## 4.4 ENVIRONMENTAL JUSTICE

As described in Section 3.4, Environmental Justice (EJ), Executive Order 12898 requires federal agencies to identify and address "disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations," including Alaska Native communities. Furthermore, Executive Order 12898 also requires the protection of populations with differential patterns of consumption of fish and wildlife. The Council on Environmental Quality (CEQ) defines this as differences in rates or patterns of subsistence consumption by minority, low-income, and Indian tribes, as compared with rates and patterns of consumption by the general population (CEQ 1997).

The CEQ's "Environmental Justice: Guidance Under the National Environmental Policy Act" (1997) and the US Environmental Protection Agency's (EPA's) *Promising Practices for EJ Methodologies in NEPA Reviews* (2016a) were developed to provide agencies with a process for identifying environmental justice communities and addressing potential impacts on those communities. According to these guidance documents, the basic components of an environmental justice assessment should include:

- A demographic assessment of the affected communities to identify minority and low-income populations that may be present
- An integrated assessment to determine whether any adverse impacts would disproportionately affect minority or low-income populations, including Alaska Native communities
- An opportunity for the public to participate in the process, including community, minority, low income, and tribal participation

CEQ guidance indicates that when determining whether natural and physical effects on the environment are "high and adverse," agencies are to consider if environmental effects are significant (as that term is defined by the National Environmental Policy Act [NEPA] lead agency), and if those significant effects are or may have 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 (CEQ 1997).

CEQ guidance also indicates that when determining whether human health effects, which may be measured in risks and rates, are high and adverse, agencies are to consider if those risks and rates are above generally accepted levels (CEQ 1997).

In addition, the EPA recommends considering the following factors in the determination of disproportionately high and adverse human health effects (EPA 2007, 2016a):

- Proximity and exposure to chemical and other adverse stressors, including impacts commonly experienced by "fence-line" communities
- Unique exposure pathways, including subsistence fishing, hunting, or gathering
- Multiple or cumulative impacts, including exposure to several sources of pollutions or pollutants from single or multiple sources
- Physical infrastructure, including inadequate housing, roads, or water supplies in communities
- Non-chemical stressors, including chronic stress related to environmental or socioeconomic impacts

The project's potentially affected population includes those who live, work, subsist, visit, or recreate in the Environmental Impact Statement (EIS) analysis area. The EIS analysis area for

this section corresponds to an area that could be affected by the mine site, transportation corridor, and natural gas pipeline for each alternative through changes in economic, subsistence, and health resources and activities. This includes the six Iliamna Lake communities that would be most impacted by the project economically and through subsistence resources, and regional communities in Bristol Bay who may experience some small economic impacts from the project. Section 3.4, Environmental Justice, presents racial and ethnic characteristics and poverty status for the populations of the six Iliamna Lake communities in the EIS analysis area that would be affected during construction and operations of the project. In the EIS analysis area, Igiugig, Iliamna, Kokhanok, Newhalen, Nondalton, and Pedro Bay, all of which are communities in the Lake and Peninsula Borough (LPB), meet the CEQ definition of minority and/or low-income communities (see Section 3.4, Environmental Justice). Many of the potential physical, environmental, and social effects would be experienced more frequently and intensely by residents of those communities, given their proximity to multiple project components and their use of the area and nearby areas for subsistence harvests.

Impacts to affected communities and the population in the EIS analysis areas for these resources are described in Section 4.3, Needs and Welfare of the People—Socioeconomics; Section 4.9, Subsistence; and Section 4.10, Health and Safety. This environmental justice analysis considers information presented in those sections; considers the distribution of adverse and beneficial impacts throughout the EIS analysis area; and concludes whether there may be disproportionately high and adverse effects to minority or low-income communities. Potential impacts include:

- Changes in job opportunities, employment, recreational opportunities, income, and the cost of living
- Changes in access to and competition for subsistence resources and resource availability
- Changes in sociocultural conditions
- Changes in health and well-being, including the risk of exposure to hazardous chemicals and bioaccumulative compounds, and non-chemical stressors

Impacts are discussed in terms of magnitude, duration, extent, and potential or likelihood. The magnitude of impact is discussed in terms of the communities impacted; the duration of impacts would be short-term, lasing only though the construction phase or months to years; or long-term, lasting throughout the life of the project (decades). The geographic extent of impacts depends on the location and proximity to the affected community; and the potential of impacts is how likely the impact would be. For this analysis, impacts would be expected to occur as described if the project or alternatives are permitted and constructed.

Scoping comments were received related to disproportionate, adverse impacts to low-income and minority communities as a result of the project. Commenters requested that the EIS identify low-income, minority, and Alaska Native communities that may be impacted by the project. Concerns should be addressed regarding food security and subsistence resources, health impacts from pollution and exposure to increased industrial activities and noises, increased risk of injury and exposure to hazardous materials, increased exposure to outsiders and the cascading social and psychological effects.

## 4.4.1 Summary of Key Issues

**Table 4.4-1: Summary of Key Issues for Environmental Justice**

| Impact | Alternative 1a | Alternative 1 and Variants | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| Socioeconomics | Economic benefits to minority and low-income communities. This alternative would increase job opportunities, create year-round employment, and provide steady income. Minority and low-income communities nearest the project components (i.e., Newhalen, Iliamna, Nondalton, and Kokhanok) would likely see the greatest impacts in employment and income.<br>Reduced transportation costs would likely lower the high cost of living for the communities near the transportation corridor (i.e., Newhalen, Iliamna, Nondalton, and Kokhanok). The natural gas pipeline could also provide opportunities for adjacent communities to lower their cost of living. | Same as Alternative 1a.<br>The Summer-Only Ferry Variant would create more seasonal employment and less year-round employment.<br>Impacts from the Kokhanok East Ferry Terminal Variant and the Pile-Supported Dock Variant would be the same as Alternative 1. | Same as Alternative 1a, except that Kokhanok would see fewer cost-of-living benefits, but Pedro Bay would experience greater benefits from reduced transportation costs that would lower the cost of living.<br>The Summer-Only Ferry Operations Variant would create more seasonal employment and less year-round employment.<br>Impacts from the Pile-Supported Dock Variant and the Newhalen River North Crossing Variant would be the same as Alternative 2. | Same as Alternative 2.<br>The Concentrate Pipeline Variant would have less employment and income. There would still be economic benefits to minority and low-income communities from job opportunities, year-round employment, and steady income, but to a lesser extent. |
| Subsistence | Changes in resource availability would be adverse for minority and low-income communities.<br>Impacts to access of subsistence resource harvest areas for minority and low-income communities would not be high or adverse because of access to alternate subsistence resource harvest areas. Employment opportunities could provide additional revenue to support subsistence activities. | Same as Alternative 1a, except that the ferry and transportation corridor would cause less disruption of access to subsistence resource areas for freshwater seals, and more disruption of access to the Upper Talarik Creek area for residents of Iliamna, Newhalen, Pedro Bay, Igiugig, and Kokhanok.<br>Impacts from variants would be the same. | Same as Alternative 1a, except that the transportation corridor and ferry would cause more disruption of access to subsistence resource areas for residents of Iliamna, Newhalen, and Pedro Bay, and less disruption of access for residents in Igiugig and Kokhanok.<br>Impacts from variants would be the same. | Same as Alternative 1a for resource availability and access to subsistence resources.<br>Access to subsistence resource use areas would be similar to Alternative 2 for residents of Iliamna, Newhalen, Pedro Bay, and Nondalton.<br>Impacts from variants would be the same. |

**Table 4.4-1: Summary of Key Issues for Environmental Justice**

| Impact | Alternative 1a | Alternative 1 and Variants | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| Health and Safety | Alternative 1a would provide economic benefits and improvements to the overall health and well-being of residents, especially those in the Lake and Peninsula Borough.<br>Beneficial and adverse impacts on minority and low-income communities from psychosocial and family stress, unintentional injuries (e.g., falls, poisoning).<br>Beneficial and adverse impacts on minority and low-income communities related to access to and quantity of subsistence resources and food security.<br>Adverse impacts from potential increased transportation/navigation accidents and potential increase in suicide rates.<br>Potential for increased risk of exposure to hazardous chemicals in air, soil, groundwater, surface water, sediment, and bioaccumulative compounds would be low, and imperceptible from baseline. Real or perceived impacts could cause additional stress for local residents harvesting salmon for subsistence, commercial fishing, and recreational fishing purposes. | Same as Alternative 1a.<br>Impacts from variants would be the same. | Same as Alternative 1a.<br>Impacts from variants would be the same. | Same as Alternative 1a.<br>The Concentrate Pipeline Variant would provide the same economic benefits and improvements to the overall health and well-being of residents as described for Alternative 3, but to a lesser extent. |
| Environmental Justice Rating | No high or adverse impacts related to socioeconomics.<br>Potential adverse impacts related to subsistence.<br>Potential adverse impacts related to human health. | Same as Alternative 1a. | Same as Alternative 1a. | Same as Alternative 1a. |

### 4.4.2 No Action Alternative

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

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

PLP has employed local community members at the site during the exploratory phase of the project. In particular, the communities closest to the exploration area in the LPB, likely including Nondalton, Iliamna, and Newhalen, provide the greatest proportion of the local workforce. These communities are identified as minority and/or low-income communities. Similarly, these communities and others harvest caribou, large land mammals, and other subsistence resources in the vicinity of project components. Therefore, although there may be some decrease in the current level of economic activity generated by exploration of the project, exploration could continue; no changes in additional future direct or indirect effects to existing socioeconomics, subsistence resources, or access to subsistence resources would be expected; and existing socioeconomic and habitat and resource trends would continue.

#### 4.4.2.1 Needs and Welfare of the People—Socioeconomics

Under the No Action Alternative, although there may be some decrease in the current level of economic activity generated by exploration of the project, exploration could continue, and no changes in additional future direct or indirect effects to the regional economy, cost of living, or current or projected infrastructure would be expected; existing trends would continue. As a result, the current number of direct and indirect jobs would remain the same, and there would be no impact on income, economic stability, or social integrity in minority and low-income communities.

#### 4.4.2.2 Subsistence

The extent of effects on subsistence would be limited to the exploration area. No construction, operations, or closure activities would occur; however, permitted resource exploration activities currently associated with the project may continue (ADNR 2018-RFI 073).

Resource availability would not change from the conditions present during exploration activity and environmental studies at the mine site; therefore, no additional future direct or indirect effects to subsistence resources or access to subsistence resources would be greater than existing conditions, and existing habitat and resource trends discussed in Section 3.9, Subsistence, would continue, including displacement of current subsistence activities from exploration activities. Existing exploration activities associated with the project provide some local employment and income, which could contribute to pursuit of subsistence activities. There is no guarantee that such employment would continue to be available, which could affect minority and low-income communities in the vicinity of the exploration area disproportionately, because these communities

may rely more heavily on subsistence activities. Existing trends in subsistence resources and uses would be expected to continue, and these communities would continue to harvest subsistence resources; the effects of the No Action Alternative would not be high or adverse.

#### 4.4.2.3 Health and Safety

Although the current number of direct and indirect jobs would remain roughly the same (see Section 4.3, Needs and Welfare of the People – Socioeconomics), human health impacts associated with any potential loss of employment opportunities (and subsequent decrease in household income) primarily concern increases or decreases in social determinants of health (SDH), such as income, psychosocial stress, substance abuse, violent crime, and family stress and stability. Any potential SDH impacts would be relatively small in magnitude, relative to baseline conditions, and would largely be confined to communities closest to the mine site (Nondalton, Iliamna, and Newhalen). There would be no impact to more distant communities in the lower Bristol Bay watershed, such as Dillingham, other than removing uncertainty about the fate of this project. Other health factors would likely be similar to current conditions (i.e., baseline), such as potential rates of accidents and injuries, communicable and non-communicable diseases, exposure to hazardous constituents, and access to healthcare services (see Section 4.10, Health and Safety).

Human health impacts from the No Action Alternative would not be perceptible, or those impacted would be able to adapt with ease and not require medical intervention. Direct effects would be largely similar to baseline levels of health. Current health conditions and trends, as described in Section 3.10, Health and Safety, would continue in the EIS analysis area (see Section 4.10, Health and Safety). In addition, a decision not to permit the project may relieve some stress in affected communities associated with concerns regarding project development and perceived impacts on salmon.

### 4.4.3 Alternative 1a

This section presents the potential for Alternative 1a to result in high and adverse effects on minority and low-income populations. Both adverse and beneficial effects are summarized below.

#### 4.4.3.1 Needs and Welfare of the People—Socioeconomics

As discussed in Section 4.3, Needs and Welfare of the People—Socioeconomics, Alternative 1a would provide economic benefits to individuals, families, and communities in the form of increased incomes, year-round employment, and steady income, and would reduce the impacts of the seasonal fluctuations in employment. Under Alternative 1a, in terms of magnitude of impacts, the number of employees would increase to about 2,000 during the 4-year construction phase, and 850 during the 20-year operation of the mine. For the construction phase, PLP has estimated that 250 employees (out of 2,000) would come from the surrounding communities, with 50 of these employees coming from communities connected to the project site by road (PLP 2018-RFI 027).

The communities closest to the mine site include Nondalton, Iliamna, and Newhalen, and Kokhanok on the southern shore of Iliamna Lake; these communities are also proximal to the transportation corridor. These communities meet the definition of minority and low-income communities. Although PLP has generated exploration-related employment for residents of villages throughout the LPB and broader Bristol Bay region over the past decade, the communities surrounding Iliamna Lake and connected by road have provided the greatest proportion of the local workforce. It would be anticipated that residents of the communities surrounding Iliamna Lake would continue to provide the majority of the local workforce for construction and operations of the project. An increased revenue stream and stabilization of population levels attributable to

employment opportunities could result in improvements to community health care facilities throughout the borough, including minority and low-income communities. Therefore, employment through the project would have beneficial economic effects on minority and low-income communities. These effects would last through the life of the project.

The LPB is not connected by road to the rest of the state, and has few roads, contributing to an extremely high cost of living. As described in Section 4.12, Transportation and Navigation, Alternative 1a would result in the construction of roads and ports. Although the road and port would have limited access, PLP has stated that they would work with all local communities to identify the best solutions for controlled-access use of the road and ferry for community transportation (PLP 2018-RFI 027). Additional access would be coordinated between the State of Alaska, the LPB, PLP, and landowners. In terms of magnitude and extent, Alternative 1a has the potential to reduce transportation costs of materials and goods to the transportation corridor area's potentially affected communities (Kokhanok, Iliamna, Newhalen, and potentially Nondalton). Reduced transportation costs would lower the cost of living for these communities, many of which are minority and low income. These benefits may cease if the roads are reclaimed at the end of the project.

Communities adjacent to the natural gas pipeline (Kokhanok, Newhalen, and Iliamna) would have the opportunity to connect to the pipeline. For heating buildings, natural gas would likely be less expensive than diesel heating oil, which could lower the cost of living once equipment (e.g., furnace, water heater) is converted to natural gas; however, communities would be responsible for funding the connections and conversions. These benefits may cease if the pipeline is reclaimed at the end of the project. No other impacts to public utilities would be apparent.

The increase in job opportunities, year-round or seasonal employment, steady income, and lower cost of living described above would have beneficial impacts on the EIS analysis area, especially for communities in the LPB, during construction and operations of the project. Therefore, the effects of Alternative 1a on the needs and welfare of the people would not be "high or adverse."

Although the project would provide a more stable employment base, it should be noted that the actual number of direct and indirect jobs in any given year could fluctuate based on economic conditions and/or business decisions.

#### 4.4.3.2 Subsistence

As discussed in Section 4.9, Subsistence, communities closest to project infrastructure would be the most affected by changes in resource availability. These include the minority and/or low-income communities of Iliamna, Newhalen, Pedro Bay, Igiugig, Nondalton, and Kokhanok. Communities in the Nushagak River drainage and the Kvichak River drainage below Iliamna Lake would experience little to no impact on resource availability or access to resources during routine operations because they use areas that are distant from the project area.

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 subsistence harvest areas; wildlife injury and mortality, and increased costs and times for traveling to more distant areas. In terms of magnitude and extent of impacts, there would be a potential for a small population increase in communities closest to the mine site, which could introduce a small amount of resource competition to the area. Adaptive strategies for the harvest of resources could maintain harvest levels for affected communities, but with the burden of additional expenditures of time and money needed to harvest subsistence resources. This could impact retention and transmission of traditional knowledge and practices related to the areas affected by project activities. In general,

the impacts of subsistence resource availability on minority and low-income communities would potentially be adverse.

Construction and operations of the project would result in changes in access to subsistence resources. During the construction period, access to resources in the immediate vicinity of project components would be inhibited or restricted. In terms of extent, this would impact the communities near project infrastructure that use this land for subsistence fishing, hunting, gathering, education of youth on subsistence traditions, and other cultural and customary practices. Construction of linear features, such as the roads, pipeline, and ice-breaking ferry corridor, could interrupt travel to resources or communities on the other side of the linear features. Safety considerations and presence of project equipment and personnel may restrict hunting activities in proximity to construction activities and facilities, resulting in adverse effects on those minority and low-income communities. Additionally, specific individuals and families that own Native Allotments near project infrastructure and transportation facilities would be disproportionately impacted if project construction and operations activities reduced the availability or value of subsistence resources on or surrounding the Native Allotments.

Once constructed, in terms of magnitude, the natural gas pipeline corridor right-of-way and the transportation corridor roads would likely have a positive impact on minority and low-income communities by providing access to subsistence resources, because these cleared routes would facilitate overland all-terrain vehicle and snowmachine travel under approved conditions. During operations, PLP has stated it would work with local communities to identify safe, practicable ways for residents to use the access roads, such as scheduled, escorted convoys for private vehicle transport; however, crossing at designated points or avoidance of barge traffic may add travel time and expense for subsistence users. The Iliamna Lake ice-breaking ferry could disrupt winter travel over the frozen lake by potentially adding to travel time, complicating travel logistics, increasing the risk of accident and injury, and increasing fuel and maintenance expenditures. This could potentially result in adverse effects on minority and low-income communities that rely on winter travel over the lake. In addition, the open water in the ferry's wake would present a safety hazard for subsistence users. PLP has stated it would work with communities (and supply funding) to provide for the marking and maintenance of snowmachine trails between communities across Iliamna Lake when lake ice would be thick enough to support such traffic (see Chapter 5, Mitigation).

In terms of extent, impacts on access to subsistence resource harvest areas would occur for the minority and/or low-income communities closest to the project components: Nondalton, Iliamna, Newhalen, Pedro Bay, Igiugig, and Kokhanok. In terms of magnitude, impacts associated with access around the mine site for subsistence use and harvest would be most concentrated near the mine site area, and would diminish with distance. The magnitude, duration, and extent of impacts of the transportation corridor and associated uses of areas would vary depending on the activity of the user and the location of the use area in relation to the transportation corridor. The effects would be limited in geographic extent, and subsistence users would be able to access other areas for harvest of resources, based on overlapping areas shown in Section 4.9, Subsistence. The duration of impacts from the transportation corridor and associated uses would be intermittent to long term over the 24-year period of project construction and operations, and extend beyond the life of the mine. Although impacts would be long-term, there would be other accessible areas for subsistence hunters, although there may be increased time and resources spent to harvest. Therefore, the impacts of access to subsistence resource harvest areas for minority and low-income communities would not be "high and adverse" (see Section 4.9, Subsistence, for a detailed discussion of impacts related to changes in access of subsistence resource harvest areas for the communities of Nondalton, Iliamna, Newhalen, Pedro Bay, Igiugig, and Kokhanok).

In terms of magnitude and extent, project construction and operations would be expected to increase employment opportunities for local residents, particularly for those living in communities surrounding Iliamna Lake. Many subsistence activities depend on cash income to pay for the tools, ammunition, equipment, maintenance, and fuel used to harvest, process, and store subsistence resources. When cash incomes increase, subsistence production often increases as a result (Wolfe et al. 2010). Therefore, new employment opportunities that would last throughout the life of the mine would benefit minority and low-income communities.

Changes in harvest participation are a leading indicator of cultural changes. The level of participation may be affected by changes in resource abundance and quality, season and bag limits, changes in physical access, real or perceived changes in cultural perceptions of resources (e.g., fish and animals seen as tainted/contaminated, or water seen as polluted) and the times and funds available for subsistence activity change. Year-round and rotational employment could reduce the opportunity for subsistence users to harvest and process resources, as well as reduce their ability to pass on skills and knowledge to the next generation. Households and communities would need to adjust to new roles of subsistence labor, changes in sharing networks, and to possible changes in harvest levels. Project employment or related regional out-migration could cause the reduction or loss of subsistence production from high-harvesting households. In typical communities, 30 percent of households harvest 70 percent of the resources, and there is a high level of sharing that occurs among households (Wolfe et al. 2010).

The loss of high-harvesting households and a reduction in sharing could result in less availability of traditional foods, thereby having adverse impacts on minority and low-income communities. If high-harvesting members of “super households” find project-related employment and have less time for subsistence activities, the rest of the community and households in other communities could end up receiving less wild food through sharing and trading relationships. Therefore, the impacts would be long-term, lasting through mine closure. However, the effects could be reduced with planned periods of leave options during subsistence harvest periods.

#### 4.4.3.3 Health and Safety

Section 4.10 and Appendix K4.10, Health and Safety, describe impact ratings for the health effects category under Alternative 1a. These effects determinations take into account impact-reducing design features proposed for the project. Although eight health effect categories (HECs) were considered, the primary focus of the health assessment were HECs 1 through 4, including SDH, accidents and injuries, exposure to hazardous materials, and food, nutrition, and subsistence activity. The relevance to the project of the remaining HECs (5 through 8) is expected to be low, and they are not summarized below, but are presented in Section 4.10 and Appendix K4.10, Health and Safety, for completeness.

The project would increase household incomes, employment rates, and education attainment during construction and operations phases, and those economic benefits would likely result in an improvement to the overall health and well-being of residents living in the communities from which the workforce for the project would be employed. Many of the communities that would experience these beneficial effects are minority and low-income communities. Economic benefits to these communities would also likely result in increased dietary options, lower regional food costs, and increased income for purchasing subsistence-related equipment. The benefits would be more apparent in the small, rural LPB communities, where even minor changes in their economies could have a measurable impact on their overall health and well-being.

Impacts on psychosocial health, family stress, other unintentional injuries (e.g., falls, poisoning), and food security (relative to impacts to cost of living/food and subsistence resources) would be both beneficial and adverse. In terms of magnitude and extent, beneficial effects could include

increased funding for the borough to maintain or improve community health services, and increased financial security for community members employed by the project. Adverse health consequences may be related to fear of changes in lifestyle and cultural practices, depression and increased substance abuse, land encroachment, impact to the environment, and real or perceived impacts on food security and quality associated with both commercial and recreational fishing, and with subsistence activities. The project could result in an increase of transportation/ navigation accidents and injuries for mine workers and the public at surface access road crossings (at a minimum) if alternate safe routes or mitigation measures were not taken. In addition, the project could potentially result in increased intentional injury (suicide) due to increases in psychosocial stress and any decreases in family stability. However, it is difficult to predict changes in the direction and magnitude of impacts to suicide rates because it is influenced by complex, multi-dimensional contributing factors.

Impacts on access to and quantity of subsistence resources could be both adverse and positive to health; and in terms of magnitude and extent, many of these effects would be most noticeable to communities in close proximity to the mine site, including material sites, and the transportation corridor. Potential negative impacts could be from actual or perceived decreases in access to, availability, and/or quality of subsistence resources, which could also adversely impact food security, community health/well-being, and cultural identity. Subsistence users would likely adjust the resource use areas and species composition of harvest resources to target resources that would be less affected by project activities. Although these adaptive approaches would likely sustain harvest levels for affected communities, they may increase expenses and time needed to harvest subsistence resources, and add to psychosocial stress and anxiety. However, benefits may also occur, because increased incomes and employment can positively affect subsistence harvest levels and participation, including making procurement of hunting and fishing equipment more affordable, which in turn could positively affect food security.

The magnitude of health impacts related to unanticipated project spills may include psychosocial stress and anxiety regarding the possible or actual occurrence of spills; potential temporary releases of hazardous chemicals to air, water, and soil; and possible exposures to chemicals by subsistence resources that are ultimately consumed by humans. Planned measures to address these potential impacts include prompt measures for spill containment, rapid community outreach and notifications, as well as testing and monitoring of environmental media such as air, water, and subsistence food resources (see Section 4.27, Spill Risk).

Other adverse key health outcomes considered are the potential for increased risk of exposure to hazardous chemicals in air, soil, groundwater, surface water, and sediment from the project construction, operations, and closure activities. Exposure to hazardous chemicals could occur through inhalation, physical (i.e., dermal) contact, and direct or indirect ingestion (e.g., direct exposure through incidental soil ingestion or indirect exposure through ingestion of subsistence foods that have the potential to bioaccumulate chemicals of potential concern [COPCs]). Recreational and subsistence activity users are expected to be the most frequent visitors to the areas affected by project-related chemicals; in terms of impact extent, these users may be drawn from the potentially affected communities identified in the EIS analysis area, particularly those in closest proximity: Nondalton, Iliamna, and Newhalen, each approximately 17 miles from the mine site; and Kokhanok, which would be approximately 2 miles from the port access road and pipeline route, and would have a spur road to the community. Specific project sources of hazardous materials, the media in which they might occur, and the magnitude and extent of impacts on potentially affected communities are summarized below. The duration of potential impacts from exposure would be long-term. See Section 4.10 and Appendix K4.10, Health and Safety, for a discussion of modeling criteria used to determine health risks associated with exposure to metals, COPCs, and hazardous air pollutants (HAPs).

- **Air Exposure Pathways—**Project air emissions resulting from stationary sources (e.g., turbines, generators, boilers), mobile sources (e.g., vehicle and mobile equipment exhaust), and fugitive sources (e.g., air particulates from blasting, drilling, vehicle road dust, and wind erosion) could potentially be inhaled by residents in the affected communities, subsistence receptors, and recreational users. Quantitative and qualitative air emission evaluations conducted for this EIS determined that the air inhalation exposure pathway from all project components would not be expected to impact the health of the affected communities, including residents, subsistence receptors, and recreational users. In addition, with implementation of dust mitigation measures, the potential localized and near-field air quality fugitive dust impacts from the project would be further reduced. Within the limits of its regulatory authority, the Alaska Department of Environmental Conservation can require an assessment of ambient air quality to verify whether fugitive dust is causing or significantly contributing to concentrations of particulate matter above ambient air standards.
- **Soil Exposure Pathways—**Mine site fugitive dust emissions from material and handling activities (mined ore, quarry rock, overburden, and waste rock) could result in wet and dry dust deposition of metals onto soils, waterbodies, and vegetation (e.g., berries) due to the concentration of heavy metals found in orebody materials. Mine site fugitive dust deposition modeling indicates that this could result in negligible increased concentrations of HAP metals and non-HAP metals above baseline outside of the mine site. Because it is expected that concentrations of HAP and non-HAP metals in soils would be almost indistinguishable from current baseline concentrations, they would not result in any new exceedances of health-based criteria (beyond those that already exceed baseline concentrations). The transportation corridor, Amakdedori port, and natural gas pipeline fugitive emissions also have the potential to result in dust deposition. However, because only existing soils with baseline levels of naturally occurring metal concentrations would be disturbed during construction, and local non-potentially acid-generating rock sources would be used for construction of the roadway, dust deposition would not be expected to increase metal concentrations above baseline conditions. Overall, dust deposition impacts to soil would not be expected to impact the health of the affected communities, including subsistence receptors and recreational users, through direct exposure relative to baseline conditions.
- **Water Exposure Pathways—**Affected communities could be exposed to mine site surplus water, inadvertent release of vehicle- or ferry-related materials (e.g., fuel, oil, and lubricants) during transportation corridor operations, and mine site fugitive emissions that could result in dust deposition of metals to surface waterbodies or to soil, and subsequent leaching to groundwater. Mine site surplus water (e.g., non-contact stormwater runoff and contact water) would be collected separately on site and discharged to downstream drainages during operations and closure after treatment under permits. Because mine site effluent would be treated to meet permitting requirements (if permits are issued) prior to discharge, the mine site effluent would not be expected to result in impacts to surface water quality, and would be presumed to be protective of human health, even for the most intensive uses, such as potable use and household water supply.

  Mine site material and handling activities would result in fugitive emissions that could result in wet and dry dust deposition of metals to surface waterbodies. Expected concentration increases in surface water and sediment at the end of mine site operations are negligible relative to baseline and future risk/hazards for metal concentrations. Therefore, the surface water and sediment exposure pathways from

dust deposition would not be expected to impact the health of the affected communities above baseline conditions, including subsistence receptors and recreational users.

The health evaluation used future media concentrations expected immediately outside the mine, which would be protective of existing drinking water protection areas near the project and the potentially affected communities. Iliamna, Newhalen, and Nondalton have community drinking water wells east of the mine site. Mine site groundwater would be expected to be captured by the seepage collection systems or contained in the open pit cone of depression, remaining within the mine site boundaries, and would not be expected to impact the mine drinking water wells of these communities. Metals deposited on soil from mine site fugitive emissions may subsequently leach to groundwater, representing a potential source of increased metals to groundwater. Any dust deposition impacts to soil and subsequently groundwater would be greater for those communities in close proximity to the mine site boundary, and would be less for other potentially affected communities farther away. Because dust deposition impacts to soil would be expected to result in negligible increases from baseline soil, there would not be groundwater exceedances of health-based criteria (beyond those that already exceed baseline concentrations). Therefore, dust deposition impacts to soil and subsequent potential migration to groundwater would not be expected to impact the health of the affected communities relative to baseline groundwater conditions.

- **Subsistence Food Exposure Pathways—**Exposure to project-related chemicals through food may occur through consumption of food resources that dust-containing chemicals have deposited directly on (e.g., berries and other plant produce), or consumption of food that has taken up project-related chemicals from the surrounding environmental media by bioaccumulation (e.g., uptake of metals by edible fish from sediments, water, or invertebrate prey items, or by plants from soils). Affected communities consuming a subsistence diet may be exposed to higher levels of bioaccumulative compounds because subsistence foods may compose a very large portion of daily dietary intake.

  Consumption of terrestrial plant foods impacted by mine site dust deposition may be seasonal, because dust would be washed off of the vegetation/berries surrounding the project during winter months, or can occur throughout the duration of project activities. The geographic extent of effects to vegetation from fugitive dust would be areas adjacent to the construction activities, active mine site, and roads with vehicle traffic or in unpaved surface areas, with the highest concentrations of dust closest to the source. Fugitive dust impacts would be expected to discourage subsistence users from harvesting resources near the areas affected by the mine site and the transportation corridor. Therefore, potential dietary exposure to plant foods impacted by dust deposition would be anticipated to be low for subsistence users.

  Vegetation has the potential to be ingested by wildlife, which may subsequently be harvested and consumed by subsistence users. Caribou and moose would be expected to avoid areas impacted by dust deposition, and subsistence users may avoid harvesting resources near the mine site and transportation corridor due to air/dust deposition concerns. In addition, increases on or in terrestrial wildlife (upland game) at the end of project operations would be expected to be negligible to slight, given the predicted negligible increases of HAP and non-HAP metals in abiotic media at the end of project operations. Therefore, potential dietary exposure to terrestrial wildlife impacted by dust deposition would be anticipated to be low for subsistence users.

Mine site fugitive emissions would result in direct dust deposition to surface waterbodies. In addition, mine site activities would create new areas of standing water in the mine site that may attract waterbirds, including various freshwater storage impoundments, the tailings pond, and the pit lake. Edible fish have the potential to uptake bioaccumulative metals from water, sediments, or invertebrate prey items; and waterbirds have the potential to uptake bioaccumulative metals in water and aquatic prey items. The edible fish and waterbirds may then be harvested and consumed by subsistence users. However, surface water concentrations outside the mine site are expected to be below water quality criteria protective of the environment and human health. Increases of all bioaccumulative metals in fish in surface waterbodies outside the mine site at the end of operations would be expected to be negligible to slight. Bioaccumulation potential would be expected to be low for migratory waterfowl because they would not be expected to have sufficient exposure to the mine site water storage features, including the pit lake. Impacts to wildlife from all aspects of the project, including around the pit lake, would be minimized or mitigated through PLP's development and implementation of a Wildlife Management Plan. Therefore, potential dietary exposure to bioaccumulative chemicals from fish and waterbirds would be anticipated to be low for subsistence users.

### 4.4.4 Alternative 1

This section presents the potential for Alternative 1 to result in high and adverse effects on minority and low-income populations. Both adverse and beneficial effects are summarized below.

#### 4.4.4.1 Needs and Welfare of the People—Socioeconomics

The magnitude, duration, extent, and likelihood of impacts of Alternative 1 on employment and income would likely be the same as the impacts of Alternative 1a. The impacts on the cost of living of Alternative 1 would be largely the same as the impacts of Alternative 1a, and would likely lower the high cost of living for the communities near the transportation corridor. Although the alignment of the mine access road and natural gas pipeline would change, Alternative 1 would have the same overall impacts to the socioeconomic indicators of the potentially affected communities as Alternative 1a. Overall, environmental justice determinations would be the same.

#### 4.4.4.2 Subsistence

The magnitude, duration, extent, and likelihood of impacts from the changes in resource availability, access to subsistence resources, and the sociocultural dimension of subsistence under Alternative 1 would be the same as Alternative 1a, except for differences described below. As described above for Alternative 1a, these impacts could result in both beneficial and adverse effects on minority and low-income communities.

Changes in resource availability along the transportation corridor and the natural gas pipeline would be similar to Alternative 1a for the port access road, but the natural gas pipeline impacts would likely have a somewhat smaller geographic extent during construction because there would be no deviation of the natural gas pipeline away from the mine access road. Individual mortality, behavioral disturbance, and displacement of subsistence resources would occur at approximately the same levels as described under Alternative 1a.

In terms of magnitude, the mine access road would cause less disruption of access to subsistence resource areas for residents of Nondalton, Iliamna, Newhalen, Pedro Bay, Igiugig, and Kokhanok than Alternative 1a, with the exception of the Upper Talarik Creek areas. Ferry operations would also result in a smaller-magnitude impact to resource availability for seals compared to

Alternative 1a from ferry operations. Magnitude of impacts would vary from year-to-year, depending on location of subsistence resources during any given year. Therefore, the impacts of access to subsistence resource harvest areas for minority and low-income communities would not be "high and adverse," and would be offset to some degree by the availability of alternate resources.

#### 4.4.4.3 Health and Safety

Alternative 1 would have the same or similar magnitude, duration, extent, and likelihood of health and safety impacts on communities as those for Alternative 1a, with few exceptions. The area of Iliamna Lake used for the ferry would be different, because it would travel to the north ferry terminal instead of the Eagle Bay ferry terminal. The mine access road alignment would be different; however, accidents and injuries due to transportation would be the same as Alternative 1a. Overall environmental justice determinations would be the same.

#### 4.4.4.4 Alternative 1—Kokhanok East Ferry Terminal Variant

The Kokhanok East Ferry Terminal Variant would have the same magnitude, duration, extent, and likelihood of impacts to socioeconomics, subsistence, and health and safety in the context of environmental justice as discussed above.

#### 4.4.4.5 Alternative 1—Summer-Only Ferry Operations Variant

The Summer-Only Ferry Operations Variant would have the same magnitude, duration, extent, and likelihood of impacts to health and safety in the context of environmental justice as discussed above. Impacts from socioeconomics and subsistence would be the same, except that for socioeconomics, it would likely shift some of the positions held by community members from year-round to seasonal, which would also lower the overall income earned by community members that stays in the region compared to year-round ferry operations, and would have fewer beneficial impacts than Alternative 1 without the variant. For subsistence, this variant would not have impacts to lake travel and associated harvest activities in the winter. Overall, there would be tradeoffs, but environmental justice determinations would be the same.

#### 4.4.4.6 Alternative 1—Pile-Supported Dock Variant

The Pile-Supported Dock Variant would have the same magnitude, duration, extent, and likelihood of impacts to socioeconomics, subsistence, and health and safety in the context of environmental justice as discussed above.

### 4.4.5 Alternative 2—North Road and Ferry with Downstream Dams

This section presents the potential for Alternative 2 to result in high and adverse effects on minority and low-income populations. Both adverse and beneficial effects are summarized below.

#### 4.4.5.1 Needs and Welfare of the People—Socioeconomics

The magnitude, duration, extent, and likelihood of impacts of Alternative 2 on employment and income would be expected to be the same as the impacts of Alternative 1a. It would be anticipated that residents of the communities surrounding Iliamna Lake would continue to provide the majority of the local workforce for construction and operations of the project under Alternative 2. The increase in job opportunities, year-round employment, and steady income under Alternative 2 would have the same beneficial impacts on minority and low-income communities as Alternative 1a. However, Pedro Bay would primarily experience more of these impacts instead of Kokhanok.

The impacts on the cost of living of Alternative 2 would likely be the same as the impacts of Alternative 1a for the communities of Nondalton, Iliamna, and Newhalen. However, because the mine and port access roads and ferry route would be at the northern end of the lake around Pedro Bay as opposed to the mid-lake region, Kokhanok would likely see fewer cost-of-living benefits under Alternative 2; however, Pedro Bay, which is considered a minority community, would likely experience greater beneficial impacts from reduced transportation costs that would lower the high cost of living.

### 4.4.5.2 Subsistence

The magnitude, duration, extent, and likelihood of impacts from the changes in resource availability, access to subsistence resources, and the sociocultural dimension of subsistence under Alternative 2 would be the same as Alternative 1a, except for the differences described below. As described for Alternative 1a, impacts could result in both beneficial and adverse effects on minority and low-income communities.

Changes in resource availability along the transportation corridor and the natural gas pipeline for Alternative 2 would be similar to Alternative 1a. Disturbance to and displacement of subsistence resources would occur at approximately the same levels. The primary difference is that there are fewer communities using the area between Pile Bay and Williamsport for subsistence; therefore, the magnitude of the impact would be less than Alternative 1a.

Under Alternative 2, there would be an overland pipeline right-of-way from Pile Bay to Eagle Bay. This could introduce some competition to subsistence users from recreational sport hunting and fishing; although because of the relatively low recreational use of the area, the magnitude of the effects on minority and low-income communities from competition for subsistence resources would be expected to be small.

In terms of extent of impacts under Alternative 2, the mine and port access roads and ferry terminals would be at the northern and eastern ends of the lake, as opposed to the mid-lake region. In terms of magnitude, the transportation corridor and ferry would cause more disruption of access to subsistence resource areas for residents of Nondalton, Iliamna, Newhalen, and Pedro Bay; less disruption of access for residents in Kokhanok; and no impacts to residents of Igiugig. In addition, there would be a higher number of overlapping use areas along the road and pipeline corridors of Alternative 2 from Pedro Bay to the mine site, and the magnitude of the impact would be slightly greater than Alternative 1a. Ferry operations would also result in a higher-magnitude impact to resource availability for seals compared to Alternative 1a, due to impacts from ferry operations. However, similar to Alternative 1a, there would be availability of alternate areas in traditional subsistence areas for activities for these communities. Magnitude of impacts would vary from year-to-year, depending on location of subsistence resources during any given year.

Therefore, the impacts of access to subsistence resource harvest areas for minority and low-income communities would not be “high and adverse,” and would be offset to some degree by the availability of alternate resources.

### 4.4.5.3 Health and Safety

Alternative 2 would have the same magnitude, duration, extent, and likelihood of health and safety impacts on minority and low-income communities as Alternative 1a. Alternative 2 would provide the same economic benefits and improvements to the overall health and well-being of residents; would have the same beneficial and adverse impacts on psychosocial health, family stress, and unintentional and intentional injuries; and would have the same beneficial and adverse impacts on access to and quantity of subsistence resources as described above for Alternative 1a.

Alternative 2 would have the same magnitude and duration potential for increased risk of exposure to hazardous chemicals in air, soil, groundwater, surface water, sediment, and bioaccumulative compounds as Alternative 1a. However, this alternative includes a natural gas pipeline along the Alternative 3 north road alignment, which eliminates any potential transportation/navigation hazards and impacts at the Iliamna Lake segment during the construction phase under Alternative 1a. In terms of geographic extent, under Alternative 2, the communities that would be impacted are those closest to the transportation corridor: Iliamna, Newhalen, Nondalton, and Pedro Bay.

See Section 4.10, Health and Safety, for information on risk of exposure.

#### 4.4.5.4 Alternative 2—Summer-Only Ferry Operations Variant

The Summer-Only Ferry Operations Variant would have the same magnitude, duration, extent, and likelihood of impacts to socioeconomics, subsistence, and health and safety in the context of environmental justice as discussed above, and as for this variant in Alternative 1.

#### 4.4.5.5 Alternative 2—Pile-Supported Dock Variant

The Pile-Supported Dock Variant would have the same magnitude, extent, duration, and likelihood of impacts to socioeconomics, subsistence, and health and safety in the context of environmental justice as discussed above.

#### 4.4.5.6 Alternative 2—Newhalen River North Crossing Variant

The Newhalen River North Crossing Variant would have the same magnitude, duration, extent, and likelihood of impacts to socioeconomics, subsistence, and health and safety in the context of environmental justice as discussed above.

### 4.4.6 Alternative 3—North Road Only

This section presents the potential for Alternative 3 to result in high and adverse effects on minority and low-income populations. Both adverse and beneficial effects are summarized below.

#### 4.4.6.1 Needs and Welfare of the People—Socioeconomics

The magnitude, duration, extent, and likelihood of impacts of Alternative 3 on employment and income would likely be the same as the impacts of Alternative 1a. It would be anticipated that residents of the communities surrounding Iliamna Lake would continue to provide the majority of the local workforce for construction and operations of the project under Alternative 3. The increase in job opportunities, year-round employment, and steady income under Alternative 3 would have the same beneficial impacts on minority and low-income communities as Alternative 1a. There would be no interference with winter access across Iliamna Lake, because there would be no ferry operations under Alternative 3.

The impacts on the cost of living of Alternative 3 would likely be the same as the impacts of Alternative 1a for the communities of Nondalton, Iliamna, and Newhalen. However, because the north access road would be at the northern end of the lake around Pedro Bay as opposed to the mid-lake region, the cost-of-living benefits provided to Kokhanok under Alternative 1a would not be provided under Alternative 3; however, Pedro Bay, which is considered a minority community, would benefit from reduced transportation costs that would lower the high cost of living.

### 4.4.6.2 Subsistence

The magnitude, duration, extent, and likelihood of impacts from the changes in resource availability, access to subsistence resources, and the sociocultural dimension of subsistence under Alternative 3 would be the same as Alternative 1a, except for differences described below. As described above for Alternative 1a, these impacts could result in both beneficial and adverse effects on minority and low-income communities.

In terms of magnitude and extent, changes in resource availability along the transportation corridor and the natural gas pipeline corridor for Alternative 3 would be similar to Alternative 1a, but would occur over a different geographic area. Disturbance to and displacement of subsistence resources would occur at approximately the same levels. The primary difference is that there are fewer communities using the area between Pile Bay and Williamsport for subsistence (Iliamna, Newhalen, Nondalton, and Pedro Bay). However, there are many overlapping use areas along the road corridor of Alternative 3 from Pedro Bay to the mine site for Iliamna and Pedro Bay, so the magnitude of the impact to those communities would be slightly higher than Alternative 1a.

Under Alternative 3, the north access road would connect Pile Bay to the mine site. In terms of magnitude of impacts, this road could introduce some competition to subsistence uses of resources from recreational sport hunting and fishing. The port access road beyond Pile Bay would have similar controlled access as described under Alternative 1a; therefore, the magnitude of effects would be similar.

Access to subsistence resource use areas would be similar to Alternative 2 for residents of Nondalton, Iliamna, Newhalen, Pedro Bay, Igiugig, and Kokhanok. Similar to Alternative 1a, there would be availability of alternate areas in traditional subsistence areas for activities for these communities; however, magnitude of impacts would vary from year-to-year, depending on location of subsistence resources during any given year. There would be no ferry operations, and therefore no impacts to winter seal hunting or access on Iliamna Lake. Therefore, the impacts of access to subsistence resource harvest areas for minority and low-income communities would not be “high and adverse.”

### 4.4.6.3 Health and Safety

Alternative 3 would have the same or similar magnitude, duration, extent, and likelihood of health and safety impacts on communities as Alternative 1a. Alternative 3 would provide the same economic benefits and improvements to the overall health and well-being of residents; would have the same beneficial and adverse impacts on psychosocial health, family stress, and unintentional and intentional injuries; and would have the same positive and adverse impacts on access to and quantity of subsistence resources as described above for Alternative 1a.

In terms of likelihood of impacts, Alternative 3 would have the same potential for increased risk of exposure to hazardous chemicals in air, soil, groundwater, surface water, sediment, and bioaccumulative compounds as Alternative 1a. In terms of magnitude, this alternative includes a natural gas pipeline along the north road, which eliminates any potential transportation/navigation hazards and impacts at the Iliamna Lake segment during the construction phase under Alternative 1a. Communities closest to the transportation corridor are the same as Alternative 2. See Section 4.10, Health and Safety, for information on risk of exposure.

Because Alternative 3 does not involve operation of a ferry across Iliamna Lake, there would be no potential safety hazards to winter transportation by local residents across Iliamna Lake compared to Alternative 1a, Alternative 1, and Alternative 2.

#### 4.4.6.4 Alternative 3—Concentrate Pipeline Variant

The Concentrate Pipeline Variant would have the same duration, extent, and likelihood of impacts to subsistence in the context of environmental justice as discussed above. In terms of magnitude, for socioeconomics and health and safety, the impacts of the variant would likely be a decrease in employment of truck operators and increased employment at the dewatering facility. Overall, the total number of employees needed during operations would likely decrease, which would decrease the overall income and employment in the potentially affected communities. However, the variant would still provide some economic benefits to minority and low-income communities by providing job opportunities, year-round employment, and steady income to a lesser extent than Alternative 3. Overall, environmental justice determinations would be the same.

### 4.4.7 Cumulative Effects

Impacts to environmental justice are those high and adverse human health or environmental effects that affect a minority or low-income population at a greater rate than the general population as a whole. The cumulative effects analysis area consists of the geographic area of those who live, work, subsist, or recreate in the EIS analysis area and the broader region that would be affected by the reasonably foreseeable future actions (RFFAs). These areas include the communities in the LPB and Dillingham Census Area, which are considered minority and low-income communities (see Section 3.4, Environmental Justice). There could be some cumulative effects on minority and low-income residents in the Kenai Peninsula Borough (KPB), Bristol Bay Borough, and Municipality of Anchorage, which are not considered minority or low-income communities as a whole. Past, present, and RFFAs in the cumulative impact analysis area have the potential to cumulatively contribute to disproportionately high and adverse effects on minority and low-income communities.

This cumulative analysis considers information presented in Section 4.3, Needs and Welfare of the People—Socioeconomics; Section 4.9, Subsistence; and Section 4.10, Health and Safety. These sections took into consideration RFFAs as identified Section 4.1, Introduction to Environmental Consequences. Because the broader region of Alaska is considered in this analysis, there are no actions identified in Section 4.1, Introduction to Environmental Consequences, that are considered to have no potential of contributing to cumulative effects on environmental justice.

#### 4.4.7.1 Past and Present Actions

**Needs and Welfare of the People—Socioeconomics**

Past and present actions that have contributed to the existing socioeconomic conditions of potentially affected communities include commercial and subsistence harvest of fish and wildlife, commercial recreation and tourism, community development and infrastructure, mining exploration activities, the Williamsport-Pile Bay Road, and the Diamond Point quarry. Changes in fishing technology and the variability of fish returns have changed the regional economy from year-to-year. Local employment and income associated with commercial fishing has been decreasing around Iliamna Lake, but remains the economic mainstay of portions of the Bristol Bay Borough and Dillingham Census Area. Commercial recreation and mineral exploration have created employment opportunities for local residents. Fluctuations in oil prices have affected the availability of state and local revenue, affecting capital improvement projects and services in the region. Employment fluctuates due to construction cycles of major projects and seasonal employment associated with commercial fishing, construction, and tourism industries. Limited transportation infrastructure keeps the cost of living high, which has contributed to the

population outmigration in some LPB communities. Subsistence has remained a cultural and economic foundation of communities in the project area.

**Subsistence**

Past and present actions have caused noticeable effects to subsistence resources. Such activities include subsistence activities themselves, sport fishing and hunting, mining exploration, and non-mining-related projects, such as transportation, oil and gas development, or community development actions. There have been observations of aircraft disturbance to wildlife and localized restriction of access to subsistence activities associated with mineral exploration activities, including the project.

**Health and Safety**

Past and present actions such as sport fishing and hunting, mining exploration, and non-mining-related projects, such as transportation, oil and gas development, or community development actions, have all influenced health and safety conditions for minority and low-income communities in the cumulative effects analysis area. Community development and transportation infrastructure projects have generally improved human health and safety on project area communities. A certain amount of psychosocial stress has resulted from the variability in salmon runs and fish prices, affecting participants in commercial fishing. Past and present mineral exploration has also created stress with regard to concerns about potential mining development in the Bristol Bay watershed.

### 4.4.7.2 Reasonably Foreseeable Future Actions

As noted above, because the broader region of Alaska is considered in this analysis, all categories of actions identified in Section 4.1, Introduction to Environmental Consequences, are considered to have a potential of contributing to cumulative effects on environmental justice. These projects include the following categories: Mineral Exploration and Mining Projects, Oil and Gas Exploration and Development projects, Transportation and Infrastructure Projects, and Energy and Utilities Projects.

The No Action Alternative would not contribute to cumulative effects on the regional and state economy, infrastructure, cost of living, population characteristics, changes to resource availability, access to resources, competition for resources, or health and safety. Although there may be some decrease in the current level of economic activity generated by exploration of the project, exploration activities could continue. If there are fewer local employment opportunities associated with future exploration of the Pebble deposit, there could be less income that could contribute to support subsistence activities. However, that could be offset by exploration of other nearby mineral deposits.

Collectively, the project alternatives and RFFAs that contribute to cumulative effects on environmental justice are summarized in Table 4.4-2.

**Table 4.4-2: Contribution to Cumulative Effects for Environmental Justice**

| Reasonably Foreseeable Future Actions | Alternative 1a | Alternative 1 | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| **Pebble Project Expansion Development Scenario** | **Mine Site:** The mine site footprint would have a larger open pit and new facilities to manage water and store tailings and waste rock. The Pebble Project expansion development scenario would continue, and likely increase, the beneficial and adverse impacts that would be realized from the project on socioeconomics, subsistence, and health and safety characteristics.<br>**Other Facilities:** The north access road would be extended east from the Eagle Bay Ferry Terminal to a new deepwater port site at Iniskin Bay. Construction and operation of a second road access corridor would have both beneficial and adverse effects on socioeconomics, subsistence, and health and safety through increased access opportunities and increased disturbance of subsistence resources.<br>**Magnitude:** The Pebble Project expansion development scenario would create some additional local employment and revenue opportunities over a longer period of time, but likely increase and extend stress and concerns about contamination resulting from the project. An increased area around the mine site and second access corridor would be restricted for subsistence activities, including portions of Upper Talarik Creek, with potential losses in harvest and cultural activities.<br>**Duration/Extent:** Beneficial and adverse effects of mining would be extended over an additional 78 to 98 years. Pedro Bay would experience greater impacts under the Pebble Project expansion development scenario with the development of the second transportation access corridor.<br>This additional habitat loss associated with the mine site and second transportation corridor would not be expected to have population-level effects on fish and wildlife; however, noise, access to resources, and | **Mine Site:** Identical to Alternative 1a.<br>**Other Facilities:** Similar to Alternative 1a, except that the portion of the access road from the north ferry terminal to the existing Iliamna area road system would not already be constructed. Concentrate and diesel pipelines would be constructed along the Alternative 3 road alignment and extended to a new deepwater port site at Iniskin Bay.<br>**Magnitude:** Impacts to environmental justice from mine expansion would be similar to Alternative 1a regarding local employment and revenue, contamination concerns, and subsistence access.<br>**Duration/Extent:** The duration and extent of cumulative impacts to environmental justice would be similar to the duration and extent of Alternative 1a.<br>**Contribution:** The contribution to cumulative effects would be slightly more than Alternative 1a, Alternative 2, and Alternative 3. | **Mine Site:** Identical to Alternative 1a.<br>**Other Facilities:** Same as Alternative 1a.<br>**Magnitude:** Impacts to environmental justice from mine expansion would be similar to Alternative 1a regarding local employment and revenue and contamination concerns. There would be a smaller magnitude of impacts on access to subsistence resources because there would be one mine access route instead of two.<br>**Duration/Extent:** The duration and extent of cumulative impacts to environmental justice would be similar to the duration and extent of Alternative 1a, although affecting a smaller amount of acreage over a smaller geographic area with one road access corridor.<br>**Contribution:** Beneficial cumulative impacts from Alternative 2, combined with the Pebble Project expansion development scenario to income and infrastructure for minority and low-income communities would be less than Alternative 1a because the north ferry operation | **Mine Site:** Identical to Alternative 1a.<br>**Other Facilities:** Overall expansion would use the existing north access road; concentrate and diesel pipelines would be constructed along the existing road alignment and extended to a new deepwater port site at Iniskin Bay.<br>**Magnitude:** Impacts to environmental justice from mine expansion would be similar to Alternative 1a, although affecting a smaller amount of acreage over a smaller geographic area with one road access corridor.<br>**Duration/Extent:** The duration and extent of cumulative impacts to environmental justice would be similar to the duration and extent of Alternative 1a, Alternative 1, and Alternative 2, although affecting a smaller amount of acreage and geographic area.<br>**Contribution:** Expanded mine site development and associated contributions to cumulative impacts would be the same as Alternative 1a. Cumulative cost-of-living |

**Table 4.4-2: Contribution to Cumulative Effects for Environmental Justice**

| Reasonably Foreseeable Future Actions | Alternative 1a | Alternative 1 | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| | the quality and cultural experience of subsistence activities could be affected. The cumulative impacts would be long-term over extended operations, and decrease in magnitude as closure is implemented.<br>The Pebble Project expansion development scenario has the potential to result in increased beneficial and adverse health impacts, especially from increased impact durations, possible increased releases into the environment, and affected community exposure to potentially hazardous materials over an additional 78 years. The geographic exposure would combine the footprints of Alternative 1a and Alternatives 3, with two operating ports and transportation corridors.<br>**Contribution:** The Pebble Project expansion development scenario would continue, and likely increase, the beneficial (additional employment and income opportunities) and adverse (potential exposure) impacts to socioeconomic conditions for minority and low-income communities. It would contribute to impacts on subsistence activities as described above. The expanded development scenario has the potential to add to the beneficial and adverse cumulative health impacts of minority and low-income communities in areas with pre-existing industrial pollutants and contaminated sites. It would be expected that mitigation measures would be used to minimize or mitigate exposure. | | would be discontinued, and the south transportation system/ferry would not be in place. Therefore, employment opportunities would be lower, because employees would not be required at those locations. Expanded mine site development and associated contributions to cumulative impacts would be similar to but of lesser magnitude than Alternative 1a, because the Amakdedori port and connecting transportation infrastructure would not be built. As a result, potential beneficial and adverse cumulative impacts to Kokhanok would also be less under this alternative, particularly those associated with road access and lower costs for goods and services. | benefits would be similar to Alternative 2. Beneficial cumulative impacts from Alternative 3, combined with the Pebble Project expansion development scenario to income and infrastructure would be less than Alternative 1a, Alternative 1, and Alternative 2 because no ferry operation would be in place. With the concentrate pipeline, employment opportunities for minority and low-income communities associated with truck traffic would be lower.<br>Potentially affected minority and low-income communities would be similar to Alternative 2. |
| **Other Mineral Exploration Projects** | **Magnitude:** Mining exploration activities would include additional borehole drilling, road and pad construction, helicopter support, and development of temporary camp facilities. Actions that expand mineral exploration near the Pebble deposit and around Iliamna Lake contribute to landscape-level effects, including additional impediments to the movement of people and animals in the immediate vicinity of exploration activities; increased noise, vibration, and atmospheric pollution; and increased | Similar to Alternative 1a. | Similar to Alternative 1a. | Similar to Alternative 1a. |

**Table 4.4-2: Contribution to Cumulative Effects for Environmental Justice**

| Reasonably Foreseeable Future Actions | Alternative 1a | Alternative 1 | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| | numbers of people to the area. This, in combination with the Pebble Project, could result in increased stress associated with fear of changes in lifestyle and cultural practices, changes in land use, degradation to the environment, and real or perceived impacts on food security and quality.<br>There could be greater beneficial impacts to socioeconomic indicators such as employment and community services.<br>**Duration/Extent:** Exploration activities typically occur at a discrete location for one season, although a multi-year program could expand the geographic area affected in a specific mineral prospect.<br>**Contribution:** The RFFAs related to continuing mining exploration activities would likely induce some measurable cumulative effects to the socioeconomic characteristics of minority and low-income communities during the exploratory phases, primarily through limited employment and support service activities.<br>Actions that expand mineral exploration near the Pebble deposit and around Iliamna Lake contribute to landscape-level effects; site-specific impediments to the movement of people and animals; increased seasonal noise, vibration, and atmospheric pollution; and increased numbers of people to the area. This could lead to similar effects to resource availability, access to resources, competition for resources, and sociocultural conditions described above for the Pebble mine expanded development scenario, but on a smaller scale.<br>The Donlin Gold Project would contribute to regional economic benefits similar to those of the Pebble Project. Employees would likely come from the city of Bethel, as well as other parts of the Bethel Census Area, the Kusilvak Census Area, and the Yukon-Koyukuk Census Area. Therefore, these | | | |

**Table 4.4-2: Contribution to Cumulative Effects for Environmental Justice**

| Reasonably Foreseeable Future Actions | Alternative 1a | Alternative 1 | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| | benefits would not directly contribute to economic benefits for minority and low-income communities in the cumulative effects analysis area. From a statewide perspective, both the Donlin Gold Project and the Pebble Project could create a need for support services and secondary/indirect jobs associated with such services in the region. | | | |
| **Oil and Gas Exploration and Development** | **Magnitude:** Onshore oil and gas exploration activities could involve seismic and other forms of geophysical exploration; and in limited cases, exploratory drilling. Potential impacts would be similar to mining exploration.<br>Offshore oil and gas exploration and development has been ongoing in Cook Inlet for 6 decades. Employment opportunities for project area residents would be extremely limited and would have negligible interaction with project marine subsistence activities. Offshore exploration and development could be intermittently noticeable to local residents, and could add to cumulative stress associated with landscape-level resource development.<br>**Duration/Extent:** Seismic exploration and exploratory drilling are typically single-season temporary activities. Offshore development could result in installation of additional production platforms and marine support activities on a long-term basis. These activities would occur in Cook Inlet north of the project area.<br>**Contribution:** If the RFFAs related to oil and gas exploration and development are developed, they could create a need for direct employees, support services, and secondary/indirect jobs associated with such services, but offshore exploration activities would be supported out of the KPB, where there is a mature oil support service industry. Any continuing onshore oil and gas exploration on the Alaska | Similar to Alternative 1a. | Similar to Alternative 1a. | Similar to Alternative 1a. |

**Table 4.4-2: Contribution to Cumulative Effects for Environmental Justice**

| Reasonably Foreseeable Future Actions | Alternative 1a | Alternative 1 | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| | Peninsula would be small in scale and supported out of King Salmon, rather than minority or low-income Iliamna Lake communities.<br>As indicated above, direct interactions with subsistence and health would be limited, but could contribute to stress associated with resource development. | | | |
| **Road Improvement and Community Development Projects** | **Magnitude:** Road improvement projects would take place in the vicinity of communities and have positive economic impacts through reduction in transportation costs and lowering the cost of living for minority and low-income communities. These transportation projects would increase access to the area, which could improve access to subsistence resources, but also introduce additional disturbance to and competition for resources, affecting all minority and low-income communities in the cumulative effects analysis area.<br>Local hydroelectric projects such as Knutson Creek and Igiugig would create beneficial socioeconomic effects through renewable power generation. There could be some construction and operations effects on subsistence resources, but federal and state permitting would require mitigating adverse impacts. Renewable energy could also have modest beneficial impacts on health by reducing reliance on fossil fuels.<br>**Duration/Extent:** Disturbance from road and hydroelectric construction would typically occur over a single construction season. Geographic extent would be limited to the vicinity of communities and Diamond Point.<br>**Contribution:** The RFFAs related to transportation and infrastructure improvements could have a beneficial cumulative impact on potentially affected communities by reducing high transportation and power costs, and lowering the cost of living for | Similar to Alternative 1a and 2; greater than Alternative 3. | Cumulative impacts in terms of employment opportunities would likely be less under Alternative 2 due to commonly shared project footprints with the quarry site. | Similar to Alternative 2; less than Alternative 1a. |

**Table 4.4-2: Contribution to Cumulative Effects for Environmental Justice**

| Reasonably Foreseeable Future Actions | Alternative 1a | Alternative 1 | Alternative 2 and Variants | Alternative 3 and Variant |
|---|---|---|---|---|
| | minority and low-income communities in the LPB. In combination with the Pebble Project, there could be some adverse impacts to resource availability, access to resources, and competition for resources, which would increase for minority and low-income communities in the cumulative effects analysis area.<br>The capital improvement–related RFFAs and rural development projects have the potential to improve road access to many affected minority and low-income communities (e.g., road improvement and increased safety) in the EIS analysis area, improving safety and access to healthcare.<br>The Diamond Point rock quarry would be near the convergence of Cottonwood and Iliamna bays. This project could increase job opportunities and provide steady income to minority and low-income communities. | | | |
| **Summary of Project Contribution to Cumulative Effects** | Overall, the contribution of Alternative 1a to cumulative effects to Environmental Justice when taking other past, present, and RFFAs into account, would include both beneficial (socioeconomics) and adverse (health and subsistence) effects on low-income and minority communities, and vary in terms of magnitude, duration, and extent. | Similar to Alternative 1a, although slightly more acreage would be affected by expansion of the Pebble Project. | Similar to Alternative 1a, although slightly less acreage/geographic area would be affected by expansion of the Pebble Project, reducing both beneficial and adverse effects. | Similar to Alternative 1a, although less acreage would be affected by expansion of the Pebble Project than either Alternative 1a, Alternative 1, or Alternative 2, reducing both beneficial and adverse effects. |

Notes:
EIS = Environmental Impact Statement
KPB = Kenai Peninsula Borough
LPB = Lake and Peninsula Borough
RFFA = Reasonably foreseeable future action