *Friends of the Earth v. Hall*, 693 F. Supp. at 925–26 (citing *Southern Oregon Citizens Against Toxic Sprays, Inc. v. Clark,* 720 F.2d 1475, 1479 (9th Cir. 1983), *cert. denied,* 469 U.S. 1028 (1984)).
[590] *Id.* at 926 (noting that "an EIS 'must be particularly thorough when the environmental consequences of federal action are great.'" (quoting *Warm Springs Dam Task Force v. Gribble,* 621 F.2d 1017, 1026 (9th Cir. 1980))).

precipitation, surface water, and groundwater come into contact with materials disturbed by mining. Even after mining stops, the Pebble Mine will continue to produce polluted discharges.

The pollutants produced by the mine will include toxic materials with the potential for profound ecological impacts, including selenium and mercury. As a result of the large volume of contaminated contact water, the mine will have to continuously discharge this polluted water. Because the concentrations of pollutants in the mine pits and other impoundments will significantly exceed water quality standards — including levels of mercury more than 140 times the water quality standard — this contact water will need to be treated before it can be released into surface waters. If treatment fails or if contaminants bypass the treatment system, however, the mine will have no way to stop the ongoing production of contaminated water. There is no valve that can be turned off to stop the flow while a solution is identified. Meanwhile, every discharge that exceeds water quality standards has the potential to cause significant harm to downstream ecosystems. And these exceedances could continue for decades or centuries, with accumulating and compounding downstream impacts, if it turns out that the mine cannot adequately contain or treat the contaminated water it produces.

These unassailable facts about water pollution from the mine are baked into the very nature of the proposed Pebble Mine. This should have led the Corps to produce a DEIS that includes a rigorous assessment of the level of pollutant concentrations that the mine will produce, the capacity of the mine to successfully contain contaminated water, the availability and field-tested reliability of treatment technologies, the adequacy of contingency plans to be employed in the event contaminated water is not fully contained or treated, and the environmental effects that would be suffered by downstream species and ecosystems should there be a failure of the containment and treatment system ranging from minor to catastrophic. The DEIS fails to provide an assessment of any of these elements sufficient to fully inform decisionmakers and the public. As a result, the DEIS violates NEPA.

1. The project will produce elevated concentrations of harmful pollutants.

The DEIS fails to provide complete consideration for the impacts of the mine on water quality in the receiving streams and associated wetlands. And, as discussed in greater detail below, the DEIS relies on unsupported assumptions and assertions to predict pollutant concentrations in the mine pits and impoundments and in the mine's treated discharges. But even this limited assessment of water quality impacts clearly establishes that the mine will have significant adverse effects on aquatic life. The DEIS, including in particular Appendix K4.18, already demonstrates levels of contaminants in the pits during both operations and closure far in excess of water quality standards. The DEIS also acknowledges that during operations and closure the mine will discharge water with pollutants — particularly selenium — in concentrations that exceed the levels recommended by the EPA for protection of aquatic life. The DEIS entirely fails to consider, however, whether or how the mine could bring its discharges into compliance with EPA's recommended criterion or with an updated Alaska water quality standard for selenium based on that criterion.

i. The Pebble Mine will discharge selenium, a highly bioaccumulative toxin.

Among the water pollutants that the Pebble Mine will generate at elevated concentrations is selenium.[591] EPA has identified selenium as a highly bioaccumulative toxin that can cause lethal deformities in fish and other aquatic organisms. In July 2016, EPA issued its final "Recommended Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater."[592]

EPA's Recommended Criterion describes the harm caused by elevated concentrations of selenium and the pathways through which fish and other aquatic organisms may be exposed to the pollutant:

> Bioaccumulation and transfer through aquatic food webs are the major biogeochemical pathways of selenium in aquatic ecosystems. Dissolved selenium oxyanions (selenate, selenite) and organic selenides are assimilated into the tissues of aquatic primary producers (trophic level 1 organisms), such as periphyton, phytoplankton, and vascular macrophytes; and subsequently biotransformed into organoselenium. These organisms, together with other particle-bound selenium sources, constitute the particulate selenium fraction in the water column. Selenium from this particulate fraction is then transferred to aquatic primary consumers such as zooplankton, insect larvae, larval fish, and bivalves (trophic level 2), and then to predators such as fish and birds (trophic level 3 and above).[593]
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> [E]xcessive amounts of selenium can also have toxic effects, with selenium being one of the most toxic of the biologically essential elements (Chapman et al. 2010). Egg-laying vertebrates have a lower tolerance than do mammals, and the transition from levels of selenium that are biologically essential to those that are toxic occurs across a relatively narrow range of exposure concentrations (Luckey and Venugopal 1977; U.S. EPA 1987, 1998; Haygarth 1994; Chapman et al. 2009, 2010). Selenium consumed in the diet of adult female fish is deposited in the eggs, when selenium replaces sulfur in vitellogenin, which is transported to the ovary and incorporated into the developing ovarian follicle (Janz et al. 2010), the primary yolk precursor.[594]
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> A variety of lethal and sublethal deformities can occur in the developing fish exposed to selenium, affecting both hard and soft tissues (Lemly 1993b). Developmental malformations are among the most conspicuous and diagnostic symptoms of chronic selenium poisoning in fish. Terata are permanent biomarkers of toxicity, and have been used to identify impacts of selenium on fish

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[591] DEIS at 4.18-14.
[592] 81 Fed. Reg. 45,285 (July 13, 2016).
[593] Environmental Protection Agency, Report, *Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016 (Aquatic Life Ambient Water Quality Criterion)*, June 2016, at 10–11 (included as an attachment with these comments).
[594] *Id.* at 12.

> populations (Maier and Knight1994; Lemly 1997b). Deformities in fish that affect feeding or respiration can be lethal shortly after hatching. Terata that are not directly lethal, but distort the spine and fins, can reduce swimming ability, and overall fitness.[595]

EPA's findings include the observation that the line between concentrations of selenium in the aquatic environment that are beneficial, and concentrations that are toxic, can be exceedingly slim:

> Selenium has a narrow range encompassing what is beneficial for biota and what is detrimental. . . . Aquatic and terrestrial organisms require low levels of selenium in their diet to sustain metabolic processes, whereas excess concentrations of selenium that are only an order of magnitude greater than the required level have been shown to be toxic to fish, apparently due to generation of reactive oxidized species, resulting in oxidative stress (Palace et.al. 2004).[596]

Accordingly, the addition of even relatively low amounts of selenium to the aquatic environment can tip the balance and lead to harmful toxic effects.

EPA also specifically identified metals mining and processing as a significant source of selenium pollution:

> Mining activities bring selenium-enriched deposits to the surface, where they are exposed to physical weathering processes. . . . Where selenium-containing minerals, rocks, and coal are mined, selenium can be mobilized when rock overburden and waste materials are crushed, increasing the surface area and exposure of material to weathering processes. Selenium contamination of surface waters can also occur when sulfide deposits of iron, uranium, copper, lead, mercury, silver, and zinc are released during the mining and smelting of these metal ores.[597]

Other experts have similarly identified the ecological harm caused by elevated selenium concentrations. As Dr. Zamzow notes:

> Ecotoxicity from selenium discharges has been reported for several decades. Its effects were observed in the Kesterson Reservoir, San Joaquin Valley, California in the early 1980's as dramatic losses in migratory bird populations (Skorupa and Ohlendorf 1991). Selenium ecotoxicity was also documented in the early 1980's at Belews Lake, North Carolina, where 16 of 20 (80% of) endemic resident fish species were extirpated from a coal ash settling pond (Lemly 1985, Lemly 1987, Cumbie and Van Horn 1998), and other reservoirs receiving effluents from coal power plants (Lemly 2014). In these cases, selenium leached from coal ash was discharged into reservoirs and lakes, where it impacted fish populations. More

[595] *Id.* at 14.
[596] *Id.* at 14–15.
[597] *Id.* at 4–5.

> recently, selenium was found in discharges from coal, gold, phosphate and uranium mines and impacts from some of these operations have been observed (Sobolewski 2010).[598]

Despite this well-documented evidence of the harm that elevated selenium concentrations can cause to downstream aquatic environments and the species who rely on them, and despite the clear evidence that the Pebble Mine will produce elevated concentrations of selenium, the DEIS fails to adequately assess the project-specific effects of its selenium discharges. "Despite such well-documented toxic effects, no ecotoxicity studies or analyses necessary to predict and consider potential ecotoxic effects, have been conducted on water treatment plant discharge water in the DEIS or otherwise to determine the potential for biological impacts for the Pebble project."[599]

ii. The DEIS fails to adequately assess compliance with water quality standards and permit limits.

The cursory assessment of the mine's projected compliance with water quality standard presented in the DEIS is limited to consideration of Alaska's current water quality standards. As such, the DEIS ignores EPA's recommended criterion for selenium, which sets a limit for the water-column concentration in lotic (flowing) streams that is lower than the existing Alaska water quality standards. This omission is striking and improper because Alaska is likely to adopt the EPA criterion as the state standard during the life of the permit. Even if Alaska does not adopt the EPA criterion as a statewide standard, Alaska may use the criterion as the basis to set lower limits in the mine's National Pollutant Discharge Elimination System (NPDES) permit.

The CWA requires that states periodically review their water quality standards. As part of this "triennial review" process, Alaska must consider new scientific information and — in particular — updated EPA criteria such as the 2016 selenium criterion.

The CWA requires states to adopt EPA's recommended criteria or develop their own and routinely review and update water quality standards to ensure consistency with the requirements of the act. Specifically, §303(c)(1) states the ". . . State shall from time to time (but at least once each three year period...) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards."[600]

> In each [water quality standards] review cycle, states and tribes, with input from the public, review their existing [water quality standards] to identify additions and/or revisions that are necessary or appropriate to ensure that their [water quality standards] meet the requirements of the CWA and the needs of the state or tribe. . . . The following are examples of items that states and tribes should consider when reviewing their [water quality stanards]: . . . New or updated

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[598] Zamzow, Kendra, et al., April 2019, *Selenium Issues in the Pebble Project Draft EIS Position Paper*, U.S. Army Corps of Engineers (Zamzow, 2019a) at 18 (report and its references are included as attachments to these comments).
[599] *Id.*
[600] 33 U.S.C. § 1303(c)(1).

> scientific information (e.g., new or updated Section 304(a) national criteria recommendations).[601]

EPA's proposed criteria for selenium were developed over multiple years and involved a rigorous process of scientific vetting. The recommended criteria reflect the most recent and reliable views of the scientific community. These criteria include a lower water-column based limit for selenium in lotic (flowing) streams, as well as criteria based on the concentration of selenium in fish tissue. As such, Alaska will have to consider EPA's recommendations as part of a future triennial review of its water quality standards, and will be unlikely to avoid adopting the selenium criteria as updated water quality standards. The DEIS entirely fails to consider the fact that the Pebble Mine is projected to produce discharges that will violate this new water quality standard, nor does it consider whether or how the mine could bring its discharges into compliance with the new standard.

Similarly, the DEIS fails to account for or consider that Alaska, in issuing the CWA NPDES permit for the mine, may determine that a lower limit for selenium is necessary to ensure compliance with narrative standards or otherwise to prevent harm to aquatic life. The CWA requires "that every permit contain (1) effluent limitations that reflect the pollution reduction achievable by using technologically practicable controls, and (2) any more stringent pollutant release limitations necessary for the waterway receiving the pollutant to meet 'water quality standards.'"[602] Every permit must ensure the receiving waterway will meet the water quality standards, which

> have two primary components: designated "uses" for a body of water (e.g., public water supply, recreation, agriculture) and a set of 'criteria' specifying the maximum concentration of pollutants that may be present in the water without impairing its suitability for designated uses. Criteria, in turn, come in two varieties: specific numeric limitations on the concentration of a specific pollutant in the water (e.g., no more than .05 milligrams of chromium per liter) or more general narrative statements applicable to a wide set of pollutants (e.g., no toxic pollutants in toxic amounts).[603]

The effluent limitations in a NPDES permit "must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the [permitting authority] determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."[604] Effluent limitations are defined as "any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of

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601 Environmental Protection Agency, Regulations, Water Quality Standards Handbook, *Chapter 6: Procedures for Review and Revision of Water Quality Standards*, August 2014, at 2.
602 *American Paper Inst. v. United States Envt'l Prot. Agency*, 996 F.2d 346, 349 (D.C. Cir. 1993) (citing 33 U.S.C. § 1311(b)(1)) (internal citations omitted).
603 *Id.* (citing 33 U.S.C. § 1313(c)(2)(A)) (internal citations omitted).
604 40 C.F.R. § 122.44(d)(1)(i).

compliance."[605] In this way, "the rubber hits the road when the state-created standards are used as the basis for specific effluent limitations in NPDES permits."[606]

Here, Alaska — either on its own, or as compelled by a citizen suit challenging a defective final permit — must consider whether a limit on selenium that is lower than the current Alaska water quality standard (and more protective of water quality) would be warranted for the mine. Such a determination could be compelled by the EPA-recommended criterion, or by the voluminous scientific record on which EPA based its criterion. Once Alaska adopts the lower standard recommended by EPA, it is not clear whether or how the Pebble Mine could bring its discharges into compliance.

iii. Selenium discharges will fall just below the current Alaska water quality standard, and exceed the EPA recommended criterion.

During operations, discharges from the water treatment ponds will contain pollutant concentrations that approach Alaska's current water quality standard for selenium and that exceed the EPA-recommended standard for selenium. The DEIS projects that the concentrations of pollutants in discharges to surface waters during operations will fall just barely below Alaska's current standard for selenium, and **will exceed** EPA's recommended criteria for selenium which was promulgated for the protection of aquatic life. The DEIS projects that the levels of selenium that will be discharged from water treatment plant numbers 1 and 2 will be 0.004 mg/l and 0.003 mg/l, respectively, which is just below the Alaska water quality standard of 0.005 mg/l.[607] The concentrations in each of those discharges will either reach or exceed EPA's recommended water-column-based criterion for lotic (fast moving) streams of 0.0031 mg/l.

There remains significant potential that additional parameters will exceed water quality standards in discharges during operations. The following parameters will require active treatment before they can be discharged to receiving streams, because the following concentrations in the influent to the water treatment plants will exceed water quality standards: total dissolved solids, total suspended solids, aluminum, antimony, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc.[608] The concentration of mercury in the influent will be ten times the Alaska water quality standards.[609]

The DEIS further projects that discharges of selenium during both Closure Phases 3 and 4 will be just barely below the Alaska water quality standards, and **in excess** of recommended EPA standards.[610] During Phase 3 Closure, the concentration of treated selenium discharged from the seepage collection pond is projected to be just barely under the Alaska water quality standard, at 0.0048 mg/l, compared to the standard of 0.005 mg/l.[611] This discharge will **exceed** the

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605 33 U.S.C. § 1362(11).
606 *American Paper Inst.*, 996 F.2d at 350.
607 DEIS at K4.18-53, Table K4.18-13.
608 *Id.*
609 *Id.*
610 *Id.* at K4.18-54, Table K4.18-14.
611 *Id.*

recommended EPA standard for lotic (flowing) waters of 0.0031mg/l. The concentration of selenium in treated discharges during Phase 4 will remain elevated at 0.0042 mg/l, again falling just below the Alaska water quality standard of 0.005 mg/l and **exceeding** the recommended EPA standard of 0.0031 mg/l for lotic waters.[612]

Multiple pollutants will require active treatment throughout closure because the concentrations of those pollutants in the influent to the water treatment plants will exceed water quality standards. During Phase 3, the following discharges from the Seepage Collection Pond will require active treatment: total dissolved solids, total suspended solids, fluoride, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, and zinc.[613] The concentration of mercury in the seepage collection pond influent will be 0.0005741 mg/l, **over 47x the Alaska water quality standards**. Similarly, during Closure Phase 4 the following pollutants will require active treatment: total suspended solids, aluminum, antimony, cadmium, copper, iron, lead, manganese, mercury, molybdenum, selenium, and zinc.[614]

iv. The mine pits and impoundments will exceed water quality standards during operations and closure.

During operations, the mine's pits and impoundments will contain highly contaminated water with multiple pollutants exceeding water quality standards. Although the Pebble Mine will not be required to meet water quality standards in the pits and impoundments themselves, the projected concentrations provide cause for concern because they will require intensive treatment to bring discharges within the water quality standards, and because they will pose a direct threat to the environment from leakages and spills. The DEIS fails to adequately assess these risks.

The DEIS estimates levels of toxic pollutants in ponds far in excess of water quality standards during operations. The concentration of each of the following pollutants will exceed water quality standards in at least one pit or impoundment: TDS, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, selenium, zinc, and nitrate (ion).[615] For selenium, every pit or impoundment will exceed the current Alaska water quality standards during operations.[616] The highest concentration of selenium will be in the "Main Embankment Seepage Collection Pond," where the projected concentration of 0.055 mg/l, will be more than 11x the Alaska water quality standards of 0.005 mg/l. In addition, every pit or impoundment will exceed the current Alaska water quality standard for mercury during operations.[617] The highest levels of mercury will be in the "Main Embankment Seepage Collection Pond," where the projected concentration of 0.00050 mg/l will be more than 40x the Alaska water quality standard of 0.000012 mg/l.

[612] *Id.* at K4.18–55, Table K4.18–15.
[613] *Id.* at K4.18–54, Table K4.18–14.
[614] *Id.* at K4.18–55, Table K4.18–15.
[615] *Id.* at K4.18–17, Table K4.18–4.
[616] *Id.*
[617] *Id.*

After the operations phase ends and closure begins, the concentrations of pollutants in the pits and impoundments will continue to exceed water quality standards for multiple parameters. During Closure Phase 1, the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc.[618] For selenium, all pits and impoundments (with the exception of bulk tailings storage facility under 10th percentile projection) will exceed Alaska water quality standards during Closure Phase 1.[619] The highest levels of selenium, 0.0606 mg/l in the "Main Embankment Seepage Collection Pond", will be **more than 12x** the Alaska water quality standards (0.005 mg/l).[620] For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 1.[621] The highest levels of mercury, 0.001676 mg/l in the pyritic tailings storage facility, will be **more than 140x** the Alaska water quality standards (0.000012 mg/l).

During Closure Phase 2, the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: TDS, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc.[622] For selenium, all pits and impoundments (with the exception of the bulk tailings storage facility under 10th percentile projection) will exceed Alaska water quality standards during Closure Phase 2.[623] The highest levels of selenium, 0.0664 mg/l in the "Main Embankment Seepage Collection Pond", will be **more than 13x** the Alaska water quality standards (0.005 mg/l).[624] The concentration of selenium, therefore, will increase between Closure Phases 1 and 2. For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 2.[625] The highest levels of mercury, 0.000604 mg/l in the pyritic tailings storage facility, will be **more than 50x** the Alaska water quality standards (0.000012 mg/l).

During Closure Phase 3, the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, alkalinity, fluoride, sulfate, aluminum, antimony, barium, beryllium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc.[626] For selenium, the concentration in the Main Embankment Seepage Collection Pond will exceed Alaska water quality standards during Closure Phase 3.[627] The highest levels of selenium, 0.0632 mg/l in the "Main Embankment Seepage Collection Pond", will be **more than 13x** the Alaska water quality standards (0.005 mg/l), continuing the trend of increasing concentrations of that pollutant.[628] For

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618 *Id.* at K4.18–29, Table K4.18–7.
619 *Id.*
620 *Id.*
621 *Id.*
622 *Id.* at K4.18–31, Table K4.18–8.
623 *Id.*
624 *Id.*
625 *Id.*
626 *Id.* at K4.18–33, Table K4.18–9.
627 *Id.*
628 *Id.*

mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 3.[629] The highest levels of mercury, 0.000574 mg/l in the pyritic tailings storage facility, will be **more than 47x** the Alaska water quality standards (0.000012 mg/l).

Finally, during the final part of closure — Phase 4 — the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, alkalinity, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc.[630] For selenium, the concentration in the Main Embankment Seepage Collection Pond will exceed Alaska water quality standards during Closure Phase 4.[631] The highest levels of selenium, 0.0550 mg/l in the "Main Embankment Seepage Collection Pond", will be **more than 11x** the Alaska water quality standards (0.005 mg/l).[632] For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 4.[633] The highest levels of mercury, 0.000500 mg/l in the pyritic tailings storage facility, will be **more than 41x** the Alaska water quality standards (0.000012 mg/l).

v. The DEIS fails to adequately assess PLP's compliance with narrative water quality standards.

The DEIS fails entirely to assess whether the Pebble Mine's discharges will cause or contribute to violations of an entire category of water quality standards: narrative standards. As the US Court of Appeals for the DC Circuit has recognized, water quality standards "come in two varieties: specific numeric limitations on the concentration of a specific pollutant in the water (e.g., no more than .05 milligrams of chromium per liter) or more general narrative statements applicable to a wide set of pollutants (e.g., no toxic pollutants in toxic amounts)."[634]

Alaska's water quality standards include a narrative standard prohibiting "concentrations of toxic substances in water or in shoreline or bottom sediments, that, singly or in combination, cause, or reasonably can be expected to cause, adverse effects on aquatic life."[635] "Toxic substances" include selenium, mercury, copper, silver, and zinc.

The DEIS makes no effort to assess the effects of potential combinations of toxic substances introduced to surface waters by the proposed Pebble Mine, including the effects of pollutants in concentrations that individually fall below the respective numeric water quality standards, but that in combination cause or reasonably can be expected to cause adverse effects on aquatic life. For example, EPA's Recommended Criteria for Selenium notes that "studies have found interactions between mercury and selenium to be additive (Heinz and Hoffman 1998) or

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[629] *Id.*
[630] *Id.* at K4.18–34, Table K4.18–10.
[631] *Id.*
[632] *Id.*
[633] *Id.*
[634] *American Paper Inst.*, 996 F.2d at 349 (citing 33 U.S.C. § 1313(c)(2)(A)) (internal citations omitted).
[635] Alaska Department of Environmental Conservation, Regulations, *18 AAC 70.020: Water Quality Standards*, April 6, 2018, 25–26.

synergistic (Huckabee and Griffith 1974; Birge et al. 1979)."[636] "Selenium and mercury have a synergistic negative effect on fish reproduction."[637]

2. The DEIS fails to take a hard look at pollution concentrations in the mine pits and other impoundments.

The DEIS fails to satisfy the most basic purposes of an EIS. An EIS must provide (1) "decisionmakers with sufficiently detailed information to aid in determining whether to proceed with the action in light of its environmental consequences" and (2) "the public with information and an opportunity to participate in the information gathering process."[638] The DEIS fails on both counts by failing to disclose the full severity of water contamination in the pits and other impoundments, to accurately model the hydrologic system, to disclose the risk and uncertainty inherent to the untested proposed water treatment system, and to describe the environmental consequences should any aspect of the water management or treatment system fail. As a result, the DEIS does not provide decisionmakers with the information needed to determine whether to issue the 404 permit and does not provide the public with information adequate to allow for the level of public participation required under the law.

The actual concentrations of water pollutants released into the environment by the Pebble Mine are likely to be far higher than the concentrations projected and assessed in the DEIS. Multiple factors support this conclusion. A review of historic trends at other U.S. copper mines reveals that actual pollutant discharges almost always exceed pre-mining projections — sometimes by a wide margin. Site-specific analysis of the basis for projected pollutant concentrations in the mine pits and impoundments reveals that those projections are significantly underestimating the actual likely concentrations, including due to acid leaching. The DEIS also underestimates the potential for discharges that bypass treatment systems, including through groundwater seepage. In addition, the mine is unlikely to achieve the projected pollutant concentrations in its surface water discharges because those projections rely on new and untested treatment methods that are unlikely to function as planned, particularly because the mine will be required to treat far higher volumes of discharges than any other comparable existing mine. These flaws in the assessment of projected pollutant concentrations in the DEIS are particularly problematic because, as discussed above, even under the best case scenario the mine is already projected to produce pollutant concentrations in its discharges that are very close to existing Alaska water quality standards and that exceed EPA's recommended criterion. The Pebble Mine is already projecting no margin for error, but available information establishes that errors are inevitable and could be considerable.

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[636] Environmental Protection Agency, *Aquatic Life Ambient Water Quality Criterion*, 15–16; Penglase, S. et al., Apr. 2014, *Selenium and mercury have a synergistic negative effect on fish reproduction*, Aquat Toxicol. (included as an attachment with these comments).
[637] S. Penglase et al., Apr. 2014, *Selenium and mercury have a synergistic negative effect on fish reproduction*, Aquat Toxicol.
[638] *Nw. Res. Info. Ctr., Inc.*, 56 F.3d at 1064.

i. Agencies must fully disclose uncertainty concerning proposed technologies.

The DEIS acknowledges that the Pebble Mine will produce huge quantities of highly contaminated waste water. The DEIS downplays the potential effects of this contaminated water on downstream ecosystems, however, by claiming that PLP will be able to successfully capture and treat the contaminated water before it's discharged. But the DEIS fails to sufficiently describe the experimental nature of the proposed technology, including the fact that similar technologies have never been successfully deployed to treat the quantities of water that will be produced at the Pebble Mine, nor have those technologies been used in an environment with such an extreme climate. Because the DEIS fails to accurately describe the risk of failure of the untested technology, it also fails to assess the devastating environmental effects that will result from partial or complete failure of the proposed treatment system.

The Pebble Mine proponents rely on untested, experimental technologies to avoid discharging toxic pollutants in harmful concentrations in two ways: (1) using groundwater wells to prevent highly contaminated leachate from the waste rock piles and tailings storage facilities from bypassing the proposed treatment system; and (2) treating highly contaminated contact water before it is released into surface streams. If either of these systems fails, the result will be the release of pollutants at harmful concentrations into sensitive ecosystems.

In *Friends of the Earth v. Hall*, the U.S. District Court for the Western District of Washington held that an EIS failed to satisfy NEPA where it did not disclose sufficient information about the experimental nature of a critical technology relied on to minimize environmental impacts that would otherwise occur.[639] There, the Navy planned to extensively dredge a harbor to accommodate Navy vessels, and to dispose of the highly contaminated dredge spoils using a technique called Confined Aquatic Disposal.[640] The court noted that, while Confined Aquatic Disposal had been successfully used previously, the project under review would involve much more challenging circumstances. While the technology had previously been employed in 70-foot-deep water, the Navy proposed to use Confined Aquatic Disposal at depths "four to six times greater" for this project, and the court noted that Confined Aquatic Disposal had never been attempted in the United States at depths greater than 100 feet.[641] The court concluded that the EIS prepared by the Corps and the Navy "failed to acknowledge the degree of uncertainty concerning the [Confined Aquatic Disposal] technology and its use at [the proposed] depths;" and "failed to identify the 'major' environmental consequences of a technology failure."[642] The court further noted that "NEPA requires an EIS to expose scientific uncertainty concerning safety and environmental risk of a proposed action."[643] In the case of the Pebble DEIS, PLP and the Corps have not adequately acknowledged the uncertainty around the technology proposed to achieve environmental compliance with water quality standards.

[639] 693 F. Supp. at 904, 922.
[640] *Id.* at 915–16.
[641] *Id.* at 923–24.
[642] *Id.* at 925–26.
[643] *Id.* (citing *Southern Oregon Citizens Against Toxic Sprays, Inc.,* 720 F.2d at 1479).

ii. The DEIS fails to disclose that the proposed treatment technologies are experimental, uncertain, and subject to a high likelihood of failure.

The Pebble Mine will necessarily produce high volumes of extremely contaminated contact water. To maintain pit levels and achieve water balance on site, the mine will need to continuously discharge water into the receiving streams. And to comply with water quality standards and otherwise avoid serious adverse environmental impacts, the mine must continuously treat its discharges — again, in perpetuity. The technology that will be relied on to achieve these ambitious treatment results represents a critical part of the proposed mine plan and of the DEIS. Unfortunately, the DEIS provides a wholly inadequate description of the treatment technology that fails to acknowledge either the experimental nature of the technology or the risk that the technology will not reduce pollution concentrations to the projected levels.

As one water treatment expert who has reviewed the DEIS and associated materials observed,

> The water treatment plants proposed for the Pebble Project are very large, complex, poorly documented and untested treatment systems expected to treat water in perpetuity. They have been designed using optimistic assumptions, instead of a conservative design philosophy. Their designs are ill-defined and unsubstantiated. A number of assumptions in their designs were shown to be incorrect. For selenium, the proposed treatment systems will probably discharge non-compliant effluents. In the case of sulfate, their proposed method for disposing residuals from treatment may be ineffective. Finally, the proposal to treat water in perpetuity with these treatment plants presents a large, indefensible risk.[644]

Another expert – Richard Borden, an environmental scientist and manager who worked for the global mining company Rio Tinto for 23 years – highlighted the unprecedented and experimental nature of the proposed water treatment system:

> The proposed closure water treatment plant design is very complex, still has significant uncertainties and is likely to have very high operating costs. Treatment steps include metals precipitation with lime, ferric chloride and other reagents, second-stage metals precipitation, clarification, ultrafiltration, nanofiltration, followed by multistage gypsum precipitation via lime addition, ultrafiltration and reverse osmosis. I am not aware of a treatment flowsheet of this complexity being applied to such high flows anywhere else in the world. By necessity the entire water treatment strategy is at best conceptual in nature and no laboratory or pilot scale tests have been completed. During an internal review of the proposed treatment processes conducted in October, 2018 (AECOM 2018i) it was stated that "it is difficult to fully assess the treatment process in a meaningful way

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[644] Sobolewski, André, May 20, 2019, *Review of water treatment plants proposed for Pebble Project* (Sobolewski, 2019) at 1 (report and its references are included as attachments to these comments).

> without confidence in reliability of the design of the treatment process". Given the current uncertainties and inconsistencies in the treatment strategy, and the lack of even preliminary engineering drawings, designs and specifications, the ability of the proposed post-closure water treatment plant to meet required throughputs and discharge water quality requirements has not been demonstrated. These same deficiencies also exist for the operational water treatment plants which are, if anything, more complex than the proposed closure facilities.[645]

The description in the DEIS of the proposed treatment system that will play such a critical role in minimizing environmental impacts is limited to the following:

> Key treatment steps for both [water treatment plants] would include dissolved metals oxidization, co-precipitation, clarification, ultrafiltration, and reverse osmosis (see Chapter 2, Alternatives, Figure 2-11 and Figure 2-12). The open pit [water treatment plant] would also include biological selenium removal, and the main [water treatment plant] would include nanofiltration through high-pressure membranes (expected to remove selenium and other salts) and multiple-stage calcium sulfate precipitation with a lime softening process."[646]

The DEIS attempts to justify this cursory description by noting that the proposed treatment system "would employ treatment plant processes commonly used in mining and other industries around the world."[647] This is not true. In fact, "[n]one of these technologies have been proven to be effective at treating the volumes of water, or in the climatic conditions expected to be present at the Pebble Project. Furthermore, by failing to specify the particular technology being proposed, it is difficult to fully evaluate the effectiveness of treatment."[648]

In the *Friends of the Earth v. Hall* decision, the court concluded that an EIS failed to satisfy NEPA's requirement of informed decisionmaking and public participation where the EIS failed to "discuss crucial information concerning technological uncertainty and what major environmental impact would occur if the … technology failed."[649] To reach this conclusion, the court noted that the EIS associated with the proposed project did not adequately acknowledge the fact that the proposed technology was "experimental, subject to a significant degree of uncertainty, and present[ed] a significant risk of failure."[650] The court also stated that under NEPA an EIS must "expose scientific uncertainty concerning safety and environmental risk of a proposed action."[651] Like in *Hall*, there is a high degree of uncertainty around the proposed technology relied on by the Pebble DEIS to minimize environmental impacts: the "proposed treatment systems at the Pebble Project are essentially experimental: no similar systems have ever been constructed and operated at any other mine anywhere in the world."[652]

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[645] Borden, 2019d at 6.
[646] DEIS at 4.18–4.
[647] *Id.*
[648] Zamzow, 2019a at 11.
[649] 693 F. Supp. at 904, 926.
[650] *Id.* at 922–23.
[651] *Id.* at 925–26 (citing *Southern Oregon Citizens Against Toxic Sprays, Inc.*, 720 F.2d at 1479).
[652] Sobolewski, 2019 at 1.

The mere fact that similar technologies have been used at other mines does not excuse the failure of the Pebble DEIS to acknowledge the experimental nature of the technology in this setting and for this purpose. That the proposed treatment system is based around technologies that have been employed in some capacity at other mines does not render the limited discussion in the DEIS adequate under NEPA. The court in *Friends of the Earth v. Hall* held that a technology that was "technically feasible" nevertheless warranted additional disclosures and analysis because it "remain[ed] experimental in the eyes of a wide variety of knowledgeable observers."[653]

The reports of multiple knowledgeable experts make clear that there are several reasons why the treatment proposed for the Pebble Mine is experimental, subject to a significant degree of uncertainty, and presents a significant risk of failure.

The proposed treatment technology — and in particular the biological treatment component — remains experimental and unproven because it has never been successfully deployed in the harsh climatic conditions found at the Pebble Mine site in Alaska. As EPA noted in its review of an earlier draft of the DEIS, the DEIS must

> explain whether this [water treatment plant] technique has been utilized at other mine sites, in particular for the proposed treatment rates. If it has been utilized elsewhere, please explain how the differences in temperature at the Pebble site would affect the biological activity associated with Se removal, as well as describe whether the effect of temperature on the efficiency of Se removal using this technique has been evaluated.[654]

But the DEIS entirely fails to do that. Other site specific factors that could negatively influence the functioning of the treatment system include "water temperature, pH, and the concentrations of other constituents, including nitrates and salts."[655]

The proposed treatment technology is also experimental and unproven for treating the volume of water that will be produced by the Pebble Mine. The DEIS presumes, without justification, that technologies that have successfully treated lower volumes of water can be scaled up to treat the much higher volumes at Pebble. "A key assumption is of linear scaling: that flows treated at 6,000 gpm will be treated with the same efficiency as 22,000 gpm. While theoretically acceptable, there is no real-world basis to support this assumption for such a complex treatment system, specifically that treatment performance will remain the same at all scales, despite variability in influent composition, temperature, or other environmental variables."[656] "The treatment system proposed at the Pebble Project introduces a new uncertainty: it is uncertain that

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[653] 693 F. Supp. at 924.
[654] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.18 – Water and Sediment Quality at EPA Comment #18, 10 (emphasis added).
[655] Zamzow, 2019a at 10 (citing study by the North American Metals Council (NAMC) Selenium Working Group).
[656] Sobolewski, 2019 at 4.

the performance observed at 1,400-2,000 gpm will scale linearly to the 6,300 gpm flows during operation or to the 22,000 gpm flows proposed at closure."[657]

Because there are no treatment systems successfully operating under the conditions and at the volumes required for the Pebble Mine, the DEIS must present detailed technical specifications and the results of pilot testing to justify the projections of successful water treatment. But this information is entirely missing. Dr. Zamzow notes that

> [v]ery few details are available on the design of the treatment plant for selenium removal. The main water treatment plant (WTP #2) would rely on a nanofiltration (NF) unit to remove selenium. HDR claims that selenium will be removed by 92-94% by membrane filtration, but they do not substantiate their claims with data from operational treatment systems. . . . The DEIS states that methods for treating selenium could include biological removal at the Open Pit [water treatment plant], and nanofiltration and calcium sulfate precipitation at the Main [water treatment plant] (DEIS p. 4.18-4). None of these technologies have been proven to be effective at treating the volumes of water, or in the climatic conditions expected to be present at the Pebble Project. Furthermore, by failing to specify the particular technology being proposed, it is difficult to fully evaluate the effectiveness of treatment.[658]

The risk of overstating the likelihood that the proposed experimental technologies will achieve the projected pollution reductions is compounded by the fact that the DEIS fails to assess how the proposed treatment systems would handle the upper range of pollutant concentrations that could be reasonably expected in discharges from the Pebble Mine. "Pebble has not adopted a conservative approach to design. In their design documents, HDR adopted 50th percentile values as a design basis, even as they re-evaluated the design for 90th percentile concentrations (HDR, 2012, HDR, 2018b)."[659] This overly-optimistic approach is particularly inappropriate given the experimental nature of the technology. "A design basis from 50th percentile flows and concentrations would be defensible if it drew on a record of 10+ years of monitored flows and water chemistry, but this is not the case for this project."[660] To fully inform decisionmakers and the public as to the risks of environmental harm posed by discharges from the Pebble Mine, the DEIS should use "90th (preferably 95th) percentile influent contaminant concentrations (they used 50th percentile concentrations), after revising their water balance and predicted influent chemistry, as well as discharge criteria."[661]

The most reliable way for the DEIS to establish that the projected pollutant reductions are feasible and realistic would be to reference testing that accurately replicates the unique conditions that will be present at the Pebble Mine. Unfortunately, the DEIS contains no reference to any project-specific testing, either at bench-scale or pilot-scale. The proposed treatment system cannot be assumed to work unless and until it is established through rigorous testing.

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[657] Zamzow, 2019a at 13.
[658] *Id.* at 10–11.
[659] Sobolewski, 2019 at 4.
[660] *Id.*
[661] *Id.*

Nor does the DEIS even cite to literature to justify the fundamental assumptions regarding the ability of the proposed treatment system to function in this novel environment, including the significantly elevated flow volumes. "No authoritative literature review is provided in any document appended to the DEIS, nor is any discussion provided on how published information about a treatment process translates into a specific design."[662] The cursory discussion of largely inapplicable literature in the DEIS does not satisfy this need:

> The only independent reference to selenium treatment presented by HDR is the 2010 Review of Available Technologies for the Removal of Selenium from Water (NAMC 2010). This document largely discusses the performance and engineering aspects of pilot-scale treatment systems, not full-scale treatment systems. Otherwise, HDR relies on vendor information to predict a >92% removal rate by the Seepage Collection Pond [water treatment plant] at closure, which would render the effluent compliant with the Alaska State standard.[663]

Ultimately, the DEIS must address the unfortunate reality that it simply may not be possible to reduce the concentration of selenium and other pollutants in the Pebble Mine's discharges to levels that comply with water quality standards. "Under the current mine plan...the proposed treatment system will not produce an effluent compliant with the Alaska State standard for selenium, for the Seepage Collection Pond [water treatment plant] at closure."[664] "In the case of selenium, with which I have great expertise and intimate knowledge of treatment aspects, their claim of >92% removal rates is not supported by the performance of full-scale operating treatment systems."[665] "There is a real possibility that no treatment technology exists that can remove selenium to the necessary level at this site."[666]

iii. The Pebble Mine poses significant technical challenges for water quality treatment.

a. Historically, copper mines have generated worse water quality than initially predicted.

The reliance of the DEIS on untested treatment technologies is particularly troubling given the well-established historic trend of copper mines in the United States failing to achieve the projected treatment results. This pattern should have led the Corps to subject the Pebble Mine's proposed experimental treatment systems to even more rigorous review.

A recent review of fifteen operating open-pit copper mines in the United States found that virtually all — 93% — failed to capture and control wastewater, resulting in significant water

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662 Sobolewski, 2019 at 8.
663 *Id.* at 9.
664 *Id.*
665 *Id.* at 14
666 *Id.* at 7.

quality impacts.[667] Sources of contamination at these existing open-pit copper mines included leaching through groundwater, pipeline ruptures, tailings spills, precipitation-induced runoff, and releases during extreme storm events.[668] Many of the discharges from these mines resulted in water quality standard exceedances for selenium, mercury, and other pollutants of concern.[669]

The DEIS itself acknowledges that the actual pollutant concentrations in discharges from the mine may exceed the levels projected in the DEIS or incorporated as NPDES permit limits:

> [O]ver the life of the mine, it is possible that APDES permit conditions may be exceeded for various reasons (e.g., treatment process upset, record-keeping errors) as has happened at other Alaska mines. In these types of events, corrective action is typically applied in response to ADEC oversight to bring the [water treatment plant] discharges into compliance.[670]

Beyond that cursory acknowledgment, however, the DEIS fails to meaningfully engage with this issue. The DEIS does not identify specific mechanisms that may lead to exceedances, or assess the likelihood of each potential failure. Nor does the DEIS explain what "corrective actions" may be available to address each mechanism of failure. The Corps has not meaningfully considered the actual potential impacts of the mine on water quality, including impacts that will result from discharges that exceed the projected pollutant concentrations.

b. The Pebble Mine will produce more wastewater than any other mine in Alaska.

The already considerable challenge of treating contaminated water at the Pebble Mine is compounded by the fact that the volume of water to be treated far exceeds what any other mine in Alaska has ever attempted. According to data from the project proponent's own analysis, the Pebble Mine will be required to treat more than four times the volume of water managed by the next largest mine:

Mine	**Gallons per Minute**	**Process/Equipment**	**Pebble vs others**
Pebble Mine proposed Water Treatment Plant[671]	19,000 (combined based on two proposed water treatment plants)	chemical precipitation, filtration, high-pressure membranes filtration, and biological selenium removal	--

[667] Gestring, Bonnie, May 2019, *U.S. Operating Copper Mines: Failure to Capture & Treat Wastewater*, Earthworks. (Gestring, 2019) (report and references included as attachments to these comments).
[668] *Id.*
[669] *Id.*
[670] DEIS at 4.18–5.
[671] DEIS App. K4.18–53 (Table K4.18–13).

Kensington Mine Water Treatment Plant[672]	1,500	Co-precipitation	Pebble would process **12.7 times** that of Kensington
Greens Creek Mine Water Treatment Plant[673]	2,500	Co-precipitation	Pebble would process **7.6 times** that of Greens Creek
Red Dog Mine Water Treatment Plant[674]	4,600	Chemical precipitation	Pebble would process **4.1 times** that of Red Dog
Donlin proposed Water Treatment Plant[675]	4,750 (max. capacity)	Oxidation, clarification, and filtration	Pebble would process **4 times** that proposed for Donlin

The dramatically higher volumes of water requiring treatment at the Pebble mine means that there is no treatment technology that has been field tested and proven to effectively treat mine discharges under these conditions. The DEIS fails to adequately describe the risks and uncertainty inherent in achieving the water treatment projections. Additional information, including field testing, is necessary before any conclusions can be made about the availability (let alone performance) of treatment technology to deal with these volumes of water.

c. The DEIS fails to accurately assess water contamination levels in the mine pits and other impoundments.

The DEIS fails to provide an accurate estimate of the pollutant concentrations likely to be found in the mine pits and other impoundments throughout the operational and closure phases. By underestimating the pollutant concentrations that should be expected, the DEIS fails to accurately assess the environmental impacts of the mine, under both best case and worst case scenarios. The inaccurate pollutant concentration estimates are also used to inform the design and assessment of potential water treatment technologies, further contributing to the failure of the DEIS to

[672] PLP, Report, *Pebble Project: Water Treatment Process – Benchmark Update*, prepared by HDR, Dec. 6, 2017, at 2 (included as an attachment with these comments).
[673] *Id.*
[674] *Id.*
[675] Alaska Dept. of Environmental Conservation, APDES Permit Fact Sheet – Final, Permit No. AK0053643, Donlin Gold Project, May 24, 2018, at 7 (included as an attachment with these comments); *see also* Alaska Dept. of Environmental Conservation, APDES Permit – Final, Permit No. AK0053643, Donlin Gold Project, May 24, 2018 (included as an attachment with these comments).

appropriately acknowledge the unavailability of existing technology to achieve the required treatment.

As an initial matter, the projections of water quality in the DEIS strain credulity because they run counter to the plain evidence. "More than 200 million tons of potentially acid-generating (PAG) wastes will be excavated and stored on the site in perpetuity, yet the DEIS predicts that no site water will be acidic during operations, closure, or post-closure."[676] Copper mines are associated with a poor record of environmental degradation because of their low buffering capacity and tendency to leach contaminating metals into groundwater from waste rock, tailings, and mine pits.[677] In a 2012 report titled "Comparison of the Pebble Mine with Other Alaska Large Hard Rock Mines," the Center for Science and Public Participation noted, "[m]ost porphyry deposits/mines are large and low grade, leading to the production of large quantities of waste rock and tailings."[678] The report notes that the metal mineralization is in the form of metal sulfides and that in wet environments, the environmental risks are higher.[679] The report further notes that the "geochemistry at the Pebble mine indicates that much of the mined rock will be potentially acid generating" and that the [g]eomorphology suggests that leaked contaminants will be difficult to contain."[680] The wet environment of Bristol Bay "increases the likelihood that these contaminants will become mobile."[681] Due to Pebble's large size and the fact that "[m]itigation techniques . . . have been notoriously ineffective to slow acid production and to prevent it from leaving the minesite," Pebble's "acid rock drainage (ARD) could be difficult to control."[682]

Fundamental assumptions of the DEIS, including in particular that submerged materials will not generate acid because they will be deprived of exposure to oxygen, are undermined by the results of PLP's own testing and by fundamental principles of chemistry. "The DEIS assumes that submerging pyritic tailings and potentially acid-generating waste under water during operation in the [pyritic tailings storage facility] (also known as Area E) and during closure in the pit will prevent oxidation and acid generation."[683] However, "PLP's leachate test results show that once potentially acid-generating wastes start producing acid and leaching metals, they will continue to do so even if submerged."[684] This is because, among other factors, testing reveals that "material in the [pyritic tailings storage facility] will be oxidized by ferric iron even under submerged, reducing conditions."[685] Subaqueous column tests conducted by PLP, in which

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[676] Maest, Ann, June 24, 2019, *Pebble Project Mine Water Quality Predictions and Implications for Environmental Risk: Comments on the Pebble Project Draft Environmental Impact Statement*, prepared for Center for Science in Public Participation and National Resources Defense Council (Maest, 2019) at 2 (report and its references are included as attachments to these comments)
[677] Levit, Stuart & Chambers, David, Feb. 2012, *Comparison of the Pebble Mine with Other Alaska Large Hard Rock Mines*, Center for Science and Public Participation (Levit & Chambers, 2012) at 4 (included as an attachment to these comments).
[678] *Id.*
[679] *Id.*
[680] *Id.*
[681] *Id.*
[682] *Id.* at 4.
[683] Maest, 2019 at 6.
[684] *Id.* at 2.
[685] *Id.* at 8.

crushed waste rock or tailings are placed in a column and kept submerged with water, were run and the samples tested (six samples of Pre-Tertiary Pebble West Zone potentially acid-generating waste rock, two samples of Tertiary Pebble East Zone waste rock, and two samples of pyritic tailings).[686] The results show that leaching will continue for some period of time, even under submerged conditions.[687]

The DEIS also assumes, incorrectly and without support, that the pit lake will remain stratified in perpetuity.[688] This assumption ignores the high potential for pit lake turn over caused by "the sloughing of unstable pit walls into the lake."[689] The failure to consider, or model, the effects of pit lake turn over renders the water quality projections in the DEIS inaccurate and unreliable because "[i]f pit wall sloughing occurs in the Pebble pit, the predicted concentrations in Lorax Environmental (2018) and Knight Piésold (2018a) would greatly underestimate the concentrations in Water Treatment Plant #3 influent water and in water that could discharge from the pit along faults and through the upper glacial materials (overburden) or over the top of the pit if the pumps fail."[690]

The DEIS materials also contain contradictory information that further calls into question the reliability of any of the water quality calculations or projections. For example: whereas the DEIS claims that 50 million tons of potentially acid-generating waste rock will be stored in the pyritic tailings storage facility (DEIS p. 2-12 and App. N, p. 1), Knight Piésold (2018b, p. 18) states the amount will be three times higher - approximately 160 million tons.[691] This is a huge gap since the concentrations of acid generated using rates from the tests are dependent on the amount of material at the site.[692]

Another fundamental flaw in the DEIS' water quality projections comes from the inappropriate application of artificial caps when modeling pollutant concentrations. "SRK Consulting (2018) applied concentration caps as a "tailings pond adjustment" for pH, sulfate, aluminum, copper, iron, and manganese (SRK Consulting, 2018, Table 4). The concentration and pH caps force tailings water to have a neutral pH and low concentrations of these metals and sulfate, but a justification for this approach was not presented."[693] In particular, this artificial suppression of copper values "is especially problematic because it limits predicted concentrations of a contaminant known to be toxic to salmon at low concentrations."[694]

The DEIS' fundamentally flawed and inaccurate description of pollutant-forming conditions in the mine pits further invalidates other parts of the DEIS, notably the discussion of pollution treatment technologies and the projected concentrations of pollutants in water

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686 *Id.*
687 *Id.*
688 Maest, A. and Wobus, C., June 24, 2019, Water Quality and Failure Mode Issues Associated with the Pebble Project Pit Lake (Maest & Wobus, 2019) at 4.
689 *Id.*
690 *Id.* at 5.
691 *Id.* at 4.
692 *Id.*
693 *Id.* at 8.
694 *Id.* at 8–9.

discharged to surface streams. Contrary to the conclusions in the DEIS, tests conducted on materials from the Pebble Mine "show that once [potentially acid-generating] waste rock starts producing acid – and some samples did so immediately – acidity, metals, sulfate, and other constituents will continue to be released even under subaqueous conditions."[695] However, these releases and the resulting elevated pollutant concentrations appear to be excluded in the calculation of water treatment plant source terms.[696] Because the projected influent chemistry for the water treatment plants during operations does not include any acidic leaching from the pyritic tailings storage facility and because acidic leaching of the potentially acid-generating wastes will strongly increase concentrations of pollutants entering the water treatment plants, the design criteria for the water treatment systems drastically underestimate the actual concentrations that will require treatment.[697]

d. The DEIS fails to take a hard look at risks posed by water balance management and treatment.

The DEIS acknowledges, as it must, that mine operations will produce highly contaminated contact water that will exceed water quality standards for multiple parameters. But the DEIS inappropriately downplays the difficulty of managing the pits and other water impoundments during closure, both in terms of maintaining the appropriate hydrologic balance and in terms of treating discharges necessitated by the water management plan.

The nature of the proposed mine means that there will never be a point where active management is not required to avoid unacceptable adverse impacts to the environment. Appendix K4.18 of the DEIS acknowledges that the mine pit will include multiple metals that will form oxyanions that will be mobile at the projected pH values.[698] As a result, "it will be important to continue to maintain the pit lake as a hydraulic sink in perpetuity to control releases to the environment."[699]

The DEIS does not, however, adequately describe the hydrologic conditions that will have to be managed in perpetuity, nor does it describe the measures that will have to be taken to maintain the required low pit lake level, including the volume of water that will have to be treated and discharged. The absence of consideration of this critical issue is particularly striking in light of the fact that "[b]ecause the pits and seepage collection ponds would need to be managed in perpetuity, the probability of a management failure – eventual failure of the pumps and/or failure of the treatment plant – nears 100%."[700]

Despite the fact that avoidance of significant environmental harm during the closure period depends on the maintenance of a particular target level in the mine pit, the DEIS provides only a flawed water balance model:

[695] Maest, 2019, at 7.
[696] *Id.* at 7.
[697] *Id.*
[698] DEIS at K4.18–45.
[699] *Id.*
[700] Maest & Wobus, 2019, at 9.

> Based on the hydrologic data reported in the DEIS, the site water balance has substantial, unexplained flaws, as illustrated by the fact that water inputs and outputs are not balanced at any spatial scale. Thus the entire hydrologic impact evaluation described in the DEIS is also flawed, and must be corrected.[701]

The water balance model presented in the DEIS employs a very basic, gross-scale approach focused around a spreadsheet-based model developed almost 10 years ago.[702] "PLP has built its entire water balance – including its estimate of dewatering needs, water treatment needs, and hydrologic impacts – around a complex and poorly documented 'watershed spreadsheet module.'"[703]

One example of the debilitating flaws in the spreadsheet model is that even though the only inputs to the water balance are from precipitation, between 9% (at gage site UT100E) and 66% (at gage site NK100B) of the precipitation falling on the site is unaccounted for.[704] "This module is 'tuned' to the smaller, streamflow-based values, rather than the larger, precipitation-based values shown in Table 1, so it is possible that the DEIS is significantly underestimating the amount of water requiring management."[705] These and other gaps and inconsistencies in the model make it difficult to assess whether the proposed mandatory water management approach will be successful, or to assess the downstream impacts of the projects should there be a partial or complete failure of the proposed water management.

Part of managing the pit water levels and otherwise controlling the hydrologic balance on site will require ongoing active treatment of surface water discharges. The DEIS fails to describe in any detail how such treatment will be accomplished. These gaps make it impossible for decisionmakers or the public to assess the risks presented by the proposed mine, or to understand the potential environmental impacts.

The DEIS presumes the need for ongoing active treatment of contaminated contact water, even during closure. "In closure phase 3 and beyond, surplus water from the open pit and the bulk [tailings storage facility] main [seepage collection pond] would be treated as two stand-alone water treatment streams, and may be housed in the same [water treatment plant] building (HDR 2019b)."[706] But Pebble hasn't completed engineering or design for this critical treatment. "Water quality of discharge from the open pit [water treatment plant] is the subject of ongoing engineering analysis (PLP 2019-RFI 106)."[707]

This is a significant oversight, and a major gap in the information necessary to assess the proposed mine's overall environmental impacts. The high volumes of water, high levels of

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[701] Wobus, Cameron, May 30, 2019, *Comments on Pebble Project Draft EIS*, Prepared for Trustees for Alaska (Wobus, 2019) at 1 (report and references included as attachments with these comments).
[702] *Id.* at 4.
[703] *Id.* at 6.
[704] *Id.* at 5.
[705] *Id.* at 6.
[706] DEIS at K4.18–52.
[707] *Id.*

contamination, and remote setting all call into question whether it is even possible to design and implement a successful water management program in perpetuity. "[T]o protect downstream waters from significant contamination, PLP has proposed to pump and treat contaminated water generated from mining the deposit, *forever*. The technical challenges and the costs associated with perpetual water treatment in this remote, wet, setting will be substantial."[708]

For that reason, the DEIS cannot presume that a successful engineering solution will be forthcoming. There are no off-the-shelf technologies that PLP can rely on to achieve the monumental and unprecedented water management that will be required:

> The adoption of reverse osmosis and other membrane filtration systems in the mining industry is scarcely more than 15 years old. It seems preposterous to believe that we currently have the knowledge and expertise to build these membrane systems to last as long as HDS plants, with their 50 year life cycle, never mind building such a large and complex treatment system as that proposed by Pebble.[709]

This absence of existing technology makes the omission of critical engineering plans from the DEIS even more striking and unacceptable.

Modeling by Maest and Wobus considered the effects of an eventual failure of pit lake pumping and treatment, finding that

> the results showed that after the pumps ceased operating, simulated pit lake levels rose above the southeastern perimeter of the pit and drained overland into the South Fork Koktuli River (Figure 5) at an average annual rate of approximately 2.4 cfs. In addition, approximately 0.7 cfs of pit water flowed out of the pit through the shallow glacial aquifer and reached the South Fork Koktuli River (Table 1). Maximum overflow for the 23-year abandoned scenario was predicted to reach approximately 13 cfs during the spring freshet (Figure 6).[710]

The difficulty of managing the water balance and treating contaminated water in perpetuity post-closure will be even greater if PLP is allowed to develop the full 78-year mine:

> Mining the full deposit would require substantially more pumping and water management in order to keep the pit and/or underground workings dry – and will require perpetual treatment averaging ~100 cubic feet per second (~50,000 gallons per minute, or approximately 28 billion gallons per year) to prevent the pit from overflowing after mine operations have ceased (Prucha, 2019; see Figure 1). The post-closure water treatment from the smaller mine described in the EIS (50 cfs, or approximately 11.8 billion gallons per year; Knight Piesold, 2018a) is already more than three times larger than the largest water treatment facility in the United States (Climax Molybdenum, 2.86 billion gallons/yr; Climax 2012); the

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[708] Wobus, 2019 at 6.
[709] Sobolewski, 2019 at 12.
[710] Maest & Wobus, 2019 at 9–10.

full buildout would require a water treatment plant that is approximately an order of magnitude larger than that facility, which is likely to be more water than can be reasonably managed in perpetuity.[711]

e. The DEIS fails to assess impacts from multiple likely mine operation scenarios.

The DEIS fails to provide a full, complete, or reliable assessment of hydrologic impacts or adverse effects to water quality because it relies on overly-simplistic methodologies that are based on incorrect model inputs and assumptions.[712] The DEIS also fails to fully assess the mine's hydrologic impacts because it considers only a small fraction of the actual likely mine configurations or scenarios.[713]

The DEIS cannot fully assess the mine's impacts to hydrology or water quality because it relies on an overly-simplistic model. The primary tools utilized in the DEIS to predict hydrologic impacts are a single-process groundwater flow model linked to a separate surface water "spreadsheet" tool that uses proprietary, undisclosed methods.[714] This model is only capable of producing gross-scale lump calculations over large catchments, and is incapable of modeling or predicting mine impacts at sub-catchment points.[715] The spreadsheet tools utilized in combination use different time frames and methodologies, which raises serious questions about the compatibility of the models.[716] The use of models that calculate results on only a monthly basis means that the model will miss the sort of event-level variation frequently observed in the actual monitoring data from the mine site.[717] These primary tools relied on by the DEIS are inherently and fatally flawed because they are "simply unable to simulate physically-realistic baseline or predicted mine-impacted strongly coupled surface-water/ groundwater dynamics."[718]

By evaluating the hydrologic impacts of only one scenario — a 23-year mine that is then managed in perpetuity — the DEIS fails to assess the impacts from other scenarios that are equally likely. The scenarios that the DEIS fails to consider include a 23-year mine that is abandoned post-closure and not managed; a built-out 78-year mine that is managed post-closure; and a built-out 78-year mine that is abandoned and not managed post-closure.[719] These omissions are striking, because they mean that the DEIS does not assess important potential impacts. Under a scenario where the mine operates for 23 years and then is abandoned, the water level in the main pit would reach a level approximately 105 feet above the level Pebble expects to maintain under a

[711] Wobus, 2019 at 3.
[712] Prucha, Robert H., June 6, 2019, *Review of Groundwater Impacts in the Proposed Pebble Mine Draft EIS (February 2019) and Evaluation of Potential Impacts on the Coupled Hydrologic System*, Prepared for The Wild Salmon Center (Prucha, 2019) at 2 (report and its references are included as attachments to these comments)
[713] *Id.*
[714] *Id.* at 3.
[715] *Id.*
[716] *Id.*
[717] *Id.*
[718] *Id.* at 4.
[719] *Id.* at 4–5.

managed scenario.[720] This scenario would lead to increased subsurface discharges into the South Fork Koktuli drainage, representing a major source for water pollution into the surface streams and wetlands in that drainage.[721] Modeling by Maest and Wobus projects this scenario would result in concentrations of cadmium, copper, lead, and zinc exceeding water quality standards at distances greater than 35 miles downstream from the pit.[722] Copper concentrations would be approximately 1,000 times higher than the applicable standard 35 miles downstream from the pit.[723] A scenario where the mine operates for 78 years and then is abandoned would lead to the pit overtopping, creating direct surface flows into the Upper Talarik drainage allowing for decanting of highly contaminated pit lake water directly into that drainage.[724] Either of these unmanaged scenarios would have devastating effects on water quality in the receiving streams.

Finally, the DEIS' assessment of hydrologic impacts is flawed, unreliable, and inadequate because it relies on unsupported assumptions and then fails to adequately address the resulting uncertainty. The DEIS appendix at K4.17-2 acknowledges that the model incorporates certain assumptions about the bedrock hydraulic conductivity, but that additional calibration, validation, and sensitivity analyses are warranted."[725] The DEIS fails, however, to conduct a "detailed and robust predictive uncertainty analysis which focuses not just on predicted groundwater inflow to the pit lake, but also on predicted response at all other mine components, at the same time."[726]

iv. The DEIS fails to take a hard look at potential impacts from contaminated water that bypasses water treatment systems.

A central premise of the DEIS' discussion of water quality impacts is that all contaminated contact water will be captured and then processed through the proposed water treatment system. But the DEIS does not adequately describe how much contact water will infiltrate to groundwater (as opposed to manifesting as surface runoff).

The DEIS expressly states that all contact water will be captured and treated:

> All runoff water contacting the facilities at the mine site and water pumped from the open pit would be captured to protect overall downstream water quality. Prior to discharge to the environment, any water not meeting applicable discharge requirements would be treated. For example, contact water that may infiltrate into the groundwater system at the mine site would be collected at the mine site by the open pit groundwater wells or by pumpback wells located around the mine site. This water would be treated at a water treatment plant (WTP) and discharged as wastewater (i.e., surplus water).[727]

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[720] *Id.* at 18.
[721] *Id.*
[722] Maest & Wobus, 2019 at 17–18.
[723] *Id.*
[724] Prucha, 2019 at 21.
[725] *Id.* at 45.
[726] *Id.*
[727] DEIS at 4.18–3.

Because the DEIS presumes the effectiveness of the proposed systems at capturing contaminated groundwater, it includes no detailed description of either the back-up systems that could be installed to address higher levels of seepage than anticipated. It also fails to assess the effects to downstream ecosystems should contaminated water bypass the treatment systems and discharge into receiving streams. In particular, "[t]he risk for selenium seepage from the Bulk [tailings storage facility] and its main embankment is a perpetual concern."[728] These omissions violate NEPA because they prevent decisionmakers and the public from fully understanding the environmental impacts of the Pebble Mine.

Specifically, the DEIS fails to adequately consider the fact that "[l]iner leaks, overtopping, and runoff wastes in the facilities and their embankments would cause contact waters to escape the waste impoundments and potentially avoid capture by the seepage collection ponds. Leakage of mine waste seepage to groundwater and surface water could adversely affect aquatic biota due to the presence of selenium and other mine contaminants, especially metals."[729]

The DEIS's limited assessment of the risk of releasing high concentrations of toxic pollutants into downstream surface waters fails to account for the high seepage potential of the local geology at the proposed mine site. A report by the Center for Science and Public Participation notes,

> Pebble's near-surface geology has thick layers of highly permeable glacial gravels. The water table lies near the surface resulting in seeps and springs that recharge both surface and substrate. Most mines have leaks and spills, both small and large, but at Pebble any leak has a particularly high potential to cause contamination because of the potential to migrate offsite. Deposits of glacial permeable sediments are largely unconfined and mine spills or leaks could be difficult to contain. Pebble's highly permeable glacial gravels will present difficult design and management problems for both waste contaminant discharge and spill containment.[730]

The DEIS also fails to assess whether tailings leaks are more or less likely based on location of the tailing facility. A review by Wobus and Prucha identified that

> [t]he proposed siting of the tailings storage facility reflects a lack of understanding on the part of PLP of how this strongly coupled groundwater-surface water system will affect downstream aquatic habitat. For example, the permit application discusses how the siting of the tailings storage facility will "minimize potential impacts to environmental resources" by noting that "The valley includes a tributary to the [North Fork Koktuli] that has experienced intermittent flows, with dry stretches extending two miles." (Appendix D p. 41). In fact, this criterion for [tailing storage facility] site selection may actually

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[728] Zamzow, 2019a at 6.
[729] *Id.* at 5.
[730] *See* Levit & Chambers, 2012 at 3.

> increase, not decrease, the impacts to downstream resources. The fact that parts of the [North Fork Koktuli] beneath the [tailing storage facility] are dry indicates that the hydraulic gradients beneath the proposed [tailing storage facility] are downward, which will enhance any leakage of contaminants from the [tailing storage facility] into groundwater. The [North Fork Koktuli] immediately downstream of the [tailings storage facility] remains unfrozen during the wintertime, indicating strong groundwater upwelling and ideal habitat for salmonids. Thus, any leakage from the proposed [tailing storage facility] will contribute contaminants into the alluvial aquifer beneath the [North Fork Koktuli], which will then re-emerge in the upwelling areas that provide salmon habitat immediately downstream. Given the likely high permeability in this aquifer, this contamination may be very difficult to capture and treat.[731]

The DEIS's fails to take a hard look or to fully inform decisionmakers or the public regarding the potential for seepage from the proposed mine pits and impoundments because it does not assess the hydraulic gradients and groundwater flow in the vicinity of the proposed tailing storage facility or other impoundments.[732]

EPA's Regional Administrator made specific findings in the Proposed Determination regarding the potential for seepage to bypass seepage collection systems and reach surface waters.[733] The Regional Administrator determined that it was appropriate to conclude that half of the leachate released by the waste rock facilities and the tailings storage facilities outside of the drawdown zone of the mine pit would escape the leachate collection system and be released to downstream water. This is due to "the area's geological complexity and the permeability of surficial underlying layers would allow water to flow between wells and below their zone of interception."[734]

A report by the Center for Science and Public Participation notes,

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[731] Wobus Scoping Comments, 2018 at 5.
[732] *Id.*
[733] *See* PD.
[734] *Id.* at 4–52 to 4–53
[735] Levit & Chambers, 2012 at 3.

The DEIS itself supports these conclusions, noting the potential that "[s]eepage water could also flow vertically downwards into deeper bedrock fractures."[736]

Rather than describe in detail what steps the Pebble Mine could take to address higher rates of groundwater seepage and contamination than anticipated, including any assessment of the availability of the required technologies or examples where such back-up systems have been successfully deployed, the DEIS merely states that: "Any impacted groundwater that bypasses the seepage collection pond capture system is expected to be detected in these wells. Additional seepage collection, cutoff walls, and/or pumpback systems may be installed downstream if necessary, as determined by monitored water quality (PLP 2018-RFI 006a)."[737]

Avenues by which additional contaminated water could enter the groundwater include liner leaks and migration through deeper fissures and flaws in the bedrock. "Unplanned releases of selenium from the mine facilities can occur as leaks from the seepage collection and water management ponds and from uncaptured seepage directly to groundwater from the waste storage facilities." [738]

Liner leaks pose a particular risk that is inadequately assessed or described in the DEIS:

> The Main [water management pond], and the seepage collection ponds will be lined (DEIS, Appendix N), but liner leaks and overtopping would cause mine-influenced waters to escape the ponds. If monitoring is not effective at identifying leaks and the proposed pump back wells are not effective in capturing the escaped solutions, selenium and other mine contaminants would adversely affect downgradient groundwater, surface water, and aquatic biota and wildlife in streams and wetlands. Such mitigation and mine water capture failures have occurred at other mine sites (Earthworks 2012).[739]

Although the DEIS gives cursory attention to a limited liner leak scenario, it only considers the impacts from a small tear at a single pond, rather than a larger rupture or a liner failure at other pits or impoundments that are projected to contain higher concentrations of pollutants.

> The DEIS examined a failure scenario with the Main [water management pond] in which a small amount of contact water (0.4% of the total volume of the pond) escaped from the pond due to damage from ice hitting the liner during spring break-up. . . Larger releases were not examined, nor were potential releases from any of the other contact water ponds on the site with higher predicted selenium concentrations. . . . The DEIS failure scenario highlights that liner failures could occur and adversely affect downstream water quality during operations.[740]

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[736] DEIS at 4.17–14.
[737] DEIS at 4.18–14.
[738] Zamzow, 2019a at 4.
[739] *Id.*
[740] Zamzow, 2019a at 5.

The DEIS also fails to acknowledge or consider other ways that contaminated water could seep out of pits or impoundments containing highly contaminated water, including through faults or fissures in the bedrock. "In addition, pit water could migrate through faults to downgradient groundwater and surface water. This potential exposure pathway has not been examined in the DEIS."[741] A recent report by Maest and Wobus examined the location of identified faults in the mine area, and found that "many of them intersect the open pit, especially in the northern and southeastern areas of the pit."[742] Other similar mines have experienced "[m]ovement of mine-influenced water along faults and outside the capture zone."[743] Consideration of the effects of these faults is important because "[o]utward movement of poor-quality water from the pit could affect the Upper Talarik and the South Fork Koktuli watersheds."[744] The DEIS does not model or otherwise assess the potential for contaminated water to bypass the treatment system via these avenues.

Indeed, such modeling would be impossible, because PLP has not designed or engineered the treatment system. In response to a request from EPA seeking more information on the proposed hydraulic containment system, the Corps indicated that the seepage capture facilities and hydraulic containment system "are currently conceptual only . . . and would be developed in the final design."[745]

In addition, the proposed plan to use excavated rock for construction on site creates the potential for generating contaminated contact water that will not be captured or treated.

> The [potentially acid-generating] waste rock will be stored in the [pyritic tailings storage facility] under submerged conditions, while the non-[potentially acid-generating], predominantly Tertiary waste rock will be used, in addition to the quarry rock, for constructing the embankments of the waste and water impoundments. Runoff from this material will mobilize selenium into groundwater or surface water.[746]

Other avenues by which pollutants could evade treatment and enter the environment include direct contact by birds who land on highly contaminated pits and impoundments on site. The DEIS does not consider the environmental impacts of these contacts.

> The pit lake has the potential to act as a reservoir of selenium, . . . [and] birds could be exposed through direct ingestion and preening if they land on the lake. During winter, it is possible that migrating birds would choose the pit lake as it will likely not freeze because of the perpetual pumping proposed for pit lake

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741 *Id.* at 21–22.
742 Maest & Wobus, 2019 at 2.
743 *Id.*
744 *Id.*
745 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.18 – Water and Sediment Quality at EPA Comment #33, 15.
746 Zamzow, 2019a at 5.

management.[747]

The DEIS also fails to fully inform decisionmakers or the public of either the likelihood of a major spill or other significant failure of contaminated water containment or treatment systems, or of the devastating downstream impacts that would result from such a failure. Because the downstream impacts that would result from the release of untreated contaminated contact water would be so extreme, the DEIS must consider all potential events which could result in such a release. "Reasonably foreseeable" impacts include those that may "have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason."[748] For the proposed Pebble Mine, the failure scenarios that must be considered include spills and complete tailings dam failures.

The DEIS contains only cursory, inadequate assessments of the environmental impacts from limited containment failure scenarios, including a tailing pipeline spill, partial breach of a tailing impoundment, and a liner tear at the main water management pond that leads to a slow release over the course of one month.[749]

The description in the DEIS of the resulting downstream impacts from these scenarios "underestimates the potential for the spills to adversely affect soils, vegetation, shallow groundwater, stream water, stream sediment, and aquatic life."[750] For example, the tailings impoundment partial breach scenario "completely ignores the potential for thicker layers of tailings to remain in place, leach to shallow groundwater, and bleed from shallow groundwater into Tributary [South Fork Koktuli]1.420 and the South Fork Koktuli over time, as occurred along Silver Bow Creek in Montana."[751]

The limited failure scenarios considered in the DEIS represent only a fraction of the actual potential sources of failure at the proposed Pebble Mine:

> Additional failure scenarios should be included that examine the water quality consequences of mine water leaking from both tailing facilities, the mine water management ponds, the seepage collection ponds, and the open pit. The downgradient groundwater and surface water quality effects of any predicted failures and the predicted three-foot groundwater mound around the Bulk [tailings storage facility] should be quantified.[752]

Notably, the DEIS omits any consideration of the most consequential potential failures. "The draft EIS for the Pebble Mine does not consider the possibility of a complete tailings dam failure at any of the proposed facilities, noting that 'The probability of a full breach of the bulk or

[747] *Id.* at 21.
[748] 40 C.F.R. § 1502.22.
[749] DEIS at 4.27–80 to 4.27–117.
[750] Maest, 2019 at 30.
[751] *Id.* at 31.
[752] *Id.* at 39.

pyritic [tailings storage facility] tailings embankments was assessed to be extremely low' (DEIS, p. 4.27-72)."[753]

Not only is the DEIS deficient because it fails to present and fully evaluate a complete tailings dam failure scenario, it doesn't even provide adequate data or specifications to allow a third party to conduct such an analysis.

> The [tailings storage facility] Dam designs are incomplete, which affects fundamental aspects of the stability/failure analysis that are not acknowledged in the DEIS as required by NEPA. As noted in the [Failures Modes and Effects Analysis] workshop report, "The current Pebble Project embankment designs are at an early-phase conceptual level, with geotechnical investigations still under way at the major embankment sites. This current conceptual design level inherently results in uncertainties." (AECOM, 2018b, p. 1). . . . Rather than acknowledging that the dam designs are incomplete and lacking sufficient information to fully evaluate the risk of a [tailings storage facility] failure (as required by 40 C.F.R. § 1502.22), the DEIS dismisses the risk of a full [tailings storage facility] breach, and proceeds with a detailed analysis of a scenario in which an earthquake ruptures the bulk tailings pipeline but leaves the tailings dam intact.[754]

This omission is striking and problematic because the actual effects of a complete tailings dam failure would be catastrophic. "Simply stating that no catastrophic failure scenarios need to be evaluated because the facilities will not be designed or built to fail is inadequate justification for ignoring one of the greatest risks posed by the project."[755]

> Lynker (2019) developed a physically-based model of the downstream fate and transport of tailings in the event of a complete tailings dam failure. That study found that a full [tailings storage facility] failure could impact hundreds of miles of salmon- producing streams, with potentially catastrophic long-term consequences to salmon habitat in these streams. . . . A full [tailings storage facility] failure is projected to transport tailings more than 140 km downstream, spreading materials across much of the floodplain of the Koktuli, Mulchatna and Nushagak rivers and the abundant off-channel habitat currently available to salmonids throughout those catchments.[756]

v. The DEIS fails to take a hard look at potential impacts of fugitive dust on water quality.

Another way that the DEIS fails to disclose or assess the potential for the proposed water containment and treatment systems to fail to prevent downstream water quality impacts from the Pebble Mine is by not fully accounting for the impacts to water quality from fugitive dust. The

[753] Wobus, 2019 at 11.
[754] *Id.* at 13.
[755] Borden, 2019e at 5.
[756] Wobus, 2019 at 13–14.

DEIS does not adequately assess impacts of fugitive dust on water quality from either runoff or direct deposition on water bodies. The DEIS also artificially restricts consideration of the constituents of fugitive dust to a subset of the actual pollutants that will be present in the dust and that may impact water quality. For example, the DEIS fails to consider copper. The calculations of contaminant loading in waterbodies caused by fugitive dust are flawed because they assess fugitive dust water quality impacts in isolation, rather than together with projected contaminant loading from other established sources, such as discharges from the mine's water treatment plants.

The proposed Pebble Mine will generate fugitive dust from multiple sources. The mine will produce dust via mine activities, including blasting, drilling, wind erosion from stockpiles and overburden, and dust plumes produced by vehicles moving over unpaved surfaces.[757] The DEIS section on water quality impacts offers only a scant paragraph on the impacts of fugitive dust.[758] That paragraph provides summary findings without meaningfully quantifying the analysis, or explaining data relied on or basis for analysis.[759] The DEIS states:

> In terms of impact magnitude, the calculations indicate an expected increase in the concentration of metals in surface water as a result of dust deposition, ranging from 0.1 to 0.7 percent, which would not result in exceedances of the most stringent water quality criteria (Appendix K3.18, Table K3.18-1) in background conditions or [water treatment plant] outflow conditions.[760]

The table cited, K3.18-1, merely lists the water quality criteria, and offers no analysis.

Fugitive dust will impact water quality in the area surrounding the mine site in two primary ways: chemical toxicological effects, and physical effects, such as turbidity.[761] Neither of these impacts is fully or accurately assessed in the DEIS. Most egregiously, the DEIS completely fails to assess the water quality impacts of copper from fugitive dust sources.[762] This is because the DEIS only analyzes the subset of metals that are designated as hazardous air pollutants, completely ignoring the full range of environmental impacts — including water quality impacts — from the metals and other contaminants that will be mobilized by the Pebble Mine.[763] Copper will be present in high concentrations in the fugitive dust from the mine.[764] Copper is toxic to aquatic life in even small concentrations, and is known to reduce growth, immune response, reproduction, and survival.[765]

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[757] Zamzow, Kendra, et al., May 30, 2019, *Fugitive Dust Issues in the Pebble Project Draft EIS*, U.S. Army Corps of Engineers (Zamzow, 2019b) at 4 (report and its references are included as attachments to these comments).
[758] DEIS at 4.18–11.
[759] *Id.*
[760] *Id.*
[761] Zamzow, 2019b.
[762] *Id.* at 2, 5, 15, 18, 26.
[763] *Id.* at 18.
[764] *Id.* at 4, 18.
[765] *Id.* at 18, 26.

The DEIS fails to properly assess all of the vectors by which contaminants in fugitive dust will reach surface waters and impact water quality. For example, an appendix to the DEIS notes that the modeling for water quality impacts from fugitive dust "does not account for overland runoff."[766] The DEIS does not explain the rationale behind this conclusion, and no studies or direct measurements are cited as informing the decision to exclude this source. Similarly, the DEIS fails to assess contaminant loading from fugitive dust that leaches into groundwater that is hydrologically connected to surface water.[767] Nor does the EIS account for contaminant loading from snowmelt from areas where snow has accumulated layers of dust throughout the winter.[768]

The DEIS' assessment of the chemical and toxicological impacts of water quality contamination by fugitive dust is particularly inadequate because the DEIS treats water quality impacts from fugitive dust in isolation, rather than in connection with other sources such as discharges from the water treatment plants. As a result, the DEIS fails to assess the ecological impacts of the combined pollutant loadings. In particular, the DEIS fails to consider whether concentrations of selenium would exceed even Alaska' current water quality standard once all sources are considered together. In addition to the potential to contribute to exceedances of specific pollutants, such as selenium, the introduction of trace elements from fugitive dust may also increase the potential for negative synergistic impacts among pollutants.[769] For example, copper can act synergistically with zinc, magnifying some impacts.[770] The DEIS completely fails to assess these impacts.

The DEIS also entirely fails to assess the water quality effects of fugitive dust on turbidity. Beyond the water quality impacts from trace metals and other chemical pollutants, fugitive dust from the Pebble Mine will increase the turbidity of surface waters, including in particular the many small ponds near the mine site.[771] Fugitive dust deposition on ponds may cause temporary turbidity, and may block photosynthesis.[772] Reduction in water clarity could substantially affect aquatic ecosystems, including by degrading waters and killing vegetation.[773] Particulates from fugitive dust may also alter the physical substrate conditions in water bodies.[774] Particulates from dust may abrade benthic plants and animals, and may clog the interstices of coarse gravel beds degrading the intragravel environment and potentially harming eggs and larvae of salmonids and other substrate-spawning fishes.[775]

[766] DEIS at Appendix K4.18.3.1.
[767] Zamzow, 2019b at 23, 28.
[768] *Id.* at 28.
[769] *Id.* at 27.
[770] *Id.*
[771] *Id.* at 22.
[772] *Id.* at 23.
[773] *Id.* at 25.
[774] *Id.*
[775] *Id.* at 25–26.

vi. There is no concrete, specific contingency plan for when water capture or treatment systems fail.

The inadequate discussion in the DEIS of the potential for failure of the proposed treatment system or for pollutants to bypass the treatment system is particularly egregious. Once mine operations begin, there will be no way to stop the constant production of highly contaminated water. The proposed mine would be located in a natural system onto which precipitation falls and through which groundwater and surface water flows. The DEIS acknowledges that once this water comes into contact with disturbed materials on the mine site it will accumulate contaminants that will be carried downstream unless contained and treated. And the proposed containment in mine pits and additional impoundments will only increase the potential and duration of the contacts that will produce contaminated water. As new water continues to enter the mine system in the form of precipitation and other natural inputs, water will need to be discharged from the site to maintain the hydrologic balance. These discharges will contain elevated levels of pollutants unless treated.

The Pebble Mine project must be distinguished from other industrial projects where the failure of proposed pollution treatment systems can be addressed by completely shutting down the facility. If a power plant's proposed emissions controls fail to reduce air pollutants to below environmentally safe levels, the entire plant can be shut down while a solution is identified and installed. The Pebble Mine will not have this luxury. Any repairs, substitution, or augmentation to the proposed water pollution containment and treatment systems will have to be made on the fly, while the mine continues to produce high volumes of contaminated discharges.

This means that there is no room for error when it comes to the containment and treatment of contaminated discharges. If any part of that system fails, the mine will discharge toxic pollutants into the environment. If it turns out that there is no technology actually capable of achieving the required pollution reductions prior to discharge, the mine will discharge these toxic pollutants into the environment in perpetuity.

Because the DEIS presumes — without evidence and in the face of multiple indications to the contrary — that the containment and treatment systems will function as planned, it fails to disclose or assess the actual potential for the mine to create devastating environmental effects. This failure violates NEPA.

vii. The water treatment system is likely to fail.

The DEIS describes some factors that are likely to negatively impact the ability of the proposed treatment system to achieve the projected pollution concentration reductions. That the DEIS includes, in an appendix, a description of some of these barriers to proper functioning of the treatment system renders the ultimate conclusions in the DEIS as to the likelihood of successful treatment disingenuous and counter to the evidence.

Appendix K4.18 acknowledges that the water quality of the influent requiring treatment will worsen over the life of the mine. "The influent water quality to [water treatment plant] #1 would be expected to gradually worsen with each year of mine activity as more pre-Tertiary age rock is exposed to oxygen and water. Thus, pit wall runoff in early years of mining would be expected to be of better quality than at the end of mine life (i.e., after 20 years)."[776] This means that the demands on the water treatment system will only increase over time. If the water treatment system struggles at first, any issues will only be compounded and magnified over time.

Although the DEIS acknowledges that water treatment systems are highly sensitive and prone to disruption, and that the conditions at the Pebble Mine have the potential to produce particular treatment challenges, the DEIS fails to identify any actual solutions, opting instead to kick the can down the road. In so doing, the DEIS fails to fully inform decisionmakers or the public.

Appendix K4.18 contains some general statements about the sensitive nature of some of the proposed treatment technologies, but neither the appendix nor the DEIS incorporates these limitations into the design or assessment of the proposed treatment system. The appendix notes that "[u]ltrafiltration membranes would be used to filter precipitated metals and protect downstream high-pressure membranes," but that "[t]he process can be disrupted by fouling if the membrane system is not properly monitored and maintained, or if the upstream processes are upset in a manner that results in excessive solids in the influent."[777] The appendix further notes that another treatment technology relied on to achieve the water quality results projected in the DEIS, nanofiltration, "can be disrupted if the membrane system is not properly monitored and maintained, or if the upstream processes are upset in a manner that results in excessive [total dissolved solids] in the influent."[778] The DEIS fails, however, to include any meaningful discussion of what steps will be taken to properly monitor or maintain these systems. More problematically, the DEIS is completely silent as to the potential environmental impacts that would result from fouling of these systems.

The DEIS and supporting appendices also note specific conditions at the Pebble Mine that will pose particular treatment challenges, but fail to identify any corresponding treatment solutions. The DEIS states that

> [b]ased on an independent review of the [water treatment plant] source terms and processes (Appendix K4.18; AECOM 2018i), discharge water from both [water treatment plants] is currently expected to meet ADEC criteria. However, there is some concern that salt and selenium could build up over time in the pyritic [tailings storage facility], which has the potential to lead to increased total dissolved solids (TDS) concentrations that would require treatment in the main [water treatment plant] (AECOM 2018i).[779]

Rather than provide a solution to this problem or identify aspects of the proposed treatment system capable of addressing this challenge, the DEIS punts on the issue, stating "This may require further investigation as design progresses, and/or as a long-term adaptive management strategy."[780]

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[776] DEIS at K4.18–16.
[777] DEIS at K4.18–49.
[778] *Id.* at K4.18–49.
[779] *Id.* at 4.18–4 to 4.18–5.
[780] *Id.*

Appendix K4.18 describes one potential scenario under which projected conditions of the influent requiring treatment would not be met, and the resulting disruption to the functioning of the treatment system. However, neither the appendix nor the DEIS itself provides a plan for addressing this scenario. Nor does the DEIS contain a description of the negative environmental impacts that would follow from this occurrence, as is required by NEPA. Appendix K4.18-50 introduces a plausible and foreseeable scenario that would lead to conditions requiring more intensive treatment than could be achieved by the projected water treatment system:

> An independent review of the [water treatment plant] #2 inflows and processes was conducted by AECOM (2018i). While the strategy for treatment and management in [water treatment plant] #2 considers the major species, it involves highly complex chemistry and is reliant on assumptions that salt mass would be captured in solid form within interstitial voids in the pyritic [tailings storage facility], and that rejected selenium solids discharged to the bulk [tailings storage facility] would not be remobilized. In the event that these assumptions prove to be invalid, the currently modeled salt and selenium mass balance would not be achieved by the end of operations, and a more rapid increase in salt and selenium mass would occur in the main [water management pond] than currently projected.[781]

The appendix specifically acknowledges that the currently proposed treatment system would not be able to successfully treat these pollutant loads, and that additional treatment would need to be brought online: "As these species concentrate, [total dissolved solids] would rise and the treatment strategy for [water treatment plant] #2 would need to be altered to address these changed conditions."[782] But neither the appendix nor the DEIS identifies whether any existing technology would be capable of addressing these issues, nor do they provide any actual plans or design specifications.

The Appendix identifies a potential scenario under which initial treatment failures would be compounded over time, leading to additional treatment failures and, ultimately, exceedances of water quality standards:

> This would also contribute to higher dissolved salt loads, which could result in lower recovery rates in the [nanofiltration] processes, treatment systems not meeting current design capacities, and the potential for higher TDS in the discharge streams in order to close the salt balance. Further, the captured selenium would continue to cycle up in the process and could eventually reach a level where the treatment system is unable to meet discharge limits.[783]

Despite directly acknowledging the potential for exceedances of water quality standards for multiple pollutants, neither the appendix nor the DEIS includes any

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[781] *Id.* at K4.18–50.
[782] *Id.*
[783] *Id.*

assessment of the environmental impacts of these elevated polluted concentrations in streams outside of the mine.

Instead of actually describing and assessing the likelihood of treatment failure and resulting downstream pollution exceedances, the DEIS presupposes the existence of additional treatment.

> To mitigate the lower recovery rates to meet the hydraulic capacity, the [nanofiltration] system would need to increase pressures as salt load increases to achieve recoveries similar to the current design criteria. While this could allow [water treatment plant] #2 to meet the hydraulic capacity, salt load would continue to increase, potentially resulting in elevated levels of [total dissolved solids] and selenium in the discharge. This may require further investigation as design progresses and/or as a long-term adaptive management strategy. If necessary to meet both hydraulic capacity and discharge criteria, trains would be installed as needed (PLP 2019-RFI 106).[784]

By failing to describe what additional treatment technologies may be available, to confirm that such technologies exist and could be employed in this setting, or to provide field tests showing the efficacy of such treatment, the DEIS deprives decisionmakers and the public of the opportunity to understand and assess the likelihood that treatment could be achieved.

3. The DEIS does not adequately assess potential impacts from a failure of the containment or treatment systems.

Given the established risk that the Pebble Mine will discharge water containing elevated concentrations of selenium and other pollutants (either through treatment system failure or discharges that bypass the treatment system), and given the severity of environmental impacts from selenium exposure, the DEIS must fully describe and assess the environmental consequences that would result from discharges of pollutants into the environment.

NEPA requires a full accounting of the environmental effects of the introduction of high concentrations of selenium into the environment. This is true even if the DEIS elsewhere predicts that the chances of such a release are unlikely. "An EIS 'must be particularly thorough when the environmental consequences of federal action are great.'"[785] Where a proposed project's minimization of environmental impacts relies on a technology that is "experimental and fraught with uncertainties," the "'major' environmental consequences that would result from a failure cannot be said to be 'remote and highly speculative.'"[786]

It is not disputed that the Pebble Mine will produce contact water with extremely high levels of selenium, including concentrations sufficient to cause devastating impacts to aquatic ecosystems should they be released with no treatment or with inadequate treatment.

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[784] *Id.* at K4.18–50.
[785] *Friends of the Earth*, 693 F.Supp. at 926 (quoting *Warm Springs Dam Task Force*, 621 F.2d at 1026.
[786] *Id.*

> The majority of the Tertiary samples from the Pebble West Zone (PWZ) leached selenium concentrations in excess of values known to cause toxicity to aquatic life over the long term, and leachate would need to be diluted by many times — by up to two orders of magnitude — to comply with relevant criteria (Figure 2).[787]

Even under the best case scenario, assuming that the DEIS has accurately modeled and projected selenium concentrations in the on-site pits and impoundments,

> [s]elenium concentrations from the pit lake during closure years 20 to 125 are expected to be 9-15 µg/L (Lorax Environmental 2018) and will likely be higher. While the pit lake is not required to meet aquatic life criterion (5 µg/L), it does need to be assessed for potential consequences to receptors. . . . Such an assessment has not been conducted.[788]

But if the modeling and projections in the DEIS are wrong, and it is clear that the DEIS overlooks multiple factors that could lead to elevated selenium, then concentrations in the pit water will be even higher.

> After mine closure, pit lake water will be pumped and treated by [water treatment plant] #3 in perpetuity. Higher pit lake selenium concentrations would result in higher concentrations of selenium in [water treatment plant] effluent and a potentially greater impact on aquatic life. The FEIS needs to consider the effects of higher [water treatment plant] influent and effluent concentrations on biological receptors.[789]

The Pebble Mine will need to discharge contact water to maintain the required pit lake level and otherwise to manage the water balance on site. This means that the contact water must be subject to intensive treatment to reduce pollutant concentrations to below the applicable water quality standards. As discussed in detail above, the technologies that the Pebble Mine will rely on to reduce the concentrations of selenium and other harmful pollutants in discharges to the environment are untested, unproven, and carry a high risk of failure. The DEIS fails to establish that contaminated water will not bypass the treatment system and discharge directly into receiving streams. As a result, the DEIS must presume the worst case scenario and must fully assess the effects on the environment from the release of contact water containing elevated levels of selenium. "If a governmental agency cannot obtain adequate information upon which to make a reasoned assessment of the environmental impacts, it must perform a 'worst case' analysis."[790] The DEIS fails to provide this analysis.

Finally, there is a real risk of failure of the water treatment system. Other mines in Alaska have experienced similar failures. Even the DEIS notes that "over the life of the mine, it is

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[787] Zamzow, 2019a at 5.
[788] *Id.* at 7–8.
[789] *Id.* 8.
[790] *Friends of the Earth*, 693 F. Supp. at 932 (*citing Methow Valley Citizens Council v. Reg'l Forester*, 833 F.2d 810, 817 (9th Cir. 1987)).

possible that APDES permit conditions may be exceeded for various reasons (e.g., treatment process upset, record-keeping errors) as has happened at other Alaska mines."[791] Despite this, the DEIS fails to meaningfully assess the downstream effects of such a failure.

Should elevated concentrations of selenium from the Pebble Mine enter the environment, the effects on impacted ecosystems would be devastating:

> The fingerprint of selenium toxicity is well-established (Chapman et al. 2009, EPA 2016b). It primarily affects the embryos of egg-laying vertebrates, arising from elevated selenium concentrations in yolks that are caused by elevated dietary selenium. In the growing embryo, selenium substitutes for sulfur in the amino acids cysteine and methionine because of its molecular and chemical similarity. These amino acids are key components of keratins and other fibrous structural proteins that make up cartilage, hair, nails, horns, claws, hooves, and the outer layer of human skin. The proper function of these proteins is impaired when they contain high proportions of seleno-amino acids, and this is reflected in physical deformities in fish such as missing gill plates and deformities of the head, spine, and fins (Muscatello 2006, Lemly 2014). Since diet is the primary source of selenium to fish, its efficient uptake by algae and aquatic insects contributes to selenium toxicity (Lemly 2004). Aquatic birds can also be affected, primarily through the death or deformation of chicks (Brix et al. 2000, Ratti et al. 2006, NAMC 2008a, Chapman et al. 2009).[792]

The organisms most likely to be affected by exposure to elevated selenium concentrations from the Pebble Mine are birds and fish. "Because dietary exposure is the dominant pathway of selenium uptake, animals at higher trophic levels—particularly birds and fish—are considered among the most sensitive to deleterious effects of selenium (Hamilton 2004)."[793]

But the negative impacts of selenium exposure could be much more wide ranging. "Bioaccumulation of selenium is known to occur in amphibians and reptiles (Ohlendorf et al. 1988) and mammals (Clark 1987) that prey on aquatic biota from selenium-polluted waters, but more study of toxic effects to these taxa is needed (ATSDR 2003a)."[794]

To satisfy NEPA's requirement that an EIS provide a robust description and assessment of the environmental effects that would result from failure of an experimental technology or management scheme, the DEIS should have included a much more in-depth description of several topics.

First, the DEIS is deficient because it fails to identify the specific species at risk from exposure to elevated selenium in discharges from the Pebble Mine.

The DEIS and supporting documentation are insufficient to determine species at

[791] DEIS at 4.18–5.
[792] Zamzow, 2019a at 17–18.
[793] *Id.* at 18.
[794] *Id.*

> risk; fish and aquatic birds known to incubate, nest, rear, and/or spawn on or near ponds, wetlands and streams in close proximity to proposed discharge locations. Chinook, coho, and sockeye salmon spawn in at least one of the [water treatment plant] discharge areas but information on potentially more vulnerable resident fish spawning areas is sparse (DEIS p.3.24-5 to 3.24-13). Similarly, the mine area is used by raptors (DEIS Figure 3.23-1), waterfowl (DEIS Figures 3.23-2 and 3.23-3), and includes swan nesting areas (DEIS Figure 3.23-4). The species that nest and rear broods in the mine area, particularly near [water treatment plant] effluent discharge sites, are not sufficiently considered for potential individual and population level impacts of elevated selenium concentrations resulting from discharge (DEIS p.3.23-1 to 3.23-23).[795]

The DEIS also fails to describe or assess the site-specific factors that will determine the concentration of selenium at which particular species and downstream ecosystems will suffer adverse impacts.

> [F]actors that influence selenium uptake and movement through the food chain include organic carbon, temperature, trophic status of the receiving ecosystem, latitude or the presence of susceptible species. These factors need to be considered when assessing the environmental consequences of selenium discharge in natural waters and the subsequent impacts to aquatic life.[796]
>
> Despite such well-documented toxic effects, no ecotoxicity studies or analyses necessary to predict and consider potential ecotoxic effects, have been conducted on [water treatment plant] discharge water in the DEIS or otherwise to determine the potential for biological impacts for the Pebble project.[797]

The DEIS violates NEPA because it fails to include a detailed assessment of the environmental effects that will follow should the proposed containment and treatment system allow the release of contaminated contact water containing toxic levels of selenium and other pollutants.

4. The DEIS fail to take a hard look at impacts caused by discharges that raise the temperature of receiving streams.

To achieve compliance with the Alaska state water quality standards for selenium, the DEIS indicates that the Pebble Mine will rely on a combination of treatment technologies, including biologic based treatment. But biologic treatment requires the water to be a particular temperature, and that temperature exceeds the temperature in the receiving streams. Alaska's water quality standards include the prohibition that "the weekly average temperature may not exceed site-specific requirements needed to preserve normal species diversity or to prevent

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[795] Zamzow, 2019a at 18.
[796] *Id.* at 15.
[797] *Id.* at 18.

appearance of nuisance organisms."[798] The DEIS fails to include any discussion or assessment of the environmental effects of raising the temperature of the receiving streams.

The DEIS states that "[t]he open pit [water treatment plant] would also include biological selenium removal."[799] However, the organisms required for that biological treatment are active and effective within only a narrow temperature range, and therefore "[s]upplemental heating could be necessary during cooler periods to achieve minimum temperature levels for biological selenium removal to be effective."[800] The result is that "[e]ffluent discharged from the water treatment plants will be warmer than the receiving environment and may adversely impact aquatic organisms in the receiving streams."[801]

The DEIS's inadequate assessment of the impacts of increased temperatures from treated water discharges suffers from poor quality data, inconsistent data, and a failure to support or explain several critical assumptions. The DEIS relies on inadequate baseline data by apparently relying solely on one summer ice-free period in 2007.[802] "By only using 2007 data, models are not robust to predicting outside of the data range or to account for inter-annual variation, which for temperature is typically quite high."[803] Furthermore, it is unclear whether the baseline data or modeling inputs include winter temperatures at all.[804] The DEIS and supporting documents also include "discrepancies in the reported changes post-mine in water temperatures between Chapter 4 and Appendix I (Table 1). Chapter 4 reports a single value of change while Appendix I reports a 'range of average temperatures.'"[805] The DEIS provides no explanation for how or why specific values were selected from the range of average temperatures provided in Appendix I.[806] The data ranges provided in Appendix I lack confidence intervals, which means "it is not possible to assess the validity of the estimate[s] or the conclusions drawn from them."[807]

The DEIS relies on conclusory statements regarding the distance downstream that the effects of the water temperature increases will extend. Specifically, the DEIS claims that temperature effects will not extend past 0.5 miles in North Fork Koktuli River, 1 mile in South Fork Koktuli River, and 3 miles on Upper Talarik Creek.[808] But the DEIS fails to explain how it developed these estimates. There is simply "no analysis to confirm that water temperatures would not be altered beyond the distances reported in the DEIS."[809] In fact, "[g]iven the magnitude of change in water temperatures, particularly during the winter, it is implausible that these findings

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[798] 18 AAC 70.020(10).
[799] DEIS at 4.18–4.
[800] *Id.*
[801] Zamzow, 2019a at 13.
[802] *See* Reeves, Gordon and Sue Mauger, May 24, 2019, *Review of Water Temperature Impacts in the Proposed Pebble Mine Draft Environmental Impact Statement*, Prepared for Wild Salmon Center (Reeves & Mauger, 2019) at 1.
[803] *Id.* at 1–2.
[804] *Id.* at 2.
[805] *Id.*
[806] *Id.*
[807] *Id.*
[808] DEIS at 4.24–25.
[809] Reeves, 2019b at 3.

are correct and the areas of stream affected by the discharge are likely much wider than reported in the DEIS."[810]

The DEIS fails to adequately or accurately assess the ecological effects of raising the temperature in the receiving streams, despite the fact that "[t]here can be ecological impacts if high-volume flow effluent is released at a higher temperature than the receiving waters." [811] Specifically, "[a] potential adverse effect of [water treatment plant] treatment for selenium is the increased temperature of the effluent, predicted in this Position Paper to be 5.6 C. The predicted effluent temperature is higher than baseline water temperature averages: the baseline mean water temperatures at streams at the mine site area are 4-4.8°C (DEIS at 3.18-8) with median water temperature for the South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek ranging from 1°C to 3°C (ERM 2018 Table 9.1-3, Table 9.1-7, Table 9.1-11)." [812]

The failure of the DEIS to adequately assess the ecological impacts from the discharges of heated water is particularly problematic here due to the sensitivity of salmonids to increases in stream temperature. Rather than meaningfully engage with the issue, the DEIS summarily dismisses concerns regarding the effects of increased temperatures.

> The DEIS states that in general winter water temperature changes could impact eggs and alevins through increased metabolism, growth, and changes in time of emergence (DEIS at 4.24-23), but that changes in [water treatment plant] effluent water temperatures are within the optimum ranges for the different life-stages of the various species present (as described by Weber-Scannell 1991) and, therefore, effects of changes in summer water temperature would be expected to cause negligible impacts to Pacific salmon and their habitat and in winter water temperatures to be negligible to potentially positive.[813]

But the Weber-Scannell paper relied on by the DEIS to dismiss temperature-related concerns does not contain a meaningful analysis of the effects of temperature increases on fish species in Alaska. Rather, that paper cautions against applying its conclusions to streams and species in Alaska, as it:

> describes temperature values reported in the scientific literature for species across distributional ranges and includes very few citations for populations in Alaska and fewer for western Alaska. Weber-Scannell noted that there were critical limitations of applying these temperatures to fish in Alaska, stating that "Many of the studies that relate changes in temperature effects on fish examine higher ranges than are usually experienced by fish in Alaska. Therefore, acceptable upper and lower temperature ranges from the published literature are often not applicable to fish naturally occurring at higher latitudes."

As Weber-Scannell suggests, and the DEIS fails to acknowledge, populations of

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[810] *Id.*
[811] Zamzow, 2019a at 14.
[812] *Id.* at 15.
[813] Zamzow, 2019a at 15 (internal quotations omitted).

> Pacific salmon are highly adapted to local conditions (Beer and Anderson 2001), and the EPA noted that the diverse environmental conditions in the Bristol Bay area have led to large variation among populations of Pacific Salmon species and local adaptation (EPA 2014 p. 7-34 to 7-35). Applying generic standards to assess impacts to local populations leads to invalid conclusions about potential effects.[814]

A full review of the available literature would have revealed that the salmon species present in the streams that will receive the heated water discharges from the Pebble mine are particularly sensitive to water temperature increases, and that increases to stream temperatures during the winter are likely to significantly negatively affect these species. "Local adaptation of salmon to water temperature appears strongest at low, rather than high, temperatures (Jensen *et al*, 2000). Thus the reported increase in winter water temperatures is likely to have significant negative, not 'negligible to potentially positive' effect on Pacific Salmon."[815] For example,

> egg development depends on the accumulation of degree days. (Neuheimer and Taggart 2007) over the development period. As a result, spawn timing is finely tuned to local environmental conditions, notably water temperatures during the incubation period (Beacham and Murray 1990), to promote juvenile emergence at a favorable time of year for growth and viability (Webb and McLay 1996; Brannon et al. 2004; Campbell et al. 2019). Slight increases in temperature can accelerate rate of development, resulting in smaller (Beacham and Murray 1990) and less well developed (Fuhruman et al. 2018) fish emerging earlier (McCullough 1999, Adelfio et al. 2019; Fig. 1).[816]

"Changes to thermal and hydrologic regimes that disrupt life-history timing cues can result in mismatches between fish and their environments or food resources, adversely affecting survival (Angilletta et al. 2008, Einum and Fleming 2000, Letcher et al. 2004)."[817] The DEIS wrongly concludes that there would be no anticipated effects on the community of aquatic invertebrates, a major food source for juvenile salmon. In fact, "[a] study in Sweden, found that the abundance of Chironomids (midges), a major food of juvenile Coho Salmon (Campbell et al. 2019), declined with an increase of 3°C (Jonsson et al. 2015)."[818]

Because the DEIS dismisses concerns regarding the impacts of discharges of heated water from the treatment system, and because it relies only on studies that are facially inapplicable to the impacted environment while ignoring other directly relevant studies, it fails to adequately inform decisionmakers or the public of the foreseeable negative environmental impacts of the proposed treatment system.

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[814] *Id.* at 15–16; *see also* Reeves, 2019b at 3.
[815] Zamzow, 2019a at 16; *see also* Reeves, 2019b at 4; American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019), at 5–6.
[816] Reeves, 2019b at 4.
[817] *Id.*
[818] *Id.* at 5.

C. Hydrologic Analysis, Water Balance, and Water Management.

Water management is fundamental to mine planning.[819] Located at the headwaters of the North Fork Koktuli, South Fork Koktuli, and Upper Talarik Creek, the project will impact water quantity and water quality in all of these drainages.[820] To fully capture the downstream impacts, the DEIS must demonstrate a clear understanding of the hydrologic cycle, including how much water will be falling on the site via precipitation, the range of pathways water may move into the downstream water, and how much water will need to be managed and treated.[821] As discussed below, there are numerous problems and errors with the DEIS assessment, as identified in a memorandum prepared by Dr. Cameron Wobus.

1. The water balance is flawed.

A water balance accounts for all water inputs, outputs, and changes in storage within a system.[822] The water balance is the foundation on which all hydrologic impact analyses must be based.[823] The EPA notes that "successful wastewater management requires a thorough understanding of water flow and the site water and mass balance."[824] A detailed analysis of the DEIS and the underlying documents in the 2019 Wobus Memo reveal several problems that lead to an inadequate analysis of downstream impacts. The DEIS relies on PLP's spreadsheet-based model developed almost a decade ago.[825] Based on the information provided in the DEIS and the Knight Piesold (2018g) report, the 2019 Wobus Memo calculated the site water balance.[826] The 2019 Wobus Memo found "a consistent mismatch between inflows and outflows, at both the largest and smallest sub-watersheds in each of the three major tributaries."[827] The calculations show that between 9% and 66% of the precipitation falling on the site is unaccounted for.[828] Nothing in the DEIS or the underlying documents identify this discrepancy.[829] Based on the hydrologic data in the DEIS, Dr. Wobus concludes that

> the water spreadsheet module must have a substantial, unexplained flaw, since water inputs and outputs are not balanced at any spatial scale. Thus, the entire hydrologic impact evaluation descried in the DEIS is also flawed, and must be corrected.[830]

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[819] *See* Wobus Scoping Comments, 2018 at 3.
[820] *See* Schweisberg, 2019a at 9 and 15.
[821] *See* Wobus, 2019.
[822] *Id.* at 4.
[823] *Id.*
[824] *See* Environmental Protection Agency, Report, *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska*, App. E: Wastewater Management, Jan. 2003 at E–3 (included as an attachment with these comments).
[825] Wobus, 2019 at 4.
[826] *Id.* at 5.
[827] *Id.*
[828] *Id.*
[829] *Id.* at 6.
[830] *Id.*

2. The post-closure impact analysis is flawed.

Water management will pose a long-term challenge for the Pebble Mine.[831] To keep toxics from making their way into downstream waters, Pebble has proposed to pump and treat contaminated water in perpetuity.[832] In evaluating the post-closure water balance, the 2019 Wobus Memo again found that "the numbers in the DEIS show significant internal inconsistencies that reflect a very poor understanding of the mine's impacts to downstream waters."[833]

Table 2 from the Knight Piesold (2018j) report identifies that, on an annual average basis, the post-closure streamflow impact without including treated water discharges is approximately -27cfs total.[834] The DEIS anticipates that the loss of -27cfs will be mitigated from discharges from the wastewater treatment plant.[835] However, as shown in Table 1 from Knight Piesold (2018j), the average annual flow from the treatment plant is only projected to be 13 cfs.[836] As a result, the treatment plant discharges are incapable of mitigating the streamflow loss. The 2019 Wobus Memo points out that "the problem with this assessment is that there are not enough 'sinks' on the mine site post-closure to account for the loss of 14 cfs . . . post-closure."[837] Dr. Wobus concludes that

> [a]s with the baseline water balance, this substantial discrepancy in the post-closure water balance exposes a significant, but unexplained, flaw in Pebble's water accounting. Again, because of the importance of water management to the long-term environmental impacts of the mine, [the Corps] needs to demonstrate a much better understanding of the water balance in order to determine where Pebble has gone wrong, to fix the problem, and to re-evaluate the downstream impact evaluation as described in Chapter 3, Affected Environment.[838]

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[831] *See* Gestring, B., U.S. Copper Porphyry Mines Report: *The Track Record of Water Quality Impacts Resulting from Pipeline Spills, Tailings Failures and Water Collection and Treatment Failures*, July 2012, Revised November 2012 (Gestring, 2012) https://earthworks.org/cms/assets/uploads/archive/files/publications/Porphyry_Copper_Mines_Track_Record_-_8-2012.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* Gestring, 2019; International Council on Mining & Metals, *Water Management in Mining: a Selection of Case Studies*, May 2012 (included as an attachment to these comments); Kuipers, J. & Maest, A., *Comparison of Predicted and Actual Water Quality at Hardrock Mines, The reliability of predictions in Environmental Impact Statements*, 2006 (included as an attachment to these comments).

[832] *Id.*; *see also* DEIS at ES–41; 2–37 to 2–38; 4.18–17 ("Modeling of post-closure pit water quality indicates that the open pit water would need to be treated in perpetuity (Knight Piésold 2018d); 4.18–18 ("Groundwater entering the pit, where it would mix with pit lake water, would be pumped and treated in perpetuity to maintain the open pit as a hydraulic sink.").

[833] Wobus, 2019 at 6.

[834] *Id.*

[835] *Id.*

[836] *Id.*

[837] *Id.*

[838] *Id.* at 6–7.

The DEIS's assessment of post-closure impacts cannot be accurate until Pebble rectifies the inconsistencies in its water balance. Until then, any conclusions drawn by the Corps are arbitrary.

3. The DEIS fails to adequately address concerns raised by cooperating agencies.

Because water management is a major concern and potential problem for large hardrock mines,[839] multiple agencies asked PLP to clarify how the water balance works.[840] For example, in three separate requests, EPA asked AECOM and the Corps to describe the model basis, approach, sensitivity analysis and any uncertainties in the model output.[841] PLP has not provided additional detailed documentation on how water balance parameters were adjusted, a sensitivity analysis, or any uncertainty analysis, as requested.[842] Dr. Wobus concludes that "[w]ithout a demonstration of [a] very basic understanding [of their water balance], some of the most important environmental impacts related to water management could be substantially under-estimated in the DEIS."[843]

4. PLP's hydrologic modeling approach is flawed.

The Watershed Assessment identifies the highly connected hydrologic nature at the mine site, with a close connection between groundwater and surface water.[844] Surface water can seep into the ground and move as groundwater into an entirely different watershed.[845] As the 2019 Wobus Memo notes,

> [t]his 'leaky' system will create substantial challenges for water management in and around the mine site. In addition to these challenges, however, this groundwater-surface water exchange requires a much more sophisticated modeling approach than what PLP has developed, in order to accurately quantify the direct, indirect and cumulative environmental impacts of the mine.[846]

Instead of using an integrated surface water-groundwater model, PLP has elected to use a number of different models to describe the hydrologic system.[847]

Concerns regarding the utilization of three distinct components for the water balance model were identified in Trustees' scoping comments.[848] Neither PLP, nor the Corps, recognized

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[839] Environmental Protection Agency, Report*, Management and Treatment of Water from Hard Rock Mines*, 2006 (included as an attachment with these comments); *See* Gestring, 2012; Gestring, 2019; International Council on Mining & Metals, 2012; Kuipers & Maest, 2006.
[840] Wobus, 2019 at 7 (citing to RFI 104).
[841] *Id.* (citing to Dec. 21, 2018 EPA request to AECOM).
[842] *Id.*
[843] *Id.*
[844] *See* BBWA at ES–8, *cf.* DEIS at 3.17–16 (describing the hydrogeological characterization but not identifying the highly connected nature of groundwater and surface water).
[845] Wobus, 2019 at 7.
[846] *Id.*
[847] *Id.*

or responded to these concerns. The three components of the Water Balance Model all interact with one another. Groundwater recharge, discharge, and storage are complex, highly non-linear processes which require rigorous simulation of all processes from the ground surface to the water table, including flows within the unsaturated zone.[849] To accurately capture such dynamics, the EIS needs to clearly show how the unsaturated zone will be simulated and which model will be simulating it.[850] However, to adequately characterize the impacts of mining, the DEIS must treat groundwater and surface water as a coupled system using an integrated hydrologic model, rather than developing three separate models that feed inputs/outputs to one another.[851] Review by Dr. Wobus and Dr. Prucha noted that:

> Due to the surficial geology of the site, there are many segments of streams where strong groundwater upwelling is the major contributor to surface water flow, and other segments of streams that lose water to the ground and even run dry in the summer. Understanding this strongly coupled hydrologic system requires explicit consideration of these processes, particularly when large-scale perturbations to the groundwater-surface water system such pit dewatering, interbasin transfers of water, and water treatment and discharge, are proposed as part of the mine plan.[852]

The review emphasizes that breaking out water modules is problematic.[853] The scoping comments encouraged the Corps to consider groundwater-surface water interactions in detail and assess the fully coupled flow and water quality within the system.[854] The scoping comments highlighted the need for the EIS to detail how extraction of groundwater, treatment of mine water, and discharge to surface water will affect critical habitat variables including stream discharge, stream temperature, pH, metals concentrations, and suspended sediment.[855] The DEIS fails on all accounts.

Even if PLP continued to use its water modules, the modules are flawed. The watershed module does not appear to be integrated with the water management plan.[856] The groundwater module lacks information regarding flow characteristics at the mine site, including lateral

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848 Trustees for Alaska Scoping Comments, 2018 at 41–45.
849 *Id.* at 43, citing Wobus Scoping Comments, 2018 at 3.
850 *Id.* at 43–44, citing Wobus Scoping Comments, 2018 at 3.
851 *Id.* at 44, citing Wobus Scoping Comments, 2018 at 4.
852 *Id.*
853 *Id.*, *cf.* 2018 Project Description at 53–54 (describing the three independent modules); *see also* Welker Scoping Comments, 2018 at 7 (noting that "[g]roundwater-surface water interactions in the Pebble Mine area appear to be widespread based on the identification of thousands of seeps in the region that reflect a shallow groundwater table, measurable interbasin transfer of groundwater between the [South Fork Koktuli] and [Upper Talarik Creek], numerous upwelling areas along [South Fork Koktuli], and open water during late winter suggest a strong groundwater influence in these streams. This interconnectivity between groundwater and surface water enables hydrologic and biochemical connectivity between wetlands, ponds, [and] streams.").
854 Trustees for Alaska Scoping Comments, 2018 at 44, citing Wobus Scoping Comments, 2018 at 4.
855 *Id.*
856 *See* Mouw Scoping Comments, 2018 at 9.

hydrologic connectivity between the proposed open put and the surrounding aquifer.[857] The mine plan module does not state whether it will operate interactively with the project. The model would need to provide predicted baseline flows, water production in response to operations (dredging, pumping, and artificial circulation), and identify flow that would be diverted from project-affected basins.[858] The instream-flow model is flawed because of its reliance on Physical Habitat Simulation System (PHABSIM).[859]

Using different models requires internal consistency across models.[860] PLP has failed to meet this bar, rendering its modeling flawed. In fact, in a response to an RFI, PLP acknowledges the internal *inconsistencies*.[861] Wobus concludes that PLP's response "reflects a potentially significant flaw in the way the different models interact, and underscores the shortcomings of using a modular, rather than an integrated approach, to modeling this system."[862] Because PLP's assigned values[863] to the Watershed Module are arbitrary, and exceed the upper confidence limits, PLP's modeling scheme renders water completely unaccounted for between models and is not internally consistent.[864]

PLP's application and approach also fails to adequately account for spatial and temporal variation in stream and pond water levels.[865] Understanding the coupled system dynamics and where specific segments of water bodies are gaining and losing over different times of the year is critical to fully capturing and assessing the impacts to the ecological functioning of this ecosystem.[866] PLP needs to provide modeling that captures these dynamics and the DEIS must reflect these dynamics in its analysis. The Water Management Plan needs to provide a detailed water balance evaluation at the proposed mine during the full lifecycle including water flow patterns for surface water, water use, land application and discharge systems, pond storage and discharge, seasonal changes during base flow, steady state, and peak flow conditions.[867]

The 2019 Wobus Memo summarizes the complexity of this problem in terms any Corps permit reviewer should understand:

> PLP's existing data also do not appear to honor the most basic requirement of mass balance: using the precipitation, evapotranspiration and streamflow data quoted in the DEIS, there is approximately 25% more water entering the system than leaving it. . . . [The Corps] cannot grant a permit for building a mine of this scale until PLP demonstrates that it fully understands the water management

[857] *Id.*
[858] *Id.*
[859] *Id.; see infra* Section VI.D.9 for a more detailed discussion of the inappropriate use of PHABSIM.
[860] *Id.*
[861] *Id.* at 7–8.
[862] *Id.*
[863] *Id.* (referencing RFI 19b).
[864] *Id.*
[865] Wobus Scoping Comments, 2018 at 4.
[866] *Id.*
[867] Welker Scoping Comments, 2018 at 8.

challenges associated with mining the Pebble deposit. That basic requirement will not be met until PLP can demonstrate that its water balance functions properly.[868]

5. The DEIS fails to adequately assess downstream impacts.

Due to the size and scale of the proposed mine, and the likely future expansion, "one of the most significant impacts of mining on the ecology of the Bristol Bay watershed will be due to changes in streamflow and water quality."[869] In its Proposed Determination, EPA found that "mining of the Pebble deposit at any of [the three mining scenarios identified] even the smallest, could result in significant and unacceptable adverse effects on ecologically important streams, wetlands, lakes, and ponds and the fishery areas they support."[870] As a result, EPA proposed restricting the discharge of dredged or fill material if, among other things, streamflow alterations would be greater than 20% of daily flow in 9 or more linear miles of streams with documented anadromous fish occurrence.[871]

In the 2019 Wobus Memo's review of streamflow reductions, Wobus found that "the monthly change factors reported in the DEIS appear to substantially underestimate streamflow reduction impacts."[872] In an integrated hydrologic modeling analysis of the proposed Pebble Mine, Dr. Prucha used MikeSHE, an internally consistent code that models rainfall, runoff, infiltration, evaporation and other processes.[873] The monthly flow changes modeled by Dr. Prucha in MikeSHE provide a stark contrast to those modeled in the DEIS.[874] "[I]n many cases, the projected *daily* change factors from the MikeSHE model greatly exceed the USEPA threshold of 20%, even when the monthly average is less than 20%."[875] The 2019 Wobus Memo notes that the DEIS fails to include a description of how water treatment operations will be modified to prevent changes in daily flow.[876] Dr. Wobus concludes that "even with an active water management plan there are likely to be limitations to how well Pebble can time their water treatment releases to prevent daily or monthly streamflow fluctuations from exceeding the 20% threshold."[877] The DEIS fails to adequately assess streamflow changes and evaluate how PLP will meet EPA's threshold. Dr. Wobus notes that the failure to use appropriate models, like MikeSHE, render the analysis flawed with a water balance that simply does not balance out.[878] Absent use of the appropriate and requisite modeling that is internally consistent, the DEIS is incapable of (1) predicting the likely streamflow alterations and (2) assessing PLP's water management strategy to actually offset such streamflow alternations. Dr. Wobus concludes that "[s]uch an analysis is missing and renders the overall assessment of downstream impacts flawed."[879]

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[868] *Id.* at 8.
[869] *Id.*
[870] Proposed Determination at ES–5.
[871] *Id.* at ES–6.
[872] Wobus, 2019 at 8.
[873] *Id*; *see also* Prucha, 2019.
[874] *See* Wobus, 2019 at 9, Fig. 3.
[875] *Id.* at 9.
[876] *Id.*
[877] *Id.*
[878] *Id.*
[879] *Id.*

6. *The DEIS fails to account for climate change in its hydrologic analysis.*

Water management is not static and the hydrologic system is predicted to change as a result of climate change. However, the baseline data relied upon in the DEIS "reflect[s] only recent historical hydrologic variability at the mine site."[880] The Pebble project is likely to extend beyond twenty years, as reflected through the acknowledged reasonably foreseeable 78-year mine expansion. As a result, the mine's water management must be designed to accommodate the predicted climatic changes. As Dr. Wobus notes, "[b]ecause water management and mine infrastructure must be designed to be resilient to future temperature and precipitation variations decades into the future, these data need to be placed into the context of the expected range of variability that could occur over those coming decades."[881] As a result, the DEIS must consider long-term trends in precipitation, temperature, and other parameters that may influence operations.[882]

Unfortunately, the DEIS takes the opposite approach, going to great lengths to dismiss the well-accepted science regarding climate change in Alaska.[883] As Dr. Wobus notes, the National Climate Assessment "unequivocally states that increasing temperature trends in Alaska over the past few decades are significantly larger than what would be expected due to natural variability."[884] PLP's assertion that the Pebble area is different due to Pacific decadal oscillation is without support.

In 2015, Dr. Wobus quantified hydrologic changes at the mine site using a range of climate change projections.[885] The analysis found that even under a moderate emissions scenario, the percent of winter storms falling as rain, rather than snow, doubles by 2100 (near the period when the mine would close under the expanded 78-year mine scenario).[886] Such a dramatic change in the hydrologic system (rain versus snow) would "fundamentally influence the DEIS assumptions regarding mine impacts to site hydrology, including the amount of water requiring treatment, the impacts of treatment discharges on downstream hydrology, and the magnitude of extreme precipitation events."[887]

The DEIS not only fails to account for these predicted changes but also makes the arbitrary decision that extreme precipitation events occur during non-winter months.[888] The Wobus 2015 analysis found that "a warmer climate results in far more high flow events per year

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880 *Id.*
881 *Id.*
882 *See id*.
883 *See id*.
884 *Id.*
885 *Id.* at 10 (citing Wobus, Cameron et al., 2015, *Hydrological Alterations from Climate Change Inform Assessment of Ecological Risk to Pacific Salmon in Bristol Bay*, Alaska, PLOS ONE (Wobus, 2015)) (included as an attachment).
886 *Id.*
887 *Id.*; *see also* Welker Scoping Comments, 2018 at 9.
888 Wobus, 2019 at 10.

that would be expected based on a simple analysis of baseline hydrology."[889] As storms fall as rain, rather than snow, the likelihood of more high flow and extreme precipitation events increases.[890] Yet, the DEIS discounts this predictable outcome. By dismissing the impacts of climate change on the hydrologic cycle, the DEIS, in turn, underestimates hydrologic risks.

7. The DEIS fails to adequately address issues raised in scoping.

In Trustees for Alaska's scoping comments, a long list of issues pertaining to water management were identified.[891] That list included:

- Evaluate tailing facility capacities to account for extreme precipitation during the rainy season, spring breakup/snow melt, and during high precipitation years;[892]
- Evaluate Pebble water storage mitigation/emergency measures to address water management concerns;[893]
- Evaluate extent (three-dimensional spatial extent) and impact of cone of depression, including assessing impact to groundwater flow pathways;[894]
- Evaluate whether the cone of depression will accelerate flow toward the artificial gradient;[895]
- Evaluate whether the cone of depression will create artificial bypass reaches;[896]
- Assess level of connectivity between the proposed pit and the deep-water bedrock valleys adjacent to the pit;[897]
- Evaluate the potential for the project to restructure the head gradient of continuous aquifer networks;[898]
- Evaluate the potential of dewatering to prolong drought in intermittent reaches;[899]
- Assess how Pebble plans to mimic spatial and temporal heterogeneity of water quantity and quality;[900]
- Assess whether seeps, springs, and primary order streams will be bypassed (essentially eliminating the mosaic of headwater sources);[901]
- Analyze impacts to surface seasonal water flow, including quality and quantity from construction and operation of the mine, port and transportation corridor, potential changes to hydrology of rivers and streams at crossings, scouring, erosion, and other impacts to geomorphology in the project area;

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[889] *Id.*
[890] *Id.*
[891] Trustees for Alaska Scoping Comments, 2018 at 42–43.
[892] *See* Welker Scoping Comments, 2018 at 9.
[893] *Id.*
[894] *See* Mouw Scoping Comments, 2018 at 4.
[895] *Id.* at 13.
[896] *Id.*
[897] *Id.* at 1.
[898] *Id.* at 13.
[899] *Id.*
[900] *Id.* at 14.
[901] *Id.*

- Provide a detailed schematic diagram depicting the water balance changes throughout the mine life cycle — construction, start up, operations, closure, reclamation and post-closure and monitoring;
- Include a water resource analysis that evaluates all disturbances (e.g. surface hardening and soil compaction from roads, airstrip, overall facility footprint, overburden removal, permafrost disturbance, etc.) that may influence water storage capacity and infiltration rates related to groundwater;
- Consider impacts from project water management on fish, wildlife, habitat, and subsistence resources;
- Assess extent of impacts from groundwater pumping and dewatering of streams and wetlands in the vicinity of the mine, which may affect fish spawning, rearing, and overwintering habitat, migratory birds, and other animals;
- Demonstrate how the unsaturated zone will be simulated (and which model will simulate this);[902]
- Explicitly address shortcomings in the precipitation and streamflow monitoring data, and evaluate how these uncertainties in the site water balance propagate through their mine water management plans;[903] and
- Explicitly consider and discuss uncertainties in the site water balance related to incomplete data or short periods of record.[904]

The DEIS fails to adequately address these issues.

The scoping comments noted that the application raised questions by identifying some aspects of water management with particular specificity despite the dearth of data and information underlying the application. For example, Pebble provided precise estimates in Section 4.1.3.1 of Attachment D, stating that "[t]he annual average surplus is estimated at approximately 39 cubic feet per second (cfs) for the maximum mine site footprint."[905] The 2018 application modified this estimate to "approximately 29 cubic feet per second."[906] This precision is at odds with the uncertainties identified above.[907] And, there is no explanation for how the precise annual average changed by 10 cubic feet per second between the two applications. As noted in the Trustees scoping comments, the Corps must require Pebble to conduct a full uncertainty analysis on such preproduction and production phase water balance estimates, given significant uncertainties in mine plan layout and operation, and most importantly uncertainty in key model inputs such as precipitation, infiltration, evaporation, transpiration, and dewatering rates.[908]

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[902] *See* Wobus Scoping Comments, 2018 at 3.
[903] *Id.*
[904] *Id.*
[905] 2017 Pebble Application, Attachment D at 63.
[906] 2018 Pebble Application, Attachment D at 57.
[907] Wobus Scoping Comments, 2018 at 3–4; *see also* Mouw Scoping Comments, 2018 at 10.
[908] Wobus Scoping Comments, 2018 at 3–4.

D. Fish

Bristol Bay supports the world's largest sockeye salmon fishery. The Nushagak and Kvichak are the two most productive sockeye watersheds within Bristol Bay.[909] Bristol Bay's Chinook salmon runs are frequently at or near the world's largest, and the region also supports significant coho, chum, and pink salmon populations.[910] Because no hatchery fish are raised or released in the watershed, Bristol Bay's salmon populations are entirely wild.[911] Bristol Bay is remarkable as one of the last places on Earth with such bountiful and sustainable harvests of wild salmon.[912] One of the main factors leading to the success of this fishery is the fact that its aquatic habitats are untouched and pristine, unlike the waters that support many other fisheries.[913]

Salmon return to their natal environments, where they were spawned or hatched.[914] This results in a diverse stock, each uniquely adapted to their particular environment.[915] This diversity, or biocomplexity, is key to long-term sustainability of healthy populations.[916]

The proposed mine is situated in the headwaters of the North Fork Koktuli, South Fork Koktuli, and Upper Talarik Creek. Headwaters provide refuge from predators and competitors, rich feeding grounds, and thermal refuge.[917] Salmonids may use headwaters for both rearing and spawning habitat.[918] Alterations to headwaters can have a variety of downstream impacts, including increased flood frequency, sedimentation, mortality of aquatic biota, and reductions in organic matter and invertebrate prey.[919]

The DEIS fails to adequately address a variety of relevant and important aspects regarding the fish populations in or downstream of the project area. Several fisheries experts have concluded that the DEIS lacks requisite information, fails to adequately assess the full scope, extent, magnitude, and scale of impacts on the impacted fisheries, and reaches unsupportable conclusions that dismiss or minimize impacts from the project on these fisheries.

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909 *See* PD at ES–1. *See* O'Neal Scoping Comments, 2018 at 6.
910 *Id.* The Nushagak drainage produces one of the largest remaining king salmon populations in Alaska, and possibly in the world. O'Neal Scoping Comments, 2018 at 3.
911 PD at ES–1.
912 *Id.*
913 *Id.*; *see also* O'Neal Scoping Comments, 2018 at 3.
914 O'Neal Scoping Comments, 2018 at 3.
915 *Id.*
916 *Id.*; *see also* Schindler, 2019 at 3–4; American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019) at 3.
917 O'Neal Scoping Comments, 2018 at 4.
918 *Id.*
919 *Id.*

1. The DEIS fails to take a hard look at potential impacts to fish population structure and life history diversity.

The DEIS does not adequately address how the project will impact life history diversity and the uniquely differentiated populations of sockeye salmon.[920] As Dr. Hovel establishes in her report, *Assessment of Pebble Mine Draft EIS: Salmonid life history diversity and impacts to Iliamna Lake*, the DEIS's failure to assess impacts on these distinct populations and consider their diverse life histories renders any conclusions inadequate. By failing to differentiate among the genetically distinct units and their life history diversity within the impacted watersheds, the DEIS cannot support any of its conclusions regarding the impact of the project for sockeye salmon populations.[921] To adequately assess impacts, "[p]opulation structure and life history traits must be considered."[922] Fisheries management requires management at the level of fine-scale population structure.[923] By failing "to account for . . . fine-scale diversity . . . the DEIS does not evaluate important potential losses to the fishery in terms of harvest access and processing capacity."[924] Because the DEIS does not "describe ecotype distributions," it lacks the requisite "assessment of the loss of unique biodiversity that exists in the watershed."[925] Further, the DEIS assessment is inadequate because it fails to discern between the different life histories associated with the genetically distinct populations throughout the Nushagak basin.[926]

O'Neal also raises concerns about the DEIS's failure to consider genetic diversity of salmon stocks and the portfolio effect when evaluating the impacts of the project on salmon throughout the watershed.[927]

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[920] *See* Hovel, Rachel A., May 2019, Assessment of Pebble Mine Draft EIS: Salmonid Life History Diversity and Impacts to Iliamna Lake, Report prepared for the Wild Salmon Center (Hovel, 2019) at 2 (report and references included as attachments with these comments).
[921] *Id.*
[922] *Id.*
[923] *Id.* at 3.
[924] *Id.* at 2.
[925] *Id.* at 3.
[926] *Id.*
[927] O'Neal, 2019 at 13.

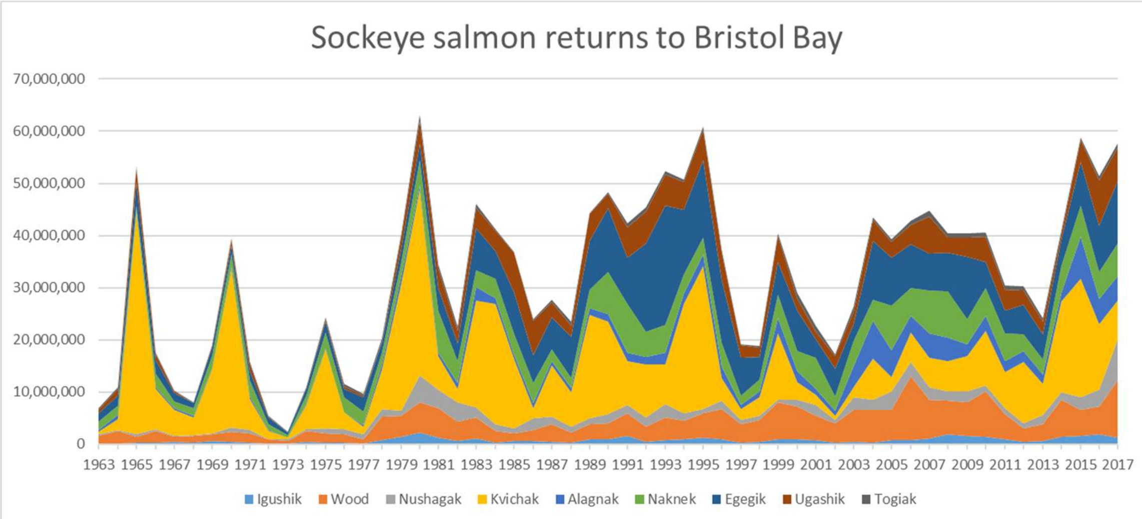

Figure 1 from O'Neal, 2019. Sockeye salmon returns to Bristol Bay based on ADF&G data. The figure highlights the variability of contributions to the overall fishery from each of nine watersheds (biocomplexity), and thus the importance of maintaining the sustainability of each "stock" in the Bristol Bay-wide "portfolio." Within each watershed, multiple individual stocks vary through time as well, which contribute to sustainability of populations overall.[928]

O'Neal notes that

> [b]est available science clearly describes genetic and (related) life history diversity are amongst the most critical factors contributing to the overall sustainability of the Bristol Bay salmon fishery (Hilborn et al. 2003, Schindler et al. 2010). The hundreds of discrete spawning populations of sockeye salmon in Bristol Bay display local adaptations to highly variable spawning and rearing habitats (i.e., life history diversity). Distinct stocks can occur at fine spatial scales and collectively create a "portfolio effect" which dampens overall variability in the fishery by more than two times (Hilborn et al. 2003, Schindler et al. 2010, Quinn et al. 2012).[929]

O'Neal concludes that "characterization of the genetic composition of potential impacted stocks is essential to understanding and predicting project impacts. The omission of genetic information in the DEIS is glaring in light of the potential for elimination of some streams, and underestimation of habitat impacts in a multitude of surrounding streams."[930]

Dr. Schindler also raises concerns about the DEIS's failure to consider the impacts to one portion of a watershed as an impact to the portfolio of habitat within the watershed:

> A major component of the DEIS focuses on estimating the amount of fish habitat that is vulnerable to the development of Pebble Mine. The DEIS concludes that a

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[928] *Id.* at 4.
[929] *Id.*
[930] *Id.* at 13–14.

> small fraction of a percent of fish habitat in the Kvichak and Nushagak river watersheds is vulnerable to mining activities. To arrive at this conclusion, the DEIS compares the number of fish recently observed in nearby streams to the aggregate number that returned to the entire watershed. This approach leads inevitably to underestimating the value of habitat that could be impacted by the mining activities.
>
> The reason for this underestimation is that we know from decades of monitoring of salmon, that population abundance varies tremendously through time in any individual component of habitat (Schindler et al. 2010). However, all populations do not boom and bust at the same time, so that the abundance lows in one habitat are offset by abundance highs in other habitats. What this means is that different pieces of habitat are important for producing fish at different points in time. Thus, just because certain habitat currently produces a small number of fish, does not mean it does not have the potential to support higher abundances in the future. In fact, long-term data on Bristol Bay rivers shows that local abundances can vary 100x over decade-long time scales. Thus, properly functioning watersheds should be viewed as habitat portfolios, whereby the sustainability of the regional resource depends on the diversity of habitats across a river basin (Schindler et al. 2010, Brennan et al. 2019). The DEIS currently does not view the system in this dynamic way, thereby distinctly underestimating the importance of small components of habitat to the long-term sustainability of the ecosystem.[931]

A recent study by Sean Brennan, a post-doctoral researcher at the University of Washington School of Aquatic and Fishery Sciences, confirms the value of the portfolio effect.[932] Brennan notes that the study finds "that the areas where fish are born and grow flicker on and off each year in terms of productivity."[933]

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[931] Schindler, 2019 at 3; *see also* Stanford, Jack A., June 29, 2019, *Efficacy of the draft Environmental Impact Statement (dEIS) for the Pebble Mine, Alaska*, (Stanford, 2019) at 3 (noting the need for the DEIS to consider how salmonid "resiliency derives from an entirely intact ecosystem where habitat mosaics and associated salmon stocks naturally shift from place to place annually) (emphasis in original) (report and references included as attachments with these comments).

[932] *See*, S.R., et al., *Shifting habitat mosaics and fish production across river basins*, Science. 364, 783–786 (May 24, 2019) (Brennan, 2019a) (included as an attachment with these comments).

[933] *See* Michelle Ma, *Hot Spots in Rivers that Nurture Young Salmon 'Flicker On and Off' in Alaska's Bristol Bay region*, UW News, May 23, 2019 (included as an attachment with these comments).

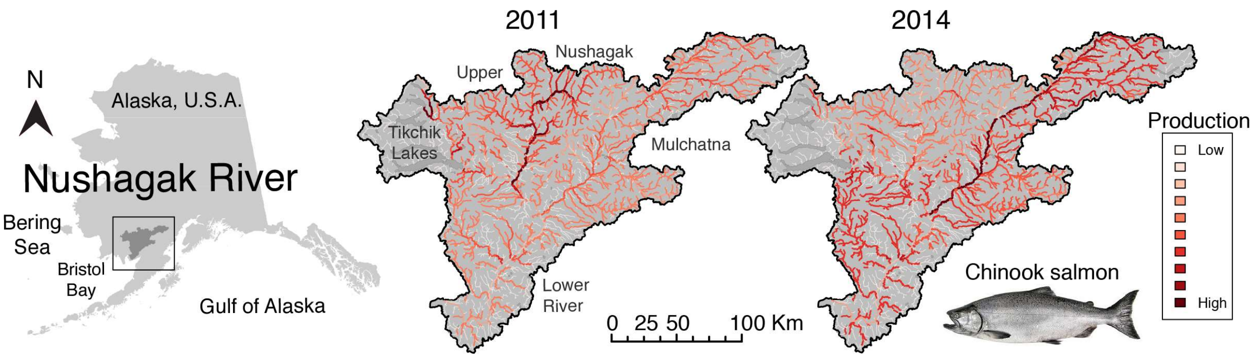

Fig. 1 from the Brennan et al. study, Science 2019.[934] The spatial pattern in the production of Chinook salmon from the Nushagak River basin shifted among different parts of the watershed year to year. Regions of high production in 2011 were located in the upper Nushagak River. In 2014, the most productive habitats shifted to the east to the Mulchatna River basin.

The study notes that in the same year, the best habitat might be entirely different for various sockeye populations, with some adapted to lakes and others to rivers. It finds that the whole system is important to the fish, if not all at the same time. Brennan states that "[y]ou can't really carve that basin up into isolated habitat patches and assume that the [salmon] production of one habitat patch is going to be constant through time . . . Intact river systems operate as more than just a simple sum of their parts."[935]

By compartmentalizing its analysis, the DEIS fails to account for the "dynamic nature of salmon habitat, [and] the fact that intact watersheds operate as shifting habitat mosaics. . . ."[936] Concerns over failure to consider the portfolio effect were also identified by the American Fisheries Society.[937] The American Fisheries Society notes that

> [t]hese factors lead to extremely high levels of genetic diversity among hundreds of locally adapted unique salmonid populations, which in turn support high levels of salmon production and system-wide stability. Because of this *portfolio effect*, there is remarkable annual productivity regionally despite considerable fluctuation in any single river system or any single year (Schindler et al. 2010). Similar portfolio conditions have been erased from the salmon rivers of Canada and the USA to the south, by activities associated with resource extraction, human overpopulation, and economic development. The DEIS fails to consider impacts to fish as they relate to distinct populations and life history diversity.[938]

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[934] *See* Brennan, 2019 at 1.
[935] *See* Ashley Braun, *Can Wild Salmon and the Pebble Mine Coexist?* Hakai Magazine, May 23, 2019 (included as an attachment with these comments).
[936] Schindler, 2019 at 4.
[937] *See* American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019), at 3.
[938] *Id.*

O'Neal also points out that the DEIS has failed to consider the global importance of Nushagak River Chinook salmon.[939] The Nushagak River supports one of the world's largest remaining populations of Chinook salmon.[940] The Nushagak River averages an escapement second to the Kuskokwim River in all of Alaska.[941] Chinook returns, however, have recently failed to meet escapement levels necessary for subsistence as set by Alaska's Board of Fisheries, prompting ADF&G to restrict subsistence harvest starting in 2010.[942] The DEIS fails it recognize the importance of conserving the world's largest remaining wild Chinook salmon populations or assess impacts to Chinook in light of dwindling populations across the State.

The DEIS's cumulative impacts analysis of fish impacts from reasonably foreseeable future mining is also inadequate. For the same reasons identified in Section VI.A.8.2, the DEIS fails to account for the cumulative impacts of two corridors and future mining due to the established infrastructure on fish species and the overall portfolio. As O'Neal notes,

> once infrastructure (transportation and power) is in place, exploration of adjacent claims and subsequent adjacent mine development would nearly inevitably occur. This could result in centuries of large scale mine development, overlapping with dozens of generations of salmon. The potential cumulative impacts of decades of mining activity is virtually ignored in the DEIS, rendering the assessment a vast underestimate of potential fisheries and aquatic life impacts overall. . . . Ultimately, the countless impacts of mining activity throughout all adjacent claims will lead to a myriad of impacts the DEIS fails to adequately consider.[943]

In addition to failing to adequately assess the direct, indirect, and cumulative impacts to all five Pacific salmon species, the DEIS fails to "consider the subsistence, recreational, and ecological value of other fish species including rainbow trout, Dolly Varden, Northern pike, Arctic grayling, whitefish (*Coregonus* sp.), sculpin (*Cottid* sp.), stickleback (*Gasterosteus aculeatus* and *Pungitius pungitius*). Impacts to resident fishes are virtually ignored in the DEIS."[944]

2. The DEIS improperly bases impacts on loss of habitat area.

As Dr. Hovel points out, "the [D]EIS characterizes direct impacts to fish species primarily in terms of loss of habitat area."[945] The DEIS approach generally identifies an amount of stream habitat impacted in miles and then compares that amount to the total amount of stream habitat in a particular watershed and the entire Bristol Bay watershed. For example, the DEIS states that

> [t]he 8.2 miles of anadromous habitat permanently removed within tributaries 1.190 and 1.200 represent 11 percent of the total documented 72.7 miles of

[939] O'Neal, 2019 at 13.
[940] *Id.*
[941] *Id.*
[942] *Id.*
[943] *Id.* at 4–5.
[944] *Id.* at 14.
[945] Hovel, 2019 at 3.

> anadromous habitat in [North Fork Koktuli] River. When compared to the total mileage of documented anadromous waters in the three main tributaries associated with the mine site (i.e., the [North Fork Koktuli, South Fork Koktuli, and Upper Talarik Creek]), *this loss represents a 4 percent and 3 percent of spawning and rearing habitat for coho salmon, respectively; and 3 percent of Chinook salmon rearing habitat*. The entire Bristol Bay drainage has 9,816 miles of documented anadromous waters. Therefore*, the loss of tributaries 1.190 and 1.200 represents an 0.08 percent reduction of documented anadromous stream habitat*.[946]

As discussed above in Section VI.A.4, the DEIS's misuse of the threshold approach is problematic. As Dr. Hovel notes, "this simplified measure does not account for population structure or life history diversity among fish that occupy these watersheds, and measuring loss of habitat area as a percent of all that is available is not an appropriate method to scale up impacts to salmon or other fishes."[947] Instead of arbitrarily evaluating the loss of streams as compared to the number of streams in the entire watershed, the DEIS must assess the characteristics and attributes of the particular steams lost. This analysis must consider the "biological diversity represented by fish in these habitats, such as fine-scale population structure and life history diversity."[948] This type of analysis is required because "important habitat characteristics can vary greatly on small spatial scales in both streams and lakes."[949] As Dr. Hovel notes, "identifying percentage of habitat lost can ignore this biologically relevant variation."[950] O'Neal also draws out the problem with this approach as it pertains to fish habitat:

> **Percentage estimates of habitat loss in the DEIS overly simplify freshwater ecosystems spatially and temporally**. Estimates reduce habitat loss to linear distances of headwater streams and the percentages of stream distance within each basin, which vastly underestimates actual impact. The methodology overlooks the three-dimensional nature of fish habitat (or four-dimensional nature given temporal variability e.g., Stanford et al. 2005). They ignore downstream, integrated impacts of changes in streamflow, groundwater-surface water exchange, water temperatures, water quality, and food web effects (Figure 4, Vannote et al. 1980, Colvin et al. 2019).[951]

In addition, simply looking at the percentage of stream lost does not take into account fish abundance and occupancy currently or the potential of these streams to provide important habitat in the future.[952] To the degree the DEIS attempts to characterize the impacted environment, it takes a simple snap shot in time. Yet, "the locations of highest chinook and sockeye salmon production shift across years."[953]

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[946] DEIS at 4.24–5 (emphasis added).
[947] Hovel, 2019 at 4
[948] *Id.*
[949] *Id.*
[950] *Id.*
[951] O'Neal, 2019 at 8.
[952] Hovel, 2019 at 4.
[953] *Id.*

The failure to assess impacts to population structure, its role for population persistence, and life history diversity "renders the [DEIS] analysis insufficient to evaluate how proposed operations would affect salmon populations or commercial and subsistence harvest access."[954]

3. *The DEIS fails to take a hard look at potential impacts to Lake Iliamna's fish habitat.*

The DEIS fails to take a hard look at potential impacts to fish in Lake Iliamna. The DEIS does not adequately capture fish life stages and habitat use in the lake throughout the year and across the life-span of salmonids. The DEIS asserts that juvenile sockeye have the highest potential to interact with the ferry operations, but "fails to cite any existing data or published work" regarding fish use of the open water zone.[955] Because the DEIS does not describe fish use of open-water habitat, it is "unable to describe how the ferry operations may interact with juvenile sockeye salmon."[956] To make any determinations about impact, the DEIS "must include data on fish use of the epilimnion (surface) waters of Lake Iliamna, especially during crepuscular and night periods. . . ."[957]

The eastern half of the lake supports the great majority of juvenile sockeye salmon.[958] This is also where the proposed ferry corridors would be located. Despite the fact that the "[p]roposed ferry corridors would occur in the highest-density juvenile sockeye habitats in Lake Iliamna, . . . the DEIS fails to assess the manner in which fish of this size would interact with ferry operations."[959]

Dr. Hovel's review found that "[]the conclusions in Section 4.24 on fish habitat use cannot be correctly drawn from the information provided."[960] Utilizing survey data from a single season in a single year is insufficient for the Corps to draw the conclusions contained in the DEIS.[961] Population from a single year is not reflective of the potential importance of habitat in the future.[962] Also, as previously noted, "local [fish] populations fluctuate widely across years on fine spatial scales. . . .[963]"

Dr. Hovel found that the DEIS also fails to adequately consider the impacts of roadways on lake habitat. Specifically, roadways can lead to shoreline erosion and contribute fine sediment and contaminants.[964] The DEIS fails to consider wave action erosion on the shoreline from ferry operations.[965] The DEIS fails to adequately consider ferry operation impacts to migration.[966] The

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[954] *Id.*
[955] *Id.* at 7.
[956] *Id.*
[957] *Id.*
[958] *Id.* at 9.
[959] *Id.* at 11.
[960] *Id.* at 13.
[961] *Id.*
[962] *Id.*
[963] *Id.*
[964] *Id.*
[965] *Id.*

DEIS fails to consider the cumulative impact of the ferry terminal and operations across life stages.[967] The DEIS does not assess the cumulative exposure or interaction among multiple stressors, including disturbance to shoreline habitat, noise, turbulence, and exposure to contaminants. To adequately understand the cumulative impacts, the DEIS "must include an analysis of impacts across life stages and the ways in which stressors can interact."[968]

4. The DEIS fails to take a hard look at impacts to the aquatic food web.

The DEIS fails to address potential impacts to zooplankton. Juvenile sockeye salmon rely on zooplankton.[969] Dr. Hovel notes that "[a]n intact and productive zooplankton assemblage is essential to support sockeye salmon populations. Zooplankton are sensitive to contaminants and may suffer population declines in response to even low concentrations of heavy metals of fuel oils."[970] The DEIS fails to acknowledge zooplankton susceptibility to contaminants and the impacts that loss of zooplankton would have on juvenile sockeye salmon populations.[971] A hard look analysis must consider contaminant impacts to zooplankton and the resulting impacts to the food web that supports sockeye salmon rearing.[972]

5. The DEIS fails to take a hard look at habitat impacts.

The Upper Talarik Creek, North Fork Koktuli, and South Fork Koktuli are pristine watersheds. The mine footprint will eliminate, block, or dewater over 20 miles of streams. Most of these streams provide spawning or rearing habitats for salmon.[973] Change in water flow from the mine will impact fish habitat in the headwaters of these three anadromous streams.[974] The DEIS fails to address several issues regarding habitat impact.[975] In an evaluation of the DEIS, doctoral student Sarah O'Neal[976] found several problems with the lacking analysis. O'Neal notes that

> [i]n general, **the DEIS considers potential impacts of all mining activities in isolation** (e.g., consideration of impacts to stream discharge are considered separate from impacts to groundwater exchange, sedimentation, temperature, dissolved oxygen, water quality, juvenile rearing, adult spawning, etc.). It is precisely the variability through time and space of diverse habitats to which

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[966] *Id.* at 14.
[967] *Id.*
[968] *Id.*
[969] *Id.* at 15.
[970] *Id.*
[971] *Id.*
[972] *Id.*
[973] Welker Scoping Comments, 2018 at 13.
[974] *Id.* at 14.
[975] *Id.*
[976] O'Neal has significant experience studying freshwater ecology and salmon ecosystems, including ten years in Bristol Bay, including a decade-long habitat monitoring program on and around the proposed Pebble Mine site. O'Neal, 2019 at 1. O'Neal's Ph.D research focuses on toxicity of metals to salmonid fishes resulting from hardrock mining. *Id.*

> fishes and other aquatic biota have adapted over millennia that produce the overall sustainability of the fishery (Schindler et al. 2010). Overlooking the importance of combinations of diverse habitats and life history types will almost inevitably result in fish impacts at a population level (Figure 3; Hilborn et al. 2003, Allan and Castillo 2007, Brennan et al. 2019b).[977]

The DEIS analysis of impacts to salmon habitat is also flawed because it evaluates the impacts from the project in a piecemeal fashion, considering aspects of the project in "isolation spatially (e.g., impacts from the mine foot print are considered separate from the transportation corridor, etc.)."[978]

In addition to isolating impacts spatially, the DEIS separates out review of impacts by issue. For example, the DEIS considers impacts of spills separate from fugitive dust. Accordingly, the DEIS cumulative impacts analyses, which are also compartmentalized by issue, fails to adequately asses the full scale of cumulative impacts from the project on the aquatic ecosystem. O'Neal notes that "[t]he end result of isolating potential impacts to individual stream reaches and individual mine components (i.e., mine footprint, transportation corridor, port, and pipeline) is a vast underestimate of overall project impacts."[979] O'Neal provides a figure that helps visualize the overlapping impacts, which the cumulative impacts analysis utterly fails to connect and assess:

[977] O'Neal, 2019 at 6–7.
[978] *Id.*
[979] *Id.* (emphasis removed from original).

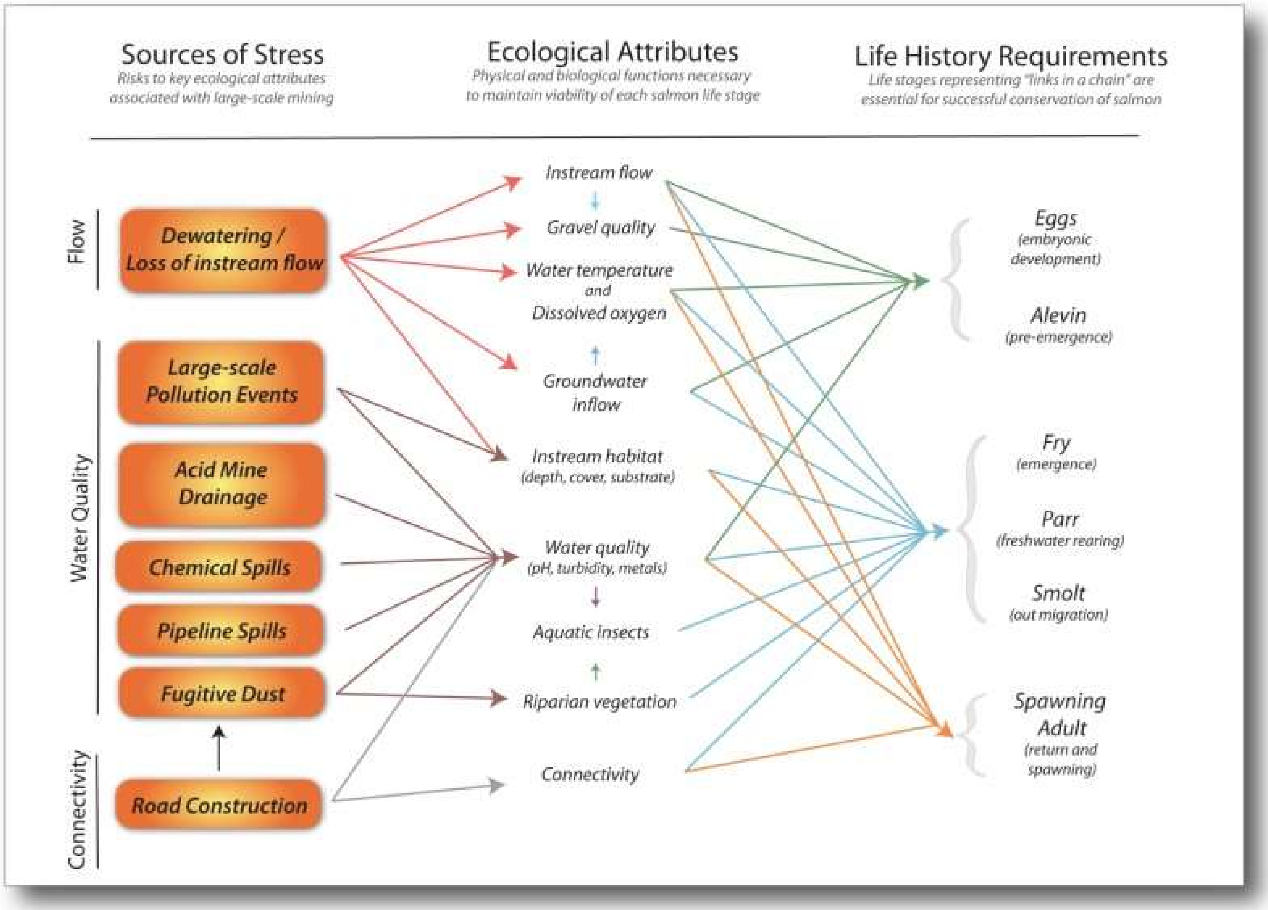

Fig. 3 from O'Neal, 2019: Impacts of mining on salmon habitat and life history stages (Ecology and Environment 2010).

In addition to the lacking cumulative impact analysis, the DEIS overlooks the secondary or indirect effects of the project on fish habitat. O'Neal points out that

> [t]he DEIS also consistently fails to consider the importance of wetlands and headwater streams in forming downstream habitat which accommodate anadromous and other fishes, resulting in vast underestimates of impacts from mining (Vannote et al. 1980, Colvin et al. 2019). Headwater streams comprise the majority of all stream networks and strongly influence the ecological functions and biota in receiving waters. They are sources of organic matter and energy inputs essential to the productivity of downstream communities (Figure 4). Headwaters also provide refugia for rare species, refugia from invasive species, are culturally, commercially, and recreationally important, and are at high risk of impairment (Colvin et al. 2019). The impacts to downstream receiving waters from mine and infrastructure development is vastly underestimated in the DEIS.[980]

[980] *Id.* at 7–8.

O'Neal also identifies significant problems with the use of the PHABSIM model[981] noting that

> [c]ountless evidence exists in the peer-reviewed literature that temperature, off-channel habitat, groundwater influence, instream structure and cover, seasonal variability, and many other factors all combine in unique combinations to produce the diversity of habitats that support Bristol Bay salmon.[982]

As discussed in greater detail in Section VI.D.9 PHABSIM fails to account for these factors.

Finally, O'Neal notes that the DEIS fails to assess impacts to estuarine habitat.[983] Estuaries provide crucial habitat for rearing salmon and are important to the smoltificaiton process. The DEIS ignores the value of this habitat and how the port and associated infrastructure and traffic will impact this habitat.

6. The DEIS fails to take a hard look at copper impacts to salmonids.

The Pebble deposit is primarily a copper ore body, and salmon can be negatively impacted by very small increases in concentrations of copper.[984] Copper concentrations vary both spatially and temporally in the Pebble Mine area, but rarely do they exceed the most stringent water quality criteria, expected to be about 2 μg/L, based on hardness of waters in the area.[985] Natural stream waters in the Pebble Mine area are very low in copper, and frequently at or below 0.2 μg/L.[986] A small increase in copper concentration will impact the headwater streams by causing water quality standards for the protection of aquatic life to be exceeded.[987]

Copper is a documented neurotoxin in fish, which can impair olfaction in salmon at concentrations in the part per billion.[988] O'Neal notes that "[v]ery slight increases in copper (Cu) concentrations (5-25 parts per billion) inhibit olfaction in coho and Chinook salmon and rainbow trout, with potential to inhibit recognition of predators, prey, mates, kin, and natal streams."[989] Impairment of salmon olfaction from increased copper concentrations due to mining in this area is a significant risk and has potential to adversely affect salmon productivity, biodiversity, and long-

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981 *Id.* at 8–9, *see also* Section VI.D.9 for a more detailed discussion of the problems with PHABSIM.
982 *Id.* at 8.
983 *Id.* at 9.
984 Welker Scoping Comments, 2018 at 1; O'Neal Scoping Comments, 2018 at 16–18 (discussing acute, chronic and sub-lethal toxicity to copper); American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019), at 6; National Marine Fisheries Service, Alaska Region, Report, *Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska*, Nov. 2011, at 3–2 ("salmonids exposed to sub-lethal levels of metals are susceptible to increasing levels of fish pathogens due to stressed immune responses and metabolisms") (included as an attachment with these comments).
985 Welker Scoping Comments, 2018 at 2.
986 *Id.*
987 *Id.*
988 *Id.*; O'Neal Scoping Comments, 2018 at 17.
989 O'Neal, 2019 at 9–10 (citations omitted).

term sustainability.[990] Studies have found that Chinook salmon and rainbow trout avoid copper contaminated waters altogether, except after long-term sublethal exposure, after which their avoidance response may be impaired.[991] The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts of copper, at both low and high concentrations, on salmonids.

O'Neal notes that avoidance can also "lead to degradation of spawning patterns and resulting genetic diversity which are essential to maintaining overall population structure and sustainability. Adult spawning migrations are delayed or interrupted in [copper] contaminated streams, downstream smolt migration is likewise delayed, and osmoregulation of smolts in seawater is impaired."[992] Exposure to copper also impairs salmonid responses to predators.[993] In addition to the indirect impacts identified above, copper, at low concentrations, can have adverse impacts on freshwater algae, zooplankton, mussels, and other invertebrates.[994] In turn, decreased prey abundance reduces habitat quality to support fish growth and reproduction.[995]

The streams near the Pebble Project have low concentrations of constituents that reduce the toxicity of copper to aquatic biota (i.e., calcium, alkalinity, and dissolved organic matter).[996] In general, copper toxicity is a function of the amount of dissolved organic matter, hardness, and alkalinity in the stream; pH is another factor that affects copper toxicity.[997] O'Neal notes that "[s]pecifically at the proposed Pebble site, Morris et al. (2018a, 2018b) found that water quality criteria for copper are under-protective for fish in project area waters, and that rainbow trout experienced acute impacts (lethality) and/or inhibition of olfaction at copper increases less than water quality criteria."[998]

The DEIS must take a hard look at both acute and chronic toxicity to salmon. This analysis does not end at determining whether water quality standards are met. Nothing precludes PLP from seeking a site-specific criteria, which could lead to less protective water quality standards.[999] Further, the water quality standards are based on lethal doses and do not address whether lower concentrations will impact salmon olfactory senses. Whether the effects of copper exposure are mortality, avoidance of contaminated waters, inhibition of the olfactory system during imprinting in early life stages, abnormal predator avoidance behaviors, or impacts to the olfactory system during navigation to natal spawning areas, an understanding of the bioavailability and toxicity of copper to salmonids in site waters in the vicinity of the Pebble Project is critical to the evaluation of the potential environmental consequences.[1000] The DEIS fails to address all copper-related impacts, including those at low concentrations.

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[990] Welker Scoping Comments, 2018 at 2.
[991] O'Neal, 2019 at 10.
[992] *Id.* (citation omitted).
[993] *Id.*
[994] *Id.*
[995] *Id.* at 10–11.
[996] Welker Scoping Comments, 2018 at 4.
[997] *Id.*
[998] O'Neal, 2019 at 10.
[999] Welker Scoping Comments, 2018 at 3–4.
[1000] *Id.*

For the Corps to take the requisite hard look at copper impacts, it needs more data from the applicant. PLP should have incorporated site-specific testing using water sources and native fish species relevant to the Pebble Project area to reduce uncertainty associated with estimating adverse effects levels of copper to salmonids and other important aquatic species in the Pebble Project area.[1001] PLP has failed to do so. The DEIS needs to ensure that all impacts to fish — including sub-lethal effects — are assessed and the mine is designed to ensure water that moves off site is high enough quality to have no sub-lethal or lethal impacts to aquatic life. However, the DEIS fails to account for the likely impacts.

The DEIS completely fails to assess the water quality impacts of copper from fugitive dust sources.[1002] This is because the DEIS only analyzes the subset of metals that are designated as hazardous air pollutants, completely ignoring the full range of environmental impacts — including water quality impacts — from the metals and other contaminants that will be mobilized by the Pebble Mine.[1003] Copper will be present in high concentrations in the fugitive dust from the mine.[1004] Copper is also toxic to fish and other forms of aquatic life in even small concentrations, and is known to reduce growth, immune response, reproduction, and survival.[1005]

Concerns regarding copper toxicity were identified by the EPA in the Proposed Determination. Copper was identified as "the primary contaminant of concern with regard to water quality, both because it is the major resource metal and because it is particularly toxic to marine organisms."[1006] The Regional Administrator made the following findings with regard to the water quality impacts of planned mining operations associated with the Pebble deposit, specifically addressing copper toxicity:

> Uncollected leachate from waste rock piles and the [tailing storage facilities] could enter area waters via either surface or shallow subsurface flow. Leachate that drains to shallow aquifers would reemerge via upwelling through the water body substrate. In the Pebble 2.0 and 6.5 stage mines, the receiving waters for uncollected leachate from the waste rock piles would be in the upper reaches of the [South Fork Koktuli] and [Upper Talarik Creek]; some leachate would also enter [Upper Talarik Creek] through interbasin transfer (EPA 2014: Chapter 8). [Tailings storage facility] leakage and releases would be to the [North Fork Koktuli] watershed in the Pebble 2.0 stage mine and to both the [South Fork Koktuli] and [North Fork Koktuli] watersheds in the Pebble 6.5 stage mine. [Tailings storage facility] leakage and releases would convey both leachate and ore processing chemicals (EPA 2014: Tables 8-1 and 8-3). **Aquatic biota downstream of the mine would be directly exposed to contaminants in discharged waters.** Aquatic insects would be exposed in all juvenile stages, which constitute most of their life cycles. Benthic invertebrates and fish eggs could be exposed to a range of concentrations, from undiluted to highly diluted

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1001 *Id.* at 4.
1002 Zamzow, 2019b at 2, 5, 15, 18, 26.
1003 *Id.* at 18.
1004 *Id.* at 4, 18.
1005 *Id.* at 18, 26.
1006 Proposed Determination at 4–52.

leachate (EPA 2014: Chapter 8). . . .

[T]he Pebble 2.0 and 6.5 stage mines would substantially increase copper in streams spanning all three watersheds. As shown in Table 4-9, **the BBA estimates that, even during routine operations, discharges from the Pebble 2.0 stage mine could exceed BLM based copper criteria in a total of 39.1 miles (62.9 km) of streams in the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds (EPA 2014: Table 8-19).** . . . Estimated impacts are conservative in that they do not include ungauged tributaries and do not include effects in any mixing zones or upwelling areas of contaminated water.

In the upper 13.9 miles (22.4 km) of the [South Fork Koktuli], copper levels during routine operation of the Pebble 2.0 stage mine could be high enough to generate measurable effects on fish, including fish kills in the uppermost reaches. Coho salmon spawn or rear in more than 98% of the streams that would have some level of fish toxicity under the Pebble 2.0 stage mine; Chinook and sockeye salmon also use a substantial proportion of those streams (Johnson and Blanche 2012). Although the uppermost affected reach of the [South Fork Koktuli] would be converted to a waste rock pile in the Pebble 6.5 stage mine, effects on fish would extend farther downstream and cause some level of toxicity in 31.8 miles (51.2 km), including almost the entire [South Fork Koktuli].[FN 45] Copper would be at a concentration sufficient to kill rainbow trout and other salmonids in the upper 7.3 miles (11.7 km) of the remaining [South Fork Koktuli] downstream of the mine. Rearing coho, Chinook, and sockeye salmon would be affected in this reach. Acute and chronic effects of copper would affect eggs, fry, smolts, and returning salmon; chronic effects may have different levels of toxicity for different life stages. Dolly Varden, Arctic grayling, northern pike, burbot, and slimy sculpin would also be affected.

Downstream of the acutely toxic reaches of the [South Fork Koktuli], levels sufficient to cause habitat avoidance would affect chum salmon, as well as rainbow trout, round whitefish, Arctic Alaskan brook lamprey, threespine stickleback, and ninespine stickleback. Copper would also affect fish in the 4.0mile (6.4km) [Upper Talarik Creek] tributary that receives interbasin transfers from the [South Fork Koktuli], resulting in concentrations sufficient to cause fish to avoid the habitat. Dolly Varden are widespread in this tributary, and the lower end also supports both spawning and rearing sockeye, rearing coho and Chinook salmon, rainbow trout, and Dolly Varden. In total, coho, Chinook, sockeye, and chum salmon would each lose more than 19 miles (31 km) of habitat to copper effects under the Pebble 6.5 stage mine.

In the long-term, acute toxicity to vertebrates can result in extirpation of populations. Eradication of fish from and long-term reductions in productivity and diversity of streams severely affected by mine operations have been documented in the past, even where dilution has lessened impacts (Marchand 2002, Jennings et al. 2008). Studies have not yet documented a relationship between effects on fish olfaction and effects on fish populations, but it is reasonable to expect such consequences (DeForest et al. 2011). For both the Pebble 2.0 and 6.5 stage mines,

> **it is reasonable to expect that copper effects would significantly impair fish spawning success, and consequently productivity, in substantial segments of the [South Fork Koktuli]**.
>
> Beyond the stream reaches in which copper concentrations would be toxic to fish, levels would still be toxic to invertebrates (Table 4-9). [FN46] Under the Pebble 2.0 stage mine, copper would be at levels toxic to invertebrates in the entire [South Fork Koktuli] mainstem (33.7 miles [54.2 km]); most of the [North Fork Koktuli] tributary that drains the [tailings storage facility] (1.4 miles [2.3 km]); and the [Upper Talarik Creek] tributary that receives interbasin transfer from the [South Fork Koktuli] (4.0 miles [6.5 km]). Fish within those reaches include juvenile coho and Chinook salmon, as well as Dolly Varden, Arctic grayling, and slimy sculpin (Johnson and Blanche 2012, ADF&G 2013).[1007]

These findings are significant. It is remarkable that the DEIS fails to account for these findings. In considering the concerns identified in the Watershed Assessment or Proposed Determination regarding the potential water quality impacts from the operations of Pebble Mine, it is appropriate for the Corps to evaluate how the changes to the proposed operations warrant reevaluation of the Watershed Assessment and Proposed Determination's findings. The Corps has not completed such an analysis in the DEIS. The DEIS must evaluate the mine impacts, bearing in mind the findings of the Watershed Assessment. These impacts are severe and significant. The DEIS fails to recognize these impacts and take the requisite hard look at the likely impacts of copper contamination on the aquatic ecosystem.

7. The DEIS fails to take a hard look at water quality impacts to salmonids.

In addition to addressing the water quality impacts regarding copper, the DEIS also fails to take a hard look at how other metals would impact salmonids.[1008] The headwater streams at the Pebble site have low buffering capacity, and very low conductivity.[1009] Under these conditions aquatic biota are more susceptible to the toxic effects of metal releases because the background water quality conditions provide little assimilative or buffering capacity for additional metal loads.[1010] The low buffering capacity and low metal concentrations in the streams draining the Pebble Mine area suggest that even minor changes in water quality could adversely affect salmonid populations in these Bristol Bay salmon spawning and rearing streams.[1011] As O'Neal notes, "Pacific salmon are known to have evolved adaptations to their local environment,

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[1007] Proposed Determination at 4–53 to 4–56.
[1008] *See* O'Neal Scoping Comments, 2018 at 12–22 (addressing impacts of metals exposure to fish); *see also* O'Neal, 2019 at 11 (noting that the O'Neal scoping comments provided a review of impacts of metals and that the Corps should reconsider those comments and incorporate them into the EIS analysis of impacts).
[1009] Welker Scoping Comments, 2018 at 5.
[1010] *Id.*
[1011] *Id.*

including water chemistry. . . . Even subtle changes in chemistry can impact behavior, disrupting the biocomplexity essential to maintaining the overall sustainability of salmon fisheries. . . ."[1012]

The DEIS fails to evaluate the acute, chronic, and sub-lethal toxicity of aluminum, cadmium, copper, iron, molybdenum, selenium, zinc, and sediment.[1013]

Selenium pollution from the Pebble Mine poses a particular threat to salmon and other fish species in the receiving streams.[1014] The Pebble Mine will generate elevated concentrations of selenium, both in the mine pits and other impoundments, and in its treated discharges.[1015] EPA has identified selenium as a highly bioaccumulative toxin that can cause lethal deformities in fish and other aquatic organisms. EPA's "Recommended Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater" highlights, in particular, the threat to fish posed by elevated concentrations of selenium:

> A variety of lethal and sublethal deformities can occur in the developing fish exposed to selenium, affecting both hard and soft tissues (Lemly 1993b). Developmental malformations are among the most conspicuous and diagnostic symptoms of chronic selenium poisoning in fish. Terata are permanent biomarkers of toxicity, and have been used to identify impacts of selenium on fish populations (Maier and Knight1994; Lemly 1997b). Deformities in fish that affect feeding or respiration can be lethal shortly after hatching. Terata that are not directly lethal, but distort the spine and fins, can reduce swimming ability, and overall fitness.[1016]

The DEIS also fails to consider the effects on fish caused by the interactions between multiple pollutants discharges at elevated concentrations. EPA's Recommended Criteria for Selenium notes that "studies have found interactions between mercury and selenium to be additive (Heinz and Hoffman 1998) or synergistic (Huckabee and Griffith 1974; Birge et al. 1979)."[1017] "Selenium and mercury have a synergistic negative effect on fish reproduction."[1018]

O'Neal explains "[s]elenium bioaccumulates through the foodchain and can ultimately cause teratogenic effects (malformations) to early life stages of fish skeletons, skulls, and fins (Lemly 2004, Janz 2012)."[1019] Because of this, "relatively low [selenium] concentrations can lead to fish toxicity via bioaccumulation."[1020] Because bioaccumulation and biomagnification cannot be predicted from selenium concentrations, "sufficiently protective water quality guidelines are

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1012 O'Neal, 2019 at 9.
1013 *See* O'Neal Scoping Comments, 2018 at 12–22; O'Neal, 2019 at 11.
1014 *See supra* Section VI.B, Water Quality.
1015 DEIS at 4.18–14; *see, also,* discussion of concentrations of selenium in impoundments and discharges in Section VI.B.1.
1016 Environmental Protection Agency, *Aquatic Life Ambient Water Quality Criterion*, at 14.
1017 *Id.* at 15–16; S. Penglase et al., April 2014, *Selenium and mercury have a synergistic negative effect on fish reproduction*, Aquatic Toxicology.
1018 *Id.*
1019 O'Neal, 2019 at 11.
1020 *Id.*

exceedingly difficult to estimate. Population level effects of selenium contamination have been documented in multiple freshwater ecosystems, though further investigation is needed."[1021] O'Neal notes that in multiple case studies, "the majority of fish species have been extirpated as a result of [selenium] exposure (Lemly 2004)."[1022]

Despite this well-documented evidence of the harm that elevated selenium concentrations can cause to salmonids and other fish, and despite the clear evidence that the Pebble Mine will produce elevated concentrations of selenium, the DEIS fails to adequately assess the project-specific effects of its selenium discharges. "Despite such well-documented toxic effects, no ecotoxicity studies or analyses necessary to predict and consider potential ecotoxic effects, have been conducted on [Water Treatment Plant] discharge water in the DEIS or otherwise to determine the potential for biological impacts for the Pebble project."[1023]

The DEIS also fails to take a hard look at the impacts of methylmercury on fish. Like selenium, methylmercury (a bioavailable form of mercury) has the potential for bioaccumulation up the aquatic food webs, with highest concentrations generally occurring in largest, oldest piscivorous fish.[1024] O'Neal notes that

> [h]ighest concentrations of methymercury in fish tissue are also associated with rivers influenced by wetlands and acidification—both of which could compound impacts from Pebble Mine and associated infrastructure development (Ward et al 2010). Chronic methylmercury exposure has impacts at very low levels . . . , including: neurotoxicity causing brain lesions and organ damage that impairs abilities to locate and capture prey and avoid predation; inhibition of reproductive success and growth; damage to intestines, digestion, cellular metabolism, organs; and alteration of stress hormones. Indirect effects of methylmercury exposure which alter behavior and ultimately survival include decreased competitive feeding abilities, swimming performance, and predator avoidance.[1025]

O'Neal concludes that "[b]ecause of the lack of consideration for potential aquatic and human impacts of increased mercury concentrations associated with mining activities and bioaccumulation up the food web, the DEIS vastly underestimates potential impacts of the proposed alternatives."[1026]

The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts of mine-related operations and transportation corridor regarding the increase in metals in surface and groundwater and how the changes to water quality would impact the aquatic ecosystem, including salmonids.[1027]

[1021] *Id.*
[1022] *Id.*
[1023] *Id.*
[1024] *Id.*
[1025] *Id.* at 11–12.
[1026] *Id.* at 12.
[1027] *Id.* at 11, Welker Scoping Comments, 2018 at 5.

8. The DEIS fails to take a hard look at impacts on salmonids from loss of groundwater upwelling.

The balance of surface water and groundwater inputs to downstream reaches will shift due to the mine operations, which will potentially reduce winter fish habitat and make streams less suitable for spawning and rearing.[1028] Groundwater upwelling areas occur in the North Fork Koktuli, South Fork Koktuli, and Upper Talarik Creek and provide key salmon spawning habitat.[1029] Salmon preferentially spawn in upwelling groundwater, and groundwater also provides overwintering juvenile fish refuge from ice and predators.[1030] Groundwater upwelling protects fish embryos from freezing during winter incubation, after hatching, ice-free groundwater allows salmon to move both down and laterally into the hyporheic zone to absorb yolk sacs.[1031] Upwelling also reduces fine sediment, which enhances the porosity and oxygen content of the redds.[1032] Hyporheic sampling in downstream locations of the mine site should be added to the monitoring program to better understand this important aquatic biological environment.[1033] The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts that loss of upwelling can have on salmon. The DEIS also fails to provide any analysis of how this impact will be mitigated.

9. PLP's use of the Physical Habitat Simulation model is flawed.

PLP utilizes the PHABSIM model to evaluate fish habitat in the project area.[1034] PLP's use of PHABSIM to predict impacts to fish habitat based on flow hydraulics is flawed.[1035] In a report prepared by Dr. Gordon Reeves, doctoral candidate Sarah O'Neal and Molly Welker, the authors reviewed the PHABSIM model and its application for the Pebble project.[1036] The executive summary identifies the challenge with PHABSIM because it

> describe[s rivers] as single-thread systems despite the frequent occurrence of wetland complexes, floodplains, beaver ponds, areas of surface and groundwater exchange, and off-channel habitats throughout the Pebble project area. This complexity—which is essential to the overall sustainability fisheries—is not captured in instream habitat classification.[1037]

PHABSIM is now largely regarded as poor science for two primary reasons: (1) PHABSIM relies on one-dimensional hydraulic models that are incapable of representing real stream hydraulics,[1038]

1028 Welker Scoping Comments, 2018 at 12.
1029 *Id.*
1030 *Id.* at 13.
1031 *Id.*
1032 *Id.* at 12.
1033 *Id.* at 13.
1034 *See* Reeves, Gordon, S. O'Neal and M. Welker, June 24, 2019, *Limitations of the PHABSIM Model to Evaluate Impacts to Fish Habitat near the Pebble Mine* (Reeves, 2019a) (report and references included as attachments with these comments).
1035 *See* Mouw Scoping Comments, 2018 at 2.
1036 Reeves, 2019a; *see also* O'Neal, 2019 at 8–9.
1037 Reeves, 2019a at 1.
1038 Mouw Scoping Comments, 2018 at 31; Reeves, 2019a at 9.

and (2) there is no valid linkage between hydraulics and habitat.[1039] It has been widely recognized that hydraulic associations change in space, time, and with flow. This means that hydraulic associations of surface water are oftentimes meaningless. This is especially the case for salmonids.

The second major problem with PHABSIM is that it is applied without consideration of its appropriateness. U.S. Geological Survey, who now curates the antiquated PHABSIM, cautions that PHABSIM is only appropriately applied when hydraulics are the basis of habitat selection. Because of the number of limitations with PHABSIM, the National Research Council concluded that

> [t]o the degree that any analysis…relies on PHABSIM, it will need to convince others in the discipline that (1) all appropriate assumptions have been fully addressed; (2) the limitations of the model as documented in the scientific literature have been addressed; (3) both hydraulic and biological sub-models have been appropriately calibrated and tested against independent field data; and (4) the analysis recognizes that the hydraulic aspects of the habitat are but one element of a necessarily more comprehensive instream flow study.[1040]

PLP and the Corps have failed to heed this caution. When other components of habitat, such as water quality, are more important than surface-water flow hydraulics, PHABSIM is an invalid tool. Advancements in aquatic ecology over the past 30 years have demonstrated this to be more of a rule than an exception. It has become widely recognized that other physical aspects of habitat, such as localized flow advection (circulation of stream water within the stream bed), groundwater upwelling, and resultant gradients in water quality (e.g., temperature and dissolved oxygen) are more important than flow depth and velocity.

In the context of the proposed Pebble Mine, the use of PHABSIM as a valid habitat-assessment tool is particularly egregious. Though the scientific community has put PHABSIM in the archives, PLP is utilizing it to assess potential habitat impacts of one of the world’s largest proposed gold mines — as though PHABSIM were still representative of the latest and best available science. More importantly, PHABSIM was utilized by PLP without first considering whether it could appropriately represent habitat in project streams. Habitat representation through PHABSIM is not likely because project-affected streams are heavily influenced by groundwater. Since groundwater is considered the most influential driver of habitat selection by spawning salmon, the use of PHABSIM is entirely inappropriate in this context. Using PHABSIM on the Pebble project is like trying to fit the proverbial round peg through a square hole.

A report by Dr. Reeves, et al. states:

> the PHABSIM model used in the DEIS suffers from a poor choice of assessment tools for the stated objectives, improper selection of intensive study areas, and numerous procedural and technical errors. Resulting model outputs suffer from

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[1039] Reeves, 2019a at 13.
[1040] *Id.* at 15, *quoting* National Research Council. 2008. Hydrology, Ecology and Fishes of the Klamath River Basin. The National Academies Press, Washington, DC. 272 pp.

> glaring inaccuracies and inappropriate assumptions. Some of these limitations include:
> 1) Investigation of the direct impact area at the mine site was largely not sampled. Primarily mainstem locations, in some cases over a mile away from the planned mine site, were assessed.
> 2) The resolution of physical habitat data collection is inadequate to capture future impacts and biologically meaningless. Insufficient transects were measured, sampling strategy was neither rigorous nor systematic and gross extrapolation has been implemented.
> 3) The biological model is based on very few observations, is lacking data, and relies on false assumptions about habitat ignoring fish movement and effects of temperature, groundwater, and myriad other habitat influences.
> 4) The modeling results lack validation and verification.[1041]

The report concludes that

> [i]n more complex systems, or where study objectives require habitat assessment in larger areas, the amount of necessary effort makes the application of such models impractical. The PHABSIM is an outdated and overly simplistic habitat and hydraulic model. Given the potential significant habitat impacts from the Pebble mine the [Corps] should include a more robust ecosystem and habitat impact evaluation in a revised DEIS using the most robust tools available (i.e., holistic models, individual-based models, and/or multivariate improvements to PHABSIM).[1042]

The report goes on to highlight the challenges with extrapolating from a sample set to larger segments of rivers and streams, noting that "the physical habitat models are frequently discredited as poorly applicable to larger scale issues and therefore inadequate for system-scale, holistic management."[1043]

The report runs through a number of issues with PLP's use of, and the DEIS's reliance on, PHABSIM. For example, the report identifies the limitations and implications of transect selection:

> Hundreds of miles of river length was intended to be evaluated using a set of transects. A major issue with PLP's habitat modeling in PHABSIM is that there is frequently no real connection between hydraulic modeling and habitat utilization because modeling transects are usually selected based on hydraulic criteria for ease of modeling rather than biological reasons (EBD Chapter 15 p. 15.1-16).[1044]

This creates a disconnect between locations where habitat is modeled and the distribution of fish. The PHABSIM model ignores fish movement and instead substitutes an evaluation of habitat in

[1041] *Id.* at 2.
[1042] *Id.* at 9 (emphasis in original).
[1043] *Id.* at 10.
[1044] *Id.*

time and at a fixed location for an assessment that is biologically meaningful.[1045] By characterizing habitat in terms of stream hydraulics, one has to assume habitat is uniform throughout a stream reach, which is not the case.[1046]

Another limitation is that the environmental baseline documents and SEBD's hydromorphologic units (HMU) classification is not reliable because transects were defined before PLP conducted a mesohabitat-level survey.[1047] "Mesohabitats" are defined as "visually distinct habitat units on a reach-scale" and require foot surveys in sample areas to visually identify runs, riffles, pools and island complexes.[1048] Mesohabitats consist of more than a morphologic shape of the river as is classified in an HMU. The report concludes that "[c]onsidering that HMU classification is not reliable, the entire scheme of data collection is questionable."[1049] Moreover, PLP has not collected an adequate number of transects to represent the study area.[1050] The transect selected for PHABSIM also under-sampled habitat types.[1051] And some habitat types, like pools, were not even sampled in some reaches.[1052] Pools can provide the most productive off-channel habitat for coho.[1053] The report notes that "selectively removing data is erroneous and dangers as such areas may be the most vulnerable to mining impacts."[1054] Because these areas are either not mapped, poorly characterized, or misrepresented, it is impossible for the DEIS to take an actual hard look at the impacts of the mine on fish habitat.

The model also fails to capture valuable habitat if a location was not occupied at the time of sampling.[1055] This results in exclusion of highly suitable locations.[1056] Issues with the biologic models led the authors of the report to conclude that predictions of effects of changes in flow are uncertain and their accuracy, applicability, and ecological meaning is not known, reported, or based on best available science in the DEIS."[1057]

Because the DEIS does not describe habitat suitability criteria, the accuracy of the model cannot be tested or confirmed.[1058] "The DEIS additionally failed to consider the potential effect of other factors that will influence habitat suitability."[1059] PHABSIM bases fish habitat on flow velocity, depth and substrate.[1060] This leaves out key factors relevant for evaluating fish habitat

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[1045] *Id.*
[1046] *Id.*
[1047] *Id.*
[1048] *Id.* at 5.
[1049] *Id.* at 10.
[1050] *Id.*
[1051] *Id.* at 11.
[1052] *Id.*
[1053] *Id.*
[1054] *Id.*
[1055] *Id.*
[1056] *Id.*
[1057] *Id.*
[1058] *Id.* at 12.
[1059] *Id.*
[1060] *Id.*

and distribution including temperature, groundwater influence, food availability, competition, predator avoidance, time of day, and season.[1061]

The model also fails to recognize the value of off-channel habitat. Aerial surveys indicate the presence of side channels and backwaters throughout the study region.[1062] But off-channel habitat was analyzed separately from main channel habitat, ignoring the interconnectivity of these waters.[1063] The report identifies the significant limitations of studying off-channel habitat through aerial photographs.[1064] The resolution is "inadequate for establishment of baseline conditions and thus the ability to assess future impacts."[1065]

The report concludes that

> [t]he DEIS prediction of impacts to fish habitat singularly rely on the overly reductionistic PHABSIM model that forced unsubstantiated assumptions about the role of surface-water flow hydraulics in structuring spawning and rearing habitat. . . . Based on the unsubstantiated assumptions required for use of the PHABSIM model to quantify habitat, the project cannot yet be assessed for impacts.[1066]

The DEIS inappropriately relies upon PHABSIM in such a manner that it fails to identify, recognize, or assess the variety of important factors that support salmon in the project area. The report notes that the DEIS "seems to place weight upon the instream flow model that it was not designed to support."[1067] The report identifies the overlooked factors, like water temperature, which "is an important driver in spawning habitat selection;" and groundwater upwelling and vertical hydraulic gradient, which create important habitat for salmon spawning and incubation of eggs.[1068] The report concludes that "[t]hese are well known patterns that tend to be very important in driving habitat selection and life history diversification . . . . As designed, PHABSIM models were not developed to consider and account for these important influences."[1069]

The failing analysis is even further eroded by the fact that the data acquired for the PHABSIM modeling is not representative of the area that will be impacted. The report states that

> [t]he most problematic issue with the Pebble PHABSIM study design is the fact that all data was collected in mainstem locations miles away from potential mining activity, thereby rendering data worthless for future environmental impact assessment. . . . These headwaters would be directly impacted by mining activities, which would propagate impacts downstream. Only small portions of

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[1061] *Id.* at 13.
[1062] *Id.* at 13.
[1063] *Id.*
[1064] *Id.*
[1065] *Id.*
[1066] *Id.* at 14.
[1067] *Id.*
[1068] *Id.*
[1069] *Id.*

this network were qualitatively investigated in the DEIS.[1070]

The report goes on to state that "[t]he [environmental baseline documents] and PHABSIM model results are rife with methodological and technical errors. The data collection strategy, analytical procedures, as well as interpretation are inadequate for an environmental impact assessment."[1071]

The use of PHABSIM cannot be modified to be made acceptable. Every time the assumptions behind PHABSIM have been carefully examined, they have been proven invalid. Maps overlaying the distribution of spawning and upwelling demonstrate that the DEIS's reliance on PHABSIM results in a failure to adequately identify important habitat and assess how the project will impact that critical habitat.

To effectively assess impacts to fish habitat, PLP must start over. Without more modern, ecologically robust methods of characterizing habitat selection, the DEIS cannot take a hard look at the impacts of this project on fish habitat.[1072] The use of these methods requires starting from ground zero, in consultation with agencies and the wealth of current literature and best available science. The Corps must require PLP to update its application with best available science that replaces the outdated PHABSIM model. Any reliance on PHABSIM to assess impacts must be rejected. The DEIS analysis is limited, erroneous, misleading, and fails to contain the requisite hard look regarding impacts to fish habitat, in large part to PLP's use of an outdated and inappropriate modeling tool. The Corps has erred by not requiring modeling that actually represents the habitat that will be impacted.

10. The DEIS fails to take a hard look at impacts to fish from increased water temperatures.

The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts to fish populations from potential changes to water temperature. The Pebble Mine will impact the temperature in streams below the mine site in ways that could negatively affect salmon and other aquatic organisms. Among other things, the proposed water treatment system will need to raise water temperature to facilitate selenium removal.[1073] The result will be that "[e]ffluent discharged from the water treatment plants will be warmer than the receiving environment and may adversely impact aquatic organisms in the receiving streams."[1074] Fish migration is highly sensitive to water temperature, as is spawning and incubation, and rearing.[1075] Site-specific thermal patterns are also known to drive population diversification and genetic diversity.[1076] As a result, populations are highly adapted to the patterns with which they evolved.[1077]

[1070] *Id.* at 15.
[1071] *Id.*
[1072] *Id.* at 15.
[1073] DEIS 4.18–4.
[1074] Zamzow, 2019a at 13.
[1075] *See* Mouw Scoping Comments, 2018 at 6–7.
[1076] *Id.*
[1077] *Id.*

These comments address water quality impacts in Section VI.B.4, including a detailed discussion of the DEIS' inadequate assessment of the impacts from heated water discharges associated with the selenium treatment system. As that section describes, the DEIS's inadequate assessment of the impacts of increased temperatures from treated water discharges suffers from poor quality data, inconsistent data, and a failure to support or explain several critical assumptions. The DEIS' discussion of the potential impacts from the heated water is inadequate. The DEIS contains "no analysis to confirm that water temperatures would not be altered beyond the distances reported in the DEIS."[1078] In fact, "[g]iven the magnitude of change in water temperatures, particularly during the winter, it is implausible that these findings are correct and the areas of stream affected by the discharge are likely much wider than reported in the DEIS."[1079]

The assessment in the DEIS of the effects of heated water on salmon is particularly deficient. The DEIS fails to acknowledge that

> populations of Pacific salmon are highly adapted to local conditions (Beer and Anderson 2001), and the EPA noted that the diverse environmental conditions in the Bristol Bay area have led to large variation among populations of Pacific Salmon species and local adaptation (EPA 2014 p. 7-34 to 7-35). Applying generic standards to assess impacts to local populations leads to invalid conclusions about potential effects.[1080]

A full review of the available literature would have revealed that the salmon species present in the streams that will receive the heated water discharges from the Pebble mine are particularly sensitive to water temperature increases, and that increases to stream temperatures during the winter are likely to significantly negatively affect these species.[1081]

11. The DEIS fails to take a hard look at impacts from culverts and blockages to fish passage.

Roads constructed through streams significantly impede or may altogether block fish movements.[1082] If properly sized, installed, monitored, and maintained, culverts can potentially mitigate the impacts of roads on stream crossings. However, as O'Neal notes,

> [r]egardless of design, . . . roads and culverts have long established impacts to passage of salmon and other fishes due to downstream habitat impacts and upstream passage impacts including altered hydrology, erosion, sedimentation, and overall habitat simplification ultimately impacting fish migration (Price et al. 2010, Davis and Davis 2011, Lachance et al. 2011, MacPherson et al.

[1078] Reeves, 2019b at 3.
[1079] *Id.*
[1080] Zamzow, 2019a at 15-16; Reeves, 2019b at 3.
[1081] *See* Zamzow, 2019a at 16; Reeves, 2019b at 4.
[1082] *See* O'Neal, 2019 at 12; *see also* National Marine Fisheries Service, Alaska Region, Report, *Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska*, Nov. 2011, at 2–14 ("Roads can also degrade aquatic habitat through improperly placed culverts at road-stream crossings that reduce or eliminate fish passage").

2012).[1083]

Just one ineffective culvert can restrict access to key seasonal habitat and thus impact a whole fish population.[1084] Culvert failure is common, with significant percentages of culverts found to be inadequate for fish passage in Alaska.[1085] Culvert failure negatively impacts waterways and fish habitat. Moreover, the physical barrier imposed can significantly alter hydrology and intercepts natural water flow, which is a driver of connectivity for fish.[1086]

O'Neal identifies additional concerns, noting that

> culvert construction has rarely occurred in areas heavily influenced by ice processes which are a dominating channel formation factor in Bristol Bay. Ice will at least increase culvert and bridge maintenance requirements, but may also cause full blockage, particularly at spring breakup during which time smolt outmigration is likely to occur. Because they limit channel migration and alter local stream hydrology, culverts have known, long-term negative consequences for fishes and habitat for many kilometers upstream and downstream. Even culverts that do not block fish passage inhibit channel migration and thus habitat complexity, cause sedimentation and erosion, and frequently block transport of woody debris, marine-derived nutrients, and ice regardless of culvert design (Furniss et al. 1991, Roni et al. 2002).[1087]

The American Fisheries Society also expressed concerns noting that

> [r]ecent assessments of the potential impacts of the proposed 138 km of access roads with 64 associated stream crossings concludes that salmon spawning migrations will be impeded at 36 of these crossings (Kravitz and Blair 2019). Juvenile salmonid movement will also likely be reduced by culverts (Davis and Davis 2011). Stream crossings and modifications lead to reduced water quality and velocity, spread of fungal diseases, degraded riparian species, altered stream substrates, increased erosion and sedimentation resulting in buried spawning and rearing gravels, channel fragmentation, lost spawning habitat, and decreased egg survival (Trombulak and Frissell 2000; WDFW 2003; Gibson et al. 2005; Kemp and Williams 2008). The DEIS conclusions that salmon passage would be only

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1083 O'Neal, 2019 at 12.
1084 Benjamin Sullender, Ecological Impacts of Road- and Aircraft-Based Access to Oil Infrastructure 25, http://ak.audubon.org/sites/g/files/amh551/f/road_aircraft_access_report_final_0.pdf (internal citations omitted) (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* Pete Cott, et al., *Implications of Linear Developments on Northern Fishes*, Environmental Reviews 23:177-190 (2015) (previously provided as an attachment with Trustees for Alaska's scoping comments).
1085 *See* Zamzow Scoping Comments, 2018 at 7 (internal citations omitted).
1086 *See* Benjamin Sullender, Ecological Impacts of Road- and Aircraft-Based Access to Oil Infrastructure 25 (internal citations omitted).
1087 O'Neal, 2019 at 12–13; *see also* Mouw Road Corridor Scoping Comments, 2018 at 2.

temporarily affected are not supported by recent research (Kravitz and Blair 2019). Instead, projections indicate that almost 90% of culvert-impeded streams contain restricted upstream habitat, 30% of which will be blocked entirely or partly even after project closure ultimately resulting in reduced or extirpated salmon populations (Kravitz and Blair 2019).[1088]

The Alternative 1 transportation corridor includes 86 culverts; only 41 will have fish passage.[1089] This raises significant concerns regarding impacts to fish passage. While there are a limited number of identified culverts in the Bristol Bay watershed (25 identified by ADF&G), ADF&G has identified a more than 50% failure rate for fish passage for the existing culverts. ADF&G has determined that 14 may or are likely to impact fish passage, 5 have no impact on fish passage, and 6 were culverts replaced within the past 4–5 years and thus do not have complete survey data available.[1090] The DEIS fails to provide any substantive analysis of whether certain crossings should require bridges rather than roads. As the National Marine Fisheries Service (NMFS) notes in its report, *Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska*, recommended conservation measures to avoid and minimize impacts include "build[ing] bridges rather than culverts for stream crossings when possible."[1091] The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts of culvert failure and associated impacts on fish passage.

In addition to concerns over culvert failure, the DEIS must also assess culvert placement over time. The DEIS fails here as well, providing no analysis of placement. The current proposed project has a 20-year life, although with expansion is likely to be much longer. As with any stream crossing, this presents a challenge because streams move over time, depending upon their flow and sediment regimes and the compositions of their beds, floodplains, and banks.[1092] Those that are more alluvial in nature actively aggrade and denude their courses, meander about their floodplains, and erode their banks.[1093] Even when culverts appear adequately sized, alluvial streams can be laterally dynamic enough to cause significant erosion, making the culvert position obsolete and improperly placed to accommodate the patterns in flow resulting from natural changes that have occurred upstream.[1094]

PLP provides no information on how culverts will be added or upgraded during different phases of construction. As O'Neal notes, "large scale flood events associated with spring

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[1088] American Fisheries Society, June 13, 2019, *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers* (AFS, 2019) at 4.
[1089] DEIS at ES–9.
[1090] *See* Fish Passage Project SWA12, Alaska Dep't of Fish & Game http://www.adfg.alaska.gov/sf/reports/FishPassage/rptProjectDetails.cfm?projectID=40 (previously provided as an attachment with Trustees for Alaska's scoping comments)
[1091] National Marine Fisheries Service, Alaska Region, Report, *Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska*, Nov. 2011, at 2–14 to 2–15 ("Roads can also degrade aquatic habitat through improperly placed culverts at road-stream crossings that reduce or eliminate fish passage").
[1092] *See* Mouw Road Corridor Scoping Comments, 2018 at 2–3.
[1093] *Id.*
[1094] *Id.* at 1–2.

breakup (which frequently coincides smoltification) and/or heavy rains are likely to cause multiple failures which may delay repairs significantly."[1095] The extent of impacts from failures will also depend on the frequency of inspections. The DEIS fails to take this into account or address how culverts would be inspected in the post-closure period.[1096] In addition, there are impacts associated with maintenance. Removing and replacing culverts would have serious adverse effects on these waterbodies. The impacts of any changes to these or other structures during the various phases of the project are also not assessed in the DEIS.

O'Neal concludes that "[i]n general, the magnitude, extent, and duration of culvert impacts are grossly underestimated and should be improved in a revised draft EIS prior to finalization or permitting."[1097]

12. The DEIS fails to take a hard look at impacts to Pacific herring.

Pacific Herring spawning concentration areas for herring occur in Kamishak Bay and Iniskin Bay.[1098] Spawning occurs from late April through mid-June on rocky headlands or in shallow lagoons and bays.[1099] Herring may return to different spawning locations each year. Eggs are deposited sub-tidally or intertidally on aquatic vegetation with kelp or eelgrass as the preferred spawning substrates.[1100] ADF&G identifies "loss of spawning grounds" as a threat to Pacific herring.[1101] Major impacts to eelgrass can include destruction of eelgrass beds either directly or indirectly by reducing light penetration from dredging activities.[1102] Upland erosion and construction activities can increase sedimentation, which can smother eelgrass.

The DEIS states that the port in Iniskin bay "could affect the recovery of the Pacific herring fishery."[1103] As the DEIS notes, Pacific herring spawn in Iniskin Bay.[1104] The DEIS concludes that "[t]he Pacific herring fishery in Kamishak Bay could experience direct or cumulative effects, but the magnitude of effects is unknown."[1105] Aside from a discussion about how Amakdedori Port will not have substantive effects because known eelgrass habitat is 5 miles south, this is the extent of the analysis of potential impacts to Pacific herring. The Corps, in

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[1095] O'Neal, 2019 at 13.
[1096] *Id.*
[1097] *Id.*
[1098] Cook Inlet Subarea Contingency Plan, Sensitive Areas, https://dec.alaska.gov/Spar/ppr/plans/scp_ci/CISCP_D-Sensitive_Areas_Jan2017.pdf at D–38 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1099] *Id.*
[1100] *Id.*
[1101] Pacific Herring: Species Profile, Status, Trends, and Threats, Alaska Dep't of Fish & Game, http://www.adfg.alaska.gov/index.cfm?adfg=herring.main (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1102] *See All About Eelgrass*, Richardson Bay Audubon Center & Sanctuary, Nat'l Audubon http://richardsonbay.audubon.org/all-about-eelgrass (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1103] DEIS at ES–55.
[1104] DEIS at 4.28–38.
[1105] *Id.* at 4.6–13.

essence, states that they have no idea what the cumulative impacts are to Pacific herring. This is inadequate. First, stating that the Diamond Port (Alternatives 2 and 3) would result in unknown impacts is inadequate. Such an analysis fails to meet the hard look requirement. Second, the DEIS fails to acknowledge the cumulative impacts to Pacific herring associated with Alternative 1 due to the expansion and requisite development of the Diamond Port. The cumulative impacts analysis must provide a quantified and detailed analysis of impacts. The DEIS fails to meet this requirement.

13. The DEIS fails to adequately assess impacts to Essential Fish Habitat.

The 1996 amendments to the Magnuson Fishery Conservation and Management Act include provisions that govern the conservation of essential fish habitat (EFH). [1106] The Regional Fishery Management Councils established under 16 U.S.C. § 1852 must identify and describe EFH in their Fishery Management Plans.[1107] EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity."[1108] The National Marine Fisheries Service (NMFS) is required to make information regarding EFH available in the form of maps, written descriptions, or both.[1109] Any federal agency whose actions, including permitting decisions, may adversely affect EFH must consult with NFMS before acting.[1110]

Because the Pebble project may adversely affect EFH, the Corps must consult with NMFS.[1111] The EFH assessment must use the best scientific information available, and it must contain a description of the proposed action, an analysis of the potential adverse effects, the agency's conclusion regarding the effects on EFH, and any proposed mitigation.[1112] NMFS will issue Conservation Recommendations based on the assessment prepared by the action agency.[1113] The EFH consultation and resulting Conservation Recommendations should be combined with the NEPA review and included in the DEIS.[1114]

NMFS has designated the region's fresh and marine waters as EFH for anadromous salmon, groundfish, and other invertebrate species. EFH for salmon consists of the aquatic habitat necessary to support a long-term sustainable salmon fishery and salmon contributions to healthy ecosystems. Natural wild salmon populations are currently stable and abundant, and their habitat at the ecosystem scale, from headwater streams through marine processes, is functionally intact.[1115]

1106 16 U.S.C. § 1855(b); *see also* 50 C.F.R. § 600.805–815 and 50 C.F.R. § 600.905–930
1107 *Id.* at § 600.815(a)(1).
1108 16 U.S.C. § 1802(10).
1109 50 C.F.R. § 600.915.
1110 *Id.* at § 600.920.
1111 *Id.* at § 600.920(a)(1).
1112 *Id.* at § 600.920(d), (e)(3).
1113 16 U.S.C. § 1855(b)(4)(a).
1114 *See* 50 C.F.R. § 600.920(f) and Essential Fish Habitat, NOAA Fisheries (May 25, 2017), at 28 https://alaskafisheries.noaa.gov/sites/default/files/efh-overview.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
1115 *See* National Marine Fisheries Service, December 2013, Biological Characterization: An

NMFS's 2013 analysis of EFH in Nushagak and Kvichak Bays noted

> Bristol Bay provides EFH for salmon at various life stages as well as other marine species. The Nushagak and Kvichak estuaries provide nutrient-rich transition zones where salmon smolt can achieve critical size while acclimating to the marine environment. At an ecosystem level, from the head water tributaries through the marine environment, the healthy habitat of the bay both supports and results from the interactions between natural processes and the presence and abundance of Bristol Bay salmon.[1116]

However, the EFH assessment drafted by PLP's consultant takes a piecemeal view of the project impacts. For example, the EFH assessment notes on several occasions that use in the headwaters is low and that the impacts to salmonid habitat will be localized and minimal.[1117] The DEIS provides no analysis of its own regarding impacts to EFH.[1118] The Corps, not PLP or its consultants, bears the responsibility of preparing a NEPA analysis and taking a hard look at all impacts. That hard look extends to impacts to EFH. It is wholly improper for the Corps to defer its analysis of impacts to EFH to an applicant's consultant.[1119] Furthermore, even if the Corps could rely on the applicant's analysis, for the same reasons the analysis of impacts to fish and fish habitat is inadequate, so too is the PLP-prepared assessment regarding EFH. As a result, the DEIS assessment of EFH is flawed and inadequate.

E. Birds

Fueled by richly productive waters, the Bristol Bay Watershed draws tens of millions of birds of over 100 species from around the world, to rest, forage, and breed in these productive marine waters, making Bristol Bay one of the most productive areas in the world for marine birds.[1120] The Bristol Bay watershed and coastal area is recognized as an area of continental

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Overview of Bristol, Nushagak, and Kvichak Bays; Essential Fish Habitat, Processes, and Species Assemblages, (NMFS, 2013), https://alaskafisheries.noaa.gov/sites/default/files/bbmarinecharacter1217.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1116] *Id.* at 17.

[1117] *See e.g.*, DEIS Appendix I at 66, 68, 70, 78, 82–83, 90.

[1118] *See* DEIS at 4.24–26 ("EFH Assessment is included as Appendix I") and 6–2 (relying on the PLP prepared report in Appendix I).

[1119] *See e.g. Utahns for Better Transp.*, 305 F.3d at 1165 ("Both NEPA and the COE regulations for implementing NEPA require that the agency verify the accuracy of information supplied by an applicant, 40 C.F.R. § 1506.5(a); 33 C.F.R. Part 325, App. B § 8(f)(2). . . ").

[1120] *See* Nils Warnock, Exec. Dir., Audubon Alaska, Letter, Audubon Alaska to Scott Pruitt, Administrator, EPA, Re: Formal Comments for Proposal to Withdraw Proposed Determination to Restrict the Use of An Area as a Disposal Site; Pebble Deposit Area, Southwest, Oct. 17, 2017, at 2 (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* Warnock & Smith, *The Importance of Bristol Bay to Marine Birds of the World*, *in Bristol Bay Alaska Natural Resources of the Aquatic and Terrestrial Ecosystems* 263 (previously provided as an attachment with Trustees for Alaska's scoping comments). Trustees' comments on the DEIS also incorporate the comments submitted by Audubon Alaska on the DEIS. *See* Natalie Dawson, significance to North American ducks, geese and swans.[1121] Nushagak and Kvichak Bays are Western Hemispheric Shorebird Reserve Network sites of regional importance (with at least 20,000 shorebirds annually or at least 1% of the biogeographic population for a species).[1122] The Bays are also identified as globally Important Bird Areas.[1123] Key coastal and marine bird species dependent on the Bristol Bay region include Steller's Eider (threatened under the Endangered Species Act), King Eider (Audubon Watchlist), Black Scoter (International Union for Conservation of Nature Red List, Audubon Watchlist), Brant (Audubon Watchlist), Emperor Goose (International Union for Conservation of Nature Red List, Audubon Watchlist), Black-legged Kittiwake, Bar-tailed Godwits (Audubon Watchlist), and numerous other seabirds.[1124] In addition to these, the Bristol Bay region also includes the Kittlitz's Murrelet (International Union for Conservation of Nature Red List).[1125] The Kittlitz's Murrelet has undergone steep population declines in several of its core population areas.[1126] Kamishak Bay is an Important Bird Area of global significance for Glaucous-winged Gull, Rock Sandpiper, Black Scoter, and Steller's Eider,[1127] and is an Important Bird Area of statewide significance for Long-tailed Duck, Surf Scoter, and White-winged Scoter.[1128]

Exec. Dir., Audubon Alaska, Letter, Audubon Alaska to U.S. Army Corps of Engineers, July 1, 2019.

1121 *See* Warnock & Smith, The Importance of Bristol Bay to Marine Birds of the World, in Bristol Bay Alaska Natural Resources of the Aquatic and Terrestrial Ecosystems 263.

1122 Nils Warnock, Exec. Dir. Audubon Alaska, Letter, Audubon Alaska to Lisa Jackson, Administrator, EPA, July 23, 2012, at 4 (previously provided as an attachment with Trustees for Alaska's scoping comments).

1123 *Id.*

1124 *See* Nils Warnock, Exec. Dir., Audubon Alaska, Letter, Audubon Alaska to Scott Pruitt, Administrator, EPA, Re: Formal Comments for Proposal to Withdraw Proposed Determination to Restrict the Use of An Area as a Disposal Site; Pebble Deposit Area, Southwest, Oct. 17, 2017, at 5–10. The DEIS relies on outdated information on birds of special concern, including environmental baseline data that does not reflect most recent Watchlist information. *See* Natalie Dawson, Exec. Dir., Audubon Alaska, Letter, Audubon Alaska to U.S. Army Corps of Engineers, July 1, 2019 at 4–5.

1125 *See* Kuletz et al., Distribution, Population Status and Trends of Kittlitz's Murrelet Brachymphus Brevirostris in Lower Cook Inlet and Kachemak Bay, Alaska (May 26, 2011) http://www.marineornithology.org/PDF/39_1/39_1_85-95.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments); Distribution of the Kittlitz's Murrelet (map), Center for Biological Diversity, http://www.biologicaldiversity.org/publications/maps/highlighted_maps/Kitlitzs_murrelet_distribution.html (previously provided as an attachment with Trustees for Alaska's scoping comments).

1126 Lynn Denlinger, Alaska Seabird Information Series: Kittlitz's Murrelet, USFWS Migratory Bird Management Nongame Program, Nov. 2006, https://www.fws.gov/alaska/mbsp/mbm/seabirds/pdf/asis_complete.pdf 67 (previously provided as an attachment with Trustees for Alaska's scoping comments).

1127 *See infra* Section VI.X, Impacts to Other Threatened or Endangered Species.

1128 Audubon Alaska, 2014. Important Bird Areas of Alaska, v3., http://databasin.org/datasets/f9e442345fb54ae28cf72f249d2c23a9.

The DEIS fails to take a hard look at the direct, indirect and cumulative impact to all bird species that are found in the Bristol Bay region, with close attention to those species that are imperiled. The DEIS takes a broad brush approach to wildlife impacts asserting that "[i]mpacts to all wildlife species from each variant are discussed collectively, and not subdivided based on species grouping (birds, terrestrial wildlife, and marine mammals), because many of the impacts from the variants would be similar across species groups."[1129] This is a gross over characterization of the ways in which wildlife can be impacted by the project. The DEIS also errs by relying on a wildlife management plan that was not drafted at the time the DEIS was released.[1130]

In its analysis of impacts to birds, the DEIS states:

> The project has the potential to directly and indirectly impact breeding, wintering, migrating, and staging bird populations through behavioral disturbance, injury and mortality, and habitat changes as detailed in the following sections. The magnitude, extent, duration, and likelihood of impacts to raptors, waterbirds, landbirds, and shorebirds would be anticipated to differ among individual species; however, impacts are discussed collectively herein for the majority of avian groups.[1131]

The DEIS's analysis lacks any substance. For example, regarding noise impacts, the DEIS states that blasting activities "would occur in varying levels throughout the life of the project. In terms of magnitude and extent, noise levels would be increased above present levels . . . during all phases of the project."[1132] The general comments that do not disclose anything of substance continue with statements like "[b]irds may experience a wide range of impacts from noise sources. . . ."[1133] The DEISs analysis is so lacking on details that it references "a wide range of avian studies" but fails to include references.[1134] And it goes on to say that the noise may lead to displacement but qualifies that statement by stating "[t]he degree of disturbance would vary among individuals, species, and time of year."[1135] Using a "rough estimate" on behavioral disturbance distance, the DEIS states "that it is difficult to determine the potential responses of each avian species to the range of noise levels potentially produced."[1136] Stating that birds will be displaced does not constitute a hardlook.

In addition, the DEIS fails to take a hard look at: (1) cumulative impacts from the larger mine expansion's destruction of bird habitat; (2) the indirect impacts to piscivorous birds from loss of salmon streams; (3) acute and chronic impacts to birds from exposure to contaminants from a potential tailings spills and leaks; (4) acute and chronic impacts to birds from exposure to

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[1129] DEIS at 4.23–2.
[1130] *Id.* at 4.23–3. In addition, while RFI 122 was released on June 18, 2019, with less than two weeks remaining in the public comment period, the wildlife mitigation plan measures identified in the RFI response are woefully deficient and lacking requisite details.
[1131] *Id.* at 4.23–4.
[1132] *Id.*
[1133] *Id.*
[1134] *Id.*
[1135] *Id.*
[1136] *Id.* at 5.

contaminants in the pit lake and tailings ponds; (5) mitigative measures to avoid impacts; (6) spill impacts from toxic reagents; (7) impacts to Steller's Eiders in Bristol Bay; and (8) impacts to bird-related tourism in the region.[1137]

F. Brown Bears

The proposed Pebble Mine and associated infrastructure will adversely impact brown bears. The DEIS fails to consider the direct, indirect, and cumulative impacts of the project to brown bears on the upper Alaska Peninsula, particularly in the proximity of Lake Clark National Park and Preserve (Lake Clark), Katmai National Park and Preserve (Katmai), and the McNeil River State Game Sanctuary and Refuge (McNeil). The transportation corridor under the preferred alternative would come within a 250 feet of the McNeil boundary, and the port facility would be located within two miles of McNeil's boundary.[1138]

In 1967, the Alaska State Legislature designated the McNeil River area to "protect the world's largest concentration of wild brown bears."[1139] This area was enlarged in 1993. The long-term (1976–2017) average number of individual bears annually identified is 94.5 and the long-term average of bear use days (1980–2017) is 2,089.[1140] But the high bear densities are not limited to the McNeil area. The density of brown bears on the Alaska Peninsula are some of the highest in the world, approaching one bear per square mile.[1141]

The DEIS improperly constricts its analysis of impacts to brown bears to an arbitrarily small area and by failing to adequately analyzing impacts from the transportation corridor, port, and remote field camps.

1. The DEIS analysis area for brown bears is arbitrarily small.

The DEIS uses an arbitrary 3-mile radius for the EIS analysis area for brown bears.[1142] The survey area for brown bear den sites is even smaller: an aerial survey of a 0.6 mile buffer

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[1137] *See* Natalie Dawson, Exec. Dir., Audubon Alaska, Letter, Audubon Alaska to U.S. Army Corps of Engineers, July 1, 2019 at 4–15.
[1138] DEIS at 3.2–11 and 3.5–1.
[1139] *See* Alaska Dep't of Fish & Game, Website, McNeil River — State Game Sanctuary and Refuge Area Overview, http://www.adfg.alaska.gov/index.cfm?adfg=mcneilriver.main (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* DEIS at 3.5–1 and 3.5–10.
[1140] Griffin, Thomas M. & Edward W. Weiss, 2017, *McNeil River State Game Sanctuary Annual Management Report 2017*, Alaska Dep't of Fish & Game, (Griffin 2017) http://www.adfg.alaska.gov/static/home/library/pdfs/wildlife/mgt_rpts/mcneil_river_state_game_sanctuary_annual_mgt_rpt_2017.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1141] *See* Alaska Dep't of Fish & Game, Website, Brown Bear (Ursus arctos) http://www.adfg.alaska.gov/index.cfm?adfg=brownbear.printerfriendly (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1142] DEIS at Table 4.23–1; DEIS at 3.23–1 ("It is understood that many wildlife species have a much larger range than the EIS analysis area; however, this section focuses on species that are present in the area during project construction, operations, and closure."). This description of the

along the transportation corridor.[1143] Due to the large home ranges of brown bears, the 3-mile study area is entirely inappropriate. As Suring notes in his report, *The Pebble Project and McNeil River Brown Bears*, "any potential negative effects to brown bears that may occur in the vicinity of project activities will have consequences for the brown bear population across a large area."[1144]

Brown bears have large area requirements and home ranges in Alaska that vary from 10 to 50 square miles on the northern islands of southeast Alaska to over 1,000 square miles on Alaska's North Slope. Males have much larger ranges than females.[1145] On the Alaska Peninsula, seasonal ranges average over 100 square miles for females and up to 286 square miles for subadult females.[1146] The proposed project will result in the loss of habitat, displacement, mortality, and reduced reproductive success of bears that frequent McNeil, Katmai, Lake Clark and other nearby habitat. Yet the DEIS artificial restricts the analysis area for bears so that it never takes a hard look at the impacts from this project on the high density of brown bears.

ADF&G has repeatedly commented that the DEIS needs to include data and information on movement patterns and habitat use areas within the project area.[1147] Information regarding bear numbers utilizing the area, movement patterns, and habitat use areas around the proposed port site and transportation corridor cannot be ascertained from the survey data presented in the DEIS.[1148]

EIS analysis area makes no sense at all unless one reads the word "individual" in place of the word "species" in the second clause. Apparently, the DEIS drafters intentionally excluded consideration of any impacts to the species outside the narrowly defined three mile corridor regardless of whether those impacts are direct, indirect, or cumulative impacts from the proposed project. To adequately analyze impacts, the DEIS must consider impacts to the species in their entire range.

1143 DEIS at 3.22–34 and Figure 3.23–12.

1144 *See* Suring, 2019 at 6.

1145 *See* Nature, Brown Bear Fact Sheet, Public Broadcasting Service: Nature (July 9, 2012), http://www.pbs.org/wnet/nature/bears-of-the-last-frontier-brown-bear-fact-sheet/6522/ ("Males have areas of about 200-500 square miles (500-1300 square kilometers), though some have ranges of up to 1615 square miles (4180 square kilometers) in size. Females generally have smaller home ranges, averaging 50-300 square miles (130-780 square kilometers) in size.") (previously provided as an attachment with Trustees for Alaska's scoping comments).

1146 *See* Glenn, Leland P. & Leo H. Miller, *Seasonal Movements of an Alaska Peninsula Brown Bear Population*, Bears: Their Biology and Movement, Volume 4, A Selection of Papers from the Fourth International Conference on Bear Research and Management, Kalispell, Montana, USA, February 1977, pp. 307-312. https://www.bearbiology.com/wp-content/uploads/2017/10/Glenn_Miller_Vol_4.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* Suring, 2019 at 6.

1147 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.23 – Wildlife Values, at ADF&G Comment #18 at 9, Comment #21 at 10, Comment #25 at 13.

1148 ADF&G has also expressed concerned that the solid fill causeway at the port side for Alternative 1 would interrupt longshore movement of sediments and fish and wildlife habitats along Amakdedori Beach. U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.23 – Wildlife Values, at ADF&G Unnumbered Comment at 14-15.

Without more information, and information outside the 3-mile area considered for brown bears, the Corps cannot evaluate reasonably foreseeable significant adverse effects.[1149]

The overly restrictive Analysis Area has resulted in a severe under representation of the significance of the brown bear resources in the transportation corridor and at the port sites and at McNeil river State Game Refuge and Sanctuary.[1150] Additional information, and a larger analysis area, is critical to being able to avoid, minimize, or mitigate impacts to brown bears. Because the brown bears den, feed, mate, and travel in and around the project area and on to important congregation sites at McNeil, Katmai and Lake Clark, the impacts to bears in the project area will result in reasonably foreseeable, direct, indirect, and cumulative impacts to other areas. ADF&G has noted the need for this information to understand and minimize impacts to the bears at McNeil.[1151] PLP has wrongly concluded that this additional information is not necessary to disclose the reasonably foreseeable significant impacts of the project, and that the requested information is not essential to choosing between alternatives.[1152] PLP dismisses impacts to McNeil as "outside the EIS analysis area."[1153]

Even though the DEIS expressly excludes consideration of impacts at McNeil, the overly restrictive Analysis Area for the transportation corridor includes portions of McNeil.[1154] So even though part of McNeil is physically within the Analysis Area, impacts to the bears that use McNeil are not considered. The National Park Service has expressed concerns that the DEIS fails to consider impacts to bear viewing and other recreation uses in Lake Clark and Katmai.[1155]

Even if the Analysis Area for wildlife was sufficient, the impacts to brown bears must also be considered under any analysis of socioeconomics and recreation. Brown bear viewing and hunting are a vital part of the economy in Southcentral Alaska, for both commercial operators and individual recreationists. Impacts from the project, especially the transportation corridors and port sites, will impact bears. The DEIS fails to include any data or analysis of potential impacts to the

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1149 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.23 – Wildlife Values, at ADF&G Response to Comment #19 at 10-11 (McNeil and Katmai "are outside of the EIS analysis area. This information is not necessary to disclose the reasonably foreseeable significant impacts of the proposed project. . . It has not been included in the Draft EIS.").
1150 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.23 – Wildlife Values, at ADF&G Comment #21 at 10, Comment #25 at 13.
1151 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.23 – Wildlife Values, at ADF&G Comment #18 at 9.
1152 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.23 – Wildlife Values, at Responses to ADF&G Comment #18 at 9, Comment #21 at 10, Comment #25 at 13.
1153 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.23 – Wildlife Values, at Response to ADF&G Comment #25 at 13.
1154 DEIS at 3.23-33, Figure 3.23-12.
1155 Debra Cooper, Letter, NPS to Corps, August 17, 2018.

high concentration of bears in the project area that support the region's bear viewing and bear hunting industries.[1156]

The Analysis Areas for socioeconomics and recreation are inexplicably much larger than the Analysis Area for wildlife. The Analysis Area for recreation is defined as "the area from Lake Clark National Park and Preserve south to Katmai National Park and Preserve and from the Nushagak River east to the western Kenai Peninsula."[1157] The Analysis Area for socioeconomics "includes the State of Alaska, regions, and communities where aspects of the monetized economy, including population, employment, income, housing, and education, would be impacted by the construction, operation, and closure of all components of each alternative of the proposed project." [1158] Given the importance of high concentrations of brown bears in this region, it is impossible to evaluate impacts to socioeconomics and recreation without taking a hard look at how bears in a much larger analysis area will be impacted.

2. The DEIS fails to take a hard look at the impacts of the road corridor and port on brown bears.

The proposed transportation corridor bisects McNeil and Katmai to the south and Lake Clark National Park and Preserve to the north. As a result, the road will cut across the home ranges and disturb seasonal movement of brown bears in this high-density population. The road under any of the three alternatives will have 2–4 years of construction, and then an estimated 78 truck trips per day. Under the foreseeable mine expansion, both the road to Amakdedori and the northern access road to Williamsport would be operational after the first 20 years. Nowhere does the DEIS take a hard look at the direct, indirect, and cumulative impacts that are likely to occur from this level of development. Instead, the DEIS concludes that, "[b]ecause the area has a high density of bears (per Section 3.23, Wildlife Values) some individuals would experience disturbance, but impacts would not be expected to result in population-level impacts.[1159] The DEIS has failed to meet the standard of analysis required for brown bears.[1160]

[1156] The DEIS acknowledges only that visitors to McNeil River State Game Sanctuary would be able to see the loading activities.
[1157] DEIS at 3.4–7 and Figure 3.5–1.
[1158] DEIS at 3.2–19.
[1159] DEIS at 4.23–18. The DEIS fails to meet the threshold required by NEPA. Whether the project will have a significant effect does not depend on the conclusion that there will be population-level effects. Moreover, the DEIS does not clarify what scale of brown bear population it is evaluating. Is it the entire population of brown bears, the state-wide population, populations in each GMU, or some other population?
[1160] *See*, *e.g.*, *W. Watersheds Project v. Bureau of Land Mgmt.*, 443 F. App'x 278, 279–280 (9th Cir. 2011) (finding statements like "some species could incur population-level effects," "further mortality" and "a somewhat larger percent increase in mortality" to be general and conclusory statements); *see also Neighbors of Cuddy Mountain*, 137 F.3d at 1380 ("General statements about 'possible' effects and 'some risk' do not constitute a 'hard look' absent a justification regarding why more definitive information could not be provided.").

Roads have many negative consequences for wildlife and these impacts have been documented in numerous scientific publications.[1161] Schweisberg notes that as long as roads remain accessible and passable enough to facilitate human use, roads also lead to increased hunting, fishing, poaching, fish and wildlife harassment, use conflicts, lost soil productivity, fires, landscape modifications, and decreased opportunities for solitude.[1162] The direct and indirect impacts of roads on other resources and their use must also be recognized.[1163]

Roads cause functional habitat loss, alter movement patterns and can become ecological traps for wildlife.[1164] Road construction can impact brown bears at individual and population levels through effects on habitat use, home range selection, movements, population fragmentation, survival, and reproductive success.[1165]

A 2014 study of brown bears in Alberta found that

> [o]ne of the principal factors that have reduced grizzly bear populations has been the creation of human access into grizzly bear habitat by roads built for resource extraction. . . . Roads have also affected movements and distribution of bears, changes in behavior relative to roads, and changes in body condition and survival rates relative to roads, and have caused fragmentation of populations.[1166]

The study notes "the [scientific] literature contains numerous publications looking at the negative consequences of roads for grizzly bear populations."[1167] In a 2018 study, Proctor et al.,

> found that road construction impacted brown bears at the individual and population levels through effects on brown bears' habitat use, home range selection, movements, population fragmentation, survival, and reproductive success that ultimately were reflected in population density, trend, and conservation status.[1168]

[1161] *See* Dawson, Natalie. 2018, *Potential Environmental Impacts to Brown Bears (Ursus arctos with development of Pebble Mine, Southwest Alaska*, Scoping Comments of National Parks Conservation Association (Dawson, 2018) at 4 citing Nielsen et al. 2004; Schwartz et al. 2005 ("One of the primary causes of brown bear declines are roads built for resource extraction by impeding the necessary, long range movement that bears require for survival and reproductive success.") https://pebbleprojecteis.com/files/5a7d1923-0e96-4f2d-bcc7-55671c70776f; Suring, 2019 at 12.
[1162] Schweisberg, 2019a at 14 citing Forman, 2004; Gucinski et al., 2001, Trombulak and Frissell, 2000, and Angermeier et al., 2004.
[1163] Schweisberg, 2019a at 14.
[1164] *See* Suring, 2019 at 12.
[1165] Suring, 2019 at 12.
[1166] *See* Boulanger, John & Gordon B. Stenhouse, December 22, 2014, *The Impacts of Roads on the Demography of Grizzly Bears in Alberta*, PloS ONE (Boulanger, 2014) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4274100/ (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1167] *Id.*
[1168] Suring, 2019 at 12.

Brown bears have been shown to avoid roads regardless of traffic volume.[1169] Prior to road use, there will be 2–4 years of intense construction. Then there will be an approximately 82–84 mile transportation corridor through prime brown bear habitat, adjacent to the seasonally highest concentration of brown bears in the world.[1170]

The level of traffic anticipated from mining operations on the proposed transportation corridor is approximately one truck passing in either direction every 18.5 minutes (including at night).[1171] There will also be "incidental light vehicle traffic"[1172] This incidental traffic is not quantified. In addition to the 82–84 mile long transportation corridor, under alternative one, eleven miles of spur roads will be constructed, connecting the transportation corridor to the communities of Iliamna, Newhalen, and Kokhanok.[1173] Iliamna is currently connected to the Williamsport-Pile Bay Road that serves as a transportation route from Cook Inlet to Lake Iliamna. This road has an average traffic count of 19 cars per day in 2017.[1174] There are 12 miles of road connecting Iliamna to Newhalen, and 15 miles of roads connecting Iliamna to Nondalton.[1175] On the Illiamna-Nondalton River Road there were 424 cars per day in 2017.[1176] Nondalton had approximately 50–60 cars perday, and Kokhanok had an average of 75 cars per day on the road.[1177] All of these vehicles will gain access to the transportation corridor upon completion of construction. The DEIS fails to take a hard look at the potential impacts of this traffic, and provides no detail on how access will be controlled or limited to local users (or even define who would qualify as a local user).[1178]

All of this industrial and incidental traffic will continue, night and day, for up to 78 years. Road use will also continue during mine-closure. And because water treatment will be required in perpetuity, it is foreseeable that the road will be maintained and open in perpetuity. It is reasonably foreseeable that this road will become a permanent road, and that the roads will become public transportation corridor. The Corps must assess the potential cumulative impacts of the road being opened for public use.[1179] The North Slope Haul Road, now called the Dalton

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1169 DEIS at 4.23–17 citing McLellan and Shackleton 1988.
1170 Alternative 1 proposes an 84 mile transportation corridor, with a 37 mile port access road that comes within 250 yards of McNeil River State Game Sanctuary. DEIS at 2–82, Figure 2–41. Alternative 2 proposes an 84 mile transportation corridor, with an 18 mile port access road. DEIS at 2–91, Figure 2–48. Alternative 3 propose a north access road that is 82 miles long with year-round truck transportation from Diamond Point port. DEIS at 2–107, Figure 2–59.
1171 DEIS at 4.23–17.
1172 RFI-122, Wildlife Management Response uploaded to the Pebble Project Library on June 18, 2019.
1173 DEIS at 2–41 and Figure 2–15.
1174 DEIS 3.12-3.
1175 DEIS at 3.12, Table 3.12–1.
1176 DEIS at 3.12.
1177 DEIS at 3.12–1.
1178 The project plan would allow "community transportation" by "all local communities." DEIS 4.4-5. There is insufficient detail to analyze this public use of the road.
1179 The DEIS states that "once the roads are no longer needed, the alignments would be recontoured if required, stabilized, and overburden would be placed as appropriate." DEIS at 2-

Highway, was built in 1974 as a private supply road for commercial traffic to support the Trans-Alaska Pipeline. In 1981, the State of Alaska opened the road to public access to Milepost 211, and in 1994 the entire road was opened for public access.[1180] It is reasonably foreseeable that the transportation corridor would be opened to the public. This will lead to a reduction in numbers of brown bears, and to more competition between urban and traditional subsistence hunters. The DEIS fails to assess the full range of impacts, including wildlife, socioeconomic, and subsistence impacts that could stem from the road being open to the public.

In addition to habitat impacts, roads constructed in brown bear habitat will significantly increase bear-human interactions. A road right on the border of McNeil raises significant concerns. First, a road will increase the likelihood of legal hunting, which can increase mortality pressures on the population.[1181] Second, a road may increase risks from illegal hunting or poaching.[1182] Third, a road will also increase bear-human interactions and associated defense of life or property (DLP) killings.

DLPs are exacerbated due to the impacts of food-conditioning and habituation.[1183] The brown bears at McNeil have become habituated to the presence of humans and do not perceive them as a threat.[1184] Suring notes that given the proximity of the road corridor and port to McNeil and the fact that the corridor cuts through the home range of these brown bears, "[a] large number of these habituated brown bears … may encounter nonhabituated people who would perceive the brown bears as a threat."[1185] These "habituated brown bears . . . have increased vulnerability to mortality through [DLP] kills."[1186] The DEIS fails to adequately assess the increase in DLP killings from encounters between humans and these habituated brown bears.

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60. There is no time frame given for this activity, because there is no time frame given for post-closure road needs. The DEIS also fails to include and consider a plan for reclamation of the road. *Id.* Without this information, the Corp cannot reasonably evaluate the impacts of the alternatives.
[1180] BLM, 2018, The Dalton Highway Visitor Guide at 3. https://www.blm.gov/documents/alaska/public-room/brochure/dalton-highway-visitor-guide-2018
[1181] The road corridor will cut through Game Management Units 9A and 9B. *See* ADF&G Hunting Regulations 2017–18, GMU 9 (previously provided as an attachment with Trustees for Alaska's scoping comments); Dawson, 2018 at 4.
[1182] In May 2018, a black bear was poached on Skilak Lake Road, in Kenai National Wildlife Refuge. *See* Tegan Hanlon, *Wildlife officers Investigating the Illegal Killing of a Black Bear in the Kenai National Wildlife Refuge*, Anchorage Daily News, May 21, 2018, https://www.adn.com/alaska-news/wildlife/2018/05/21/wildlife-officers-investigating-the-illegal-killing-of-a-black-bear-in-the-kenai-national-wildlife-refuge/ (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1183] *See* Suring, 2019 at 8–9.
[1184] *Id.* at 9.
[1185] *Id.*
[1186] *Id.* at 8.

3. The DEIS fails to take a hard look at the impacts of remote field camps on brown bears.

The project description includes a permanent personnel camp of 1,700 workers during construction and 850 workers for the operational phase.[1187] Temporary camps would also be established at the ferry landing sites,[1188] and at Amakdedori under the preferred alternative or at Diamond Point port under alternatives 2 and 3.[1189] The DEIS fails to take a hard look at impacts to brown bears from the increase in people present in the region, instead referencing nonexistent plans to mitigate the unexamined impacts (i.e., a Waste Management Plan and a Wildlife Management Plan).[1190] The addition of 2,000 people to the area during the four year construction phase,[1191] is significant in an area that has only approximately 1,663 residents in the entire Lake and Peninsula Borough.[1192] The DIES violates NEPA by failing to include any realistic assessment of the potential impacts this will have on the region's brown bears.

4. The analysis of potential impacts to brown bears in the DEIS is woefully inadequate.

The baseline data and analysis presented in the DEIS of potential impacts to brown bears are inadequate.[1193] ADF&G noted that the ABR field report relied on by the DEIS likely significantly underestimates the number of bears using the area around the south access site and Amakdedori port.[1194]ADF&G also commented on bears noted in Amakdedori Creek at the port site and that the creek supports chum, Coho, pink, and sockeye salmon with likely higher bear use throughout the season. [1195] This is also a likely travel corridor for bears. [1196] The DEIS failed to include:

- brown bear density within the home ranges impacted by the mine, transportation corridor, and port;
- a robust habitat-value assessment for brown bears in the vicinity of the proposed Pebble Mine and associated infrastructure;[1197]
- data-based descriptions of habitat use by brown bears with the project area;[1198]

[1187] DEIS at 2–29.
[1188] DEIS at 2–59.
[1189] DEIS at ES–12, 2-62, ES–17, 2–97.
[1190] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.23 – Wildlife Values, at ADF&G Comments and Responses #1-3 at 1.
[1191] DEIS at 4.3–4
[1192] DEIS at 3.3–1.
[1193] Suring, 2019 at 17.
[1194] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.23 – Wildlife Values, at ADF&G Comments #18 and 25 at 8–9 and 13–14 .
[1195] *Id.*
[1196] *Id.*
[1197] Suring, 2019 at 16.
[1198] *Id.*

- all relevant Alaska-based studies and recent brown bear work from other areas;[1199]
- cumulative impacts modeling of changes in quality of habitat as a result of habitat modification and the reduction in the effectiveness of that habitat as a result of human activities (including mortality);[1200]
- identification of movement corridors for brown bears, including density of bears within 30+ miles on either side of the road corridor, and probable road crossing locations;
- a plan for facilitating road crossings (e.g,. exclusion fencing, overpasses, and underpasses);[1201]
- a hard look at noise impacts and the resulting changes to brown bear behavior and movement patterns;[1202]
- cumulative impacts modeling to the brown bear population from the impacts of the project to individual bears;[1203]
- a hard look at harvest and visitor use information for brown bear hunting and viewing in the region and potential impacts to those activities;
- a hard look at the impacts from decreased bear density and interrupted migration routes on the world-class bear viewing opportunities at Katmai, Lake Clark, and McNeil River, and the nearby state-owned lands;
- a hard look at denning behavior, denning habitat, and denning disturbance from construction and operations in the project area;[1204]
- a hard look at habitat use patterns, including the daily and seasonal movements within the road corridor and port site and how those movements will be altered;
- a hard look at the significant risks of increased brown bear mortality as a result of the road (from food conditioning, hunting, poaching, and DLP).
- a comprehensive Wildlife Manage Plan for review and evaluation;[1205]
- baseline data and information on brown bear movement patterns and habitat use critical to determining impacts to the high concentrations of brown bears in the area;[1206]
- a hard look at indirect impacts to salmon and how loss of salmon productivity would in turn affect brown bears.[1207]

[1199] *Id.*
[1200] *Id.* at 14.
[1201] *Id.* at 13; *see also* Schoen, John. *Pebble Mine DEIS comments to the U.S. Army Corps of Engineers*, June 11, 2019.
[1202] *Id.*
[1203] *Id.* at 14 *citing* Johnson et al., 2005, and Suring et al., 1998.
[1204] *Id.* at 11
[1205] *Id.* at 15. The DEIS references only a potential, future Wildlife Management Plan, that "would be developed . . . prior to the commencement of construction." *See* DEIS at 5–8. It is impossible to discern if the hypothetical future plan would adequately address any of the likely impacts to brown bears from project activities.
[1206] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.23 – Wildlife Values, at ADF&G Comment #25 at 13–14.
[1207] Dawson, 2018 at 2–3.

- a hard look at incidental and community road use, provide more details on controlled access provisions, and consider cumulative impacts from the expanded mine scenario which results in two transportation corridors, and the impacts from both the transportation corridors being opened to public access.

The DEIS's analysis of these relevant and important factors is either entirely absent or woefully insufficient. Moreover, how these factors interact and lead to greater impacts is completely absent from the cumulative impacts analysis.[1208] As Suring notes,

> [a]n analysis of the cumulative effects on brown bears would certainly include the combination of changes to the brown bears' environment that are caused by Project actions in combination with other past, present, and future human actions. What is included in the DIES under cumulative effects analysis for brown bears is a series if unrelated statements mostly associated with potential impacts of spills and unplanned releases of materials that may contaminate the environment.[1209]

A quantified and detailed cumulative impacts analysis must look at the potential individual effects that may cumulatively impact a brown bear population.[1210] Such an analysis would evaluate: (1) the direct loss of habitat from construction of facilities; (2) the indirect loss of habitat following avoidance behavior; (3) fragmentation and isolation of habitat; (4) loss and/or reduction in effectiveness of habitat; (5) change in bear behavior with negative social or physiological consequences; (6) disruption of breeding or rearing activities and associated impact on fecundity rate and recruitment; (7) nutritional or hormonal cost of avoidance behavior and associated impacts to individual fitness and population productivity; (8) increased mortality from hunting, vehicle collisions, and DLP. The DEIS cumulative impacts analysis fails to adequately assess these factors individually or cumulatively and is utterly devoid of any quantified or detailed analysis that indicates how the brown bears would be cumulatively impacted from this proposed project.

G. Climate Change

NEPA requires agencies to assess the climate effects of direct greenhouse gas emissions from a project (such as emissions from construction activities), the indirect environmental impacts (such as degraded air quality), and the long-term cumulative impacts caused by the project's development and continued activity. The Corps fails to take a hard look at the direct, indirect, and cumulative impacts of emissions produced from mine operations, including operation of the power plant, diesel generators, vehicles, airplanes, helicopters, and vessels. The DEIS also fails to take a hard look at overall greenhouse gas contributions over time.

The affected environment sets the "baseline" for the impacts analysis and comparison of alternatives. Excluding climate change effects from the environmental baseline ignores the reality

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1208 U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.23 – Wildlife Values, at ADF&G Comment #8, #19, and #35 at 3–4, 10–12, and 23.
1209 *Id.* at 14.
1210 *Id.*

that the impacts of proposed actions must be evaluated based on the already deteriorating, climate-impacted state of the resources, ecosystems, human communities, and structures that will be affected. An adequate DEIS requires comprehensive baseline data to characterize the existing environment, including seasonal and climatic changes over multiple years. Effects from climate change are already occurring and are expected to increase, resulting in shrinking or altered water resources, increased precipitation, extreme flooding and other weather events, invasion of more combustible non-native plant species, soil erosion, changes in season length, loss of wildlife habitat, and changes to migratory and other biological patterns.

Climate change scenarios predict precipitation will increase by 30% by 2100 in all four seasons.[1211] Climate change model simulations suggest substantial changes in mean winter flow, peak flow dates, and water temperature by 2100.[1212] Annual hydrographs will no longer be dominated by a single spring thaw event, but will instead be characterized by numerous high flow events throughout the winter.[1213] This forecast will change the magnitude and timing of streamflow in the North Fork Koktuli, South Fork Koktuli, and Upper Talarik Creek watersheds.[1214] The DEIS rejects incorporating climate change and associated impacts on the hydrologic cycle into its assessment of direct, indirect, and cumulative impacts.[1215]

O'Neal notes that the failure to adequately assess the consequences of climate change has a direct impact on the DEIS's analysis of impacts to fish and fish habitat:

> While climate change is mentioned in the DEIS, it is not explicitly (or implicitly) factored in to the evaluation of potential impacts with respect to any aspect of the project (water flow, temperature, water quality, fish habitat, etc.) Although the consequences of climate of change are not easily predictable, it is clear precipitation and stream discharge will continue to increase in the future—rendering predictions of impact that ignore those increases unreliable (Figure 2, SNAP 2019). In all likelihood, increased variability in precipitation and discharge will compound impacts of project operations and post-closure (e.g., compound stream temperature increases and thus impacts to incubation, emergence timing and other life history events which have evolved over millennia with specificity for individual spawning sites).[1216]

Dr. Schindler also raises concerns about the climate induced changes with precipitation, noting that "changes in climate pose distinct risks to aquatic ecosystems and to infrastructure. Of particular relevance to the Pebble Mine EIS is that changes in precipitation patterns, particularly during the winter when rain-on-snow events will become more common, pose additional risks to

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[1211] Welker Scoping Comments, 2018 at 17.
[1212] *Id.*
[1213] *Id.*
[1214] *Id.*
[1215] *Id.*; *see also* Zamzow Scoping Comments, 2018 at 10; *Climate Change in Nondalton, Alaska*, Alaska Native Tribal Health Consortium (Nov. 2013) https://anthc.org/wp-content/uploads/2016/01/CCH_AR_112013_Climate-Change-in-Nondalton.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1216] O'Neal, 2019 at 6.

flooding and erosion."[1217] Dr. Schindler also states that the DEIS fails to address the anticipated climate impacts to habitat, noting:

> [E]stimates of fish habitat loss will likely be exacerbated by climate change. More intense summer droughts, heat waves, and flooding events are expected with climate change. We know that maintaining a diversity of habitat conditions in watersheds is what provides fish and wildlife the 'options' for coping with extreme climate events. By reducing the variety of habitat conditions in these watersheds (i.e., by draining wetlands, dewatering streams, etc.), the Pebble project will undeniably reduce the resilience of these watersheds to future climate change. The current DEIS does not even consider these issues in its assessment of the risks of the Pebble project.[1218]

To meet its hard look obligation, the Corps must provide an analysis similar to the Chuitna Integrated Hydrologic Effects Model, which studied climate change impacts on the watershed.[1219]

The DEIS analysis of potential climate change fails to assess the estimated greenhouse gas emissions associated with the project; changes in the carbon cycle due to manipulation of natural carbon sinks and sources (especially loss of peatlands); effects of climate change on the project (i.e., water management, need for dredging to accommodate barge traffic, revegetation, reclamation, and water treatment in perpetuity); management measures in response to meteorological/weather changes; climate change induced effects on precipitation, snow pack, stream flows, and culvert sizing and effects on the project; climate change induced changes to the hydrologic regime; climate-driven wildlife and habitat changes; and changes in biomes.

NEPA requires the Corps to analyze and disclose the effects of greenhouse gas emissions as indirect or cumulative effects.[1220] In *Center for Biological Diversity v. National Highway Traffic Safety Administration*, the Ninth Circuit held that "[t]he impact of greenhouse gas emissions on climate change is precisely the kind of cumulative impacts analysis that NEPA requires agencies to conduct."[1221] The Corps must, accordingly, quantify and analyze the climate impacts from the potential emissions for this action, including impacts for each alternative and variant.

[1217] Schindler, 2019 at 5.
[1218] *Id.* at 6.
[1219] *See* Robert H. Prucha, Ph.D., PE, et al., April 2012, *Documentation Report: Development and Application of an Integrated Hydrologic Model to study the Effects of Climate Change on the Chuitna Watershed, Alaska*, Integrated Hydro Systems, LLC (Prucha, 2012), https://www.fws.gov/alaska/fisheries/fieldoffice/anchorage/pdf/Documentation%20Report%20Climate%20Effects%20on%20Chuitna%20Hydrology%20Revised%200412.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1220] *See e.g.*, *Sierra Club v. Fed. Energy Regulatory Comm'n*, 867 F.3d 1357, 1373 (D.C. Cir. 2017) (holding that agencies must analyze the climate effects of burning fossil fuels conveyed by pipeline projects they approve and reasoning that the consumption of those fuels was not just "reasonably foreseeable" but was "the project's entire purpose").
[1221] 538 F.3d 1172, 1217 (9th Cir. 2008).

As Borden notes,

> The cumulative effects analysis in the DEIS does not address the roughly seven-fold increase in greenhouse gas emissions associated with the 78-year mine plan. This is largely driven by the massive increase in required waste rock stripping, higher mill throughputs, longer mine life and the need to move roughly four billion tons of acid generating waste rock and tailings back into the open pit at closure. During operation it is estimated that annual greenhouse gas emissions will increase from 940,000 tons of CO_2 equivalents to roughly 1,700,000 tons. Despite the clear increase in greenhouse gas emissions associated with the mine expansion, Section 4.20.10 of the DEIS states "it is not anticipated that [expanded] mine operations would be meaningfully different than those analyzed for Alternative 1" and furthermore that "the expansion would result in similar magnitude, duration and geographic extent of the air quality impacts described under Alternative 1 for a given year". Both of these statements are clearly wrong.[1222]

The DEIS must also consider the indirect effects of releasing greenhouse gasses through natural gas leaks. Natural gas leaks into the atmosphere from oil and natural gas wells, storage tanks, pipelines, and processing plants accounted for 32% of total U.S. methane emissions and about 4% of total U.S. greenhouse gas emissions in 2015.[1223] The proposed Pebble Mine would require approximately 50 million standard cubic feet of natural gas per day, or 18.25 billion standard cubic feet of natural gas per year, of 365 billion standard cubic feet of natural gas over the 20-year lifetime of the project.[1224] The DEIS fails to address potential natural gas leaks over the 20-year or 78-year mine life.

In addition, the Draft EIS fails to quantify and analyze the contributions to greenhouse gas emissions from shipping and transportation associated with the proposed mining operations, including from trucks, barges, ferries, and other vessel or vehicular traffic in Cook Inlet, Iliamna Lake, and along all other proposed transportation corridors and spur roads. Moreover, the DEIS fails to account for the emissions associated with the diesel-powered mining equipment required for the proposed operations. The DEIS does not account for the overall contributions of the diesel hydraulic shovel, two diesel drills, seventeen 400-ton class diesel haul trucks, and five 150-ton class diesel haul trucks[1225] over 20 years or how use of diesel equipment will expand over the 78-year mine and the associated greenhouse contributions from such use.

H. Subsistence Resources

The Bristol Bay watershed is home to exceptional fisheries and wildlife essential to those in the region who maintain a subsistence way-of-life. The abundant resources of Bristol Bay have

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[1222] Borden, 2019f at 9.

[1223] *See* U.S. Energy Information Administration, Natural Gas Explained, Natural Gas and the Environment, https://www.eia.gov/energyexplained/index.php?page=natural_gas_environment (included as an attachment with these comments).

[1224] 2018 Project Description at 51.

[1225] *Id.* at 29.

supported Alaska Native people for more than 10,000 years.[1226] The Alaska Native cultures present in the Nushagak River and Kvichak River watersheds — the Yup'ik and Dena'ina — are two of the last intact, sustainable, salmon-based cultures in the world.[1227] Salmon are integral to the entire way of life in these cultures as subsistence food and as the foundation for their language, spirituality, and social structure.[1228] Fourteen of Bristol Bay's 25 Alaska Native villages and communities are within the Nushagak River and Kvichak River watersheds, with a total population of 4,337 in 2010.[1229]

In the Bristol Bay region, salmon constitute approximately 52% of the subsistence harvest. Subsistence from all sources (fish, moose, and other wildlife) accounts for an average of 80% of protein consumed by area residents.[1230] These cultures have a strong connection to the landscape and its resources.[1231] In the Bristol Bay watershed, this connection has been maintained for at least the past 4,000 years and is in part due to, and responsible for, the continued pristine condition of the region's landscape and biological resources.[1232]

It is through these subsistence uses that people of the region feed their families. In addition, the cultural and religious interests of many in the region are deeply embedded in the subsistence traditions of tribes. Disruption of subsistence activities may affect social and kinship ties, many of which are based on the harvesting, distribution, and consumption of subsistence resources. For the reasons discussed throughout these comments, the DEIS misrepresents, underestimates, inaccurately assesses or otherwise fails to adequately assess the likely impacts to subsistence resources, including fish, at the mine site, along the transportation corridor, and downstream. As a result, all assessments regarding subsistence resources and impacts to those that use and rely on subsistence resources is also inaccurate. The DEIS fails to take the required hard look at the potential impacts to subsistence resources.

I. Cultural Resources

The DEIS has not taken the required hard look at potential impacts to archeological and cultural resources because inventory and consultation under Section 106 of the National Historic Preservation Act[1233] is not complete. Section 106 of the National Historic Preservation Act requires federal agencies to consider the effects of projects they carry out, approve, or fund on historic properties.[1234] If an agency action may impact historic properties, the agency must consult

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1226 *See* Bristol Bay Regional Guide, BBNC at 4 https://www.bbnc.net/wp-content/uploads/2016/04/BBNC-Bristol-Bay-Regional-Guide.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
1227 *See Bristol Bay: About Bristol Bay*, Environmental Protection Agency https://www.epa.gov/bristolbay/about-bristol-bay (previously provided as an attachment with Trustees for Alaska's scoping comments).
1228 *Id.*
1229 *Id.*
1230 *Id.*
1231 *Id.*
1232 *Id.*
1233 54 U.S.C. § 306108.
1234 54 U.S.C. § 306108; 36 C.F.R. § 800.1.

with the Alaska State Historic Preservation Officer/Tribal Historic Preservation Officer.[1235] Federal agencies must also provide the Advisory Council on Historic Preservation with an opportunity to comment on projects prior to the agency's decision on them.[1236] Information obtained pursuant to the 106 consultation process is necessary to inform the required NEPA analysis, including informing the broad range of alternatives.[1237]

The DEIS makes it clear that the Section 106 process has not been completed and could not have been used in determining the range of alternatives.[1238] Rather, the DEIS explains that the identification, evaluation, and mitigation of effects will be covered in a "programmatic agreement" that will be created after the completion of the DEIS and the public review process of the DEIS. Despite this, the DEIS concludes "there would be no direct or indirect impact to identified historic properties" under alternative 1.[1239] The DEIS acknowledges there will be direct and permanent impacts to the only historic property currently identified under alternatives 2 and 3.[1240] Until the required section 106 process to identify historic properties, these conclusions are meaningless.

The proposed Pebble Mine and associated infrastructure has the potential to affect historic places and cultural resources. This may result from a wide range of activities, including ground disturbance associated with mining, road and port construction, and construction of other permanent facilities. The Corps must consult as part of this process and fully comply with the requirements in the National Historic Preservation Act to determine how proposed activities could impact cultural resources listed on, *or eligible for inclusion in*, the National Register of Historic Places. Survey of lands potentially impacted also must be completed prior to completion of the DEIS.

Further, the National Historic Preservation Act requires agencies to ensure that properties listed or eligible to be listed on the National Historic Register are preserved to maintain their historic, archaeological, architectural, and cultural values.[1241] The Corps must consult with the Alaska State Historic Preservation Officer and tribes as part of this process and determine how proposed activities could impact cultural resources listed on, or eligible for inclusion in, the National Register of Historic Places. Without this analysis, the DEIS has failed to take the required hard look.

[1235] 36 C.F.R. § 800.4(a).
[1236] 36 C.F.R. § 800.1(a).
[1237] 36 C.F.R. § 800.1(c) ("The agency official shall ensure that the section 106 process is initiated early in the undertaking's planning, so that a broad range of alternatives may be considered during the planning process for the undertaking.")
[1238] DEIS 3.8–2 ("While underway, the [DEIS] and Section 106 processes have not yet produced additional information regarding the identification and evaluation of historic properties in the analysis area.").
[1239] DEIS at 4.8–3.
[1240] DEIS at 4.8–3.
[1241] 54 U.S.C. § 306102(b)(2).

J. Socioeconomics

The DEIS incorrectly assumes that the Pebble Mine will bring significant economic benefits to people in the region and to the State of Alaska. The DEIS ignores the substantial economic contributions that wildlife generally, and brown bears specifically, provide to people in the region and to the State of Alaska. The over-estimation is addressed in a report prepared by Power Consulting, Inc. The report analyzed the DEIS and its assessment of socioeconomics associated with the Pebble project.[1242] It identifies four major issues with the DEIS analysis: (1) lack of an economic feasibility assessment; (2) misleading projection of economic benefits from the mine in the region and for the State; (3) jobs are not likely to be filled by people from the region at the rate projected by PLP; and (4) PLP provides unreliable estimates for local and state revenue.[1243] The failure to provide an economic assessment is addressed above, in Section III.C.3. The remaining three issues are addressed below in sections i–v.

The substantial economic value of recreational and commercial brown bear viewing in Southcentral Alaska is addressed in a report from the School of Management at the University of Fairbanks.[1244] That report analyzes the socioeconomic value of brown bears that has been completely ignored in the DEIS. The importance of brown bears to the economy and the need for more analysis are discussed below in sections vi–viii.

1. Net economic benefits to local communities and the State of Alaska are overestimated.

While the DEIS projects long-term beneficial impacts over the life of the mine, the fluctuations in international economic markets tell a different story. As Power Consulting notes, there are costs "associated with mineral-dependent economies that often keep communities and states from prospering from those mineral extraction activities."[1245] Power Consulting states that mineral extraction activities do not bring steady benefits:

> Chief among those negative characteristics of economic dependence on mineral extraction is the volatility of international commodity prices and the regular "flicker" in the level of employment, size of payroll, purchases from within the local and state economies, and revenue flows to local and state governments. This economic instability can discourage private and public investment in infrastructure and limit widespread economic vitality.[1246]

[1242] *See* Power, Thomas and Power, Donovan, Power Consulting, Inc., June 11, 2019, *Public Comments on the U.S. Army Corps of Engineers Pebble Project EIS Draft Environmental Impact Statement*, Prepared for Cook Inletkeeper (Power, 2019) (report and its references included as an attachment to these comments).

[1243] *Id.* at ESi to ESvi.

[1244] Young, Taylor B. & Little, Joseph M., May 2019. *The Economic Contributions of Bear Viewing in Southcentral Alaska*. University of Alaska Fairbanks, prepared for Cook Inletkeeper. (Young, 2019) (report and references are included as an attachment).

[1245] Power, 2011 at 2.

[1246] *Id.*

Power Consulting identifies that the "flicker" is tied to the fluctuations in the international commodity markets, differing from the boom-bust scenario identified in the DEIS.[1247]

Power Consulting highlights that the reality of mining and its socioeconomic benefits to those in the community differs from the story PLP and the DEIS portray:

> most mining areas are not known for their prosperity and economic vitality. That is because there are other characteristics associated with mining that dilute or overwhelm the projected benefits that are emphasized by mine proponents. The DEIS is silent on these negative aspects of economic dependence on mining even though Alaska in recent years has been an excellent case study of these off-setting negative characteristic of mineral-dependent economies. This is a very serious flaw in the DEIS socioeconomic presentation.[1248]

Power Consulting runs through a number of important negative characteristics associated with mining that are overlooked in the DEIS. These include: (1) the instability of mine production; (2) the labor-displacing technological changes in the industry over time; (3) the inevitable end of mining once the economically viable ore is extracted; (4) the associated inevitable adverse impacts to the environment; (5) rural settings for mines lead to a flow of economic benefits back to trade or manufacturing centers; and (6) experienced miners will commute long distances and will not spend their earned income in the region.[1249]

2. The DEIS fails to take a hard look at impacts from flicker and from boom-bust cycles.

The DEIS asserts that mining is not subject to the boom-bust cycle like oil and gas because "most of the large operating mines in Alaska have been successful in finding additional reserves adjacent to their mine, extending their operating life and postponing a potential 'bust' cycle."[1250] Power Consulting notes that

> [t]his DEIS statement confuses two quite different mining phenomena. The first focuses on the cyclical fluctuation of metal prices that can change the profitability of an operating mine. . . . The second issue . . . is associated with the fact that all mines, ultimately, will exhaust the ore that is economically feasible to mine, leading to the permanent shutdown of the mine.[1251]

The DEIS errs in assuming the only downturn comes when the mine can no longer extract ore. The international market is known for "constant fluctuations in mineral prices and . . . [that] leads to fluctuations in mining employment, payroll, and revenues to governments. . . ."[1252] This is referred to as flicker.[1253] As a result, the market-driven volatility, which can lead to layoffs and

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1247 *Id.*
1248 *Id.* at 5.
1249 *Id.* at 5–6.
1250 DEIS at 3.3–2.
1251 Power, 2019 at 7.
1252 *Id.*
1253 *Id.*

rehires "creates and maintains a level of economic uncertainty that discourages other, non-mineral, economic activities, retarding economic vitality."[1254]

As we have seen with the recent economic downturn due to oil prices (and not oil supply in Alaska), impacts from fluctuating oil prices has been far reaching in this state, leading to a major, multi-year state government budget crises that Alaska has yet to move out of.[1255]

3. The DEIS fails to take a hard look at potential jobs at the Pebble Mine, especially in the overall context of the Alaska economy.

While the mine intends to employ 850 workers during operations, the DEIS fails to put this number into perspective with state employment and growth. Power Consulting puts the Pebble employment figures in context:

> Each year the Alaskan economy has been adding about *ten times* that number of jobs. Put slightly differently, the Alaskan economy creates the number of direct mining jobs that PLP projects for Alaskans approximately each month. . . . If we look at total employment associated with metal mining in Alaska in 2017, those 3,100 jobs directly associated with *all* metal mining represented only about two-thirds of one percent of the 454,100 Alaskan jobs in 2017.[1256]

4. The DEIS overestimates local economic benefits.

Because of the rural location of the mine, the local economy will not receive many of the "ripple" or "multiplier" effects associated with mining.[1257] Power Consulting notes that PLP will need to bring in supplies and goods through its own means. The ripple effect is limited where "there is unlikely to be much local commercial infrastructure where the mine could purchase the inputs it needs or where employees and their families could spend their mine earnings."[1258] Further, "there may be no possibility for local 'induced impacts' associated with employees spending their income because they will be all services (from lodging to food service) that will be provided through PLP facilities."[1259] In addition, because the majority of workers will not be from the region, when they finish work, they will fly out of Bristol Bay and spend their earned income in other markets, whether in Alaska or elsewhere outside of Alaska.[1260]

The DEIS relies on PLP local hire job predictions that are not realistic. PLP's predictions are based on job rates for its exploration phase.[1261] But as Power Consulting notes, these past hire figures are skewed because many of the job employment opportunities "were support positions appropriate for entry-level employees," and almost all of the exploration jobs were seasonal.[1262]

1254 *Id.*
1255 *See id*. at 7–8.
1256 *Id.* at 13–14.
1257 *Id.* at 19.
1258 *Id.*
1259 *Id.*
1260 *Id.* at 19–20
1261 *See id*. at 21.
1262 *Id.*

However, the future employees "are likely to have to meet more stringent requirements in terms of technical experience and training that may exclude many working-age residents of the villages in the Pebble project area."[1263] In addition, PLP misinterprets previous work history reporting to assert that there was 43% local hire.[1264] This figure is pulled from a report prepared by the Institute for Social and Economic Research (ISER) at the University of Anchorage.[1265] ISER included everyone who worked on PLP exploration for at least one day during a four-year period. As a result, someone who worked for a single day was counted the same as someone who worked for four seasons straight.[1266] If one were to count up the annual number of employees engaged in exploration work who list one of the Bristol Bay communities as home, the annual number of "local" workers who were employed in exploration comes to less than half that reported by ISER.[1267] Power Consulting concludes that "[r]ather than evaluating potential socioeconomic impacts of the proposed Pebble Mine using past seasonal employment from the 2009-2012 period, a closer analysis of more recent 2016–2018 economic data on community labor force characteristics, employment rates, etc. would be more informative and reliable." The DEIS fails to take this approach.

5. DEIS estimates on anticipated local and state government revenue are unreliable.

The DEIS concludes that the license tax, income tax, and royalty payments would have long-term benefits for the state.[1268] However, the DEIS obtains its estimates of the likely impact of the proposed Pebble Project from a report in 2013, when PLP had a much different project on the table.[1269] As Power Consulting notes, "[t]he DEIS did not seek to study the impacts of the actual proposed Pebble Project on government revenues. The result was seriously exaggerated 'financial benefits' to local and state governments."[1270] Of note, IHS Global Insight, the author of the report, was aware that it was reviewing a conceptual mine and prefaced its findings by stating that

> Any proposed mining plan will be subject to an exhaustive, multi-year regulatory review process involving multiple state and federal agencies, and an extensive public comment period. Thus, *additional comprehensive economic studies will be needed as the development plan becomes more refined and finalized*.[1271]

Power Consulting concludes that "the 2013 IHS report . . . is a poor representation of the currently proposed Pebble mine as far as tax and fiscal impacts are concerned. As a result, the

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1263 *Id.*
1264 *Id.* at 22.
1265 *Id.* at 21–22.
1266 *Id.* at 22.
1267 *Id.*
1268 *Id.* at 24–25; *see also* DEIS at 4.3–9.
1269 *Id.* at 24.
1270 *Id.*
1271 *Id.* at 26 (quoting IHS, "The Economic and Employment Contributions of a Conceptual Pebble Mine to the Alaska and United States Economies" May 2013, at 1) (emphasis added).

fiscal and tax impacts that are assumed in the DEIS, which came directly from the IHS report, are not reliable."[1272]

Power Consulting's ultimate conclusion is that instability (*flicker)* in mine dependent economies is unavoidable and that "economic impact of new mining ventures should not be discussed as if they will operate smoothly indefinitely into the future."[1273] In addition, the "estimate of . . . revenues available to governments to support the provision of public services" is not reliable. The Corps should do its own independent analysis of any figures offered by PLP given the identified problems with their estimates.

6. The DEIS fails to consider potential economic impacts to brown bear viewing in Alaska.

Alaska supports over 98% of the brown bear population of the United States, and 70% of the brown bear population in North America.[1274] Southcentral Alaska supports Alaska's, and the world's, largest concentration of brown bears.[1275] The abundance of food sources for the omnivorous brown bears on the west side of Cook Inlet means reduced competition between bears, allowing for the population density that make Alaska a premier destination for brown bear viewing.[1276] This provides a unique experience for bear-viewers, and an economic opportunity for the many associated local service providers.[1277] In Alaska, tourist are willing to pay more to view brown bears than any other Alaskan wildlife.[1278]

In addition to the large concentrations, Alaska is the only place in North America with well-developed, permanent bear viewing sites.[1279] The combination of large concentrations of bears, and permanent facilities for viewing, helps drive wildlife viewing based tourism to the west side of Cook Inlet.[1280] It is the predictability of brown bear congregations that has resulted in the development of these permanent viewing facilities.[1281] The majority of opportunities for bear

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[1272] *Id.* at 31; *see id.* at 27–31 (comparing the current proposal and the 2011-2013 conceptual proposal).
[1273] *Id.* at 32.
[1274] Young, 2019.
[1275] *Id.* citing ADF&G, 2019 and the National Park Service, 2019.
[1276] *See* Young, 2019 at 1. In 2011, there were 640,000 total non-consumptive wildlife viewing participants in the State of Alaska. *Id.* citing 2011 National Survey of Fishing, Hunting and Wildlife-Associated Recreation. This equals a total of more than $2 billion spent in 2011. *Id.* These numbers are not specific to brown bears, but it is clear that large land mammals, including bears, bison, deer, moose, and elk, support a robust part of Alaska's tourism economy. *Id.*
[1277] *Id.*
[1278] Penteriani, Vincenzo et al., 2017, *Consequences of Brown Bear Viewing Tourism: A Review*, Biological Conservation, 206, pp. 169-180 at 171 *citing* Miller and McCollum, 1997. (Penteriani, 2017) (included as an attachment with these comments) Penteriani also reports that ecotourism is rapidly growing as a commercial activity and is currently considered as one of the world's biggest industries, with ecotourism growing three times faster than the number of conventional tourist. *Id.* at 170.
[1279] *Id.*
[1280] Young, 2019 at 3.
[1281] *Id.* at ii, citing NPS, 2019 and ADF&G 2019.

viewing in Alaska include: Katmai National Park & Preserve, McNeil River State Game Sanctuary, Lake Clark National Park & Preserve as well as other state lands that lie between Katmai and Lake Clark.

McNeil River and Katmai National Park and Preserve form a contiguous unit of land that includes a large portion of Cook Inlet's west coast and is managed primarily for the protection of brown bears. Lake Clark National Park and Preserve to the north is also managed for the protection brown bears. The habitat between these two areas is critical for migration and also contains important denning and feeding areas. This important habitat for brown bears helps maintain the brown bear population, which in turn supports local businesses.

i. McNeil River State Game Refuge and Sanctuary

The State of Alaska runs a world-class viewing program at McNeil River. The Sanctuary was established in 1966 and expanded in 1991. Bear viewing access to McNeil is done by permit lottery. Over the past five years, 4,711 permit applications have been made.[1282] The 2018 receipts to the State of Alaska for just the permit applications and permits was $96,060. [1283]

Permit winners at McNeil have to fly in by float plane from Anchorage, Homer, or Kodiak. Private operators fly visitors to other locations in McNeil River, including Chenik Lake, which is to the north of the small camp where permitted visitors and sanctuary staff are located.

The transportation corridor in PLP's preferred alternative runs along the northern border of McNeil River.[1284] The port road comes within 250 feet of McNeil River.[1285] The port itself is less than two miles from the boundary of McNeil.

ii. Katmai National Park and Preserve

Katmai was established in 1918 by President Woodrow Wilson, and expanded in 1931 by President Hoover for the "protection of brown bear, moose, and other wild animals." Katmai, which had been a National Monument, became a National Park and Preserve in 1980 with the passage of the Alaska National Interest Lands Conservation Act. The purpose of Katmai National Park and Preserve is to "protect habitats for, and populations of, fish and wildlife including . . . high concentrations of brown/grizzly bears and their denning areas, to maintain unimpaired the water habitat for significant salmon populations . . . ."[1286]

In 2017, there were 59 Conditional Use Authorizations issued by the National Park Service to operators offering bear viewing services at Katmai.[1287] Service providers originated

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[1282] Young, 2019 at 6.
[1283] *Id.* at 9. Young cites to Clayton & Mendelsohn, 1993, to demonstrate that visitors to McNeil River have a willingness-to-pay that exceeds the actual cost of McNeil Permits. The potential economic benefit of the bear viewing program is likely much higher than the current, actual receipts.
[1284] *See* Map at DEIS at 3.23–33, Figure 3.23–12.
[1285] DEIS at 3.2–41.
[1286] 16 U.S.C. § 410hh-1(2).
[1287] Young, 2019 at 10.

from Homer, Anchorage, and Kodiak, and reported a combined total of 5,783 bear viewing Visitor Use Days.[1288] One study reported that out of 392 visitor groups surveyed, 79% listed bear viewing as the primary reason for visiting the park.[1289] In 2015 and 2016, bear viewing supplanted sportfishing as the most popular "primary" activity reported by commercial operators.[1290] Young points out that the three primary activities for Katmai, sportfishing, bear viewing and air taxi services are not mutually exclusive.[1291]

Brooks Camp, within Katmai, may be the most well-known location to view bears in the wild.[1292] It accounts for one-third of all Katmai Visitor Use Days.[1293] Other locations where park visitors view brown bears include, but are not limited to: Hallo Bay, Moraine Drainage, Amalik Bay, and Kulik River.[1294]

iii. Lake Clark National Park and Preserve

Lake Clark National Park and Preserve was first created in 1978, and designated as a park and preserve in 1980.[1295] One of its statutory purposes is "to protect habitat for fish and wildlife including . . . brown/grizzly bears . . . ."[1296] Young reports that over the last ten years visitation by commercial operators to Lake Clark has more than quadrupled from approximately 4,000 to nearly 17,000 Visitor Use Days.[1297] In 2017, Crescent Lake, Silver Salmon Creek, and Chinitna Bay accounted for more than 75% of total visitation to the park.[1298] In 2017, Lake Clark issued twenty-eight Conditional Use Authorizations to operators offering bear viewing services. Service providers from Homer and Anchorage reported a combined total of 3,000 bear viewing visitor use days.[1299] In the last five years, visitors listing bear viewing as their primary activity has surpassed sportfishing and photography. Park biologists have counted well over 200 individual bears within a 54-square mile area.[1300]

7. *The DEIS completely failed to consider the tourism industry dependent on current concentration of brown bears.*

The DEIS identified the entire state of Alaska as the Analysis Area for Socioeconomics.[1301] It then completely failed to consider the substantial tourism industry that

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1288 *Id.*
1289 *Id.* at 10 citing Strawn and Le, 2015.
1290 *Id.* at 11.
1291 *Id.* at 11.
1292 Young, 2019 at 11.
1293 *Id.*
1294 *Id.* citing NPS, 2019.
1295 16 U.S.C. § 410hh(7)(a).
1296 *Id.*
1297 Young, 2019 at 12.
1298 *Id.*
1299 *Id.* at 13.
1300 *Id.* citing NPS 2019.
1301 DEIS at 3.3–1 and Table 3.3–1 ("The Environmental Impact Statement (EIS) analysis area for this section includes the State of Alaska, regions, and communities where aspects of the monetized economy, including population, employment, income, housing, and education, would

depends on the current concentration of brown bears in the area impacted by the proposed Pebble Mine.

Young reports that almost all of the business offering bear viewing services are locally owned and operated.[1302] Service providers indicated that approximately 74% of business expenditures, on average, are made locally in the Southcentral region of Alaska, and more than half of the business reported 90–100% of business expenditures are made locally.[1303] Young concludes that "the majority of money operators receive from south central bear viewing visitors is injected back into the local economy."[1304]

8. The DEIS fails to address substantial socioeconomic benefits from brown bear viewing.

Young reports that there are many different business industries that are directly impacted as a result of brown bear viewing opportunities in southcentral Alaska. These include lodges, hotels, air taxi providers, guided photography workshops, guided wildlife viewing, boat taxis, dining facilities, grocers, etc. The service operators themselves also contribute to the socioeconomic impact in their communities, as they live and recreate on their incomes generated from bear viewing activities.[1305]

Young took employment, labor income, valued added and output estimates to model the values for direct, indirect, and induced impacts to Southcentral Alaska from bear viewing-associated service provider expenditures.[1306] The modeling estimates that the 109 known service providers resulted in bear viewing related business activity of approximately $34.5 million in sales and $10 million in direct wages and benefits.[1307] Bear viewing economic contribution estimates are summarized in the table below.

TABLE 8.
Bear Viewing Economic Contribution Estimates (2019 dollars)

	Direct Purchases	Employment	Labor Income	Value Added
Direct Effect	$17,085,981	371	$9,984,858	$7,205,510
Indirect Effect	$9,765,449	56	$3,974,799	$6,126,837
Induced Effect	$9,411,464	63	$3,319,786	$5,708,554
Total Effect	**$36,262,894**	**490**	**$17,279,170**	**$19,040,901**

be impacted by the construction, operation, and closure of all components of each alternative of the proposed project.")
1302 Young, 2019 at 14.
1303 *Id.*
1304 Young, 2019 at 14.
1305 Young, 2019 at 14.
1306 Young, 2019 at 24.
1307 *Id.* at 24.

Table 8 from Young, 2019 at 25.

For Katmai, Young estimates that bear viewing supports about 328 jobs and $46.9 in intermediate production and $23.9 million in value added.[1308] Studies that focus on the individual parks, rather on one specific activity concluded that visitor spending in Katmai supports 756 jobs and approximately $84.6 million in total economic output. For Lake Clark, visitor spending supported 455 jobs and approximately $50.9 million in total economic output.[1309] Young concludes that spending by visitors on bear viewing opportunities helps to diversify the regional economy and supports the financial well-being of many local businesses and households.[1310]

The DEIS also failed to address noise and visual impacts to McNeil from the southern road and pipeline corridor and the Amakdedori Port site.[1311] The southern road and pipeline corridor would be visible in the immediate foreground of the landscape along much of the northern refuge and from elevated locations within the refuge.[1312] Likewise, several material sites are within 1/2 to 3 miles from the McNeil border and would also be visible. Blasting from these sites could impact McNeil. And the Amakdedori Port site would be highly visible along much of the northern refuge, from elevated locations within the refuge and from the Chenik Lagoon area. Chenik Lagoon is a bear viewing/guiding area used by private citizens, commercial operators and commercial filming companies.[1313]

The DEIS fails to take a hard look at all of the ways the brown bears will be impacted, making it impossible to analyze how the brown bear viewing industry will be impacted. Jobs and revenue from brown bear viewing and hunting are absent. To the extent any impacts are generally acknowledged, the DEIS simply defers to a future, unwritten Wildlife Management Plan. That plan — to the extent its possible contents are revealed — does not address the loss of experience or revenue that would follow from the Pebble Mine's impacts to the world's largest concentration of brown bears that supports a high and growing demand for bear viewing experiences.

K. Public Health

The Corps has failed to take a hard look at a number of public health issues in the DEIS. These include impacts from changes in diet and nutrition, exposures to contaminants from construction and mining, safety, acculturative stress, and economic impacts. The Corps has also

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[1308] Young, 2019 at 25.
[1309] *Id.*
[1310] *Id.* at 26.
[1311] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.11 – Appendix k4.11 Aesthetics, at ADF&G Comment #1 at 1.; U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 4.11 – Aesthetics, Comment #6 at 2 (noting that "[v]isual impacts would impact McNeil River State Game Refuge users"). The DEIS also fails to take a hard look at sound and visual impacts to Lake Clark. NPS Comments Section 4.5 Recreation, at Comment #12 at 5 and Comment #21 at 7.
[1312] *Id.*
[1313] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, ADF&G Comments – Pebble Project Preliminary Draft EIS, Section 3.11 – Aesthetics, at ADF&G Comment #15 at 5.

not taken a hard look at potential impacts from mining and mining-related activities on air quality in the local communities. Moreover, public health in much of Alaska is already under stress from climate change, with anticipated health implications such as a greater rate of chronic and infectious diseases; damaged water and sanitation infrastructure; an increase in anxiety and depression; and increasingly dangerous hunting and harvesting conditions that limit subsistence activities.[1314] The Corps must consider the health impacts of this project in the context of the changing climate. As the Center for a Livable Future stated in comments to the Corps.

> Food security and the global seafood supply are threatened by the impending crises of a changing climate, growing population and myriad other global stressors. Wild Bristol Bay sockeye salmon represents a vital resource to the health of future generations, both locally and around the world as part of the global seafood supply. We urge the [Corps] to consider this comment and recognize that *the Pebble Project DEIS does not reflect many critical risks directly associated with the survival of the Bristol Bay sockeye salmon fishery and the larger public, environmental and economic health of the region*.[1315]

The Corps should require the completion of a full Health Impact Assessment for this project. A Health Impact Assessment provides a systematic analysis of the potential positive and negative effects of a project on the health of a population and the distribution of those effects within the population. These assessments identify appropriate actions to manage or mitigate negative effects. The U.S. Centers for Disease Control and Prevention and the World Health Organization support the use of these assessments to address health impacts when a project is being developed.

The Health Impact Assessment should give special attention to vulnerable populations, such as elderly, young children, and pregnant women, who all may be more susceptible to exposure. The assessment should include:

- A complete screening analysis to determine which aspects of human health could be impacted (including, but not limited to, public, environmental, social, metal, and cultural health, etc.);
- Consideration of historical impacts to health and overall cultural well-being;
- Identification of potential contaminants that may persist and bioaccumulate in the environmental and up the food chain (e.g., consumption of berries, fish, drinking water, etc.);
- Identification of pollutants of concern and their sources that represent health risks to local and regional communities;
- Identification of pollutants of concern exposures, pathways, and susceptibilities;

[1314] *See* State of Alaska, Dep't of Health & Social Servs., Assessment of the Potential Health Impacts of Climate Change in Alaska at VI-VII (2018) (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1315] *See* Jillian P. Fry, Letter, The Center for a Livable Future, Johns Hopkins Bloomberg School of Public Health to Shane McCoy, U.S. Army Corps of Engineers, May 29, 2019 (included as an attachment to these comments).

- Identification of pathways to exposure related to environmental impacts and subsistence resources;
- Use of the North American HIA Practice Standards Working Group document "Minimum Elements and Practice Standards for Health Impact Assessment, Version 3;"[1316]
- A profile of existing health conditions of the region;
- Strategies to mitigate and manage identified adverse health impacts — local communities and tribal governments should be involved in developing these health strategies and mitigation measures;
- Evaluation of potential health impacts of individuals and communities in the region; and
- An assessment of the potential direct, indirect and cumulative impacts of the project on children's health, pursuant to EO 13045, *Protection of Children from Environmental Health Risk and Safety Risks* (April 21, 1997).

This assessment should be completed and made publicly available with the publication of a revised DEIS.

Health Impact Assessments are not uncommon for projects like the Pebble mine. While the DEIS claims to include the components of an HIA, the listed categories of potential health and safety risks and cataloged baseline demographic information does not constitute a hard look. Health Impact Assessments have been or are being prepared for the Alaska Liquefied Natural Gas project, Ambler Mining District Industrial Access Road, Chuitna Coal Project, Donlin Gold Mine, the Susitna-Watana Hydroelectric Project[1317] and the Wishbone Hill coal mine.[1318] These assessments are important, feasible, and reasonably-required tools to ensure the agency thoroughly assesses all health-related impacts from the project.

L. Environmental Justice

Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Native American

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[1316] *See* Rajiv Bhatia, et al., *Minimum Elements and Practice Standards for Health Impact Assessment, Version 3*¸ 3–4 (North American HIA Practice Standards Working Group) (2014) (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1317] *See* Alaska Department of Health and Social Services, Webpage, HIA Program Resources, http://dhss.alaska.gov/dph/Epi/hia/Pages/program.aspx (included as an attachment to these comments).
[1318] *See* Alaska Department of Health and Social Services, Report, *Health Impact Assessment for Proposed Coal Mine at Wishbone Hill, Matanuska-Susitna Borough Alaska*, Sept. 30, 2014, Prepared by NewFields Co. for Alaska Department of Health and Social Services http://dhss.alaska.gov/dph/Epi/hia/Documents/WishboneHillCompleteHIA.pdf (included as an attachment with these comments).

tribes.[1319] The EPA also considers children, the disabled, the elderly, and those of limited English proficiency to be potential Environmental Justice communities due to their unique vulnerabilities.

This guidance includes six principles for environmental justice analyses to determine any disproportionately high and adverse human health or environmental effects to low-income, minority, and tribal populations. These principles are:

- Consider the composition of the affected area to determine whether low-income, minority, or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations;
- Consider relevant public health and industry data concerning the potential for multiple exposures or cumulative exposure to human health or environmental hazards in the affected population, as well as historical patterns of exposure to environmental hazards;
- Recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed action;
- Develop effective public participation strategies;
- Assure meaningful community representation in the process, beginning at the earliest possible time; and
- Seek tribal representation in the process.[1320]

Additionally, per the Executive Order 12898, "Federal Agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal Agencies shall communicate to the public the risks of those consumption patterns."[1321] It is particularly important that human health exposure and pathways for contaminants and other impacts from the proposed project be fully discussed and mitigation measures developed in close consultation and coordination with the communities. This should include a discussion regarding any human health or cultural impacts from the proposed project, as well as any risk from accidents or failures along the transportation corridor and at the proposed mine site.

The impacts to subsistence are not just lost food sources. Impacts include threats to and the loss of:

- Healthy subsistence way of life;
- Subsistence practices;

[1319] Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, Feb. 11, 1994, https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1320] *See* EPA *Envtl. Justice and Nat'l Envtl. Policy Act*, https://www.epa.gov/environmentaljustice/environmental-justice-and-national-environmental-policy-act (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1321] Exec. Order No. 12,898, 59 Fed. Reg. No. 32 (Feb. 16, 1994).

- Cultural connections to the past;
- Connection to specific places;
- Teaching and learning of subsistence ways;
- Sharing networks; and
- Individual, community, and cultural identity.

According to the Council on Environmental Quality's *Environmental Justice Guidance under the National Environmental Policy Act*, when determining whether environmental effects are disproportionately high and adverse, agencies should consider the following factors:

- Whether environmental effects are or may be having an adverse impact on minority populations, low-income populations, or Indian tribes that appreciably exceeds or is likely to appreciably exceed those on the general population or other appropriate comparison group; and
- Whether the disproportionate impacts occur or would occur in a minority population, low-income population, or Indian tribe affected by cumulative or multiple adverse exposures from environmental hazards.[1322]

In addition to the considerations identified above, an environmental justice analysis should address:

- *Demographic Analysis*. Gather geographic and demographic data about the area affected by the proposed action to determine whether minority populations, low-income populations, or tribes are present, and if so whether there may be disproportionately high and adverse human health or environmental effects on these populations.
- *Baseline Conditions*. Consult relevant public health data and industry data to establish the potential for multiple or cumulative exposure to human health or environmental hazards in the affected population and historical patterns of exposure to environmental hazards, to the extent such information is reasonably available.
- *Characterization*. Describe the direct, indirect, and cumulative effects of the proposed action within this context: As noted above, this requires the Corps to recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed agency action. These factors should include the physical sensitivity of the community or population to particular impacts; the effect of any disruption on the community structure associated with the proposed action; and the nature and degree of impact on the physical and social structure of the community. Attention should be given to consideration of the dependence of local communities on local and regional subsistence resources, access to those resources, and perception of the quality of those resources. In addressing potential adverse impacts, measures for

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[1322] Council on Envtl. Quality (Dec. 10, 1997). *Envtl. Justice Guidance Under the Nat'l Envtl. Policy Act*, 9 https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

> avoidance or minimization of those impacts should be considered before resorting to mitigation measures. Where avoidance or minimization is not possible, the Corps should develop appropriate mitigation measures and agreements. These should be developed with input from the affected population in a consensus-based process. Agreements should be developed between the project proponent and the EJ communities. The EIS should include a summary conclusion or an EJ determination which concisely expresses whether impacts have been appropriately avoided, minimized, and/or mitigated.

The cultural, social, psychological, and spiritual aspects of subsistence way-of-life should be considered in addition in the socioeconomic, environmental justice, and human health impact assessments.[1323]

The environmental justice analysis in the DEIS falls short by failing to adequately assess impacts to subsistence resources. The DEIS states:

> Project construction—and to a lesser extent, operations—would impact the availability and abundance of traditional and subsistence resources through habitat loss; behavioral disturbance to resources from increased noise and human activity; fugitive dust deposits on vegetation; concerns about contamination of resources; avoidance of traditional use areas; and increased costs and times for traveling to more distant areas.[1324]

None of these impacts are quantified in any meaningful way. Generally identifying that a community would be impacted but not assessing in a qualified and quantified way how those impacts will affect the community does not constitute a hard look.

The DEIS also underestimates impacts from the project on the environment, including fish throughout the Nushagak system. This, in turn, precludes the agency from understanding the actual anticipated impacts and assessing those impacts under the environmental justice filter.

The DEIS makes a number of unsupported assumptions about how contaminants will not escape into the environment. A single full tailings breach would have disastrous results on the downstream environment leading to substantial impacts to subsistence resources. Oil spills along the transportation corridor, the port, or mine site could all have significant impacts on subsistence resources. As noted above, the DEIS must assess human health exposure and pathways for contaminants. If the DEIS inaccurately characterizes the likely fate and transport of contaminants, then its analysis regarding impacts of subsistence resources not being exposed to contaminants is also inaccurate. Because the DEIS fails to adequately assess likely release of contaminants into

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[1323] *See* Promising Practices for EJ Methodologies in NEPA Reviews, March 2016 (previously provided as an attachment with Trustees for Alaska's scoping comments). *See also* Environmental Protection Agency, "Environmental Justice Considerations in the NEPA Process." https://www.epa.gov/environmentaljustice/environmental-justice-and-national-environmental-policy-act.

[1324] DEIS at 4.4–5.

the ecosystem, the DEIS has not adequately assed the likely impacts to users of subsistence resources.

M. Tailings Storage Facility Failures

"Large-scale catastrophic release of tailings and contact water is one of the most significant risks posed by the Pebble project."[1325] The DEIS has failed to take a hard look at such risk. Rather,

> the release scenarios evaluated by the DEIS are anomalously small, representing only 1) 0.004% of produced bulk tailings which must be contained on-site forever; 2) 0.6% of produced pyritic tailings which must be contained on-site during operation; and 3) 0.4% of untreated process water which must be contained on-site during operation. The only bulk tailings release scenario that is evaluated by the DEIS assumes a brief six-hour pipeline break and therefore does not even consider containment failure associated with the tailings storage facility itself.[1326]

"Any untreated water or tailings released from the site will discharge directly into the North and/or South Forks of the Koktuli River."[1327]

1. PLP completely redesigned its proposed tailings storage facility after submitting its original 404 application.

Since submitting its original 404 application in December 2017, PLP has majorly redesigned its proposed tailings storage facility. The design proposed in PLP's original application for a CWA 404 permit included separate storage cells for bulk tailings and pyritic tailings.[1328] The design allowed for a total storage capacity of 135 million tons of pyritic tailings and 950 million tons of bulk tailings.[1329] The bulk tailings cell had four embankments: main (600 feet), south (350 feet), east (60 feet) and internal (420 feet).[1330] The pyritic cell had a south embankment of 250 feet.[1331] The downstream embankment slopes were to be maintained at approximately 2.6H:1V (horizontal:vertical), including buttresses established at the downstream toe of the main embankment.[1332] The final embankment crest elevation would have been approximately 1,770 feet above sea level for the main, east, and internal embankments.[1333]

PLP subsequently redesigned the tailings storage facility.[1334] PLP revised its plans in its May 2018 *Technical Note* by separating the facilities; one for bulk tailings and another for the

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[1325] Borden, 2019e at 1.
[1326] *Id.*
[1327] *Id.* at 3.
[1328] December 22, 2017 Project Description at 40.
[1329] *Id.*
[1330] *Id.* at 29.
[1331] *Id.* at 28.
[1332] *Id.* at 41.
[1333] *Id.*
[1334] *See* Technical Note at 2–3.

potentially acid-generating tailings.[1335] At that time, PLP provided scant details on the new designs. PLP did not include any schematics, diagrams, figures or descriptions that identified the facilities and types of details included in PLP's original 404 application. Seven months later, PLP updated its application with a new Proposed Description.[1336] The revised application and Project Description included substantial changes to the tailings design and post-closure plans. The bulk tailings storage facility's approximate capacity is 1,140 million tons, with a main embankment height of 545 feet and a south embankment height of 300 feet.[1337] The main water management pond capacity is 2,450 M cubic feet (56,300 ac-ft) with an embankment height of 190 feet.[1338] The pyritic tailings storage facility has an approximate capacity of 155 million tons for tailings and 50 million tons for potentially acid-generating waste, with a south embankment height of 305 feet, north embankment height of 425 feet and an east embankment height of 315 feet.[1339]

The 2018 Project Description states:

> The main embankment of the bulk [tailings storage facility] will function as a permeable structure to maintain a depressed phreatic surface in the embankment and in the tailings mass in proximity to the embankment. A basin underdrain system will be constructed at various locations throughout the bulk [tailings storage facility] basin to provide preferred drainage paths for seepage flows. The pyritic [tailings storage facility] will be a fully lined facility. The pyritic [tailings storage facility], which will also contain the [potentially acid-generating] waste, will have a full water cover during operations, while the bulk tailings cell will have a relatively small supernatant pond, located away from the embankments, to promote large tailings beach development upstream of the embankments.[1340]

Regarding embankment slopes, the 2018 Project Description includes the same horizontal:vertical ratios as in the 2017 design:

> The bulk [tailings storage facility] downstream embankment slopes will be maintained at approximately 2.6H:1V (horizontal:vertical), including buttresses established at the downstream toe of the main embankment. The final embankment crest elevation will be approximately 1,730 feet above sea level for bulk [tailings storage facility]. Embankment heights, as measured from lowest downstream slope elevation, will be 545 feet (main) and 300 feet (south).
> The pyritic [tailings storage facility] embankment slopes will be maintained at 2.6H:1V. The final crest elevation will be 1,710 feet above sea level. The north embankment height will be 425 feet, the south embankment height will be 305 feet, and the east embankment height will be 315 feet.[1341]

[1335] *Id.*
[1336] *See generally* 2018 Project Description.
[1337] 2018 Project Description at 27.
[1338] *Id.*
[1339] *Id.* at 26.
[1340] *Id.* at 37.
[1341] *Id.*

2. *Geotechnical data gaps preclude a hard look at tailings dam location and stability.*

Geotechnical data gathered by the applicant is essential for a hard look analysis of tailing facilities. Because the stability of a dam is dependent on the foundation,[1342] the applicant must have adequate geotechnical data to determine potential appropriate sites for embankments and impoundments.[1343] The Greens Creek mine design and ultimate location illustrates the need for this data. An EIS was prepared for Greens Creek prior to completion of the geotechnical program.[1344] The data from the drilling indicated that the location assessed in the EIS would not support the weight of the tailings dam.[1345] Because the location needed to be changed, a supplemental environmental review was required.

PLP has moved the site of its dam location after filing its 404 application and is currently in the process of obtaining geotechnical data. But this information will not be available for the Final EIS.[1346] The Corps is unable to take the requisite hard look at impacts without this information and is unable to consider alternative locations.

The DEIS also lacks requisite details to adequately analyze the structural stability of the tailings dams and how they will stand up to seismic hazards. In April 2018, AECOM identified that "[t]he Project Description provides limited information necessary to evaluate the stability of the [tailings storage facility] under static and seismic conditions."[1347] Responding to the RFI, Knight Piesold stated that a stability analysis was done in 2011. However, as Chambers notes, the 2011 analysis was of a single tailings storage facility with centerline construction that

> had a conventional impermeable zone to prevent the infiltration of water into the dam. The Bulk Tailings dam . . . in the DEIS does not have an impermeable zone. This makes the static and seismic stability for the two dams different. They are not comparable for these analyses. And, as noted above, the probabilistic earthquake information has changed, which impacts the seismic analysis.[1348]

Knight Piesold also said that the stability analyses for the pyritic tailings storage facility, including seismic analysis, would be "updated as the design progresses."[1349] This analysis has not been completed. Without it, the DEIS is unable to adequately assess the stability of both the bulk and pyritic tailing storage facilities under seismic conditions:

> Despite the significant seismic hazards at Pebble, there has been no seismic stability analysis conducted for the specific embankment designs proposed in the DEIS. . . . Thus, the stability of all key containment structures in response to

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[1342] *See* Environmental Protection Agency, Technical Report, *Design and Evaluation of Tailings Dams*, Aug. 1994, at 11 (included as an attachment to these comments).
[1343] *See* Chambers 2019 at 7.
[1344] *Id.*
[1345] *Id.*
[1346] *See* RFI 014a.
[1347] RFI 008.
[1348] Chambers, 2019 at 13.
[1349] RFI 008 Response.

> seismic events and actual foundation conditions has not been definitively demonstrated and there are no plans to do so for the EIS. This is a potential fatal flaw for all impoundments, but for the bulk tailings impoundment in particular, because it must ensure containment forever, not just during operation. . . . The risk posed by a catastrophic geotechnical failure is unlikely to decline as significantly as implied by the term "dry closure" used in the DEIS.[1350]

These are critical gaps that precludes the Corps from making any conclusions about stability or probability of failure.

3. Tailings failures are becoming more frequent and more serious.

Tailings dam failures for large mines are common and occur frequently.[1351] For recent examples, one need look no further back than April of 2019.[1352] The concern over the rise in tailings failures is supported by a number of reports and studies.

In 2015, a report titled *The Risk, Public Liability & Economics of Tailings Storage Facility Failure*, found that the rate of serious tailings dams failures is increasing, that the rate of failures is propelled by, not in spite of, modern mining practices, and that the cost of cleanup exceeds what mining companies can afford.[1353] The report concluded that regulators must "look beyond 'mechanisms of failure' to the fundamental financials of the miner, the mine, and mega trends that shape decisions and realities at the level of miner and individual mine."[1354]

In an effort to further expand upon *The Risk, Public Liability & Economics of Tailings Storage Facility Failure* report, a study was undertaken that evaluated four tailings dam failures, including Mt. Polley and the two recent tailings disasters in Brazil.[1355] The report, *Why have so*

[1350] Borden, 2019e at 4–5.
[1351] *See e.g.*, World Information Service on Energy Uranium Project, Website*, Chronology of Major Tailings Dam Failures* (last updated June 5, 2019), http://www.wise-uranium.org/mdaf.html (included as an attachment with these comments). Meanwhile, the Brazilian Gongo Soco mine, owned by the Vale S.A. mining company, is teetering on the brink of a major tailings dam collapse. *See* BBC News, *Brazil's Vale Warns Another Mining Dam at Risk of Collapse*, May 17, 2019, https://www.bbc.com/news/world-latin-america-48308092 (included as an attachment with these comments); BBC News*, Brazil's Barao de Cocais Waits as Dam Nearby at Risk of Collapse*, May 24, 2019, https://www.bbc.com/news/world-latin-america-48391767 (included as an attachment with these comments).
[1352] World Information Service on Energy Uranium Project*, Chronology of Major Tailings Dam Failures* (last updated June 5, 2019).
[1353] Lindsay Newland Bowker & David M. Chambers, *The Risk, Public Liability, & Economics of Tailings Storage Facility Failures* (July 21, 2015) https://earthworks.org/cms/assets/uploads/archive/files/pubs-others/BowkerChambers-RiskPublicLiability_EconomicsOfTailingsStorageFacility%20Failures-23Jul15.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments)
[1354] *Id.* at 2.
[1355] *See* Armstrong, M., et al., *Why Have so Many Tailings Dams Failed in Recent Years, Resources Policy* 63:101412, May 22, 2019 (included as an attachment to these comments).

many tailings dams failed in recent years? was released in May 2019 and focuses on how and why cost cutting and increasing production leads to tailings failures.[1356] Noting that the "number of tailings dams failures has doubled in recent years," the report found that "the cost reductions and increases in ore production identified by Bowker and Chambers (2015) had occurred in" both the Mt. Polley mine and Los Frailes mine dam failures.[1357] The report also noted that production at the Samarco mine had increased by about 40% in just over a year.[1358] The "existing tailings facilities had to cope with larger quantities of tailings."[1359] The report hypothesizes that efforts to drive short-term profits may lead managers to take more risks.[1360]

Tailings dams have a high rate of failure, occurring at a worldwide rate of roughly one failure every 8 months.[1361] Alarmed over the frequency and size of tailings failures across the world, the United Nations Environmental Programme prepared a report titled *Mine Tailings Storage: Safety is No Accident*.[1362] The report concluded that "the number of serious failures has increased, despite advances in the engineering knowledge that can prevent them."[1363] The report also noted that

> The challenge of safely storing mine waste is growing in scale and complexity. Over the last few decades, the tailings-to-ore ratio has been increasing, as mineral deposits with increasingly lower ore grades are mined (Mudd 2007). The fate of this increasing volume of waste is a major focus of the debate on the general sustainability of mining and the practicalities of storing ever-increasing quantities of tailings. This is a challenge that could be further complicated by the increased severity and occurrence of extreme weather events expected under climate change predictions (Franks et al. 2011).[1364]

In another 2017 report, *In the Dark Shadow of the Supercycle Tailings Failure Risk & Public Liability Reach All Time Highs* (*Supercycle Tailings Failure Risk*), the authors confirmed

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[1356] *Id.* at 1.
[1357] *Id.* at 6–7.
[1358] *Id.* at 7.
[1359] *Id.*
[1360] *Id.*
[1361] David Chambers & Bretwood Higman, *Long Term Risks of Tailings Dam Failure* (Oct. 2011) (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* David Chambers, *Long Term Risk of Releasing Potentially Acid Producing Waste Due to Tailings Dam Failure* (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1362] *Mine Tailings Storage: Safety Is No Accident. A UNEP Rapid Response Assessment*. United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal (Charles Roche, Kristina Thygesen, & Elaine Baker eds. 2017) https://gridarendal-website-live.s3.amazonaws.com/production/documents/:s_document/371/original/RRA_MineTailings_lores.pdf?1510660693 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1363] *Id.* at 6.
[1364] *Id.* at 16; *see also* Armstrong 2019 at 8.

that the frequency of significant tailings failures is on the rise, as well as the severity of those failures. The report found that:

> It is irrefutable that the frequency and consequence of Very Serious Failures and of Serious Failures is continuing to increase at alarming rates, that the trend emerged and grew post 1990 and that it is in large part a consequence of conscious decisions made at the mine-level to make up for fundamental mine and miner specific economic disadvantages viz. global economics.[1365]

The report draws a direct correlation between the economics of mining and tailings failure. It notes that ore production volume and the mining cost per tonne of ore are key economic variables in high failure frequency and severity.[1366] The report concludes that regulators are not adequately accounting for the economic viability of mines and that the current market pressures (fallout of the supercycle dysfunctions) will lead to "higher than previously expected Serious and Very Serious Failures."[1367]

A 2002 report, titled *Tailings Impoundment Failures: Are Geotechnical Engineers Listening?*, found that:

> Tailings impoundments are some of the largest man-made structures. The largest dam ever constructed is a tailings dam. Tailings impoundments are also one of the most technically challenging elements in geotechnical practice. . . . Mine tailings impoundment failures are occurring at relatively high rates. Worldwide, the mining industry has experienced several significant impoundment failures per year over the past 30 years. . . . Many of these failure events have resulted in massive damage, severe economic impact and, in several cases, loss of life. The rate of failure is approximately ten times that for water retention dams. . . . Tailings impoundments can have environmental "failure" while maintaining sufficient structural integrity (e.g. impacts to surface and ground waters). . . . Within the full spectrum of failure modes that have occurred at large tailings impoundments, static liquefaction is likely the most common, and at the same time likely the least understood. . . . Static liquefaction, and the resulting flowslide of liquefied tailings materials, is indeed a relatively common phenomenon among the more dramatic tailings impoundment failure case histories. Static liquefaction can be a result of slope instability issues alone, or can be triggered as a result of other mechanisms.[1368]

[1365] *See* Bowker, Lindsey N. & Chambers, David, *In the Dark Shadow of the Supercycle Tailings Failure Risk & Public Liability Reach All Time Highs*, Bowker Associates Science & Research in the Public Interest & Center for Science in Public Participation, Oct. 21, 2017, at 3.
[1366] *Id.* at 9.
[1367] *Id.* at 17–18.
[1368] Michael Davies, *Tailings Impoundment Failures: Are Geotechnical Engineers Listening?* Waste Geotechnics (2002) (previously provided as an attachment with Trustees for Alaska's scoping comments).

The report reviewed tailing failure cases across the world and found several trends relevant to the proposed Pebble Mine, including:

- Active impoundments are more susceptible to failure;
- Upstream dams are more susceptible to liquefaction flow events; and
- For active impoundments, overtopping is cited as the primary failure mode in nearly half of the reviewed incidents.[1369]

Notably, the report concludes that each and every failure was predictable.[1370] For all the cases in the past 30 years reviewed by the report, "[t]here was lack of design ability, poor stewardship (construction, operating or closure) or a combination of the two, in each and every case history."[1371] The failures have involved "elementary engineering issues and/or basic operating issues."[1372]

This opinion is confirmed by the 2017 *Supercycle Tailings Failure Risk* report discussed above. That report found that "[v]irtually all Very Serious Failures in recorded history were preventable, either by better design or by better operational management."[1373] Citing Mt. Polley as an example, the report identifies that the company deviated from construction design.[1374] One of the experts convened to an independent review panel of the Mt. Polley tailings failure noted:

> Tailings dams are complex systems that have evolved over the years. They are also unforgiving systems, in terms of the number of things that have to go right. Their reliability is contingent on consistently flawless execution in planning, in subsurface investigation, in analysis and design, in construction quality, in operational diligence, in monitoring, in regulatory actions, and in risk management at every level. All of these activities are subject to human error. . . Without exception, dam breaches produce tailings releases. This is why best practices can only go so far in improving the safety of tailings technology that has not fundamentally changed in the past hundred years. Improving technology to ensure against failures requires eliminating water both on and in the tailings: water on the surface, and water contained in the interparticle voids. Only this can provide the kind of failsafe redundancy that prevents releases no matter what.[1375]

1369 *Id.* at 5.
1370 *Id.*
1371 *Id.*
1372 *Id.*
1373 *See* Bowker, Lindsey N. & Chambers, David, *In the Dark Shadow of the Supercycle Tailings Failure Risk & Public Liability Reach All Time Highs*, Bowker Associates Science & Research in the Public Interest & Center for Science in Public Participation, Oct. 21, 2017, at 5.
1374 *Id.* at 6; *see also Report on Mount Polley Tailings Storage Facility Breach* (Jan. 30, 2015) https://www.mountpolleyreviewpanel.ca/final-report (previously provided as an attachment with Trustees for Alaska's scoping comments).
1375 Report on Mount Polley Tailings Storage Facility Breach (Jan. 30, 2015) at 119.

The 2017 *Supercycle Tailings Failure Risk* report also notes that the Fundão dam failure in Brazil was due to both construction flaws and operational deviations.[1376] Due to the frequency and consequences of tailings failures, the International Council on Mining and Metals provides the following recommendations and guidelines:

- The tailings facility infrastructure and management requirements must be informed by the potential for the facility to do harm. *As such the baselines that characterize the residue source and the potential impacts on the environment and the extent of physical impact in the "zone of influence" associated with a potential dam break must be well understood at the outset.* The consequence classification of the tailings facility must follow from this understanding.
- All phases of the life cycle and in particular the design and operational phases should be informed by and take into account the possible failure consequences identified in a formal risk analysis which is recorded in a risk register and periodically updated. The identification of failure modes, assignment of likelihoods of occurrence and development of mitigation strategies should be carried out by suitably qualified individuals.
- The stringency of the design and analysis methods used should be based on the consequence classification of the facility and should include the use of state of practice analysis methods and references. The design must be informed by the risk assessment and the essential requirements for operation upon which success of the design depends should be comprehensively captured in the construction and operational specifications.
- Independent review by suitably qualified and experienced professionals should take place at appropriate milestones and intervals during each of the design, construction, and operation phases.[1377]

[1376] *See* Bowker, Lindsey N. & Chambers, David, *In the Dark Shadow of the Supercycle Tailings Failure Risk & Public Liability Reach All Time Highs*, Bowker Associates Science & Research in the Public Interest & Center for Science in Public Participation, Oct. 21, 2017, at 6; *see also* Flavio Fonseca do Carmo, et al., Fundao Tailings Dam Failures: The Environmental Tragedy of the Largest Technical Disaster of Brazilian Mining in Global Context, Associação Brasileira de Cienca Ecologica e Conservacao, July 2017, (previously provided as an attachment with Trustees for Alaska's scoping comments); Fatal Brazilian Mine Waste Disaster Shows Modern Mining Is Increasingly Dangerous, Earthworks (Nov. 6, 2015), https://earthworks.org/media-releases/fatal_brazilian_mine_waste_disaster_shows_modern_mining_is_increasingly_dan/ (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1377] International Council on Mining and Metals, *Review of Tailings Management Guidelines and Recommendations for Improvement*, Dec. 2016, at 5 (emphasis added) (included as an attachment with these comments); *see also* Chambers, 2019 at 8 ("Probably the only universally-adopted requirement coming out of the Mount Polley dam failure was that each large tailings dam should have an Independent Tailings Review Board (Panel). British Columbia, Montana, the Mining Association of Canada all require/recommend an ITRB. Yet, even though PLP has not only begun design of its tailings dams, but has also submitted this design for analysis in an EIS, there is no ITRB involved. This is the critical time for independent review, at the early design stage. If PLP waits until the dam has essentially been designed, then its review flexibility is severely limited.").

These benchmarks have not been met for the proposed Pebble Mine.

Tailings failures are becoming so common that investors are requesting more details about mining company operations and maintenance. In 2019, the Church of England and several Swedish pension funds, which invest billions of dollars in global sectors including mining, encouraged big mining companies to disclose details about their dams.[1378] In response, Anglo American PLC, Barrick Gold Corp., Newmont Goldcorp Corp., BHP Group Ltd., Freeport-McMoRan Inc. and Glencore PLC each issued documents tallying up details about their dams, including their location, size and type of design.[1379] One of the questions posed was whether the mining company had conducted a formal analysis of the downstream impacts on communities and the environment in the event of a catastrophic failure.[1380] As an example, Rio Tinto had analyzed downstream impacts from a catastrophic failure for 96 of 136 dams.[1381]

Astoundingly, PLP is asserting that risk of catastrophic failure is so low that they need not consider it. PLP provides no support for this conclusion.

4. A complete tailings failure is reasonably foreseeable.

The DEIS does not consider the possibility of a complete tailings failure, instead asserting that "[t]he probability of a full breach of the bulk or pyritic [tailings storage facility] tailings embankments was assessed to be extremely low."[1382] Based on this erroneous conclusion, the DEIS goes on to state that "[m]assive, catastrophic releases that were deemed extremely unlikely were . . . ruled out for analysis in the EIS."[1383] Whether the likelihood of a catastrophic event is extremely low or unlikely is not the appropriate bar for dismissing a review of such an event in an EIS.

The Corps' dismissal of this critical analysis is inconsistent with the Council on Environmental Quality's regulations implementing NEPA. An agency must consider the direct, indirect, and cumulative effects of a proposed action.[1384] The DEIS recognizes that the 78-year mine expansion is a reasonably foreseeable future action.[1385]

"[R]easonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason.[1386] The Ninth Circuit has established that low probability events must be assessed unless they are

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[1378] *See* Alistair MacDonald, *Big Mining Companies Disclose Questionable Stability of Dams*, Wall St. Journal, June 8, 2019 (included as an attachment with these comments).
[1379] *Id.*
[1380] Rio Tinto, Mine Tailings Disclosure Table, June 12, 2019, https://www.riotinto.com/documents/RT_tailings_storage_facilities_12Jun19.xlsx (included as an attachment with these comments).
[1381] *Id.*
[1382] DEIS at 4.27–72.
[1383] DEIS at 4.27–75.
[1384] 42 U.S.C. § 4332(2)(C); *see also* 40 C.F.R. §§ 1502.16, 1508.7, 1508.8, 1508.25(a)(2).
[1385] DEIS at 4.1–8, Table 4.1–1.
[1386] 40 C.F.R. § 1502.22.

"remote and highly speculative."[1387] As discussed above, the 2019 Wobus Memo lays out why an analysis of a complete tailings failure is "supported by credible scientific evidence," is not "pure conjecture," or "remote and highly speculative" and is well within the rule of reason given the known history of tailings failures. Borden, in turn, concludes that:

> Large-scale catastrophic release of tailings and contact water is one of the most significant risks posed by the Pebble Project and the DEIS' intentional failure to evaluate the impacts of any catastrophic release events cannot be justified. By ignoring all potential catastrophic failure events, the release scenarios evaluated by the DEIS are anomalously small, representing only 1) 0.004% of produced bulk tailings that must be contained on-site forever; 2) 0.6% of produced pyritic tailings that must be contained on-site during operation; and 3) 0.4% of untreated process water that must be contained on-site during operation. Even a release of just five percent of the bulk or pyritic tailings is likely to have profound, permanent negative impact on downstream aquatic ecosystems and fisheries.[1388]

5. The DEIS underestimates the long-term risk of a tailings dam failure.

The decision of whether to assess the impacts of a complete tailings failure was reportedly based on the outcomes of a workshop on "Failures Modes and Effects Analysis."[1389] The workshop[1390] narrowly constrained the EIS analysis to only those failures that had a reasonable chance of occurring during the 20-year operational life of the mine.[1391] The workshop noted that "[a full tailings breach was] ruled out as remote during the 20-year operational life due to likelihood of successful detection and intervention."[1392]

Notably, the workshop's outcomes were significantly constrained by the pre-established objective of the workshop, as defined by AECOM.[1393] AECOM staff provided a "Pre-Workshop [Failures Modes and Effects Analysis] Participant Information summary document"[1394] where AECOM set out that minor failures have a "reasonable probability of occurrence" but that "[m]assive catastrophic failures (full embankment breach) . . . are statistically improbable."[1395] As Dr. Wobus notes,

[1387] *See* e.g., San Luis Obispo Mothers for Peace v. NRC, 449 F.3d 1016, 1031 (9th Cir. 2006); Warm Springs Dam Task Force, 621 F.2d at 1026.
[1388] Borden, 2019b at 3–4.
[1389] AECOM Pebble EIS-phase failure modes and effects analysis workshop report. Dec. 2018 (FMEA Workshop Report) (included as an attachment to these comments).
[1390] The Failures Modes and Effects Analysis workshop included members from AECOM, the Corps, Pebble, Knight Piesold (PLP's consultant), and DNR.
[1391] *Id.*
[1392] *Id.*
[1393] Wobus, 2019 at 15.
[1394] *See* Allison Payne, Email, AECOM to Failures Modes and Effects Analysis Workshop attendees, Oct. 08, 2018 (included as an attachment to these comments).
[1395] *See* AECOM, Pebble EIS Failure Modes and Effects Analysis Workshop Participant Information at 2, included as an attachment to Allison Payne, Email, AECOM to Failures Modes and Effects Analysis Workshop attendees, Oct. 08, 2018 (included as an attachment to these

> This tells the workshop participants ahead of time that a full [tailings storage facility] failure should not be considered in the [Failures Modes and Effects Analysis] workshop analysis. Table 1 in the workshop participant information shows that "Low" probability events are defined as those with a 0.01 to 0.1% annual probability of occurrence; based on the numbers quoted in the DEIS, as described above, the probability of a [tailings storage facility] breach is in the middle of this range, at approximately 0.05% annual probability. Given the high potential consequence of a [tailings storage facility] failure as described above, a full [tailings storage facility] breach should have been considered per NEPA guidelines due to the "reasonable level of probability and a comparative high level of consequence."[1396]

By defining a full breach as statistically improbable, AECOM precluded the review of such an event from the DEIS prior to having the workshop to determine what type of failure scenarios should be assessed.

In a subsequent pre-meting email, Allison Payne, of AECOM, prioritized the type of failure scenarios that should be evaluated.[1397] Payne pointed out that the "initial emphasis was on considering failures from the three largest embankments [Bulk tailings storage facility, Pyritic tailings storage facility, and Main Water Management Pond], thus including all three potential materials for release (bulk tailings, pyritic tailings, contact water)."[1398] But, because fish habitat experts identified that the South Fork Koktuli provides higher quality habitat, addressing failures from the southern embankments of the bulk tailings storage facility and pyritic tailings storage facility were "now a higher priority for the workshop."[1399] The southern embankments would be constructed with the downstream method while the northern embankment for the bulk tailings storage facility would be constructed with centerline construction.[1400] Payne noted that "[d]ownstream construction embankments are considered to be a more robust design than centerline construction embankments and would have a lower probability of failure."[1401] Consequently, "probability of failure for those two different types of embankments would require two separate, unique assessments."[1402] Payne concluded that AECOM has

> determined that including a failure scenario of the Pyritic [tailings storage facility] south or east embankments is a higher priority than the Bulk [tailings storage facility] south embankment. Therefore, the scope of the workshop has been modified to assess potential failures of: (1) Bulk [tailings storage facility] main embankment; (2) Main [water management pond] embankment; (3) Pyritic

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comments).
1396 Wobus, 2019 at 15.
1397 *See* Allison Payne, Email, AECOM to Workshop Attendees, Oct. 17, 2018 (included as an attachment to these comments).
1398 *Id.* at 1.
1399 *Id.*
1400 *Id.*
1401 *Id.*
1402 *Id.*

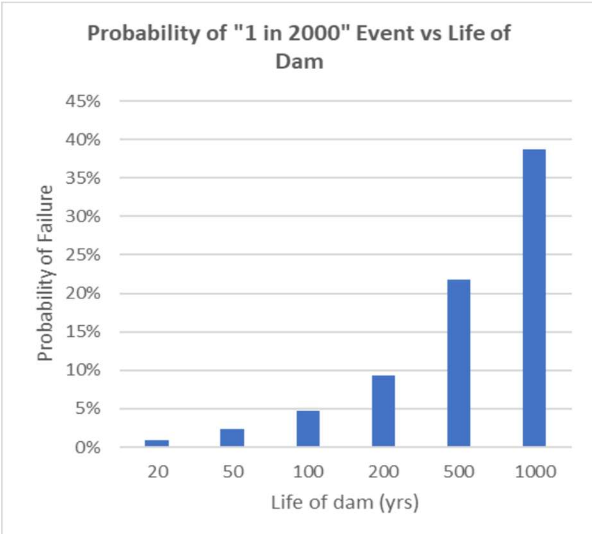
> [tailings storage facility] north embankment; and (4) Pyritic [tailings storage facility] south or east embankment.[1403]

As a result, prior to the workshop, AECOM not only precluded review of a full tailings embankment failure, but also set out that certain failures, including failure of the less robust centerline constructed northern embankment for the bulk tailings storage facility was a lower priority. The Corps should have interceded and instructed that NEPA requires consideration of all potential failures, unless they are remote or speculative. Prioritization for purposes of staying on schedule are irrelevant. Dr. Wobus concludes:

> The examples above illustrate how the [Failures Modes and Effects Analysis] process in the DEIS was steered away from an objective assessment of risk; how speed, rather than accurate scientific analysis, was the most important objective driving the DEIS process; and how critical cooperating agency comments regarding dam failure risk were ignored in preparing the DEIS.[1404]

As noted above, the reasoning offered to preclude review of a variety of tailings failures, including complete failures of both north and south embankments, is inconsistent with the requirements of NEPA. Given that the 78-year mine is a reasonably foreseeable future action, the 20 years is an inappropriate time period; any assessment must at least analyze a 78-year life span and the potential cumulative impacts from an expansion from a 20-year mine to a 78-year mine. Those potential impacts include tailings failures. Further, since the water balance calculations indicate that the bulk tailing facility may remain saturated indefinitely, the risk of a tailings failure will remain in perpetuity.[1405] The DEIS indicates that the probability of a tailings storage facility dam failure is approximately 1 in 2000, for every year of dam's life.[1406]

[1403] *Id.* at 1–2.
[1404] *Id.*
[1405] Wobus, 2019 at 13.
[1406] DEIS at 4.27–73.



2019 Wobus Memo - Figure 6. Probability of a tailings storage facility failure vs time.[1407]

This probability leads to a 1% risk of failure during the first 20 years.[1408] The cumulative probability of a failure increases over time. Dr. Wobus' analysis of the probability of failure over time — based on the 1:2000 probability relied on by the Corps — establishes that there is a 5% risk of failure after 100 years, 10% after 200 years, and 22% after 500 years.[1409] A 1% risk cannot be considered remote or speculative, let alone 5% or 10%.

Also, as discussed above, there is a significant record of tailings failures across the world. The DEIS properly acknowledges that "recent tailings dam failures in China, Mexico and Australia demonstrate that modern, well-engineered tailings facilities are subject to failure."[1410] As the Lynker study notes, "none of these recent tailings dam failures were 'one-off' events. The Feijao dam failure was the 11th serious tailings dam failure in the last decade, and such catastrophic events are becoming more frequent."[1411] The following figure from World Mine Tailings Failures highlights the growing number of serious tailings storage facility failures:[1412]

1407 Wobus, 2019 at 13.

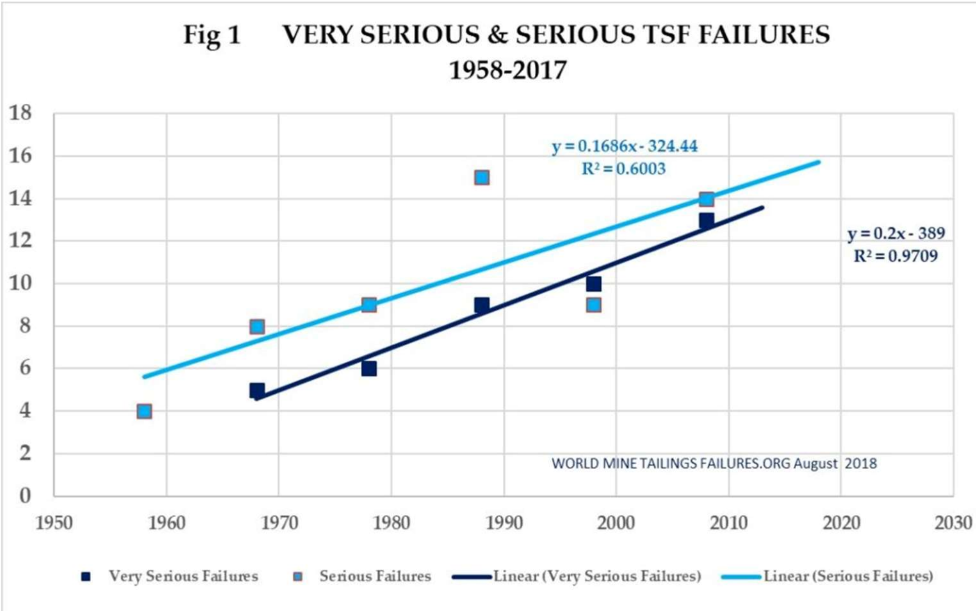
1408 *Id.* at 13, Fig. 6; *see also* Lynker Technologies, LLC, March 12, 2019, A Model Analysis of Flow and Deposition from a Tailings Dam Failure at the Proposed Pebble Mine, Prepared for The Nature Conservancy and Bristol Bay Regional Seafood Development Association (Lynker, 2019) at 1 (report and its references are included as attachments to these comments).

1409 Wobus, 2019 at 13; Lynker, 2019 at 1.

1410 DEIS at 4.27–69.

1411 Lynker, 2019 at 2 (citing World Mine Tailings Failures, Website https://worldminetailingsfailures.org/) (included as an attachment with these comments).

1412 World Mine Tailings Failures, Website, https://worldminetailingsfailures.org/.



The fact that tailings failures occur on a frequent basis to this day, even when properly designed, erodes any conclusion that: (1) a failure can absolutely be prevented; and (2) that it is beyond reason to anticipate a tailings failure. While the DEIS fails to recognize the scale and extent of tailings failures, its acknowledgment, nonetheless, supports the fact that a failure is not a remote or speculative proposition.[1413]

The information provided by PLP is insufficient to support any finding regarding the integrity of the tailing facilities or how they are impervious to failure. As the Failures Modes and Effects Analysis workshop noted, "[t]he current Pebble Project embankment designs are at an early-phase conceptual level, with geotechnical investigations still under way at the major embankment sites. This current conceptual design level inherently results in uncertainties."[1414] The DEIS, in turn, notes that "[l]ocations, alignments, configurations, sizes, capacities, and other details of the underdrains would be developed following more detailed site-specific geotechnical and geological investigations and observations made during the preliminary and detailed designs, in accordance with the [Alaska Dam Safety Program] guidelines."[1415] Yet, despite the lack of design details and underlying requisite geotechnical and geological data, PLP, AECOM, and the Corps have all already determined that a tailings failure is a remote possibility. As Dr. Wobus notes, "[g]iven this enormous level of uncertainty in the dam designs, which fundamentally affect the stability of the tailings impoundments, [the Corps] does not have enough information to evaluate the risk of a full [tailings storage facility] dam failure . . . ."[1416] The uncertainty over design is a significant matter. The Mt. Polley dam failed due to geological factors that were

[1413] Wobus, 2019 at 13.
[1414] AECOM Pebble EIS-phase failure modes and effects analysis workshop report. Dec. 2018 (FMEA Workshop Report) at 1; Chambers notes that this type of information is the type of technical documentation that should be in a DEIS. Chambers, 2019 at 8.
[1415] DEIS at 2–22.
[1416] Wobus, 2019 at 12.

unknown at the time the dam was designed.[1417] PLP is still obtaining geologic data to support its dam design, and uncertainties exist that could lead to a similar failure. These uncertainties preclude the Corps from making conclusions about the integrity of the dam or that the likelihood of a tailings failure is remote.

One of the principal factors in determining the stability of a tailings dam is the water volume behind the dam. However, given the dearth of information about design and operations, "the DEIS provides limited details on how the permeable dam will function or the timescale for how the tailings will dewater through time."[1418] The limited available information indicates that "the majority of tailings will remain saturated throughout operations, and potentially long into the post-closure phase."[1419]

The structural design of the raised embankments is another critical factor in assessing future integrity and stability. There are three principal designs used in tailing storage facilities — upstream, downstream, and centerline structures.[1420] PLP has proposed a centerline construction for the northern embankment of the bulk tailings storage facility.[1421] The DEIS correctly acknowledges that "dams designed with downstream construction methods are less likely to fail than dams using centerline construction methods, especially under seismic shaking."[1422] Despite the increased risk associated with centerline construction, the DEIS fails to incorporate this less stable design into its analysis of a potential tailings failure. Nor does the DEIS assess whether the centerline method is a valid alternative based on PLP's assertion that this less stable dam will save material.[1423] Strikingly, there is no discussion of the modified centerline design that failed at Mt. Polley.[1424]

Dr. Chambers noted that "[t]he explanation and discussion of the differences between the proposed centerline dam for the bulk tailing facility, and a downstream dam for the confining structure, is almost absent."[1425] The DEIS asserts that "the preliminary stability analysis for the downstream constructed main embankment calculated a FoS value on the order of 1.9 to 2.0 under static loading conditions, similar to that of the buttressed centerline design (Appendix K4.15, Table K4.15-5), thereby offering minimal additional stability over the Alternative 1 design."[1426] Dr. Chambers counters that

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[1417] Lynker, 2019 at 2.
[1418] Wobus, 2019 at 12.
[1419] *Id.*; *see also* RFI 019c Pebble Response noting that precipitation will maintain a post-closure water table within the tailings.
[1420] *See* Tailings.info, Website, Conventional Impoundment Storage – Current Techniques, http://www.tailings.info/disposal/conventional.htm (included as an attachment to these comments).
[1421] DEIS at ES–7.
[1422] DEIS at 4.27–3.
[1423] *See* DEIS App. B at B–69 ("There is adequate space and material to construct downstream dams at the bulk [tailings storage facility]. It would require more fill and be more expensive than the proposed centerline dam, but it does not appear to make the project uneconomic.").
[1424] Lynker, 2019 at 2.
[1425] *See* Chambers, 2019 at 5.
[1426] DEIS at 4.15–16.

> It only stands to reason that a downstream structure would have a higher factor of safety than a centerline structure designed to hold the same amount of waste. Even though a downstream dam must be higher than the centerline dam, it has approximately 50% more mass than the centerline structure. There are no explanations or calculations in the EIS that address this issue.[1427]

EPA, in its comments on a preliminary version of the DEIS, also identified concerns about the use of a centerline dam and need for independent review:

> given the size of the dams and importance of downstream aquatic resources, and for the bulk [tailings storage facility], centerline dam construction methodology (which is not as stable as downstream construction), we recommend that: (1) a Failure Modes Effect Analysis (FMEA) or other type of formal risk assessment be conducted for the dam designs; and (2) the Corps require that the tailings dam designs be independently reviewed per 33 C.F.R. 325.1 . . . . *We recommend that the FMEA/risk assessment and independent review occur now so that the results can be disclosed in the DEIS to support the Corps' hard look, as required by NEPA, at tailings dam stability and safety*.[1428]

AECOM and the Corps ignored EPA's request and recommendation, stating that the current designs are "conceptual-level" and have been reviewed by third-party Subject Matter Experts, which one can only assume is a reference to the Failures Modes and Effects Analysis workshop attendees. Given the fact that the designs are conceptual and that there has been no real independent third party review of the tailings designs, Dr. Wobus states that "[i]t is thus impossible for the Corps to take a 'hard look' at potential environmental harms, since there is

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[1427] *See* Chambers, 2019 at 5.

[1428] U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Chapter 2 – Alternatives. Feb. 26, 2019 at EPA Comment #14, at 6–7 (emphasis added); *see also* 33 C.F.R. § 325.1(d)(6) ("If the activity would involve the construction of an impoundment structure, the applicant may be required to demonstrate that the structure complies with established state dam safety criteria or that the structure has been designed by qualified persons and, in appropriate cases, independently reviewed (and modified as the review would indicate) by similarly qualified persons. No specific design criteria are to be prescribed nor is an independent detailed engineering review to be made by the district engineer."); *see also* Alistair MacDonald and Rhiannon Hoyle, *After Brazil Tragedy, Mining Firms Call for New Oversight of Waste Dams*, Wall St. Journal, Feb. 25, 2019 (mining companies are calling for an independent body to monitor risks posed by tailings dams because consulting companies compete for work with the same companies they may audit, creating an inherent conflict) (included as an attachment to these comments); *see also* Patricia Kowsmann and Samantha Pearson, *After One Auditor Flunked Brazil Dam, Vale Found Another Who Passed It*, Wall St. Journal, March 4, 2019 ("A Journal investigation found that employees of Vale and TÜV SÜD knew for months of dangerous conditions at the dam that collapsed. Yet TÜV SÜD employees certified the dam as safe, expressing worry about losing contracts with Vale, a major client, the investigation found.") (included as an attachment to these comments).

currently no way to assess the stability of the tailings dams, the risk of failure, or the consequences of failure."[1429]

All the existing evidence indicates that a risk of failure is not remote or speculative. The lack of information, due to the conceptual design, also precludes any affirmative conclusions that can overcome the significant existing evidence that a failure is far from remote, especially over the full 78-year period. The Corps has improperly rejected a review of a full breach tailings failure on specious and unsupported assessments that such a failure is statistically improbable.

6. A tailings failure would be catastrophic.

Because the DEIS failed to analyze a complete failure, Lynker (2019) developed its own physically-based model of the downstream fate and transport of complete bulk tailings dam failure.[1430] Lynker prefaced its analysis by stating that conducting an analysis of tailings storage facility failures rests with the Corps.[1431] However, given the fact that neither PLP nor the Corps have conducted a meaningful analysis of potential tailings failures, Lynker undertook its own modeling analysis. Lynker's modeling extends modeling done by the EPA for the Watershed Assessment.[1432] The EPA analysis had a model domain that extended approximately 30 kilometers downstream of the tailing facility.[1433] The EPA analysis found that tailings would be transported far beyond the model boundary and that the effects would likely be long-lasting:

> Deposited tailings and their leachate would persist at toxic levels for decades. The acute effects of a tailings spill would extend beyond the modeled 30-km (18.6 mi) distance downstream.[1434]

The Lynker study extended the EPA analysis in two ways: (1) extending the modeling domain approximately 140 kilometers down the Koktuli river system, and (2) simulated the tailings storage facility failures as a non-Newtonian flow due to the fact that the material released has a very high sediment concentration.[1435] Lynker points out that the goal of the modeling analysis was to "simulate a range of plausible failure scenarios based on both site-specific characteristics and general observations from other [tailings storage facility] failures in the recent past, and to use this range of parameters and scenarios to bracket the types if impacts that might be expected."[1436]

The type of modeling analysis performed by Lynker — FLO 2D — is the exact type of analysis that was identified by Frank Lan, an AECOM engineer.[1437] Specifically, Frank Lan stated "[a]ssuming non-Newtonian to model Newtonian fluid will result in higher flow velocity, smaller

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1429 Wobus, 2019 at 16.
1430 *Id.* at 13; *see also* Lynker, 2019 at 3.
1431 Lynker, 2019 at 3.
1432 *Id.*
1433 *Id.* at 2; *see also* BBWA at 9–45.
1434 BBWA at 9–45.
1435 Lynker, 2019 at 3.
1436 *Id.*
1437 *See* Frank Lan, Email, AECOM to Violeta Martin, Knight Piesold, et al., Nov. 9, 2018 (included as an attachment to these comments).

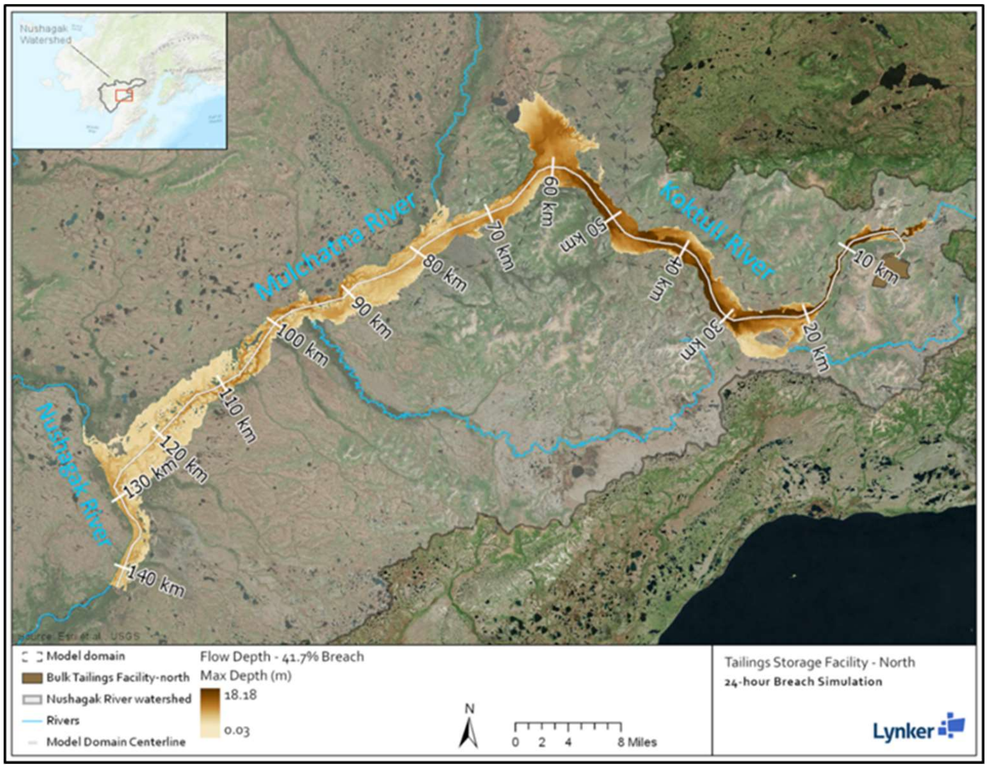
flow depth, and most likely faster arrival time. These should be noted. There's simple model that's available to model non-Newtonian fluid and FLO-2D is one that I'd recommend."[1438] Violeta Martin, of Knight Piesold, responded that "[w]e agree non-Newtonian flows could be modeled in FLO-2D, but developing a new model would result in delays."[1439] Dr. Wobus, after reviewing this correspondence, notes that:

> [B]oth AECOM and Knight Piesold note that the rheology of tailings spilled in their scenarios requires a software package like FLO-2D, which is what Lynker (2019) used in its modeling. . . . This exchange between AECOM and Knight Piesold demonstrates that the [Failures Modes and Effects Analysis] process that fed into the DEIS was not driven by high quality information or accurate scientific analysis, but rather by an unrealistic need for completing the analysis in a rushed manner.[1440]

This is yet another example of how rushing through the NEPA analysis has led to an inadequate DEIS that had the ability and opportunity to conduct the appropriate analyses to understand the full scope of direct, indirect, and cumulative impacts.

The Lynker tailings failure scenario "found that a full [tailings storage facility] failure could impact hundreds of miles of salmon-producing streams, with potentially catastrophic long-term consequences to salmon habitat . . . ."[1441] The Lynker study demonstrates that, despite the probability of failure, the consequences of such an event would be significant.

[1438] *Id.* at 4.
[1439] *Id.*
[1440] Wobus, 2019 at 15
[1441] Wobus, 2019 at 13; *see also* Lynker, 2019 at ES–a to ES–b.



2019 Wobus Memo. - Figure 7. Tailings flood extent from median tailings dam failure scenario (Lynker, 2019)[1442]

The model results projected the transport of tailings more than 140 kilometers downstream from the bulk tailings storage facility.[1443] The failure would result in spreading of tailings materials "across much of the floodplain of the Koktuli, Mulchatna and Nushagak rivers and the abundant off-channel habitat currently available to salmonids throughout those catchments."[1444] The mudflows would "fill[] the valley bottoms, spreading tailings across the off-channel habitat in the floodplains."[1445] Tailings would be deposited in approximately 250 kilometers (155 miles) of streams mapped as salmon habitat and approximately 700 kilometers (435 miles) of streams identified as potentially suitable for salmon spawning and/or rearing.[1446] In the modeled simulations, up to 80% of tailings are still moving through the downstream boundary of the model.[1447] When the model domain is expanded, the results indicate tailings continuing 130 kilometers (80 miles) downstream beyond the confluence with the Nushagak.[1448] In the expanded model domain, 50% of the tailings are still moving through the downstream boundary of the

[1442] Wobus, 2019 at 14.
[1443] *Id.*; *see also* Lynker, 2019 at ES–b.
[1444] Wobus, 2019 at 14 and 41 ("Because the [anadromous waters catalog] does not account for the abundant off-channel habitat within the floodplains of the Nushagak watershed …, estimates of salmon habitat impacts by tailings releases are likely to be significant underestimates of true impacts.").
[1445] Lynker, 2019 at ES–b.
[1446] *Id.*
[1447] *Id.*
[1448] *Id.*

model.[1449] With these results, Lynker concludes that "[g]iven the fine-grained nature of the material, it is extremely likely that these tailings would continue to Bristol Bay, where they would eventually settle out in the Nushagak River estuary."[1450] Lynker also states that whether the Corps prepares its own modeling analysis or incorporates Lynker's work, "based on the outcomes of [the Lynker] study, the current DEIS clearly requires more analysis that acknowledges the potential impacts of a tailings dam failure."[1451]

In addition to modeling tailings failure of the bulk tailings facility, Dr. Wobus also modeled failure of the pyritic tailings facility.[1452] As discussed above, the pyritic tailings storage facility will store pyritic tailings and potentially acid generating and metal leaching waste rock from the mine.[1453] The DEIS fails to consider a failure of the northern embankment for this facility on the grounds that the water management pond contain any release.[1454] Dr. Wobus notes that "this decision was made without any supporting analysis."[1455]

Dr. Wobus's modeling examined "the range of potential impacts using a range of failure scenarios based on historical [tailings storage facility] breach data.[1456] Dr. Wobus concludes that (1) the main water management pond "does not have enough freeboard to contain a likely failure from the [pyritic acid generating tailings storage facility]"; (2) the "DEIS is inconsistent in its summary of how much waste rock will be stored in the [pyritic acid generating tailings storage facility]"; and (3) "[s]ediment transport modeling using FLO-2D shows tailings spilling over the water management pond main embankment and continuing downstream in the North Fork Koktuli."[1457]

Because the DEIS precludes a review of a complete tailings failure, it includes no analysis of the downstream impacts from such a failure. While the DEIS acknowledges the long-term fate of tailings, the DEIS fails to include any substantive discussion or analysis of what such exposure for years to decades would mean to the health of the aquatic ecosystem.[1458] The Lynker study indicates that the geographic extent of such a failure would be massive and that the associated direct and indirect impacts would be far reaching. To put a potential tailings failure into perspective, "[t]he bulk [tailings storage facility] is approximately ten times larger than the

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[1449] *Id.*
[1450] *Id.*
[1451] *Id.* at 3.
[1452] *See* Wobus, Cameron, et al., June 30, 2019, *Memorandum – Pyritic TSF Failure Modeling Results*, Prepared for Salmon State (Wobus, et al., 2019) (included as an attachment with these comments).
[1453] *Id.* at 1.
[1454] *Id.*
[1455] *Id.*
[1456] *Id.*
[1457] *Id.*
[1458] *See e.g.* DEIS at 4.27–64 to 4.27–65 (stating that "[u]nrecovered tailings that are exposed to oxygen could generate acid on a timescale of years to decades. Acid and metals flushed into the watershed would be diluted by stream water, while acid and heavy metals that accumulate in streambed sediments, wetland soils, or isolated waterbodies could impact water quality on a timescale of decades" but failing to include any analysis).

facilities that failed at Mt. Polley and Samarco, and is nearly unprecedented in scale relative to historical dam failures (Rico et al., 2008)."[1459] Based on the findings regarding the extent of tailings movement downstream, the Lynker study concludes that "the impacts of such a failure could be catastrophic to salmon habitat in the Nushagak watershed and should not be ignored in the EIS process."[1460]

N. Acid Rock Mine Drainage

Copper mines have a poor environmental record because of their low buffering capacity and tendency to leach contaminating metals into groundwater from waste rock, tailings, and mine pits.[1461] In a 2012 report titled, *Comparison of the Pebble Mine with Other Alaska Large Hard Rock Mines*, the Center for Science and Public Participation noted, "[m]ost porphyry deposits/mines are large and low grade, leading to the production of large quantities of waste rock and tailings."[1462] The report notes that the metal mineralization is in the form of metal sulfides and that in wet environments, the environmental risks are higher.[1463]

The report noted that the "geochemistry at the Pebble mine indicates that much of the mined rock will be potentially acid generating" and that the [g]eomorphology suggests that leaked contaminants will be difficult to contain."[1464] The wet environment of Bristol Bay "increases the likelihood that these contaminants will become mobile."[1465] Due to Pebble's large size and the fact that "[m]itigation techniques . . . have been notoriously ineffective to slow acid production and to prevent it from leaving the minesite," PLP's "acid rock drainage (ARD) could be difficult to control."[1466]

The DEIS fails to take a hard look at the likelihood of acid rock drainage problems. The DEIS analysis assumes all contact water will be captured and directed into the water management treatment system to protect downstream water quality.[1467] The DEIS fails to take a hard look at the likelihood of success in capturing all contact water. As noted in the 2017 Earthworks report, *U.S. Gold Mines Spills & Failures Report: The Track Record of Environmental Impacts Resulting from Pipeline Spills, Accidental Releases and Failure to Capture and Treat Mine Impacted Water*, mines have a horrible track record for controlling mine seepage and associated acid rock drainage problems.[1468]

1459 Lynker, 2019 at ES–a. The Mt. Polley dam was 115 feet high.
1460 *Id.* at ES-b.
1461 *See* Levit & Chambers, 2012 at 4.
1462 *Id.*
1463 *Id.*
1464 *Id.*
1465 *Id.*
1466 *Id.*
1467 DEIS at 4.18–3.
1468 *See e.g.*, Gestring, Bonnie & John Hadder, July 2017, U.S. Gold Mines Spills & Failures Report: The Track Record of Environmental Impacts Resulting from Pipeline Spills, Accidental Releases and Failure to Capture and Treat Mine Impacted Water (Gestring & Hadder, 2017) https://earthworks.org/cms/assets/uploads/archive/files/publications/USGoldFailureReport2017.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

1. The DEIS fails to take a hard look at potential impacts from acid mine drainage associated with the main mine site.

The DEIS' discussion of the Pebble Mine's potential to generate acid mine drainage is compromised by its misinterpretation of leachate test results and its reliance on inaccurate assumptions.[1469] Fundamental conclusions of the DEIS — including that submerged materials will not generate acid because they will be deprived of exposure to oxygen — are undermined by the results of PLP's own testing and by fundamental principles of chemistry. "The DEIS assumes that submerging pyritic tailings and [potentially acid-generating] waste under water during operation in the [pyritic tailings storage facility] (also known as Area E) and during closure in the pit will prevent oxidation and acid generation."[1470] However, "PLP's leachate test results show that once [potentially acid-generating] wastes start producing acid and leaching metals, they will continue to do so even if submerged."[1471] This is partially because "material in the [pyritic tailings storage facility] will be oxidized by ferric iron even under submerged, reducing conditions."[1472] Subaqueous column tests conducted by PLP, in which crushed waste rock or tailings are placed in a column and kept submerged with water, were run and the samples tested (six samples of Pre-Tertiary Pebble West Zone [Potentially Acid-Generating] waste rock, two samples of Tertiary Pebble East Zone waste rock, and two samples of pyritic tailings).[1473] The results show that leaching will continue for some period of time, even under submerged conditions.[1474]

The DEIS materials also contain contradictory information that further calls into question the reliability of any of the water quality calculations or projections. For example, the DEIS claims that 50 million tons of potentially acid-generating waste rock will be stored in the pyritic tailings storage facility, Knight Piésold states the amount will be three times higher - approximately 160 million tons.[1475] This discrepancy is significant because the concentrations of acid generated using rates from the tests are dependent on the amount of material at the site.[1476]

The DEIS's fundamentally flawed and inaccurate description of pollutant-forming conditions in the mine pits further invalidates other parts of the DEIS, notably the discussion of pollution treatment technologies and the projected concentrations of pollutants in water discharged to surface streams. Contrary to the DEIS, tests conducted on materials from the Pebble Mine "show that once [potentially acid-generating] waste rock starts producing acid — and some samples did so immediately — acidity, metals, sulfate, and other constituents will continue to be released even under subaqueous conditions."[1477] However, these releases and the resulting elevated pollutant concentrations appear to be excluded in the calculation of water treatment plant source terms.[1478]

[1469] *See also* Section VI.B.2.
[1470] Maest, 2019 at 6.
[1471] *Id.* at 2.
[1472] *Id.* at 8.
[1473] *Id.*
[1474] *Id.*
[1475] *Id.* at 4.
[1476] *Id.*
[1477] *Id.* at 7.
[1478] *Id.*

The design criteria for the water systems drastically underestimate the actual concentrations that will require treatment.[1479] This is because the projected influent chemistry for the water treatment plants during operations does not include either: (1) any acidic leaching from the pyritic tailings storage facility, or (2) acidic leaching of the potentially acid-generating wastes. These will both significantly increase concentrations of pollutants entering the water treatment plants.[1480] As a result, the DEIS cannot rely on the proposed water treatment system to mitigate or avoid elevated pollution levels related to acid mine drainage in mine's discharges, and the Corps has failed to take a hard look at acid mine drainage issues associated with the main mine site.

2. The DEIS fails to take a hard look at potential impacts from acid mine drainage associated with the pipeline and transportation corridor.

The proposed pipeline corridor would extend over 188 miles.[1481] In PLP's 404 application, the proposed pipeline would be installed in a trench.[1482] The DEIS fails to adequately evaluate whether trenching will result in acid rock drainage or metal leaching into adjacent surface waters and groundwaters. The DEIS failed to take a hard look at potential of the bedrock to cause acid rock drainage or metal leaching (including neutral or high pH metal leaching). The DEIS also failed to adequately assess PLP's plans to test and monitor acid rock drainage/metal leaching during trenching activities, and measures to reduce and/or capture runoff of acid rock drainage/metal leaching into adjacent surface and groundwaters from trenching.

O. Mine Processing and Potential Use of Cyanide

The hardrock mining industry is the single largest source of toxic waste and one of the most destructive industries in the country. Large scale industrial mining involves the blasting, excavating, and crushing of many thousands of acres of land and the use of huge quantities of toxic chemicals such as cyanide and sulfuric acid. Mines are notorious for polluting adjacent streams, lakes, and groundwater with toxic by-products. The EPA estimates that 40 percent of the watersheds in the western United States are contaminated by pollution from hard rock mines.[1483]

While PLP asserts that it will forego secondary gold recovery, the questionable economics of a 20-year mine raise significant doubts about whether Pebble would turn to cyanide for secondary gold recovery during the first phase of what is sure to be a much longer mine life. Even if PLP does not utilize cyanide in the first twenty years, the use of cyanide is reasonably foreseeable during mine expansion.

[1479] *Id.*
[1480] *Id.*
[1481] 2018 Project Description at 2.
[1482] *Id.* at 56.
[1483] *See* Environmental Protection Agency, *Report, Liquid Assets 2000: America's Water Resources at a Turning Point*, May 2000, at 10 (included as an attachment with these comments).

By eliminating secondary gold recovery, PLP will be leaving behind, under their own estimates, 12% of potentially recoverable gold.[1484] Leaving 12% of its recoverable gold could amount to over $2 billion dollars left in the ground.[1485] Given the significant questions about PLP's net present value over the first 20 years, it is foreseeable that PLP would utilize cyanide to ensure it is making the most out of its investment for its shareholders.

On June 5, 2019, two-thirds of the way into the DEIS public comment period, the Corps updated the project library with RFI 062a.[1486] PLP's response to RFI 062a states that:

> The expanded development scenario as described in RFI062 did not specifically address the subject of secondary gold recovery as the associated footprint and logistical impacts would be minor in the context of that project. It is however possible, indeed likely, that any future expanded development could include some form of secondary gold recovery.
>
> Cyanide is one of the few chemicals that has the ability to put gold into solution and thus has been the traditional means used in the mining industry for the recovery of microscopic-sized gold that cannot be separated from gangue minerals by purely physical processes.[1487]

While PLP asserts that other alternative processes would be evaluated due to the concern over cyanide, it does not explicitly discount the possibility of using cyanide. Because expansion is foreseeable, PLP has made past statements about potential use of cyanide, and the fact that PLP does not summarily state that cyanide would not be used, the DEIS must consider potential cumulative impacts from its use. Yet, the DEIS fails to evaluate potential cumulative impacts of cyanide use associated with mine expansion. Until the Corps takes the following into account, it has failed to take a hard look at the potential cumulative impacts of cyanide:

- The mining industry has a long history of cyanide use.[1488] For decades, cyanide has been used as a pyrite depressant in base metal flotation.[1489] It has also been used

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1484 *See* Statement of Doug Allen, Northern Dynasty VP Corporate Communications, at the Vancouver Investment Conference (Jan. 20-21, 2019), video available at https://www.youtube.com/watch?v=EPFmt_mzEDQ&feature=youtu.be (@6:45-7:52).
1485 This estimate assumes that Pebble will mine 12.1 million ounces of gold (DEIS App. N at N–12) and recover 12% of that amount and sell the recovered amount at current gold prices of $1,300 per ounce.
1486 *See* Pebble Project EIS, Documents, Requests for Information at https://pebbleprojecteis.com/documents/library (identifying June 5, 2019 as the upload date for RFI 62a, *Clarification of Cyanide Use in Expanded Mine Scenario.*).
1487 RFI 062a (emphasis added).
1488 Office of Water, *Hardrock Mining: Environmental Impacts*, Environmental Protection Agency, https://www3.epa.gov/npdes/pubs/env.htm (previously provided as an attachment with Trustees for Alaska's scoping comments).
1489 *Id.*

for over a century for gold extraction.[1490] After cyanide leaching of gold heaps proved feasible in the 1970s, the relatively high price of gold has made cyanide leaching of relatively low-grade ores economically feasible.[1491]

- Cyanide-contaminated solution in tailing ponds and solution retention basins has proven to be attractive to unsuspecting waterfowl and wildlife.[1492] These organisms have suffered both acute and chronic poisoning as a result of direct contact with and ingestion of cyanide-contaminated solution.[1493] Leakage from linear failure at heaps can allow the release of cyanide and other toxic constituents directly into the environment.[1494] Residual cyanide in mine tailings can cause persistent release of toxic metals (e.g., mercury) into groundwater and surface waters.
- Accidental spills of cyanide at gold mine processing facilities do occur. For example, the Fort Knox Gold Mine north of Fairbanks had spill releases of 300,000 gallons of cyanide containing water (May 2010) and 45,000 gallons as a result of a bulldozer breaching the supply line (August 2012).[1495]
- The transportation, storage, and disposal of cyanide present potential risks and many opportunities for accidental spills and releases of cyanide. If cyanide was used, it would be transported to the mine site using marine cargo vessels, a ferry across Lake Iliamna, and trucks on a gravel road. In transit, the cyanide could be stored at the Amakdedori port or the mine site. Cyanide released into the environment can adversely impact water, soil, aquatic organisms, wildlife, waterfowl, and humans.[1496]

Potential spills of transported and stored cyanide must be evaluated. The DEIS analysis of the expanded development must consider the full scale of potential impacts associated with the use of cyanide.

P. Spills

The DEIS fails to take a hard look at the potential direct, indirect, and cumulative impacts from spills in the transportation corridor. The DEIS frames the spill risks of diesel, ore concentrate, and mine reagents incorrectly.[1497] The 83-mile long transportation corridor stretches

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[1490] *Id.*
[1491] *Id.*
[1492] *Id.*
[1493] *Id.*
[1494] *Id.*
[1495] *See Fairbanks Fold Mining Inc. Cyanide Water Spill*, Alaska Business (Aug. 25, 2012), http://www.akbizmag.com/Alaska-Business-Monthly/August-2012/Fairbanks-Gold-Mining-Inc-Cyanide-Water-Spill/ (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1496] *See* Office of Water, *Hardrock Mining: Environmental Impacts*, Environmental Protection Agency.
[1497] Lubetkin, Susan, May 20, 2019, *A Critique of the Transportation Corridor Spill Risk Estimates of Diesel, Ore Concentrate, and Chemical Reagents in The Pebble Project Draft Environmental Impact Statement*, Prepared for Cook Inletkeeper (Lubetkin, 2019) at i (report and its references are included as attachments to these comments).

from the mine site to a port on Cook Inlet and includes a 30-mile road, a ferry terminal, an 18-mile crossing of Lake Iliamna, another ferry terminal, a 35-mile road, a port facility and jetty for lightering and supply barges, offshore lightering locations, a 188-mile gas pipeline, and associated facilities.[1498] The analysis in the DEIS "ignores many potential spill risks along the transportation corridor, only modeled the largest possible volumes from a small number of possible sources, and the estimates they have are not statistically justified."[1499] As a result, the analysis presented in the DEIS underestimates the potential environmental impacts from spills, and fails to adequately analyze cumulative impacts:

> Given the large amounts of materials being transported to and from the mine and the multiple modes of transportation and transfers between those modes, even seemingly small risk rates can lead to significant expected numbers of spills. The additive risks across all spill sizes and potential spill sites are the true measure of environmental risk.[1500]

By failing to analyze the direct, indirect, and cumulative effects of all sizes of spills at all points along the transportation corridor, the DEIS has failed to take a hard look at the potential environmental impacts of spills.

1. The DEIS fails to account for numerous categories of spill risks along the transportation corridor.

Many potential spills "were dismissed as unlikely or not consequential,"[1501] and the DEIS failed to quantitatively analyze "risk rates, expected numbers of spills, or cumulative volumes over the course of the proposed project."[1502] For example, the DEIS failed to analyze "potential spills from lightering barges, spills at any of the transfers between transportation modes, and spills from activities at the port, such as storage facility spills, power generation, or during maintenance activities."[1503] Overall, these omissions "seriously underestimate[] the number of spills that can occur along the transportation corridor."[1504]

The DEIS also fails to analyze the potential that the ore carriers will be using heavy fuel oil, and the potential of a spill of that heavy fuel oil. As the DEIS itself notes, the impact from a spill of heavy fuel oil has the potential to cause much greater impacts than a spill of diesel

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1498 Lubetkin, 2019 at 2–3.
1499 Lubetkin, 2019 at 81.
1500 *See* Lubetkin, 2019 at 73.
1501 Lubetkin, 2019 at 81.
1502 *Id.*
1503 *Id*; *see id.* at ii ("The PLP DEIS also ignores possible spills from storage facilities at the port, the ferry, or the mine site, or any of the transfers between all the transportation modes and storage facilities as too small or too unlikely to be concerned with."); *id.* at 5 ("This analysis does not address potential spills at the mine site or from tailing ponds."); *id.* at 67 (indicating that the DEIS failed to analyze potential spills associated with the marine barge, tanker trucks, Lake Iliamna Ferry, storage, transfer of reagents between marine barges and potentially port storage facilities and tanker trucks, and transfer of reagents to and from the Lake Iliamna Ferry and tanker trucks).
1504 Lubetkin, 2019 at ii.

fuel.[1505] The potential for a ship to run aground is not remote. "There are a number of submarine rocky outcrops (shoals) in Kamishak Bay that pose a danger to passing ships. . . . [F]oul weather, strong currents, or a loss of power could cause ships to become grounded and damaged by the rocks."[1506] Given the potential for carriers to spill fuel due to accidents and other factors, if any of the ore carriers will be using heavy fuel oil, the DEIS must analyze the potential impacts from a spill into marine waters of heavy fuel oil.

The spill risk calculations in the DEIS do not include the shore-based and marine facilities at the ports.[1507] This is despite these types of spills accounting for 5% of all spills in the ADEC data from 1985–2018, including 501 bulk fuel storage spills, 41 chemical storage spills, 1,015 harbor/port/marina spills, 328 power generation spills, and 1,179 maintenance yard operation spills.[1508]

> The only marine scenario carried forward for analysis was a 300,000-gallon spill of diesel due to allision of a fuel barge. Oil spills may occur from ore carriers, supply barges, lightering vessels, and during fuel transfers at the port. A potential spills analysis should consider, at minimum, all vessel types, age, construction (including the use of double hulls), and flag state. It should also consider the potential spill frequency from different parts of the operation, spill size, and spill type (including what type of fuel the self-propelled vessels will use). If any vessels use heavy fuel oil for propulsion, this has very different properties than the diesel analyzed in the current spill scenario. Each analysis should include potential spill fate and trajectory, including considering the product(s) that may be spilled and prevailing conditions in different seasons of operations.[1509]

The spill risk calculations in the DEIS also fail to include at least 10 transfer points ("three listed for diesel, five for ore concentrate, and two for chemical reagents"), and "[t]his may be an incomplete list of transfer processes if there are more intermediate storage points along the transportation corridor than explicitly listed here."[1510] "The transfer spill data could be approached by looking at the spill data from *crude oil terminals* and *harbor/port/marina* facility types in ADEC. This can be done for diesel spills, and then for ore concentrate and chemical reagents."[1511]

1505 DEIS at 4.27–23 ("Impacts from a spill of [ultra-low sulfur diesel] would have a reduced magnitude compared to a spill of heavy oil, such as crude oil.").
1506 DEIS at 4.27–18.
1507 Lubetkin, 2019 at 70; *see also* Nuka Research and Planning Group, LLC, May 20, 2019, *Comments on Draft EIS for Proposed Pebble Mine*, Comments prepared for Cook Inletkeeper and Salmon State (Nuka Research, 2019) at 1 (report and its references are included as an attachment with these comments) ("The DEIS lacks key information regarding . . . spill risks . . . for the two proposed ocean port sites of Amakdedori and Diamond Point.").
1508 Lubetkin, 2019 at 70.
1509 Nuka Research, 2019 at 7–8.
1510 Lubetkin, 2019 at 68.
1511 *Id.* at 67.

The DEIS must analyze possible spill scenarios and responses based on the location of the spill for all site locations.[1512] This includes "[a] response viability analysis . . . for [the] marine oil spill scenario."[1513] Currently, "the DEIS does almost nothing to discuss response capabilities."[1514] The DEIS fails to estimate response times, merely citing the remote location of Kamishak Bay.[1515] But "[e]stimated response times are regularly calculated for potential response scenarios throughout Alaska."[1516] The DEIS should analyze when adverse sea conditions will preclude spill response operations, and prepare a response viability analysis.[1517]

> To characterize the shipping hazards, and the consequent environmental impact of accidents and spills, [the Corps] needs to provide detailed metocean data or models for all potential port and lightering sites, operating parameters for all vessels, and a response viability analysis for oil spill responses to all modeled spills. These analyses are technologically practical, and have been done for many other waterways and industrial projects in Alaska and elsewhere. Without this information it is impossible to determine the environmental impact of shipping operations, and impossible to evaluate the relative impact of the two proposed port sites. The proposed shipping activity poses significant hazards to humans and the environment not addressed in the DEIS.[1518]

Response viability analyses "assess[] the percentage of time a set of environmental conditions would have prevented or severely limited the ability to mount an oil spill response."[1519] The DEIS should include this analysis "[g]iven the winds, waves, sea ice, and other conditions common in port/lightering areas" and "should include the potential for sea ice to preclude or hamper an on-water spill response effort."[1520] Similarly, the DEIS should also include a response capacity analysis "to analyze the volume of a spill that could possibly be recovered or treated based on potential product(s) spilled, spill response resources available, time it will take to mount a response to the incident, and the potential for adverse conditions to delay or preclude a response (including the frequency with which these occur)."[1521] This is especially important as "[c]urrent tug resources in Cook Inlet would be unlikely to assist a deep draft vessel before it grounded in Kamishak Bay."[1522] "While tug/barge lightering operations would bring more tugs to the port area, both their availability and suitability to assist a drifting deep draft vessel should be analyzed."[1523] Further:

> It may also not be possible for a tug attending a barge to safely position the barge

[1512] Nuka Research, 2019 at 1.
[1513] *Id.* at 8.
[1514] *Id.*
[1515] *Id.*
[1516] *Id.*
[1517] *Id.*
[1518] *Id.* at 1.
[1519] *Id.* at 8.
[1520] *Id.*
[1521] *Id.*
[1522] *Id.*
[1523] *Id.* at 8–9.

> and attend to a distressed ship even if it did have the capabilities to provide this aid. Availability should be considered based on the time a tug (or tug type) will spend in the area, how long it would take to safely release a barge under tow, and whether liability or other contractual and regulatory issues would allow them to do this. Suitability for rescue should consider minimum tug characteristics that would be required to assist a ship in severe wind/waves (bollard pull and other performance requirements); equipment requirements; crew capabilities; and the time it would take to mobilize, transit, and deploy from usual location. This information should be used to determine the likelihood of a successful tug rescue from the lightering location vicinity based on the resources available and the ships that will be present.[1524]

2. The DEIS only analyzes potential impacts of incredibly large spills.

The DEIS underestimates the likelihood of spills of diesel, ore concentrate, and chemical reagents by only considering exceptionally large spills.[1525]

> For each potential scenario type, an example is given that would be toward the very high end of what has historically been seen for an individual spill. The largest spills are the most infrequent, and so the logic is circular: If the only scenarios that are considered are the really rare ones, the calculations show they don't happen very often.[1526]

The DEIS only evaluates four kinds of spills: (1) those > 3,000 gallons of diesel from a tanker truck; (2) approximately 3,850 gallons of copper-gold ore concentrate from a pipeline; (3) 5,700 gallons of copper-gold ore concentrate from a tanker truck; and (4) > 300,000 gallons of diesel from a marine barge. "Those are the only spill rates used in the PLP DEIS for the transportation corridor, which means any spills smaller than the specific volumes shown or other than those specific transportation modes were not considered."[1527] These are all exceptionally large-volume spills, which has resulted in the DEIS underestimating the likelihood of spills occurring.[1528] And by only analyzing the potential impact of these large spills, the DEIS fails to take a hard look at the direct, indirect, and cumulative impacts from smaller spills — even those that other EISs would have captured.[1529] This is a critical error, as "[m]edium and small spills also accumulate and need to be considered explicitly."[1530] As the DEIS notes, "[s]mall spills of diesel (e.g., less than 50 gallons) are very common, while very large spills (e.g., greater than 10,000 gallons) are rare."[1531] The DEIS "should include the probability not only that a large diesel spill doesn't happen, or that there isn't a big ore concentrate spill due to a truck rollover, but also the

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[1524] *Id.* at 9.
[1525] *Id.* at 80.
[1526] *Id.* at i.
[1527] *Id.* at ii.
[1528] *Id.* at 80; *see id*. at 4 ("In broad strokes, smaller spills are more frequent than larger spills.").
[1529] *Id.* at 80.
[1530] *Id.* at i.
[1531] DEIS at ES–66.

cumulative probability that there will be no significant impacts from spills individually or collectively."[1532]

The DEIS should analyze all sizes of spills, and define categories of small, medium, large, and very large spills explicitly, "possibly with different volumes for different substances spilled."[1533] After defining different size categories, the DEIS should estimate the rate of spill for each category for each substance, or class of substances.[1534] This should be analyzed, as discussed above, for each component of the entire project, not just a few portions of the transportation corridor. This analysis should estimate the expected frequencies and total spill volumes for each substance, and evaluate the biological, environmental, and socioeconomic consequences of the spills.[1535] "[T]he frequency of the spills in different size classes varies dramatically, so even if the impacts of a single *small* or *medium* spill may not appear significant alone, it is worthwhile to consider how many such spills might occur and their aggregated and cumulative effects over time and space."[1536]

3. The methodology relied on in the DEIS is statistically flawed.

"[N]ot only were very few spill rates estimated, but the ones that were modeled were done so based on very limited data and with questionable mathematical justification."[1537] For example, the DEIS bases its spill rates for both diesel and ore concentrate from analogizing to the Dalton Highway (for diesel) and the Red Dog Mine Road (for ore concentrate), which are "tiny sample sizes."[1538] The diesel spill risk rate is estimated based on a single spill.[1539] The ore concentrate spill risk rate is estimated based on only 17 spills.[1540] This "limited data set" likely underestimates spill risks.[1541] Other examples include:

[1532] Lubetkin, 2019 at i; *see id*. at 4 ("[I]t is important to know the expected number of spills and cumulative amount of material spilled from all size classes, whether it's diesel, natural gas, ore concentrate, chemical reagents, or produced water.").
[1533] *Id.* at i; *see id*. at 4 ("One important failure in the PLP DEIS is the lack of spill size class definitions."); *id.* at 5 ("Based on the volumes used, transported, and stored, and on their level of toxicity [and] other negative effects on the environment, spill size classes might be better described in substance-specific volumes for some pollutants."); *id.* at 73 ("The PLP DEIS does not have a complete list of spill risk rates for spill size classes as they are commonly defined in other DEISs.").
[1534] *Id.* at i.
[1535] *Id.*
[1536] *Id.* at 5 (emphasis in original).
[1537] *Id.* at ii; *see id.* at 73 ("The few risks that have been quantitatively estimated are based on the use of very limited data, selected without justification, or mathematically suspect, even as they address spill sizes that are well past the minimum volume" that is typically considered to be a large spill).
[1538] *Id.* at 80.
[1539] *Id.*
[1540] *Id.* Even with this limited data set that likely underestimates spill risks, "AECOM (2019) estimates that a spill of 5,700 gallons of ore concentrate from a truck is expected ~ 2.5 years." *Id.*
[1541] *Id.*

- "The modeling to find the risk rate for spills > 300,000 gallons from a marine barge uses the Bureau of Ocean Energy Management's estimated rates of spills > 42,000 galls, > 420,000 gallons, and > 1,050,000 gallons in an overly complicated and mathematically unjustified attempt at curve fitting."[1542]
- "The pipeline spill risk estimates were based on spill risks rates of petroleum products, which may have entirely different characteristics than ore concentrate."[1543]
- "Within the AECOM (2019) probability estimates, the authors tried to find analogs to very specific spill criteria, and match substance, location, and spill size before trying to estimate a spill rate. With rare incidents and few data to work from, this can make models worse rather than better. A more appropriate approach would have two modeling steps. In the first, all the rates of all spills would be modeled for a given transportation model or process and substance class. That very generalizable estimate could then be modified with more details, such that a specific rate of interest can be a function of a base rate that is adjusted up or down, additionally or proportionally, based on the data. After finding the overall incidence rate, a spill size distribution can be used to estimate the risk rates for specific spill size classes by substance and by transportation mode. That is, first model how often spills of all sizes happen, then break that down by spill size class."[1544]
- "The increased difficulty of Kamishak Bay conditions in comparison to broader Cook Inlet conditions makes accidents more likely. Calculated oil spill risks in the DEIS are based on calculated incident rates for existing Cook Inlet traffic. Since the traffic this project is proposing is not similar to existing traffic in type or location, these incident rates are not an adequate analog. To account for this [the Corp] must analyze a broader array of spill scenarios, including fuel spills from bulk carriers, transferring errors, and a larger spill from an oil tanker. The scenario already analyzed should be assumed to be higher risk than stated."[1545]

Further, the DEIS analyzed the risk of ore concentrate spills by relying on data from the Red Dog Mine haul road. However, "[t]he Red Dog Mine haul road, like the Dalton Highway used to model the tanker truck diesel spill risk, may not be comparable to the roads associated with Pebble Mine."[1546] "As with the diesel spill scenario on the Dalton Highway, the spill volumes aren't comparable if the haul volumes aren't the same. (The densities of zinc concentrate [from Red Dog] and copper-gold concentrate [from the proposed Pebble Mine] are also relevant because ore concentrate spill amounts are listed by weight, but spill risks are defined by volume.)"

[1542] *Id.* at 80–81.
[1543] *Id.* at 80.
[1544] *Id.* at 73.
[1545] *Id.* at 3.
[1546] *Id.* at 41.

4. *The DEIS fails to take a hard look at potential impacts from fuel spills.*

The fuel spill analysis should assess impacts on subsistence resources and users throughout Bristol Bay including downstream from the mine and along the corridor route.

The proposed Pebble Project would use "approximately 16 million gallons of diesel annually."[1547] The potential for fuel spills includes contamination in the Bristol Bay headwaters, Lake Iliamna (at the ferry terminals and lake crossing corridor), creeks and streams along the transportation corridor route, the bay where the port is located (Amakdedori or any alternative port location), and Cook Inlet. The DEIS fails to address impacts in all of these sites and the degrees and severity of fuel spills on all resources at all locations. Rather, the DEIS "only included quantitatively modeled spill risks for marine barges and for tanker trucks."[1548] And the spill scenario analyzed for marine barges "describes a spill that is 300 times larger than necessary to be considered *large* in other DEISs."[1549] For analyzing spill scenarios for tanker trucks, the DEIS looks at spills that are "three times larger than necessary to be considered *large* in other DEISs."[1550] When evaluating diesel spills, "both the average spill sizes and the spill rates were chosen with little to no justification."[1551] "Overall, the modeling for the [potential spills of diesel from barges] answers the wrong question with the wrong data using the wrong technique."[1552] The same is true for the DEIS's analysis of potential diesel spills from tanker trucks.[1553]

The DEIS only considered the potential for spills over >300,000 gallons from a marine barge. Again, limiting the analysis to these extraordinarily large spills results in underestimating potential impacts.[1554] "[E]stimating the probability of a spill of >300,000 gallons is answering the wrong question" and "the estimate for the $R_{diesel, ferry}$ is a weak stab at the wrong spill rate with no

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1547 DEIS at 4.27–4.
1548 *Id.* at 11.
1549 *Id.* at 11 (emphasis in original).
1550 *Id.* at 22; *see id.* ("Modeling the risk of spills 3,000 gallons is modeling the spills in the 99.5th percentile by volume.").
1551 *Id.* at 18.
1552 *Id.* at 20.
1553 *See*, *e.g.*, *id*. at 27 (noting that the DEIS used data from the Dalton Highway for comparison, but "the trucks in the proposed Pebble Project DEIS will be hauling three times the volume that the Dalton Highway trucks are. The potential for larger spills is therefore greater for the proposed Pebble Project."); *id.* ("In summary, the $R_{diesel, tanker}$ used in the PLP DEIS relies on the questionable assumption that $R_{Dalton} = R_{Pebble}$, estimates R_{Dalton} for spills >3,000 gallons instead of for spills >1,000 gallons, basing that rate on a single spill from a small data set. Furthermore, the Dalton Highway collision scenario described to result in a spill of >3,000 gallons is different than the risks for the Pebble Mine because the Pebble Mine will use triple tankers with larger total fuel loads than the single tankers used on [the] Dalton.").
1554 *Id.* at 30 (noting that the average spill size from vessels was 1,980 gallons); *see also id.* at 32 ("The assertion that 'the 2016 BOEM lower-bound spill rates for ocean barges . . . is arguably an upper bound for potential ferry spill rates' (AECOM 2019 p.11) has no data to back it, even if the ferry is to be custom built, highly regulated, and the weather and water conditions in the lake and in Cook Inlet differ.").

data."[1555] Much smaller spills can have significant impacts. For example, a 2,500 gallon diesel spill near the Iliamna River spread over a 15' x 200' area and had the potential to go into the water table and the river.[1556] By excluding these potential spills from the analysis of potential direct, indirect, and cumulative effects, the DEIS fails to take the required hard look at the impact of diesel spills.

The DEIS failed to analyze an oil spill scenario in Lake Iliamna. The DEIS provided "only three analogs for its proposed icebreaking ferry . . . all of which operate in different environments and conditions, with different cargo."[1557] This is too small of a sample size "to determine the real risk of these operations."[1558] The risk probabilities for ferry spills in the DEIS "do not represent analogous operations, and cannot be relied upon to be 'negligible.'"[1559] By not including an analysis of a ferry spill in Lake Iliamna, the DEIS has failed to take the required hard look, as "[a]n oil spill in Lake Iliamna could impact salmon, salmon eggs and fry, freshwater seals, human health, and other wildlife."[1560] The DEIS failed to include an oil spill planning analysis — which identifies areas of environmental concern or potential places of refuge — for Lake Iliamna.[1561] The DEIS should also include a response viability analysis for responding to a spill in Lake Iliamna that provides a "response gap analysis that includes both the conditions in which a response could successfully be mounted, and the time it would take to get response equipment and personnel to the lake."[1562]

The oil spill response equipment described in the DEIS that "will be housed at the port sites and in Lake Iliamna is inadequate."[1563] "Adequate response equipment should include, at minimum, a skimmer, and no mention is made of what the 'spill response kits' on the tugs and ferry would include."[1564] "Response equipment should be tailored to the different fuel types that may be spilled, including diesel and heavy fuel oil if the latter will be used in the bulk carriers that will frequent the area."[1565] The equipment also needs to be suited to the range of anticipated conditions.[1566]

The DEIS failed to apply an Environmental Sensitivity Index when analyzing the possible effects of spills on wildlife. The DEIS mentioned the possible impacts of an oil spill on different wildlife groups, but failed to apply an Environmental Sensitivity Index. This is a "standardized color-coded map with detailed information on shoreline sensitivity to oil spills, and biological and

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1555 *Id.* at 32.
1556 Elizabeth Bluemink, 2,500 gallons of diesel spill near Iliamna River, Anchorage Daily News, June 8, 2009. https://www.adn.com/alaska-news/article/2500-gallons-diesel-spill-near-iliamna-river/2009/06/09/ (included as an attachment with these comments).
1557 Nuka Research, 2019 at 13.
1558 *Id.*
1559 *Id.*
1560 *Id.*
1561 *Id.* at 14.
1562 *Id.* at 13.
1563 *Id.* at 9, 14.
1564 *Id.* at 9.
1565 *Id.*
1566 *Id.*

human resources in the area."[1567] It is a standard tool used across Alaska "and is necessary to determine the environmental risks of an oil spill and to mitigate those risks by prioritizing key areas in a response plan. Advance planning reduces the harmful consequences of oil spills and cleanup."[1568]

5. The DEIS fails to take a hard look at potential impacts from other spills, leaks, and use of chemicals.

Spills are a common occurrence at mine sites across the world. A 2017 report by Earthworks, *The Track Record of Environmental Impacts Resulting from Pipeline Spills, Accidental Releases and Failure to Capture and Treat Mine Impacted Water, U.S. Gold Mines Spills & Failures Report*, evaluated gold mine toxic releases in the U.S.[1569] The report found that 27 of 27 mining operations have experienced at least one pipeline spill or other accidental release.[1570] Twenty of the 27 mining operations have failed to capture or control contaminated seepage.[1571] The report concluded that "mines with high acid generating potential and in close proximity to surface and groundwater are at highest risk for water quality impacts.[1572] In a 2012 report, Earthworks compiled the record of pipeline, seepage control and tailings impoundment failures at operating copper porphyry mines in the U.S.[1573] That report concluded:

> [W]ater quality impacts to surface and/or groundwater are common at currently operating copper porphyry mines in U.S., resulting from three failure modes (pipeline spills or other accidental releases, failure to capture and treat mine seepage, and tailings spills or impoundment failures).
>
> These failures resulted in a variety of environmental impacts, such as contamination of drinking water aquifers, contamination and loss of fish and wildlife and their habitat, and risks to public health. In some cases, water quality impacts are so severe that acid mine drainage will generate water pollution in perpetuity.
>
> This research demonstrates that the three failure modes identified in the Bristol Bay watershed assessment with respect to risks to water quality are reasonable and well-supported by the track record of operating copper porphyry mines in the U.S.[1574]

The DEIS failed to adequately analyze the impact of an ore concentrate spill in the nearshore/intertidal environment and provide a meaningful spill response plan.[1575] Impacts that should be considered include metal leaching and acid production if a container of concentrate is

[1567] *Id.* (internal citation omitted).
[1568] *Id.*
[1569] *See* Gestring & Hadder, 2017.
[1570] *Id.* at 8.
[1571] *Id.*
[1572] *Id.*
[1573] *See* Gestring, 2012.
[1574] *Id.* at 5.
[1575] Nuka Research, 2019 at 9.

lost overboard and spills when it is being loaded and / or lightered.[1576] Contrary to the DEIS, which states that no acid will be generated from the sulfide minerals due to lack of oxygenation, "[i]n nearshore and intertidal environments near the port, surf oxygenates the entire water column" and "[a]cid generation can be expected."[1577] "The intertidal reefs on either side of Amakdedori port are exceptionally biologically rich areas, and metal leaching and sedimentation may have significant impacts in that localized environment."[1578] Further, the response plan currently included is inadequate, as it indicates that salvaging any spilled material "may not be justified."[1579]

Water quality impacts from pipeline spills, accidental releases, failure to capture and treat mine seepage, and tailings spills or impoundment failures should all be anticipated and fully evaluated in the DEIS. The DEIS must analyze the direct, indirect and cumulative impacts of toxic spills, leaks and accidental releases.[1580]

The DEIS failed to analyze the direct, indirect and cumulative impacts of pesticides, herbicides and de-icing compounds used for maintaining infrastructure.

6. The conclusory analysis provided in the DEIS of potential impacts from spills is inadequate.

The DEIS fails to provide more than a cursory analysis of the potential impacts from fuel, ore concentrates, and mine reagents along the transportation corridor. For example, regarding the road corridor diesel spill scenario, the DEIS only states that potential impacts are "temporary" and "could be" remediated.[1581] Throughout the spills analysis, the DEIS fails to take a hard look at potential impacts. Rather than providing an analysis of potential impacts, the DEIS lists factors that will affect the extent and severity of impacts. For example, rather than analyzing potential impacts to soils from a diesel spill, the DEIS lists factors that will affect the severity of the impacts:

> The magnitude of soil contamination in this scenario would depend on the location of the spill, the permeability of the soils at the site, the season, and the speed and effectiveness of the spill response.[1582]

Similarly, regarding impacts to air quality of a diesel spill, the DEIS states:

> The magnitude and potential of impacts [to air quality] would depend on the amount of diesel fuel that evaporates, disperses, or burns. With greater amounts of fuel that evaporates or burns, the impacts would be more likely and larger in magnitude.[1583]

[1576] *Id.* at 9–10.
[1577] *Id.* at 10.
[1578] *Id.*
[1579] *Id.*, *quoting* DEIS at 4.27–57.
[1580] *See* Section VI.P, Spills.
[1581] DEIS at ES–67.
[1582] *Id.* at 4.27–12.
[1583] *Id.* at 4.27–14.

Listing the variables that will affect the analysis is not the same thing as providing the analysis itself. This approach falls far short of meeting NEPA's hard look requirement.

Elsewhere, the DEIS asserts that there will be no impact because recovery efforts will remove any spills. For example, when evaluating the potential impacts of a concentrate spill from a truck rollover, the DEIS states that "[c]oncentrate spilled onto soils would be recovered so that there would be no impact."[1584] The DEIS offers no citation or support for the idea that recovery of spills such as this would be 100% effective at either recovering the spilled material or at preserving the impacted soil.[1585] Such conclusory statements fail to meet NEPA's hard look requirements.

Q. Reclamation, Post-Closure Monitoring, Long-Term Management and Financial Assurances.

1. PLP has not submitted a post-closure reclamation plan.

A key component in determining the environmental impacts of a proposed mine is the effectiveness of closure and reclamation planning activities, including long-term water management. PLP has not yet submitted a post-closure reclamation plan. As Dr. Chambers notes,

> There is virtually no discussion of what will happen during reclamation and closure in the text of the EIS. The only detail provided is in the few figures provided as a part of the Proposed Project. The reader is left to discern from these figures what reclamation will look like, when it happen, and how much it will cost. . . . to have a good analysis of a mine plan, inclusion of a detailed reclamation and closure plan, and accompanying financial assurance calculation is viewed as essential.[1586]

Borden provides a similar assessment, noting

> Despite the significant post-operational environmental impacts and risks at Pebble, no Reclamation and Closure Plan has been completed and the closure analysis within the DEIS is clearly inadequate (Borden, 31 May). The lack of even a conceptual level plan is a particular concern because closure of the 20-year Pebble mine will be complex and very costly (almost certainly exceeding 1.5 billion dollars). Water treatment for flows in excess of 5000 gallons per minute will likely be required for centuries after mining is completed. Completion of a Reclamation and Closure plan during the EIS process is common practice within the mining industry. A pertinent recent example is the Donlin Gold Project in Alaska, whose EIS was led by the Army Corps of Engineers, which completed a

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[1584] *Id.* at 4.27–43.

[1585] EPA guidance documents for cleaning soil at RCRA and CERCLA sites indicates that soil remediation involves far more than recovering the spilled material. *See* https://www.epa.gov/hw/guidance-cleaning-groundwater-soil-and-air-corrective-action-facilities#Soil.

[1586] *See* Chambers, 2019 at 2.

458-page plan with a detailed cost estimate during its EIS process.[1587]

The omission is no small error. Without a plan, it is not possible to fully assess the impacts of this mine. Even AECOM recognized the importance of a post-closure reclamation plan, stating:

> *A detailed reclamation plan is potentially essential to a reasoned choice among the alternatives*. A detailed reclamation plan would provide an understanding of temporary versus permanent impacts to wetlands, waters of the US (WOUS), and vegetation between alternatives. A detailed reclamation plan would also provide rationale and details on what a successful reclamation approach would be, and provide specific number of acres of planned reclamation in specific locations, which may differ among alternatives. . . . *A reclamation plan would provide an understanding of magnitude, duration, extent, and potential success of reclamation activities between alternatives and variants*.[1588]

The EPA also expressed concerns about the lack of a reclamation and closure plan prior to the release of the DEIS:

> We recommend that the detailed reclamation and closure plan referred to in the text be provided in advance of the DEIS. Our previously submitted comments on PDEIS Chapter 2 recommended providing additional details related to reclamation and closure that would typically be provided in a reclamation and closure plan. *The information on reclamation and closure is necessary to support the analysis of impacts and consideration of mitigation measures in the EIS, pursuant to NEPA*.[1589]

The Corps' unsatisfactory response is that such a plan "would be developed by the applicant at a later time. A reclamation plan was not available at the time of publication of the Draft EIS."[1590] The Corps provides no reasons for why a reclamation plan could not have been prepared by PLP prior to the publication of the DEIS. In contrast, Barrick Gold provided a reclamation plan prior to the release of the DEIS for the proposed Donlin Mine.[1591]

EPA also noted that

> Since the [reclamation and closure plan] would document the plan for long term

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[1587] Borden, 2019b at 4.
[1588] Bill Craig, Memorandum, AECOM to Shane McCoy, Corps, *Pebble Project – Final Data Gap Analysis*, Nov. 19, 2018 (included as an attachment to these comments).
[1589] *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.22, Wetlands and Other Waters/Special Aquatic Sites, at EPA Comment #7, at 5 (emphasis added).
[1590] *Id.*
[1591] *See* Donlin Gold Project, Draft Environmental Impact Statement, Nov. 2015, at 2–6 to 2–7 and 2–8 ("Reclamation and closure planning has been based on the concept of 'design for closure,' which was initiated in the very early stages of the Donlin Gold project development to address post-closure impacts on the physical resources of the area and on local communities."). https://www.arlis.org/docs/vol1/E/Donlin/932143704/932143704-ch2.pdf.

> closure of the site in compliance with closure criteria, we recommend that a draft [reclamation and closure plan] be developed, analyzed, and disclosed in the DEIS. Otherwise, it will be difficult for agency decision makers and the public to assess the effectiveness and success of the closure actions identified in the project description. In addition, as noted in previous comments to the Corps, we continue to recommend that a draft closure cost estimate be provided, the amount of which is a key factor in determining the effectiveness and ability to successfully implement the closure plan.[1592]

Regarding mine site reclamation and closure, EPA also encouraged the Corps to provide information "typically included in mining EISs since reclamation and closure activities should be described in a sufficient level of detail to predict long-term environmental impacts."[1593] That information includes a detailed plan for closure as it pertains to all aspects of water treatment, the reclamation standards and objectives, proposed monitoring, timing for reclamation activities and a temporary closure plan, which most jurisdictions require.[1594] While the Corps asserts that the DEIS provides this information, the DEIS remains incomplete and inadequate and PLP has yet to submit a detailed plan that encompasses the full scope and scale of issues associated with closure and reclamation.

2. PLP has not submitted any financial assurances.

The DEIS must also assess the financial assurances offered by Pebble for post-closure reclamation and long-term water management. The DEIS should provide a detailed level of information to ensure that there will be adequate financial assurance to cover the costs of implementing closure and reclamation plans, monitoring, contingency measures, and long-term water management to avoid unacceptable adverse environmental impacts. Mine closure and post-closure water treatment costs can typically range from $10s to $100s of millions.[1595] However, for this project, Borden estimates that closure costs are likely to exceed $1.5 billion dollars.[1596]

The CWA also requires PLP to provide "financial assurance" to cover mitigation costs.[1597] The mitigation plan has to describe how the financial assurances "will be provided and how they are sufficient to ensure a high level of confidence that the compensatory mitigation project will be

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1592 *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Chapter 5, Mitigation, at EPA Comment #8, at 5.

1593 *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Chapter 2, Alternatives, at EPA Comment #40, at 22.

1594 *Id.*

1595 *See* Chambers Scoping Comments, 2018 at 2.

1596 *See* Borden, 2019d at 1, 7–10.

1597 33 C.F.R. § 332.3(n)(1) ("The district engineer shall require sufficient financial assurances to ensure a high level of confidence that the compensatory mitigation project will be successfully completed, in accordance with applicable performance standards. . . ."); 33 C.F.R. § 332.3(n)(2) ("The rationale for determining the amount of the required financial assurances must be documented in the administrative record for either the DA permit or the instrument.").

successfully completed. . . ."[1598] The 404(b)(1) Guidelines also require "the district engineer [to] assess . . . the costs of the compensatory mitigation project."[1599] The Corps' Regulatory Guidance Letter No. 05-1 also requires the Corps "District engineers [to] document the analysis used to determine the amount of the financial assurance, and . . . include this analysis in the administrative records for their permits."[1600] As discussed below in Section VII.E, the compensatory mitigation plan is lacking on a number of accounts. At this time, neither PLP, nor the Corps, have provided any documentation that indicates how PLP will meet the requirements of the CWA. This is pertinent for NEPA review because the public should understand how the company will ensure that it has taken all requisite and appropriate steps to soundly and responsibly set out its financial assurances.

Hardrock mining companies have a history of providing inadequate financial assurances. The DEIS should include the mechanisms so they can be adequately evaluated by the public and cooperating agencies. The form of assurance, whether a surety bond, letter of credit or corporate guarantee, for example, have a bearing on how reliable the assurance is. In addition, estimated reclamation costs are critical to ensure that the assurance is adequate. In an analysis of hardrock financial assurances on Bureau of Land Management lands, the U.S Government Accountability Office found that "[f]inancial assurances were not adequate to pay all estimated costs for required reclamation for 25 of the 48 operations."[1601]

The DEIS should disclose the costs associated with implementing the closure and reclamation plan, as well as the contingency measures to address the reasonably foreseeable but not specifically predictable project outcomes. The financial assurances should be in a form that protects the public interest in the event that Pebble, or any future companies involved in the operations at the mine, is unable to implement contingency measures or perform long-term operation and maintenance. Details regarding the financial assurances must be provided for public review and comment. The EPA "recommend[ed] that the DEIS disclose the estimated financial assurance amount. This information is necessary to assess the effectiveness of reclamation and closure activities, which is critical to the assessment of environmental consequences of the project at and beyond closure."[1602]

In particular, the Corps must include information on how PLP proposes to provide financial assurances adequate to cover the costs of water management and treatment in perpetuity. The DEIS notes that active water management and treatment will be required in perpetuity. "Modeling of post-closure pit water quality indicates that the open pit water would need to be

[1598] 33 C.F.R.§ 332.4(c)(13)
[1599] 40 C.F.R. §§ 230.93(a)(1), (m), (n).
[1600] U.S. Army Corps of Eng'rs, Regulatory Guidance Letter No. 05-1, Guidance on the Use of Financial Assurances, and Suggested Language for Special Conditions for Department of army Permits Requiring Performance Bonds, Feb. 14, 2005, at 2.
[1601] U.S. GAO, Report, *Hardrock Mining BLM Need to Better Manage Financial Assurances to Guarantee Coverage on Reclamation Costs*, June 2005, at 2 (included as an attachment with these comments).
[1602] *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Chapter 2, Alternatives, EPA Comment #41, at 25.

treated in perpetuity (Knight Piésold 2018d)."[1603] "Groundwater entering the pit, where it would mix with pit lake water, would be pumped and treated in perpetuity to maintain the open pit as a hydraulic sink."[1604]

Richard Borden, an environmental scientist and manager who worked for the global mining company Rio Tinto for 23 years, noted that "[c]losure costs are driven largely by the exceedingly large perpetual water treatment liability created by the 20-year mine plan." [1605] Borden noted, particularly, the variety of drivers of significant costs associated with operating the water capture and treatment infrastructure post-closure: "In order to maintain and operate all water collection, transport and treatment infrastructure for the first one hundred years, a large number of support facilities will also be required. These will include a power plant, employee housing, workshops, more than 60 miles of road, ports and a ferry. Although mentioned in Chapter 2 no detail is provided as to how this infrastructure will be maintained and how frequently it will need to be replaced."[1606]

Federal regulators have determined that financial assurances are required for this type of long-term pollution treatment from mines, but that not all forms of financial assurances are appropriate to ensure that funds remain available to cover these costs in the event of abandonment by the mine operator.

In 2002, OSMRE published in the Federal Register an "advance notice of proposed rulemaking" regarding "Bonding and Other Financial Assurance Mechanisms for Treatment of Long-Term Pollutional Discharges and Acid/Toxic Mine Drainage (AMD) Related Issues."[1607] That notice contained multiple findings and statements from OSMRE regarding the problem of long-term treatment of mine pollution, including the potentially perpetual duration of mine discharges. OSMRE expressly noted that "[i]n rare cases, technical analysis of a given discharge may be able to define (predict) the time over which pollution loading will cease so that treatment will no longer be needed. Absent that determination, the discharge is an indefinite or 'perpetual' liability for the permittee."[1608]

In a 2006 Federal Register notice, OSMRE determined that certain forms of financial assurances are more appropriate than others in ensuring that the costs of long-term treatment will be met:

> Our experience has shown that bonding systems which do not provide an income stream are not well-suited to ensuring the treatment of long-term pollutional discharges, such as AMD. Surety bonds, the most common form of conventional bond, are especially ill-suited for this purpose because no surety will underwrite a bond where there is no expectation of release of liability. Further, mandating that the permittee immediately post other forms of conventional bonds, such as cash or

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[1603] DEIS at 4.18–17.
[1604] *Id.* at 4.18–18.
[1605] Borden, 2019b at 8.
[1606] *Id.* at 7.
[1607] 67 Fed. Reg. 35,070 (May 17, 2002).
[1608] 67 Fed. Reg. at 35,072.

> negotiable bonds, may force insolvency on a permittee that is currently treating pollutional discharges. Bankruptcy will lead to bond forfeiture and forfeited amounts are not likely to be sufficient to ensure perpetual treatment of discharges.[1609]

OSMRE concluded that trust funds or annuities are necessary to ensure that the costs of long-term treatment will be met:

> We believe that the best approach to providing financial assurances for longterm treatment of pollutional discharges is to require that the permittee establish dedicated income-producing accounts such as trust funds or annuities that are held by a third party as trustee for the regulatory authority.[1610]

OSMRE ultimately adopted this approach in a final rule.[1611]

Accordingly, PLP cannot meet its financial assurance obligations until it provides verifiable estimates for the costs of installing and maintaining its water capture and treatment systems, and establishes a trust fund or annuity held by a third party that is sufficiently capitalized to produce annual income in perpetuity capable of covering ongoing treatment costs.

In scoping comments, Trustees for Alaska recommended that the DEIS:

- Assess and independently verify the cost (+/- percent) to reclaim and close the site in a manner that achieves reclamation goals and post-mining land use objectives;
- Discuss effectiveness for each criteria identified for determining success of reclamation activities for bond release;
- Assess and independently verify the direct costs for site reclamation, monitoring, long term management (including water treatment), maintenance, and contingencies, including removal of structures and facilities, and revegetation;
- Assess and independently verify the costs associated with implementing contingency measures to address reasonably foreseeable but not specifically predicted outcomes;
- Assess and independently verify the cost estimates (including reasonable contingencies) and appropriate economic variables to calculate the net present value of future expenses, including the time period to complete long term treatment, monitoring and maintenance;
- Evaluate the "mechanics" of the financial assurance mechanism for the site, for example, if a trust is being used, include such details as:
    - Requirements for timing of payments into the trust fund and for "true-ups";
    - Discount rate used, if any, including assumptions for inflation, management fees, and tax rates;
    - Acceptable investment instruments;

[1609] 71 Fed. Reg. 17,683 (April 6, 2006).
[1610] *Id.*
[1611] 72 Fed. Reg. 9,618 (March 2, 2007).

    - Tax status of the trust fund and how management fees and taxes are paid; and
    - Identification of the trust fund beneficiaries.
- Address how financial assurance cost estimates will be re-evaluated periodically (e.g. every three to five years or whenever a major change to the mine operations has occurred);
- Identify all potentially responsible parties for any post-closure clean up actions, and evaluate their potential for meeting post-closure obligations — the financial assurance should not depend on the continued financial health of the mine operator or its parent company;
- Disclose detailed information about the process used to develop and secure financial assurance, including, but not limited to, costs, calculations, models, assumptions, inflation adjustments and rates, rates of return, contingencies, labor rates, net present value to consider costs many years into the future;
- Evaluate the benefits and costs of removal of the tailings material and potentially acid generating material off-site;
- Base the financial assurance estimates on the reasonable spill or failure scenarios, such as the largest disturbances and material volume, water treatment, soil amendments, and hazardous materials;
- Assess the costs of a worst-case post-closure water treatment scenario;
- Estimate the indirect costs, such as mobilization and demobilization, contingencies, engineering design, etc.;
- Evaluate the indirect and cumulative costs associated with the long-term impacts to subsistence and water resources; and
- Evaluate Northern Dynasty Mineral's and PLP's fiscal solvency in assessing all financial assurances.[1612]

Dr. Chambers highlights the importance of understanding the financial assurances at the DEIS stage because it is the only stage where the public gets to comment prior to the Corps issuing a permit:

> Should the financial assurance be underestimated, or be unavailable for legal reasons – both of which have happened – the public is either saddled with the making up the missing funds, or for suffering the subsequent environmental damage that occurs. In many cases the indirect costs for the financial surety calculations are underestimated. These indirect costs can be up to 40% of the direct costs for mine closure (PLP used an estimate of 40% for indirect costs in its estimate for economic projections for the various mine alternatives in the Proposed Project.)[1613]

However, the DEIS does none of this. With no reclamation and closure plan and no financial assurances, the DEIS fails to take a hard look at any of the potential direct, indirect and cumulative impacts associated with post-closure, reclamation and outcomes if Pebble goes bankrupt. Instead, the DEIS ties development of financial assurance to the non-existent

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[1612] *See* Trustees for Alaska scoping comments, 2018 at 81–82.
[1613] *See* Chambers, 2019 at 3.

reclamation and closure plan.[1614] As a result, the DEIS lacks sufficient information to support any conclusions about direct, indirect and cumulative impacts associated with post-closure, reclamation and financial assurances. The Corps must obtain this information from Pebble and revise the DEIS.

R. The Natural Gas Pipeline and Gas Supply

The DEIS fails to take a hard look at potential impacts from the natural gas pipeline to fish, wildlife, and their habitats, including habitat fragmentation, stream crossings, bisected wildlife migratory routes, and disturbance to fish and wildlife from pipeline inspection and maintenance activities. The DEIS also fails to assess the socio-economic impacts associated with the significant gas demands from the 270-megawatt power plant on the overall Cook Inlet gas supply.

The project intends to draw its gas via a natural gas pipeline that will connect to the existing gas pipeline infrastructure on the Kenai Peninsula. In 2018, Petrotechnical Resources of Alaska updated its 2012 assessment of Cook Inlet gas demand and supply.[1615] The updated assessment notes that "[t]he revised assessment indicates that at current rates of gas well drilling, gas supplies will start to fall short of demand in 2021. In the absence of the drilling of new wells, the shortfall would begin in 2019."[1616] The application provides no information on gas supply over time and how Pebble's 270-megawatt plant will impact supply through the Cook Inlet region. The DEIS fails to analyze the project's gas demand impacts on the region, including an assessment of how utility rates will be impacted for all rate-payers that depend on power that uses Cook Inlet gas.

The DEIS also fails to analyze the potential necessity of importing natural gas to meet Pebble's demands if the Cook Inlet supply is incapable of meeting such demand. This analysis must include assessing the potential impacts associated with the construction of a liquefied natural gas facility. The DEIS fails to address this as a potential reasonably foreseeable future action.

S. Amakdedori Port

During scoping, PLP made substantial changes to the proposed port. According to PLP's 404 revised application, the port facility's marine component would include an earthen access causeway extending out to a marine jetty.[1617] The jetty, constructed of sheet pile cells would allow for roll-on/roll-off barge access berth on one side and lightering of barges on the other.[1618] PLP later abandoned the jetty with dredged channel concept that was part of the original application. The revised project lighters the concentrate containers to deeper water, where they would be loaded onto bulk carriers.[1619]

[1614] DEIS at 2–41.
[1615] *See* Alan Bailey, *PRA Cook Inlet Gas Forecast Indicates More Development Needed*, Petroleum News, May 20, 2018, http://www.petroleumnews.com/pntruncate/779089213.shtml (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1616] *Id.*
[1617] 2018 Project Description at 4.
[1618] *Id.* at 50.
[1619] *Id.* at 51.

1. The DEIS fails to take a hard look at potential impacts from the jetty.

The marine port component includes an earthen access causeway extending out to a marine jetty located in 15 feet of natural water depth. On one side will be a roll-on/ roll-off barge access berth and a separate berth on the opposite side for lightering barges.[1620] The jetty is expected to be constructed as a sheet pile cell structure filled with granular material.[1621]

It is unclear whether this design is similar to that utilized by the Port of Anchorage in the late 2000s. The Port of Anchorage's open cell sheet pile design has proven to be a complete failure.[1622] The Port's open cells were designed to interlock with one another.[1623] But the design was unable to retain the silt behind the sheet and separated at the seams, buckling, twisting and bending.[1624] The survey of the failure found that "[o]f 66 cells targeted for inspection, 28 showed damage, some of it dramatic. . . . In all, the inspections revealed 635 damaged sheets out of 2,611 examined so far."[1625] The Port has since abandoned this design.[1626]

PLP's application lacks the requisite details regarding the jetty construction. The DEIS notes that "[i]n the absence of the additional foundation information and related engineering analyses, the proposed rockfill causeway and sheet-pile dock would have the potential to result in adverse impacts to the environment during construction and operations."[1627] Without

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1620 *Id.* at 50.
1621 *Id.*
1622 *See e.g.*, *Port of Anchorage Expansion: 10 Years Gone — What Now?*, Alaska Journal of Commerce, July 11, 2013, http://www.alaskajournal.com/business-and-finance/2013-07-11/port-anchorage-expansion-10-years-gone-%E2%80%94-what-now#.Wy1geqeQGUl (previously provided as an attachment with Trustees for Alaska's scoping comments); Elwood Brehmer, *Anchorage Settles with Port Contractors, MARAD Suit Ongoing*, Alaska Journal of Commerce, Feb. 01, 2017, http://www.alaskajournal.com/2017-02-01/anchorage-settles-port-contractors-marad-suit-ongoing#.Wy1h56eQGUk (previously provided as an attachment with Trustees for Alaska's scoping comments); Kirsten Adams, *Design Problems Plague Port of Anchorage Expansion*, Alaska Policy Forum, June 7, 2010 http://alaskapolicyforum.org/2010/06/port-of-anchorage-expansion-project-tops-750m/ (previously provided as an attachment with Trustees for Alaska's scoping comments).
1623 *See* Lisa Demer, *Port of Anchorage: A Billion-Dollar Mess?,* Alaska Daily News, Jan. 15, 2011, Updated Sept. 29, 2016, https://www.adn.com/alaska-news/article/port-anchorage-billion-dollar-mess/2011/01/16/ (previously provided as an attachment with Trustees for Alaska's scoping comments).
1624 *Id.*
1625 *Id.*
1626 *See* Tegan Hanlon, *City Considers New Strategy for Troubled Port of Anchorage Project*, Alaska Daily News, Published Aug. 17, 2014, Updated May 31, 2016, https://www.adn.com/anchorage/article/city-moving-forward-port-anchorage-construction-project/2014/08/18/ ("The city is moving forward with another attempt to revamp the Port of Anchorage, this time downsizing the scope of the project and abandoning flawed construction to the north." (previously provided as an attachment with Trustees for Alaska's scoping comments).
1627 DEIS at 4.15–11.

understanding the design and having sufficient information about the location (including the foundation), the Corps is unable to take hard look at the impacts associated with sheet pile design for the jetty.

2. The DEIS fails to adequately analyze climatic conditions at the port.

The Amakdedori port site is known for fierce winds, extreme weather, high tides, uncharted off shore reefs, ice-scour and the natural outflowing currents from upper Cook Inlet that cause an extreme westward drift toward the Amakdedori shoreline.[1628] Nuka Research notes that

> Kamishak Bay is subject to the Kamishak Gap wind — where strong winds blow from the Lake Iliamna region through a gap in the mountains into Kamishak Bay. These northwesterly winds can be over 20 meters per second. Kamishak Gap winds are the most frequent and long-lasting wind jets in Cook Inlet.[1629]

Additional engineering designs must be provided for the port facilities to fully address the exposed location of the Amakdedori port to Gulf of Alaska storms and extreme high winds between Bristol Bay and Cook Inlet. These designs must also adequately account for the planned on-shore port facilities being located just above high tide level. PLP also needs to provide baseline meteorological and climate data prior to the Corps preparing the DEIS.[1630] ADF&G comments on the preliminary version of the DEIS note that

> Climate and Meteorology does not include a description of weather conditions at the Amakdedori Port area or in Kamishak Bay and lower Cook Inlet. The [State of Alaska] provided scoping comments on weather conditions in the Amakdedori Port area and Kamishak Bay that appear to have been ignored in the DEIS. Sea ice conditions, tidal currents, and Kamishak Gap winds have been completely ignored or understated. Weather and sea conditions will not affect operations individually but in concert.[1631]

Nuka Research makes similar conclusions regarding the lacking DEIS analysis, noting that it "does not mention or analyze these winds, the hazard they pose to shipping operations, how they affect oil spill risk, or oil spill cleanup capabilities."[1632] The DEIS fails to take a hard look at the port's ability to operate under extreme weather and inlet conditions. The DEIS fails to assess the associated problems with operating in this harsh environment, including groundings and spills.

To provide the requisite hard look at operations in this environment, the Corps must collect more information from PLP. The Cook Inlet Harbor Safety Committee recommended that

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[1628] *See* Welker Scoping Comments, 2018 at 36.
[1629] Nuka Research, 2019 at 4.
[1630] *See* Welker Scoping Comments, 2018 at 36.
[1631] *See* Alaska Department of Fish and Game, Pebble Project EIS Consolidated Comments Table, Dec. 28, 2018. Comment re Sec. 3.1.4.2, DEIS 3.14, at page 3
[1632] Nuka Research, 2019 at 4.

an adequate baseline analysis requires PLP to study and analyze tidal current directions and velocities, sea floor conditions, and prevailing and maximum wind and sea conditions at the port site.[1633] With that gathered data, PLP should simulate loading and unloading in a variety of ocean conditions.[1634]

Notably, AECOM requested much of this data in RFI 39, including wave height, wave period, bathymetry, ice coverage, port designs criteria, and details regarding barges/lightering vessels. Nuka Research notes that of those requests, PLP only provided responses regarding ice coverage and vessel size.[1635]

In addition, PLP's metocean data is inadequate to assess potential swells and tidal rips.[1636] PLP also fails to provide requisite details regarding how its preferred lightering location was chosen. Nuka Research also identified concern over PLP's failure to explain how it plans to operate in extreme conditions. Nuka Research notes that

> With an expected traffic of 60 barges per year (33 supply and 27 concentrate), and a stated timing of 4–5 days loading for concentrate barges and 3 for unloading fuel barges (presumably similar for other supply barges), barges will be operating in Kamishak Bay for more than half the days of the year (DEIS 2-69). This adds up to approximately 200 to 230 days per year. Operations are year-round, so operations during extreme winter and/or storm conditions in Kamishak Bay appear to be likely. PLP must provide an analysis that estimates how many days per year loading operations would be possible at the primary and alternate lightering sites for all identified alternatives, based on expected metocean conditions.[1637]

The currently proposed port fails to demonstrate how PLP has accounted for potential tsunamis.[1638] The proposed port sits approximately 7 feet below the "predicted run-up elevation" of a tsunami.[1639] Because the port facilities are within the tsunami run-up zone, facilities such as fuel tanks and concentrate containers could be impacted by a tsunami event. The DEIS acknowledges potential impacts but states that the tsunami analysis will be conducted prior to final port designs.[1640]

Failure to gather requisite baseline information and provide substantive design details precludes the Corps from conducting the required hard look analysis.

[1633] *Id.* at 5 citing Cook Inlet Harbor Safety Committee letter to the U.S. Coast Guard.
[1634] *Id.*
[1635] *Id.* at 5–6.
[1636] *Id.* at 6.
[1637] *Id.* at 7.
[1638] *Id.* at 10.
[1639] *Id.* quoting DEIS at 4.15–12.
[1640] *Id.* citing DEIS at 4.15–12 to 4.15–13.

T. Iliamna Lake Seals

Iliamna Lake is home to the United States' only population of freshwater seals. The population of approximately 400 seals are isolated from other seal populations through a combination of ecological, behavioral, and geographical factors.[1641] In 2013, NMFS responded to a petition to list the species under the Endangered Species Act. NMFS identified that at the time of its decision,

> there is uncertainty and conflicting information about whether Pacific harbor seals migrate between Iliamna Lake and Bristol Bay. If there is no migration, and these seals are distinct from those in Bristol Bay, then they may face potentially serious threats including low abundance, the Pebble Project and climate change.[1642]

Three years later, NMFS prepared a report that found that the Iliamna seal population is a discrete population.[1643] As a discrete population that lives in the lake year-round, the Lake Iliamna seals have developed specific behavioral adaptations to their environment, including overwintering on the frozen lake. The proposed Ferry Service and Terminals on Lake Iliamna pose a direct threat to the small, isolated, and resident Lake Iliamna seals.

The DEIS fails to fully assess seal use of the lake or how the project may impact the species. The DEIS maps seal haul-out locations but fails to adequately identify other seal habitat use patterns.[1644]

The DEIS fails to consider project impacts on seal foraging behavior.[1645] Instead, the DEIS concludes that harbor seals are known for vessel tolerance and therefore, the project would not be expected to have detrimental impacts on the seals. But in reaching this conclusion, the DEIS fails to provide support for how studies regarding harbor seal behavior are necessarily applicable to the Iliamna seal population.

The DEIS also fails to assess potential impacts from exposure to contaminants,[1646] and from disruptions to the seal's use of lake ice from the ice-breaking ferry.[1647] The DEIS also fails to evaluate potential changes to seal distribution and availability to subsistence harvesters.[1648]

[1641] DEIS at 3.23–41.
[1642] 78 Fed. Reg. 29100 (May 17, 2013).
[1643] *See* Boveng, P. L., S. P. Dahle, J. K. Jansen, J. M. London, B. L. Taylor, and D. E. Withrow. 2016. *Scientific evaluation of the distinctness of harbor seals (Phoca vitulina) in Iliamna Lake*. Report from the NOAA Alaska Fisheries Science Center to the NOAA Fisheries Alaska Region Office. Marine Mammal Laboratory, Alaska Fisheries Science Center, 7600 Sand Point Way NE, Seattle, WA 98115, U.S.A. 56 pp, at ES iii (included as an attachment with these comments).
[1644] *See* Hovel, 2019 at 17.
[1645] *Id.*
[1646] *Id.*
[1647] *Id.* at 17–18.
[1648] *Id.* at 18.

U. Fugitive Dust

The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts associated with fugitive dust. The DEIS's lack of analysis of fugitive dust from the road system is addressed in a report prepared by Dr. Christopher Frissell and Doctoral candidate, Sarah O'Neal.[1649] A second report, prepared by Dr. Kendra Zamzow, Dr. Christopher Frissell, Dr. Ann Maest, and Doctoral candidate Sarah O'Neal evaluated deficiencies in the DEIS's assessment of fugitive dust at the mine site.[1650]

1. Road system fugitive dust sources not adequately identified or assessed.

While the DEIS recognizes fugitive dust will come from in-pit drilling and blasting, material handling (transport, storage, processing), and the tailings beach, there is virtually no discussion about dust from the road system.[1651] Dr. Frissell and O'Neal identify the following inadequacies in the DEIS regarding sources of dust from the road system:[1652]

- The DEIS fails to determine the extent of dust plumes and deposition from the road and port traffic (the 330-foot zone of impact around the road is inadequate).
- The DEIS ignores contributing sources. Dust sources like road material source geochemistry, vehicle fuels and exhaust, lubricants, vehicle wear, chronic leakage, or spills of hauled material are not identified.
- The DEIS ignores road fill and surface material sites (which will vary from 241 acres to 717 acres for road material) as sources of dust.
- The DEIS does not consider sand applied for traction in winter. Traction sand applied in winter is likely to be a major dust source that must be accounted for, especially as it cannot be controlled by water spreading in near- or sub-freezing conditions.
- The DEIS offers inadequate justification for soil density, percent silt, and threshold value of tailings particles as inputs in dust plume modeling.
- The DEIS relies on incomplete wind and precipitation data.
- The volume of dust from the mine site is estimated but there is no analysis of whether, or under what conditions, contaminants in dust would enter waterways where fish could be exposed.
- Information has not been pulled from RFIs into the DEIS in any meaningful way that would allow the reader to understand sources, volumes, and chemical make-up of dust.
- Critical data are missing, outdated, or buried in RFIs and not summarized in the DEIS chapters.

[1649] Frissell, Christopher and O'Neal, Sarah, May 9, 2019, *Re: Direct and cumulative impacts of road system fugitive dust in the Pebble Project draft EIS*, (Frissell & O'Neal, 2019) (report and references to report included as an attachment to these comments).
[1650] Zamzow, 2019b.
[1651] Frissell & O'Neal, 2019 at 7; *see also* DEIS at 4.14–3.
[1652] Frissell & O'Neal, 2019 at 7.

- Assumptions in the DEIS about the efficiency of dust control are unjustified and wildly unrealistic. The DEIS and supporting record lacks citation to published literature or analyses supporting the assumed effectiveness and feasibility of the dust abatement measures identified.

Critical data is missing for adequate modeling of dust in the DEIS. Dr. Frissell and O'Neal point out that the DEIS provides a simple equation for estimating concentration of metals due to dust but fails to provide an explanation of the actual input data utilized.[1653] The DEIS provides no indication that the analysis was conducted for the road system.[1654] A proper analysis of road dust effects would consider a suite of factors all absent from the DEIS analysis. Such an analysis would consider road dust generation and dispersion and contamination.[1655] The DEIS also fails to explain how the deposition rate was determined.

> The DEIS also fails to adequately assess the extent of deposition. The DEIS's estimates are inaccurate because the DEIS has placed an arbitrary 100-meter boundary around the roadways.[1656] The DEIS acknowledgement that the research shows that "most dust generated from roads is deposited within 330 feet" indicates that dust continues past this point. Even if one were to accept the very generalized assessment that "most dust" falls within 330 feet (despite geography, prevailing wind, material source, particle size, vehicle traffic, etc.) there still remains the question of how much dust extends beyond this generalized distance. The DEIS provides no analysis to justify an assertion that the 330-foot dust zone captures all deposited dust and associated impacts.[1657]

Dr. Frissell and O'Neal identify several critical factors that influence the distance dust travels.

> Mobilization and deposition distance of dust will vary with material density, size, wind speeds and terrain, as well as with the activity and travel speeds of light trucks in administrative use or heavy trucks hauling supplies, waste rock, ore, and concentrate (Countess et al. 2001, Cecala et al. 2012). The dust dispersion model likely does not fully account for these variables, and in so doing, in our opinion very likely underestimates the area directly impacted.[1658]

These factors are not considered in the DEIS's determination that it need only evaluate a 330-foot dust zone. The DEIS also fails to identify or consider the secondary transport of dust

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[1653] *Id.*; *see also* DEIS at Section 4.14–2 to 4.14–9.
[1654] Frissell & O'Neal, 2019 at 7.
[1655] *Id.* at 8.
[1656] *Id.* at 11; *see also* DEIS at 4.22–25 ("Research on dust emissions and its impact on vegetation in Alaska has shown that most dust generated from roads is deposited within 330 feet (Petavratzi et al. 2005; Walker and Everett 1987). Therefore, a potential indirect impact area was calculated using a 330-foot zone on all permanent road footprints.").
[1657] Frissell & O'Neal, 2019 at 11–12.
[1658] *Id.* at 11.

particles and associated contaminants downstream after initial deposition in soils, vegetation, and aquatic systems. Dr. Frissell and O'Neal note that even within this arbitrary dust zone,

> [t]his results in impacts to 892 acres of "wetlands and other waters", including 648 acres of wetland, 205 acres of lakes and ponds, and 37 acres of rivers and streams (DEIS Chapter 4.22). An additional 6,100 acres of vegetation would be impacted by road dust (DEIS Chapter 4.26). All in all, including contributions from mine site dust, 10,000 acres of wetlands, vegetation, and water bodies could be impacted by fugitive dust based on the current dust plume assessments. Much of this area would receive repeated inputs of thousands of tons of dust annually (RFI 007). However, the nature of the impact that this deposited dust might have on aquatic ecosystems is not considered or disclosed in the DEIS.[1659]

Given the flaws with utilizing an arbitrary 330 feet as the distance dust will travel, "the DEIS likely seriously underestimates the probable zone of dispersion of dust and dust-borne contaminants."[1660]

The DEIS also fails to adequately assess dust dispersion based on silt in the roadbeds.[1661] The model used by PLP assumes a silt concentration of 3.9%.[1662] This percentage is taken as a representative number for industrial roads from EPA's AP-42 Manual.[1663] However, as Dr. Frissell and O'Neal point out, the use of AP-42 data is not appropriate. The AP-42 manual itself states:

> dust emissions from unpaved roads . . . vary directly with the fraction of silt. . . . [T]he ranges of silt content vary over two orders of magnitude. Therefore, the use of data from [AP-42] can potentially introduce considerable error. Use of this data is strongly discouraged when it is feasible to obtain locally gathered data.1664

PLP has provided no reasons for why it is not feasible to get site-specific data. The Corps errs by allowing PLP to rely on data from a manual that specifically identifies the limitations of using such data. PLP has had years to gather baseline data. There is no excuse for not gathering the

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[1659] *Id.*
[1660] *Id.* at 12.
[1661] *Id.* at 13.
[1662] *Id.*
[1663] *Id. See also* Environmental Protection Agency, Report, AP-42 manual, 2006, Section 13.2.2 – Unpaved Roads, https://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf) (included as an attachment to these comments). AP-42, Compilation of Air Pollutant Emission Factors, has been published since 1972 as the primary compilation of EPA's emission factor information. It contains emissions factors and process information for more than 200 air pollution source categories. *See* AP-42 Compilation of Emissions Factors, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.
[1664] Frissell & O'Neal, 2019 at 13 (quoting AP-42) (bold emphasis in original, italicized emphasis added).

requisite data to allow for a realistic and accurate modeling of dust dispersion. Dr. Frissell and O'Neal note that

> the [AP-42] manual offers no tables that show a mean as low as the 3.9% used in the dust modeling for the DEIS. Haul roads for coal mines might be the closest category, and these show a mean of 8.4% silt; a freshly-graded haul road has a mean of 24% silt.[1665]

The DEIS's reliance on dust suppression is also flawed. The DEIS assumes dust suppression will only be needed in the summer and that watering will be sufficient.[1666] The DEIS should assess the use of dust pallatives as a possible necessary dust suppression measure.[1667] Based on review of literature and past examples, Dr. Frissell and O'Neal conclude that

> watering alone (DEIS Chapter 4.14) will not work and that other dust control measures will be needed (Cecala et al. 2001, Teck 2005, Teck 2015, Jones et al. 2017). . . . The take-home message from these real-world examples is that even beyond the limited effectiveness of water as a dust abatement measure, perfect execution of any dust abatement measures is exceedingly unlikely.[1668]

The DEIS also overestimates dust control efficiency at 80%, again based on the AP-42 manual. Yet, not surprisingly, the AP-42 manual identifies that "[w]atering, the most common and, generally, least expensive method, provides only temporary dust control."[1669] As Dr. Frissell and O'Neal point out, the 80% dust suppression estimate is based on the use of chemical dust suppressants. With water alone, the control efficiency factor falls to 40–70% for PM10, 30–60% for total suspended particulates, and water is only 72% effective for three to four hours following thirty minutes of use.[1670] Unless PLP plans to have water trucks driving the road virtually non-stop, around-the-clock, the DEIS estimate is flawed and dust will be a more present and extensive problem than the DEIS asserts.

While chemical dust suppressants may control dust at a more effective rate, they can contaminant the environment. The DEIS mentions the potential use of such suppressants in Chapter 5 but does not assess the resulting impacts to the environment.[1671] By failing to do so, the Corps has not taken the requisite hard look at potential impacts.

[1665] *Id.*
[1666] *Id.*, *see also* DEIS at 4.18–11.
[1667] Frissell & O'Neal, 2019 at 16.
[1668] *Id.* at 15.
[1669] *Id.* (quoting AP-42 at Section 13.2.2).
[1670] *Id.* at 16 (citing AP-42).
[1671] *Id.* at 16.

2. *The DEIS fails to take a hard look at potential impacts from fugitive dust from the road system.*

The DEIS completely fails to assess the environmental consequences, including toxicological effects, of road system fugitive dust once it enters the freshwater ecosystem. Dr. Frissell and O'Neal identify the following failures:[1672]

- The fugitive dust chemistry reported in the DEIS does not include metals from vehicle wear as a component. This prevents an assessment of environmental consequences to aquatic life.
- The DEIS fails to include a baseline soil chemistry for roads. As a result, future impacts cannot be assessed. Baseline chemistry needs to include trace elements and salt or petroleum components that could be in chemical dust suppressants.
- The DEIS fails to include an ecological analysis that considers the cascading physico-chemical effects of fugitive dust on the environment, including bioaccumulation of metals and polycyclic aromatic hydrocarbons, and the resulting potential impacts on fish and aquatic resources.[1673]
- The DEIS fails to include an analysis of how different source sites of construction and maintenance material for roads and other operations vary across different alternatives in terms of effects on acres or types of vegetation, wetlands, or water bodies impacted.
- The DEIS fails to include an analysis of impacts to wetlands or water bodies; rather, it only includes the number of acres directly impacted by dust deposition, and those figures were estimated using a grossly inadequate model.
- The DEIS completely ignores the transport of dust and associated contaminants away from the site of deposition by water flow and biological processes.
- The DEIS fails to provide critical assumptions underlying the dust deposition model, which are instead buried in an RFI.

While the DEIS recognizes that fugitive dust may have potential impacts, the analysis of the sources, transport and fate, and the resulting impacts to the environment from fugitive dust "is grossly inadequate."[1674] Dr. Frissell and O'Neal conclude that the DEIS analysis is "misleading. . . . disjointed, fragmented, seriously incomplete, and relies on outdated and inaccurate assumptions."[1675]

While the DEIS estimate is conservative and flawed, it still estimates a significant amount of fugitive dust over an enormous area. The DEIS estimates 8,300 tons of fugitive dust per year impacting 1,500 acres of wetlands, 250 acres of lakes and ponds and nearly 50 acres of rivers and streams.[1676] Yet, as identified above, this estimate is inaccurate and incomplete. Dr. Frissell and O'Neal conclude that "[fugitive] dust is likely to extend further than has been modeled, and the

[1672] *Id.* at 17.
[1673] *Id.*; O'Neal, 2019 at 12.
[1674] Frissell & O'Neal, 2019 at 24.
[1675] *Id.*
[1676] *Id.*

impacts . . . on wetlands, water bodies, and aquatic life are very likely more extensive than has been stated in the DEIS."[1677]

In addition to the numerous flaws in the analysis of direct and indirect impacts, the DEIS fails to adequately assess the cumulative impacts. Dr. Frissell and O'Neal conclude that "the DEIS either underestimates or fails entirely to disclose the likely immediate and cumulative ecological and toxic effects of fugitive dust caused by the proposed project on fish and aquatic life."[1678] Further, the DEIS fails to consider the cumulative effects associated with the mine expansion.[1679]

3. The DEIS fails to adequately identify and evaluate mine site fugitive dust sources.

The Zamzow et al. 2019 report focuses on fugitive dust from the mine site. Many of the same problems found pertaining to road system fugitive dust are applicable to the DEIS's failure to adequately assess dust sources at the mine site. The report identifies the following problems:[1680]

- Justification for soil density, percent silt, and threshold values of tailings particles as inputs in dust plume modeling is inadequate.
- Incomplete wind and precipitation data are applied in models.
- The volume of dust from the mine site is estimated but there is no analysis of whether, or under what conditions, copper in dust would enter waterways where fish could be exposed.
- Information has not been pulled from RFIs into the DEIS in any meaningful way that would allow the reader to understand sources, volumes, and chemical make-up of dust.
- Critical data on soils classification, precipitation, wind speed are missing, outdated, or buried in RFIs and not summarized in the DEIS chapters.
- Assumptions about the efficiency of dust control are unrealistic. The DEIS and supporting record lack citations to published literature or analyses supporting the assumed effectiveness and feasibility of the dust abatement measures identified.

The DEIS ignores many of the same factors identified in Section VI.U.1 for the road system when assessing fugitive dust sources from the mine site. For example, the DEIS does not evaluate the contribution of metals from vehicle wear in fugitive dust,[1681] assess soil chemical and physical properties,[1682] models its dust plume on a single particle density when density will change based on source material,[1683] relies on a small set of meteorological data for wind speed

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[1677] *Id.*
[1678] *Id.*
[1679] *Id.* at 25.
[1680] Zamzow, 2019b at 5.
[1681] *Id.*
[1682] *Id.* at 5–8.
[1683] *Id.* at 11–12.

and precipitation,[1684] uses the same 80% control efficiency figure for dust suppression despite its inappropriate use for water,[1685] and does not address dust deposition or suppression during winter.[1686]

In addition, the DEIS fails to address factors specific to fugitive dust at the mine site. For example, the DEIS does not assess whether ore concentrate will contribute to the dust plume at the mine site and/or port site.[1687]

The DEIS analysis for the mine site is also limited by the arbitrary 330-foot dust zone. As discussed above, this limited impact analysis area fails to accurately capture and portray the anticipated dust impacts that will extend beyond 330 feet.[1688] Notably, the DEIS recognizes that dust will travel further than 330 feet through its depiction of mine site dust deposition in Figure 4.14–1.[1689] The following figure in the Zamzow et al. 2019 report includes an overlay of concentric rings at 2 and 4 miles out from the pit:[1690]

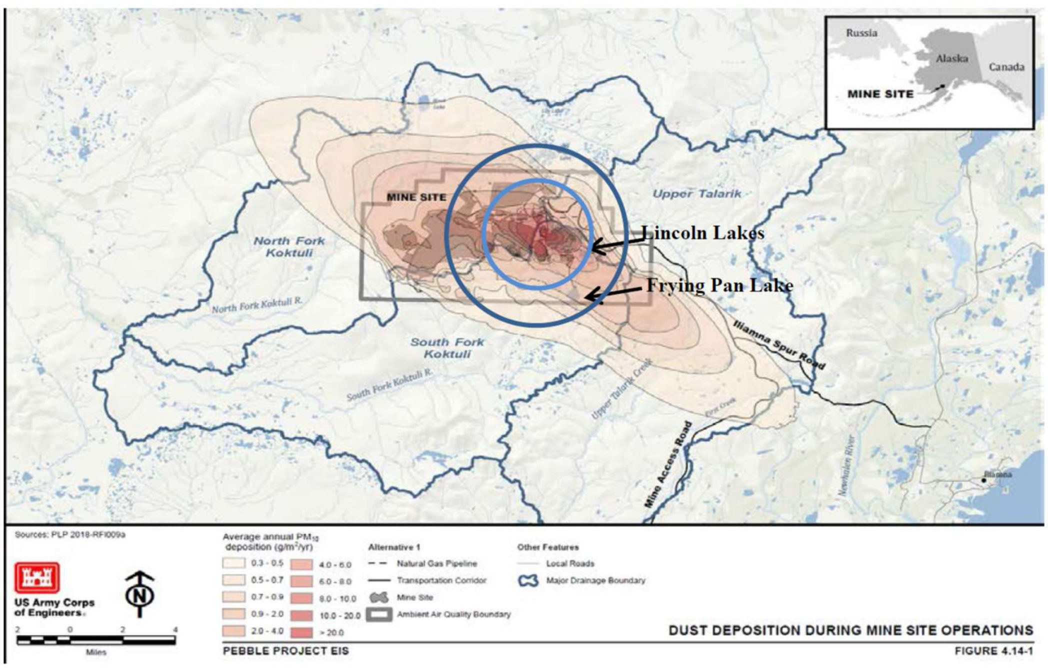


Figure 5. Mine site fugitive dust deposition plume. Concentric rings with diameters of 2 and 4 miles have been added to the figure. Frying Pan Lake, over 2 miles from the main mine area, and Lincoln Lakes located over the eastern portion of the ore deposit, are in the path of modeled dust deposition. These estimated deposition rates appear low relative to measured rates on dirt or gravel roads in Alaska. *Source: modified from DEIS Figure 4.14-1*

1684 *Id.* at 12.
1685 *Id.* at 13–14.
1686 *Id.* at 14–15.
1687 *Id.* at 9.
1688 *Id.* at 10.
1689 *Id.* at 11; *see also* DEIS Figure 4.14–1.
1690 *Id.*

As Dr. Zamzow notes, "In the Pebble Project DEIS, the 100 m zone was the sole source relied on to calculate the area of vegetation, wetlands, and water bodies impacted by dust, and is different from the dust plume map shown in Chapter 4.14."[1691] This is self-evident after looking at the expanse of dust deposition provided in the DEIS Figure 4.14–1. Because wetlands and water bodies will be impacted far beyond the 330-foot dust zone, the DEIS estimates are inaccurate and misleading. Because fugitive dust is considered a secondary or indirect impact that results in loss of wetlands under the CWA 404 permit review for this project,[1692] the estimated indirect loss of wetlands for purposes of the 404 analysis is inaccurate.

4. The DEIS fails to take a hard look at potential impacts of fugitive dust from the mine site.

As one would expect, the Zamzow et al. 2019 report finds many of the same DEIS failures regarding assessment of impacts from road system fugitive dust for the mine site. The Zamzow et al. 2019 report highlights the following environmental consequences from fugitive dust that are not adequately addressed in the DEIS:

- Fugitive dust chemistry as reported in the DEIS does not include copper as a component. As a result, environmental consequences to aquatic life are severely underestimated. There is no analysis of the concentrations of copper that will leach from dust deposited on different parts of the landscape.[1693]
- Dust deposition rates appear to be vastly underestimated, and this affects the projected accumulation of trace elements in the environment.[1694]
- There is very minimal soil and sediment baseline chemistry where mine facilities will be placed, and many water bodies in the path of fugitive dust have not had baseline sampling. Without this baseline information, there can be no quantitative measurements to assess whether mine-related metals accumulate in the environment, limiting ecological impacts analysis.[1695]
- There is no ecological analysis that considers the connected physical and chemical effects of fugitive dust on the environment or the resulting potential impacts on birds, mammals, fish, or aquatic resources.[1696]
- There is no analysis of physical or chemical impacts to wetlands or water bodies, only the number of acres directly impacted. As a result, the impacts of Alternatives cannot be assessed.[1697]
- There is no description of wetlands and water bodies within the likely deposition zones or of how they support aquatic life. As a result, the impact of dust settling on them cannot be assessed.[1698]

[1691] *Id.* at 10.
[1692] *See* DEIS at 4.22–3 to 4.22–4 ("An additional 1,896 acres of wetlands and other waters would be indirectly impacted by fugitive dust from the mine site and transportation corridor.").
[1693] Zamzow, 2019b at 18–20.
[1694] *Id.* at 20–21.
[1695] *Id.* at 15–17.
[1696] *Id.* at 25–29.
[1697] *Id.* at 24–25.

- There is no data on the ability of metals in dust to leach in different environments (e.g., slightly acidic wetlands, neutral-pH ponds, gravel stream banks).[1699]

Zamzow et al., 2019, comes to the same conclusions found in Frissell 2019. The report concludes that "[t]he treatment of the potential distribution and associated environmental risks of fugitive dust in the DEIS is inadequate, and as a consequence misleading. It is disjointed, fragmented, seriously incomplete, and relies on outdated and inaccurate assumptions."[1700] The report highlights concerns about metals like copper and zinc leaching into the aquatic environment from dust. As discussed in the report and above in Section VI.D.6, copper, even at very low concentrations, can have significance impacts on salmonids.[1701] The DEIS fails to take the requisite hard look at the contribution of trace metals, including copper, from fugitive dust into the environment. Zamzow et al., 2019, concludes that "[t]he DEIS severely underestimates the ecotoxic immediate and cumulative effects of fugitive dust on fish and aquatic life."[1702]

V. Invasive Species and Ballast Water

Executive Order 13112 directs all federal agencies to prevent the introduction and spread of invasive species.[1703] Ballast water from marine barges and vessels serves as a conduit for the introduction of non-native invasive organisms into the marine ecosystem.[1704] Non-indigenous species may compete with or prey upon native species of marine algae, fish, and wildlife, may reduce biodiversity of species inhabiting coastal waters, may carry diseases or parasites that affect native species, and may disrupt the aquatic environment and economy of affected nearshore area. Aquatic nuisance species may be transported and introduced into Cook Inlet from shipping vessels. The DEIS fails to evaluate any impacts from ballast water. The only assessment of invasive species pertains to invasive vegetation.[1705] The DEIS must evaluate the potential impacts associated with non-native invasive species introduced from marine cargo and fuel barge ballast water.[1706] The National Invasive Species Act of 1996 provides for ballast water management to prevent the introduction and spread of nonindigenous aquatic species into the waters of the United States. The DEIS must include a ballast water management plan, and take a hard look at potential impacts from invasive species introduced by ballast water.

1698 *Id.* at 25, 27.
1699 *Id.* at 22–24.
1700 *Id.* at 30.
1701 *Id.* at 26–27.
1702 *Id.* at 30.
1703 Exec. Order 12,112, Feb. 3, 1999, https://www.invasivespeciesinfo.gov/laws/execorder-13112.shtml.
1704 *See* Nuka Research, 2019 at 3; Welker Scoping Comments, 2018 at 40.
1705 *See* DEIS at 4.23–1, 4.23–12, 4.23–13, 4.23–20, 4.26–1 to 4.26–3, 4.26–18, 4.26–19 (all referring to invasive plants).
1706 *See* Nuka Research, 2019 at 3 ("The risk of invasive species introduction should be analyzed based on the amount of ballast water to be discharged and the likely ports of origin. Assuming that the ships will be obtained by charter, it is likely that they may originate at many different ports depending on the vessel and the voyage.).

W. Cook Inlet Beluga Whales

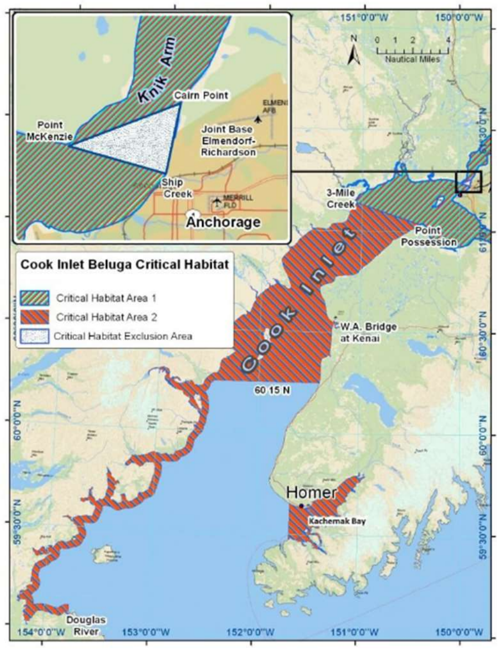
1. *The Cook Inlet Beluga Whale is Endangered and Shows No Signs of Recovery.*

The Cook Inlet beluga whale was listed as an endangered species under the Endangered Species Act in 2008.[1707] The Cook Inlet beluga whale is a distinct population segment, and was originally estimated at 1,300 whales. It has been the focus of management concerns since experiencing a dramatic decline between 1994 and 1998, when the stock declined 47 percent, attributed to overharvesting by subsistence hunting.[1708] Prior to subsistence hunting restrictions, harvest was estimated to annually remove 10 to 15 percent of the population.[1709] While only five belugas have been harvested since 1999, the population continues to decline. The most recent estimate is 340 animals.[1710] And the rate of decline between 1999 and 2014 is 1.3% per year (with a 97% probability that the growth rate is declining); the 10-year trend (2004-2014) is -0.4% per year (with a 76% probability of declining).[1711] NMFS notes that the "stock should have begun to grow at or near its maximum productivity rate (2–6%) but for unknown reasons the Cook Inlet beluga whale stock is not increasing."[1712]

In April 2011, NMFS designated critical habitat for Cook Inlet beluga whales in two specific areas of Cook Inlet:[1713]

- **Area 1**. All marine waters of Cook Inlet north of a line from the mouth of Threemile Creek (61°08.5′ N., 151°04.4′ W.) connecting to Point Possession (61°02.1′ N., 150°24.3′ W.), including waters of the Susitna River south of 61°20.0′ N., the Little Susitna River south of 61°18.0′ N., and the Chickaloon River north of 60°53.0′ N.
- **Area 2**. All marine waters of Cook Inlet south of a line from the mouth of Threemile Creek (61°08.5′ N., 151°04.4′ W.) to Point Possession (61°02.1′ N., 150°24.3′ W.) and north of 60°15.0′N., including waters within 2 nautical mi seaward of mean high water (MHW) along the western shoreline of Cook Inlet between 60°15.0′ N. and the mouth of the Douglas River (59°04.0′ N., 153°46.0′ W.); all waters of Kachemak Bay east of 151°40.0′ W.; and waters of the Kenai River below the Warren Ames bridge at Kenai, Alaska (Figure 6).

[1707] 73 Fed. Reg. 62,919 (Oct. 22, 2008).
[1708] *Id.* at Fed. Reg. 62,920.
[1709] *Id.*
[1710] *See* Beluga Whale (*Delphinapterus leucas*): Cook Inlet Stock, Dec. 30, 2016, http://www.nmfs.noaa.gov/pr/sars/pdf/stocks/alaska/2016/ak2016_beluga-cookinlet.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1711] *Id.*
[1712] Final determination to list a Distinct Population Segment of the beluga whale, *Delphinapterus leucas*, as endangered, 73 Fed. Reg. 62,919 (Oct. 22, 2008).
[1713] *Final rule to designate critical habitat for the Cook Inlet beluga* whale distinct population segment under the Endangered Species Act. Two areas are designated, comprising 7,800 square kilometers (3,013 square miles) of marine habitat. Effective May 11, 2011, 76 Fed. Reg. 20,180 (Apr. 11, 2011).



Map of Cook Inlet beluga whale critical habitat. (NOAA)

NMFS acknowledged the precarious state of Cook Inlet beluga whales when it proposed issuing a programmatic EIS that would analyze the multitude of anthropogenic activities (including the expected increase in activities) over multiple years, expressing "concern" about the "lack of recovery" of the whales.[1714] But the agency has not yet issued a draft programmatic EIS[1715] — or even an environmental assessment in the interim. Despite providing notices in recent years that NMFS would prepare an environmental assessment to analyze the environmental impacts of issuing annual incidental harassment authorizations, it has yet to follow through.[1716]

NMFS sums up the plight of the Cook Inlet beluga whale in a biological opinion regarding the Port of Anchorage, where it stated:

> As we have detailed in previous biological opinions (e.g., NMFS 2015c) and conservation documents (NMFS 2008a, b, 2015a) the baseline condition for Cook

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[1714] 79 Fed. Reg. 61616, 61617 (Oct. 14, 2014).

[1715] In its 2016 notice of intent to prepare an environmental assessment on issuance of incidental harassment authorizations for Cook Inlet belugas during 2017, NMFS noted that "[t]he preparation of an EIS is a lengthy and intensive process that, in the case of the for Cook Inlet beluga EIS, will likely take two or more years." 81 Fed. Reg. 66,640 (Sept. 28, 2016). It has been four years and NMFS has yet to issue even a draft programmatic EIS.

[1716] *See e.g.* 82 Fed. Reg. 41,938–39 (Sept. 5, 2017) (noting that the environmental assessment would cover "multiple [Marine Mammal Protection Act] [incidental harassment authorizations] for the 2018 open water season."); 81 Fed. Reg. 66,639–40 (stating that "NMFS will develop an [environmental assessment] to analyze the effects if using multiple, concurrent, one-year [Marine Mammal Protection Act] authorizations to take Cook Inelt beluga whales."). While NMFS said it would prepare an environmental assessment for takes in 2017, it never did.

> Inlet beluga whales is characterized by: (1) very low abundance; (2) lack of recovery; and (3) a high probability of extinction within the next 100 years (Hobbs and Shelden 2008).[1717]

The Marine Mammal Commission states that "[t]he underlying growth rate of this population remains low and there are concerns about whether this population will be able to recover."[1718]

In 2015, NMFS launched its "Species in the Spotlight: Survive to Thrive" initiative.[1719] The Cook Inlet beluga was included among eight of "the most at risk of extinction in the near future."[1720] NMFS notes that:

> These eight species were selected because they all are listed as endangered, their populations are declining, and they are ***considered a recovery priority #1***. A recovery priority #1 species is one ***whose extinction is almost certain in the immediate future because of rapid population decline or habitat destruction***. Additionally, ***it is a species that conflicts with construction, other developmental projects, or other forms of economic activity***. We understand the limiting factors and threats to these species, and we know that the necessary management actions have a high probability of success. Our goal is to focus our recovery actions and motivate partners and interested citizens to work with us on these actions to turn this situation around.[1721]

In December 2016, NMFS released the Cook Inlet beluga whale recovery plan.[1722] The plan identified ten potential threat types. Threats of high relative concern include noise and cumulative effects of multiple stressors.[1723] Threats of medium relative concern include habitat

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[1717] National Marine Fisheries Service, March 2, 2016, ESA Section 7(a)(2) Biological Opinion Port of Anchorage Test Pile Project and Associated Proposed Issuance of Incidental Harassment Authorization and NWP Verification at 38 (NMFS, 2016a) (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1718] *See* Marine Mammal Commission, *Cook Inlet Beluga Whale*, https://www.mmc.gov/priority-topics/species-of-concern/cook-inlet-beluga-whale/ (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1719] *See* NOAA Fisheries, *Species in the Spotlight Priority Actions: 2016-2020 Cook Inlet Beluga Whale*, https://www.fisheries.noaa.gov/resource/document/species-spotlight-priority-actions-2016-2020-cook-inlet-beluga-whale (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1720] *Id.*

[1721] *Id.* (emphasis added).

[1722] National Marine Fisheries Service, 2016 *Recovery Plan for the Cook Inlet Beluga Whale (Delphinapterus leucas)* (NMFS, 2016b) (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1723] *Id.* at Exec. Summ., xiii; *see also* Norman, Stephanie A., D.V.M., M.S., 2011,A*nthropogenic and Environmental Stressors in Cook Inlet Beluga Whales (Delphinapterus leucas)*, Report prepared for NOAA Fisheries, National Marine Fisheries Service, Anchorage, Alaska (Norman, 2011), https://alaskafisheries.noaa.gov/sites/default/files/sn_nonlethalstressors0911.pdf (previously loss or degradation.[1724] The plan acknowledges that "we do not know why" the "beluga population is not recovering as expected after the regulation of subsistence hunting in 1999."[1725] The plan goes on to state that "[u]ntil we know which threats are limiting this species' recovery, the strategy of this recovery plan is to focus recovery efforts on threats identified as of medium or high relative concern. This will focus efforts and resources on actions that are more likely to benefit [Cook Inlet] beluga recovery."[1726] The plan calls for "[i]mprov[ing] the management of threats of medium or high relative concern to reduce or eliminate the effects of those threats on [Cook Inlet] belugas."[1727]

2. The Pebble Project Will Adversely Impact Belugas.

Considering the port infrastructure, the potential for disruption of the belugas' calving, feeding, and social lifestyles is inevitable. The impacts of the noise pollution alone could cause the belugas to abandon critical habitat.[1728] The proposed Amakdedori port development is within administratively recognized, designated critical habitat found specifically to be of fundamental importance to the calving and feeding requirements of this protected species.[1729] The DEIS failed to take a hard look at the potential loss of habitat and displacement due to noise and vessel activity on beluga calving, rearing, and social interactions.

The port and increased vessel traffic present several serious concerns for the health, survival, and recovery of the declining Cook Inlet beluga whale. These concerns are heightened by the fact that NMFS is unable to determine why the beluga is not recovering.[1730]

The Project's port facility is located within the designated critical habitat for the beluga whale.[1731] In the May 2018 Technical Note, PLP made substantial modifications to its port design. Specifically, PLP abandoned the jetty with dredged channel concept. The newly outlined project would involve the use of barges that would lighter the concentrate containers to deeper water,

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provided as an attachment with Trustees for Alaska's scoping comments).

1724 NMFS, 2016b at Exec. Summ., xiii.

1725 *Id.* at xiv.

1726 *Id.*

1727 *Id.*

1728 *See supra* Section VI.W.3.i.

1729 Critical Habitat Designation Rule, 76 Fed. Reg. at 20,205.

1730 *See* National Marine Fisheries Service, 2008, Beluga Whale (*Delphinapterus leucas*): Cook Inlet Stock (NMFS, 2008a). This is the most recent stock assessment; *See* National Marine Fisheries Service, 2008, Conservation Plan for the Cook Inlet Beluga Whale at 1 (NMFS, 2008b) (noting that the Cook Inlet beluga whale once numbered approximated 1,300 animals in 1979 but has since declined to less than 375 animals on average in 2008, with further declines continuing each year) http://alaskafisheries.noaa.gov/protectedresources/whales/beluga/mmpa/final/cp2008.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

1731 Critical Habitat Designation Rule, 76 Fed. Reg. 20,180 (Apr. 11, 2011); *see also* Sue E. Moore, et al., *Beluga, Delphinapterus leucas, Habitat Associations in Cook Inlet, Alaska*, Marine Fish Review (2000) https://spo.nmfs.noaa.gov/mfr623/mfr6237.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

where they would be loaded onto bulk carriers.[1732] At the time of the Technical Note, PLP conceded that the design had not been completely developed.[1733] The Technical Note did not provide details regarding changes to the jetty.

In the revised 2019 404 application, and accompanying 2018 Project Description, PLP provided additional details regarding the port design change. Specifically, the 2018 design included the earthen access causeway extending out to a marine jetty.[1734] The 2018 Project Description did not include how long the jetty would be. The jetty design changed in that the one side which formerly allowed berthing for Handysize vessels now accommodates the lightering barges.[1735] While the revised design reduces the requisite dredging, the vessel activity still poses significant threats.

The proposed mine will undoubtedly impact the habitat and health of the endangered Cook Inlet beluga whale. As noted by NMFS, development of the beluga's coastal habitat is a major threat to the future survival and recovery of the species.[1736] Because beluga whales are not uniformly distributed throughout the Inlet, but instead are predominantly concentrated in nearshore areas, they must compete with anthropogenic development and uses, which often lead directly to the loss of their essential habitat and food resources.[1737] Impacts to the beluga from coastal development may include diminished water quality, structural obstructions from bridges, docks, or pilings, increased boat traffic, and harmful levels of in-water noise.[1738]

While the Corps has separate and distinct obligations under the Endangered Species Act, the Corps must also consider the direct, indirect, and cumulative impacts of the project under NEPA, including potential impacts from the construction and operation of the port on these protected whales. PLP's application provides insufficient information to determine whether it can meet the requirements for a permit under either the Endangered Species Act or the Marine Mammal Protection Act.[1739]

The DEIS fails to provide the requisite hard look analysis. The DEIS fails to thoroughly consider adverse effects on the beluga in the physical context — such as impacts from excessive

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[1732] Technical Note at 4 (Pebble noting that it "will continue to investigate options for a restricted access (high tide only) port facility to reduce dredging requirements to address the questions raised in RFI-033.").
[1733] *Id.*
[1734] 2018 Project Description at 50.
[1735] *Id.*
[1736] NMFS, 2008b at 54. Notably, the "Pebble Mine with a marine terminal in Iniskin Bay" was specifically noted as a potentially threatening development project within the NMFS Conservation Plan for Cook Inlet beluga whales. *Id.* at 56.
[1737] *Id.* at 54.
[1738] *Id.*
[1739] *See*, *e.g.*, James W. Balsiger, Ph.D., NOAA Administrator Alaska Region, Letter, NOAA to Colonel Michael S. Brooks, Corps, Feb. 9, 2019 (included as an attachment to these comments) ("There are insufficient details regarding aspects of the proposed project that would allow us to make determinations regarding the requirements for authorization under the Marine Mammal Protection Act").

noise pollution during construction and operation of the project; harm to the whales' calving, feeding, and social lives; potential fuel spill concerns; and the risks associated with increased vessel traffic — as well as the loss of designated critical habitat and the adverse impacts upon important associated fishery habitats that are vital to the belugas' feeding needs.

3. The DEIS fails to take a hard look at potential impacts to the Cook Inlet Beluga Whale.

The port will have substantial effects on the physical health and wellbeing of the endangered Cook Inlet beluga whale. Potential harms include: (1) the adverse impacts of excessive noise, (2) harm to the calving, feeding, and social lifestyle of the beluga, (3) contamination threats from possible fuel spills, (4) impacts from dredging; and (5) the risks associated with increased vessel traffic, including the risk of vessel strikes and habitat avoidance.

i. Noise

Beluga whales use sound as their primary means of communicating, navigating, and locating prey.[1740] In fact, the Cook Inlet belugas "are known to be among the most adept users of sound of all marine mammals, using sound rather than sight for many important functions, especially in the highly turbid waters of the upper Cook Inlet."[1741] Residing primarily in nearshore areas of the highly developed Cook Inlet, these whales must compete regularly with anthropogenic noises from marine vessel traffic, oil and gas drilling, aircraft, marine seismic surveys, dredging, and pile-driving, among others.[1742] Such noise can create serious implications for the species' overall wellbeing. When confronted with excessive noise, the whales experience a diminished sense of hearing similar to when a human's vision is reduced by heavy fog or darkness.[1743] Excessive noise can cause harassment, and in-turn, avoidance or abandonment of essential habitat.[1744] Noise above ambient levels can cause severe injury to the beluga whales' delicate hearing, both temporarily and permanently, and extreme noise can cause death.[1745]

Due to the dangerous impacts background noise can have on this protected species, NMFS has established levels of in-water noise that define what constitutes harassment and/or injury to the species. The minimum, threshold level of noise that is considered to harass the Cook Inlet beluga is 160 dB re: 1 µPa for impulsive sounds, such as pile-driving, with injury occurring at impulsive noise levels above 180 dB re: 1 µPa.[1746] When noise is continuous, harassment and

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[1740] Critical Habitat Designation Rule, 76 Fed. Reg.at 20,203.
[1741] *Id.*
[1742] *Id.*
[1743] NMFS, 2008b at 58.
[1744] Critical Habitat Designation Rule, 76 Fed. Reg.at 20,203; *see also* NMFS, 2008b at 58–59 (noting that "Alaska Native beluga whale hunters with [Cook Inlet Marine Mammal Council] have said that the Cook Inlet beluga whales are very sensitive to boat noise, and will leave areas subjected to high use;" and "[B]eluga whales were observed to react to [noise producing] ice-breaking ships at distances more than 80 km, showing strong avoidance, apparent alarm calls, and displacement." (internal citation omitted)).
[1745] Critical Habitat Designation Rule, 76 Fed. Reg. at 20,203.
[1746] NMFS, 2008b at 66–67; Critical Habitat Designation Rule, 76 Fed. Reg.at 20,204.

injury is deemed to occur at 120 dB re: 1 μPa.[1747] Accordingly, it has been widely recognized that anthropogenic noises occurring near or above these levels in the Cook Inlet beluga whales' designated critical habitat can present a serious threat to the continued survival and recovery of this endangered species.[1748]

However, these thresholds are not protective enough. There are numerous studies showing significant behavioral impacts from received sounds well below 160 dB. For example, in its decision document related to seismic surveys associated with oil and gas exploration in the Chukchi Sea, NMFS imposed a 120 dB safety zone for aggregations of bowhead whales based on its finding that "bowhead whales apparently show some avoidance in areas of seismic sounds at levels lower than 120 dB."[1749] Similarly, harbor porpoises, a species of marine mammal that may be found in the project zone, have been reported to avoid a broad range of sounds—low-frequency (airgun pulses), mid-frequency (sonar transmissions), and high-frequency (acoustic harassment devices)—at very low sound-pressure levels (between 100 and 140 dB re 1 μPa).[1750]

Reliance on the outdated 160 dB threshold, in disregard of best available science, is not trivial. It results in a gross underestimate of the activity's impact area and of the harm, or "take," experienced by marine mammals. This undermines the DEIS's impact analysis. This can easily be seen by comparing the impact area associated with NMFS' 160 dB threshold with that of the 140 dB threshold recommended, as the mid-point of a behavioral risk function, in a 2015 study conducted by leading biologists and bioacousticians.[1751] The Corps' hard look analysis must consider noise impacts even below NMFS's established thresholds, as those thresholds fail to consider chronic impacts, including displacement and disruption in the beluga's behavioral patterns.

Of greatest relevance, NMFS has acknowledged the impacts of sounds on belugas even at significant distances from a sound source. For example, in a proposed take authorization related

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[1747] *ID.*
[1748] Critical Habitat Designation Rule, 76 Fed. Reg. at 20,203.
[1749] Final Programmatic Environmental Assessment for Arctic Ocean Outer Continental Shelf Seismic Surveys – 2006 (June 2006) (OCS EIS/EA MMS 2006-038) (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1750] *See, e.g.,* Kastelein, et al., The Effects of Acoustic Alarms on the Behavior of Harbor Porpoises in a Floating Pen, 16 Marine Mammal Science 46 (2000); Olesiuk, et al., Effect of the Sound Generated by an Acoustic Harassment Device on the Relative Abundance of Harbor Porpoises in Retreat Passage, British Columbia, 18 Marine Mammal Science 843 (2002); Calambokidis, et al., Marine Mammal Research and Mitigation in Conjunction with Air Gun Operation for the USGS 'SHIPS' Seismic Surveys in 1998 (1998) (report to Minerals Management Service); Assessment of Acoustic Exposures on Marine Mammals in Conjunction with USS Shoup Active Sonar Transmissions in the Eastern Strait of Juan de Fuca and Haro Strait, Washington – May 5 2003, NMFS, Office of Protected Resources (Jan. 21, 2005) (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1751] Nowacek, D.P., Clark, C.W., Mann, D., Miller, P.J., Rosenbaum, H.C., Golden, J.S., Jasny, M., Kraska, J., & Southall, B.L., Marine Seismic Surveys and Ocean Noise: Time for Coordinated and Prudent Planning, *Frontiers in Ecology and the Environment* 13(7): 378-386 (2015) (previously provided as an attachment with Trustees for Alaska's scoping comments).

to seismic surveys by the National Science Foundation, NMFS noted that belugas can be displaced at distances of up to 20 km from a sound source.

> Aerial surveys during seismic operations in the southeastern Beaufort Sea recorded much lower sighting rates of beluga whales within 10–20 km (6.2–12.4 mi) of an active seismic vessel. These results were consistent with the low number of beluga sightings reported by observers aboard the seismic vessel, suggesting that some belugas might be avoiding the seismic operations at distances of 10–20 km (6.2–12.4 mi).[1752]

In 2016, NMFS prepared a five-year action plan as "part of a strategy to marshal resources on species listed under the Endangered Species Act for which immediate, targeted efforts are vital for stabilizing their populations and preventing their extinction."[1753] The plan was created to "guide agency actions where we have the discretion to make critical investments to safeguard these most endangered species."[1754] The plan identifies key actions that represent a "small subset of the recovery actions identified in the May 2015 draft recovery plan."[1755] One of the key actions is to "reduce the threat of anthropogenic noise."[1756]

The Cook Inlet beluga whale recovery plan identifies noise as a high concern that can impact beluga acoustic perception, communication, echolocation, and behavior (including displacement).[1757] The recovery plan concludes that

> In the long term, anthropogenic noise may induce chronic effects altering the health of individual [Cook Inlet] belugas, which in turn have consequences at the population level (i.e., decreased survival and reproduction). Although the effects on [Cook Inlet] belugas of the diverse types of anthropogenic noises occurring in their habitat have not been analyzed and are currently unknown, there is enough evidence from other odontocete species (and for some effects in other beluga populations) to conclude that the potential for a negative impact to [Cook Inlet] beluga recovery is of high relative concern.[1758]

Recent studies show that "[c]ommercial shipping is the noise source of highest priority for evaluation due to its reported noise levels, prevalence, and wide spatial distribution throughout the critical habitat."[1759] Construction a port in Amakdedori Bay — an area with essentially no

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[1752] 71 Fed. Reg. 27997 at 28004 (May 15, 2006).
[1753] *See* NOAA Fisheries, *Species in the Spotlight Priority Actions: 2016-2020 Cook Inlet Beluga Whale*, https://repository.library.noaa.gov/view/noaa/10747, at 2 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1754] *Id.*
[1755] *Id.* at 3.
[1756] *Id.* at 4.
[1757] NMFS, 2016b at III–3, III-10 to III-13.
[1758] *Id.* at III-13.
[1759] Castellote, Manuel et al., May, 2019, *Anthropogenic Noise and the Endangered Cook Inlet Beluga Whale, Delphinapterus leucas: Acoustic Considerations for Management*, Marine Fisheries Review (Castellote, 2019) https://spo.nmfs.noaa.gov/sites/default/files/pdf-

noise impacts — will add significant noise impacts to a currently pristine portion of the Cook Inlet beluga whale's critical habitat. The DEIS fails to take a hard look at this impact.

The port would create serious noise pollution during both the construction and operation phases of the project that will likely impact the endangered Cook Inlet beluga whale. The construction activities — including pile-driving and installation of pipeline — will destroy critical habitat and cause adverse noise impacts. The whales will also be harassed and displaced by increased vessel traffic and increased sedimentation. These impacts are deeply concerning given the whale's continued decline.

For reference as to the amount of in-water noise pollution the pile-driving construction activities would likely entail, a recent study conducted in the Port of Anchorage found pile-driving using the vibratory method reached noise levels between just under 120 dB re: 1 µPa to 179 dB re: 1 µPa, while pile-driving using the impact method ranged between the levels of 173 dB re: 1 µPa to 194 dB re: 1 µPa.[1760] Pile-driving will thus, at a minimum, harass the endangered beluga and may even result in injury to the species.[1761]

Construction could take many months and will involve a significant amount of excessive impulsive noise reverberating throughout the beluga's Cook Inlet habitat as a result of vibratory sheet pile-driving and/or pile-driving. Harmful vibratory construction activities occurring at any time of the year in this critical beluga habitat will likely have significant harassing and injurious effects on this species' health and wellbeing. Further, once operational, the daily vessel traffic and noise associated with the operation of the port machinery and idling barges or Handysize bulk carriers will produce continuously excessive noises.

The Corps must ensure the project will not negatively impact the protected Cook Inlet beluga whale before approving any federal permit allowing the project to proceed, in accordance with its obligations under the Endangered Species Act and Marine Mammal Protection Act.[1762] The Corps must also take a hard look at the direct, indirect and cumulative noise impacts to belugas.

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content/mfr8033_0.pdf (included as an attachment with these comments)

[1760] URS, Port of Anchorage Marine Terminal Development Project Underwater Noise Survey Test Pile Driving Program Anchorage, Alaska ES-1 (2007) https://alaskafisheries.noaa.gov/sites/default/files/2007underwaternoise.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1761] As noted previously, the NMFS established that the minimum, threshold level of noise that is considered to harass the Cook Inlet beluga is 160 dB re: 1 µPa for impulsive sounds, such as pile-driving, with injury occurring at impulsive noise levels above 180 dB re: 1 µPa. NMFS, 2008b at 66–67; Critical Habitat Designation Rule, 76 Fed. Reg. at 20,204.

[1762] 16 U.S.C. § 1538 (prohibiting the taking of a listed species); 16 U.S.C. § 1371 (prohibiting the taking of a marine mammal); *See also* 16 U.S.C. § 1532(19) (defining the term 'take' under the Endangered Species Act to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct"); 16 U.S.C. § 1362(13) (defining the term 'take' under the Marine Mammal Protection Act to mean "to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal").

ii. Contaminants and Potential Fuel Spills

Cook Inlet beluga whales may be adversely effected by the increased amount of toxic contamination from Port activities deposited into the waters of Cook Inlet as a result of the ship loading and Port management operations, as well as by the increased risk of potential fuel spills within its critical habitat.[1763] Toxic runoff from developed areas and mining operations is already a principle source of pollution in Cook Inlet.[1764] The construction and operation of a port will necessarily add to the amount of pollution entering this important waterway.

The proposed port presents concerns regarding potential fuel spills as well.[1765] As noted by NMFS, "[c]ontaminated food sources and displacement from feeding areas … may occur as a result of an oil spill or during response operations. Any diminishment of feeding habitat during the summer months could adversely affect the energy balance of beluga whales."[1766] The increased industrial activity associated with this project presents serious concerns and real potential for a fuel spill to occur. The DEIS fails to take a hard look at potential impacts of spills on belugas.

iii. Dredging

The Corps must also consider impacts associated with dredging.[1767] The recovery plan indicates that the increased turbidity from disposing of dredged materials can have a direct impact on the beluga's echolocation performance and a cumulative impact by amplifying negative effects from anthropogenic noise sources.[1768] Level B harassment includes "the ***potential to disturb*** a marine mammal . . . in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."[1769] Because NMFS has identified, in the recovery plan, that dredging can impact echolocation, dredging poses the "potential to disturb" the beluga's ability to feed. This is Level B harassment. The fact that beluga occupy areas that include dredging operations does not mean there are not impacts.[1770] The DEIS fails to take a hard look at dredging impacts to belugas.

[1763] DEIS at 4.27–26 ("The magnitude of potential impacts from the proposed diesel scenario on the Cook Inlet beluga whale (*Delphinapterus leucas*) is high, because the stock and its critical habitat are only found in Cook Inlet.").
[1764] NMFS, 2008b at 46–47 (internal citation omitted).
[1765] *See* Section VI.P, Spills.
[1766] NMFS, 2008b at 54.
[1767] *See* Todd, Victoria L. G. et al., 2014, *A Review of Impacts of Marine Dredging Activities on Marine Mammals*, International Council for the Exploration of the Sea Journal of Marine Science, (Todd, 2014) (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1768] NMFS, 2016b at III-10.
[1769] 50 C.F.R § 216.3.
[1770] *See* DEIS at 4.25–5.

iv. Increased Vessel Traffic

The Cook Inlet beluga whale would likely face an increased risk of being struck by marine vessels.[1771] The Project Description states that Pebble anticipates up to 27 Handysize ships per year, 33 marine line-haul barge loads per year and two ice-breaking tug boats used throughout the year to support marine facility operations.[1772] Loading the Handysize bulk carriers would require about ten trips by the lightering barges.[1773] This dramatic increase in vessel traffic moving throughout the beluga's critical habitat will increase the potential for accidental vessel strikes. The DEIS erroneously dismisses the likelihood of vessel strikes by asserting that there have been no vessel strikes in the analysis area.[1774]

Increased boat traffic can also lead to the beluga whale avoiding critical habitat.[1775] As noted by NMFS, "displacement from transit areas and from sensitive feeding or calving habitats could be very harmful to the recovery of [the Cook Inlet beluga whale] stock."[1776] In fact, "NMFS has often witnessed avoidance and overt behavioral reactions by Cook Inlet beluga whales when approached by vessels."[1777] Traditional Alaska Native hunters of beluga whales "have [also] said that the Cook Inlet beluga whales are very sensitive to boat noise, and will leave areas subjected to high use."[1778]

The DEIS errs by stating that the port and associated vessel activity would not change marine mammal behavior because there is already existing infrastructure and vessel traffic in Cook Inlet.[1779] This assessment fails to recognize that there is little infrastructure and vessel traffic in the Amakdedori port area. As Nuka Research identifies in their report, "the proposed mine would bring more traffic, more bulk carriers, and deep draft vessel activity to an area of Cook Inlet where such vessels do not currently operate."[1780] As Nuka further identifies, "[n]o significant shipping activity currently occurs in Kamishak Bay. AIS data shows nearly all traffic of ships greater than 300 tons occurs in Eastern and Upper Cook Inlet . . . ."[1781] Nuka concludes that

> The stated increase in traffic (adding 110 transits or port calls to a baseline of 480) is 23%. Twenty-three percent is a significant, not "incremental" increase. More importantly, Kamishak Bay is currently an area with near-zero vessel traffic, which would be converted to an area of high vessel traffic. Behavioral

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[1771] This is not an unforeseeable potential impact. *See*, *e.g.*, Adelyn Baxter, *Feds investigate video of cruise ship in near-collision with humpback whales*, Anchorage Daily News, June 26, 2019 (included as an attachment to these comments).
[1772] *See* 2018 Project Description at 51.
[1773] *Id.*
[1774] DEIS at 4.23–28.
[1775] NMFS, 2008b at 57.
[1776] *Id.*
[1777] *Id.* at 58.
[1778] *Id.* at 58–59.
[1779] DEIS at 4.23–27.
[1780] Nuka Research, 2019 at 1.
[1781] *Id.*

> patterns of marine mammals in Kamishak Bay are likely to change.[1782]

The DEIS fails to take a hard look at these potential impacts.

v. Degradation and Loss of Habitat

The DEIS fails to take a hard look at the potential impacts to Cook Inlet beluga whale caused by destruction and degradation of designated critical habitat and fisheries. The Cook Inlet beluga whale was listed as an endangered species in 2008.[1783] This required the Secretary of Commerce to designate critical habitat for all listed species.[1784] "Critical habitat" is defined as (1) "the specific areas within the geographical area occupied by the species, at the time it is listed . . . on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection;" and (2) "specific areas outside the geographical area occupied by the species at the time it is listed . . . upon a determination by the Secretary that such areas are essential for the conservation of the species."[1785]

While determining the Cook Inlet beluga whales' critical habitat requirements, NMFS found — based on the best scientific data available — that physical and biological features that are essential to the conservation of the endangered beluga include:

> (1) Intertidal and subtidal waters in Cook Inlet with depths less than 30 feet . . . and within 5 miles (8 km) of high and medium flow anadromous fish streams[;] (2) Primary prey species consisting of four species of Pacific salmon (Chinook, sockeye, chum, and coho), Pacific eulachon, Pacific cod, walleye pollock, saffron cod, and yellowfin sole[;] (3) Waters free of toxins or other agents of a type and amount harmful to Cook Inlet beluga whales[;] (4) Unrestricted passage within or between the critical habitat areas[;] (5) Waters with in-water noise below levels resulting in the abandonment of critical habitat areas by Cook Inlet beluga whales.[1786]

In 2011, the Secretary of Commerce designated critical habitat for the Cook Inlet beluga whale.[1787] Two areas were designated, constituting approximately 3,013 square miles of marine

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[1782] *Id.* at 2.
[1783] Endangered and Threatened Species: Endangered Status for the Cook Inlet Beluga Whale, 73 Fed. Reg. 62,919 (Oct. 22, 2008) (to be codified at 50 C.F.R. pt. 224).
[1784] 16 U.S.C. § 1533(3)(A)(i).
[1785] *Id.* § 1532(5)(A). Additionally, essential features to be considered when making a critical habitat designation include the following requirements be met: "(1) Space for individual and population growth, and for normal behavior; (2) Food, water, air, light, minerals, or other nutritional or physiological requirements; (3) Cover or shelter; (4) Sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally; (5) Habitats that are protected from disturbance or are representative of the historical geographical and ecological distributions of a species." 50 C.F.R. §424.12(b) (2013).
[1786] Critical Habitat Designation Rule, 76 Fed. Reg. at 20,203–04.
[1787] *Id.* at 20,180.

habitat found to be of vital importance to the beluga's recovery and survival.[1788] Area 2 consists of 2,275 of those square miles.[1789] NMFS states that

> Area 2 is largely based on dispersed fall and winter feeding and transit areas in waters where whales typically occur in smaller densities or deeper waters. It includes both near and offshore areas of the mid and upper Inlet, and nearshore areas of the lower Inlet. Due to the role of this area as probable fall feeding areas, Area 2 includes Tuxedni, Chinitna, and Kamishak Bays on the west coast and a portion of Kachemak Bay on the east coast. Winter aerial surveys (Hansen, 1999) sighted belugas from the forelands south, with many observations around Kalgin Island. Based on tracking data, Hobbs *et al.* (2005) document important winter habitat concentration areas reaching south of Kalgin Island.[1790]

Area 2 habitat "contains anywhere from one to all of the identified physical or biological features essential to the whale's conservation."[1791] Area 2 is used by belugas in the late-summer, fall and winter for feeding.[1792] During this time, NMFS believes "the whales take advantage of the late coho runs along the west side of Cook Inlet.[1793]

Under the Endangered Species Act, a project that results in the adverse modification of a listed species' habitat, with the subsequent result of causing injury or death to a listed species, constitutes a harm, and thereby, unlawful take of the species. [1794] The Corps cannot permit the proposed Pebble mine if it will adversely modify the endangered beluga's Area 2 designated critical habitat in a way that causes injury to the protected whale's behavioral or feeding habits.[1795]

[1788] *Id.*
[1789] *Id.* at 20,205.
[1790] *Id.*
[1791] *Id.* at 20,183.
[1792] *Id.* at 20,182–20,183.
[1793] *Id.* at 20,183.
[1794] *See* 50 C.F.R. § 17.3 (2013) (defining "harm" within the definition of "take" in the Endangered Species Act to mean "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."); *See also* 16 U.S.C. § 1536(a)(2) ("Each federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized . . . by such agency . . . is not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary . . . to be critical.").
[1795] *See* 50 C.F.R. § 17.3 (2013) (defining "harm" within the definition of "take" in the Endangered Species Act to mean "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."); *See also* 16 U.S.C. § 1536(a)(2) ("Each federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized . . . by such agency . . . is not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or

The DEIS fails to take the required hard look at the potential impacts to Area 2 critical habitat — an area that is legally recognized for its fundamental importance to the recovery and future survival of the species.[1796] The DEIS states that approximately 10.7 acres of critical habitat will be directly impacted by the placement of fill for the port construction and 11.5 acres would be temporarily impacted for the installation of the natural gas pipeline.[1797] The DEIS characterizes the impacts to critical habitat as "localized, only affecting the area immediately surrounding the port."[1798] The DEIS notes:

> Area 2 encompasses known fall and winter foraging and transit habitat for beluga whales, as well as spring and summer habitat for smaller concentrations of beluga whales. The analysis area has less-concentrated spring and summer beluga whale use; however, it also includes fall and winter feeding and transit areas. . . . The magnitude and extent of project impacts on the physical or biological features of beluga whale critical habitat would be disturbance or resuspension of sediments in the water column, installation of structures, and discharges of fill into marine waters during construction. Additional critical habitat Primary Constituent Elements . . . that may be impacted include disturbance to primary prey species, and in-water noise levels resulting in abandonment of critical habitat areas.[1799]

After this acknowledgement that the project may disturb prey species and have noise levels resulting in abandonment of critical habitat, the DEIS then quickly denies both of these potential impacts, stating:

> Because construction of the port would occur during summer months when beluga whales are generally absent, and mitigation measures would be implemented to prevent harassment of beluga whales, in-water noise levels during construction are not likely to cause abandonment of critical habitat areas. Additionally, beluga whale primary prey fish species are anticipated to pass around the port, and their distribution in Kamishak Bay is not likely to be altered by the presence of the port. . . . The port is not expected to impede anadromous fish from using Amakdedori Creek, because fish already have multiple rocky reefs, shoals, and other areas to negotiate before entering the creek.[1800]

However, the impacts of the port on the region's important fishery habitat for a wide variety of fish species will likely lead to negative impacts upon the endangered Cook Inlet beluga whale. Beluga feed primarily on fish as its main prey species—specifically, king (Chinook) salmon and Pacific eulachon (hooligan),[1801] although three other species of Pacific salmon

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adverse modification of habitat of such species which is determined by the Secretary . . . to be critical.").

[1796] Critical Habitat Designation Rule, 76 Fed. Reg. at 20,180.

[1797] DEIS at 4.25–7.

[1798] *Id.* at 4.25–9.

[1799] *Id.* at 4.25–7.

[1800] *Id.*

[1801] Critical Habitat Designation Rule, 76 Fed. Reg. at 20,202.

(sockeye, chum, and coho), Pacific cod, walleye pollock, saffron cod, and yellowfin sole also contribute to the whale's diet.[1802] NMFS has acknowledged the interconnectedness of beluga habitat and fishery habitats, noting that "[p]rojects that reduce anadromous fish runs could . . . negatively impact the foraging success of Cook Inlet beluga whales."[1803] The DEIS failed to take a hard look at the impacts a depleted fishery may have on the endangered Cook Inlet beluga whale, including the impact of any spills — the extent of the DEIS' analysis of spills to beluga's prey is that "[c]atastrophic events such as high volume petroleum-based spills . . . may have effects on Cook Inlet beluga whale prey, whether through changes to spawning or migration patterns, direct mortality, or potential long-term sub-lethal impacts."[1804]

Also, operation of the port will add significant noise impacts into designated critical habitat for the Cook Inlet beluga whale.

> Potential effects from seafloor disturbance would likely limit the foraging quality of the disturbed area during construction due to increased turbidity, which would eventually settle out, and only the direct footprint of the port would remain permanently impacted. The duration of time that Cook Inlet beluga whales may be exposed to habitat alternation would be permanent for the life of the project. The duration of these impacts would be permanent. In terms of likelihood, these impacts on critical habitat would be certain to occur if the project is permitted and built.[1805]

The DEIS notes that increased vessel traffic at the port and the west side of Cook Inlet would impact beluga whales and designated critical habitat.[1806] The DEIS also notes that port construction would cause noise that would impact beluga whales in the area, but then dismisses any impacts as unlikely as belugas "do not commonly occur in the analysis area."[1807] However, as the DEIS observes, the risk of impacts would be permanent for the "duration of the extended mining/milling period."[1808] In other words, these impacts would occur within Cook Inlet beluga whale critical habitat for the duration of the project. The DEIS fails to take a hard look at the potential effect of these impacts to the recovery of the Cook Inlet beluga whale.

In sum, the DEIS fails to take a hard look at the potential adverse impacts the project will have on the endangered Cook Inlet beluga whale, including direct, indirect and cumulative impacts. As a federally protected species under the Endangered Species Act and Marine Mammal Protection Act, with designated critical habitat impacted by the proposed project, the Corps has a legal obligation to ensure that the Pebble Project will not jeopardize the continued existence and overall recovery of this rare species or result in the destruction or adverse modification of critical

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[1802] *Id.* at 20,203–04.
[1803] National Marine Fisheries Service, August 11, 2010, Final RIR/4(b)(2) Preparatory Assessment/FRFA of Critical Habitat Designation of Cook Inlet Beluga Whale (NMFS, 2010) at 2-1.
[1804] DEIS at 4.27–26.
[1805] *Id.* at 4.25–9.
[1806] *Id.* at 4.25–28.
[1807] *Id.*
[1808] *Id.* at 4.25–29.

habitat.[1809] The DEIS fails to adequately analyze the potential impacts to beluga from excessive noise pollution, impacts to the whales' social, calving, and feeding habits, potential toxic and fuel spill contamination of the species and its habitat, and the impacts of increased vessel traffic. The DEIS also fails to adequately analyze the potential impacts to the Cook Inlet beluga whale's critical habitat and associated fishery habitat and resources.

X. Impacts to Other Threatened or Endangered Species

The DEIS has failed to take a hard look at the direct, indirect, and cumulative impacts to threatened and endangered species that are found in vicinity of the action area. The DEIS failed to take a hard look at impacts to Steller's eiders, the southwest distinct population segment of the northern sea otter, and the western population of Stellar sea lion.

The North American breeding Steller's eider (*Polysticta stelleri*) was listed as threatened in 1997. It is a seaduck that occupies nearshore marine waters of lower Cook Inlet, Kodiak Island, and the Alaska Peninsula from approximately late September through April.[1810] The majority of the Pacific population of Steller's Eiders comes to the region to molt. Molting is a particularly vulnerable time, as they are flightless during much of the molt stage. A significant proportion of these birds winter in the Bristol Bay area.[1811] The DEIS fails to take a hard look at potential impacts to Steller's eiders, including adequately assessing threats from fuel spills.

The southwest distinct population segment of the northern sea otter (*Enhydra lutris kenyoni*) was listed as threatened in 2005. It occupies nearshore marine waters of lower Cook Inlet, Kodiak Island, the Alaska Peninsula, and the Aleutian Islands. The otters may occur there year-round. The DEIS failed to take the required look at potential threats to the northern sea otter from oil spills and displacement from critical habitat. The marine shipping channels will cross the sea otter's designated critical habitat. This critical habitat was designated in 2009 and includes areas that provide the physical and biological features — the primary constituent elements — essential to the conservation of this species. This includes: 1) shallow, rocky areas less than 2 meters in depth where marine predators are less likely to forage, or 2) nearshore waters within

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[1809] 16 U.S.C. § 1536(a)(2) ("Each federal agency shall, in consultation with and with the assistance of the Secretary, insure that any action authorized . . . by such agency . . . is not likely to jeopardize the continued existence of any endangered species . . . or result in the destruction or adverse modification of habitat of such species which is determined by the Secretary . . . to be critical.").

[1810] *See* FWS, Winter Distribution and Abundance of Steller's Eiders (*Polsticta stelleri*) in Cook Inlet, Alaska 2004–2005, OCS Study MMS 2006-066, https://www.fws.gov/alaska/mbsp/mbm/waterfowl/surveys/pdf/cistei_report.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

[1811] *Id.*; *see also* Letter from Nils Warnock, Exec. Dir., Audubon Alaska, to Scott Pruitt, Administrator, EPA, Re: Formal Comments for Proposal to Withdraw Proposed Determination to Restrict the Use of An Area as a Disposal Site; Pebble Deposit Area, Southwest Alaska (82 Federal Register 33123, July 19, 2017) (Oct. 17, 2017) at 2; Daniel H. Rosenberg, et al., Seasonal Movements and Distribution of Steller's Eiders (Polysticta stelleri) Wintering at Kodiak Island, Alaska, (2013) (previously provided as an attachment with Trustees for Alaska's scoping comments).

100 meters from the mean high tide line that may provide protection or escape from marine predators; and 3) kelp forests, which occur in waters less than 20 meters in depth, that provide protection from marine predators, or 4) prey resources within the areas identified by primary constituent elements 1, 2, and 3 that are present in sufficient quantity and quality to support the energetic requirements of the species. Marine waters adjacent to the west coast of lower Cook Inlet that are less than 100 meters from shore and less than 20 meters in depth are designated as sea otter critical habitat. The DEIS failed to adequately assess all potential impacts from port construction and operation, including barge traffic, on the sea otter and its critical habitat.

The western population of Steller sea lion (*Eumatopias jubatus*). This population's range includes Lower Cook Inlet. The DEIS also failed to take the required hard look at potential impacts to this population.

Y. EPA's Proposed Determination Findings

The DEIS completely ignores EPA's Proposed Determination findings and the underlying science that led to those findings. The DEIS does not include a single reference to the CWA 404(c) process or EPA's Proposed Determination. Neither PLP nor the Corps have made a supportable, scientifically-defensible argument that the Watershed Assessment and Proposed Determination findings are either not relevant or inaccurate. It defies reason that the Corps found it appropriate to omit any reference to the Proposed Determination. While the DEIS mentions the Watershed Assessment, the references are fleeting. And the fact that the DEIS contains only 6% of the references in the Watershed Assessment is astounding and indefensible. The only excuse for such a blatant effort to hide the findings of the Watershed Assessment and Proposed Determination is that the Corps and PLP have nothing to counter the credible science presented by EPA.

As discussed above,[1812] in 2014, EPA took steps under Section 404(c) of the CWA to restrict fill activities in the headwaters of Bristol Bay.[1813] The EPA found that loss of the headwaters would

> fundamentally alter surface and groundwater hydrology and, in turn, the flow regimes of receiving—or formerly receiving—streams. Such alterations would reduce the extent and frequency of stream connectivity to off-channel habitats, as well as reduce groundwater inputs and their modifying influence on the thermal regimes of downstream habitats (Section 4.2.4). These lost streams also would no longer support or export macroinvertebrates, which are a critical food source for developing alevins, juvenile salmon, juvenile northern pike, and all life stages of other salmonids and forage fish.[1814]

EPA took this incredibly unusual and important step because mining the Pebble deposit, even on the smallest logistically-practicable scale, would pose unacceptable adverse impacts to the watershed. EPA determined that "mining of the Pebble deposit at any of [the three mining

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[1812] *See* Section I.B, The Bristol Bay Watershed Assessment and Proposed Determination.
[1813] *See* PD at ES–1.
[1814] *Id.* at 4–9.

scenarios identified] even the smallest, could result in significant and unacceptable adverse effects on ecologically important streams, wetlands, lakes, and ponds and the fishery areas they support."[1815]

EPA found that the 0.25 mine scenario "would eliminate or dewater nearly 5 miles of streams with documented occurrence of anadromous fish."[1816] EPA found that "[t]he greatest impacts would be at the [tailings storage facility] location in the North Fork Koktuli watershed. Coho salmon spawn or rear in nearly 50% of the stream length within the [tailings storage facility] footprint."[1817] Moreover, because the loss of these streams is at the headwaters of the North Fork Koktuli, EPA emphasized that the impacts would be far-reaching: "Thus, the coho salmon streams that the Pebble 0.25 stage mine would eliminate or dewater likely play an important role in the life cycle of that species in all three watersheds."[1818]

EPA found that the 0.25 mine scenario would result in the elimination, dewatering, or fragmenting of approximately 19 miles of tributaries to anadromous fish streams.[1819] EPA stated that this would be "an unprecedented impact in Alaska" and while the loss of tributaries may be nearly 3% of mapped streams in the three watersheds, the "effects of their loss would reverberate to downstream habitats and affect species such as coho, Chinook, sockeye, and chum salmon."[1820] EPA concluded that the loss of these headwaters tributaries could have unacceptable adverse effects on fishery areas.[1821]

In addition to the devastating impacts to salmon-bearing streams and their tributary headwaters, the 0.25 mine scenario would eliminate, dewater, or fragment more than 1,200 acres of wetlands, lakes, and ponds, of which approximately 1,100 of those acres are contiguous with anadromous streams or their tributaries.[1822] The loss of these wetlands, lakes, and ponds would be "a very large and unprecedented impact under the Clean Water Act Section 404 regulatory program in Alaska."[1823]

In addition to the direct loss of these waters and wetlands, the 0.25 mine would consume large volumes of water drawn from surface and groundwater sources.[1824] The Watershed Assessment calculated that the 0.25 mine would reduce flow in more than 45 miles of streams.[1825] The adverse impacts from streamflow alteration "could jeopardize the long-term sustainability of these fisheries."[1826] EPA found that drawdown would alter streamflows by more than 20% in

[1815] *Id.* at ES–5.
[1816] *Id.* at 4–4.
[1817] *Id.*
[1818] *Id.* at 4–6.
[1819] *Id.* at 4–19.
[1820] *Id.*
[1821] *Id.*
[1822] *Id.* at 4–20.
[1823] *Id.* at 4–21.
[1824] *Id.* at 4–22.
[1825] *Id.* at 4–23.
[1826] *Id.* at 427.

approximately 9 miles of stream and that such a chance could pose unacceptable adverse impacts to the salmon fisheries of both the South and North Fork of the Koktuli.[1827]

As a result, EPA proposed restricting "the discharge of dredged or fill material related to mining the Pebble deposit into waters of the United States within the potential disposal site that would, individually or collectively, result in any of the following:"

1. Loss of streams
   a. The loss of 5 or more linear miles of streams with documented anadromous fish occurrence; or
   b. The loss of 19 or more linear miles of streams where anadromous fish are not currently documented, but that are tributaries of streams with documented anadromous fish occurrence;

   or
2. Loss of wetlands, lakes, and ponds. The loss of 1,100 or more acres of wetlands, lakes, and ponds contiguous with either streams with documented anadromous fish occurrence or tributaries of those streams; or

3. Streamflow alterations. Streamflow alterations greater than 20% of daily flow in 9 or more linear miles of streams with documented anadromous fish occurrence.[1828]

The Proposed Determination remains in place. EPA elected to "leave[] that Determination in place pending further consideration by the Agency of information that is relevant to the protection of the world-class fisheries contained in the Bristol Bay watershed."[1829]

The proposed restrictions are based on sound science that remains valid. There has been nothing to date offered that substantively and soundly refutes the underlying science that supports the Proposed Determination. Despite PLP's assertions to the contrary, it has not offered any science that disputes or undermines the science of the Watershed Assessment or Proposed Determination. Notably, even EPA, under a process it initiated to withdraw the Proposed Determination, did not make a single statement that any of the science found in the Watershed Assessment or Proposed Determination is unsound. The science stands and must be a part of the Corps' review.

EPA based the restrictions on the 0.25 mining scenario, which is the smallest mine scenario that the agency considered.[1830] PLP's 404 application was for a 1.2 billion ton mine,[1831] which was updated in May 2018 to 1.5 billion tons[1832] and then refined to 1.44 billion tons[1833] —

[1827] *Id.* at 4–28.
[1828] *Id.* at ES–6.
[1829] *See* 83 Fed. Reg. 8668 (Feb. 28, 2018).
[1830] *Id.*
[1831] 2017 Project Description at 1.
[1832] Technical Note at 2.
[1833] 2018 Project Description at 1.

7 times larger than the smallest mine scenario reviewed and found to pose unacceptable impacts. The Corps has failed to take a hard look at how a mine 7 times larger than that found unacceptable by EPA will not pose similar or more significant adverse impacts.

The 0.25 mining scenario included a 20-year mining plan, extracting 31,100 tons of ore per day.[1834] PLP's 2017 404 application proposed a mine with a milling rate of 160,000 tons of ore per day.[1835] The May 2018 update increased the milling rate to 180,000 tons.[1836] The 2018 Project Description increased the milling rate to 180,821 tons.[1837] The Corps must take a hard look at the associated impacts of a mine with a milling rate five times larger than that found unacceptable by EPA and determine how a larger mine will not pose similar or more significant adverse impacts.

The 0.25 mining scenario included a total surface area (including the mine pit, waste rock pile and tailings storage facility) of 4.09 square miles.[1838] The total footprint of mine site development associated with Alternative 1 is 8,086 acres or 12.6 square miles.[1839] The mine site footprint is three times as large as the 0.25 mining scenario footprint reviewed by EPA. The Corps has failed to take a hard look at how this much larger mine will not pose similar or more significant adverse impacts than those found by EPA.

EPA found that even the smallest mine scenario "would eliminate or dewater nearly 5 miles of streams with documented occurrence of anadromous fish."[1840] EPA found that "[t]he greatest impacts would be at the [tailings storage facility] location in the North Fork Koktuli watershed. Coho salmon spawn or rear in nearly 50% of the stream length within the [tailings storage facility] footprint."[1841] Moreover, because the loss of these streams is at the headwaters of the North Fork Koktuli, EPA emphasized that the impacts would be far-reaching: "Thus, the coho salmon streams that the Pebble 0.25 stage mine would eliminate or dewater likely play an important role in the life cycle of that species in all three watersheds."[1842] EPA further highlighted that the elimination or dewatering of at least 4.7 miles of salmon-bearing streams would be "unprecedented in the context of the Clean Water Act Section 404 regulatory program in Alaska."[1843] EPA also noted concern about the impacts of a 20–25 year mine regarding the return of salmon post-mining:

> areas that do not support salmon for many years are not likely to become productive again (Reeves et al. 1991a, Reeves et al. 1991b, Paulsen and Fisher

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[1834] PD at 2-16 (Table 2-2 Mine stage parameters).
[1835] 2017 Project Description at 30.
[1836] Technical Note at 1.
[1837] 2018 Project Description at 1.
[1838] PD at 2–16 (Table 2-2 Mine stage parameters).
[1839] DEIS at 2–120. Alternative 2's total mine site footprint is slightly larger (8241 acres) while Alternative 3 is the same as Alternative 1 (8086 acres). The total footprint for Alt. 1 is 9317 acres; 10,341 acres for Alt. 2 and 10,047 acres for Alt. 3. *Id.* at 2–127.
[1840] PD at 4–4.
[1841] *Id.*
[1842] *Id.* at 4–6.
[1843] *Id.*

> 2005, Katz et al. 2007). Both the 20-year life of the Pebble 0.25 stage mine and the 40 years or more during which dewatering would persist are many times longer than the 2- to 5-year life span of coho and Chinook salmon. Thus, as successive year classes of salmon return and are unable to reach their natal spawning grounds and produce fry, the cycle of spawning would be interrupted. Displaced spawners that attempt to return to lost habitat for the first few generations after the loss and that do not die without spawning may stray elsewhere to spawn, but success will depend on availability of suitable spawning habitat and its capacity to support additional fish. The substantial spatial and temporal extent of stream habitat losses to the Pebble 0.25 stage mine suggest that these losses would reduce the overall capacity and productivity of Chinook, and particularly coho, salmon in the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds.[1844]

Comparison of Proposed Pebble Mine 404 Permit Application Loss of Wetlands and Streams at Mine Site to EPA Analysis and 404(c) Proposed Determination[1845]

	EPA Pebble 0.25	**Draft EIS 20-year**	**EPA Pebble 2.0**	**EPA Pebble 6.5**	**Draft EIS 78-year**	**EPA Proposed Determ.**
Ore Mined (% of delineated 12.125 billion ton deposit)[1846]	0.25 bil. tons (2.1%)[1847]	1.44 bil. tons (11.9%)[1848]	2.0 bil. tons (16.5%)[1849]	6.5 bil. tons (53.6%)[1850]	6.67 bil. tons (55%)[1851]	
Anadromous Streams Permanently Lost[1852]	4.7 linear miles[1853]	8.75 linear miles[1854]	13.5 linear miles[1855]	22.3 linear miles[1856]	43.75 linear miles[1857]	5 linear miles[1858]

[1844] *Id.* at 4–7.
[1845] This table compares **only mine-site impacts** and does not include transportation corridor impacts. Note also that EPA and the Corps use different definitions for "lost" streams and wetlands. EPA includes in its loss figure waters that are eliminated, dewatered, or fragmented. The Corps excludes from its loss figure waters that are dewatered or fragmented and instead categorizes those impacts as "indirect" impacts.
[1846] *See* https://www.northerndynastyminerals.com/pebble-project/project-overview/ (identifying the current resource estimate at 11 billion metric tonnes, converted to 12.125 billion US tons). The tons figures in this chart all refer to US tons.
[1847] BBWA at ES–10.
[1848] DEIS at 4.13–2; App. N at N–1.
[1849] BBWA at ES–10.
[1850] BBWA at ES–10.
[1851] DEIS at 4.1–8.
[1852] Note these numbers refer to documented and known anadromous streams, as presented in the Alaska Anadromous Waters Catalog and used by both EPA and the Corps in their analysis of impacts.

Resident Fish Streams Permanently Lost	At least 4.9 linear miles[1859]	20 linear miles[1860]	22 linear miles[1861]	46 linear miles[1862]	*Not quantified*	
All Streams Permanently Lost	18.9 linear miles[1863]	73.2 linear miles[1864]	55.6 linear miles[1865]	93.8 linear miles[1866]	*Not quantified*	19 linear miles of tributaries to anadromous streams[1867]
Wetlands, Lakes, Ponds Directly and Permanently Lost	1,218 acres[1868]	3,458 acres[1869]	3,091 acres[1870]	4,885 acres[1871]	15,903 acres [1872]	1,100 acres contiguous with anadromous streams and tributaries of anadromous streams[1873]

[1853] PD at 4–4, Table 4–1 (based on the National Hyrdrography Dataset and Anadramous Waters Catalog).
[1854] DEIS at 4.24–31, Table 4.24–4.
[1855] PD at 4–36.
[1856] *Id.*
[1857] DEIS at 4.24–37 ("At the mine site, an additional 35 miles of anadromous stream habitat would be lost in the [South Fork Koktuli] and [Upper Talarik Creek] watersheds…").
[1858] PD at ES–6.
[1859] *Id.* at 4–20 ("available data indicate that at least 4.9 miles of these tributaries, spanning all three watersheds, support non-anadromous fish species such as rainbow trout, Dolly Varden, Arctic grayling, ninespine stickleback, and slimy sculpin").
[1860] DEIS at 4.24–31, Table 4.24–4.
[1861] PD at 4–38 (impacts to "fish-bearing streams" that also "likely contain undocumented anadromous fish habitat" and "may be particularly valuable habitat for juvenile salmonids" and include other fish populations such as rainbow trout, Dolly Varden, Arctic grayling, northern pike, ninespine stickleback, and slimy sculpin).
[1862] *Id.* at 4–38.
[1863] *Id.* at 4–17, Table 4–4 (based on the National Hydrography Dataset).
[1864] DEIS at 4.22–33, Table 4.22–10.
[1865] PD at 4–36 (based on the National Hydrography Dataset).
[1866] *Id.* at 4–36 (based on the National Hydrography Dataset).
[1867] *Id.* at ES–6.
[1868] *Id.* at 4–20, Table 4–5.
[1869] DEIS at 4.22–33, Table 4.22–10.
[1870] PD at 4–36, Table 48.
[1871] *Id.*
[1872] DEIS at 4.22–39 to 4.22–40 ("The total number of wetlands potentially affected under this scenario would amount to an additional 12,445 acres.").
[1873] PD at ES–6.

Total Mine Site Footprint	4,670 acres[1874]	8,086 acres[1875]	11,000 acres[1876]	25,000 acres[1877]	29,632 acres [1878]	

Because the Corps and PLP have refused to do any comparative analysis of the proposed project to what EPA assessed, The Nature Conservancy conducted its own detailed analysis.[1879] The report, *Direct loss of salmon streams, tributaries, and wetlands under the proposed Pebble Mine compared with thresholds of unacceptable adverse effects in the EPA Proposed Determination pursuant to Section 404(c) of the Clean Water Act*, (Albert 2019) (TNC Comparative Analysis) compares the loss of salmon streams, tributaries and wetlands under the 2018 proposed Pebble Mine to thresholds determined to represent "unacceptable adverse effects" by the EPA in its Proposed Determination.

Using PLP's and Corps data, the report found that the proposed mine (20-year mine scenario) would result in the loss of:

- 7.5 miles of salmon streams;
- up to 56.4 miles of tributaries; and
- up to 4,350 acres of wetlands contiguous with salmon streams or tributaries.[1880]

These values exceed the EPA thresholds for unacceptable adverse effects by more than half for the loss of documented salmon streams, up to fourfold for loss of tributaries and up to threefold for loss of wetlands.

While these numbers are significant and exceed what EPA has already found to be unacceptable, they are also conservative. The following figure highlights the significant differences in salmon streams, all streams, and wetland calculations based on what data set is used.

[1874] BBWA at 6–21, Table 6–5 (noting a total mine footprint of 18.9 sq. kilometers, or 4,670 acres).
[1875] DEIS at 2-210 (impacts for mine site only). Note that elsewhere in the DEIS, the Corps says the total mine site footprint is 12,371 acres.
[1876] PD at 4–33.
[1877] *Id.*
[1878] DEIS at 4.22–39. Note that elsewhere in the DEIS, the Corps says the expanded mine site footprint is 34,790 acres.
[1879] *See* Albert, 2019.
[1880] *Id.* at 1.

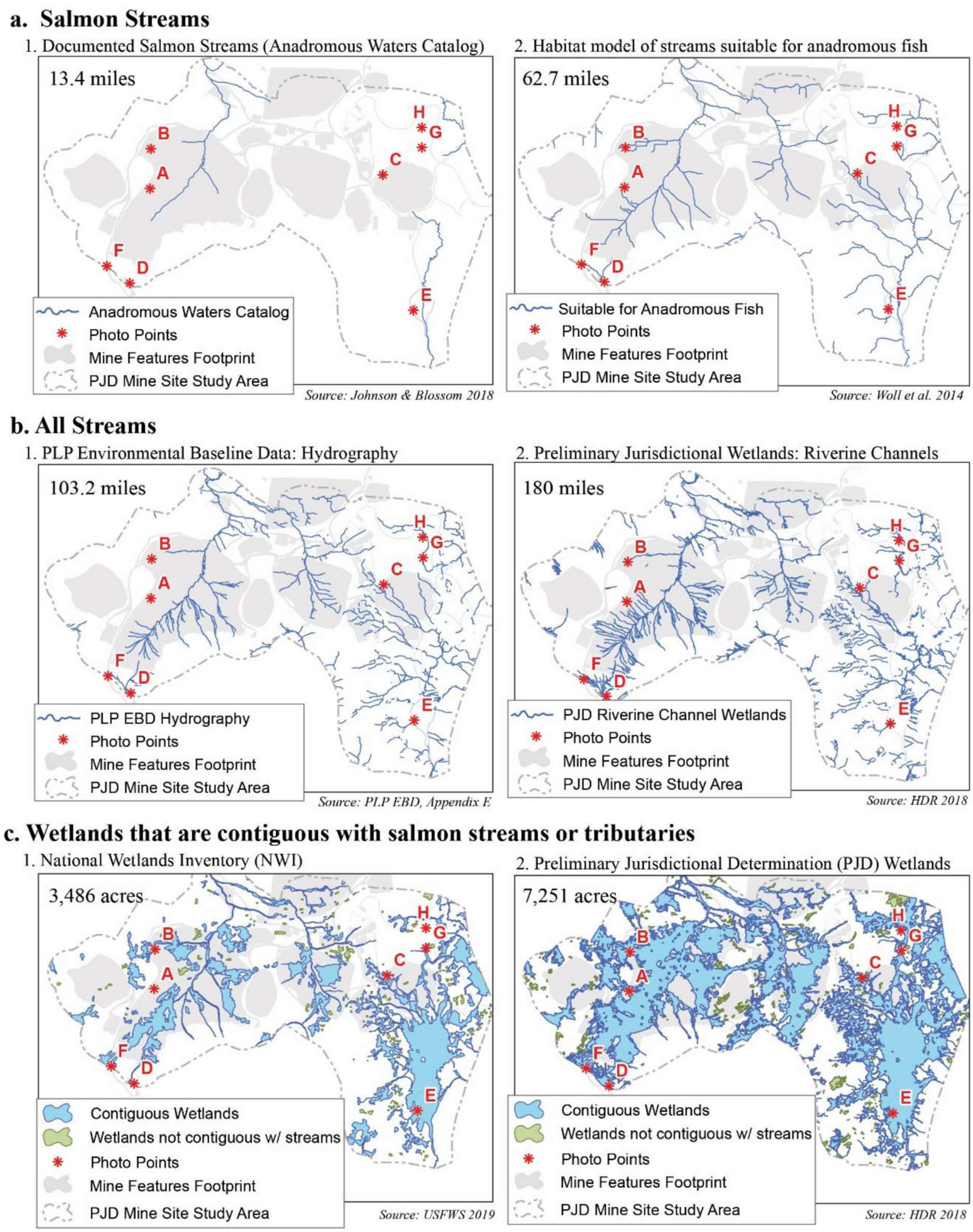

Fig. 2. from TNC Comparative Analysis (Albert, 2019).[1881]

[1881] *Id.* at 5

Within the PJD wetland study area, the Anadromous Waters Catalog lists 13.4 miles of documented salmon streams. The coarse-scale model of salmon habitat from the TNC Comparative Analysis identified 62.7 miles of streams with characteristics potentially suitable for anadromous fish.[1882] Of those streams, under the 20-year mine scenario, 5.8 miles of streams listed in the Anadromous Waters Catalog would be directly eliminated and 1.7 miles would be indirectly impacted or fragmented.[1883] However, when looking at potentially suitable anadromous habitat, the number jumps to 38.2 miles of streams lost.[1884]

Looking at tributaries, the TNC Comparative Analysis found a significant disparity between tributaries identified by PLP (130.2 miles) and those identified by the PJD (180 miles).[1885] PLP determined that the 20-year mine scenario would result in the loss of 56.4 miles of tributaries, while the PJD estimated a loss of 99.8 miles.[1886]

Moving on to wetlands, the NWI contains 3,664 acres of wetlands in the PJD mine site area, and of those, 3,486 acres are contiguous with salmon steams or tributaries.[1887] However, the PJD study documented 7,571 acres of wetlands, of which 7,251 acres are contiguous to salmon streams or tributaries.[1888] For the 20-year mine, the NWI indicates a loss of 1,866 acres wetlands contiguous with tributaries or salmon streams. However, under the PJD study, the number of acres lost jumps to 4,351 acres.[1889]

Analyzing the 78-year mine scenario presented additional challenges because of the lack of information currently available — either collected by PLP or the Corps. The first challenge in analyzing the impacts of the 78-year mine is that the project area extends beyond the current PJD area.[1890] Figure 1 from the report highlights the limitation of the PJD study area, as compared to the 78-year mine scenario footprint:

[1882] *Id.* at 7 and Fig. 2a.
[1883] *Id.* at 7.
[1884] *Id.*
[1885] *Id.* at 11 and Fig. 2b.
[1886] *Id.* at 11.
[1887] *Id.* at 11 and Fig. 2c.
[1888] *Id.*
[1889] *Id.* at 11.
[1890] *Id.* at 1.

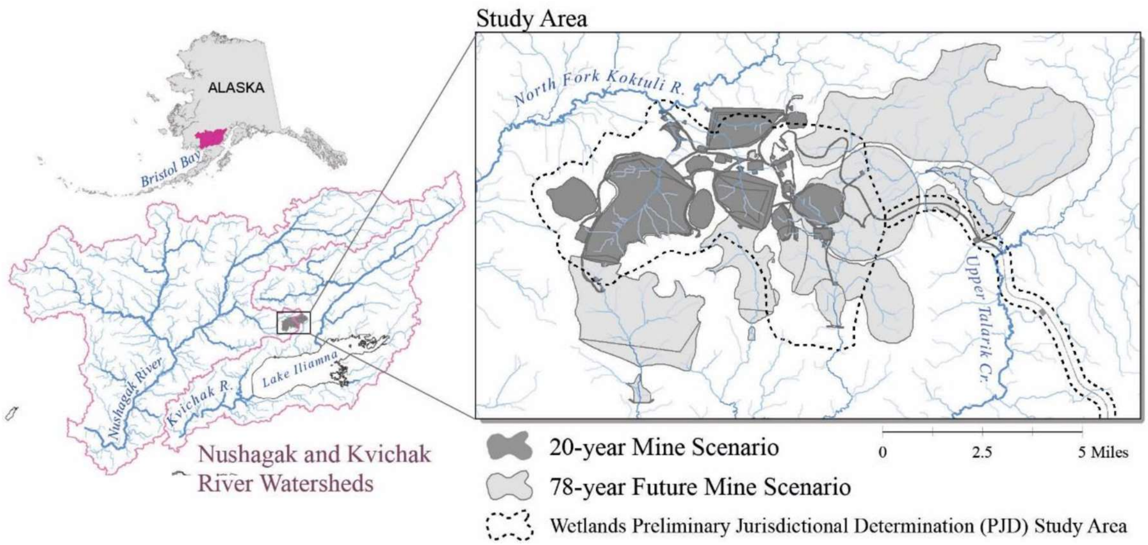

Fig. 1 from TNC Comparative Analysis (Albert, 2019).[1891]

As a result, to assess the impacts, the report used ratios of mapped-to-unmapped streams and wetlands within the PJD study to serve as a coarse-scale estimate of potential impacts within the larger 78-year mine scenario.[1892] The report estimated that the 78-year mine scenario would result in the loss of:

- 34 miles of salmon streams;
- 218.8 – 407.2 miles of tributaries; and
- 7,208 – 14,994 acres of wetlands.[1893]

These values also exceed EPA criteria by substantial margins. Table 1 of the TNC Comparative Analysis summarizes the impacts for the 20-year and 78-year mine under each dataset:[1894]

1891 *Id.* at 2.
1892 *Id.* at 1.
1893 *Id.* The report notes that "[t]he ranges reported herein can be attributed to variation between available datasets that estimate the distribution of streams and wetlands in the Pebble area. The most detailed data are only available for a limited area, but they suggest that data available for the wider area underestimate the extent of streams and wetlands, and therefore impacts to these resources, by around half." *Id.*
1894 *Id.* at 8.

The Nature Conservancy 6/1/19

Table 1. Estimated loss of salmon streams, tributaries and wetlands that are contiguous with salmon streams or tributaries from the 2018 proposed Pebble Mine (20-year scenario) and reasonably foreseeable future development (78-year scenario) in comparison with EPA Proposed Determination criteria for unacceptable adverse effects pursuant to Section 404(c) of the Clean Water Act.

	Loss under 20-year Mine Scenario				Loss under 78-year Mine Scenario			
	Direct Effect	Indirect Effects	Total	% Exceedance of EPA Criteria under 404(c)	Direct Effects	Indirect Effects	Total	% Exceedance of EPA Criteria under 404(c)
SALMON STREAMS (miles):								
Documented Salmon Streams[1]	5.8	1.7	7.5	+ 51%	29.5	4.5	34.0	+ 581%
Streams Suitable for Anadromous Fish[2]	28.4	9.7	38.2	N/A	125.2	19.9	145.1	N/A
TRIBUTARIES TO SALMON STREAMS (miles):								
National Hydrography Dataset (NHD)[3,8]	18.9	8.6	27.5	+ 45%	84.6	13.5	98.1	+ 416%
Pebble EBD Hydrography[4,8]	41.7	14.7	56.4	+ 197%	180.9	37.9	218.8	+ 1,052%
Preliminary Jurisdictional Wetlands (PJD): Riverine Channels[5,8]	75.5	24.3	99.8	+ 425%	337.6[9]	69.4[9]	407[9]	+ 2,042%
CONTIGUOUS WETLANDS (acres):								
National Wetlands Inventory[6]	1,428	439	1,866	+ 70%	5,972	1,236	7,208	+ 555%
Preliminary Jurisdictional Wetlands: All wetlands and wetland mosaic[7]	3,211	1,139	4,351	+ 295%	12,422[9]	2,571[9]	14,994[9]	+ 1,263%

Data Sources: [1] Johnson & Blossom 2017; [2]Woll et al. 2014; [3]USGS 2013; [4]PLP 2011, Appendix E; [5]HDR 2017; [6]USF&WS 2018; [7]HDR 2017
[8] This hydrographic dataset included stream reaches that were also mapped in the AWC. To estimate miles of tributary streams, we subtracted the miles of AWC streams from the total miles of streams represented in this data set to avoid double counting of documented salmon streams.
[9]The full extent of streams and wetlands outside of the Preliminary Jurisdictional Determination (PJD) Study Area is not known, so we multiplied NWI acres by correction factor by 2.08, and Pebble EBD hydrography by a factor of 1.74 as the best estimate the actual acres of wetland and miles of tributaries lost under the 78-year mine scenario (see Methods).

As documented in Table 1 above, the loss of wetlands, anadromous streams, and tributaries far exceeds what EPA found to be unacceptable. For streams listed in the Anadromous Waters Catalog, the 20-year mine would result in a 51% exceedance over EPA's Proposed Determination restrictions, while the 78-year mine would result in a 581% exceedance.[1895] The estimates for tributary loss exceed the Proposed Determination restrictions by 197%–425% for the 20-year mine to approximately 1052%–2043% for the 78-year mine.[1896] For contiguous wetlands, the 20-year mine exceeds the Proposed Determination criteria by 70% according to the NWI data set or 295% if one uses the more accurate PJD data set.[1897] The 78-year mine wetlands loss would exceed the Proposed Determination criteria by 555% under the NWI data set and 1263% under the PJD data set.[1898]

While there is uncertainty regarding the full extent and scale of impacts, the uncertainty creates an obligation on PLP and the Corps to further analyze the project with appropriate data sets to more accurately account for direct, indirect, and cumulative impacts. Regardless, even the lowest estimates, based on generalized data like the NWI or Anadromous Waters Catalog, far

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[1895] *Id.* at 11 and Table 1.
[1896] *Id.*
[1897] *Id.* at Table 1.
[1898] *Id.*

exceed the scale of impacts that EPA has found unacceptable. The Corps must take a hard look at the loss of salmon streams, tributaries, and wetlands far in excess of that which EPA has already found unacceptable. Without such an analysis, the Corps cannot support a finding that the loss of these waters is not significant.[1899]

Z. Bioaccumulation, biomagnification, and biotransport of persistent pollutants on the aquatic ecosystem

The DEIS fails to take a hard look at the environmental effects of bioaccumulation, biomagnification, and biotransport of several persistent pollutants. A report prepared by Dr. Christopher Frissell, *Failure to Address Cumulative and Long-Term Effects of Bioaccumulation and Biomagnification of Contaminants, Including Trace Metals and Hydrocarbons, in the Pebble Project DEIS*, provides a probing assessment of the failure of the DEIS to take a hard look at this relevant and significant impact on the aquatic ecosystem.[1900] These pollutants are "virtually certain . . . to enter the aquatic ecosystems of Bristol Bay as a consequence of the project."[1901] These pollutants will be "released over long periods of time, resulting in potentially large biological and toxicological effects."[1902] These impacts are heightened in pristine ecosystems.[1903] Yet, the DEIS analysis of impacts to "fish and aquatic life simply does not in fact address bioaccumulation of trace metals and its potential cumulative and long-term effects."[1904] The DEIS analysis of spill impacts and wildlife also fail to take a hard look at the direct, indirect, and cumulative impacts of bioaccumulation.[1905] Dr. Frissell concludes that

> "[b]ioaccumulation, biomagnification, and biotransport of persistent contaminants in my opinion constitutes the most pressing family of likely adverse cumulative environmental effects of the proposed Pebble Project, short of catastrophic failure of mine site infrastructure. . . . Yet despite widespread recognition of these concerns in the scientific literature, they are virtually ignored in the key portions of the DEIS concerning impacts on fish and wildlife, and cumulative effects of the project.[1906]

Despite the extensive scientific literature on this subject, and the fact that the Watershed Assessment raised this concern,[1907] the DEIS barely discusses bioaccumulation, and only in the

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[1899] *See infra* Section VII.C.
[1900] Frissell, Christopher, PhD, June 15, 2019, *Failure to Address Cumulative and Long-Term Effects of Bioaccumulation and Biomagnification of Contaminants, Including Trace Metals and Hydrocarbons, in the Pebble Project DEIS*, at 1 (Frissell, 2019) (report and references are included as attachments to these comments).
[1901] *Id.*
[1902] *Id.*
[1903] *Id.*
[1904] *Id.* at 3.
[1905] *Id.*
[1906] *Id.*
[1907] *Id.* at 4 *citing e.g.*, BBWA at 8–31 and 12–6 (discussing selenium bioaccumulation); 8–51 (mercury bioaccumulation); 9–36, 9–40, and 9-43 to 9–44 (metals bioaccumulation in stream foodwebs).

context of wildlife, particularly birds and mammals that consume fish.[1908] The DEIS assumption that fish and aquatic invertebrates will not be affected is unfounded.[1909] This assumption is based on four "ill-documented or undocumented" premises: (1) discharges below water quality standards do not have adverse effects; (2) these pollutants will not be bioavailable; (3) that 7-day lab tests of acute toxicity adequately assess exposure and impact; and (4) that sublethal effect is limited to within "a few miles" of the point of origin.[1910]

The Frissell report identifies a number of issues associated with bioaccumulation that are not adequately addressed in the DEIS.

1. Bioaccumulation

Dr. Frissell points out that acute toxicity and bioaccumulation are quite different:

> Bioaccumulation occurs precisely because the metals or persistent organics accumulated by one species of organism, or a set of species across one trophic level, are not acutely toxic to those species. . . . [L]ead, mercury, selenium, and many persistent organic compounds are toxic at higher concentrations, and therefore animals lower in the food chain can consume and bioaccumulate them without suffering immediate acute mortality."[1911]

A hard look analysis must address bioaccumulation, separate from impacts associated with acute mortality.

2. Mercury Pollution

There are a number of mercury sources from the Pebble Project, including: the mine treatment system; mobilization of atmospheric-source or geologic source mercury, fugitive dust from mine concentrate, native sources in road construction materials, and motor vehicles (e.g., vehicle wear, fuels and exhaust), among others.[1912] As Welker notes,

> the DEIS (Table K4.18-2) predicts mercury water quality concentrations being very elevated: 2,170 ng/L, 500 ng/L, and 6,200 ng/L for the waste rock, rock fill, and non-acidic stockpiles respectively. Due to the fact that the total mercury water quality standard is 12 ng/L, these exceedances, by several orders of magnitude, is of concern and therefore should be further discussed in a revised DEIS. Another concern that is not discussed in the DEIS is that these rock materials associated with these high mercury values are all from non-acidic sources and may not be subjected to a similar level of treatment and capture as materials destined for the

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1908 *Id.* at 2, citing DEIS at 4.27–122 to 4.27–125.
1909 *Id.*
1910 *Id.* at 2–3.
1911 *Id.* at 4.
1912 *Id.* at 5; *see also* Welker, Molly, June 28, 2019, *Mercury Pollution Originating from the Pebble Mine has not been Comprehensively Addressed in the DEIS*, prepared for Salmon State (Welker, 2019) (report and references included as attachments to these comments).

> [potentially acid-generating] Tailings Storage Facility.[1913]

The DEIS acknowledges that the tailings contact water will contain concentrations of some metals that exceed water quality criteria, including mercury, but fails to model downstream impacts from heavy metals.[1914] Welker also notes that "[i]mpacts from weathering of ore, the waste rock and tailings stockpiles, and on site ore processing may result in substantial atmospheric deposition of heavy metals, particularly mercury, into nearby bodies of water."[1915] The DEIS fails to identify or account for mercury sources, fate and transport, and "the net cumulative effects of mercury pollution from the project."[1916]

3. *Mercury Methylation*

The majority of mercury production occurring in aquatic systems is via biotic mechanisms, namely, bacterial methylation.[1917] Dr. Frissell notes that "the DEIS fails to adequately address mercury methylation and the fate and effects of mercury in wetlands, streams, and lakes that will be influenced by mercury discharged from the mine site and potentially released from the road system."[1918] Dr. Frissell goes on to state that

> A cursory, undocumented, and unqualified claim in the DEIS that mercury entering surface waters will become biologically unavailable stands in complete ignorance of the extreme variability of chemical environments that exist in wetlands, streams, rivers, lakes, and estuaries, as a consequence of seasonal changes in water flow, temperature and biotic activity, sediment storage, and sediment transport.[1919]

Dr. Frissell concludes that "[a]n important cumulative effect of the proposed Pebble project transportation system on mercury mobilization and associated contamination of aquatic ecosystems appears to be entirely overlooked in the DEIS."[1920] And "[t]he effects of the proposed actions on mobilization of mercury in soil storage are ignored entirely in the DEIS, but they could be very significant."[1921]

4. *Selenium*

Selenium can have lethal effects on embryos in fish and birds.[1922] Selenium bioaccumulates and biomagnifies.[1923] Selenium concentrations are likely to be greater than

[1913] Welker, 2019 at 2.
[1914] *Id.*
[1915] *Id.* at 3.
[1916] Frissell, 2019 at 5.
[1917] *Id.*
[1918] *Id.* at 6; *see also* Welker, 2019 at 1.
[1919] Frissell, 2019 at 6.
[1920] *Id.*
[1921] *Id.* at 7.
[1922] *Id.*
[1923] *Id.*

anticipated in the DEIS.[1924] Dr. Frissell states that "the DEIS fails to account for the likely bulk release of selenium into the aquatic environment in the case that mine site waste infrastructure or the proposed concentrate slurry pipeline fail."[1925] While the DEIS recognizes that selenium poisoning may impact birds, it "fails to disclose that the same considerations of selenium bioaccumulation apply to fish and mammals."[1926] Dr. Frissell also notes that the DEIS fails to assess selenium bioaccumulation in amphibians, namely wood frogs.[1927] Dr. Frissell highlights that the selenium problem compounds over time:

> Because the source of the selenium is a treatment plant at the mine site that would need to operate in perpetuity, the source would never be eliminated, hence the processes of bioaccumulation and biotransport of selenium to areas beyond the immediate mine site appears likely to cumulatively increase both in terms of geographic distribution and body tissue concentration. The potential cumulative impacts of selenium release over the two to eight decade life of the mine, and in subsequently in perpetuity, need to be considered and fully assessed in the EIS.[1928]

5. *Persistent Organic Pollutants: Polycyclic Aromatic Hydrocarbons*

Polycyclic aromatic hydrocarbons can be toxic to fishes at very low concentrations.[1929] They "can bind to cellular proteins and DNA, resulting in biochemical disruptions and cell damage, mutations, developmental malformations, tumors, and cancer."[1930] Dr. Frissell points out that impacts can occur at very low concentrations:

> known sublethal toxic effects on fishes begin at concentrations of less than 0.5 ppm and include changes in heart and respiratory rates, gill structural damage, enlarged liver, reduced growth, fin erosion, corticosteriod stress response, immunosuppression, impaired reproduction, increased external and decreased internal parasite burdens, behavioral responses, and a variety of biochemical, blood, and cellular changes.[1931]

Further, species may be affected differently at different life stages. "Even when adult fishes may survive exposure to bioaccumulated hydrocarbon toxins and their breakdown products, these may be highly toxic to larval fishes even in trace amounts."[1932] Dr. Frissell concludes that

> [polycyclic aromatic hydrocarbons] in road runoff and dust deposition from proposed Pebble mine road system pose similar or greater health risks to fish in

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[1924] *Id. citing* Zamzow, 2019a.
[1925] *Id.* at 7–9 *citing* Maest, 2019.
[1926] *Id.* at 8.
[1927] *Id.*
[1928] *Id.*
[1929] *Id.*
[1930] *Id.* at 9
[1931] *Id.*
[1932] *Id.*

> the Kvichak River system and Iliamna Lake, because of their chemical persistence, their tendency of to bioaccumulate in food webs, their inherent toxicity, and fact that the discharges that will occur over a sustained period of many decades, during all seasons of the year.[1933]

6. *Metals and Hydrocarbons*

Biological and physical processes will likely transport contaminants long distances from the mine site and transportation corridor.[1934] These contaminants can be mobilized into water or the foodweb. Dr. Frissell concludes that "[t]he DEIS is grossly inadequate in its treatment of physical transport of contaminants, relying on unsupported, ridiculously simplified, and in my opinion, indefensible assumptions about the dynamics of potential storage and mobilization conditions o[f] persistent pollutants in the affected aquatic environments."[1935]

7. *Complex Food webs and Multiple Trophic Levels*

The Bristol Bay ecosystems are relatively pristine, with diverse and large natural populations.[1936] Dr. Frissell notes that

> [t]his biotic richness embodies complex food webs comprised of many levels of animal predation; the range of fish species and sizes alone in Iliamna Lake . . . supports a food web of up to four trophic levels. . . . [T]he number of functional trophic levels in a food web is a consistent predictor of the concentration of persistent hydrocarbons and other contaminants prone to bioaccumulation. . . . [F]ood webs with a large biomass of top carnivores are more prone to biomagnification, because accumulation of persistent contaminants acquired primary through ingestion is compounded at each trophic level.[1937]

In addition to a complicated ecosystem with multiple trophic levels that result in increased biomagnification, species like salmon, who are highly mobile and migratory, establish a large geographic range for biotransport of these pollutants.[1938] Dr. Frissell notes that "[s]almon and migratory birds are obvious vectors of long-distance transport of selenium from food webs in the immediate area the proposed Pebble mine site to other water bodies in the region, thus likely secondarily contaminating the food web in lake, rivers, and marine waters."[1939] The biotransport can also be magnified based on bioaccumulation from one highly mobile species to another:

> contaminants acquired by fish feeding on invertebrates exposed in the vicinity of mine site discharges and streams affected by roads and road runoff can be mobilized rapidly into the food web, bioaccumulated, and biotransported as the exposed fish migrate and are consumed by predators, themselves often mobile

[1933] *Id.*
[1934] *Id.* at 10.
[1935] *Id.*
[1936] *Id.*
[1937] *Id.*
[1938] *Id.* at 10–11.
[1939] *Id.* at 11.

species such as eagles, grizzly bears, river otters, and a host of other species.[1940]

Because salmon that bioaccumulate these pollutants return to spawn, "their body burden of persistent contaminants" returns back to the region:

> Body burdens of contaminants in returning salmon would add to the continuing influx of contaminants from the mine source, road dust, road runoff, and spills. Bioaccumulated contaminants can remain in biotic food webs rather than returning to bio-unavailable forms of storage in the ecosystem; most mercury bioaccumulated by top predator fishes in freshwater food webs appears to remain biotically demethylated and sequestered, rather than returning to sediments.[1941]

8. *Marine Food Webs*

In addition to the bioaccumulation impacts in the freshwater ecosystems surrounding the project, bioaccumulation and biomagnification "could have disproportionate effects on species like beluga whales, which show physiological evidence of having high toxic sensitivity to polycyclic aromatic hydrocarbons."[1942]

9. *Lower Trophic Species*

Bioaccumulation of contaminants is not limited to higher trophic species.[1943] It can also have disproportionate impacts on the base of the food web.[1944] Dr. Frissell notes that "[t]he overall ecological effects of major shifts or losses in production at the base of aquatic food webs are highly uncertain, but potentially could reverberate to the higher trophic levels where salmon and other fishes reside."[1945]

10. *Species in Pristine Environments*

Species in ecosystems that do not have a history of exposure to "industrial-origin contaminants may be highly inherently sensitive to and harmed by even very low concentrations of these contaminants."[1946] The high sensitivity of belugas to small concentrations of polycyclic aromatic hydrocarbons is a good example. Further, tests to determine water quality standards may be skewed by relying on species that have a long history of exposure.[1947]

11. *Multiple Stressor Effects*

Adding these factors together creates even greater concern. Introducing these contaminants into a pristine environment that supports a complex, multi-level food web, with

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[1940] *Id.* at 11, 13.
[1941] *Id.* at 13.
[1942] *Id.* at 14.
[1943] *Id.*
[1944] *Id.*
[1945] *Id.*
[1946] *Id.*
[1947] *Id.* at 14–15.

species that have not been exposed to these contaminants in the past "represents a worst case scenario in terms of the potential for ecotoxic effects on ecosystems and fish and wildlife populations."[1948] Furthermore, the toxic soup effect also makes matters worse. Studies are showing that "exposure to a toxin reduces the resilience of populations, and increases vulnerability to other toxins—and to other environmental stressors generally."[1949] Dr. Frissell concludes that

> [t]he result is that each toxic substance a population is exposed to can incrementally diminish its adaptive capacity to cope with environmental challenges from other causes—including other toxins, normative environmental fluctuations, habitat alteration, fishery harvest, disease, and climate change. By introducing or increasing several categories of industrial-origin toxins, the Pebble mine and transportation system proposed in the DEIS threaten exactly these kinds of cumulatively-acting impacts to the Bristol Bay ecosystem.[1950]

12. Climate Change Induced Impacts

As the environment and hydrologic cycle changes due to climate change, the pathways by which contaminants are mobilized and introduced into the ecosystem may also change.[1951] Dr. Frissell identifies a number of potential climate change-driven factors that the DEIS needs to take a hard look at:[1952]

- Increased frequency of freeze-thaw processes and loss of permafrost with climate change could result in greater propensity for mobilization of mercury from soils into surface waters and their biota.
- Increased rain-on snow runoff and more precipitation as rain rather than snow is likely to increase aqueous runoff and sediment transport from polluted road surfaces into surface waters.
- Increased incidence and temporal juxtaposition of freezing and thawing during the cold season is likely to increase the need for application of deicing agents to keep road surfaces operable.
- Increased duration and frequency of dry weather in summer and winter seasons is certain to increase the incidence and magnitude of dust generation and dispersal from the mine site and roads.
- Increased freeze-thaw episodes and more rainfall as precipitation is certain to increase the need for grading, recontouring, culvert and bridge maintenance and reconstruction work on roads; each such event raises the risk that mercury and other accumulated mining-related pollutants are mobilized from roads and soils adjacent to wetlands and streams.
- Increased hydrologic variability overall will increase the likelihood of overwhelming the design criteria applied in stream crossings, resulting in

[1948] *Id.* at 15.
[1949] *Id.*
[1950] *Id.*
[1951] *Id.*
[1952] *Id.* at 16.

washouts, possible accidents, spills, and pipeline ruptures, and the need for ongoing reconstruction work.

- Increased hydrologic variability will alter the physical transport of persistent pollutants, and increasing the likelihood of fluctuating redox and wetting conditions that spur methylation and mobilization of mercury from storage in sediments and streamside and floodplain soils.
- Reduced life history complexity of sockeye salmon (especially reduced variance in age at return, or number of year classes contributing to a return year), partly a result of climate change, likely increases the vulnerability of sockeye salmon populations to spills or catastrophic failures associated with mining.

13. The DEIS fails to take a hard look at potential effects from bioaccumulation, biomagnification and biotransport of contaminants.

The DEIS simply fails to "acknowledge or address in any way the risks and potential effects of bioaccumulation and biotransport of contaminants in the receiving waters and the rivers, lakes, and marine water of Bristol Bay."[1953] This "renders the DEIS fatally incomplete, and unreliable as a basis for making an informed decision, and grossly inadequate for ensuring that effective avoidance and mitigation actions for the project are properly identified."[1954] Dr. Frissell concludes that the DEIS "is fatally flawed and fundamentally misleading in its lack of disclosure about likely the scope, magnitude, and duration of harmful environmental effects of the proposed project."[1955]

AA. Cumulative Impacts

The DEIS fails to take the required hard look at cumulative impacts of the proposed project. Throughout the DEIS, each individual section's cumulative impact analysis suffers from unsupported conclusions that lack the quantified and detailed analysis required by NEPA. For example, several sections' cumulative impacts analysis for the 78-year mine expansion contain 2–3 sentence general descriptions of the expected impacts from Pebble Project buildout without any meaningful analysis of those impacts. Simply identifying that mine expansion may impact, disturb or destroy more habitat is insufficient. Merely stating that expansion would result in more impacts for a longer period of time is also insufficient.[1956] For example, the DEIS makes

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[1953] *Id.* at 17.
[1954] *Id.*
[1955] *Id.*
[1956] *See e.g.*, DEIS at 4.24–37 ("The primary potential future impacts to fish from the Pebble mine expansion would be direct loss of habitat; fish displacement and injury; habitat degradation; and changes in the natural flow regime. These impacts would be similar to those described previously in this section, but take place over a geographic area combining components of Alternatives 1 and 3. With the mine expansion, the duration of these impacts would be extended by an additional 58 years of mining and 20 years of additional milling."); 4.23–45 ("At the mine site, an additional 21,546 acres of habitat would be lost. The habitat and wildlife species affected would be similar to those described above under "Alternative 1 – Applicant's Proposed Alternative." The expanded development would increase the magnitude, extent, duration, and likelihood of impacts. The longer duration would also increase the likelihood of injury or mortality and cause longer habitat

statements like "[t]hese impacts [for the 78-year mine] would be similar to those described previously in this section [for the 20-year case] but take place over a geographic area combining components of Alternatives 1 and 3"[1957] and "[w]ith the mine expansion, the duration of these impacts would be extended by an additional 78 years."[1958] Any assertion that impacts from an additional 78 years of mining would be similar is a gross mischaracterization of anticipated impacts.

For reasons identified throughout these comments, the 78-year mine expansion is not sufficiently analyzed in the DEIS. Mine expansion would have significant, extensive impacts over a much larger area. It is simply not the case that the impact would be similar but extend for a longer period of time.[1959] The potential impacts of mine expansion are given short, conclusory descriptions at best. As Borden notes,

> [i]f the 20-year mine was constructed it is almost certain that a much larger mine would ultimately be developed in an attempt to attain a positive rate of return on a very large and risky initial investment. However, the cumulative effects evaluation of the more-credible 78-year mine plan significantly understates and, in some cases, grossly underestimates the much larger impacts and risks associated with an expanded mining operation.[1960]

Borden goes on to conclude that

> The cumulative effects analysis for the expanded mine case evaluated in the DEIS contains insufficient detail, understates the impacts of a larger mine and in some cases its conclusions are clearly wrong. Most of the individual impacts and risks for the 78-year mine will be at least three to seven times greater than for the small 20-year mine (Borden, 17 June). However, the geochemical and water quality risks posed by the larger mine will be at least ten times greater. The mine would also need to manage five times more tailings and one hundred times more waste rock with an associated increase in the risk of catastrophic containment failure. It is certain that this larger mine would lead to measurable, significant and permanent harm to fisheries in the Bristol Bay watershed even if everything were to go according to plan.[1961]

The DEIS cumulative impacts analysis is also inadequate because it compartmentalizes impacts by issue or subject matter. The DEIS takes the approach that the cumulative impacts analysis can be assessed on a subject-by-subject basis by only assessing cumulative impacts at the end of each individual section in Chapter 4. The DEIS does not consider (1) cumulative impacts

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avoidance of nearby areas."); 4.22–40 ("These impacts would be additive to those of the proposed project. The expansion would increase the magnitude, duration, and geographic extent of the wetland impacts described under Alternative 1.").

[1957] *Id.* at 4.24–37

[1958] *Id.* at 4.24–37, 4.24–39.

[1959] *See* Borden, 2019f at 9–10.

[1960] Borden, 2019b at 1.

[1961] *Id.* at 3; *see also* Borden, 2019f at 5–6.

among assessed subjects, and (2) what the synergistic cumulative impacts are. For example, there is no cross-cutting analysis of the cumulative impacts from impacts to water quality and wetlands. Instead, the DEIS takes each, individually, in turn. As Dr. Schindler notes,

> [i]t is broadly understood in environmental sciences that most development activities produce many possible stressors to ecosystems. In the case of Pebble Mine, this includes dewatering streams, draining wetlands, leakage of toxic materials into water sources, roads preventing streams from moving across floodplains, in addition to the potential for more catastrophic events such as failures of tailings dams. What has become widely appreciated is that these multiple stressors typically amplify the effects of each other when generating risks to the environment, i.e., stressors interact and compound each other's effects (Hodgson et al. 2019). The current DEIS assumes that all stresses associated with the Pebble project occur independently, and do not amplify each other's effects on ecosystems. This assumption ignores decades of research and assessment of the effects of similar projects that show clearly that the effects of mines involve multiple stressors that typically interact with one another and amplify the risks that each individual stressor creates on its own. This oversight of the Pebble DEIS also leads to a serious underestimate of the potential environmental risks of this project. A properly conducted EIS would account for interactions among stressors and how these translate into risks to the ecosystem, which would inevitably be much higher than the Pebble DEIS currently concludes. The current treatment of 'cumulative risks' in the DEIS focused narrowly on the accumulation of stressors through time. It does not include interactions among stressors and it should if the purpose is to rigorously assess risks to ecosystems.[1962]

Overall, whether in each section of Chapter 4, or across the entirety of impacts from the project, the DEIS fails to provide a quantified and detailed analysis of impacts from past, present and reasonably foreseeable future projects and actions.

VII. THE DEIS FAILS TO DEMONSTRATE THAT THE PEBBLE PROJECT WILL COMPLY WITH CWA 404(B)(1) GUIDELINES.

The Corps must ensure compliance with the 404(b)(1) Guidelines before issuing a permit. The Guidelines impose important limitations on when a section 404 permit may be issued.[1963] The Guidelines prohibit the permitting of any discharge of dredged or fill material: (1) if a practicable alternative to the proposed discharge would have less adverse impact on the aquatic ecosystem; (2) if the discharge will cause or contribute to significant degradation of the environment; or (3) unless all appropriate steps have been taken to minimize potential adverse impacts.[1964] EPA notes that

> the record must contain sufficient information to demonstrate that the proposed discharge complies with the requirements of Section 230.10(a) of the Guidelines.

[1962] Schindler, 2019 at 3.
[1963] 40 C.F.R. pt. 230.
[1964] 40 C.F.R. § 230.10.

> The amount of information needed to make such a determination and the level of scrutiny required by the Guidelines is commensurate with the severity of the environmental impact (as determined by the functions of the aquatic resource and the nature of the proposed activity) and the scope/cost of the project.[1965]

Given the extensive anticipated impacts from this project, the required level of scrutiny is high.

A. The Basic and Overall Purpose is Unlawfully Narrow.

The Corps has unlawfully limited the basic and overall purposes of the project as the development and operation of "a copper, gold, and molybdenum mine in Alaska in order to meet current and future demand."[1966] As discussed in Thomas Yocom's report, *The Corps Determination of Basic and Overall Project Purposes Improperly Eliminates Consideration of Potentially Less Environmentally Damaging Practicable Alternatives*, "[t]his determination defines the basic and overall project purposes so narrowly as to effectively limit consideration of alternatives to the applicant's preferred site."[1967]

The Corps bears the responsibility of determining the basic and overall project purposes of any projects that propose to discharge dredged or fill material. The basic project purpose is typically generic, and the overall project purposes add the consideration of project costs, logistical constraints, and technical concerns.[1968] The Corps was correct in finding that "the applicant's stated purpose is made too narrow by limiting the proposed development to the Pebble deposit. The public's interest in commodities such as copper, gold, and molybdenum does not dictate a particular source of these commodities."[1969] By rejecting PLP's definition, the Corps indicates that alternatives would include mining of different ore deposits, if practicable. However, the Corps itself inappropriately narrowed the purpose by defining the basic and overall purposes of the project as the development and operation of "a copper, *gold, and molybdenum* mine in *Alaska* in order to meet current and future demand."[1970]

[1965] *See* Environmental Protection Agency, *Memorandum: Appropriate Level of Analysis Required for Evaluating Compliance with the Section 404(b)(1) Guidelines Alternatives Requirements*, https://www.epa.gov/cwa-404/memorandum-appropriate-level-analysis-required-evaluating-compliance-section-404b1 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[1966] DEIS at 1–4; ES–3.
[1967] Yocom, Thomas G. June 6, 2019, *The Corps Determination of Basic and Overall Project Purposes Improperly Eliminates Consideration of Potentially Less Environmentally Damaging Practicable Alternatives*, Prepared for Earth Works (Yocom, 2019b) at 1.
[1968] The preamble to the 404(b)(1) regulations provides the following guidance on the meaning of basic purpose: "Non-water-dependent" discharges are those associated with activities which do not require access or proximity to or siting within the special aquatic site to fulfill their basic purpose. An example is fill to create a restaurant site, since restaurants do not need to be in wetlands to fulfill their basic purpose of feeding people. 45 Fed. Reg. 85,339 (Dec. 24, 1980).
[1969] DEIS at App. B, B–3; *see also Sylvester*, 882 F.2d. at 409 ("[A]n applicant cannot define a project so as to preclude the existence of any alternative sites and thus make what is practicable appear impracticable.").
[1970] DEIS at 1–4 (emphasis added).

This defined basic and overall purpose is unreasonably narrow because it includes the presence of molybdenum when the project has always been focused on the copper and gold deposit. Yocom points out that the Corps' defined purpose is too narrow because PLP discovered molybdenum mineralization in the Pebble deposit after it had acquired its mining rights.[1971] Mining molybdenum is only an additional aspect of the project, and PLP has demonstrated that the presence of molybdenum is not critical to its interest in the project or the viability of the project.

The Corps has also inappropriately geographically constrained the project. By restricting the purpose to a mine in Alaska, the project purpose forecloses numerous potential copper mines around the world, many of which could have been obtained by Northern Dynasty when it entered the market in 2001.[1972] The DEIS states that the project would "help meet global demand."[1973] The DEIS also states that

> PLP's (the applicant) stated need for the proposed project is, "to meet the increasing global demand for commodities such as copper, gold, and molybdenum." From the broad, macroeconomic scale, the project need is reflected in the worldwide demand for copper.[1974]

Any assertion by the Corps that the mine in Alaska would benefit the public interest of Alaskans and is part of the purpose of the project is misplaced. Public interest is not a factor in determining the purpose. Rather, as discussed below in Section VII.F, the public interest review is a wholly separate analysis.[1975]

PLP's purpose is to mine copper. Consequently, the range of copper mining alternatives (both onsite and offsite) should be evaluated based on costs and logistics. By limiting the location and requiring the presence of commercially viable deposits of gold and molybdenum, the Corps has defined the purpose in a manner that "preclude[s] the existence of any alternative sites and thus make what is practicable appear impracticable."[1976] Including the geographic and set of mineral materials into the project purpose renders other practicable alternatives inappropriately

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[1971] Yocom, 2019b at 1, 4 n.22.
[1972] *Id.* at 7.
[1973] DEIS at ES–25.
[1974] DEIS at 1–3.
[1975] *See infra* Section VII.F; *See also* Yocom, Thomas G., June 6, 2019, *The Pebble Project DEIS provides no substantive proposals of compensatory mitigation for losses of wetlands and aquatic areas,* (Yocom, 2019c) at 7–8.
[1976] *See Sylvester*, 882 F.2d. at 409. In addition, the purpose is not consistent with the Corps' 2009 Operating Procedures. The 2009 Operating Procedures provide that "[t]he overall project purpose should be specific enough to define the applicant's needs, but not so restrictive as to constrain the range of alternatives that must be considered under the 404(b)(1) Guidelines." *See* U.S. Army Corps of Engineers, Memorandum for Commanders, Major Subordinate Commands and District Commands, *Updated Standard Operating Procedures for the U.S. Army Corps of Engineers Regulatory Program*, July 1, 2009, at 15 (included as an attachment to these comments).

impractical. The Corps' definition of project purpose must be modified consistent with its regulations, guidance, and case law.

B. The Alternatives Reviewed Fail to Include the Least Environmentally Damaging Practicable Alternative.

The CWA regulations prohibit the discharge of dredged or fill material into any regulated "waters of the United States," including wetlands, if there is a less environmentally damaging practicable alternative to the proposed discharge. The regulations state that

> an alternative is practicable if it is available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes. If it is otherwise a practicable alternative, an area not presently owned by the applicant which could reasonably be obtained, utilized, expanded or managed in order to fulfill the basic purpose of the proposed activity may be considered.[1977]

The 404(b)(1) regulations place the burden of proof squarely on the applicant to prove that its proposal is the least environmentally damaging practicable alternative if the applicant's project would discharge dredged or fill material in "special aquatic sites" for purposes that are not water-dependent.[1978] Under the regulations, any "practicable" alternative to achieve the basic and overall project purposes must be determined to be cost-effective, when viewed from the perspective of the industry as a whole.[1979] But the least environmentally damaging practicable alternative need not be the least-costly, nor the most profitable.[1980]

The regulations presume that less environmentally damaging alternatives are available to the applicant and practicable, unless the applicant clearly demonstrates otherwise. In the absence of such a clear showing, the Corps is required to deny the permit application.[1981] PLP has failed to demonstrate that its proposed project is the least environmentally damaging practicable alternative, and the Corps must deny PLP's permit application.

[1977] 40 C.F.R. § 230.10(a)(2).
[1978] *See id.* § 230.10(a).
[1979] The financial circumstances of a particular applicant are not considered relevant if an alternative could be achieved practicably by a "typical" applicant. The preamble to the 404(b)(1) regulations states: "Our intent is to consider those alternatives which are reasonable in terms of the overall scope/cost of the proposed project. The term economic might be construed to include consideration of the applicant's financial standing, or investment, or market share, a cumbersome inquiry which is not necessarily material to the objectives of the Guidelines. We consider it implicit that, to be practicable, an alternative must be capable of achieving the basic purpose of the proposed activity."
45 Fed. Reg. 85,339 (Dec. 24, 1980).
[1980] *Louisiana Wildlife Federation, Inc. v. York*., 761 F.2d 1044, 1048 (5th Cir. 1985) (noting that the Corps had properly chosen "alternatives that reduced both the applicants' profit and the economic efficiency of their proposed operations in order to preserve other environmental values").
[1981] *See* 40 C.F.R. § 230.12(a)(3)(i), (iv).

1. *Without a feasibility study, the Corps cannot discern whether alternatives are practicable.*

The level of analysis required for determining which alternatives are practicable depends on the type of project and general costs associated with the project.[1982] "[A]s the scope/cost of the project increases, the level of analysis should also increase."[1983] Without a pre-feasibility study, it is impossible to determine the anticipated costs of this project. As a result, there is no possible way the Corps can evaluate whether alternatives to PLP's proposed action are so prohibitively expensive that they are not practicable under the CWA. To make any assessment of alternatives, including a determination of which alternative or variant of an alternative is the least environmentally damaging *practicable* alternative, the Corps must have an economic feasibility study of the proposed project.

2. *The northern corridor alternative and variants are not practicable.*

While the alternatives requirements under the CWA and NEPA are distinct, the northern corridor is not an eligible alternative for review under either law. The northern corridor alternative (including all variants) is not practicable and is not a valid alternative for consideration because all property crossed by the corridor cannot reasonably be obtained. This renders the entire discussion of the northern corridor and all the variants associated with that corridor utterly meaningless for purposes of alternatives review under either law.

The Ninth Circuit has noted for NEPA review that "the concept of alternatives is 'bounded by some notion of feasibility.'"[1984] And under the CWA, an alternative is only practicable if it is "available" to the project applicant.[1985] An alternative is available to a project applicant where the property is obtainable for meeting the project's purpose. The regulations clarify that "an area not presently owned by the applicant *which could reasonably be obtained*, . . . may be considered."[1986] As a result, the key question for the Corps in determining whether the northern corridor is an available alternative is whether all property crossed by the corridor can reasonably be obtained. The Fifth Circuit has stated that "[a] mere, unsupported theoretical possibility of acquiring the alternative site . . . does not constitute a showing that the alternative site is reasonably obtainable."[1987]

For example, the Corps utilized "not capable of being obtained" as the reason for elimination of potential alternatives in its 404 review of the proposed Oil Spill Response Facility at Shepard Point in Cordova, Alaska.[1988] In its October 2017 decision, the Corps found that

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[1982] *Id.*
[1983] *Id.*
[1984] *Laguna Greenbelt, Inc. v. U.S. Dep't of Transp*., 42 F.3d 517, 524 (9th Cir. 1994), *as amended on denial of reh'g* (Dec. 20, 1994) (*citing Vt. Yankee Nuclear Power Corp. v. Nat. Res. Def. Council, Inc.*, 435 U.S. 519, 551 (1978).
[1985] *Vt. Yankee Nuclear Power Corp.*, 435 U.S. at 551 (quoting *Nat. Res. Def. Council v. Norton*, 458 F.2d 827, 837–38 (D.C. Cir. 1972)).
[1986] 40 C.F.R. § 230.10(a)(2) (emphasis added).
[1987] *City of Shoreacres v. Waterworth*, 420 F.3d 440, 449 (5th Cir. 2005).
[1988] U.S. Department of Army, Record of Decision, Cordova Oil Spill Response Facility, POA-

several alternatives were not "available" because the land owner would not convey any of its property interests to allow the project to proceed:

> 3.1.2 Alternative 2 (Ocean/City Dock)
> Although Alternative 2 was considered practicable in the FEIS, through the passage of Resolution 03-07-10 the City of Cordova resolved that the City would not make the land at Ocean Dock available for the OSR facility project. (City Of Cordova Resolution 03-07-10, March 2007 and letters from the City of Cordova, dated April 17, 2015 and March 24, 2017). Because the land at Ocean Dock is not available nor capable of being obtained, the Ocean Dock Alternative is not practicable and will not be carried forward for review in this document.
>
> 3.1.3 Alternative 3 (Fleming Point)
> As the site is unavailable for lease through at least year 2032 (State Tidelands Lease ADL 63896) and unavailable from the land owner (Letter from the Eyak Corporation, dated December 18, 2015), the Fleming Point Alternative is not practicable and will not be carried forward for review in this document.
>
> 3.1.5 Alternative 5 (Orca Site)
> Although Alternative 5 was considered practicable in the FEIS, a portion of the land where the OSR facility was proposed to be constructed is owned by the State of Alaska and **the state has indicated that they will not lease the land for construction of the OSR facility**. (Letter from Governor Bill Walker dated April 15, 2016). **Because the land at the Orca site is not available nor capable of being obtained, the Orca Cannery Alternative is not practicable and will not be further discussed in this document.**
>
> 3.2 Alternatives Considered but Eliminated from Further Consideration:
> The alternatives considered but not carried forward in the FEIS and the rationale for not advancing these alternatives are described in the Section 2.3 of the FEIS.[1989]

The last alternative (3.2) was eliminated from review in the FEIS because "[t]he privately owned Orca Cannery Facility was an option considered that did not advance for full evaluation. Mr. Steve Ranney, property owner, was unwilling to sell the facility — making the site unavailable."[1990]

With the proposed Pebble project, the northern corridor would cross Bristol Bay Native Corporation (BBNC) lands.[1991] In a RFI response to the Corps in May of 2018, PLP made clear that the northern corridor would cross properties owned by several different entities: "It should be noted that all access corridors are subject to PLP's ability to negotiate a mutually acceptable

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1994-1014, Orca Inlet, Oct. 13, 2017 (included as an attachment with these comments).
[1989] *Id.* at 8–12.
[1990] *Id.* at 12.
[1991] James Fueg, PLP, Memorandum, PLP to Shane McCoy, Corps, May 25, 2018, at 7 (regarding Response to RFI-032 Project Options) (included as an attachment to these comments).

access agreement with the associated landowners. . . . The Northern Access option will require [a right of way] from . . . [BBNC] . . . ."[1992]

BBNC subsequently sent a letter to the Corps stating in no uncertain terms that it "will not allow use or occupancy of its lands in furtherance of [PLP's] efforts to develop the proposed Pebble Mine."[1993] BBNC alerted the Corps to the fact that it "is the owner of both surface and subsurface estates of three former Native allotments along the proposed northern two transportation corridors."[1994] Notably, while BBNC took this effort to "correct misinformation in the [DEIS] regarding the land ownership states of lands that are implicated by various components of the three action alternatives,"[1995] BBNC's position has been clear since 2009. In 2009, and again in 2018, BBNC passed resolutions in opposition to the mine.[1996] In its 2018 Resolution, BBNC expressed that "BBNC management is directed . . . not to make any resources owned or controlled by the Corporation available by sale or otherwise to the construction or operation of Pebble Mine or its related infrastructure or transportation corridor elements."[1997]

The Pedro Bay Corporation has also had a long-held position opposing development of the Pebble Mine. It made clear in February of 2019 that none of its lands would be available as a transportation corridor for the Pebble Mine.

> Pedro Bay Corporation (PBC) reiterated its opposition to the Pebble Mine after the Army Corps of Engineers released its [DEIS] providing for a transportation corridor north of Lake Iliamna as part of [PLP's] plans. PBC owns over 92,000 acres of surface lands between the Pebble deposit and a potential deepwater port on Cook Inlet. After extensive review, PBC's Board of Directors unanimously concluded in 2014 that the Pebble Mine does not meet PBC's responsible development standards given the significant impacts that the mine would have on Pedro Bay. **The Board reiterated that opposition this past week when considering and rejecting a right-of-way agreement for PLP's transportation corridor.**
>
> According to the recently-released Pebble DEIS, PBC lands would be directly impacted in 2 out of the 3 alternatives under consideration, with approximately 800 acres of corporation lands required for construction of the transportation corridor, access roads, a 12-inch natural gas pipeline, a ferry terminal, and a possible mine concentrate pipeline. Moreover, any expansions of the Pebble Mine

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1992 *Id.*
1993 Joseph L. Chythlook, Chair, Board of Directors, and Jason Metrokin, President and CEO, Letter, Bristol Bay Native Corporation to Shane McCoy Re: Comment Concerning BBNC Land Ownership, June 6, 2019 (included as an attachment to these comments).
1994 *Id.*
1995 *Id.*
1996 Bristol Bay Native Corporation Resolution 18-10, BBNC Opposition to Proposed Pebble Mine, March 2, 2018, and Bristol Bay Native Corporation Resolution 09-41, Resource Protection Policy, Dec. 11, 2009 (both included as attachments to these comments).
1997 Bristol Bay Native Corporation Resolution 18-10, BBNC Opposition to Proposed Pebble Mine, March 2, 2018.

> beyond the current 20-year mine plan would also require the construction of a road, concentrate pipeline, and diesel pipeline across Pedro Bay Corporation lands. The [DEIS] released this week shows that Pebble Mine remains a threat to Pedro Bay and our surrounding community. PLP does not have permission, much less an agreement, to access our lands for the purpose of a transportation corridor north of Lake Iliamna.[1998]

Because BBNC and the Pedro Bay Corporation have expressly stated that they have no intent to convey any of their lands to Pebble for access, the northern corridor is not "reasonably obtainable" and thus not "available" pursuant to the CWA. With the removal of the northern route alternative and variants, the Corps is left with two alternatives — the no action alternative and the southern corridor alternative.[1999] The existing available options do not provide either a "reasonable range of alternatives" under NEPA or allow the Corps to adequately evaluate the project under the CWA.

In addition, the DEIS states that

> [t]he natural gas pipeline corridor would cross subsurface lands owned by Cook Inlet Region, Inc. and [BBNC]. Uses on these surface and subsurface lands privately owned by Alaska Native corporations are subject to the approval of the landowners. Any activity would be conducted in accordance with lease and surface use agreements that PLP would establish with the landowners.[2000]

For the same reason that the northern corridor is not an available option, so too is any alternative that includes the gasline running across BBNC property. The DEIS fails to include any available alternative for routing the natural gas pipeline.

[1998] Pedro Bay Corporation, Blogpost, *Pebble Limited Partnership Lacks Permission from Pedro Bay Corporation to Cross its Lands*, Feb. 22, 2019 https://www.pedrobaycorp.com/recent-news (included as an attachment to these comments).

[1999] The minor variants associated with the southern route are also limited due to the recent statements from Alaska Peninsula Corporation "that they will not provide PLP a right-of-way (ROW) and land lease for the Kokhanok East road and port site variant. As such, this variant is not available for use." RFI 112 at 18; *cf.* DEIS at ES–15, ES–63 (identifying Action Alternative 1 – Kokhanok East Ferry Terminal Variant and discussing impacts to wetlands and water bodies). In addition, Iliamna Natives Limited (INL) has refused to provide access for the Northern Terminal Access Spur Road. RFI 112 at 18–19; *cf.* DEIS at ES–13 (identifying that the Action Alternative 1 route would locate the North Ferry Terminal approximately 10 miles to the west of Newhalen. A mine access road would connect the mine to the terminal and include a spur road that connects with an existing that runs from Iliamna towards Nondalton). PLP notes that "[a]s a result of the concerns expressed by members of the community of Iliamna INL has declined to incorporate the ROW for the spur road where it crosses INL lands into the recent agreement that was completed granting PLP access to the Eagle Bay ferry terminal and the road and pipeline ROWs described above. As a result, this spur road is not available for use." RFI at 19.

[2000] DEIS at 4.2–4.

3. The DEIS improperly dismisses potentially less damaging alternatives.

The DEIS dismisses alternatives that may be practicable and which would almost certainly be less environmentally damaging than PLP's proposal. There has never been a copper mine proposed in the United States with greater direct, indirect, and secondary impacts to wetland and aquatic areas. A determination that the Pebble Project as proposed is the least environmentally damaging alternative is completely unsupportable.

The Pebble Project has been proposing to mine for copper since at least 2001.[2001] In evaluating potential alternatives, the Corps must consider alternatives that were available to the permit applicant when it entered the market for its proposed project purpose.[2002] This is referred to as the market-entry approach to determining alternatives available for consideration. In *Bersani v. EPA*, the court reviewed whether the "market entry" approach was consistent with the 404(b)(1) guidelines.[2003] The court found that "a common sense reading of the statute can lead only to the use of the market entry approach used by the EPA":[2004]

> [T]he preamble to the 404(b)(1) guidelines states that the purpose of the "practicable alternatives" analysis is "to recognize the special value of wetlands and to avoid their unnecessary destruction, particularly where practicable alternatives *were* available in non-aquatic areas to achieve the basic purpose of the proposal." 45 Fed.Reg. 85,338 (1980) (emphasis added). In other words, the purpose is to create an incentive for developers to avoid choosing wetlands when they could choose an alternative upland site. [PLP's] reading of the regulations would thwart this purpose because it would remove the incentive for a developer to search for an alternative site at the time such an incentive is needed, i.e., at the time it is making the decision to select a particular site. If the practicable alternatives analysis were applied to the time of the application for a permit, the developer would have little incentive to search for alternatives, especially if it were confident that alternatives soon would disappear.[2005]

Because the scope of potential alternatives must include alternatives available at the time PLP entered the market, the Corps must go back to at least 2001, when PLP's parent company Northern Dynasty Minerals acquired the Pebble leases.[2006] In the report, *Determining the least damaging practicable alternative for the proposed Pebble Project: Potentially less damaging practicable alternatives are improperly dismissed in the DEIS*, Thomas Yocom identifies several alternatives that were improperly dismissed.[2007] Those alternatives include those discussed in the following subsections.

[2001] *See* NDM, Website, Pebble Project History and Locations, https://www.northerndynastyminerals.com/pebble-project/history-and-location/ (included as an attachment to these comments).
[2002] *See Bersani v. U.S. EPA*, 850 F.2d 36, 43–47 (2nd Cir. 1988).
[2003] *Id.* at 43.
[2004] *Id.* at 44.
[2005] *Id.* at 43–44.
[2006] *See* NDM, Pebble Project History and Locations.
[2007] *See* Yocom, 2019a at 5–11 (report and its references are included as attachments to these

i. The Whistler Project

The DEIS improperly eliminated this project from further analysis because "Whistler does not contain molybdenum."[2008] As discussed above, in Section VII.A, the Corps has improperly narrowed the basic purposes by including molybdenum as one of the minerals that must be in the deposit. The lack of molybdenum, or a specific mineralization of gold or other associated metals, should not have eliminated other porphyry copper deposits from being considered as potentially less environmentally damaging practicable alternatives under the regulations because molybdenum was not identified as an intended resource prior to the Northern Dynasty Minerals acquisition of the leases.[2009]

ii. The Pyramid Project

The DEIS improperly eliminates this alternative on the grounds that it would be "extremely expensive to conduct additional exploration" to determine if mining the copper and associated minerals in the Pyramid deposit is practicable, citing that the applicant has "spent approximately $700 million to date on exploration."[2010] However, "sunk costs" are not relevant to whether another alternative is practicable to a typical applicant in the mining industry.[2011]

As Yocom notes,

> The question is whether the Pyramid Project would be a practicable alternative if the applicant had pursued it instead of the Pebble deposit, and spent a similar amount of time delineating the ore deposit before applying for a permit. It is inappropriate for the Corps to dismiss alternatives on the basis of either their availability or mineral characterization only after the applicant chooses to apply for a permit, rather than on the basis of when the applicant entered the market.[2012]

Rather, than dismissing alternatives based upon the invalid "sunk costs" factor, the Corps should evaluate whether PLP could have expended similar resources at a different copper porphyry deposit to delineate and develop a viable copper mine.[2013] The Corps has failed to provide this analysis.

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comments)

[2008] *See* DEIS at App. B, B-6.

[2009] Yocom 2019a at 5.

[2010] DEIS App. B at B-6 to B-7.

[2011] *See* Yocom 2019a at 6; *see also id.* at 6 n.16 ("A project proponent assumes a certain risk in moving forward financially for a project that requires, but has not received, 404 authorization. This risk cannot be transferred to the costs of another site, nor can these 'sunk costs' be used to justify a finding that another site is not practicable on the basis of costs." (citing Yocom, T.G., R.L. Leidy, and C. Morris. 1989. *Wetlands protection through impact avoidance: a discussion of the 404(b)(1) Alternatives Analysis*. Wetlands. Volume 9, No. 2. Pages 283-296, at 294).

[2012] Yocom 2019a at 6; *see also* Yocom 2019b at 8–9.

[2013] Yocom 2019a at 6.

iii. Copper deposits outside of Alaska

The Corps dismisses any potential ore deposits outside of Alaska because its stated purpose improperly includes locating the copper mine project in Alaska.[2014] As discussed above, in Section VII.A, the Corps' inclusion of the geographic restriction to the State of Alaska is improper. As a result, any dismissal of a potential alternative on these grounds is also improper.

The Corps also improperly dismisses out-of-state projects because, at market entry, Northern Dynasty Minerals had the opportunity to acquire deposits elsewhere in the world. Northern Dynasty Minerals and its parent corporation, Hunter Dickenson, considered several hundred porphyry copper deposits within "the Americas" before focusing on the Pebble deposit in the 1990's.[2015] The following figure indicates the locations of porphyry copper deposits around the world.[2016]

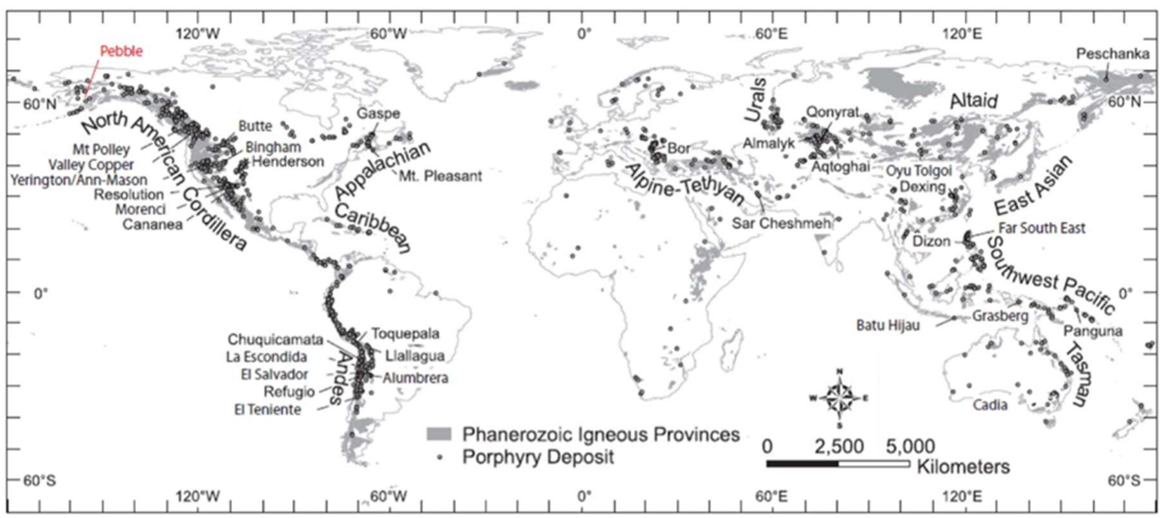

Figure 2. Map showing location of Phanerozoic porphyry deposits with representative deposits labeled. Modified from Seedorff and others (2005) and John and others (2010).

If a copper ore deposit could have been acquired, leased, or managed by Northern Dynasty Minerals, the development of that deposit must be considered pursuant to EPA's market entry approach. This should include deposits that were or have been available since the applicant entered the market in the late 1990's, as well as those that have been practicable since the applicant acquired rights to the Pebble deposit and surrounding claims. Essentially any copper

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2014 *See* DEIS App. B at B–7.

2015 *See* Bill Killam and Bill Craig, Memo, AECOM to Shane McCoy, Corps, Pebble Project EIS — Off-Site Alternatives Review and Screening, Oct. 10, 2018, at 1 (included as an attachment to these comments).

2016 *See* BBWA App. H, U.S. Geological Survey, Geological and Environmental Characteristics of Porphyry Copper Deposits with Emphasis on Potential Future Development in the Bristol Bay Watershed, Alaska, April 2012, at 5 (BBWA and Appendices previously included as an attachment to Trustees for Alaska's scoping comments).

mining operation or copper porphyry deposit that has changed hands or added partners in the past 20 years, where copper is or could be mined practicably should be assessed.[2017] The Corps has failed to undertake this requisite analysis to determine what deposits were available.

In addition, the Corps inappropriately dismisses off-site deposits on the grounds that off-site deposits do not compare in regards to the size of the deposit.[2018] Again, the Corps inappropriately dismisses potential available alternatives on grounds that are not properly tied to a lawful purpose. The applicant's purpose is not to develop a copper, gold and molybdenum mine of a certain size that matches or exceeds the Pebble deposit. Rather, the overall purpose, as stated above, is to mine copper. The Corps cannot establish arbitrary porphyry deposit size limits that just so happen to match the Pebble deposit.

iv. Massive sulfide deposits in Alaska

The Corps improperly rejected this alternative on the grounds that "these deposits do not contain molybdenum."[2019] For the same reasons that the Corps must consider the Whistler project as an alternative, so too must it consider copper deposits in Alaska. The Corps cannot dismiss alternatives on the ground that the deposit does not contain molybdenum when Northern Dynasty Minerals had no knowledge that the Pebble deposit included molybdenum at the time of acquisition.

v. Single tailings storage facility with two cells

The DEIS dismisses this alternative, which was the original design included in PLP's 2017 application, because of the need for maintenance of the pyritic tailing facility and water treatment into perpetuity.[2020] The DEIS errs in finding that this alternative should not be considered.

The DEIS acknowledges that this alternative would impact fewer wetlands. Because this facility design would avoid wetlands impacts, as compared to the proposed project, it must be considered.

The grounds for dismissal of this alternative are not consistent with the reasonably foreseeable future of this project. Because expansion is reasonably foreseeable, the Corps must anticipate and assess storage of pyritic waste in the potentially acid-generating facility for at least 78 years. Further, even without expansion, water must be managed in perpetuity under the

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[2017] Similar to PLP's own search for partners for its Pebble Project, PLP has not been limited from seeking to become a partner on other copper mining projects with less adverse environmental impacts than its own proposal. This includes sites outside of the State of Alaska and outside of the United States. The Corps has failed to evaluate other mining projects which NDM/PLP could have joined as a partner.
[2018] *See* Bill Killam and Bill Craig, Memo, AECOM to Shane McCoy, Corps, Pebble Project EIS — Off-Site Alternatives Review and Screening, Oct. 10, 2018, at 8.
[2019] DEIS App. B at B–8.
[2020] *Id.* at B–10 to B–11.

alternative assessed in the DEIS.[2021] Because the potentially acid-generating facility may operate for 78 years and the mine will have to treat water in perpetuity under any scenario, the reasons for dismissal of the single tailings storage facility with two cells are non-existent.

vi. Mine Size Smaller than Proposed Determination's Benchmarks for Unacceptable Adverse Impacts

The Corps states that an alternative was suggested during scoping that would "restrict the size of the mine to what the [EPA] found appropriate in the 2014 Watershed Assessment."[2022] As the DEIS properly notes, the statement that EPA found any mine size "appropriate" is not accurate.[2023]

As discussed above in Section II.B, the EPA found that even the smallest mine reviewed by the EPA "could have unacceptable adverse effects on fishery areas in the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds, as well as downstream fishery areas."[2024] Further, EPA found that, while "it cannot be certain of the full extent of the implications of these losses, it is apparent that impacts of this magnitude could *compromise the sustainability of fish populations within the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds, as well as downstream fishery areas*."[2025] The EPA found that the impacts would be unacceptable due to the outright loss of nearly 5 miles of habitat; the importance of that habitat to juvenile salmon; the degradation of downstream rearing and spawning habitat; loss of genetic diversity, which is key to the Bristol Bay salmon stocks; and the strong connection between an intact headwaters and the thriving, healthy salmon stocks of Bristol Bay.[2026] The Proposed Determination is also clear that EPA has not found any mine scenario "appropriate." Rather, the Proposed Determination states that "[m]ine alternatives with lower environmental impacts at the Pebble deposits [were] not evaluated" and found that all those scenarios which were evaluated could result in unacceptable adverse impacts.[2027]

But the DEIS improperly dismisses a mine size below EPA's threshold on the grounds that a 0.23 billion ton mine with a throughput of 31,100 metric tons per day "is not economically practicable because it would have a negative [Net Present Value]."[2028] However, the basis for this determination is not provided. As discussed in Section III.C.3, PLP has not prepared a pre-feasibility assessment. Without a feasibility assessment, it is impossible to know where the break-even point is for net present value.

[2021] *See* DEIS at 4.18–17 ("After lake level rise, groundwater gradients toward the pit would be maintained by managing the pit lake level through pumping and treating the lake water in perpetuity.").
[2022] *Id.* at B–12.
[2023] DEIS App. B at B–13.
[2024] PD at 4–13.
[2025] *Id.* (emphasis added).
[2026] *Id.*
[2027] *Id.* at ES–7.
[2028] DEIS App. B at B–13.

The Harvard Business Review identifies three general options to determine the investment value in today's dollars.[2029] Net present value "is the tool of choice for most financial analysts" because it "considers the *time value of money*, translating future cash flows into today's dollars[, and] it provides a concrete number that managers can use to easily compare an initial outlay of cash against the present value of the return."[2030] PLP has not provided any concrete numbers.[2031] As a result, any asserted or project net present value by PLP must be evaluated in concert with a feasibility assessment. Absent a demonstration of why a small mine is not economically practical, the Corps should consider a smaller mine below the EPA threshold as an alternative.

vii. Larger Mine

The DEIS recognizes that the project, as proposed, is likely to be expanded substantially in the future, but concludes that doing a thorough analysis of this expansion "exceeds the scope of the proposed project."[2032] The statement that a larger mine exceeds the scope of this project is not supported by PLP's or Northern Dynasty Mineral's statements to the investment community. As detailed above in Section II.D.1, both PLP and Northern Dynasty Mineral representatives refer to a mine that could exist for generations. As a result, evaluating a mine that represents the scope and scale presented to investors is entirely appropriate.

There are two important reasons why the DEIS must analyze the 78-year mine as an actual alternative. First, because there is nothing to support the fact that a 20-year mine is practical, the DEIS should analyze the actual mine that PLP and Northern Dynasty Minerals continue to tout to the mining and investment communities.

The second reason the larger mine must be addressed is that the impacts proliferate if the 20-year mine is allowed to proceed first. As the DEIS notes, expansion would result in a second transportation corridor with a slurry concentrate pipeline on the north side of the lake (as evaluated in Alternatives 2 and 3) and new port at Iniskin Bay.[2033] The fact that expansion could double the impacts is not assessed. This is particularly egregious when compared to what the project would look like if it counted on the need for the slurry pipeline, and thus northern corridor, from the beginning. If the DEIS evaluated this scenario, the proposed 78-year mine expansion scenario would not include two transportation routes, as is the case currently, and would have less long-term associated impacts.

viii. On-site reconfiguration options

The DEIS lacks an adequate analysis of how project features could be resized, relocated, or reconfigured to reduce impacts to wetland and aquatic areas. PLP has made numerous changes to its proposed project footprints over the past several years, as well as since submitting its permit application in December 2017. Yet, the DEIS assumes that there are no other potential

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[2029] *See* Amy Gallo, *A Refresher on Net Present Value*, Harvard Business Review, Nov. 19, 2014 https://hbr.org/2014/11/a-refresher-on-net-present-value (included as an attachment to these comments).
[2030] *Id.* (emphasis in original).
[2031] *See* Borden, 2019f at 2–3.
[2032] DEIS App. B at B–14.
[2033] DEIS at 4.1–23 to 4.1–24.

configurations of any of the facilities — from the port facilities to the mine site — that could result in fewer impacts to wetlands. This failure to adequately assess configuration options demonstrates the Corps' and PLP's abject failure to take all practicable steps to avoid impacts. PLP must clearly demonstrate that it cannot reduce its impacts in any further way. Without an alternatives analysis of configuration options, there is no way for the Corps to know whether PLP has proposed the least environmentally damaging practicable alternative.

To adequately assess configuration options, the DEIS must include expanded maps of wetland and aquatic areas that reflect the far more extensive delineations completed by PLP beginning in 2004. The mapping included in the Corps' PJD uses a "study boundary" that is far smaller than the areas that were mapped by PLP in its Environmental Baseline Documents (see figure below from a presentation made by one of PLP's consultants in 2007).[2034] Those wetland and aquatic site maps should be included in the DEIS to assess whether nearby areas that are outside of the PJD study area may include sites for project components that may be practicable alternatives that are less environmentally damaging.

C. The Project Will Cause or Contribute to Significant Degradation of Aquatic Resources.

The DEIS fails to provide an adequate analysis to support a decision that the project will not cause or contribute to significant degradation of the aquatic environment. While the DEIS lacks a sufficient analysis to meet the hard look standard and fails to adequately address a number of impacts, everything that is known and assessed supports the finding that the project will cause or contribute to significant degradation of the aquatic environment. As the Watershed Assessment notes, the wetlands and waters that would be lost provide valuable habitat for salmon.[2035]

Based on numbers alone, the extent of wetlands and stream loss — as identified in the permit application and DEIS — is enormous. Pebble's 20-year mine would destroy 3,560 acres of wetland and other waters, temporarily impact another 510 acres of wetlands and waters, and indirectly impact 1,896 acres of wetlands and waters from fugitive dust, 449 acres from dewatering, and another 462 acres from fragmentation.[2036] The 20-year mine would destroy 81 miles of streams.[2037]

The cumulative impacts from the 78-year mine expansion are staggering. The DEIS estimates that the 78-year mine expansions would impact an additional 12,445 acres.[2038] The DEIS does not provide an estimate for streams lost, directly or indirectly, through the 78-year mine expansion. As Dr. Gracz notes, the

> degradation of aquatic resources in the Groundhog Mountain HUC would be

[2034] *See* Yocom, 2019b at 10.
[2035] BBWA at 7–32.
[2036] DEIS at 4.22–33, Table 4.22–10.
[2037] DEIS at ES–61, 4.22–4. The DEIS does not break that number down by salmon bearing stream versus tributary, as was done in the BBWA and Proposed Determination.
[2038] *Id.* at 4.22–40. Due to the lacking data and analysis, the DEIS projects the number of wetlands impacted based on a calculation that "42 percent of the new affected area (29,632 acres) is wetlands." *Id.*; *see also* DEIS at 4.22–40, n.1.

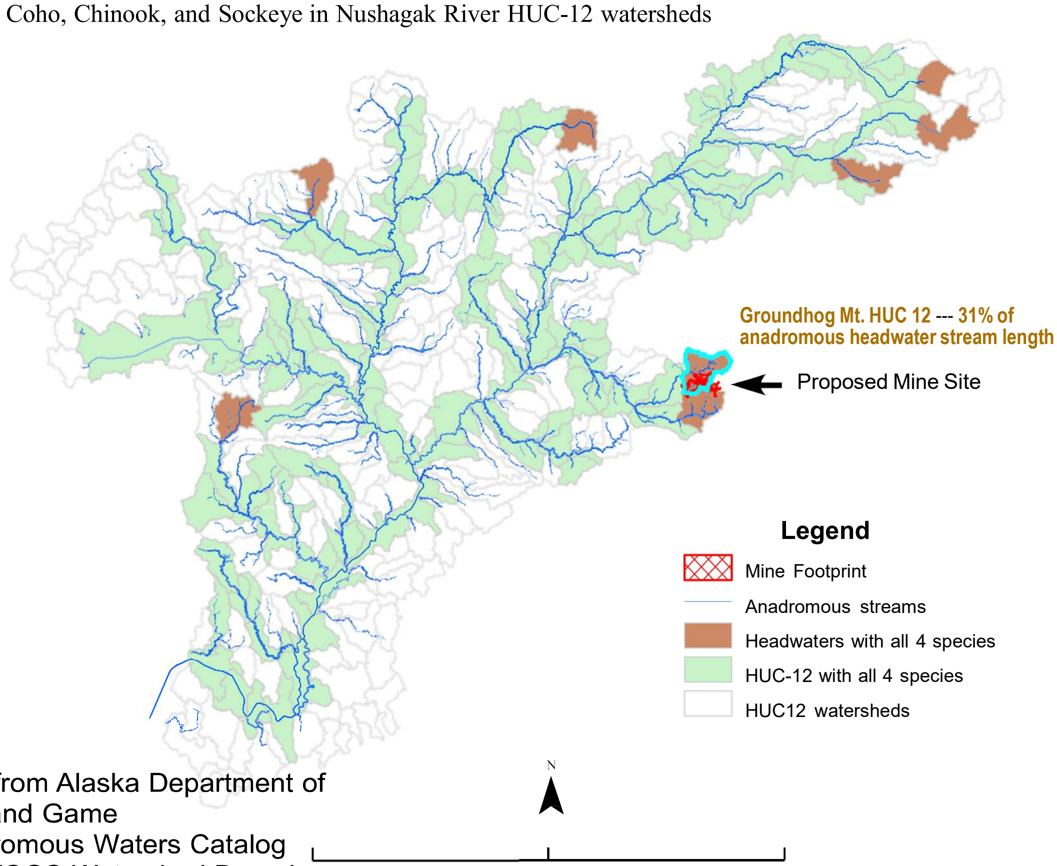
> regionally and globally significant. Groundhog Mountain is one of only eight 12-digit headwater HUCs that support four or more species of Pacific salmon in the Nushagak River Basin, one of the most productive basins for sockeye salmon in the world.[2039]

Dr. Gracz goes on to emphasize the importance of the headwaters, noting

> [t]hese four species of Pacific salmon are supported in only seven other 12-digit headwater HUCs of the 8 million-acre Nushagak River basin; and one of those others will also be impacted by the proposed mine (Fig. 2). Moreover, the Groundhog Mountain HUC contains a disproportionately large amount of those headwater streams supporting four species of Pacific salmon. Groundhog Mountain HUC contains nearly one-third (31%) of the length of headwater streams mapped by the Anadromous Waters Catalogue in the Nushagak Basin that support four species of Pacific salmon.[2040]

Figure 2 from Dr. Gracz's report illustrates the value of these headwaters:

Chum, Coho, Chinook, and Sockeye in Nushagak River HUC-12 watersheds



Data from Alaska Department of Fish and Game Anadromous Waters Catalog and USGS Watershed Boundary Dataset

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[2039] Gracz, 2019 at 5–6.
[2040] *Id.* at 6.

Figure 2 from Gracz, 2019. The Groundhog Mountain HUC-12 watershed (light blue outline), other HUC-12 headwater watersheds of the Nushagak River Basin that support four species of Pacific salmon (brown), other HUC-12 watersheds that support four species (green), HUC-12 watersheds (grey outline), and anadromous streams mapped by ADF&G (blue lines).

1. The DEIS underestimates impacts to wetlands and streams.

While these numbers are significant and exceed what EPA has already found to be unacceptable, they also underestimate the likely direct, indirect, and cumulative impacts. As discussed in Section VI.Y, the DEIS underestimates impacts because the DEIS relies on non-site-specific data. For example, the wetlands impacts are based off the NWI, rather than the PJD mapping prepared by PLP, and the salmon bearing streams are limited to those included in the Anadromous Waters Catalog, which is known to have left out salmon-bearing streams. Due to such lacking analysis, a more detailed assessment was prepared by The Nature Conservancy.[2041]

The detailed analysis found much more extensive impacts:

> Following criteria outlined by EPA, we considered direct and indirect effects that result in the loss of salmon streams, tributaries and wetlands from the discharge of dredged or fill material, inundation within a tailings impoundment, dewatering, or the fragmentation of previously contiguous streams or wetlands. Using data submitted by PLP to [Corps] on the size and proposed placement of the open pit, tailings storage, and associated facilities, the proposed mine (20-year mine scenario) would result in the loss of 7.5 miles of salmon streams, up to 56.4 miles of tributaries, and up to 4,350 acres of wetlands contiguous with salmon streams or tributaries. These values exceed the EPA thresholds for unacceptable adverse effects by more than half for the loss of documented salmon streams, up to fourfold for loss of tributaries and up to threefold for loss of wetlands.
> We estimated that the 78-year mine scenario would result in the loss of 34 miles of salmon streams, 218.8 – 407.2 miles of tributaries, and 7,208 – 14,994 acres of wetlands. These values also exceed EPA criteria by substantial margins.[2042]

Regarding the streams impacted, the Albert 2019 report found that the anadromous waters catalog contained 13.4 miles of documented salmon streams within the PJD wetland study area, while "a coarse-scale model of salmon habitat identified 62.7 miles of streams with characteristics potentially suitable for anadromous fish."[2043] For tributaries, the Albert 2019 report found that "[t]he [environmental baseline documents] hydrography dataset contains 103.2 miles of stream within the PJD Mine Site Study Area (Fig. 2, panel b.1). In this same area, the PJD wetlands database contains an estimated 180 miles of riverine channel wetlands."[2044] For wetlands, the Albert 2019 report found that

> [w]ithin the PJD study area, the NWI database contains 3,664 acres of wetlands, 95% of which (3,486 ac.) were contiguous with salmon streams or tributaries

[2041] *See* Albert, 2019.
[2042] *Id.* at 1.
[2043] *Id.* at 7, Fig. 2a.
[2044] *Id.* at 11.

> (Fig. 2, panel c1). In this same area, the PJD wetlands study documented 7,571 acres of wetlands and wetland mosaic, 96% of which (7,251 ac.) were contiguous with salmon streams or tributaries (Fig. 2, panel c2). According to the NWI data, the loss of wetlands that are contiguous with salmon streams or tributaries in the 20-year mine scenario is estimated at 1,866 acres. Using the PJD data set, the loss of wetlands is estimated at 4,351 acres (Table 1).[2045]

The significant disparity between general vs. site-specific datasets is a strong indication that the DEIS is underestimating actual direct, indirect, and cumulative impacts.

2. The Watershed Assessment and Proposed Determination support a finding that the project will cause or contribute to significant degradation.

As discussed above in Section I.B, the Watershed Assessment and Proposed Determination, after substantial scientific review, including peer review, identified significant impacts associated with a mine even at a much smaller scale than proposed by PLP.

The Watershed Assessment found that

> Stream and wetland habitats would be lost within and upstream of the footprint (Figures 7-10 through 7-12), and downstream habitat would be degraded by the loss of the headwater streams and wetlands. Streams under or upstream of each mine footprint would be inaccessible by fish from downstream reaches because of the following factors.
>
> - Elimination of streams and wetlands within the mine footprints, either due to removal (e.g., excavation of streams or wetlands in the mine pit area) or burial under a tailings storage facility or waste rock pile.
> - Dewatering by capture into a groundwater drawdown zone associated with the pit. This effect is distinct from the effect of water removal and capture on streamflows downstream of the mine footprint, which is covered in Section 7.3.
> - Blockage due to either of the above or channel diversion in a manner that prevents fish passage (e.g., via pipes or conveyances too steep for fish passage).[2046]

The Watershed Assessment review of the 0.25 mining scenario found that "38 km of streams would be eliminated, blocked, or dewatered by the mine footprint."[2047] "In addition to these direct losses, loss of these headwater habitats would have indirect impacts on fishes and their habitats in downstream mainstem reaches of each watershed."[2048]

PLP's 404 application does not identify how many miles of streams would be eliminated, blocked, or dewatered. As noted above, a GIS analysis of the application indicates that the project

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2045 *Id.*
2046 BBWA at 7–19.
2047 *Id.* at 7–24.
2048 *Id.* at 7–27.

would result in the loss of 7.3 miles of salmon stream and 23.5 miles of tributaries to salmon.[2049] The Watershed Assessment found that "[t]he net effects of headwater stream and wetland losses would reduce the capacity and productivity of stream habitats. Together, these reductions would result in adverse impacts on fish populations."[2050]

Based on the Watershed Assessment, EPA determined that "mining of the Pebble deposit at any of [the three mining scenarios identified] even the smallest, could result in significant and unacceptable adverse effects on ecologically important streams, wetlands, lakes, and ponds and the fishery areas they support."[2051] EPA stated that the elimination or de-watering of at least 4.7 miles would be unprecedented under the 404 permitting program.[2052] EPA identified concern over the temporal and spatial extent of stream habitat loss and concluded that "the discharge of dredged or fill material associated with the Pebble 0.25 stage mine could have unacceptable adverse effects on fishery areas in the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds, as well as downstream fishery areas."[2053] Further, EPA found that while "it cannot be certain of the full extent of the implications of these losses, it is apparent that impacts of this magnitude could *compromise the sustainability of fish populations within the [South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek] watersheds, as well as downstream fishery areas*."[2054] The EIS must either confirm EPA's findings or demonstrate how these losses would not cause or contribute to significant degradation of the aquatic environment.

The Watershed Assessment was unable to calculate the effects of lost wetland connectivity. Specifically, the Watershed Assessment stated that

> [o]f the total wetland area eliminated, blocked, or dewatered by each footprint, the proportion used by anadromous salmonids or resident fish species is unknown. Fish access to and use of wetlands are likely to be extremely variable in the deposit area, due to differences in the duration and timing of surface water connectivity with stream habitats, distance from the main channel, and physical and chemical conditions (e.g., dissolved oxygen concentrations) (King et al. 2012). Wetlands can provide refuge habitats (Brown and Hartman 1988) and important rearing habitats for juvenile salmonids by providing hydraulically and thermally diverse conditions. Wetlands can also provide enhanced foraging opportunities (Sommer et al. 2001). Given our insufficient knowledge of how fish use wetlands in the deposit area, it is not possible to calculate the effects of lost wetland connectivity and abundance on stream fish populations.[2055]

The EIS must identify the unknowns and calculate the direct and indirect effects of loss of streams and wetlands on the environment. If the EIS is unable to answer these questions, the

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[2049] *See* Albert Scoping Comments, 2018 at 3, 5.
[2050] BBWA at 7–33.
[2051] PD at ES–5.
[2052] *Id.* at 4–6.
[2053] *Id.* at 4–13.
[2054] *Id.* (emphasis added).
[2055] BBWA at 7–28.

Corps cannot make a finding that the project will not cause or contribute to significant degradation of the aquatic environment.

The Watershed Assessment also found that "[s]treamflow alteration greater than 20% would cause moderate to major changes in ecosystem structure and function. Increasing alteration beyond 20% would cause significant losses of ecosystem structure and function."[2056] Significant loss of ecosystem structure and function is significant degradation of the aquatic environment.

The EIS must identify the degree to which streamflow is altered. If there are changes greater than 20%, the EIS must either confirm EPA's findings or demonstrate how such streamflow alteration will not cause or contribute to significant degradation.

3. A project of this scale will cause or contribute to significant degradation.

Whether focused solely on the first twenty years, or by including the more likely impacts associated with a more fiscally viable 78-year mine, the impacts of the proposed mine are astounding. Relying on PLP's and the Corps' own data,

> the proposed mine would result in the loss of 7.5 miles of salmon streams, approximately 56.4 miles of tributaries, and approximately 4,350 acres of wetlands contiguous with salmon streams or tributaries. Fragmentation of surface waters behind embankments would affect an additional 4,880 acres. Other indirect (secondary) effects (outside zone of fragmentation) cover 762 acres, and dewatering covers 264 acres (PLP 2018-RFI 082). Combined, the zone of direct and indirect (secondary) adverse effects in the 20-year mine scenario covers an estimated 13,997 acres.[2057]

Under the much more likely 78-year mine life, the project would result in the loss of:

> 34 miles of salmon streams, approximately 407.2 miles of tributaries, and approximately 14,893 acres of wetlands. The zone of fragmentation of surface waters above embankments and major mine features is approximately 44,267 acres, and other indirect (secondary) effects beyond the zone of fragmentation include an additional 621 acres, for an estimated total footprint of direct and indirect (secondary) adverse effects of 44,888 acres.[2058]

Under the 20-year mine scenario, construction of the transportation corridor would result in the permanent loss of 75 acres of wetlands and 11 acres of other waters, and 7.9 miles of streams.[2059] Temporary impacts would occur to 60 acres of wetlands and other waters.[2060] The 78-

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2056 *Id.* at 7–53.
2057 Schweisberg, Matthew, June 11, 2019, *Compliance with Section 230.10(c) of the 404(b)(1) Guidelines,* Report prepared for Trustees for Alaska (Schweisberg, 2019b) at 1 (report and references included as an attachment to these comments).
2058 *Id.* at 1.
2059 DEIS at 4.22–33, Table 4.22–10.
2060 *Id.*

year mine expansion would also require the construction of the Alternative 3 northern corridor concentrate pipeline variant, including a second port at Diamond Point with all the associated port facilities and a concentrate pipeline from the new port to the mine along with an adjacent service road.[2061] The Alternative 3 transportation corridor would include the additional loss of 108 acres of wetlands, another 6 miles of streams and temporary loss of 68 acres of wetlands.[2062] Fugitive dust would impact an additional 1,051 acres adjacent to the new transportation corridor.[2063]

Schweisberg, who has more than 30 years experience with the EPA working on CWA permitting and regulatory issues, notes "[i]n the history of the CWA Section 404 Program, whether the 20- or 78-year mine scenario, this proposed mine project would be among the most, if not *the* most, destructive to the aquatic ecosystem were it to receive a Department of the Army permit."[2064] Schweisberg goes on to state that

> [i]n looking to the relevant portions of the Guidelines, 40 C.F.R. 230.11 – 230.77, to evaluate the significance of the discharges to the aquatic ecosystem, including wetlands and other waters, it is abundantly clear that the discharges from the proposed Pebble Mine project would not comply with Section 230.10(c) because those discharges would cause or contribute to significant degradation of waters of the United States.[2065]

Section 230.10(c) requires the Corps to consider, individually or collectively:

> (1) Significantly adverse effects of the discharge of pollutants on human health or welfare, including but not limited to effects on municipal water supplies, plankton, fish, shellfish, wildlife, and special aquatic sites.
> (2) Significantly adverse effects of the discharge of pollutants on life stages of aquatic life and other wildlife dependent on aquatic ecosystems, including the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and chemical processes;
> (3) Significantly adverse effects of the discharge of pollutants on aquatic ecosystem diversity, productivity, and stability. Such effects may include, but are not limited to, loss of fish and wildlife habitat or loss of the capacity of a wetland to assimilate nutrients, purify water, or reduce wave energy; or
> (4) Significantly adverse effects of discharge of pollutants on recreational, aesthetic, and economic values.[2066]

The Section 404(b)(1) Guidelines require the Corps to make certain factual determinations addressing the potential short-term or long-term effects of a proposed discharge of dredged or fill material on the physical, chemical, and biological components of the aquatic environment.[2067]

[2061] *Id.* at 4.1–23 to 4.1–24, Table 4.1–2.
[2062] *Id.* at 4.22–33, Table 4.22–10.
[2063] *Id.* at 4.22–34, Table 4.22–10.
[2064] Schweisberg, 2019b at 1.
[2065] *Id.* at 2.
[2066] 40 C.F.R. § 230.10(c).
[2067] 40 C.F.R. § 230.11.

This includes: (a) physical substrate determinations; (b) water circulation, fluctuation, and salinity determinations; (c) suspended particulate/turbidity determinations; (d) contaminant determinations; (e) aquatic ecosystem and organism determinations; (f) proposed disposal site determinations; (g) determinations of cumulative effects on the aquatic ecosystem; and (h) determinations of secondary effects on the aquatic ecosystem.[2068]

i. Physical substrate determination[2069]

Based on the severe loss of wetlands and streams, Schweisberg concluded that

> [u]nder either the 20-year or 78-year scenario, construction of the mine would involve massive excavation and filling and would permanently destroy the substrate in the affected rivers and streams and wetlands. The filled rivers and streams and wetlands would lose all ecological functions, and the duration would essentially be permanent. No actual measures that could be implemented to minimize or reduce those adverse impacts to the aquatic ecosystem are proposed by the applicant.[2070]

ii. Water circulation and fluctuation[2071]

As discussed in detail in Section VI.C, PLP's water balance assessment contains major deficiencies. Namely, PLP has a water balance that does not balance inputs with outputs.[2072] Schweisberg notes that "[b]ased on these inconsistencies, there is insufficient information in the DEIS and permit application to fully understand, consider and assess the downstream impacts of the project."[2073] Without adequate modeling of the water balance, the DEIS is unable to assess the impacts of flow reductions, which in turn precludes the ability to determine downstream impacts.[2074] Schweisberg concludes that

> [a]lthough the DEIS asserts that water discharges from the mining operations would be controlled and that virtually few downstream effects would occur, such a claim strains credulity. It is far more likely that mine construction and operation activities would greatly increase suspended particulates (fine to medium textured soils) and turbidity in downstream reaches of streams and rivers, and this increase would continue during mining operations (particularly if there were a dam failure), which would further adversely affect aquatic life by sedimentation of spawning, breeding and feeding habitat, smothering of benthic macroinvertebrates, and clogging of fish gills.
>
> During construction and operation of the mine, especially where dams would be

2068 40 C.F.R. § 230.11(a)–(h).
2069 40 C.F.R. § 230.11(a).
2070 Schweisberg, 2019b at 3.
2071 40 C.F.R. § 230.11(b).
2072 Schweisberg, 2019b at 4, *citing* Wobus, 2019.
2073 *Id.*
2074 *Id.*

> constructed and streams blocked or interrupted, current patterns and circulation would be drastically altered, permanently in many cases. Such changes would adversely affect the ability of fish, especially salmon, and other aquatic organisms to reach feeding habitat, spawning, and nursery/juvenile habitat. These effects would likely result in the death of many of these individuals.[2075]

iii. Turbidity[2076]

As discussed above in Section VI.M, the DEIS fails to evaluate a full tailings storage facility failure. Relying on the Lynker 2019 modeling, Schweisberg concludes that a "[tailings storage facility] dam failure would severely degrade the affected habitat, smothering macroinvertebrates, spawning and feeding areas, resulting in substantial adverse effects upon the fish and wildlife species that depend upon the affected habitat."[2077]

iv. Contaminants[2078]

As discussed above in Sections VI.M, VI.N, VI.P, VI.U, VI.Z, the DEIS fails to adequately assess the fate and transport of contaminants or assess the bioaccumulation, biomagnification, and biotransport of contaminants. Schweisberg notes that

> [t]hese processes operate to cause persistent pollutants released over long periods of time, resulting in potentially large biological and toxicological effects. Moreover, biotransport of bioaccumulated toxins will predictably cause any such effects to extend over large areas of the region, far beyond the localized source of the pollutants. Such impacts may be far more extreme in their ecological effect in relatively pristine ecosystems that have been little exposed to these classes of pollutants in their ecological and evolutionary history, compared to the same level of exposure in ecosystems with previous and industrial influence, where biota have already been shaped by exposure to such toxins and by the ecological consequences of longstanding bioaccumulation and biomagnification of more persistent pollutants.

Concerns about the fate, transport, and biological ramifications of introducing heavy metals, hydrocarbons, polycyclic aromatic hydrocarbons, and persistent pollutants are "virtually ignored in key portions of the DEIS and the application concerning impacts on fish and wildlife, and cumulative effects of the project."[2079] In addition, Zamzow indicates that selenium concentrations are likely to exceed state water quality criteria.[2080] But the DEIS does not fully evaluate the risk associated with uncaptured releases from mine water ponds and mine waste facilities.

[2075] *Id.* at 5.
[2076] 40 C.F.R. § 230.11(c).
[2077] Schweisberg, 2019b at 6.
[2078] 40 C.F.R. § 230.11(d).
[2079] Schweisberg, 2019b at 6, *citing* Frissell, 2019.
[2080] *Id.* at 7, *citing* Zamzow, 2019a.

v. Aquatic ecosystem[2081]

The direct and indirect impacts to the aquatic ecosystem are severe and far reaching. The impact from this project, both the direct and indirect loss of wetlands, as well as indirect downstream impacts will lead to a collapse of the aquatic community from the lowest to highest trophic level. The project will adversely impact benthic organisms, zooplankton, macroinvertebrates, fish, and mammals that all depend upon the lower trophic level for their food source.[2082]

4. Significant adverse effects are unavoidable.

After reviewing the DEIS, underlying baseline documentation, and numerous reports cited throughout these comments, Schweisberg concludes that "it is abundantly clear that the proposed discharges for the mine and associated facilities, and for the transportation corridor do not comply with Section 230.10(c)(1–4) of the 404(b)(1) Guidelines."[2083] The loss of wetlands and streams under either the 20-year or 78-year scenario "would cause catastrophic harm to a world-class salmon fishery and to the ecological value of the Bristol Bay ecosystem."[2084] When one adds the additional indirect impacts from fragmentation, the harm is "colossal."[2085]

Schweisberg concludes that the project will have significant adverse effects under 40 C.F.R. § 230.10(c)(1)–(4). The project will have significant adverse effects on:

- human health and welfare from damage to fisheries from the direct loss of a substantial amount of valuable habitat (tens of miles of streams and thousands and thousands of acres of wetlands);[2086]
- aquatic life and other wildlife dependent on aquatic life from loss and degradation of breeding, rearing/nursery, feeding, and refuge habitat, as well as degradation of a pristine environment from exposure to contaminants;[2087]
- aquatic ecosystem diversity, productivity and stability from the loss, degradation, and fragmentation of breeding, rearing/nursery, feeding, and refuge habitat for salmon and other fishery resources, and for wetland dependent wildlife (mammals and birds) from construction and operation of the mine and related facilities, and of the transportation corridor;[2088] and

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[2081] 40 C.F.R. § 230.11(e).
[2082] Schweisberg, 2019b at 8–11.
[2083] *Id.* at 11.
[2084] *Id.*
[2085] *Id.*
[2086] *Id.*
[2087] *Id.* at 12.
[2088] *Id.*

- economic values from all of the impacts detailed above to salmon populations and habitat, likely causing substantial long-term harm to a salmon fishery vital to the economic vitality of the local communities.[2089]

Consequently, "the proposed Pebble Mine project fails to comply with Section 230.10(c) of the 404(b)(1) Guidelines because it would cause or contribute to significant degradation of waters of the United States."[2090]

D. PLP Has Not Demonstrated that the Project Will Not Cause or Contribute to Water Quality Standard Violations.

To permit the proposed Pebble Mine, the Corps must find that it complies with Section 404 of the CWA. Integral to that determination is a consideration in the DEIS of both the projected impacts to water quality if the project operates as expected, as well as consideration of the potential for even greater harm to the environment should any of the assumptions on which the projections are based prove to be unfounded. The DEIS fails in both regards. It fails to acknowledge that discharges from the mine are likely to exceed water quality standards even under the projected scenario. It also fails to acknowledge all of the factors that are likely to produce discharges with higher pollutant concentrations than projected — through failure of the proposed containment systems to capture all seepage, through failure of the proposed treatment systems to reduce pollutant concentrations, or from a catastrophic release — and fails to assess or describe the devastating impacts to downstream ecosystems that would result.

The basic precept of Section 404 of the CWA is that dredged or fill material should not be discharged into the aquatic ecosystem, unless it can be demonstrated that such a discharge will not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the ecosystem of concern.[2091] CWA regulations unequivocally place the burden of proof on the party seeking to discharge the material.

Generally, no discharge of dredged or fill material shall be permitted 1) if there is a practicable alternative to the proposed discharge, 2) if the discharge causes or contributes to violations of applicable state water quality standards, 3) if the discharge will cause or contribute to significant degradation of the environment, or 4) unless all appropriate steps have been taken to minimize potential adverse impacts.[2092] The 404(b)(1) Guidelines provide that significant adverse effects on human health or welfare; aquatic life and other water dependent wildlife; aquatic ecosystem diversity, productivity, and stability; or recreational, aesthetic, and economic values are effects contributing to significant degradation.[2093] These factors both individually and cumulatively must be considered when evaluating the specific details of the mine application. The Corps cannot authorize a discharge without "sufficient information to make a reasonable

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[2089] *Id.*
[2090] *Id.*
[2091] 40 C.F.R. § 230.10(c).
[2092] *Id.* § 230.10.
[2093] *Id.* § 230.10(c)(1)–(4).

judgment as to whether the proposed discharge will comply with [the Section 404(b)(1)] Guidelines."[2094]

The DEIS violates the CWA by failing to disclose the risk of failure of the proposed water treatment system, and by failing to describe or assess the devastating environmental impacts that would result from such a failure. Consideration of the risk of failure and resulting impacts can only lead to the conclusion that the Pebble Mine will cause unacceptable adverse impacts to downstream aquatic ecosystems and cannot be permitted.

The potential for unacceptable adverse impacts from the Pebble Mine is particularly great. Once construction begins, the mine will begin generating contaminated contact water that will then continue to be produced as precipitation, surface water, and groundwater come into contact with materials disturbed by mining. Even after mining stops, the Pebble Mine will continue to produce polluted discharges. The pollutants produced by the mine will include toxic materials with the potential for profound ecological impacts, such as selenium and mercury.

The volume of contaminated contact water that will be produced far exceeds the capacity of the mine to store on site. As a result, the mine will have to continuously discharge contact water. Because the concentrations of pollutants in the mine pits and other impoundments will significantly exceed water quality standards — including levels of mercury more than 140 times the water quality standard — this contact water will need to be treated before it can be released into surface waters. If treatment fails or if contaminants bypass the treatment system, the mine will have no way to stop the ongoing production of contaminated water. There is no valve that can be turned off to stop the flow while a solution is identified. Every discharge that exceeds water quality standards has the potential to cause significant harm to downstream ecosystems. These exceedances could continue for decades or centuries, with accumulating and compounding downstream impacts, if it turns out that the mine cannot adequately contain or treat the contaminated water it produces.

These unassailable facts are baked in to the very nature of the proposed Pebble Mine. This should have led the Corps to produce a DEIS that includes a rigorous assessment of the level of pollutant concentrations that the mine will produce, the capacity of the mine to successfully contain contaminated water, the availability and field-tested reliability of treatment technologies, the adequacy of contingency plans to be employed in the event contaminated water is not fully contained or treated, and the environmental effects that would be suffered by downstream species and ecosystems should there be a failure of the containment and treatment system ranging from minor to catastrophic.

The only rational conclusion that can be reached after an evaluation of the available information and consideration of the considerable data gaps and unsupportable conclusions in the DEIS is that the Pebble Mine will produce contaminated water that will violate water quality standards and cause unacceptable adverse impacts to downstream ecosystems. For these reasons, the 404 permit for the mine should be denied.

[2094] *Id.* § 230.12(a)(3)(iv); *see* 33 C.F.R. §§ 320.2(f) and 320.4(a)(1).

1. The project will produce elevated concentrations of harmful pollutants.

The DEIS fails to provide complete consideration for the impacts of the mine on water quality in the receiving streams and associated wetlands. And, as discussed in greater detail below, the DEIS relies on unsupported assumptions and assertions to predict pollutant concentrations in the mine pits and impoundments and in the mine's treated discharges. But even this limited assessment of water quality impacts clearly establishes that the mine will have significant adverse effects on aquatic life and other water dependent wildlife. The DEIS, including in particular Appendix K4.18, already demonstrates levels of contaminants in the pits during both operations and closure far in excess of water quality standards. The DEIS also acknowledges that, during operations and closure, the mine will discharge water with pollutants — particularly selenium — in concentrations that exceed the levels recommended by the EPA for protection of aquatic life and that come very close to violating Alaska water quality standards. The DEIS entirely fails to consider whether or how the mine could bring its discharges into compliance with EPA's recommended criterion or with an updated Alaska water quality standard for selenium based on that criterion.

i. The Pebble Mine will discharge selenium, a highly bioaccumulative toxin.

Among the water pollutants that the Pebble Mine will generate at elevated concentrations is selenium.[2095] EPA has identified selenium as a highly bioaccumulative toxin that can cause lethal deformities in fish and other aquatic organisms. In July 2016, EPA issued its final "Recommended Aquatic Life Ambient Water Quality Criterion for Selenium in Freshwater."[2096] EPA's Recommended Criterion describes the harm caused by elevated concentrations of selenium and the pathways through which fish and other aquatic organisms may be exposed to the pollutant:

> Bioaccumulation and transfer through aquatic food webs are the major biogeochemical pathways of selenium in aquatic ecosystems. Dissolved selenium oxyanions (selenate, selenite) and organic selenides are assimilated into the tissues of aquatic primary producers (trophic level 1 organisms), such as periphyton, phytoplankton, and vascular macrophytes; and subsequently biotransformed into organoselenium. These organisms, together with other particle-bound selenium sources, constitute the particulate selenium fraction in the water column. Selenium from this particulate fraction is then transferred to aquatic primary consumers such as zooplankton, insect larvae, larval fish, and bivalves (trophic level 2), and then to predators such as fish and birds (trophic level 3 and above).[2097]
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> [E]xcessive amounts of selenium can also have toxic effects, with selenium being

[2095] DEIS at 4.18–14.
[2096] 81 Fed. Reg. 45,285 (July 13, 2016).
[2097] Environmental Protection Agency, Report, *Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016*, Jul. 13, 2016, 10–11 (included as an attachment with these comments).

> one of the most toxic of the biologically essential elements (Chapman et al. 2010). Egg-laying vertebrates have a lower tolerance than do mammals, and the transition from levels of selenium that are biologically essential to those that are toxic occurs across a relatively narrow range of exposure concentrations (Luckey and Venugopal 1977; U.S. EPA 1987, 1998; Haygarth 1994; Chapman et al. 2009, 2010). Selenium consumed in the diet of adult female fish is deposited in the eggs, when selenium replaces sulfur in vitellogenin, which is transported to the ovary and incorporated into the developing ovarian follicle (Janz et al. 2010), the primary yolk precursor.[2098]
>
> A variety of lethal and sublethal deformities can occur in the developing fish exposed to selenium, affecting both hard and soft tissues (Lemly 1993b). Developmental malformations are among the most conspicuous and diagnostic symptoms of chronic selenium poisoning in fish. Terata are permanent biomarkers of toxicity, and have been used to identify impacts of selenium on fish populations (Maier and Knight1994; Lemly 1997b). Deformities in fish that affect feeding or respiration can be lethal shortly after hatching. Terata that are not directly lethal, but distort the spine and fins, can reduce swimming ability, and overall fitness.[2099]

EPA's findings include the observation that the line between concentrations of selenium in the aquatic environment that are beneficial, and concentrations that are toxic, can be exceedingly slim:

> Selenium has a narrow range encompassing what is beneficial for biota and what is detrimental. . . . Aquatic and terrestrial organisms require low levels of selenium in their diet to sustain metabolic processes, whereas excess concentrations of selenium that are only an order of magnitude greater than the required level have been shown to be toxic to fish, apparently due to generation of reactive oxidized species, resulting in oxidative stress (Palace et.al. 2004).[2100]

Accordingly, the addition of even relatively low amounts of selenium to the aquatic environment can tip the balance and lead to harmful toxic effects.

EPA also specifically identified metals mining and processing as a significant source of selenium pollution:

> Mining activities bring selenium-enriched deposits to the surface, where they are exposed to physical weathering processes. . . . Where selenium-containing minerals, rocks, and coal are mined, selenium can be mobilized when rock overburden and waste materials are crushed, increasing the surface area and exposure of material to weathering processes. Selenium contamination of surface waters can also occur when sulfide deposits of iron, uranium, copper, lead,

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[2098] *Id.* at 12.
[2099] *Id.* at 14.
[2100] *Id.* at 14–15.

> mercury, silver, and zinc are released during the mining and smelting of these metal ores.[2101]

Other experts have similarly identified the ecological harm caused by elevated selenium concentrations. As Dr. Zamzow notes:

> Ecotoxicity from selenium discharges has been reported for several decades. Its effects were observed in the Kesterson Reservoir, San Joaquin Valley, California in the early 1980's as dramatic losses in migratory bird populations (Skorupa and Ohlendorf 1991). Selenium ecotoxicity was also documented in the early 1980's at Belews Lake, North Carolina, where 16 of 20 (80% of) endemic resident fish species were extirpated from a coal ash settling pond (Lemly 1985, Lemly 1987, Cumbie and Van Horn 1998), and other reservoirs receiving effluents from coal power plants (Lemly 2014). In these cases, selenium leached from coal ash was discharged into reservoirs and lakes, where it impacted fish populations. More recently, selenium was found in discharges from coal, gold, phosphate and uranium mines and impacts from some of these operations have been observed (Sobolewski 2010).[2102]

Despite this well-documented evidence of the harm that elevated selenium concentrations can cause to downstream aquatic environments and the species who rely on them — and despite the clear evidence that the Pebble Mine will produce elevated concentrations of selenium — the DEIS fails to adequately assess the project-specific effects of its selenium discharges. "Despite such well-documented toxic effects, no ecotoxicity studies or analyses necessary to predict and consider potential ecotoxic effects, have been conducted on [water treatment plant] discharge water in the DEIS or otherwise to determine the potential for biological impacts for the Pebble project."[2103]

ii. The DEIS fails to adequately assess compliance with water quality standards and permit limits.

Information already in the DEIS precludes a determination that discharges from the Pebble Mine will not cause or contribute to a violation of applicable water quality standards. The cursory assessment of the mine's projected compliance with water quality standards presented in the DEIS is limited to consideration of Alaska's current water quality standards. The DEIS ignores EPA's recommended criterion for selenium, which sets a limit for the water-column concentration in lotic (flowing) streams that is lower than the existing Alaska water quality standards. This omission is striking and improper because Alaska is likely to adopt the EPA criterion as the state standard during the life of the permit. Even if Alaska does not adopt the EPA criterion as a statewide standard, Alaska may use the criterion as the basis to set lower limits in the mine's NPDES discharge permit.

[2101] *Id.* at 4–5.
[2102] Zamzow, 2019a at 18.
[2103] *Id.*

The CWA requires that states periodically review their water quality standards. As part of this "triennial review" process, Alaska must consider new scientific information and — in particular — updated EPA criteria such as the 2016 selenium criterion. States must adopt EPA's recommended criteria or develop their own and routinely review and update water quality standards to ensure consistency with the requirements of the act. Specifically, §303(c)(1) states the ". . . State shall from time to time (but at least once each three year period . . .) hold public hearings for the purpose of reviewing applicable water quality standards and, as appropriate, modifying and adopting standards."[2104]

> In each [water quality standards] review cycle, states and tribes, with input from the public, review their existing [water quality standards] to identify additions and/or revisions that are necessary or appropriate to ensure that their [water quality standards] meet the requirements of the CWA and the needs of the state or tribe. . . . The following are examples of items that states and tribes should consider when reviewing their [water quality standards]: . . . New or updated scientific information (e.g., new or updated Section 304(a) national criteria recommendations)."[2105]

EPA's proposed criteria for selenium were developed over multiple years and involved a rigorous process of scientific vetting. The recommended criteria reflect the most recent and reliable views of the scientific community. These criteria include a lower water-column based limit for selenium in lotic (flowing) streams, as well as criteria based on the concentration of selenium in fish tissue. Alaska will have to consider EPA's recommendations as part of a future triennial review of its water quality standards, and will be unlikely to avoid adopting the selenium criteria as updated water quality standards. The DEIS entirely fails to consider the fact that the Pebble Mine is projected to produce discharges that will violate this new water quality standard, nor does it consider whether or how the mine could bring its discharges into compliance with the new standard.

Similarly, the DEIS fails to account for the reasonably foreseeable possibility that Alaska may impose a lower limit for selenium to ensure compliance with narrative standards or otherwise prevent harm to aquatic life in PLP's National Pollutant Discharge Elimination System (NPDES) permit for the mine. The CWA requires "that every permit contain (1) effluent limitations that reflect the pollution reduction achievable by using technologically practicable controls, and (2) any more stringent pollutant release limitations necessary for the waterway receiving the pollutant to meet 'water quality standards.'"[2106] Every permit must ensure the receiving waterway will meet water quality standards, which

> have two primary components: designated "uses" for a body of water (e.g., public

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[2104] 33 U.S.C. § 1303(c)(1).
[2105] Environmental Protection Agency, Regulations, Water Quality Standards Handbook, *Chapter 6: Procedures for Review and Revision of Water Quality Standards*, August 2014, at 2 (included as an attachment to these comments) https://www.epa.gov/sites/production/files/2014-09/documents/handbook-chapter6.pdf .
[2106] *American Paper Inst.*, 996 F.2d at 349 (citing 33 U.S.C. § 1311(b)(1)) (internal citations omitted).

> water supply, recreation, agriculture) and a set of 'criteria' specifying the maximum concentration of pollutants that may be present in the water without impairing its suitability for designated uses. Criteria, in turn, come in two varieties: specific numeric limitations on the concentration of a specific pollutant in the water (e.g., no more than .05 milligrams of chromium per liter) or more general narrative statements applicable to a wide set of pollutants (e.g., no toxic pollutants in toxic amounts).[2107]

The effluent limitations in a NPDES permit "must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the [permitting authority] determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."[2108] Effluent limitations are defined as:

> any restriction established by a State or the Administrator on quantities, rates, and concentrations of chemical, physical, biological, and other constituents which are discharged from point sources into navigable waters, the waters of the contiguous zone, or the ocean, including schedules of compliance.[2109]

In this way, "the rubber hits the road when the state-created standards are used as the basis for specific effluent limitations in NPDES permits."[2110]

Here, Alaska — either on its own, or as compelled by a citizen suit — must consider whether a limit on selenium that is lower than the current Alaska water quality standard will be required for the mine. Such a determination could be compelled by the EPA-recommended criterion, or by the voluminous scientific record on which EPA based its criterion. Once Alaska adopts the lower standard recommended by EPA, it is not clear whether or how the Pebble Mine could bring its discharges into compliance.

iii. Selenium discharges will fall just below the current Alaska water quality standard, and exceed the EPA recommended criterion.

During operations, discharges from the water treatment ponds will contain pollutant concentrations that approach Alaska's current water quality standard for selenium and that exceed the EPA-recommended standard for selenium. The DEIS projects that the concentrations of pollutants in discharges to surface waters during operations will fall just below Alaska's current standard for selenium, and will exceed EPA's recommended criteria for selenium that was promulgated for the protection of aquatic life. The DEIS projects that the levels of selenium that will be discharged from water treatment plant numbers 1 and 2 will be 0.004 mg/l and 0.003 mg/l, respectively, just below the Alaska water quality standards of 0.005 mg/l.[2111] The concentrations

[2107] *Id.* at 349 (*citing* 33 U.S.C. § 1313(c)(2)(A)) (internal citations omitted).
[2108] 40 C.F.R. § 122.44(d)(1)(i).
[2109] 33 U.S.C. § 1362(11).
[2110] *American Paper Inst*., 996 F.2d at 350.
[2111] DEIS at K4.18–53, Table K4.18–13.

in each of those discharges will either reach or exceed EPA's recommended water-column-based criterion for lotic (fast moving) streams of 0.0031 mg/l.

There remains significant potential that additional parameters will exceed water quality standards in discharges during operations. The following parameters will require active treatment before they can be discharged to receiving streams, because the concentrations in the influent to the water treatment plants will exceed water quality standards: total dissolved solids, total suspended solids, aluminum, antimony, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc.[2112] The concentration of mercury in the influent will be ten times the Alaska water quality standards.[2113]

The DEIS further projects that discharges of selenium during both Closure Phases 3 and 4 will be just barely below the Alaska water quality standards, and in excess of recommended EPA standards.[2114] During Phase 3 Closure, the concentration of treated selenium discharged from the seepage collection pond is projected to be just barely under the Alaska water quality standards, at 0.0048 mg/l, compared to the standard of 0.005 mg/l.[2115] This discharge will exceed the recommended EPA standard for lotic (flowing) waters of 0.0031mg/l. The concentration of selenium in treated discharges during Phase 4 will remain elevated at 0.0042 mg/l, again falling just below the Alaska water quality standards of 0.005 mg/l and exceeding the recommended EPA standard of 0.0031 mg/l for lotic waters.[2116]

Multiple pollutants will require active treatment throughout closure because the concentrations of those pollutants in the influent to the water treatment plants will exceed water quality standards. During Phase 3, the following discharges from the Seepage Collection Pond will require active treatment: total dissolved solids, total suspended solids, fluoride, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, potassium, selenium, silver, and zinc.[2117] The concentration of mercury in the seepage collection pond influent will be 0.0005741 mg/l, over 47x the Alaska water quality standards. Similarly, during Closure Phase 4 the following pollutants will require active treatment: total suspended solids, aluminum, antimony, cadmium, copper, iron, lead, manganese, mercury, molybdenum, selenium, and zinc.[2118]

iv. The mine pits and impoundments will exceed water quality standards during operations and closure.

During operations, the mine's pits and impoundments will contain highly contaminated water with multiple pollutants exceeding water quality standards. Although the Pebble Mine will not be required to meet water quality standards in the pits and impoundments themselves, the projected concentrations are concerning because they will require intensive treatment to bring

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2112 *Id.*
2113 *Id.*
2114 *Id.* at K4.18–54, Table K4.18–14.
2115 *Id.*
2116 *Id.* at K4.18–55, Table K4.18–15.
2117 *Id.* at K4.18–54, Table K4.18–14.
2118 *Id.* at K4.18–55, Table K4.18–15.

discharges within the water quality standards, and because they will pose a direct threat to the environment from leakages and spills. The DEIS fails to adequately assess these risks.

The DEIS projects levels of toxic pollutants in ponds far in excess of water quality standards during operations. The concentration of each of the following pollutants will exceed water quality standards in at least one pit or impoundment: total dissolved solids, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, copper, lead, manganese, mercury, molybdenum, selenium, zinc, and nitrate (ion).[2119] For selenium, every pit or impoundment will exceed the current Alaska water quality standards during operations.[2120] The highest concentration of selenium will be in the "Main Embankment Seepage Collection Pond," where the projected concentration of 0.055 mg/l, will be more than 11x the Alaska water quality standard of 0.005 mg/l. In addition, every pit or impoundment will exceed the current Alaska water quality standard for Mercury during operations.[2121] The highest levels of mercury will be in the "Main Embankment Seepage Collection Pond," where the projected concentration of 0.00050 mg/l will be more than 40x the Alaska water quality standard of 0.000012 mg/l.

After the operations phase ends and closure begins, the concentrations of pollutants in the pits and impoundments will continue to exceed water quality standards for multiple parameters. During Closure Phase 1, the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, zinc.[2122] For selenium, all pits and impoundments (with the exception of Bulk tailings storage facility under 10th percentile projection) will exceed Alaska water quality standards during Closure Phase 1.[2123] The highest levels of selenium, 0.0606 mg/l in the "Main Embankment Seepage Collection Pond", will be more than 12x the Alaska water quality standards (0.005 mg/l).[2124] For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 1.[2125] The highest levels of mercury, 0.001676 mg/l in the pyritic tailings storage facility, will be more than 140x the Alaska water quality standards (0.000012 mg/l).

During Closure Phase 2, the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc.[2126] For selenium, all pits and impoundments (with the exception of the bulk tailings storage facility under 10th percentile projection) will exceed Alaska water quality standards during closure phase 2.[2127] The highest levels of selenium, 0.0664 mg/l in the "Main Embankment Seepage Collection Pond", will be more than 13x the

2119 *Id.* at K4.18–17, Table K4.18–4.
2120 *Id.*
2121 *Id.*
2122 *Id.* at K4.18–29, Table K4.18–7.
2123 *Id.*
2124 *Id.*
2125 *Id.*
2126 *Id.* at K4.18–31, Table K4.18–8.
2127 *Id.*

Alaska water quality standards (0.005 mg/l).[2128] The concentration of selenium, therefore, will increase between Closure Phases 1 and 2. For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 2.[2129] The highest levels of mercury, 0.000604 mg/l in the pyritic tailings storage facility, will be more than 50x the Alaska water quality standards (0.000012 mg/l).

During Closure Phase 3, the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, alkalinity, fluoride, sulfate, aluminum, antimony, barium, beryllium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc.[2130] For selenium, the concentration in the Main Embankment Seepage Collection Pond will exceed Alaska water quality standards during Closure Phase 3.[2131] The highest levels of selenium, 0.0632 mg/l in the "Main Embankment Seepage Collection Pond", will be more than 13x the Alaska water quality standards (0.005 mg/l), continuing the trend of increasing concentrations of that pollutant.[2132] For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 3.[2133] The highest levels of mercury, 0.000574 mg/l in the pyritic tailings storage facility, will be more than 47x the Alaska water quality standards (0.000012 mg/l).

Finally, during the final part of closure — Phase 4 — the concentration of each of the following pollutants will exceed Alaska water quality standards in at least one pit or impoundment: total dissolved solids, alkalinity, sulfate, aluminum, antimony, arsenic, beryllium, cadmium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, selenium, silver, and zinc.[2134] For selenium, the concentration in the Main Embankment Seepage Collection Pond will exceed Alaska water quality standards during Closure Phase 4.[2135] The highest levels of selenium, 0.0550 mg/l in the "Main Embankment Seepage Collection Pond", will be more than 11x the Alaska water quality standards (0.005 mg/l).[2136] For mercury, all pits and impoundments will exceed Alaska water quality standards during Closure Phase 4.[2137] The highest levels of mercury, 0.000500 mg/l in the pyritic tailings storage facility, will be more than 41x the Alaska water quality standards (0.000012 mg/l).

v. The DEIS fails to adequately assess PLP's compliance with narrative water quality standards.

The DEIS fails entirely to assess whether the Pebble Mine's discharges will cause or contribute to violations of an entire category of water quality standards: narrative standards. Water quality standards "come in two varieties: specific numeric limitations on the concentration

[2128] *Id.*
[2129] *Id.*
[2130] *Id.* at K4.18–33, Table K4.18–9.
[2131] *Id.*
[2132] *Id.*
[2133] *Id.*
[2134] *Id.* at K4.18–34, Table K4.18–10.
[2135] *Id.*
[2136] *Id.*
[2137] *Id.*

of a specific pollutant in the water (e.g., no more than .05 milligrams of chromium per liter) or more general narrative statements applicable to a wide set of pollutants (e.g., no toxic pollutants in toxic amounts)."[2138] Alaska's water quality standards include a narrative standard prohibiting "concentrations of toxic substances in water or in shoreline or bottom sediments, that, singly or in combination, cause, or reasonably can be expected to cause, adverse effects on aquatic life."[2139] "Toxic substances" include selenium, mercury, copper, silver, and zinc.

The DEIS makes no effort to assess the effects of potential combinations of toxic substances introduced to surface waters by the Pebble Mine, including the effects of pollutants in concentrations that individually fall below the respective numeric water quality standards, but that in combination cause or reasonably can be expected to cause adverse effects on aquatic life. For example, EPA's Recommended Criteria for Selenium notes that "studies have found interactions between mercury and selenium to be additive (Heinz and Hoffman 1998) or synergistic (Huckabee and Griffith 1974; Birge et al. 1979)."[2140] "Selenium and mercury have a synergistic negative effect on fish reproduction."[2141]

By failing to consider the potential for the Pebble Mine to produce discharges that violate Alaska's narrative water quality standards, the DEIS does not provide the Corps with sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with Section 404(b)(1), in violation of 40 C.F.R. § 230.12(a)(3).

2. The DEIS underestimates potential impacts to water quality.

The DEIS violates the requirements of Section 404(b)(1) of the CWA because it fails to provide the Corps with "sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with [the section 404(b)(1)] Guidelines."[2142] By failing to disclose the full severity of water contamination in the pits and other impoundments, failing to accurately model the hydrologic system, failing to disclose the risk and uncertainty inherent to the untested proposed water treatment system, and failing to describe the environmental consequences should any aspect of the water management or treatment system fail, the DEIS does not provide the Corps with the information needed to make a reasoned judgment on whether to issue the 404 permit and does not provide the public with information adequate to allow for the level of public participation required under the law.

The actual concentrations of water pollutants released into the environment by the Pebble Mine are likely to be far higher than the concentrations projected and assessed in the DEIS, and are likely to violate the prohibition against authorization of projects that will cause or contribute

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[2138] *American Paper Inst.*, 996 F.2d at 349 (*citing* 33 U.S.C. § 1313(c)(2)(A)) (internal citations omitted).
[2139] Alaska Department of Environmental Conservation, Regulations, *18 AAC 70.020: Water Quality Standards*, April 6, 2018, 25–26.
[2140] Environmental Protection Agency, *Aquatic Life Ambient Water Quality Criterion*, 15-16; S. Penglase et al., April 2014, *Selenium and mercury have a synergistic negative effect on fish reproduction*, Aquat Toxicol.
[2141] *Id.*
[2142] 40 C.F.R. § 230.12(a)(3)(iv).

to violations of applicable water quality standards. Multiple factors support this conclusion. A review of historic trends at other copper mines in the United States reveals that actual pollutant discharges almost always exceed pre-mining projections — sometimes by a wide margin. Site-specific analysis of the basis for projected pollutant concentrations in the mine pits and impoundments reveals that those projections are significantly underestimating the actual likely concentrations, including due to acid leaching. The DEIS also underestimates the potential for discharges that bypass treatment systems, including through groundwater seepage. In addition, the mine is unlikely to achieve the projected pollutant concentrations in its surface water discharges because those projections rely on new and untested treatment methods that are unlikely to function as planned, particularly because the mine will be required to treat far higher volumes of discharges than any other comparable existing mine. These flaws in the assessment of projected pollutant concentrations in the DEIS are particularly problematic because, as discussed above, even under the best case scenario the mine is already projected to produce pollutant concentrations in its discharges that are very close to existing Alaska water quality standards and that exceed EPA's recommended criterion. The Pebble Mine is already projecting no margin for error, but available information establishes that errors are inevitable and could be considerable.

i. PLP must take all appropriate steps to minimize potential adverse impacts.

The DEIS acknowledges that the Pebble Mine will produce huge quantities of highly contaminated waste water. The DEIS downplays the potential effects of this contaminated water on downstream ecosystems by claiming that PLP will be able to successfully capture and treat the contaminated water before it's discharged. But the DEIS fails to sufficiently describe the experimental nature of the proposed technology, including the fact that similar technologies have never been successfully deployed to treat the quantities of water that will be produced at the Pebble Mine, nor have those technologies been used in an environment with such an extreme climate. These omissions preclude a determination by the Corps that "appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem," as required by 40 C.F.R. § 230.10.

In *Friends of the Earth v. Hall*, the U.S. District Court for the Western District of Washington held that an EIS relied on by the Corps in issuing a 404 permit was deficient because it failed to disclose sufficient information about the experimental nature of a critical technology relied on to minimize environmental impacts that would otherwise occur.[2143] There, the Navy planned to extensively dredge a harbor to accommodate Navy vessels, and to dispose of the highly contaminated dredge spoils using a technique called Confined Aquatic Disposal.[2144] The court noted that, while the technique had been successfully used previously, the project under review would involve much more challenging circumstances. While the technology had previously been employed in 70-foot-deep water, the Navy proposed to use it at depths "four to six times greater" for this project, and it had never been attempted in the United States at depths greater than 100 feet.[2145] The court concluded that the EIS prepared by the Corps and the Navy "failed to acknowledge the degree of uncertainty concerning the [Confined Aquatic Disposal]

[2143] 693 F. Supp. at 904, 922.
[2144] *Id.* at 915–16.
[2145] *Id.* at 923–24.

technology and its use at [the proposed] depths;" and "failed to identify the 'major' environmental consequences of a technology failure."[2146] In the case of the Pebble DEIS, PLP and the Corps have not adequately acknowledged the uncertainty around the technology proposed to achieve environmental compliance with water quality standards. As a result, the DEIS cannot form the basis of a determination that all appropriate steps have been taken to minimize potential adverse impacts.

ii. Proposed treatment technologies are experimental, uncertain, and subject to a high likelihood of failure.

The Pebble Mine will necessarily produce high volumes of extremely contaminated contact water. To maintain pit levels and achieve water balance on site, the mine will need to continuously discharge water into the receiving streams. To comply with water quality standards and otherwise avoid serious adverse environmental impacts, the mine must continuously treat its discharges — again, in perpetuity. The technology that will be relied on to achieve these ambitious treatment results is a critical part of the proposed mine plan and of the DEIS. Unfortunately, the DEIS provides a wholly inadequate description of the treatment technology that fails to acknowledge either the experimental nature of the technology or the risk that the technology will not reduce pollution concentrations to the projected levels.

As one water treatment expert who has reviewed the DEIS and associated materials observed,

> The water treatment plants proposed for the Pebble Project are very large, complex, poorly documented and untested treatment systems expected to treat water in perpetuity. They have been designed using optimistic assumptions, instead of a conservative design philosophy. Their designs are ill-defined and unsubstantiated. A number of assumptions in their designs were shown to be incorrect. For selenium, the proposed treatment systems will probably discharge non-compliant effluents. In the case of sulfate, their proposed method for disposing residuals from treatment may be ineffective. Finally, the proposal to treat water in perpetuity with these treatment plants presents a large, indefensible risk.[2147]

Richard Borden, an environmental scientist and manager who worked for the global mining company Rio Tinto for 23 years, highlighted the unprecedented and experimental nature of the proposed water treatment system:

> The proposed closure water treatment plant design is very complex, still has significant uncertainties and is likely to have very high operating costs. Treatment steps include metals precipitation with lime, ferric chloride and other reagents, second-stage metals precipitation, clarification, ultrafiltration, nanofiltration, followed by multistage gypsum precipitation via lime addition, ultrafiltration and reverse osmosis. I am not aware of a treatment flowsheet of this complexity being

[2146] *Id.* at 925–26.
[2147] Sobolewski, 2019 at 1.

> applied to such high flows anywhere else in the world. By necessity the entire water treatment strategy is at best conceptual in nature and no laboratory or pilot scale tests have been completed. During an internal review of the proposed treatment processes conducted in October, 2018 (AECOM 2018i) it was stated that "it is difficult to fully assess the treatment process in a meaningful way without confidence in reliability of the design of the treatment process". Given the current uncertainties and inconsistencies in the treatment strategy, and the lack of even preliminary engineering drawings, designs and specifications, the ability of the proposed post-closure water treatment plant to meet required throughputs and discharge water quality requirements has not been demonstrated. These same deficiencies also exist for the operational water treatment plants which are, if anything, more complex than the proposed closure facilities.[2148]

The description in the DEIS of the proposed treatment system that will play such a critical role in minimizing environmental impacts is limited to the following:

> Key treatment steps for both [water treatment plants] would include dissolved metals oxidization, co-precipitation, clarification, ultrafiltration, and reverse osmosis (see Chapter 2, Alternatives, Figure 2-11 and Figure 2-12). The open pit [water treatment plant] would also include biological selenium removal, and the main [water treatment plant] would include nanofiltration through high-pressure membranes (expected to remove selenium and other salts) and multiple-stage calcium sulfate precipitation with a lime softening process.[2149]

The DEIS attempts to justify this cursory description by noting that the proposed treatment system "would employ treatment plant processes commonly used in mining and other industries around the world."[2150] This is not true. In fact, "[n]one of these technologies have been proven to be effective at treating the volumes of water, or in the climatic conditions expected to be present at the Pebble Project. Furthermore, by failing to specify the particular technology being proposed, it is difficult to fully evaluate the effectiveness of treatment."[2151]

In *Friends of the Earth v. Hall*, the court concluded that an EIS failed to satisfy NEPA's requirement of informed decisionmaking and public participation where the EIS failed to "discuss crucial information concerning technological uncertainty and what major environmental impact would occur if the . . . technology failed."[2152] To reach this conclusion, the court noted that the EIS associated with the proposed project did not adequately acknowledge the fact that the proposed technology was "experimental, subject to a significant degree of uncertainty, and present[ed] a significant risk of failure."[2153] Like in *Hall*, there is a high degree of uncertainty around the proposed technology relied on by the Pebble DEIS to minimize environmental impacts: the "proposed treatment systems at the Pebble Project are essentially experimental: no

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[2148] Borden, 2019b at 6.
[2149] DEIS at 4.18–4.
[2150] *Id.*
[2151] Zamzow, 2019a at 11.
[2152] 693 F. Supp. at 904, 926.
[2153] *Id.* at 922–23.

similar systems have ever been constructed and operated at any other mine anywhere in the world."[2154] Accordingly, the Corps cannot rely on this proposed treatment technology to make the required determination that all "appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem."[2155]

The mere fact that similar technologies have been used at other mines does not excuse the failure of the DEIS to acknowledge the experimental nature of the technology in this setting and for this purpose. That the proposed treatment system is based around technologies that have been employed in some capacity at other mines does not render the limited discussion in the DEIS adequate under Section 404(b). The court in *FOE v. Hall* held that a technology that was "technically feasible" nevertheless warranted additional disclosures and analysis because it "remain[ed] experimental in the eyes of a wide variety of knowledgeable observers."[2156]

The reports of multiple knowledgeable experts make clear that there are several reasons why the treatment proposed for the Pebble Mine is experimental, subject to a significant degree of uncertainty, and presents a significant risk of failure. The proposed treatment technology — and in particular the biological treatment component — remains experimental and unproven because it has never been successfully deployed in the harsh climatic conditions similar to those found at the Pebble Mine site in Alaska. As EPA noted in its review of an earlier draft of the DEIS, the DEIS must:

> explain whether this [water treatment plant] technique has been utilized at other mine sites, in particular for the proposed treatment rates. If it has been utilized elsewhere, please explain how the differences in temperature at the Pebble site would affect the biological activity associated with Se removal, as well as describe whether the effect of temperature on the efficiency of Se removal using this technique has been evaluated.[2157]

But the DEIS entirely fails to do that. Other site specific factors that could negatively influence the functioning of the treatment system include "water temperature, pH, and the concentrations of other constituents, including nitrates and salts."[2158]

The proposed treatment technology is also experimental and unproven for treating the volume of water that will be produced by the Pebble Mine. The DEIS presumes, without justification, that technologies that have successfully treated lower volumes of water can be scaled up to treat the much higher volumes at Pebble. "A key assumption is of linear scaling: that flows treated at 6,000 gpm will be treated with the same efficiency as 22,000 gpm. While theoretically acceptable, there is no real-world basis to support this assumption for such a complex treatment

[2154] Sobolewski, 2019 at 1.
[2155] 40 C.F.R. § 230.10(d).
[2156] 693 F. Supp. at 924.
[2157] *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.18 – Water and Sediment Quality, at EPA Comment #18, at 10.
[2158] Zamzow, 2019a at 10 (citing a study by the North American Metals Council (NAMC) Selenium Working Group).

system, specifically that treatment performance will remain the same at all scales, despite variability in influent composition, temperature, or other environmental variables."[2159] "The treatment system proposed at the Pebble Project introduces a new uncertainty: it is uncertain that the performance observed at 1,400-2,000 gpm will scale linearly to the 6,300 gpm flows during operation or to the 22,000 gpm flows proposed at closure."[2160]

Because there are no treatment systems successfully operating under the conditions and at the volumes required for the Pebble Mine, the DEIS must present detailed technical specifications and the results of pilot testing to justify the projections of successful water treatment. But this information is entirely missing.

> Very few details are available on the design of the treatment plant for selenium removal. The main water treatment plant (WTP #2) would rely on a nanofiltration (NF) unit to remove selenium. HDR claims that selenium will be removed by 92-94% by membrane filtration, but they do not substantiate their claims with data from operational treatment systems.[2161]
>
> The DEIS states that methods for treating selenium could include biological removal at the Open Pit [water treatment plant], and nanofiltration and calcium sulfate precipitation at the Main [water treatment plant] (DEIS p. 4.18-4). None of these technologies have been proven to be effective at treating the volumes of water, or in the climatic conditions expected to be present at the Pebble Project. Furthermore, by failing to specify the particular technology being proposed, it is difficult to fully evaluate the effectiveness of treatment.[2162]

The risk of overstating the likelihood that the proposed experimental technologies will achieve the projected pollution reductions is compounded by the fact that the DEIS fails to assess how the proposed treatment systems would handle the upper range of pollutant concentrations that could be reasonably expected in discharges from the Pebble Mine. "Pebble has not adopted a conservative approach to design. In their design documents, HDR adopted 50th percentile values as a design basis, even as they re-evaluated the design for 90th percentile concentrations (HDR, 2012, HDR, 2018b)."[2163] This overly-optimistic approach is particularly inappropriate given the experimental nature of the technology. "A design basis from 50th percentile flows and concentrations would be defensible if it drew on a record of 10+ years of monitored flows and water chemistry, but this is not the case for this project." To fully inform decisionmakers and the public as to the risks of environmental harm posed by discharges from the Pebble Mine, the DEIS should use "90th (preferably 95th) percentile influent contaminant concentrations (they used 50th percentile concentrations), after revising their water balance and predicted influent chemistry, as well as discharge criteria."[2164]

[2159] Sobolewski, 2019 at 4.
[2160] Zamzow, 2019a at 13.
[2161] *Id.* at 10.
[2162] *Id.* at 11.
[2163] Sobolewski, 2019 at 4.
[2164] *Id.*

The most reliable way for the DEIS to establish that the projected reductions are feasible and realistic would be to reference testing that accurately replicate the unique conditions that will be present at the Pebble Mine. But the DEIS contains no reference to any project specific testing, either at bench-scale or pilot-scale. The proposed treatment system cannot be assumed to work unless and until it is established through rigorous testing.

Nor does the DEIS even cite to literature to justify the fundamental assumptions regarding the ability of the proposed treatment system to function in this novel environment and at significantly elevated flow volumes. "No authoritative literature review is provided in any document appended to the DEIS, nor is any discussion provided on how published information about a treatment process translates into a specific design."[2165] The cursory discussion of largely inapplicable literature in the DEIS does not satisfy this need:

> The only independent reference to selenium treatment presented by HDR is the 2010 Review of Available Technologies for the Removal of Selenium from Water (NAMC 2010). This document largely discusses the performance and engineering aspects of pilot-scale treatment systems, not full-scale treatment systems. Otherwise, HDR relies on vendor information to predict a >92% removal rate by the Seepage Collection Pond [water treatment plant] at closure, which would render the effluent compliant with the Alaska State standard.[2166]

Ultimately, the DEIS must address the unfortunate reality that it simply may not be possible to reduce the concentration of selenium and other pollutants in the Pebble Mine's discharges to levels that comply with water quality standards. "Under the current mine plan...the proposed treatment system will not produce an effluent compliant with the Alaska State standard for selenium, for the Seepage Collection Pond [water treatment plant] at closure."[2167] "In the case of selenium, with which I have great expertise and intimate knowledge of treatment aspects, their claim of >92% removal rates is not supported by the performance of full-scale operating treatment systems."[2168] "There is a real possibility that no treatment technology exists that can remove selenium to the necessary level at this site."[2169]

iii. The Pebble Mine poses significant technical challenges for water quality treatment.

a. Historically, water quality at copper mines has been worse than initially predicted.

The reliance of the DEIS on untested treatment technologies is particularly troubling given the well-established historic trend of copper mines in the United States failing to achieve the projected treatment results. This pattern should have led the Corps to subject the Pebble Mine's proposed experimental treatment systems to even more rigorous review.

[2165] Sobolewski, 2019 at 8.
[2166] *Id.* at 9.
[2167] *Id.*
[2168] *Id.* at 14
[2169] *Id.* at 7.

A recent review of fifteen operating open-pit copper mines in the United States found that virtually all — 93% — failed to capture and control wastewater, resulting in significant water quality impacts.[2170] Sources of contamination at these existing open-pit copper mines included leaching through groundwater, pipeline ruptures, tailings spills, precipitation-induced runoff, and releases during extreme storm events.[2171] Many of the discharges from these mines resulted in water quality standard exceedances for selenium, mercury, and other pollutants of concern.[2172]

The DEIS itself acknowledges that the actual pollutant concentrations in discharges from the mine may exceed the levels projected in the DEIS or incorporated as NPDES permit limits.

> [O]ver the life of the mine, it is possible that APDES permit conditions may be exceeded for various reasons (e.g., treatment process upset, record-keeping errors) as has happened at other Alaska mines. In these types of events, corrective action is typically applied in response to ADEC oversight to bring the [water treatment plant] discharges into compliance.[2173]

Beyond that cursory acknowledgment, the DEIS fails to meaningfully engage with this issue. The DEIS does not identify specific mechanisms that may lead to exceedances, or assess the likelihood of each potential failure. Nor does the DEIS explain what "corrective actions" may be available to address each mechanism of failure. The Corps has not meaningfully considered the actual potential impacts of the mine on water quality, including impacts that will result from discharges that exceed the projected pollutant concentrations.

b. The Pebble Mine will produce more wastewater than any other mine in Alaska.

The already considerable challenge of treating contaminated water at the Pebble Mine is compounded by the fact that the volume of water to be treated far exceeds what any other mine in Alaska has ever attempted. According to data from the project proponent's own analysis, the Pebble Mine will be required to treat more than four times the volume of water managed by the next largest mine:

Mine	**Gallons per Minute**	**Process/Equipment**	**Pebble vs others**
Pebble Mine Water Treatment Plant (proposed)	20,600 (combined based on two proposed water treatment plants)	chemical precipitation, filtration, high-pressure membranes filtration, and biological selenium removal	--

[2170] Gestring, 2019.
[2171] *Id.*
[2172] *Id.*
[2173] DEIS at 4.18–5.

Kensington Mine Water Treatment Plant	1,500	Co-precipitation	Pebble would process **13.7 times** that of Kensington
Greens Creek Mine Water Treatment Plant	2,500	Co-precipitation	Pebble would process **8.2 times** that of Greens Creek
Red Dog Mine Water Treatment Plant	4,600	Chemical precipitation	Pebble would process **4.5 times** that of Red Dog
Donlin Water Treatment Plant (proposed), according to DEC permit	4,750 (max. capacity)	Oxidation, clarification, and filtration	Pebble would process **4.3 times** that proposed for Donlin

Pebble Project: Water Treatment Process – Benchmark Update (December 2017).

Mine	**Gallons per Minute**	**Process/Equipment**	**Pebble vs others**
Pebble Mine proposed Water Treatment Plant[2174]	19,000 (combined based on two proposed water treatment plants)	chemical precipitation, filtration, high-pressure membranes filtration, and biological selenium removal	--
Kensington Mine Water Treatment Plant[2175]	1,500	Co-precipitation	Pebble would process **12.7 times** that of Kensington
Greens Creek Mine Water Treatment Plant[2176]	2,500	Co-precipitation	Pebble would process **7.6 times** that of Greens Creek

[2174] *Id.* at App. K4.18–53 (Table K4.18–13).
[2175] PLP, Report, *Pebble Project: Water Treatment Process – Benchmark Update*, prepared by HDR, Dec. 6, 2017, at 2.
[2176] *Id.*

Red Dog Mine Water Treatment Plant[2177]	4,600	Chemical precipitation	Pebble would process **4.1 times** that of Red Dog
Donlin proposed Water Treatment Plant[2178]	4,750 (max. capacity)	Oxidation, clarification, and filtration	Pebble would process **4 times** that proposed for Donlin

The dramatically higher volumes of water requiring treatment at the Pebble mine means that there is no treatment technology that has been field tested and proven to effectively treat mine discharges under these conditions. As a result, the DEIS fails to adequately describe the risks and uncertainty inherent in achieving the water treatment projections. Additional information, including field testing, is necessary before any conclusions can be made about the availability — let alone performance— of treatment technology to deal with these volumes of water.

c. The DEIS fails to accurately assess water contamination levels in the mine pits and other impoundments.

The DEIS fails to provide an accurate estimate of the pollutant concentrations likely to be found in the mine pits and other impoundments throughout the operational and closure phases. By underestimating the pollutant concentrations that should be expected, the DEIS fails to accurately assess the environmental impacts of the mine, under both best case and worst case scenarios. The inaccurate pollutant concentration estimates are also used to inform the design and assessment of potential water treatment technologies, further contributing to the failure of the DEIS to appropriately acknowledge the unavailability of existing technology to achieve the required treatment.

As an initial matter, the projections of water quality in the DEIS strain credulity because they run counter to the plain evidence. "More than 200 million tons of potentially acid-generating (PAG) wastes will be excavated and stored on the site in perpetuity, yet the DEIS predicts that no site water will be acidic during operations, closure, or post-closure."[2179] Copper mines are associated with a poor record of environmental degradation because of their low buffering capacity and tendency to leach contaminating metals into groundwater from waste rock, tailings, and mine pits.[2180] In a 2012 report titled "Comparison of the Pebble Mine with Other Alaska Large Hard Rock Mines," the Center for Science and Public Participation noted, "[m]ost porphyry deposits/mines are large and low grade, leading to the production of large quantities of waste rock

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2177 *Id.*
2178 Alaska Dept. of Environmental Conservation, APDES Permit Fact Sheet – Final, Permit No. AK0053643, Donlin Gold Project, May 24, 2018; *see also* Alaska Dept. of Environmental Conservation, APDES Permit – Final, Permit No. AK0053643, Donlin Gold Project, May 24, 2018.
2179 Maest, 2019.
2180 Levit & Chambers, 2012 at 4.

and tailings."[2181] The report notes that the metal mineralization is in the form of metal sulfides and that in wet environments, the environmental risks are higher.[2182] The report further notes that the "geochemistry at the Pebble mine indicates that much of the mined rock will be potentially acid generating" and that the [g]eomorphology suggests that leaked contaminants will be difficult to contain."[2183] The wet environment of Bristol Bay "increases the likelihood that these contaminants will become mobile."[2184] Due to Pebble's large size and the fact that "[m]itigation techniques . . . have been notoriously ineffective to slow acid production and to prevent it from leaving the minesite," Pebble's "acid rock drainage (ARD) could be difficult to control."[2185]

Fundamental assumptions of the DEIS, including in particular that submerged materials will not generate acid because they will be deprived of exposure to oxygen, are undermined by the results of PLP's own testing and by fundamental principles of chemistry. "The DEIS assumes that submerging pyritic tailings and [potentially acid-generating] waste under water during operation in the [pyritic tailings storage facility] (also known as Area E) and during closure in the pit will prevent oxidation and acid generation."[2186] However, "PLP's leachate test results show that once [potentially acid-generating] wastes start producing acid and leaching metals, they will continue to do so even if submerged."[2187] This is partially due to the fact that "material in the [pyritic tailings storage facility] will be oxidized by ferric iron even under submerged, reducing conditions."[2188] Subaqueous column tests conducted by PLP, in which crushed waste rock or tailings are placed in a column and kept submerged with water, were run and the samples tested (six samples of Pre-Tertiary Pebble West Zone potentially acid-generating waste rock, two samples of Tertiary Pebble East Zone waste rock, and two samples of pyritic tailings).[2189] The results show that leaching will continue for some period of time, even under submerged conditions.[2190]

The DEIS also assumes, incorrectly and without support, that the pit lake will remain stratified in perpetuity.[2191] This assumption ignores the high potential for pit lake turn over caused by "the sloughing of unstable pit walls into the lake."[2192] The failure to consider, or model, the effects of pit lake turn over renders the water quality projections in the DEIS inaccurate and unreliable because "[i]f pit wall sloughing occurs in the Pebble pit, the predicted concentrations in Lorax Environmental (2018) and Knight Piésold (2018a) would greatly underestimate the concentrations in Water Treatment Plant #3 influent water and in water that could discharge from

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2181 *Id.*
2182 *Id.*
2183 *Id.*
2184 *Id.*
2185 *Id.*
2186 Maest, 2019 at 6.
2187 *Id.* at 2.
2188 *Id.* at 8.
2189 *Id.*
2190 *Id.*
2191 Maest & Wobus, 2019 at 4.
2192 *Id.*

the pit along faults and through the upper glacial materials (overburden) or over the top of the pit if the pumps fail."[2193]

The DEIS materials also contain contradictory information that calls into question the reliability of any of the water quality calculations or projections. For example, the DEIS claims that 50 million tons of potentially acid-generating waste rock will be stored in the pyritic tailings storage facility, but Knight Piésold states the amount will be three times higher — approximately 160 million tons.[2194] This is a significant discrepancy: the concentrations of acid generated using rates from the tests are dependent on the amount of material at the site.[2195]

The DEIS' fundamentally flawed and inaccurate description of pollutant-forming conditions in the mine pits further invalidates other parts of the DEIS, notably the discussion of pollution treatment technologies and the projected concentrations of pollutants in water discharged to surface streams. Contrary to the conclusions in the DEIS, tests conducted on materials from the Pebble Mine "show that once [potentially acid-generating] waste rock starts producing acid — and some samples did so immediately — acidity, metals, sulfate, and other constituents will continue to be released even under subaqueous conditions."[2196] However, these releases and the resulting elevated pollutant concentrations appear to be excluded in the calculation of water treatment plant source terms.[2197] Because the projected influent chemistry for the water treatment plants during operations does not include any acidic leaching from the pyritic tailings storage facility and because acidic leaching of the potentially acid-generating wastes will strongly increase concentrations of pollutants entering the water treatment plants, the design criteria for the water treatment systems drastically underestimate the actual concentrations that will require treatment.[2198]

d. The DEIS fails to take a hard look at risks posed by water balance management and treatment.

The DEIS acknowledges that mine operations will produce highly contaminated contact water that will exceed water quality standards for multiple parameters. But the DEIS inappropriately downplays the difficulty of managing the pits and other water impoundments during closure, both in terms of maintaining the appropriate hydrologic balance and in terms of treating discharges necessitated by the water management plan.

The nature of the proposed mine means that there will never be a point where active management is not required to avoid unacceptable adverse impacts to the environment. Appendix K4.18 of the DEIS acknowledges that the mine pit will include multiple metals that will form oxyanions that will be mobile at the projected pH values.[2199] As a result, "it will be important to continue to maintain the pit lake as a hydraulic sink in perpetuity to control releases to the

2193 *Id.* at 5.
2194 Maest, 2019 at 4.
2195 *Id.*
2196 *Id.* at 7.
2197 *Id.*
2198 *Id.*
2199 DEIS at K4.18–45.

environment."[2200] But the DEIS fails to adequately describe the hydrologic conditions that will have to be managed in perpetuity. It also fails to describe the measures that will have to be taken to maintain the required low pit lake level, including the volume of water that will have to be treated and discharged. The absence of consideration of this critical issue is particularly striking in light of the fact that "[b]ecause the pits and seepage collection ponds would need to be managed in perpetuity, the probability of a management failure – eventual failure of the pumps and/or failure of the treatment plant – nears 100%."[2201]

Despite the fact that avoidance of significant environmental harm during the closure period depends on the maintenance of a particular target level in the mine pit, the DEIS provides only a flawed water balance model:

> Based on the hydrologic data reported in the DEIS, the site water balance has substantial, unexplained flaws, as illustrated by the fact that water inputs and outputs are not balanced at any spatial scale. Thus the entire hydrologic impact evaluation described in the DEIS is also flawed, and must be corrected.[2202]

The DEIS presents a water balance model that employs a very basic, gross-scale approach focused around a spreadsheet-based model developed almost 10 years ago.[2203] "PLP has built its entire water balance — including its estimate of dewatering needs, water treatment needs, and hydrologic impacts — around a complex and poorly documented 'watershed spreadsheet module.'"[2204] One example of the debilitating flaws in the spreadsheet model is that even though the only inputs to the water balance are from precipitation, between 9% (at gage site UT100E) and 66% (at gage site NK100B) of the precipitation falling on the site is unaccounted for.[2205] "This module is 'tuned' to the smaller, streamflow-based values, rather than the larger, precipitation-based values shown in Table 1, so it is possible that the DEIS is significantly underestimating the amount of water requiring management."[2206] These and other gaps and inconsistencies in the model make it difficult to assess whether the proposed mandatory water management approach will be successful, or to assess the downstream impacts of the project should there be a partial or complete failure of the proposed water management.

Part of managing the pit water levels and otherwise controlling the hydrologic balance on site will require ongoing active treatment of surface water discharges. The DEIS fails to describe in any detail how such treatment will be accomplished. These gaps make it impossible for decisionmakers or the public to assess the risks presented by the proposed mine, or to understand the potential environmental impacts.

The DEIS presumes the need for ongoing active treatment of contaminated contact water, even during closure:

2200 *Id.*
2201 Maest & Wobus, 2019 at 9.
2202 Wobus, 2019 at 1.
2203 *Id.* at 4.
2204 *Id.* at 6.
2205 *Id.* at 5.
2206 *Id.* at 6.

> In closure phase 3 and beyond, surplus water from the open pit and the bulk [tailings storage facility] main [seepage collection pond] would be treated as two stand-alone water treatment streams, and may be housed in the same [water treatment plant] building (HDR 2019b).[2207]

But PLP has not completed engineering or design for this critical treatment. "Water quality of discharge from the open pit [water treatment plant] is the subject of ongoing engineering analysis (PLP 2019-RFI 106)."[2208]

This is not an insignificant oversight, but instead represents a major gap in the information necessary to assess the Pebble Mine's overall environmental impacts. The high volumes of water, high levels of contamination, and remote setting all call into question whether it is even possible to design and implement a successful water management program in perpetuity. "[T]o protect downstream waters from significant contamination, PLP has proposed to pump and treat contaminated water generated from mining the deposit, *forever*. The technical challenges and the costs associated with perpetual water treatment in this remote, wet, setting will be substantial."[2209]

For that reason, the DEIS cannot presume that a successful engineering solution will be forthcoming. There are no off-the-shelf technologies that the project proponents can rely on to achieve the monumental and unprecedented water management that will be required.

> The adoption of reverse osmosis and other membrane filtration systems in the mining industry is scarcely more than 15 years old. It seems preposterous to believe that we currently have the knowledge and expertise to build these membrane systems to last as long as HDS plants, with their 50 year life cycle, never mind building such a large and complex treatment system as that proposed by Pebble.[2210]

This absence of existing technology makes the omission of critical engineering plans from the DEIS even more striking and unacceptable.

Modeling by Maest and Wobus considered the effects of an eventual failure of pit lake pumping and treatment, finding that

> the results showed that after the pumps ceased operating, simulated pit lake levels rose above the southeastern perimeter of the pit and drained overland into the South Fork Koktuli River (Figure 5) at an average annual rate of approximately 2.4 cfs. In addition, approximately 0.7 cfs of pit water flowed out of the pit through the shallow glacial aquifer and reached the South Fork Koktuli River (Table 1). Maximum overflow for the 23-year abandoned scenario was predicted

[2207] DEIS at K4.18–52.
[2208] *Id.*
[2209] Wobus, 2019 at 6.
[2210] Sobolewski, 2019 at 12.

to reach approximately 13 cfs during the spring freshet (Figure 6).[2211]

The difficulty of managing the water balance and treating contaminated water in perpetuity post-closure will be even greater if PLP is allowed to develop the full 78-year mine.

> Mining the full deposit would require substantially more pumping and water management in order to keep the pit and/or underground workings dry – and will require perpetual treatment averaging ~100 cubic feet per second (~50,000 gallons per minute, or approximately 28 billion gallons per year) to prevent the pit from overflowing after mine operations have ceased (Prucha, 2019; see Figure 1). The post-closure water treatment from the smaller mine described in the EIS (50 cfs, or approximately 11.8 billion gallons per year; Knight Piesold, 2018a) is already more than three times larger than the largest water treatment facility in the United States (Climax Molybdenum, 2.86 billion gallons/yr; Climax 2012); the full buildout would require a water treatment plant that is approximately an order of magnitude larger than that facility, which is likely to be more water than can be reasonably managed in perpetuity.[2212]

e. The DEIS fails to assess impacts from multiple likely mine operation scenarios.

The DEIS fails to provide a full, complete, or reliable assessment of hydrologic impacts or adverse effects to water quality because it relies on overly-simplistic methodologies that are based on incorrect model inputs and assumptions.[2213] The DEIS also fails to fully assess the mine's hydrologic impacts because it considers only a small fraction of the actual likely mine configurations or scenarios.[2214]

The DEIS cannot fully assess the mine's impacts to hydrology or water quality because it relies on an overly-simplistic model. The primary tools utilized in the DEIS to predict hydrologic impacts are a single-process groundwater flow model linked to a separate surface water "spreadsheet" tool that uses proprietary, undisclosed methods.[2215] This model is only capable of producing gross-scale lump calculations over large catchments, and is incapable of modeling or predicting mine impacts at sub-catchment points.[2216] The spreadsheet tools utilized in combination also use different timeframes and methodologies, which raises serious questions about the compatibility of the models.[2217] The use of models that calculate results on only a monthly basis also means that the model will miss the sort of event-level variation frequently observed in the actual monitoring data from the mine site.[2218] In short, the primary tools relied on by the DEIS are inherently and fatally flawed because they are "simply unable to simulate

[2211] Maest & Wobus, 2019 at 9-10.
[2212] Wobus, 2019 at 3.
[2213] Prucha, 2019 at 2.
[2214] *Id.*
[2215] *Id.* at 3.
[2216] *Id.*
[2217] *Id.*
[2218] *Id.*

physically-realistic baseline or predicted mine-impacted strongly coupled surface-water/ groundwater dynamics."[2219]

By evaluating the hydrologic impacts of only one scenario — a 23-year mine that is then managed in perpetuity — the DEIS fails to assess the impacts from other scenarios that are equally likely. The scenarios that the DEIS fails to consider include a 23-year mine that is abandoned post-closure and not managed; a built-out 78-year mine that is managed post-closure; and a built-out 78-year mine that is abandoned and not managed post-closure.[2220] These omissions are striking, because they mean that the DEIS does not assess important potential impacts.

Under a scenario where the mine operates for 23 years and then is abandoned, the water level in the main pit would reach a level approximately 105 feet above the level PLP expects to maintain under a managed scenario.[2221] This scenario would lead to increased subsurface discharges into the South Fork Koktuli drainage, representing a major source for water pollution into the surface streams and wetlands in that drainage.[2222]

Modeling by Maest and Wobus projects this scenario will result in concentrations of cadmium, copper, lead, and zinc exceeding water quality standards at distances greater than 35 miles downstream from the pit.[2223] Copper concentrations would be approximately 1,000 times higher than the applicable standard 35 miles downstream from the pit.[2224] A scenario where the mine operates for 78 years and then is abandoned would lead to the pit overtopping, creating direct surface flows into the Upper Talarik drainage allowing for decanting of highly contaminated pit lake water directly into that drainage.[2225] Either of these unmanaged scenarios would have devastating effects on water quality in the receiving streams.

The DEIS' assessment of hydrologic impacts is flawed, unreliable, and inadequate because it relies on unsupported assumptions and then fails to adequately address the resulting uncertainty. The DEIS appendix at K4.17-2 acknowledges that the model incorporates certain assumptions about the bedrock hydraulic conductivity, but that additional calibration, validation, and sensitivity analyses are warranted."[2226] The DEIS fails to conduct "detailed and robust predictive uncertainty analysis which focuses not just on predicted groundwater inflow to the pit lake, but also on predicted response at all other mine components, at the same time."[2227]

[2219] *Id.* at 4.
[2220] *Id.* at 4–5.
[2221] *Id.* at 18.
[2222] *Id.*
[2223] Maest & Wobus, 2019 at 17–18.
[2224] *Id.*
[2225] Prucha, 2019 at 21.
[2226] *Id.* at 45.
[2227] *Id.*

iv. The DEIS fails to take a hard look at potential impacts from contaminated water that bypasses water treatment systems.

A central premise of the DEIS' discussion of water quality impacts is that all contaminated contact water will be captured and then processed through the proposed water treatment system. But the DEIS does not adequately describe how much contact water will infiltrate to groundwater (as opposed to manifesting as surface runoff).

The DEIS expressly states that all contact water will be captured and treated:

> All runoff water contacting the facilities at the mine site and water pumped from the open pit would be captured to protect overall downstream water quality. Prior to discharge to the environment, any water not meeting applicable discharge requirements would be treated. For example, contact water that may infiltrate into the groundwater system at the mine site would be collected at the mine site by the open pit groundwater wells or by pumpback wells located around the mine site. This water would be treated at a water treatment plant (WTP) and discharged as wastewater (i.e., surplus water).[2228]

Because the DEIS presumes the effectiveness of the proposed systems at capturing contaminated groundwater, it includes no detailed description of either the back-up systems that could be installed to address higher levels of seepage than anticipated, nor does it include an assessment of the effects to downstream ecosystems should contaminated water bypass the treatment systems and discharge into receiving streams. In particular, "[t]he risk for selenium seepage from the Bulk [tailings storage facility] and its main embankment is a perpetual concern."[2229]

The DEIS fails to adequately consider the fact that "[l]iner leaks, overtopping, and runoff wastes in the facilities and their embankments would cause contact waters to escape the waste impoundments and potentially avoid capture by the seepage collection ponds. Leakage of mine waste seepage to groundwater and surface water could adversely affect aquatic biota due to the presence of selenium and other mine contaminants, especially metals." [2230] The DEIS's limited assessment of the risk of releasing high concentrations of toxic pollutants into downstream surface waters fails to account for the high seepage potential of the local geology at the proposed mine site. A report by the Center for Science and Public Participation notes:

> Pebble's near-surface geology has thick layers of highly permeable glacial gravels. The water table lies near the surface resulting in seeps and springs that recharge both surface and substrate. Most mines have leaks and spills, both small and large, but at Pebble any leak has a particularly high potential to cause contamination because of the potential to migrate offsite. Deposits of glacial permeable sediments are largely unconfined and mine spills or leaks could be difficult to contain. Pebble's highly permeable glacial gravels will present

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[2228] DEIS at 4.18–3.
[2229] Zamzow, 2019a at 6.
[2230] *Id.* at 5.

> difficult design and management problems for both waste contaminant discharge and spill containment.[2231]

The DEIS also fails to assess whether tailings leaks are more or less likely based on location of the tailing facility. A review by Wobus and Prucha identified that

> [t]he proposed siting of the tailings storage facility reflects a lack of understanding on the part of PLP of how this strongly coupled groundwater-surface water system will affect downstream aquatic habitat. For example, the permit application discusses how the siting of the tailings storage facility will "minimize potential impacts to environmental resources" by noting that "The valley includes a tributary to the [North Fork Koktuli] that has experienced intermittent flows, with dry stretches extending two miles." (Appendix D p. 41). In fact, this criterion for [tailing storage facility] site selection may actually increase, not decrease, the impacts to downstream resources. The fact that parts of the [North Fork Koktuli] beneath the [tailing storage facility] are dry indicates that the hydraulic gradients beneath the proposed [tailing storage facility] are downward, which will enhance any leakage of contaminants from the [tailing storage facility] into groundwater. The [North Fork Koktuli] immediately downstream of the [tailings storage facility] remains unfrozen during the wintertime, indicating strong groundwater upwelling and ideal habitat for salmonids. Thus, any leakage from the proposed [tailing storage facility] will contribute contaminants into the alluvial aquifer beneath the [North Fork Koktuli], which will then re-emerge in the upwelling areas that provide salmon habitat immediately downstream. Given the likely high permeability in this aquifer, this contamination may be very difficult to capture and treat.[2232]

The DEIS fails to fully consider the potential for seepage from the proposed mine pits and impoundments to introduce contaminated water into downstream areas, and thereby cause or contribute to violations of water quality standards, because it does not assess the hydraulic gradients and groundwater flow in the vicinity of the proposed tailings storage facility or other impoundments.[2233]

EPA's Regional Administrator made specific findings in the Proposed Determination regarding the potential for seepage to bypass seepage collection systems and reach surface waters.[2234] The Regional Administrator determined that it was appropriate to conclude that half of the leachate released by the waste rock facilities and the tailings storage facilities outside of the drawdown zone of the mine pit would escape the leachate collection system and be released to downstream water. This is due to "the area's geological complexity and the permeability of surficial underlying layers would allow water to flow between wells and below their zone of interception."[2235]

[2231] *See* Levit & Chambers, 2012 at 3.
[2232] Wobus Scoping Comments, 2018 at 5.
[2233] *Id.*
[2234] *See* PD.
[2235] *Id.* at 4–52 to 4–53.

A report by the Center for Science and Public Participation notes,

> Pebble's near-surface geology has thick layers of highly permeable glacial gravels. The water table lies near the surface resulting in seeps and springs that recharge both surface and substrate. Most mines have leaks and spills, both small and large, but at Pebble any leak has a particularly high potential to cause contamination because of the potential to migrate offsite. Deposits of glacial permeable sediments are largely unconfined and mine spills or leaks could be difficult to contain. Pebble's highly permeable glacial gravels will present difficult design and management problems for both waste contaminant discharge and spill containment.[2236]

The DEIS itself supports these conclusions, noting the potential that "[s]eepage water could also flow vertically downwards into deeper bedrock fractures."[2237]

Rather than describe in detail what steps the Pebble Mine could take to address higher rates of groundwater seepage and contamination than anticipated, including any assessment of the availability of the required technologies or examples where such back-up systems have been successfully deployed, the DEIS merely states that: "Any impacted groundwater that bypasses the [seepage collection pond] capture system is expected to be detected in these wells. Additional seepage collection, cutoff walls, and/or pumpback systems may be installed downstream if necessary, as determined by monitored water quality (PLP 2018-RFI 006a)." [2238]

Avenues by which additional contaminated water could enter the groundwater include liner leaks and migration through deeper fissures and flaws in the bedrock. "Unplanned releases of selenium from the mine facilities can occur as leaks from the seepage collection and water management ponds and from uncaptured seepage directly to groundwater from the waste storage facilities."[2239]

Liner leaks pose a particular risk that is inadequately assessed or described in the DEIS. Dr. Zamzow notes:

> The Main [water management pond], and the seepage collection ponds will be lined (DEIS, Appendix N), but liner leaks and overtopping would cause mine-influenced waters to escape the ponds. If monitoring is not effective at identifying leaks and the proposed pump back wells are not effective in capturing the escaped solutions, selenium and other mine contaminants would adversely affect downgradient groundwater, surface water, and aquatic biota and wildlife in streams and wetlands. Such mitigation and mine water capture failures have occurred at other mine sites (Earthworks 2012).[2240]

[2236] Levit & Chambers, 2012 at 3.
[2237] DEIS at 4.17–14.
[2238] *Id.* at 4.18–14.
[2239] Zamzow, 2019a at 4.
[2240] *Id.*

Although the DEIS gives cursory attention to a limited liner leak scenario, it only considers the impacts from a small tear at a single pond, rather than a larger rupture or a liner failure at other pits or impoundments that are projected to contain higher concentrations of pollutants:

> The DEIS examined a failure scenario with the Main [water management pond] in which a small amount of contact water (0.4% of the total volume of the pond) escaped from the pond due to damage from ice hitting the liner during spring break-up. . . . Larger releases were not examined, nor were potential releases from any of the other contact water ponds on the site with higher predicted selenium concentrations. . . . The DEIS failure scenario highlights that liner failures could occur and adversely affect downstream water quality during operations.[2241]

The DEIS fails to acknowledge or consider other ways that contaminated water could seep out of pits or impoundments containing highly contaminated water, including through faults or fissures in the bedrock. "In addition, pit water could migrate through faults to downgradient groundwater and surface water. This potential exposure pathway has not been examined in the DEIS." [2242] A recent report by Maest and Wobus examined the location of identified faults in the mine area, and found that "many of them intersect the open pit, especially in the northern and southeastern areas of the pit."[2243] Other similar mines have experienced "[m]ovement of mine-influenced water along faults and outside the capture zone."[2244] Consideration of the effects of these faults is important because "[o]utward movement of poor-quality water from the pit could affect the Upper Talarik and the South Fork Koktuli watersheds."[2245] The DEIS does not model or otherwise assess the potential for contaminated water to bypass the treatment system via these avenues.

Indeed, such modeling would be impossible, because PLP has not designed or engineered the treatment system. In response to a request from EPA seeking more information on the proposed hydraulic containment system, the Corps indicated that the seepage capture facilities and hydraulic containment system "are currently conceptual only . . . and would be developed in the final design."[2246]

The proposed plan to use excavated rock for construction on site creates the potential for generating contaminated contact water that will not be captured or treated:

> The [potentially acid-generating] waste rock will be stored in the [pyritic tailings storage facility] under submerged conditions, while the non-[potentially acid-generating], predominantly Tertiary waste rock will be used, in addition to the

[2241] Zamzow, 2019a at 5.
[2242] *Id.* at 21–22.
[2243] Maest &Wobus, 2019 at 2.
[2244] *Id.*
[2245] *Id.* at 21–22.
[2246] *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.18 – Water and Sediment Quality, at EPA Comment #33 at 15.

> quarry rock, for constructing the embankments of the waste and water impoundments. Runoff from this material will mobilize selenium into groundwater or surface water.[2247]

Other avenues by which pollutants could evade treatment and enter the environment include direct contact by birds who land on highly contaminated pits and impoundments on site. The DEIS does not consider the environmental impacts of these contacts.

> The pit lake has the potential to act as a reservoir of selenium, . . . [and] birds could be exposed through direct ingestion and preening if they land on the lake. During winter, it is possible that migrating birds would choose the pit lake as it will likely not freeze because of the perpetual pumping proposed for pit lake management.[2248]

The DEIS also fails to fully inform the Corps or the public of either the likelihood of a major spill or other significant failure of contaminated water containment or treatment systems, or of the devastating downstream impacts that would result from such a failure. Because the downstream impacts that would result from the release of untreated contaminated contact water would be so extreme, the DEIS must consider all potential events that could result in such a release.

The DEIS fails to satisfy the fundamental requirement of Section 404(b) of the CWA that it demonstrate that the proposed discharges will not have significantly adverse impacts on downstream ecosystems.[2249] For the Pebble Mine, the failure scenarios that must be considered include spills and complete tailings dam failures.

The DEIS contains only cursory and inadequate assessments of the environmental impacts from limited containment failure scenarios, including a tailing pipeline spill, partial breach of a tailing impoundment, and a liner tear at the main water management pond that leads to a slow release over the course of one month.[2250] The description in the DEIS of the resulting downstream impacts from these scenarios "underestimates the potential for the spills to adversely affect soils, vegetation, shallow groundwater, stream water, stream sediment, and aquatic life."[2251] For example, the tailings impoundment partial breach scenario "completely ignores the potential for thicker layers of tailings to remain in place, leach to shallow groundwater, and bleed from shallow groundwater into Tributary [South Fork Koktuli] 1.420 and the South Fork Koktuli over time, as occurred along Silver Bow Creek in Montana."[2252]

The limited failure scenarios considered in the DEIS represent only a fraction of the actual potential sources of failure at the Pebble Mine.

2247 Zamzow, 2019a at 5.
2248 *Id.* at 21.
2249 40 C.F.R. § 230.10(c).
2250 DEIS at 4.27–80 to 4.27–117.
2251 Maest, 2019 at 30.
2252 *Id.* at 31.

> Additional failure scenarios should be included that examine the water quality consequences of mine water leaking from both tailing facilities, the mine water management ponds, the seepage collection ponds, and the open pit. The downgradient groundwater and surface water quality effects of any predicted failures and the predicted three-foot groundwater mound around the Bulk [tailings storage facility] should be quantified.[2253]

Notably, the DEIS omits any consideration of the most consequential potential failures.

> The draft EIS for the Pebble Mine does not consider the possibility of a complete tailings dam failure at any of the proposed facilities, noting that 'The probability of a full breach of the bulk or pyritic [tailings storage facility] tailings embankments was assessed to be extremely low' (DEIS, p. 4.27-72).[2254]

The DEIS is deficient because it fails to present and fully evaluate a complete tailings dam failure scenario. It also fails to provide adequate data or specifications to allow a third party to conduct such an analysis.

> The [tailings storage facility] Dam designs are incomplete, which affects fundamental aspects of the stability/failure analysis that are not acknowledged in the DEIS as required by NEPA. As noted in the Failures Modes and Effects Analysis workshop report, 'The current Pebble Project embankment designs are at an early-phase conceptual level, with geotechnical investigations still under way at the major embankment sites. This current conceptual design level inherently results in uncertainties.' (AECOM, 2018b, p. 1).[2255]
>
> Rather than acknowledging that the dam designs are incomplete, and therefore that they do not have sufficient information to fully evaluate the risk of a [tailings storage facility] failure (as required by 40 C.F.R. § 1502.22), the DEIS dismisses the risk of a full [tailings storage facility] breach, and proceeds with a detailed analysis of a scenario in which an earthquake ruptures the bulk tailings pipeline but leaves the tailings dam intact.[2256]

This omission is striking and problematic. The actual effects of a complete tailings dam failure would be catastrophic. "Lynker (2019) developed a physically-based model of the downstream fate and transport of tailings in the event of a complete tailings dam failure. That study found that a full [tailings storage facility] failure could impact hundreds of miles of salmon- producing streams, with potentially catastrophic long-term consequences to salmon habitat in these streams."[2257] "A full [tailings storage facility] failure is projected to transport tailings more than 140 km downstream, spreading materials across much of the floodplain of the Koktuli, Mulchatna

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[2253] *Id.* at 39.
[2254] Wobus, 2019 at 11.
[2255] *Id.* at 11–12.
[2256] *Id.* at 13.
[2257] *Id.*

and Nushagak rivers and the abundant off-channel habitat currently available to salmonids throughout those catchments.[2258]

v. The DEIS fails to take a hard look at potential impacts of fugitive dust on water quality.

Another way that the DEIS fails to disclose or assess the potential for the Pebble Mine to cause or contribute to water quality standards violations, or otherwise cause or contribute to significant degradation of the environment, is by not fully accounting for the impacts to water quality from fugitive dust. The DEIS does not adequately assess impacts of fugitive dust on water quality from either runoff or direct deposition on water bodies. The DEIS also artificially restricts consideration of the constituents of fugitive dust to a subset of the actual pollutants that will be present in the dust and that may impact water quality, such as copper. The calculations of contaminant loading in waterbodies caused by fugitive dust are flawed because they assess fugitive dust water quality impacts in isolation, rather than together with projected contaminant loading from other established sources, such as discharges from the mine's water treatment plants.

The Pebble Mine will generate fugitive dust from multiple sources. The mine will produce dust via mine activities — including blasting, drilling, wind erosion from stockpiles and overburden — and dust plumes produced by vehicles moving over unpaved surfaces. [2259]

The DEIS section on water quality impacts offers only a scant paragraph on the impacts of fugitive dust.[2260] That paragraph provides summary findings without meaningfully quantifying the analysis, or explaining data relied on or basis for analysis.[2261] The DEIS states:

> In terms of impact magnitude, the calculations indicate an expected increase in the concentration of metals in surface water as a result of dust deposition, ranging from 0.1 to 0.7 percent, which would not result in exceedances of the most stringent water quality criteria (Appendix K3.18, Table K3.18-1) in background conditions or [water treatment plant] outflow conditions.[2262]

The table cited, K3.18-1, merely lists the water quality criteria, and offers no analysis.

Fugitive dust will impact water quality in the area surrounding the mine site in two primary ways: chemical toxicological effects, and physical effects such as turbidity. [2263] Neither is fully or accurately assessed in the DEIS. Most egregiously, the DEIS completely fails to assess the water quality impacts of copper from fugitive dust sources.[2264] The DEIS only analyzes the subset of metals that are designated as hazardous air pollutants, completely ignoring the full range of environmental impacts — including water quality impacts — from the metals and other

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[2258] *Id.* at 14.
[2259] Zamzow, 2019b at 4.
[2260] *See* DEIS 4.18–11.
[2261] *Id.*
[2262] *Id.*
[2263] Zamzow, 2019b.
[2264] *Id.* at 2, 5, 15, 18, & 26.

contaminants that will be mobilized by the Pebble Mine.[2265] Copper will be present in high concentrations in the fugitive dust from the mine.[2266] Copper is also toxic to aquatic life in even small concentrations, and is known to reduce growth, immune response, reproduction, and survival.[2267]

The DEIS fails to properly assess all of the ways contaminants in fugitive dust will reach surface waters and impact water quality. For example, an appendix to the DEIS notes that the modeling for water quality impacts from fugitive dust "does not account for overland runoff." [2268] The DEIS does not explain the rationale behind this conclusion, and no studies or direct measurements are cited as informing the decision to exclude this source. Similarly, the DEIS fails to assess contaminant loading from fugitive dust that leaches into groundwater that is hydrologically connected to surface water.[2269] The DEIS also fails to account for contaminant loading from snowmelt from areas where snow has accumulated layers of dust throughout the winter.[2270]

The DEIS' assessment of the chemical and toxicological impacts of water quality contamination by fugitive dust is particularly inadequate because the DEIS treats water quality impacts from fugitive dust in isolation, rather than in connection with other sources such as discharges from the water treatment plants. As a result, the DEIS fails to assess the ecological impacts of the combined pollutant loadings. In particular, the DEIS fails to consider whether concentrations of selenium would exceed even Alaska' current water quality standard once all sources are considered together. In addition to the potential to contribute to exceedances of specific pollutants, such as selenium, the introduction of trace elements from fugitive dust may also increase the potential for negative synergistic impacts among pollutants.[2271] For example, copper can act synergistically with zinc, magnifying some impacts.[2272] The DEIS completely fails to assess these impacts.

The DEIS also entirely fails to assess the water quality effects of fugitive dust on turbidity. Beyond the water quality impacts from trace metals and other chemical pollutants, fugitive dust from the Pebble Mine will increase the turbidity of surface waters, including in particular the many small ponds near the mine site.[2273] Fugitive dust deposition on ponds may cause temporary turbidity, and may block photosynthesis.[2274] Reduction in water clarity could substantially affect aquatic ecosystems, including by degrading waters and killing vegetation.[2275] Particulates from fugitive dust may also alter the physical substrate conditions in water bodies.[2276] Particulates from

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[2265] *Id.* at 18.
[2266] *Id.* at 4, 18.
[2267] *Id.* at 18, 26.
[2268] DEIS at Appendix K4.18.3.1.
[2269] Zamzow, 2019b at 23, 28.
[2270] *Id.* at 28.
[2271] *Id.* at 27.
[2272] *Id.*
[2273] *Id.* at 22.
[2274] *Id.* at 23.
[2275] *Id.* at 25.
[2276] *Id.*

dust may abrade benthic plants and animals, and may clog the interstices of coarse gravel beds degrading the intragravel environment and potentially harming eggs and larvae of salmonids and other substrate-spawning fishes.[2277]

vi. There is no concrete, specific contingency plan for when water capture or treatment systems fail.

The inadequate discussion in the DEIS of the potential for failure of the proposed treatment system or for pollutants to bypass the treatment system is particularly egregious because once mine operations begin there will be no way to stop the constant production of highly contaminated water. The Pebble Mine would be placed in a natural system onto which precipitation falls and through which groundwater and surface water flows. The DEIS acknowledges that once this water comes into contact with disturbed materials on the mine site, it will accumulate contaminants that will be carried downstream unless contained and treated. And the proposed containment in mine pits and additional impoundments will only increase the potential and duration of the contacts that will produce contaminated water. As new water continues to enter the mine system in the form of precipitation and other natural inputs, water will need to be discharged from the site to maintain the hydrologic balance. These discharges will contain elevated levels of pollutants unless treated.

The Pebble Mine project must be distinguished from other industrial projects where the failure of proposed pollution treatment systems can be mitigated by shutting down the facility. If a power plant's proposed emissions controls fail to reduce air pollutants to below environmentally safe levels, the entire plant can be shut down while a solution is identified and installed. The Pebble Mine will not have this luxury. Any repairs, substitution, or augmentation to the proposed water pollution containment and treatment systems will have to be made on the fly, while the mine continues to produce high volumes of contaminated discharges simply by existing.

There is no room for error when it comes to the containment and treatment of contaminated discharges. If any part of that system fails, the mine will discharge toxic pollutants into the environment. If it turns out that there is no technology actually capable of achieving the required pollution reductions prior to discharge, the mine will discharge these toxic pollutants into the environment in perpetuity.

Because it presumes — without evidence and in the face of multiple indications to the contrary — that the containment and treatment systems will function as planned, the DEIS fails to disclose or assess the actual potential for the mine to create devastating environmental effects and fails to provide the Corps with "sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with [the Section 404(b)(1)] Guidelines."[2278]

vii. The water treatment system is likely to fail.

The DEIS describes some of the factors that are likely to negatively impact the ability of the proposed treatment system to achieve the projected pollution concentration reductions. That the DEIS includes in an appendix a description of some of these barriers to proper functioning of

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[2277] *Id.* at 25–26.
[2278] *See* 40 C.F.R. § 230.12(a).

the treatment system renders the ultimate conclusions in the DEIS as to the likelihood of successful treatment disingenuous and counter to the evidence.

Appendix K4.18 acknowledges that the water quality of the influent requiring treatment will worsen over the life of the mine:

> The influent water quality to [water treatment plant] #1 would be expected to gradually worsen with each year of mine activity as more pre-Tertiary age rock is exposed to oxygen and water. Thus, pit wall runoff in early years of mining would be expected to be of better quality than at the end of mine life (i.e., after 20 years).[2279]

This means that the demands on the water treatment system will only increase over time. If the water treatment system struggles at first, any issues will only be compounded and magnified over time.

Although the DEIS acknowledges that water treatment systems are highly sensitive and prone to disruption, and that the conditions at the Pebble Mine have the potential to produce particular treatment challenges, the DEIS fails to identify any actual solutions, opting instead to kick the can down the road. In so doing, the DEIS fails to provide the Corps with "sufficient information to make a reasonable judgment as to whether the proposed discharge will comply with [the Section 404(b)(1)] Guidelines."[2280]

Appendix K4.18 contains some general statements about the sensitive nature of some of the proposed treatment technologies, but neither the appendix nor the DEIS incorporates these limitations into the design or assessment of the proposed treatment system. The appendix notes that "[u]ltrafiltration membranes would be used to filter precipitated metals and protect downstream high-pressure membranes," but that "[t]he process can be disrupted by fouling if the membrane system is not properly monitored and maintained, or if the upstream processes are upset in a manner that results in excessive solids in the influent."[2281] The appendix further notes that another treatment technology relied on to achieve the water quality results projected in the DEIS, nanofiltration, "can be disrupted if the membrane system is not properly monitored and maintained, or if the upstream processes are upset in a manner that results in excessive TDS in the influent."[2282] The DEIS fails to include any meaningful discussion of what steps will be taken to properly monitor or maintain these systems. More problematically, the DEIS is completely silent as to the potential environmental impacts that would result from fouling of these systems.

The DEIS also notes specific conditions at the Pebble Mine that will pose particular treatment challenges, but fails to identify any corresponding treatment solutions. The DEIS states that

> [b]ased on an independent review of the [water treatment plant] source terms and

[2279] DEIS at K4.18–16.
[2280] *See* 40 C.F.R. § 230.12(a).
[2281] DEIS at K4.18–49.
[2282] *Id.*

> processes (Appendix K4.18; AECOM 2018i), discharge water from both [water treatment plants] is currently expected to meet ADEC criteria. However, there is some concern that salt and selenium could build up over time in the pyritic [tailings storage facility], which has the potential to lead to increased total dissolved solids (TDS) concentrations that would require treatment in the main [water treatment plant] (AECOM 2018i).[2283]

Rather than provide a solution to this problem or identify aspects of the proposed treatment system capable of addressing this challenge, the DEIS punts on the issue, stating "[t]his may require further investigation as design progresses, and/or as a long-term adaptive management strategy."[2284]

Appendix K4.18 describes one potential scenario under which projected conditions of the influent requiring treatment would not be met, and the resulting disruption to the functioning of the treatment system. However, neither the appendix nor the DEIS itself provides a plan for addressing this scenario. Nor does the DEIS contain a description of the negative environmental impacts that would follow from this occurrence, as is required by Section 404(b) of the CWA. Appendix K4.18-50 introduces a plausible and foreseeable scenario that would lead to conditions requiring more intensive treatment than could be achieved by the projected water treatment system:

> An independent review of the [water treatment plant] #2 inflows and processes was conducted by AECOM (2018i). While the strategy for treatment and management in [water treatment plant] #2 considers the major species, it involves highly complex chemistry and is reliant on assumptions that salt mass would be captured in solid form within interstitial voids in the pyritic [tailings storage facility], and that rejected selenium solids discharged to the bulk [tailings storage facility] would not be remobilized. In the event that these assumptions prove to be invalid, the currently modeled salt and selenium mass balance would not be achieved by the end of operations, and a more rapid increase in salt and selenium mass would occur in the main [water management pond] than currently projected.[2285]

The appendix specifically acknowledges that the currently proposed treatment system would not be able to successfully treat these pollutant loads, and that additional treatment would need to be brought online: "As these species concentrate, TDS would rise and the treatment strategy for [water treatment plant] #2 would need to be altered to address these changed conditions."[2286] But neither the appendix nor the DEIS identifies whether any existing technology would be capable of addressing these issues, nor do they provide any actual plans or design specifications.

[2283] *Id.* at 4.18–4 to 4.18–5.
[2284] *Id.*
[2285] *Id.* at K4.18–50.
[2286] *Id.*

The Appendix identifies a potential scenario under which initial treatment failures would be compounded over time, leading to additional treatment failures and, ultimately, exceedances of water quality standards:

> This would also contribute to higher dissolved salt loads, which could result in lower recovery rates in the [nanofiltration] processes, treatment systems not meeting current design capacities, and the potential for higher TDS in the discharge streams in order to close the salt balance. Further, the captured selenium would continue to cycle up in the process and could eventually reach a level where the treatment system is unable to meet discharge limits. [2287]

Despite directly acknowledging the potential for exceedances of water quality standards for multiple pollutants, neither the appendix nor the DEIS includes any assessment of the environmental impacts of these elevated polluted concentrations in streams outside of the mine.

Instead of actually describing and assessing the likelihood of treatment failure and resulting downstream pollution exceedances, the DEIS presupposes the existence of additional treatment.

> To mitigate the lower recovery rates to meet the hydraulic capacity, the [nanofiltration] system would need to increase pressures as salt load increases to achieve recoveries similar to the current design criteria. While this could allow [water treatment plant] #2 to meet the hydraulic capacity, salt load would continue to increase, potentially resulting in elevated levels of [total dissolved solids] and selenium in the discharge. This may require further investigation as design progresses and/or as a long-term adaptive management strategy. If necessary to meet both hydraulic capacity and discharge criteria, trains would be installed as needed (PLP 2019-RFI 106).[2288]

By failing to describe what additional treatment technologies may be available, to confirm that such technologies exist and could be employed in this setting, or to provide field tests showing the efficacy of such treatment, the DEIS deprives decisionmakers and the public of the opportunity to understand and assess the likelihood that treatment could be achieved.

3. The DEIS does not adequately assess potential impacts from a failure of the containment or treatment systems.

The DEIS must fully describe and evaluate the potential impacts from the discharge water containing elevated concentrations of selenium and other pollutants (either through treatment system failure or discharges that bypass the treatment system), especially given the severity pollutants like selenium.

[2287] *Id.*
[2288] *Id.*

Section 404(b) requires a full accounting of the environmental effects of the introduction of high concentrations of selenium into the environment, and prohibits the Corps from issuing a 404 permit if the resulting discharges would cause or contribute to violations of water quality standards or otherwise cause or contribute to significant degradation of the environment.[2289] This is true even if the DEIS elsewhere predicts that the chances of such a release are unlikely. "An EIS 'must be particularly thorough when the environmental consequences of federal action are great.'"[2290] Where a proposed project's minimization of environmental impacts relies on a technology that is "experimental and fraught with uncertainties," the "'major' environmental consequences that would result from a failure cannot be said to be 'remote and highly speculative.'"[2291]

The Pebble Mine will produce contact water with extremely high levels of selenium, including concentrations sufficient to cause devastating impacts to aquatic ecosystems should they be released with no treatment or with inadequate treatment:

> The majority of the Tertiary samples from the Pebble West Zone (PWZ) leached selenium concentrations in excess of values known to cause toxicity to aquatic life over the long term, and leachate would need to be diluted by many times – by up to two orders of magnitude – to comply with relevant criteria (Figure 2).[2292]

Even under the best case scenario, assuming that the DEIS has accurately modeled and projected selenium concentrations in the on-site pits and impoundments,

> [s]elenium concentrations from the pit lake during closure years 20 to 125 are expected to be 9-15 µg/L (Lorax Environmental 2018) and will likely be higher. While the pit lake is not required to meet aquatic life criterion (5 µg/L), it does need to be assessed for potential consequences to receptors. . . . Such an assessment has not been conducted.[2293]

But if the modeling and projections in the DEIS are wrong — and it is clear that the DEIS overlooks multiple factors that could lead to elevated selenium — then concentrations in the pit water will be even higher:

> After mine closure, pit lake water will be pumped and treated by [water treatment plant] #3 in perpetuity. Higher pit lake selenium concentrations would result in higher concentrations of selenium in [water treatment plant] effluent and a potentially greater impact on aquatic life. The FEIS needs to consider the effects of higher [water treatment plant] influent and effluent concentrations on biological receptors.[2294]

[2289] 40 C.F.R. § 230.10.
[2290] *Friends of the Earth*, 693 F.Supp. at 926 (quoting *Warm Springs Dam Task Force,* 621 F.2d at 1026).
[2291] *Id.*
[2292] Zamzow, 2019a at 5.
[2293] *Id.* at 7–8.
[2294] *Id.* at 8.

The Pebble Mine will need to discharge contact water to maintain the required pit lake level and otherwise manage the water balance on site. This means that the contact water must be subject to intensive treatment to reduce pollutant concentrations to below the applicable water quality standards. The technologies that the Pebble Mine will rely on to reduce the concentrations of selenium and other harmful pollutants in discharges to the environment are untested and unproven and carry a high risk of failure. The DEIS has failed to establish that contaminated water will not bypass the treatment system and discharge directly into receiving streams. The DEIS must presume the worst case scenario and must fully assess the effects on the environment from the release of contact water containing elevated levels of selenium. "If a governmental agency cannot obtain adequate information upon which to make a reasoned assessment of the environmental impacts, it must perform a 'worst case' analysis."[2295] The DEIS fails to provide this analysis.

There is a real risk of failure of the water treatment system. Other mines in Alaska have experienced similar failures. The DEIS notes that "over the life of the mine, it is possible that APDES permit conditions may be exceeded for various reasons (e.g., treatment process upset, record-keeping errors) as has happened at other Alaska mines."[2296] Despite this, the DEIS fails to meaningfully assess the downstream effects of such a failure.

Should elevated concentrations of selenium from the Pebble Mine enter the environment, the effects on impacted ecosystems would be devastating:

> The fingerprint of selenium toxicity is well-established (Chapman et al. 2009, EPA 2016b). It primarily affects the embryos of egg-laying vertebrates, arising from elevated selenium concentrations in yolks that are caused by elevated dietary selenium. In the growing embryo, selenium substitutes for sulfur in the amino acids cysteine and methionine because of its molecular and chemical similarity. These amino acids are key components of keratins and other fibrous structural proteins that make up cartilage, hair, nails, horns, claws, hooves, and the outer layer of human skin. The proper function of these proteins is impaired when they contain high proportions of seleno-amino acids, and this is reflected in physical deformities in fish such as missing gill plates and deformities of the head, spine, and fins (Muscatello 2006, Lemly 2014). Since diet is the primary source of selenium to fish, its efficient uptake by algae and aquatic insects contributes to selenium toxicity (Lemly 2004). Aquatic birds can also be affected, primarily through the death or deformation of chicks (Brix et al. 2000, Ratti et al. 2006, NAMC 2008a, Chapman et al. 2009).[2297]

The organisms most likely to be affected by exposure to elevated selenium concentrations from the Pebble Mine are birds and fish. "Because dietary exposure is the dominant pathway of

[2295] *Friends of the Earth*, 693 F. Supp. at 932 (*citing Methow Valley Citizens Council*, 833 F.2d at 817).
[2296] DEIS at 4.18–5.
[2297] Zamzow, 2019a at 17–18.

selenium uptake, animals at higher trophic levels—particularly birds and fish—are considered among the most sensitive to deleterious effects of selenium (Hamilton 2004)."[2298]

But the negative impacts of selenium exposure could be much more wide ranging. "Bioaccumulation of selenium is known to occur in amphibians and reptiles (Ohlendorf et al. 1988) and mammals (Clark 1987) that prey on aquatic biota from selenium-polluted waters, but more study of toxic effects to these taxa is needed (ATSDR 2003a)."[2299]

The DEIS fails to identify the specific species at risk from exposure to elevated selenium in discharges from the Pebble Mine:

> The DEIS and supporting documentation are insufficient to determine species at risk; fish and aquatic birds known to incubate, nest, rear, and/or spawn on or near ponds, wetlands and streams in close proximity to proposed discharge locations. Chinook, coho, and sockeye salmon spawn in at least one of the [water treatment plant] discharge areas but information on potentially more vulnerable resident fish spawning areas is sparse (DEIS p.3.24-5 to 3.24-13). Similarly, the mine area is used by raptors (DEIS Figure 3.23-1), waterfowl (DEIS Figures 3.23-2 and 3.23-3), and includes swan nesting areas (DEIS Figure 3.23-4). The species that nest and rear broods in the mine area, particularly near [water treatment plant] effluent discharge sites, are not sufficiently considered for potential individual and population level impacts of elevated selenium concentrations resulting from discharge (DEIS p.3.23-1 to 3.23-23).[2300]

The DEIS also fails to describe or assess the site-specific factors that will determine the concentration of selenium at which particular species and downstream ecosystems will suffer adverse impacts:

> [F]actors that influence selenium uptake and movement through the food chain include organic carbon, temperature, trophic status of the receiving ecosystem, latitude or the presence of susceptible species. These factors need to be considered when assessing the environmental consequences of selenium discharge in natural waters and the subsequent impacts to aquatic life." [2301] "Despite such well-documented toxic effects, no ecotoxicity studies or analyses necessary to predict and consider potential ecotoxic effects, have been conducted on [water treatment plant] discharge water in the DEIS or otherwise to determine the potential for biological impacts for the Pebble project.[2302]

The DEIS violates Section 404(b) of the CWA because it fails to include a detailed assessment of the environmental effects that will follow should the proposed containment and treatment system allow the release of contaminated contact water containing toxic levels of

[2298] *Id.* at 18.
[2299] *Id.*
[2300] *Id.*
[2301] *Id.* at 15.
[2302] *Id.* at 18.

selenium and other pollutants, and because the available information precludes a determination that the Pebble Mine will not cause or contribute to violations of applicable water quality standards, or will not cause or contribute to significant degradation of the environment.[2303]

4. The DEIS fail to take a hard look at impacts caused by discharges that raise the temperature of receiving streams.

To achieve compliance with the Alaska state water quality standards for selenium, the DEIS indicates that the Pebble Mine will rely on a combination of treatment technologies, including biologic based treatment. But biologic treatment requires the water to be a particular temperature, and that temperature exceeds the temperature in the receiving streams. Alaska's water quality standards include the prohibition that "the weekly average temperature may not exceed site-specific requirements needed to preserve normal species diversity or to prevent appearance of nuisance organisms."[2304] The DEIS fails to include any discussion or assessment of the environmental effects of raising the temperature of the receiving streams.

The DEIS states that "[t]he open pit [water treatment plant] would also include biological selenium removal."[2305] However, the organisms required for that biological treatment are active and effective within only a narrow temperature range, and "[s]upplemental heating could be necessary during cooler periods to achieve minimum temperature levels for biological selenium removal to be effective."[2306] The result is that "[e]ffluent discharged from the water treatment plants will be warmer than the receiving environment and may adversely impact aquatic organisms in the receiving streams."[2307]

The DEIS's inadequate assessment of the impacts of increased temperatures from treated water discharges suffers from poor quality data, inconsistent data, and a failure to support or explain several critical assumptions. The DEIS relies on inadequate baseline data by apparently relying solely on one summer, ice-free period in 2007.[2308] "By only using 2007 data, [the] models are not robust [enough] to predict[] outside of the data range or to account for inter-annual variation, which for temperature is typically quite high."[2309] It is unclear whether the baseline data or modeling inputs include winter temperatures at all.[2310] The DEIS and supporting documents include "discrepancies in the reported changes post-mine in water temperatures between Chapter 4 and Appendix I (Table 1). Chapter 4 reports a single value of change while Appendix I reports a 'range of average temperatures'."[2311] The DEIS provides no explanation for how or why specific values were selected from the range of average temperatures provided in Appendix I.[2312] The data

[2303] *See* 40 C.F.R. § 230.10.
[2304] 18 AAC 70.020(10).
[2305] DEIS at 4.18–4.
[2306] *Id.* at 4.18–4.
[2307] Zamzow, 2019a at 13.
[2308] *See* Reeves, 2019b at 1.
[2309] *Id.* at 1–2.
[2310] *Id.* at 2.
[2311] *Id.*
[2312] *Id.*

ranges provided in Appendix I lack confidence intervals, which means "it is not possible to assess the validity of the estimate[s] or the conclusions drawn from them."[2313]

The DEIS relies on conclusory statements regarding the distance downstream that the effects of the water temperature increases will extend. Specifically, the DEIS claims that temperature effects will not extend past 0.5 miles in North Fork Koktuli River, 1 mile in South Fork Koktuli River, and 3 miles on Upper Talarik Creek.[2314] But the DEIS fails to explain how it developed these estimates. There is simply "no analysis to confirm that water temperatures would not be altered beyond the distances reported in the DEIS."[2315] In fact, "[g]iven the magnitude of change in water temperatures, particularly during the winter, it is implausible that these findings are correct and the areas of stream affected by the discharge are likely much wider than reported in the DEIS."[2316]

The DEIS fails to adequately or accurately assess the ecological effects of raising the temperature in the receiving streams, despite the fact that "[t]here can be ecological impacts if high-volume flow effluent is released at a higher temperature than the receiving waters."[2317] Specifically,

> [a] potential adverse effect of [water treatment plant] treatment for selenium is the increased temperature of the effluent, predicted in this Position Paper to be 5.6 C. The predicted effluent temperature is higher than baseline water temperature averages: the baseline mean water temperatures at streams at the mine site area are 4-4.8°C (DEIS at 3.18-8) with median water temperature for the South Fork Koktuli, North Fork Koktuli, and Upper Talarik Creek ranging from 1°C to 3°C (ERM 2018 Table 9.1-3, Table 9.1-7, Table 9.1-11).[2318]

The failure of the DEIS to adequately assess the ecological impacts from the discharges of heated water is particularly problematic here due to the sensitivity of salmonids to increases in stream temperature. Rather than meaningfully engage with the issue, the DEIS summarily dismisses concerns regarding the effects of increased temperature:

> The DEIS states that in general winter water temperature changes could impact eggs and alevins through increased metabolism, growth, and changes in time of emergence (DEIS at 4.24-23), but that changes in [water treatment plant] effluent water temperatures are within the optimum ranges for the different life-stages of the various species present (as described by Weber-Scannell 1991) and, therefore, effects of changes in summer water temperature "would be expected to cause negligible impacts to Pacific salmon and their habitat" and in winter water temperatures to be 'negligible to potentially positive.'"[2319]

[2313] *Id.*
[2314] DEIS at 4.24–25.
[2315] Reeves, 2019b at 3.
[2316] *Id.*
[2317] Zamzow, 2019a at 14.
[2318] *Id.* at 15.
[2319] Zamzow, 2019a at 15.

But the Weber-Scannell paper relied on by the DEIS to dismiss temperature-related concerns does not contain a meaningful analysis of the effects of temperature increases on fish species in Alaska, and in fact directly cautions against applying its conclusions to streams and species in Alaska. The Weber-Scannell paper

> describes temperature values reported in the scientific literature for species across distributional ranges and includes very few citations for populations in Alaska and fewer for western Alaska. Weber-Scannell noted that there were critical limitations of applying these temperatures to fish in Alaska, stating that "Many of the studies that relate changes in temperature effects on fish examine higher ranges than are usually experienced by fish in Alaska. Therefore, acceptable upper and lower temperature ranges from the published literature are often not applicable to fish naturally occurring at higher latitudes."[2320]

In fact,

> [a]s Weber-Scannell suggests, and the DEIS fails to acknowledge, populations of Pacific salmon are highly adapted to local conditions (Beer and Anderson 2001), and the EPA noted that the diverse environmental conditions in the Bristol Bay area have led to large variation among populations of Pacific Salmon species and local adaptation (EPA 2014 p. 7-34 to 7-35). Applying generic standards to assess impacts to local populations leads to invalid conclusions about potential effects.[2321]

A full review of the available literature would have revealed that the salmon species present in the streams that will receive the heated water discharges from the Pebble mine are particularly sensitive to water temperature increases, and that increases to stream temperatures during the winter are likely to significantly negatively affect these species. "Local adaptation of salmon to water temperature appears strongest at low, rather than high, temperatures (Jensen *et al*, 2000). Thus the reported increase in winter water temperatures is likely to have significant negative, not 'negligible to potentially positive' effect on Pacific Salmon."[2322] For example,

> egg development depends on the accumulation of degree days. (Neuheimer and Taggart 2007) over the development period. As a result, spawn timing is finely tuned to local environmental conditions, notably water temperatures during the incubation period (Beacham and Murray 1990), to promote juvenile emergence at a favorable time of year for growth and viability (Webb and McLay 1996; Brannon et al. 2004; Campbell et al. 2019). Slight increases in temperature can accelerate rate of development, resulting in smaller (Beacham and Murray 1990) and less well developed (Fuhruman et al. 2018) fish emerging earlier (McCullough 1999, Adelfio et al. 2019; Fig. 1).[2323]

[2320] *Id.* at 15–16; *see also* Reeves, 2019b at 3.
[2321] *Id.*
[2322] Zamzow, 2019a at 16; *see also* Reeves, 2019b at 4.
[2323] Reeves, 2019b at 4.

> Changes to thermal and hydrologic regimes that disrupt life-history timing cues can result in mismatches between fish and their environments or food resources, adversely affecting survival (Angilletta et al. 2008, Einum and Fleming 2000, Letcher et al. 2004).[2324]

The DEIS also wrongly concludes that there would be no anticipated effects on the community of aquatic invertebrates, a major food source for juvenile salmon. In fact, "[a] study in Sweden, found that the abundance of Chironomids (midges), a major food of juvenile Coho Salmon (Campbell et al. 2019), declined with an increase of 3°C (Jonsson et al. 2015)."[2325]

Because the DEIS dismisses concerns regarding the impacts of discharges of heated water from the treatment system, and because it relies only on studies that are facially inapplicable to the impacted environment while ignoring other directly relevant studies, it fails to adequately inform decisionmakers or the public of the foreseeable negative environmental impacts of the proposed treatment system.

E. The Project Fails to Avoid, Minimize, and Mitigate Impacts.

The CWA requires PLP to avoid, minimize, and mitigate impacts to the aquatic ecosystem.[2326] The mitigation sequence requires PLP to first avoid impacts to aquatic resources.[2327] For those impacts which cannot be avoided, PLP must take all appropriate and practicable steps to minimize impacts.[2328] For the remaining unavoidable impacts, PLP must use compensatory mitigation to replace the loss of wetland and aquatic resource functions in the watershed.[2329] The amount and quality of compensatory mitigation may not substitute for avoiding and minimizing impacts.[2330]

The Corps has determined that compensatory mitigation is appropriate and asked PLP "to evaluate a full suite of available and practicable mitigation options to comply with the provisions

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2324 *Id.*
2325 *Id.* at 5.
2326 *See* 33 C.F.R. pts. 325 and 332.
2327 *See* Environmental Protection Agency, Factsheet, Wetlands Compensatory Mitigation Factsheet, EPA-843-F-08-002, https://www.epa.gov/sites/production/files/2015-08/documents/compensatory_mitigation_factsheet.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments). It is important to note that sequencing also requires the Corps to first make a determination regarding significant degradation and then move on to mitigation. *See* Environmental Protection Agency, Comments, *EPA's General Comments on the Revised Post-Mine Reclamation Plan Overview (dated August 2014) Conceptual Compensatory Mitigation Plan (CCMP) and Fish Protection Plan (both dated June 2014) for the proposed Chuitna Coal Project*, Sept. 29, 2014, at 2 ("Due to the sequential nature of the Guidelines, a determination that the project would cause or contribute to significant degradation generally precludes discussion of compensatory mitigation.") (included as an attachment to these comments).
2328 *See* U.S. EPA Wetlands Compensatory Mitigation Factsheet.
2329 *Id.*
2330 *Id.*

of the 2008 mitigation rule and 2018 MOA."[2331] This determination subjects the Pebble Mine project to the requirements of the Compensatory Mitigation Rule.

Pursuant to the Compensatory Mitigation Rule and other pertinent regulatory provisions, all practicable measures to avoid and minimize impacts must be required, with only the residual unavoidable impacts eligible for compensatory mitigation.[2332] The DEIS fails to show how PLP has met its burden to avoid and minimize impacts. The DEIS also fails to provide an adequate assessment of the effectiveness of proposed mitigation measures and how mitigation will replace lost aquatic resource functions.

1. Compensatory mitigation must replace aquatic resource functions.

The 404(b)(1) Guidelines provide that "no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken which will minimize potential adverse impacts of the discharge on the aquatic ecosystem."[2333] Pursuant to the Corps' permitting regulations, compensatory mitigation may be required to ensure that a permit complies with the 404(b)(1) Guidelines. As noted above, the Corps has already determined that mitigation is required for this project.

The 2008 Mitigation Rule sets out how mitigation requirements are determined and provides the Corps with the authority to deny a permit if there is a "lack of appropriate and practicable compensatory mitigation."[2334] The 2008 Mitigation Rule also contains substantive provisions regarding the size and location of compensatory mitigation that are directly pertinent to the Corps' decision whether to permit the Pebble Mine. The 2008 Mitigation Rule requires that "the amount of required compensatory mitigation *must be, to the extent practicable, sufficient to replace lost aquatic resource functions.*"[2335] And, "[t]he district engineer must use a watershed approach to establish compensatory mitigation requirements . . . to the extent appropriate and practicable."[2336] "The ultimate goal of a watershed approach is to maintain and improve the quality and quantity within watersheds through strategic selection of compensatory mitigation sites."[2337]

The EPA and the Corps have entered into two relevant memorandums of agreement — a general memorandum of agreement (MOA) in 1990 (1990 MOA) and an MOA specific to Alaska in 2018 (2018 MOA).[2338] The 1990 MOA sets out the avoid-minimize-mitigate sequence, stating that the Corps must first make

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[2331] DEIS at 5–23.
[2332] *See, e.g.*, 33 C.F.R. § 332.3(a)(1) ("The fundamental objective of compensatory mitigation is to offset environmental losses resulting from *unavoidable* impacts to waters of the United States . . .." (emphasis added)).
[2333] 40 C.F.R. §230.10(d).
[2334] 33 C.F.R. § 332.1(c)(3).
[2335] 33 C.F.R. § 332.3(f) (emphasis added).
[2336] 33 C.F.R. § 332.3(c)(1).
[2337] *Id.*
[2338] Memorandum of Agreement Between the Environmental Protection Agency and the Department of the Army Concerning the Determination of Mitigation Under the Clean Water Act Section 404(b)(1) Guidelines (1990 MOA) https://www.epa.gov/cwa-404/memorandum-

> a determination that potential impact[s] have been avoided to the maximum extent practicable; remaining unavoidable impacts will then be mitigated to the extent appropriate and practicable by requiring steps to minimize impacts, and, finally, compensate for aquatic resource values.[2339]

The 1990 MOA also sets out the "no net loss" policy:

> The Corps will strive to avoid adverse impacts and offset unavoidable adverse impacts to existing aquatic resources, and for wetlands, will strive to achieve a goal of no overall net loss of values and functions.[2340]

The 1990 MOA acknowledges that some individual permit decisions may not achieve no net loss because "mitigation measures to meet this goal are not feasible, not practicable, or would accomplish only inconsequential reductions in impacts."[2341] The 1990 MOA also identifies that "[t]he determination of what level of mitigation constitutes 'appropriate' mitigation is based solely on the values and functions of the aquatic resource that will be impacted."[2342] The 1990 MOA also states that "'Practicable' is defined at Section 230.3(q) of the [404 (b)(1)] Guidelines."[2343]

The 2018 MOA recognizes guiding principles specific to Alaska, including:

- Avoiding wetlands may not be practicable where there is a high proportion of land in a watershed or region which is jurisdictional wetlands;
- Restoring, enhancing, or establishing wetlands for compensatory mitigation may not be practicable due to limited availability of sites and/or technical or logistical limitations;
- Compensatory mitigation options over a larger watershed scale may be appropriate given that compensation options are frequently limited at a smaller watershed scale;
- Where a large proportion of land is under public ownership, compensatory mitigation opportunities may be available on public land;

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agreement (included as an attachment to these comments); Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency Concerning Mitigation Sequence for Wetlands in Alaska Under Section 404 of the Clean Water Act (2018 MOA) https://www.epa.gov/sites/production/files/2018-06/documents/epa_army_moa_alaska_mitigation_cwa_404_06-15-2018_0.pdf (included as an attachment to these comments).

[2339] 1990 MOA at II.C.

[2340] 1990 MOA at II.B.

[2341] *Id.*

[2342] *Id.*

[2343] *Id.* 40 C.F.R. § 230.3(q) provides "the term *practicable* means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes."

- Out-of-kind compensatory mitigation may be appropriate when it better serves the aquatic resource needs of the watershed; and
- Applying a less rigorous permit review for small projects with minor environmental impacts is consistent with the Section 404 program regulations.[2344]

The 2018 MOA identifies that "required compensatory mitigation should be located in the same watershed as the impact site, and should be located where it is most likely to successfully replace lost aquatic resource functions and values."[2345] The 2018 MOA endorses a "Watershed Approach," and sets out that "[t]he goal of a watershed approach is to maintain *and improve the quality and quantity of aquatic* resources within watersheds through strategic selection of compensatory mitigation sites."[2346] In other words, there must be some functional lift.[2347]

In comments on a conceptual compensatory mitigation plan for another project in Alaska, EPA identified concerns about achieving functional lift:

> Several decades of experience with compensatory mitigation and numerous studies have shown that success in generating functional lift is often elusive. The establishment, restoration, and enhancement of aquatic resources are risky endeavors. The Final Mitigation Rule requires the Corps to incorporate the consideration of risk into its compensatory mitigation decisions. This is generally done by applying ratios to required compensation so that the amount of compensation will be adequate to offset the authorized impacts even if the mitigation actions are not 100% successful.[2348]

[2344] 2018 MOA at II.B.
[2345] *Id.* at III.C.1.
[2346] *Id.* at III.C.1.a (emphasis added).
[2347] In comments on a conceptual compensatory mitigation plan for the proposed Chuitna Coal Mine, EPA noted that "credits and debits are units of measure that represent the accrual or loss of aquatic resource function. . . . The issue of credit generation is an important one. Per the [2008] Final [Mitigation] Rule, the accrual of aquatic resource function (the 'functional lift') represented by a credit is determined by a function or condition assessment that compares the post-project condition with the pre-project (baseline) condition. Compensation activities that result in no measureable functional lift generate no credits, those that generate minimal functional lift, such as many enhancement activities, would generate minimal credits." EPA, Comments, *EPA's General Comments on the Revised Post-Mine Reclamation Plan Overview (dated August 2014) Conceptual Compensatory Mitigation Plan (CCMP) and Fish Protection Plan (both dated June 2014) for the proposed Chuitna Coal Project*, Sept. 29, 2014, at 3.
[2348] *Id.* at 4. EPA also notes that mitigation based on "aquatic resource establishment . . . is the riskiest form of compensation." *Id.* To address risky compensation measures, EPA encourages a higher ration: "[a]pplying even a moderate ratio of 3:1 to establishment increases the compensation obligation substantially."); *see also* National Marine Fisheries Service, Alaska Region, Report, *Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska*, Nov. 2011, at 3–3 ("Although reclamation efforts and mitigation practices may restore topographic land forms to mine sites, these efforts generally fail to restore natural hydrogeomorphic and aquatic function, and associated water quantity and quality within measurable time frames.").

While the 2018 MOA recognizes that larger watershed scales may be used, it states that

> [t]he size of watershed addressed using a watershed approach should not be larger than is appropriate to ensure that the aquatic resources provided through compensation activities will effectively compensate for adverse environmental impacts resulting from activities authorized by Section 404 permits.[2349]

The 2018 MOA notes that compensatory mitigation can include options on public land, but:

> compensatory mitigation credit for such projects on public land must be based solely on aquatic resource functions provided by compensatory mitigation projects *that are over and above the aquatic resource functions already being provided by the public land* in accordance with how that land is currently being managed.[2350]

Again, the 2018 MOA makes clear that there must be functional lift.

The 2018 MOA prioritizes in-kind mitigation over out-of-kind mitigation "because it is more likely to compensate for the functions and services lost at the impact site."[2351] The Final Mitigation Rule notes that streams are "difficult to replace."[2352]

In assessing potential compensatory mitigation for the proposed Chuitna Coal Mine and the associated loss of salmon streams, EPA noted that

> [t]he Final Mitigation Rule indicates that such resources should be offset in-kind where possible. 'In-kind' in general practice means not only stream-for-stream rather than wetland-for-stream, but also that functional gains and losses be matched by stream order or type where possible. This is because the functions performed by streams of different orders are distinct enough that functional gains to a third-order stream (e.g., coho habitat enhancement) cannot effectively offset functional losses to a first-order stream (e.g., nutrient cycling or flow moderation). As discussed above, all of the direct stream impacts, not only the impacts to anadromous waters, must be compensated for. The Final Mitigation Rule indicates that preservation, restoration, and enhancement are all preferable to stream creation (establishment) due to the latter's very high failure rate.[2353]

[2349] 2018 MOA at III.C.1.b.
[2350] *Id.* at III.C.2 (emphasis added).
[2351] *Id.* at III.C.4.
[2352] 2008 Final Mitigation Rule, 73 Fed. Reg. at 19,596.
[2353] *See* Environmental Protection Agency, Comments, *General Comments on the Revised Post-Mine Reclamation Plan Overview (dated August 2014) Conceptual Compensatory Mitigation Plan (CCMP) and Fish Protection Plan (both dated June 2014) for the proposed Chuitna Coal Project*, Sept. 29, 2014, at 4.

For that project, approximately 51.6 miles of streams would have been impacted by the proposed mining activity.[2354] The applicant prepared a conceptual compensatory mitigation plan that identified different categories of streams and suggested different mitigation ratios.[2355] EPA emphasized that "for the compensation to be truly 'in-kind' an analogous stream network, with first, second, and third order streams of similar physical characteristics would have to be preserved, restored, enhanced or established."[2356] EPA also clarified that

> If the compensation were to be "out-of-kind" such as wetland enhancement to offset stream loss, then mitigation ratios would need to be higher. Suggested activities such as nutrient addition or the planting of hatchery stock may offset some of the lost fish production capacity, but actually do nothing to offset the loss of the aquatic resource itself. The streams and wetlands on the project site do much more than produce anadromous or even resident fish. If nutrient addition, for example, were considered as enhancement, credit generation would be minimal. If fish production is one of perhaps eight stream functions, then 400 linear miles of stream would need to be enhanced, even without applying a mitigation ratio.[2357]

Notably, EPA highlighted that each function must be replaced, so even at a 1:1 ratio, if multiple functions are lost, the replaced stream miles could be multi-fold larger.

This will certainly be the case for the Pebble Project. But at this time, all PLP identifies is the number of miles of streams or acres of wetlands that will be lost. PLP provides no meaningful

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[2354] *Id.* at 5.

[2355] *Id.*; *cf.* PLP has not provided anything close to what the applicant provided for the proposed Chuitna Coal Mine. PLP has not identified stream order loss or suggested mitigation ratios; *see also* U.S. Fish and Wildlife Service, Letter, FWS to the U.S. Army Corp of Engineers Re: Comments on Draft Mitigation Plan, Sept. 29, 2014 at App. 2 (noting that "[r]atios should reflect the specific value of lost resources and must account for the method of compensatory mitigation (e.g. preservation), the likelihood of success, differences between the lost functions at the impact site and the functions expected to be produced by compensatory mitigation, temporal; losses of aquatic resources functions, and the distance between the affected aquatic resources and the compensation site.") (included as an attachment to these comments).

[2356] *Id.*

[2357] *Id.*; *see also* Environmental Protection Agency, Report, *A Function-Based Framework for Stream Assessment & Restoration Projects*, May 2012, at ES–8 ("The goals are varied and range from simple streambank stabilization projects to watershed scale restoration. For these projects to be successful it is important to know *why* the project is being completed and *what techniques* are best suited to restore the lost functions. Knowing why a project is needed requires some form of functional assessment followed by clear project goals. To successfully restore stream functions, it is necessary to understand how these different functions work together and which restoration techniques influence a given function. It is also imperative to understand that stream functions are interrelated and build on each other in a specific order, a functional hierarchy. If this hierarchy is understood, it is easier to establish project goals. And with clearer goals, it is easier to evaluate project success.") (emphasis in original omitted) (included as an attachment with these comments).

evaluation of the functions that will be lost. As a result mitigating the 81 miles of stream lost — starting at a 1:1 ratio — would likely require mitigation in the range of hundreds of miles. But without more information, it is premature to know whether 1:1 is an appropriate ratios are. The same is true for wetlands lost.

Finally, the 2018 MOA recommends that preservation, if chosen as a compensatory mitigation option, should be "conducted in conjunction with aquatic resource restoration, establishment, and/or enhancement activities."[2358] The 2018 MOA also establishes that if the Corps waives this requirement and allows preservation using a watershed approach, the compensation ratios shall be higher.[2359]

2. PLP has only proposed conceptual mitigation measures.

The DEIS analysis of the proposed compensatory mitigation plan is woefully inadequate. This is partially due to the fact that PLP has only offered "conceptual" mitigation.[2360] This is inexcusable. A review of both Chapter 5.3.2 and Appendix M reveals that PLP has no specific proposed mitigation at this time. The lack of specifics is alarming given the number of years PLP has had to prepare an application, and that PLP itself has acknowledge that compensatory mitigation is

> one of the most basic requirements of the permitting process: full, functional mitigation for all unavoidable, residual project impacts. PLP has consistently acknowledged its mitigation responsibility and has assumed that permit requirements would stipulate mitigation obligations amounting to a significant multiple of actual impacts, resulting in a net gain in anadromous and resident fish productive capacity.[2361]

In 2014, PLP's consultants submitted a report on the final Watershed Assessment, asserting that

> the track record for successful mitigation of potential impacts to salmon and resident fish species in settlings like that surrounding the Pebble deposit is very long, very comprehensive and very clear[,] . . . [and that] there are myriad opportunities for implementation of these methods in streams in and around the general Pebble Project area.[2362]

[2358] 2018 MOA at III.C.5.
[2359] *Id.*
[2360] *See* DEIS at 5–23 to 5–25 (noting that "PLP has prepared a draft conceptual Compensatory Mitigation Plan . . . outlining their proposed approach for compensatory mitigation to offset environmental losses resulting from unavoidable impacts to aquatic resources.").
[2361] Thomas C. Collier, Esq., Steptoe & Johnson, LLC, Letter, PLP to Office of Environmental Information Docket, Docket Number # EPA-HQ-ORD-2012-0276, July 23, 2012, at 16 (include as an attachment to these comments). *See also* Yocom, 2019c at 6–8 (report and its references are included as attachments to these comments).
[2362] Buell, J.W., and Bailey, R.E., *Mitigation and EPA's Bristol Bay Watershed Final Assessment*, April 23, 2014 at 16–17 (included as an attachment with these comments).

However, five years later, after submitting its CWA 404 application and revisions to that application, PLP has offered no concrete mitigation measures. Instead, PLP has punted on this critical aspect of the project. The "myriad opportunities" are not found anywhere in the DEIS or Appendix M. It is remarkable that the Corps has completed a DEIS and PLP has provided no actual compensatory mitigation. This is all the more notable given PLP's assertions that the Watershed Assessment process was unfair because it did not take into consideration mitigation that PLP would implement.[2363]

Borden notes that

> many of the actions presented in the DEIS are so poorly-defined that it is impossible to assess if they would provide adequate and meaningful mitigation for the project's impacts (Borden, 17 June). For example, the DEIS states that "The project would propose fish habitat mitigation measures to enhance or create new habitat outside of the immediate project footprint." However, no actual potential mitigation projects are identified in the DEIS or in the Draft Conceptual Compensatory Mitigation Plan (CMP) (Appendix M). Instead the [compensatory mitigation plan] only discusses generic evaluation criteria for the selection of currently unidentified mitigation projects to be identified at some future time. It will be exceedingly difficult for Pebble to find any meaningful mitigation projects of sufficient size within the Bristol Bay watershed because it is an unimpacted pristine environment currently unthreatened by any large-scale development other than the Pebble Project itself.[2364]

Without any actual, specific mitigation measures, the Corps cannot conduct the required 404(b)(1) analysis and cannot permit the project. Mitigation is a key element to understanding how this project will address the unavoidable impacts, as required under the CWA. Because the DEIS has no actual proposed mitigation, there is no way for the Corps to assess (1) how impacts

[2363] Thomas C. Collier, Esq., Steptoe & Johnson, LLC, Letter, PLP to Office of Environmental Information Docket, Docket Number # EPA-HQ-ORD-2012-0276, July 23, 2012, at 4 ("Failing to include in its assessment state-of-the-art measures that would avoid and mitigate many of the impacts described in the report leads to misleading, inaccurate and unfair conclusions about the actual impacts of mining activity in the area. Indeed, Alaska agencies and EPA/other federal agencies would not permit such a plan as hypothesized by EPA in the first instance, especially with the exclusion of modem engineering design and mitigation measures."); *cf.* Proposed Determination at 2–13 to 2–14 (noting that "EPA reviewed [PLP's array of compensatory mitigation measures] but determined that it did not change the conclusions drawn in Appendix J of the BBA (EPA 2014a). . . . After fully considering the April 29, 2014, submittals from PLP and the Alaska Attorney General, the Regional Administrator was not satisfied that no unacceptable adverse effect could occur, or that adequate corrective action could be taken to prevent an unacceptable adverse effect."); *see also* David Chambers, Letter, CSP2 to EPA regarding PLP comments on the Watershed Assessment, July 2, 2014, at 1 ("reviews of mitigation projects—including reviews cited by PLP's consultants—conclude that effectiveness of stream rehabilitation efforts are rarely measured at all; and when they are measured, projects frequently fail to meet their objectives.") (included as an attachment with these comments).
[2364] Borden, 2019b at 4–5.

will be mitigated, (2) what ratio will be used, or (3) how such mitigation will actually improve the environment.

PLP's delay in drafting a compensatory mitigation plan with specific mitigation measures until later in the process is inconsistent with NEPA and the CWA. Rather than proposing mitigation to accompany what it believes to be the least environmentally damaging practicable alternative, PLP has indicated that it will wait for the Corps to determine the least environmentally damaging practicable alternative and then tailor mitigation to that alternative.[2365] This is improper under the CWA. Under the CWA regulations, PLP bears the burden of clearly demonstrating that its proposed project is the least environmentally damaging practicable alternative, and that it has mitigated all unavoidable impacts.

As a result, the Corps must suspend this review until PLP provides requisite detail to support an analysis that meets the statutory requirements for both NEPA and the CWA.

3. PLP has not assessed the functions and services of potentially impacted wetlands.

In Response to comments submitted by the EPA, the Corps has stated that "[a] functional assessment will not be prepared for this proposed project or this EIS."[2366] This is inconsistent with the Corps' regulatory guidance, which notes that "Districts should use a functional assessment by qualified professionals to determine impacts and compensatory mitigation requirements."[2367]

But conducting a functional assessment is critical to determining what functions particular wetlands perform, and their capacity to perform those functions. The U.S. Geological Survey defines wetland functions as

> a process or series of processes that take place within a wetland. These include the storage of water, transformation of nutrients, growth of living matter, and diversity of wetland plants, and they have value for the wetland itself, for surrounding ecosystems, and for people. . . . Not all wetlands perform all functions nor do they perform all functions equally well. The location and size of a wetland may determine what functions it will perform. [2368]

[2365] *See* 2017 Permit Application at 32; 2019 Permit Application at 37 (stating that "PLP will work with [the Corps] throughout the process to identify and implement a compensatory mitigation plan that is appropriate for the *final Project*") (emphasis added).
[2366] *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.22 – Wetlands and Other Waters/Special Aquatic Sites, at EPA Comment #1, 1.
[2367] U.S. Army Corps of Eng'rs, Regulatory Guidance Letter No. 02-02, *Guidance on Compensatory Mitigation Projects for Aquatic Resource Impacts Under the Corps Regulatory Program Pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899*, Dec. 24, 2002 (included as an attachment to these comments).
[2368] *See* USGS, Report*, National Water Summary on Wetland Resources, Water Supply Paper 2425, Restoration, Creation, and Recovery of Wetlands: Wetland Functions, Values, and Assessments*, 1996, https://water.usgs.gov/nwsum/WSP2425/functions.html (included as an attachment with these comments).

The functions of wetlands are influenced by characteristics such as topographic setting, size, vegetation type, hydrological input and output, and wildlife information. All of this can be assessed to map the functions of the wetlands in an analysis area.

The first step in any functional assessment is to organize the wetlands and waterbodies into functional types, or classes. All wetlands are not the same; rather, there are different types of wetlands that perform different local- and landscape-scale functions.[2369] A simple example is a slope wetland on a hillslope adjacent to a salmon-bearing stream. The slope wetland might perform an array of functions, including groundwater discharge; the salmon-bearing stream might perform an array of functions, including supporting salmonids. The two might be related — for example, groundwater discharge in the slope wetland might play an important role in controlling baseflows, temperatures, and nutrient concentrations in the salmon-bearing stream.[2370] However, though linked ecologically, the functions they perform, the way they perform those functions, and the degrees to which they perform those functions differ markedly from one another. Any attempt to assess those two wetlands and waterbodies as a single unit will both (a) miss important differences and (b) drive results towards a central tendency, where every wetland and waterbody is good at some things and not at others.

The second step in any functional assessment is to establish reference conditions, or a reference space within which comparisons can occur.[2371] Reference conditions can be real data collected at a suite of comparable sites (i.e., in the same class) that represent the range of conditions observed, from pristine to most impacted.[2372] Alternatively, reference conditions can be virtual, connected by literature and best professional judgment to a range of conditions from pristine to most impacted. In either case, the gradient, including the best or reference standard condition, must be clearly defined and justified to ensure that the results of the functional assessment of any given wetland or waterbody can be placed clearly within that reference space.

[2369] *See* Brinson MM (1993) A Hydrogeomorphic Classification for Wetlands. Technical Report WRP-DE-4, Wetlands Research Program, Army Engineer Waterways Experiment Station, Vicksburg, MS; Brinson MM (2009) Chapter 22. The United States HGM (hydrogeomorphic) approach. Pp 486-512 in E. Maltby and T. Barker (editors), The Wetlands Handbook. Wiley-Blackwell, Oxford, UK.
[2370] Callahan MK, Rains MC, Bellino JC, Walker CM, Baird SJ, Whigham DF, King RS (2015) Controls on temperature in salmonid-bearing headwater streams in two common hydrogeologic settings, Kenai Peninsula, Alaska. Journal of the American Water Resources Association 51:84-98 (included as attachments with these comments); Callahan MK, Whigham DF, Rains MC, Rains KC, King RS, Walker CM, Maurer J, Baird SJ (In Press) Nitrogen subsidies from hillslope alder stands to streamside wetlands and headwater streams, Kenai Peninsula, Alaska. Journal of the American Water Resources Association (included as attachments with these comments).
[2371] Smith RD., Ammann A, Bartoldus C, Brinson MM (1995) An Approach for Assessing Wetland Functions Using Hydrogeomorphic Classification, Reference Wetlands and Functional Indices. Technical Report TR-WRP-DE-9, Waterways Experiment Station, Army Corps of Engineers, Vicksburg, MS; Brinson MM, Rheinhardt R (1996) The role of reference wetlands in functional assessment and mitigation. Ecological Applications 6:69–76 (included as attachments with these comments).
[2372] *See* Brinson 1996, Brinson 2009.

The third step in any functional assessment is to determine the assessment endpoint. Few functional assessments actually assess functions, which are ecological processes operating over time or, stated more simply, the things that wetlands do regardless of how we value those things being done.[2373] The actual measurement of function implies repeated measures over time. Functional assessments rarely require repeated measurements over time, and instead simply require the measurement of easily measured attributes that are indicative of the functional capacity of the wetland or waterbody being assessed. A simple example is nutrient cycling, focusing on nitrogen. One way to measure the function would be to make repeated measurements of nitrogen concentrations in surface water and groundwater, including the natural abundance of 15N, a stable isotope that can be traced through the nitrogen cycle, coupled with field trials of the effects of nitrogen fertilization.[2374] Such a study, however, would take a great deal of resources, both time and money. The alternative would be to instead make observations of key attributes associated with nitrogen cycling, including measurements of the availability of water, soils, and vegetation in sufficient abundance and quality to support the performance of this function.

Because neither PLP nor the Corps has performed a functional assessment, the DEIS has failed to adequately assess and capture these critical aspects. In the DEIS, there is almost no effort to distinguish between different wetland types. All the DEIs does is distinguish wetlands from waterbodies like stream channels, ponds, and lakes, and attempts to distinguish wetland types based upon vegetation. The DEIS fails to distinguish wetland types based upon hydrogeomorphic setting,[2375] upon dominant lithology and surficial sediments,[2376] or upon any other easily mapped attribute that can help identify what functions are likely performed, how those functions are likely performed, and the degree to which those functions would be expected to be performed in this landscape. In essence, all wetlands are treated the same.

Failing to prepare — or to require PLP to prepare — a functional assessment is contrary to past Corps permitting practices in Alaska and inconsistent with the Corps' own guidance regarding assessing functional gains and losses for permittee responsible mitigation.[2377] For

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[2373] *See* Smith et al. 1995; Novitski RP, Smith RD, Fretwell JD (1996) Wetland functions, values, and assessment. Pp. 79-86 in J.D. Fretwell, J.S. Williams, and P.J. Redman.(eds), National Water Summary on Wetland Resources, USGS Water-Supply Paper 2425. U.S. Department of the Interior, U.S. Geological Survey. Washington, DC (included as an attachment with these comments).
[2374] *See* Callahan et al. (In Press).
[2375] *See* Brinson 1993; Brinson 2009.
[2376] *See* Callahan et al. 2015.
[2377] *See* U.S. Army Corps of Engineers, Alaska District*, Methodology for Assessing Functional Gains and Losses for Permittee Responsible Compensatory Mitigation and Calculating Compensatory Mitigation Credits and Debits for Third Party Mitigation Providers in the Alaska District*, April 29, 2016 (included as an attachment to these comments); *see also* U.S. Army Corps of Engineers, *Donlin Gold Project Environmental Impact Statement Final Scoping Report*, Aug. 2013, at 145 ("Include a functional assessment of wetlands in the proposed project area. . . .") (included as an attachment with these comments); Alaska Stand Alone Gas Pipeline Draft Wetlands Compensatory Mitigation Plan at 36 ("The Aquatic Site Assessment (ASA) methodology developed by AGDC's wetlands consultants was presented to the Corps of

example, the Galveston District of the Corps recognizes the importance of functional assessments in determining appropriate compensatory mitigation, noting:

> [t]he district engineer must determine the compensatory mitigation to be required in a DA permit, based on what is practicable and capable of compensating for the aquatic resource functions that will be lost as a result of the permitted activity. *The purpose of a functional assessment is to evaluate current wetland functions and predict potential changes to a wetland's functions that may result from proposed activities*.[2378]

The Alaska District of the Corps also recognizes the value of assessing the functions of wetlands for purposes of compensatory mitigation. In the recent Corps document, *Alaska District Compensatory Mitigation Thought Process*, the Corps sets out that

> [w]hen assessing a project with impacts to wetlands ask the following:
> What are the types and extent of wetlands (area and function) affected by the project? Or what are the functions, habitat types, and species that would be adversely affected?
> Focus on the functions of those wetlands being impacted. Functions of wetlands can be broadly characterized into chemical, hydrologic and biologic/physical functions. Examples of chemical functions include improvements to water chemistry through the removal of sediments, nutrients, metals, toxic organic compounds and/or pathogens. Examples of hydrologic functions include reduction of peak flows, recharging groundwater, and decreasing erosion. Physical functions include providing habitat for invertebrates, amphibians, anadromous fish, resident fish, birds, mammals, native plants and support of food webs. These examples are not exhaustive. *The key is to identify the functions that the wetlands to be impacted perform*. To aid in this endeavor, all project managers should be intimate with 40 C.F.R. Part 230-Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material (attached in Appendix 3). In addition, Appendix 4 contains a list of functional assessment methodology currently in use within the Alaska District. [2379]

Engineers in April 2014. . . . The basis of the ASAP wetlands mitigation strategy stems from the methodology AGDC developed to determine wetland functions and services, along with the debits needed to compensate for unavoidable losses. The ASAP ASA (formerly termed Functional Assessment) is the product of multiple field sampling events and revisions to final wetlands mapping."). In addition to providing the documents referenced above, Trustees is including the U.S. Army Corps of Engineers FOIA response for documents pertaining to wetlands functional assessments for the proposed mine, dated July 31, 2017. *See* July 31, 2017 Corps FOIA Response included with the attachments to these comments (included as an attachment with these comments).

[2378] *See* U.S. Army Corps of Engineers, Website, Galveston District, *Functional Assessment*, https://www.swg.usace.army.mil/Business-With-Us/Regulatory/Wetlands/Functional-Assessment/ (emphasis added) (included as an attachment with these comments).

[2379] U.S. Army Corps of Engineers, *Alaska District Compensatory Mitigation Thought Process*, Rev. Sept. 18, 2018, at 9–10 (included as an attachment with these comments).

In contrast to its current approach, the Corps noted in 2009 in a Memorandum to Record regarding a meeting with PLP that "[w]e want to emphasize that functional assessments are required for all types of waters of the U.S., including but not limited to streams, mud flats and marine environments."[2380] The comment was made in response to a question about what method to use when preparing a functional assessment, not whether to conduct a functional assessment in the first place.[2381] In May 2013, PLP requested Corps approval of PLP's preferred functional assessment methodologies.[2382] The Corps responded in January 2014 that it was unable to determine which methodologies were appropriate but that PLP should convene a working group that would "assist in the development of final functional assessment methodologies."[2383]

While the Corps asserts in its preamble to the 2008 Mitigation Rule that there is no one specific methodology that must be used, it does not abandon functional assessments in their entirety.[2384] Rather, the preamble notes that "functional . . . assessments should be used where appropriate and practicable to better describe how compensatory mitigation projects offset losses of aquatic resource functions."[2385] EPA noted that "[w]hile we understand that a functional assessment was not conducted, compensatory mitigation is designed to offset lost aquatic resource functions. Thus, information regarding the type and magnitude of aquatic resource functions that are expected to be lost or degraded is necessary to inform any compensatory mitigation plan."[2386]

PLP has not demonstrated that preparing a functional assessment is not possible or practical.[2387] Absent that showing, a functional assessment is required. The DEIS does not indicate how this information will be gathered absent a functional assessment. Without assessing wetland and stream functions in the project area, including their class and service, it is impossible to determine the appropriate amount of compensatory mitigation.[2388]

[2380] *See* U.S. Army Corps of Engineers, CEPOA-RD Memorandum for Record, *Subject: POA-2003-803, Koktuli River. Pebble Limited Partnership meeting notes from July 7, 2009*, July 31, 2017, at 5–6 (emphasis in original) (included as an attachment to these comments).
[2381] *See id.* (discussing the use of the Magee method).
[2382] *See* Katherine McCafferty, Project Manager, Letter, U.S. Army Corps to Tim Harvey, PLP, Jan. 30, 2014, at 1 (included as an attachment to these comments).
[2383] *Id.* at 2.
[2384] *See* U.S. Army Corps of Engineers, CEPOA-RD Memorandum for Record, *Subject: POA-2003-803, Koktuli River. Pebble Limited Partnership meeting notes from July 7, 2009*, July 31, 2017, at 37 (stating that "We do not agree that functional assessment methods should be standardized within watershed, districts, or states. Functional assessment methods will vary among resource type, and sometimes by regional categories, such as ecoregion or physiographic region.").
[2385] *Id.* at 28.
[2386] *See* Environmental Protection Agency, Comments, *Pebble Project Draft Compensatory Mitigation Plan, Pebble Limited Partnership, November 2018 EPA Comments*, Jan. 31, 2019, at 3 (included as an attachment to these comments).
[2387] *See* RGL 02-02 at 2.
[2388] *Id.* at 18 ("With this rule, we are moving towards *greater reliance on functional and condition assessments* to quantify credits and debits, instead of surrogates such as acres and linear feet.").

4. *The DEIS fails to take a hard look at whether mitigation will replace lost aquatic functions.*

Without a specific, concrete mitigation plan, the Corps cannot assess how lost aquatic resource functions will be replaced, restored, or preserved. A compensatory mitigation plan should be based on the functional assessment of wetlands and aquatic resources. Yet, not only is there no concrete plans for mitigation, the Corps will not require PLP to prepare a functional assessment either.[2389] Yet in the Corps' preliminary review of the mitigation plan, it noted that the mitigation plan should clarify "how, in the absence of a functional assessment, [PLP] will justify that the proposed comp[ensatory] mit[agation] would provide sufficient offset for the lost aquatic functions."[2390] PLP has failed to provide this justification.

The CWA requires mitigation to replace the lost functions according to an ecologically appropriate mitigation ratio. As the 2008 Compensatory Mitigation Rule states:

> The fundamental objective of compensatory mitigation is to offset environmental losses resulting from unavoidable impacts to waters of the United States authorized by DA permits. The district engineer must determine the compensatory mitigation . . . based on what is practicable and capable of compensating for the aquatic resource functions that will be lost as a result of the permitted activity.[2391]

Further, when mitigation is required to offset unavoidable impacts, "the amount of required mitigation must be, to the extent practicable, sufficient to replace lost aquatic resource functions."[2392]

In reviewing Chapter 5 and Appendix M, Thomas Yocom, identified the importance of understanding the type of stream or wetland impacted to assign the appropriate ratio.[2393] Yocom noted that former Alaska District guidance (RGL 09-01) recognized that

> [f]or waters in the "high" or "moderate" compensation category, as those in the Koktuli River and Upper Talarik Creek headwaters region would likely be, the required ratio is 1:1 or 2:1 for restoration and/or enhancement and 2:1 or 3:1 for preservation. Therefore, the proper compensation ration for the headwaters streams and wetlands destroyed by discharges of dredged or fill material from mining the Pebble Deposit could be 2:1 if the mitigation method is restoration or enhancement or 3:1 if the compensatory mitigation is preservation. This translated to roughly 12,000 acres of compensatory mitigation for restoration or enhancement (to offset 5906 acres of Pebble Project direct and indirect impacts),

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[2389] *See* U.S. Army Corps of Engineers, Pebble Project Comment Response Matrix, EPA Comments – Pebble Project Preliminary Draft EIS, Section 4.22 – Wetlands and Other Waters/Special Aquatic Sites, at EPA Comment #1, 1.
[2390] *See* U.S. Army Corps of Engineers, Email attachment, POA Special Projects to James Fueg, PLP, Draft Compensatory Mitigation Plan with comments, Dec. 17, 2018, at 27 (included as an attachment to these comments).
[2391] *See* 33 C.F.R. § 332.3(a)(1) (emphasis added).
[2392] *Id.* at § 323.3(f)(1).
[2393] *See* Yocom, 2019c at 5–6.

or roughly 18,000 acres of compensatory mitigation for preservation.[2394]

The DEIS and the "conceptual" compensatory mitigation plan do not include any discussion of the type of categorization for the headwater streams and wetlands that will be directly and indirectly impacted. Nor is there a discussion of how ratios have an impact. As Yocom notes,

> [o]ne well-documented review [PLP] consultants cited found that compensatory mitigation was generally not successful unless mitigation ratios were higher than 1:1 and closer to 2:1 (*i.e.*, a greater acreage or length of stream miles restored than were lost as a result of a project).[2395]

RGL 02-02 sets out guidance for offsetting losses of aquatic functions:

> For wetlands, the objective is to provide, at a minimum, one-to-one functional replacement, i.e., no net loss of functions, with an adequate margin of safety to reflect anticipated success. Focusing on the replacement of the functions provided by a wetland, rather than only calculation of acreage impacted or restored, will in most cases provide a more accurate and effective way to achieve the environmental performance objectives of the no net loss policy. In some cases, replacing the functions provided by one wetland area can be achieved by another, smaller wetland; in other cases, a larger replacement wetland may be needed to replace the functions of the wetland impacted by development. Thus, for example, on an acreage basis, the ratio should be greater than one-to-one where the impacted functions are demonstrably high and the replacement wetlands are of lower function. Conversely, the ratio may be less than one-to-one where the functions associated with the area being impacted are demonstrably low and the replacement wetlands are of higher function.[2396]

RGL 02-02 also provides guidance for offsetting the loss of stream functions:

> Districts should require compensatory mitigation projects for streams to replace stream functions where sufficient functional assessment is feasible. However, where functional assessment is not practical, mitigation projects for streams should generally replace linear feet of stream on a one-to-one basis. Districts will evaluate such surrogate proposals carefully because experience has shown that stream compensation measures are not always practicable, constructible, or ecologically desirable.[2397]

For the Pebble project, EPA has also expressed its concerns regarding determination of appropriate mitigation in the absence of a functional assessment, noting:

> Since a function or condition assessment was not used, the [compensatory

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[2394] *Id.*
[2395] *Id.* at 7.
[2396] RGL 02-02 at 2–3.
[2397] *Id.* at 3.

> mitigation plan] should clarify how it will comply with the Mitigation Rule's requirements regarding the amount of compensation, which state that *"[i]f a functional or condition assessment or other suitable metric is not used, a minimum one-to-one acreage or linear foot compensation ratio must be used"* and *"[t]he district engineer must require a mitigation ratio greater than one-to-one where necessary to account for the method of compensatory mitigation (e.g., preservation), the likelihood of success, differences between the functions lost at the impact site and the functions expected to be produced by the compensatory mitigation project, temporal losses of aquatic resource functions, the difficulty of restoring or establishing the desired aquatic resource type and functions, and/or the distance between the affected aquatic resource and the compensation site. The rationale for the required replacement ratio must be documented in the administrative record for the permit action."* (33 C.F.R. 332.3(f)/40 C.F.R. 230.93(f)). For example, the [compensatory mitigation plan] should clarify if a minimum one-to-one acreage ratio (or higher based on the factors in 33 C.F.R. 332.3(f)(2)/40 C.F.R. 230.93(f)(2)) is being proposed for impacts to wetlands, lakes, and ponds and if a minimum one-to-one linear foot ratio (or higher based on the factors in 33 C.F.R. 332.3(f)(2)/40 C.F.R. 230.93(f)(2)) is being proposed for impacts to streams. The [compensatory mitigation plan] should include the supporting rationale for the approach used.[2398]

Dr. Schindler also raised concerns about the unidentified mitigation and questioned any potential restoration efforts, stating that the DEIS

> assumes that any effects on ecosystems will be detected, and countered by effective mitigation and restoration. However, the DEIS does not explain what will be fixed and how it will be fixed. Experience has shown that habitat restoration and mitigation in other parts of the world are remarkably difficult and expensive, and often ineffective. The DEIS assumes that effective restoration and mitigation of habitat destroyed or contaminated by Pebble activities is possible and will be 100% effective.[2399]

At this time, the only compensatory mitigation plan is "conceptual," lacking in any specific, concrete measures. Because there is no functional assessment, there is no accurate data on what functions will be lost and how PLP plans to replace those lost functions.

5. *PLP's conceptual mitigation proposal fails to compensate for indirect impacts.*

Any "conceptual" approach to compensatory mitigation planning is completely inadequate to support evaluation of a project under either NEPA or the CWA. The conceptual compensatory

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[2398] *See* Environmental Protection Agency, Comments, *Pebble Project Draft Compensatory Mitigation Plan, Pebble Limited Partnership, November 2018 EPA Comments*, Jan. 31, 2019, at 8 (emphasis in original).
[2399] Schindler, 2019 at 6.

mitigation plan proposed for the Pebble Mine is particularly deficient because it fails to even recognize or assess the impacts which PLP must compensate for.

The DEIS identifies 3560 acres of direct impacts, 2345 acres of indirect impacts from dewatering and dust, and 510 aces of temporary impacts to jurisdictional wetlands and streams.[2400] The DEIS fails to identify, quantify or discuss compensatory mitigation for secondary impacts to wetland and aquatic functions — upstream and downstream impacts that may result from the proposed project.[2401] This approach is contradictory to the position taken by the Corps in the past. For example, in 2009, the Corps noted that

> [b]ecause compensatory mitigation would be required to offset the secondary and cumulative impacts, it may be more important to focus on 'stitching' the polygon edges in areas that are closer to the direct impacts in order to be prepared for a discussion of the secondary and cumulative impacts as it relates to compensatory mitigation. . . . For the secondary and cumulative impact assessment, it is more important to have information about the functions of the wetlands and other waters.[2402]

PLP's conceptual compensatory mitigation plan fails to address the 2345 acres of indirect impacts — extensive impacts that the DEIS acknowledges as permanent.[2403] As Yocom notes, PLP is not proposing any yet-to-be-defined mitigation measures for the indirect unavoidable loss of 2345 acres and temporary loss (at least one year plus the time for the area to be restored) of 510 acres.[2404] Yocom concludes that "[o]n its face, the Corps should not have accepted this conceptual plan as being adequate for failing to consider thousands of acres of indirect impacts (including permanent loss) of wetlands and aquatic habitat."[2405]

2400 DEIS at ES–60.
2401 *See* Yocom, 2019c at 8.
2402 U.S. Army Corps of Engineers, CEPOA-RD Memorandum for Record, Subject: POA-2003-803, Koktuli River. Pebble Limited Partnership meeting notes from July 7, 2009 at 3.
2403 DEIS at App. M at 3-5. The DEIS review is also notably imprecise regarding the number of acres to be mitigated. In contrast to the acreage identified above, Appendix M identifies 3524 acres of direct impact and 513 acres of temporary impact. *See* Yocom, 2019c at 9 n.41. There is no offered explanation for the disparity between the Appendix and the DEIS. One can only speculate that the accelerated review and rush by both Pebble and AECOM, the contractor preparing the DEIS, is resulting in inconsistencies and errors that should not be seen in a DEIS.
2404 *See* Yocom, 2019c at 9; *see also* EPA, Comments, *EPA's General Comments on the Revised Post-Mine Reclamation Plan Overview (dated August 2014) Conceptual Compensatory Mitigation Plan (CCMP) and Fish Protection Plan (both dated June 2014) for the proposed Chuitna Coal Project*, Sept. 29, 2014, at 2 ("Both temporal and permanent losses of aquatic resource function may need to be compensated for. . . . Direct compensation may not be required for projects with short-duration temporal losses. In such cases, permanent losses may be compensated for at a higher ratio to address the temporal loss.").
2405 *Id.*

6. The conceptual mitigation is insufficient to compensate for lost aquatic functions.

PLP has failed to even provide specific mitigation to compensate for the wetlands and streams directly impacted. Limiting the mitigation to offsetting the loss for the direct impacts to 3560 acres, PLP's mitigation should include a plan to provide the equivalent of 3560 to 7120 acres for offsite restoration/enhancement (a 1:1 or 2:1 ratio) or 7120 acres to 10,680 if the plan was to offset the loss through habitat preservation (a 2:1 to 3:1 ratio).[2406] Rather than identifying a single option out of the myriad opportunities PLP once professed, PLP's conceptual compensatory mitigation plan states that restoration, enhancement and preservation of wetlands and other waters "are effectively non-existent in the Analysis Area."[2407] The "plan" further narrows mitigation options, noting "the watershed approach, and on-site and in-kind compensatory mitigation are not practicable to meet the Project's compensatory mitigation needs."[2408]

Given the asserted dearth of available options, PLP identifies only a handful of actions, all of which will have little impact in actually offsetting the loss of aquatic functions.[2409] Specifically, the conceptual compensatory mitigation plan identifies a variety of potential water quality improvement projects focused on remediation of small parcels. Yocom notes that Table 5–9 identifies 15 specific sites near villages in the vicinity of the project area, but that most involve less than an acre of land and would involve actions like river bank stabilization.[2410] The conceptual plan also identifies potential invasive species eradication but "the applicant proposes no specific measures to address these problems, or provide any reliable measures of short- or long-term success for any such eradication program."[2411]

PLP also identifies fish habitat restoration "through culvert rehabilitation and other fish passage improvements" in areas far away from the Pebble project — "Upper and Lower Kenai Peninsula, the Lower Susitna River, Matanuska [sic]" — as potential out-of-kind mitigation. Identifying these locations as "directly affected and neighboring watersheds"[2412] is laughable. The Upper and Lower Kenai Peninsula sits on the other side of Cook Inlet. The Susitna River is far north and is not a "neighboring watershed." The reference to "Matanuska" can most generously be interpreted as the Matanuska watershed. This watershed is nowhere near the Pebble Mine. The Corps should not accept the proposition that fixing a culvert in the Matanuska watershed would in any way address lost functions in the Bristol Bay watershed. The fact that PLP even proposes such out-of-kind mitigation illustrates how preposterous their conceptual compensatory mitigation plan is.

Further, out-of-kind mitigation is supposed to still have an impact on the region affected. The Corps should consider revisiting its own Regulatory Guidance Letters before accepting the

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[2406] *Id.* at 10.
[2407] DEIS at App. M at 26.
[2408] *Id.*
[2409] *See* Yocom, 2019c at 11.
[2410] *Id.* at 10.
[2411] *Id.*
[2412] DEIS App. M at 26.

proposed conceptual compensatory mitigation plan as worthy of consideration and evaluation in the DEIS. RGL 02-02 states:

> Out-of-kind compensation for a wetland loss involves replacement of a wetland area by establishing, restoring, enhancing, or protecting and maintaining an aquatic resource of different physical and functional type. Out-of-kind mitigation is appropriate when it is practicable and provides more environmental or watershed benefit than in-kind compensation (e.g., of greater ecological importance to the region of impact).[2413]

The concept of out-of-kind mitigation — that it could have a greater impact on the region than in-kind mitigation — will simply not be achieved through culvert replacements in the Mat-Su region.

And even if such culvert replacement could benefit Bristol Bay, the conceptual compensatory mitigation plan fails to identify the number and location of culverts in need of rehabilitation or whether any of the responsibility for maintenance of these culverts rests with any other authority.[2414]

PLP displays a complete misunderstanding of how compensatory mitigation works and how replacement of lost aquatic functions are calculated on a stream mile or acreage basis. Under the title "[a]mount of compensatory mitigation," PLP states:

> For out-of-kind mitigation PLP would, to the extent practicable, replace an equivalent amount of aquatic resources to those lost. For example, fish passage improvements would open, or improve, access to an equivalent number of stream miles of habitat suitable for anadromous fish. Should PLP propose preservation as mitigation an acreage compensation ratio greater than one-to-one will be proposed in accordance with 33 C.F.R. 332.3 (f)(2).[2415]

As Yocom notes, PLP

> presumes that the upstream area performs no wetland or aquatic functions other than the added support of anadromous fishes from culvert rehabilitation. This overly narrow view of wetland and aquatic functions should not be accepted as fully offsetting project impacts.[2416]

Yocom concludes that "the [compensatory mitigation plan] proposes no specific compensatory mitigation measures that could even begin to offset the lost acreage or stream miles that its project would cause directly or indirectly."[2417]

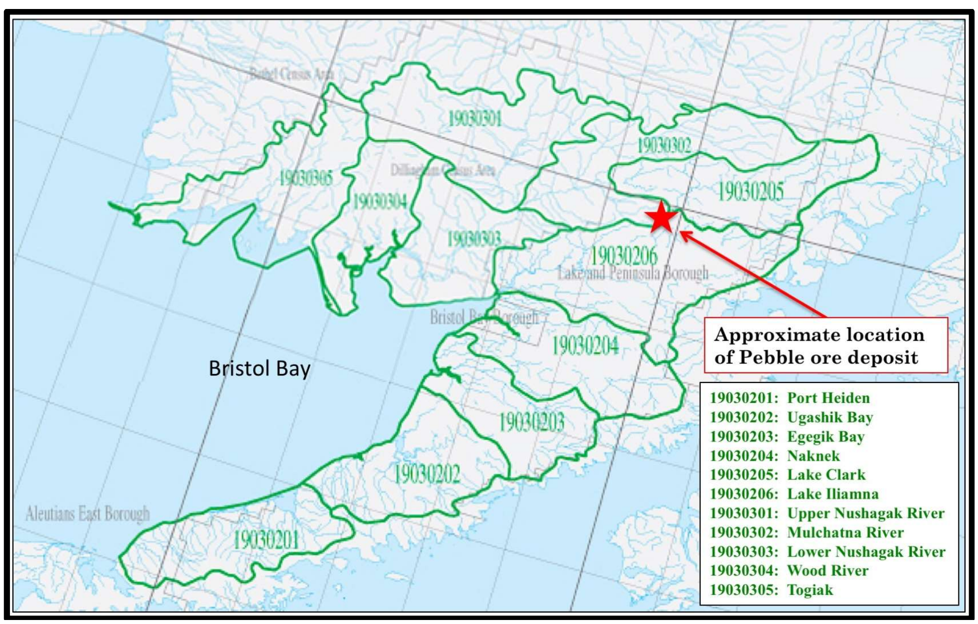
[2413] RGL 02-02 at 5.
[2414] *See* Yocom, 2019c at 10.
[2415] DEIS App. M at 27.
[2416] *See* Yocom, 2019c at 11.
[2417] *Id.*

7. *Off-site mitigation will not offset lost aquatic functions.*

The conceptual compensatory mitigation plan includes options that would not remotely mitigate the effects of the Pebble Mine. It would allow for mitigation projects located hundreds of miles away in watersheds completely unrelated to those to be impacted by the mine to be considered mitigation of the mine's impacts. This is not mitigation. The conceptual compensatory mitigation plan states that

> preservation opportunities are limited due to the land status and unjustifiable due to the lack of foreseeable development threat to existing wetlands and aquatic resources in the Analysis Area. Thus, the watershed approach, and on-site and in-kind compensatory mitigation are not practical to meet the Project's compensatory mitigation needs. Therefore, off-site, in-kind or out-of-kind mitigation opportunities must be considered.
>
> Off-site wetlands mitigation would necessitate the evaluation of mitigation opportunities beyond the HUC 10 watersheds directly impacted by the Project. Given the limited amount of development and land status in the larger directly impacted (Nushagak, Kvichak, Tuxedni/Kamishak Bay HUC 8s) watersheds it is further likely that mitigation would be predominantly limited to wetlands preservation in the surrounding HUC 8 watersheds or even further afield.[2418]

For scale and a sense of what could be considered adequate mitigation under PLP's plan, the following figures portray the HUC 8 watersheds in Bristol Bay and the HUC 4 watersheds in the State of Alaska:



Yocom CMP Report, Figure 1. HUC 8 watersheds that drain into Bristol Bay.[2419]

[2418] DEIS App. M at 26.
[2419] *See* Yocom, 2019c at 12.

Yocom CMP Report - Figure 2. HUC 4 Watersheds in Alaska.[2420]

As noted above, regarding culvert restoration in the Kenai, Susitna, or Matanuska watersheds, this approach "would conceivably include sites that are hundreds of miles from the Pebble Project site."[2421] Further, "[d]efining the watershed scale this broadly would fail to meet the fundamental requirement of the Mitigation Rule that the aquatic resources provided through compensation effectively offset the adverse environmental impacts of the permitted discharge."[2422]

Yocom notes that due to the genetic differences among salmon stocks, mitigation in other watersheds would not protect the specific aquatic resources of the drainages impacted by the Pebble mine.[2423] Mitigation off site will also not address lost aquatic functions that may be specific to low order streams, like headwaters.[2424] For example, Yocom points out that

> because they provide refuge from predators and competitors, rich feeding grounds, and thermal refuge, fish species often exploit low-order and ephemeral streams as either residents (*e.g.*, sculpin) or migrants (*e.g.*, salmonids). Salmonids may use headwater streams as rearing (*e.g.*, coho, Chinook), and spawning (*e.g.*, chum) habitat.[2425]

[2420] *Id.* at 13.
[2421] *Id.* at 12.
[2422] *Id.* at 13.
[2423] *Id.*
[2424] *Id.*; *see also* Exploring the Environment, Website, Water Quality Assessment: Physical: Stream Order http://www.cotf.edu/ete/modules/waterq3/WQassess4b.html (included as an attachment to these comments).
[2425] *See* Yocom, 2019c at 13.

Mitigation of higher order streams, through projects like culvert replacement, (possibly in entirely different HUC 8, 6, or 4 watersheds) will have no impact in offsetting the loss of aquatic functions among the headwaters of the Nushagak and Kvichak systems.

8. PLP's conceptual compensatory mitigation plan is entirely inadequate.

The conceptual compensatory mitigation plan is entirely inadequate to establish how unavoidable impacts will be offset. PLP has failed to provide specific measures that can be evaluated to determine how and whether they will offset lost aquatic functions.

The conceptual compensatory mitigation plan fails to identify how it will propose to mitigate for the expanded 78-year mine. Because the expansion scenario is reasonably foreseeable, the impacts from such expansion must be considered. The impacts from expansion could be catastrophic. PLP has failed to provide, and the DEIS does not analyze, how impacts from expansion would be offset.

Because the Corps must consider the cumulative impacts under the CWA, as well as NEPA, the only supportable presumption at this time is that there are no substantive measures which could effectively replace lost functions for the 20-year more and the 78-year mine. Further, the conceptual compensatory mitigation plan fails to acknowledge or address how PLP will offset lost aquatic functions from the indirect impacts, both for the 20-year mine and 78-year mine. As Yocom concludes,

> As presently proposed, the author believes that the project fails to comply with Federal Clean Water Act regulations with regard to compensatory mitigation [40 C.F.R. 230.10(d)], and the lack of appropriate mitigation measures should also lead to a determination that the project would cause or contribute to significant degradation of the aquatic ecosystem and thereby fail to comply with the regulations at 40 C.F.R. 230.10(c), as well. The Corps should prepare a revised DEIS that includes a detailed compensatory mitigation plan, and that expands the scope of that plan to include mine expansion to at least the 78-year scenario.

If PLP wants to proceed with evaluation of this project, it must provide more than concepts and actually demonstrate how it will offset lost aquatic functions. In turn, because mitigation is a major component of this project, the Corps cannot proceed to an FEIS without revising the DEIS, based on a concrete compensatory mitigation plan.

F. The Pebble Project is Not in the Public Interest.

Issuance of a CWA Section 404 permit for the proposed Pebble Project is "contrary to the public interest."[2426] The Corps must consider a number of factors including conservation,

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[2426] 33 C.F.R. § 320.4(a)(1) ("The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The decision whether to authorize a proposal, and if so, the conditions under which it will be allowed to occur are therefore determined by the outcome of this general balancing process."). In the preamble to economics, general environmental concerns, wetlands, fish and wildlife values, water quality, and the needs and welfare of the people.[2427] In applying these criteria, the regulations call for consideration of:

- the relative extent of the public and private need for the propose structure or work;
- where there are unresolved and substantial conflicts as to resource use, the practicability of using reasonable alternative locations and methods to accomplish the objective of the proposed structure or work; and
- the extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work is likely to have on the public and private uses to which the area is suited.[2428]

"The specific weight of each factor is determined by its importance and relevance to the particular proposal."[2429]

For the reasons described throughout these comments, the anticipated likely adverse impacts from either a 20-year and 78-year mine are extensive and significant. The project is likely to cause or contribute to significant degradation of the aquatic system and is likely to cause or contribute to violations of water quality standards. PLP has not demonstrated that the project would not have an unacceptable adverse impact either individually or in combination with known and/or probable impacts of other activities affecting the headwaters of Bristol Bay and the downstream aquatic environment.

PLP's 20-year mining proposal should be denied as contrary to the public interest. This plan is only a stalking horse, intended to conceal PLP's plans to mine far more than what is being sought in this initial round of permitting. PLP's existing permit application should either be denied as contrary to the public interest, or rejected as incomplete for failing to include the expanded mine as a necessary element of the proposal.

VIII. THE WETLANDS DELINEATION IS BASED ON STALE, INCOMPLETE DATA.

The Corps has erred by accepting PLP's wetlands delineations as valid.[2430] A report prepared by Thomas Yocom, who formerly served as National Wetlands Expert for the EPA and was a certified instructor in wetland delineation, found three major problems with PLP's wetland delineation data and methodologies.

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a 1982 Interim Final Rule and a Request for Comments concerning a wide range of issues concerning the Corps permitting programs, the Corps described the public interest review process as "the heart of our evaluation process. It involves weighing and balancing of all factors affecting the public interest." 47 Fed. Reg. 31794 (July 22, 1982).

[2427] 33 C.F.R. § 320.4(a)(1).

[2428] 33 C.F.R. § 320.4(a)(2).

[2429] 33 C.F.R. § 320.4(a)(3)

[2430] *See* Yocom, 2018c.

A. PLP's Data is Too Old to Support a Jurisdictional Determination.

PLP's data is too old to be considered reliable under the Corps national policies for jurisdictional determinations, and none of its more current data are from the proposed mine site.[2431] As the Corps informed PLP approximately a decade ago:

> the data that we receive to make those determinations is usually less than three months old, the reason that approved [Jurisdictional Determinations] are only good for a limited time is that natural and man-made changes can affect the limits of jurisdiction. The Corps concern is the 2004 data could be 10 to 15 years old before the project progresses to the point where an approved [Jurisdictional Determination] might be made. Therefore, any data that is more than 5 years old must be spot checked to determine if any changes in jurisdiction have occurred.[2432]

There is no indication that PLP has gone back out and "spot checked" data. As the 2009 memo points out, a spot check would start with a desktop survey which would "determine what percentage of the 2004 data must be re-surveyed."[2433] There is no indication that PLP has gone out based on a spot check, and resurveyed. The Corps should not have accepted PLP's work for the purposes of making a PJD because the majority of supporting documents were collected over a decade ago.[2434] National Corps policy considers jurisdictional determinations more than 5 years old to be expired because of the changes that can occur to wetland boundaries over time.[2435] PLP's delineation efforts began in 2004.[2436] Several important changes have been implemented over the subsequent years that affect how wetlands are delineated, including changes to indicator status of plant species, field indicators for hydric soils, and filed indicators of wetlands hydrology.[2437]

[2431] *Id.* at 1.
[2432] *See* U.S. Army Corps of Engineers, CEPOA-RD Memorandum for Record, Subject: POA-2003-803, Koktuli River. Pebble Limited Partnership meeting notes from July 7, 2009, at 3 (emphasis in original).
[2433] *Id.* at 4.
[2434] *See* Yocom, 2018c at 3.
[2435] *Id. citing* U.S. Army Corps of Eng'rs Regulatory Guidance Letter 05-02, June 14, 2005 ("Since wetlands and other waters of the United States are affected over time by both natural and man-made activities, local changes in jurisdictional boundaries can be expected to occur. As such, jurisdictional determinations cannot remain valid for an indefinite period of time.") https://usace.contentdm.oclc.org/utils/getfile/collection/p16021coll9/id/1246 (previously provided as an attachment with Trustees for Alaska's scoping comments).
[2436] *See* DEIS at 3.22–2.
[2437] *See* Yocom, 2018c at 3. *See also* R. W. Lichvar, et al., Alaska 2014 Regional Wetland Plant List, U.S. Army Corps of Eng'rs, http://www.poa.usace.army.mil/Portals/34/docs/regulatory/2014AKWetlandPlantList.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments).

In addition, the Corps adopted the 2007 Alaska-specific regional supplement to the 1987 Wetland Delineation Manual.[2438] In 2009, the Corps noted that it was "[g]randfathering the use of the 1987 Wetland Delineation Manual:

> Grandfathering the use of the 1987 Corps Wetland Delineation Manual - PLP began work on field wetland determinations in 2004. The [Corps] began work on a regional supplement to the 1987 Corps Wetland Delineation Manual (1987 Manual) in 2005. During the time when the regional supplement was being developed, PLP asked for, and was granted permission to grandfather in the project under the 1987 Manual. At the time that the District agreed to grandfather in the PLP project, it was expected that the NEPA/EIS process would begin in 2009.[2439]

However, the Corps made clear in 2009 that "[a]ny determinations made from the date of this memo [July 2009] must use the Alaska Regional Supplement to the 1987 Corps Wetland Delineation Manual."[2440] This requirement has not been followed.

PLP has failed to update its observations, particularly in regards to the changes in wetland indicator status.[2441] A third of PLP's wetland delineation field data were collected in 2004, and more than 72% of its samples are at least 10 years old.[2442] Only the data from 116 of PLP's 685 field sites might arguably fall within the 5-year expiration limit, as these were collected in 2013 (13 field sites) and 2017 (103 samples).[2443] The substantive changes to delineation methodologies would alter many of the conclusions reached in 2004–2008 regarding the presence or absence of one or more of the field criteria (e.g. hydrophytic vegetation, hydric soils, and wetlands hydrology).[2444] The Corps should not have accepted PLP's observations recorded from 2004 to 2008, and even the data collected in 2013 may be outdated.[2445]

B. PLP's Mapping Protocols are Based on Insufficient Wetland Delineation Field Samples.

PLP's mapping protocols are based on insufficient wetland delineation field samples. PLP extrapolated its outdated observations in mapping vast acreages that it did not physically sample or field verify any of the wetland/upland boundaries it mapped, particularly within the past 5

[2438] *See* Yocom, 2018a at 3; *see also* Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2.0), U.S. Army Corps of Eng'rs, Sept. 2007, http://www.usace.army.mil/Portals/2/docs/civilworks/regulatory/reg_supp/erdc-el_tr-07-24.pdf (previously provided as an attachment with Trustees for Alaska's scoping comments); *see also* DEIS at 3.22–2.
[2439] *See* U.S. Army Corps of Engineers, CEPOA-RD Memorandum for Record, Subject: POA-2003-803, Koktuli River. Pebble Limited Partnership meeting notes from July 7, 2009, at 3 (emphasis in original).
[2440] *Id.*
[2441] *See* Yocom, 2018a at 4.
[2442] *Id.* at 3 n.7.
[2443] *Id.*
[2444] *Id.* at 1.
[2445] *Id.* at 4.

years.[2446] Actual boundaries between wetland and non-wetland areas were not field verified for the vast majority of the mapped area.[2447] While field verification of all boundaries is not practicable, the manner in which PLP extrapolates from its data is problematic.[2448] Yocom's report finds that:

> Given that the data are too old to be considered reliable and because of the breadth to which these observations are extrapolated to areas that were not sampled, the Corps should require PLP to revisit and verify the boundaries and acreages that it extrapolated from its wetland delineation field sampling in order to update its observations.[2449]

The report calls for the Corps to independently verify PLP's maps after that have been revised.[2450]

C. PLP Erroneously Omits Potentially Jurisdictional Areas.

Potentially jurisdictional areas are erroneously omitted.[2451] All areas that "may be" subject to jurisdiction must be included as jurisdiction in a signed PJD.[2452] PLP provides data sheets from 685 wetland delineation field sites for the 45,000 acre study area. Based on these figures, PLP has one 0.1 acre sample for every 28 acres of wetlands or mosaics that it mapped.[2453] Yocom's report concludes:

> Whereas this level of effort might be sufficient to characterize homogeneous plant communities in simple landscape positions with distinct topographic boundaries, it seems inadequate for the Corps and the public to be able to assess project impacts, or to determine the least environmentally damaging practicable alternative under the 404(b)(1) Guidelines. Here, the vegetation communities, topography, soil characteristic, and sources of hydrology are complex, the data are too old, and the delineation needs to be updated. For the purposes of this report, however, the data were reviewed for inconsistencies and errors that may have resulted in jurisdictional "waters," including wetlands, being omitted from the Corps' signed PJD.[2454]

PLP's reliance on aerial photointerpretation of "vegetation photographic signatures" raises additional questions as to whether all wetland areas have been identified.[2455] In addition, some of the mapped areas of vegetation were inappropriately delineated on the basis of data collected entirely from outside of the study area boundaries.[2456]

[2446] *Id.* at 1.
[2447] *Id.* at 4.
[2448] *Id.*
[2449] *Id.* at 5.
[2450] *Id.*
[2451] *Id.*
[2452] *Id.*
[2453] *Id.* at 6.
[2454] *Id.*
[2455] *Id.* at 1.
[2456] *Id.*

The Corps should not rely upon submitted data and should consider the permit application incomplete.[2457] The Corps should not have accepted data from 10 years ago or more as valid for a jurisdictional determination in 2018.[2458] Nor should the Corps have accepted wetlands determinations based on the 1987 Wetlands Delineation Manual when there is a 2007 Alaska-focused Regional Supplement. The Corps should withdraw its preliminary jurisdictional determination and require PLP to revisit and reaffirm its delineation with present-day data and far less extrapolation.[2459]

IX. THE CORPS MUST WITHDRAW THE DEIS FROM FURTHER REVEIEW AND REJECT PLP'S APPLICATION.

The Pebble Mine will have far-reaching, adverse impacts to the aquatic ecosystem of Bristol Bay, impacting wildlife, waterways, wetlands, subsistence and sport salmon fisheries, and the thriving 1.5 billion-dollar fishing industry. The long-term adverse consequences of this project greatly outweigh the potential short-term benefits. This project is simply not in the public interest. The environmental analysis must be rigorous and thorough to make sure that decisionmaking is fully informed. Yet the application suffers from significant data gaps. The DEIS fails to take a hard look at the direct, indirect, and cumulative impacts, or consider a reasonable range of alternatives. The Corps cannot grant a CWA permit based on PLP's application and this DEIS. The Corps must abandon its full-steam-ahead approach, reject PLP's application, and revise the DEIS after obtaining all necessary information.

Thank you for considering these comments. If you have any questions regarding these comments, please do not hesitate to contact me at (907) 433-2007 or by email at blitmans@trustees.org.

Sincerely,

Brian Litmans
Senior Staff Attorney
Trustees for Alaska
blitmans@trustees.org
(907) 433-2007

cc:
U.S. Environmental Protection Agency, Region 10 (with attachments)

[2457] *Id.* at 3.
[2458] *Id.* at 11.
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