3.12 TRANSPORTATION AND NAVIGATION

The Environmental Impact Statement (EIS) analysis area for this section includes the local and regional transportation and navigation resources that could be affected by the mine site, port, transportation corridor, and natural gas pipeline corridor for each alternative and variants. This includes surface transportation from the mine site to Cook Inlet and a small section of the Sterling Highway on the Kenai Peninsula; air transportation from airports across the region (Dillingham to Anchorage); water transportation on Cook Inlet and Iliamna Lake; and navigable rivers from the mine site east to Cook Inlet. Navigation resources also include deepwater port construction and use from local to global users. The navigability of each project component is discussed.

The major mode of transportation between communities in and outside of this region is by air and water. Surface transportation is most often used for travel in communities and can include on-road and off-road transport via cars, trucks, snowmachines, all-terrain vehicles (ATVs), dog sleds, and horses (DOWL 2016).

3.12.1 Surface Transportation

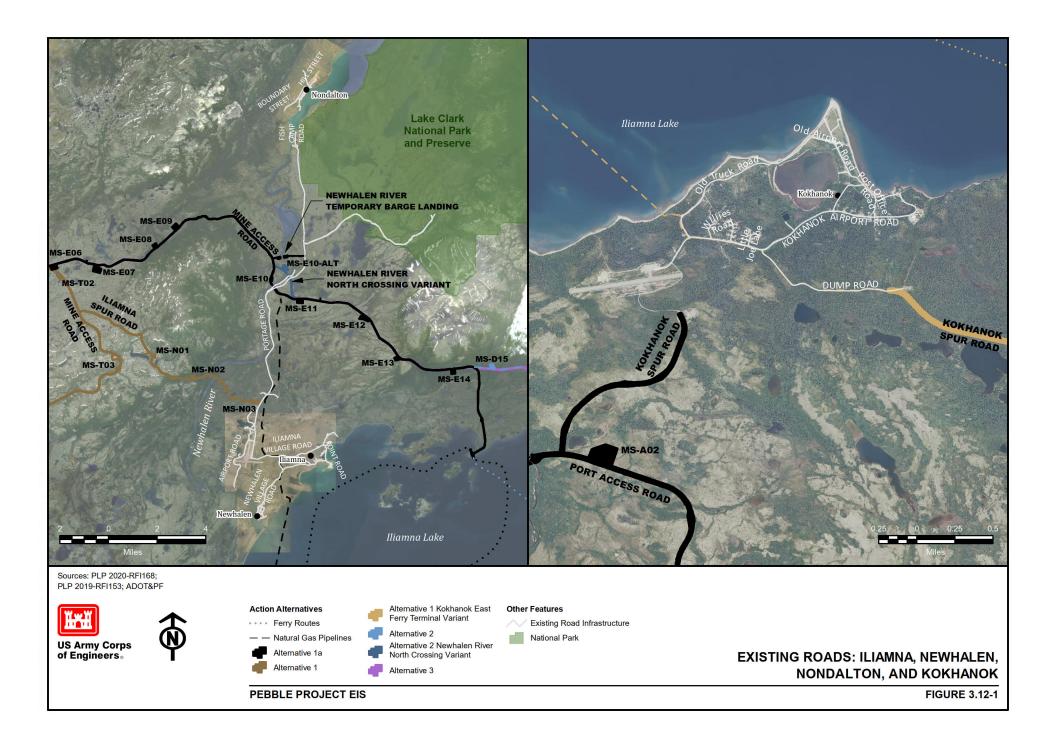
No existing roads provide direct access to the mine site or the port sites. Surface transportation in the area consists of off-road transport via ATVs and snowmachines between villages and to subsistence areas (Fall et al. 2006). Using off-road vehicles with a curb weight of less than 1,500 pounds on State-managed lands does not require a permit from the Alaska Department of Natural Resources (ADNR 2011).

There is potential for overland traffic through the EIS analysis area to access Native Allotments and private lands close to the mine site. The closest Native Allotments to the mine site include an area approximately 25 miles to the west, and land in the community of Nondalton to the east. Privately owned land exists approximately 15 miles to the north at Nikabuna Lakes (LPB 2015). Native Allotments and other private lands are shown in Section 3.2, Land Ownership, Management, and Use, Figure 3.2-1a through Figure 3.2-1e.

The road systems in the transportation corridors for all alternatives are primarily undeveloped, with the exception of local community roads, the Iliamna-Nondalton River Road (14 miles), and the Williamsport-Pile Bay Road (15 miles), with limitations. In 2017, the annual average daily traffic count for the busiest road in the Iliamna/Newhalen road system was 424 cars per day. Nondalton roads experienced 50 to 60 cars per day, and Kokhanok local roads had an average of 75 cars per day (ADOT&PF 2018b). Iliamna, Newhalen, and Nondalton are connected to one another, but the 15-mile road from Iliamna to Nondalton is only passable when the Newhalen River is frozen (ADCCED 2018b). Existing roads in and near the communities of Iliamna, Newhalen, Nondalton, and Kokhanok are provided in Table 3.12-1 and shown in Figure 3.12-1.

Community	Miles of Local Roads
lliamna/Newhalen	12
Nondalton	3
Iliamna-Nondalton River Road	15
Kokhanok	3
Pedro Bay	5
Williamsport-Pile Bay Road	15

Table 3.12-1: Community Road	ls
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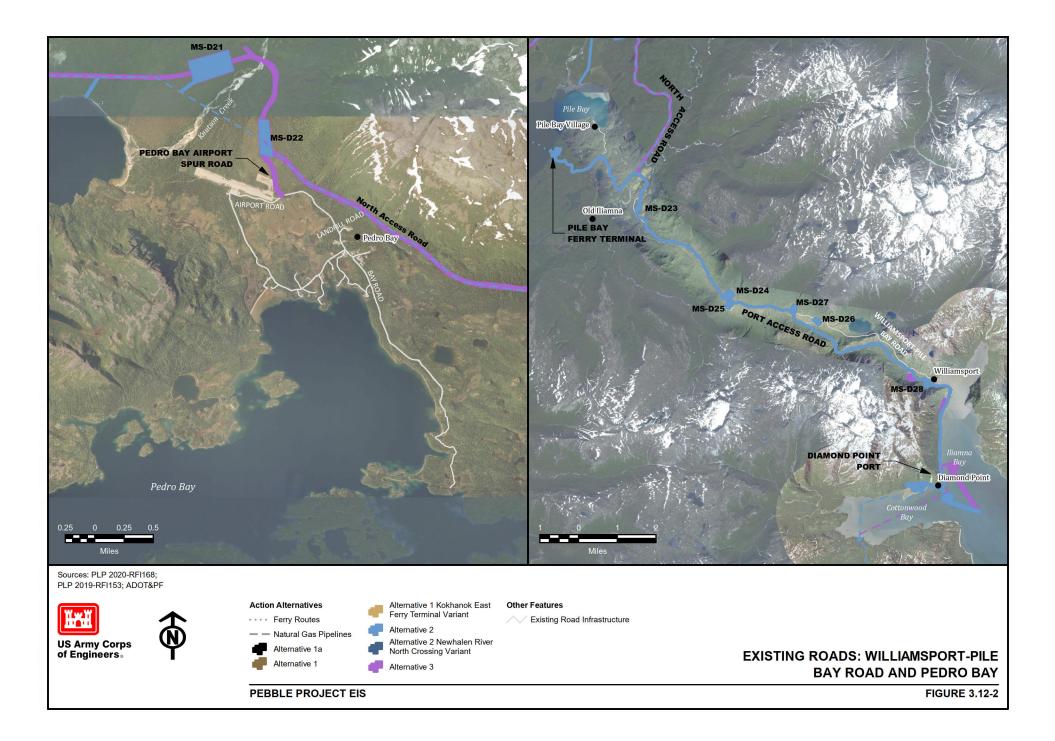
The Williamsport-Pile Bay Road is approximately 15 miles long, connecting Williamsport on Cook Inlet to Pile Bay on Iliamna Lake, and is maintained by the State (NOAA 2018c). This road had an average annual daily traffic count of 19 cars per day in 2017 (ADOT&PF 2018b); it is assumed that the average would be doubled (i.e., 38 cars per day) for the summer months, and would be zero for the winter months, because the road is only used between June and October (NOAA 2018c). It is also assumed that daily use would be higher at the beginning and end of the commercial fishing season. The road's current use is for transporting fishing vessels and heavy freight. Vessels less than 12 feet wide, 32 feet long, and 9.5 feet high may be hauled on the road. Approximately 50 fishing boats are transferred on the road annually, and approximately 22 barge loads of fuel and cargo were transported in 2009 (Kevin Waring and Associates 2011c). Tidal fluctuations in Cook Inlet and the potential for wet and flooded road conditions determine the accessibility and degree of drivability (e.g., Williamsport is very shallow, and boats can only be hauled out at a 17-foot or higher tide, after navigating through a channel. Weather often causes additional delays.) (Fast 2018; NOAA 2018c; USACE 1995). When the tide allows, one landing craft can deliver freight to Williamsport at a frequency of eight times per month; however, delivering fuel to communities by air is more economical. Fuel is also transported by barge up the Kvichak River from Bristol Bay, which takes more than a week and involves lightering (i.e., the process of transferring cargo between vessels of different sizes) through shallow areas. The Pile Bay port is undeveloped (DOWL 2016). In 2017, Airport Road in Pedro Bay experienced an average annual daily traffic count of 45 cars per day (ADOT&PF 2018b). The Williamsport-Pile Bay Road and Pedro Bay local roads are shown on Figure 3.12-2. The Diamond Point guarry port is approximately 3 miles from Williamsport in Iliamna Bay, but is not currently connected by road (DP 2018).

Current off-road surface transportation in the EIS analysis area for all alternatives includes travel to and from subsistence harvest areas and neighboring villages via ATV and snowmachine. This type of travel is easiest in the winter months, when the tundra, rivers, and lakes are frozen (Fall et al. 2006; Krieg et al. 2009). Additionally, snowmachines are used to access hunting areas for freshwater seals on Iliamna Lake (Van Lanen 2012). Known community subsistence harvest areas are discussed in Section 3.9, Subsistence.

No existing roads provide access to the Amakdedori port site. Subsistence activities occur in the area via surface and water transportation (see Section 3.9, Subsistence, for more information on subsistence activities near Amakdedori). The regional Comprehensive Economic Development Plan for the Bristol Bay Region (excluding the Bristol Bay Borough) prioritizes supporting transportation and infrastructure needs in the region to promote strong communities (BBNA 2019).

The natural gas pipeline would connect to the compressor station near Anchor Point, following Bourbon Avenue west until crossing the Sterling Highway. In 2017, this stretch of the Sterling Highway had annual average daily traffic volume of just under 3,000 vehicles (ADOT&PF 2018b). The Sterling Highway is the only major roadway connecting the city of Homer to the rest of the Kenai Peninsula and the Alaska road system (ADCCED 2017). According to the Alaska Highway Safety Office, the Sterling Highway had three fatal motor vehicle accidents in 2016, each resulting in one death; these fatal accidents all occurred in Soldotna. In 2017, there was one fatal accident resulting in one death in Clam Gulch (AHSO 2018).

There were no fatal motor vehicle accidents reported for 2016 and 2017 on any existing internal community roads that would be connected to the mine site or transportation corridor (AHSO 2018). Statewide, the Alaska Highway Safety Office reported that in 2017 there were 75 fatal crashes in Alaska totaling 79 fatalities. From 2016 to 2017, fatalities and fatal crashes decreased by 6 percent and 4 percent, respectively. In addition, fatal crashes related to alcohol dropped by 54 percent.



3.12.2 Air Transportation

Passenger and cargo transport by aircraft is common for residents, visitors, and goods in the Bristol Bay region, on a regularly scheduled and charter basis. Small charter planes, run by private guide companies, also transport sport fishers and hunters to lodges around the Iliamna Lake and Lake Clark areas (Travel Alaska 2018). General flight paths from Anchorage to Bristol Bay and the Alaska Peninsula communities go over Iliamna or the project area if there is inclement weather over Iliamna Lake (FAA 2018; Ravn 2018) (see Appendix K3.12 for flight path descriptions and illustration).

Table 3.12-2 provides a summary of airports in the EIS analysis area that may be affected by a change in air traffic related to the project. Included in the table are nine airports west of Cook Inlet and three east of Cook Inlet. Regional airports are shown in Figure 3.12-3.

Airport	Owner	Use	Average Annual Operations ¹	Runway Surface	Runway Lighting	Based Aircraft
Dillingham Airport (DLG)	ADOT&PF Central Region	Public	50,735	Asphalt/grooved	HIRL	59
lliamna Airport (ILI)	ADOT&PF Southcoast Region	Public	15,330	Asphalt/grooved Water	MIRL —	29
King Salmon Airport (AKN)	ADOT&PF Southcoast Region	Public	15,330	Asphalt/grooved, in poor condition Asphalt/grooved Water	HIRL MIRL —	39
Kokhanok Airport (9K2)	ADOT&PF Southcoast Region	Public	—	Gravel	MIRL	_
Nondalton Airport (5NN)	ADOT&PF Southcoast Region	Public	1,248	Gravel	MIRL	_
Pedro Bay Airport (4K0)	ADOT&PF Southcoast Region	Public	1,040	Gravel	MIRL	_
lgiugig Airport (IGG)	ADOT&PF Southcoast Region	Public	8,030	Gravel	MIRL	_
Port Alsworth Airport (TPO)	Glen Alsworth, SR	Private	1,300	Dirt/gravel	_	19
Wilder/Natwick LLC Airport (05K) (Port Alsworth)*	Wild Air, LLC	Private	Undetermined	Gravel	None	25
Ted Stevens Anchorage International Airport (ANC)	ADOT&PF	Public	261,705	Asphalt/concrete/grooved Asphalt/grooved Asphalt/grooved	HIRL HIRL HIRL	109
Kenai Municipal Airport (ENA)	City of Kenai	Public	39,055	Asphalt/grooved Gravel Water	HIRL None —	61
Homer Airport (HOM)	ADOT&PF Central Region	Public	48,180	Asphalt/aggregate friction Seal coat Water	HIRL —	93

Table 3.12-2: Summary of Potentially Affected Airports

Notes:

— = Not listed

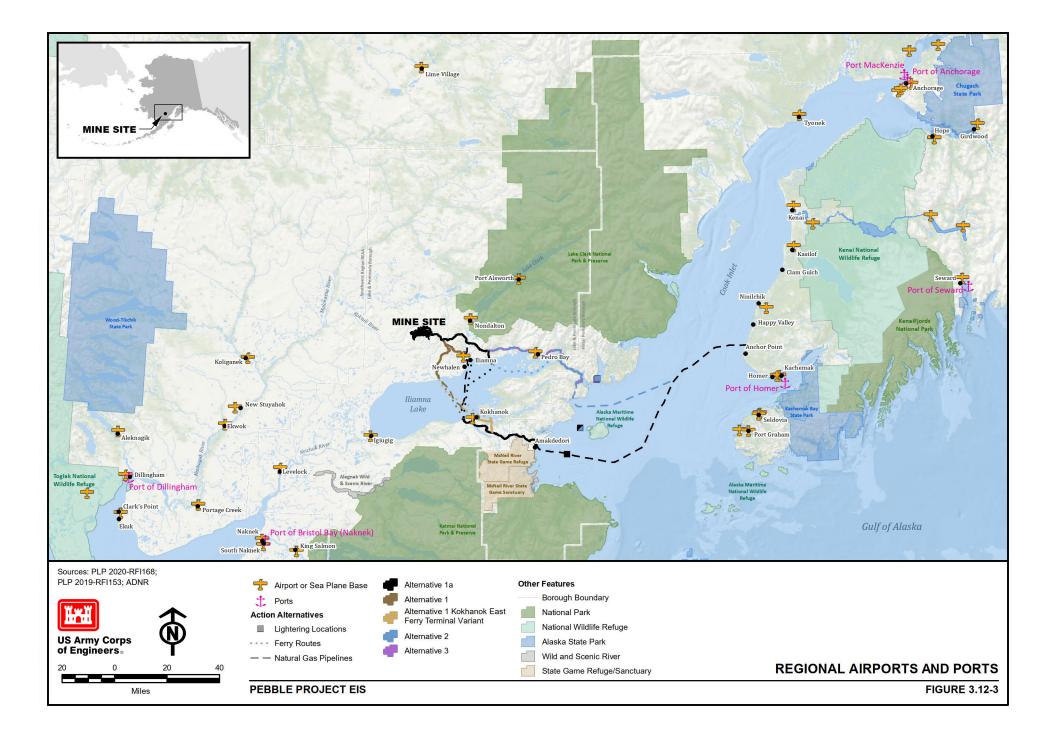
¹One operation is a takeoff or a landing

ADOT&PF = Alaska Department of Transportation and Public Facilities

HIRL=High-Intensity Runway Lighting

MIRL=Medium-Intensity Runway Lighting

Source: AirNav 2018, AirNav 2019



3.12.3 Water Transportation

Streams or lakes are referred to as "navigable in fact" when they are used or have the possibility of being used in their ordinary condition for commerce where trade and travel are conducted (77 United States Code [USC] 557, 563). There are limited facilities for delivery of cargo and fuel and similar purposes in the EIS analysis area. Examples of commerce in the vicinity of the project include goods lightered from Iliamna to Nondalton by boat in the summer (Nondalton is not accessible by barge), fuel transported across Iliamna Lake to Kokhanok and Igiugig, and goods transported to Anchorage and Homer via Cook Inlet, in addition to commercial fishing and guided hunting, fishing, rafting, or sightseeing (Kevin Waring & Associates 2010b).

3.12.3.1 Mine Site

Some small watercraft use associated with recreational activities occurs on the Koktuli River downstream of the mine site. The closest "navigable in fact" waterbody is the South Fork Koktuli River.

3.12.3.2 Transportation Corridor

The Alternative 1a, Alternative 1, and Alternative 2 transportation corridors would connect the mine site with the Amakdedori or Diamond Point port primarily overland, with one section relying on a ferry crossing of Iliamna Lake.

Iliamna Lake is used year-round by community members to access subsistence harvest areas and resources around the lake, traveling via watercraft in open water and by snowmachine when ice conditions allow. For example, Kokhanok community members cross the lake to access resources near the community of Iliamna and near Lake Clark National Park and Preserve (Fall et al. 2006) (see Section 3.9, Subsistence, for more information on subsistence practices). There is a heavily used snowmachine route between the communities of Kokhanok and Iliamna across Iliamna Lake. The communities of Pedro Bay and Igiugig also traverse the length of the lake on snowmachine, hugging the shoreline (PLP 2018-RFI 088). Local sport fishing, hunting, and tourism industries also rely on the use of Iliamna Lake for transportation and natural resources (Fall et al. 2006) (see Section 3.5, Recreation, and Section 3.6, Commercial and Recreational Fisheries).

Iliamna Lake is also used for inter-village travel, via boat during the open water season, or via snowmachine as allowed by lake ice conditions. Ice coverage (thickness and extent) can vary across Iliamna Lake, which contributes to transportation access. Iliamna Lake ice conditions are described in Section 3.16, Surface Water Hydrology (PLP 2018-RFI 013).

Fuel and other supplies are delivered to Iliamna Lake communities via barge. The Williamsport-Pile Bay Road is used as portage for barges from Cook Inlet to Iliamna Lake. Several smaller rivers (e.g., Gibraltar River) and streams are used for recreation and subsistence. The Newhalen River is used for transportation, but it cannot accommodate barge traffic to transport goods to Nondalton (Kevin Waring and Associates 2010b).

3.12.3.3 Cook Inlet

Cook Inlet is home to commercial, subsistence, sport, and personal-use fisheries. Aquatic farming, research, and hatcheries are also permitted (ADF&G 2018h) (see Section 3.9, Subsistence, for more information on subsistence uses in Cook Inlet). Cook Inlet provides access to major ports in Alaska from primary shipping lanes in the northern Pacific. All alternatives would use those shipping routes to transport goods from the west coast of the United States and to transport concentrate to markets in Asia. Shipping routes are illustrated in Appendix K3.12.

Vessels operating in Cook Inlet range up to 840 feet long and include various cargo vessels, tank ships carrying petroleum products, tugs, passenger vessels, fishing vessels, fish processing vessels, mobile drilling rigs, government vessels, and dredges, which have typical speeds of up to 20 knots. The weather and conditions in Cook Inlet can create difficulty for vessels, because seasonal sea ice and sudden weather changes can occur (Eley 2012). Sea conditions in Cook Inlet and in the vicinity of the project are described in Section 3.16, Surface Water Hydrology.

The Cook Inlet Vessel Traffic Study (Eley 2012) and Risk Assessment (Nuka and Pearson 2015) state that in 2010, 80 percent of ship transits were made by 15 ships (to Homer, Nikiski, and Anchorage); there were 480 ship port calls total. The ships include state, national, and international owners (Eley 2012). Area ports are shown on Figure 3.12-3. The study summary is presented below:

Each region of Cook Inlet (upper, middle and lower) experienced varying levels of activity based on the primary port and the types of vessels operating there. Kachemak Bay in lower Cook Inlet experienced the highest levels of activity in Cook Inlet, primarily due to ferry operations, or vessels awaiting a marine pilot, more favorable weather, or Coast Guard inspection. Middle Cook Inlet reflected tank ship movements in and around the Nikiski and Drift River oil terminals. Upper Cook Inlet activity was dominated by movement in and out of the Port of Anchorage. AIS [Automatic Identification System] data showed that the busiest times of year were the third quarter (July through September) followed by the second quarter (April through June) (Eley 2012).

Pilotage (i.e., the process of directing the movement of a ship by visual or electronic observations of recognizable landmarks) is required for all vessels traveling in Cook Inlet (unless exempt¹), because navigation is affected by large tidal fluctuations, currents, winds, mud flats, ice flows, boulders, reefs, and shoals, which are not always detectable by echo sounder, lead lines, or by observing turbulence in the water (NOAA 2018c). Potential hazardous obstacles may also include shipwrecks, unconsolidated sediments, glacial deposits, and volcanic debris (BSEE 2018b). Navigating Cook Inlet in the winter months requires a separate set of guidelines set by the US Coast Guard (USCG), and vessels are subject to inspection by the USCG (NOAA 2018c).

Western Cook Inlet has more debris than eastern Cook Inlet and experiences larger ice pans in the winter. In Kamishak Bay, there are scattered reefs within a few feet of the water surface, many are visible at low tide. Local knowledge is recommended for navigation of this area, especially for lower Kamishak Bay (known as the Kamishak Gap) near the Douglas River, where rip tides, currents, and strong west winds combine with the underwater obstructions of reefs, ledges, and mudflats, making navigation more challenging.

The Amakdedori port site for Alternative 1a and Alternative 1 would be on a beach in Kamishak Bay. Amakdedori can be safely approached just north of Amakdedori Creek, although rocky outcroppings exist near shore and large reefs offshore. Winds in this area can pick up after mid-August to produce larger swells (NOAA 2018c). Regional and local wave climate, tides, currents, and storm surge are described in Section 3.16, Surface Water Hydrology.

The seabed from Amakdedori to about 5.6 miles offshore gently slopes to a depth of 60 feet, with Amakdedori Creek's alluvial fan reaching almost 1,000 feet offshore. Rocky outcrops occur about 2 miles north of the mouth of Amakdedori Creek (PLP 2018-RFI 039).

The Diamond Point port site for Alternative 2 and Alternative 3 would be in Iliamna Bay north of the entrance to Cottonwood Bay. The site for Alternative 2 is currently being developed as a quarry. The bay shoals gradually from 36 feet in the entrance north of White Gull Island to 6 feet

¹ Examples of vessels exempt from pilot requirements in Cook Inlet include fishing vessels, most vessels under 65 feet, and US-registered pleasure craft.

in the entrance to Cottonwood Bay. Iliamna Bay can be approached between North Head and White Gull Island, although care must be taken to avoid a reef. Iliamna Bay has several suitable temporary anchorages (NOAA 2018c).

At the end of the eastern arm of Iliamna Bay is Williamsport, the eastern portage point for passage to Iliamna Lake. The depth of Iliamna Bay is 36 to 48 feet, although Williamsport is shallow and usable only at higher tides, as discussed above. Upper Cook Inlet ice drifts to this area in the winter (NOAA 2018c). The National Oceanic and Atmospheric Administration (NOAA) acoustic wave profiler recorded wave height data from 2010 to 2012 outside of Iliamna Bay.

The lightering location for Alternative 2 and Alternative 3 would be in Iniskin Bay. Safe anchorages in this area can be dependent on season and wind. Although sometimes windy, Iniskin Bay is considered secure for anchorage of medium-sized vessels on the western side of Cook Inlet in any weather. Fishing vessels 4,000 tons or less currently use this bay for anchorage. Reefs and shoals near the water surface exist in this bay (NOAA 2018c). Sea ice conditions at Amakdedori, Diamond Point, and Lightering Location A are described in Section 3.16, Surface Water Hydrology.

Based on the available data for geography, wave climate, bathymetry, and ice coverage, access to Amakdedori or Diamond Point may be limited due to periods of high wave activity and/or ice conditions in Kamishak and Iliamna bays.

3.12.4 Navigation

Federal jurisdiction of navigation includes waters that are subject to tidal influence, are currently used, were used in the past, or could be used in the future to transport interstate or foreign commerce (e.g., transportation of goods and fuel, guided fishing or rafting, oil and gas production) (33 Code of Federal Regulations [CFR] Part 329.4). Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the US Army Corps of Engineers (USACE) for the construction of any structure in, under, or over any navigable waters of the US (NWUS). NWUS require a Section 10 permit if the structure or work affects the course, location, or condition of the waterbody, and applies to any dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a NWUS. The General Bridge Act of 1946, as amended, and the Rivers and Harbors Act, as amended, require the location and plans of bridges and causeways across the NWUS be submitted to and approved by the Secretary of Homeland Security (delegated to the USCG) prior to construction. Table 3.12-3 lists the federally navigable waters in the EIS analysis area.

Figure 3.12-4 illustrates the navigable waterways in the EIS analysis area. The navigable waterbodies are listed in Table 3.12-3. The Iliamna River and the Pile River are considered navigable by the State of Alaska (ADNR 2018b); the ADNR Division of Mining, Land, and Water determines navigable waters for the state.

3.12.4.1 Mine Site

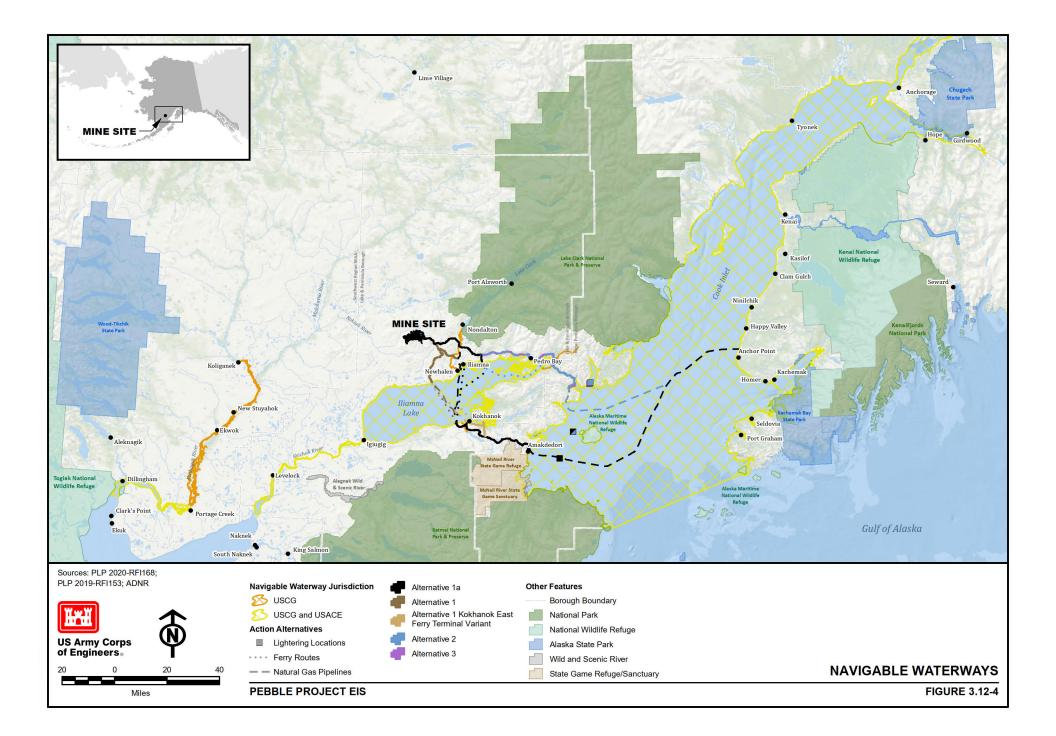
The mine site is not accessible by navigable waters, although some navigable waters are hydrologically connected to the area, such as the Kvichak and Nushagak rivers. The closest navigable water with facilities to accommodate vessel traffic is Iliamna Lake.

3.12.4.2 Transportation Corridor

The Alternative 1a, Alternative 1, and Alternative 2 transportation corridors would connect the mine site with the Amakdedori or Diamond Point port primarily overland, with one section relying on a ferry crossing of Iliamna Lake.

Waterway	Agencies with Authority	Limit of Navigability	Existing Structures/Facililities
Cook Inlet	USACE/USCG BOEM/BSEE	All waters subject to tidal influence Alaska OCS (Cook Inlet)	Communication cables Oil and gas infrastructure— platforms, pipelines, exploration drilling (BOEM/BSEE in OCS Cook Inlet Waters) Municipal and commercial docks Navigation aids
lliamna Lake	USACE/USCG	Entire waterway	Public dock in Iliamna Small boat ramp in Igiugig Boat landing in Pedro Bay Several private docks
lliamna River	USCG	Entire waterway	Bridge on the Williamsport-Pile Bay Road
Kvichak River	USACE/USCG	Mouth to and including Iliamna Lake	Beach landing and riverfront dock in Levelock
Gibraltar River	USCG	Undetermined	Unknown
Newhalen River	USCG	Entire waterway	Beach landing in Newhalen, small- boat launch along Newhalen River Road
Nushagak River	USACE/USCG	USACE—from mouth of Wood River USCG—Mouth to the Village of Koliganek	N/A

Notes: BOEM = Bureau of Ocean Energy Management BSEE = Bureau of Safety and Environmental Enforcement OCS = Outer Continental Shelf USACE = US Army Corps of Engineers USCG = US Coast Guard Source: USCG 2012, 2020; USACE 2018b; Kevin Waring & Associates 2010b, 2011b



Iliamna Lake is considered navigable by USACE, USCG, and the State of Alaska, and is used year-round by community members to access subsistence harvest areas, resources, and other villages around the lake, traveling via watercraft in open water and via snowmachine when ice conditions allow. Historically, barges have traveled from Bristol Bay up the Kvichak River to Iliamna Lake, delivering goods at the Iliamna barge landing for the communities of the area; however, low water levels and river shoals in some years make this route limited to shallow-draft vessels, or infeasible. No other navigable waterways in the transportation corridor are used to transport goods commercially. Other commerce on the lake includes the transport of commercial fishing vessels from Pile Bay to Bristol Bay, recreational navigation, and guided sport fishing (Kevin Waring and Associates 2010b).

3.12.4.3 Cook Inlet

All alternatives would use a port on Cook Inlet to transport supplies to and from the mine site. Cook Inlet is used for commercial, subsistence, sport, and personal-use fishing, as well as oil and gas exploration and extraction, transportation of goods, cruise ships, aquatic farming, research, and hatcheries (ADF&G 2018h).

Alternative 1a and Alternative 1 would use Amakdedori Creek as a port location. There are no port structures currently in this area.

The Diamond Point port site for Alternative 2 and Alternative 3 would be in Iliamna Bay, north of the entrance to Cottonwood Bay. At the end of the eastern arm of Iliamna Bay is the port of Williamsport, the eastern portage point for passage to Iliamna Lake. The current use of Williamsport as a port is discussed above.

The lightering location for Alternative 2 and Alternative 3 would also be in Iniskin Bay. Iniskin Bay is considered secure for anchorage of medium-sized vessels on the western side of Cook Inlet in any weather. Fishing vessels 4,000 tons or less currently use this bay for anchorage (NOAA 2018c).