APPENDIX K – TECHNICAL APPENDICES

EIS Sections and Related Technical Appendices (Appendix K)

Chapter/Section	Technical Appendix
Chapter 1: Purpose and Need	No
Chapter 2: Alternatives	Yes
Chapter 3 – Affected Environment*	
Section 3.1 – Introduction to Affected Environment	Yes
Section 3.2 – Lands	No
Section 3.3 – Needs and Welfare of the People – Socioeconomics	No
Section 3.4 – Environmental Justice	No
Section 3.5 – Recreation	No
Section 3.6- Commercial and Recreational Fisheries	Yes
Section 3.7 – Cultural Resources	Yes
Section 3.8 – Historic Properties	No
Section 3.9 – Subsistence	Yes
Section 3.10 – Health and Safety	Yes
Section 3.11 – Aesthetics	No
Section 3.12 – Transportation and Navigation	No
Section 3.13 – Geology	Yes
Section 3.14 – Soils	Yes
Section 3.15 – Geohazards	Yes
Section 3.16 – Surface Water Hydrology	Yes
Section 3.17 – Groundwater Hydrology	Yes
Section 3.18 – Water and Sediment Quality	Yes
Section 3.19 – Noise	No
Section 3.20 – Air Quality	No
Section 3.21 – Food and Fiber Production	No
Section 3.22 – Wetlands and Other Waters/Special Aquatic Sites	No
Section 3.23 – Wildlife Values	No
Section 3.24 – Fish Values	Yes
Section 3.25 – Threatened and Endangered Species	No
Section 3.26 – Vegetation	Yes
Chapter 4 – Environmental Consequences*	
Section 4.1 – Introduction to Environmental Consequences	No
Section 4.2 – Lands	No
Section 4.3 – Needs and Welfare of the People – Socioeconomics	No
Section 4.4 – Environmental Justice	No
Section 4.5 – Recreation	No

EIS Sections and Related Technical Appendices (Appendix K)

Chapter/Section	Technical Appendix
Section 4.6- Commercial and Recreational Fisheries	No
Section 4.7 – Cultural Resources	No
Section 4.8 – Historic Properties	No
Section 4.9 – Subsistence	No
Section 4.10 – Health and Safety	Yes
Section 4.11 – Aesthetics	Yes
Section 4.12 – Transportation and Navigation	No
Section 4.13 – Geology	Yes
Section 4.14 – Soils	No
Section 4.15 – Geohazards	Yes
Section 4.16 – Surface Water Hydrology	Yes
Section 4.17 – Groundwater Hydrology	No
Section 4.18 – Water and Sediment Quality	Yes
Section 4.19 – Noise	No
Section 4.20 – Air Quality	Yes
Section 4.21 – Food and Fiber Production	No
Section 4.22 – Wetlands and Other Waters/Special Aquatic Sites	Yes
Section 4.23 – Wildlife Values	No
Section 4.24 – Fish Values	No
Section 4.25 – Threatened and Endangered Species	Yes
Section 4.26 – Vegetation	No
Section 4.27 – Spill Risk	No
Chapter 5 – Mitigation	No
Chapter 6 – Consultation And Coordination	No
Chapter 7 – List of Preparers	No
Chapter 8 – List of Agencies, Organizations, and Persons to Whom Copies of the Statement Have Been Sent	No
Chapter 9 – References	No

*Chapters 3 and 4 are made up of Sections 3.1 to 3.26, and 4.1 to 4.27, respectively.

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K2.0 ALTERNATIVES

K2.1 ACTION ALTERNATIVE 1 – APPLICANT'S PROPOSED ALTERNATIVE

K2.1.1 Action Alternative 1 Project Components Footprints

Table K2-1 provides a summary of the Action Alternative 1 project footprint for each of the four project components (mine site, transportation corridor, port, and natural gas pipeline) described in Chapter 2 of the Environmental Impact Statement (EIS).

Table K2-1: Action Alternative 1 Permanent Project Footprint

Project Component	Facility	Permanent Footprint (acres)
Mine Site	Open Pit	608
	Quarries[1]	873
	Stockpiles	479
	Mineral Processing Facilities	113
	Bulk Tailings Storage Facility	2,796
	Pyritic Tailings Storage Facility	1,071
	Main Water Management Pond	955
	Water Management Ponds	66
	Sediment/Seepage Collection Systems	358
	Mine Site Infrastructure	87
	Onsite Access Roads	613
	Mill Site Power Plant	22
	Waste Management Facilities	17
	Water Treatment Plants	27
	Mine Site Total	**8,086**
Transportation Corridor	Access Roads	892
	Ferry Terminals	27
	Material Sites	241
	Transportation Corridor Total	**1,161**
Amakdedori Port	Airstrip	6
	Shore-based facilities	14
	Marine facilities	11
	Amakdedori Port Total	**30**
Natural Gas Pipeline	Compressor station pad[2]	5
	Stand-alone onshore pipeline segments[3]	35
	Natural Gas Pipeline Total	**40**

Table K2-1: Action Alternative 1 Permanent Project Footprint

Project Component	Facility	Permanent Footprint (acres)
	Action Alternative 1 Total	**9,317**

Notes:
Footprints are based on project GIS data (PLP 2018h) and represent permanent impacts. Numbers are rounded to the nearest whole number; therefore, the sum of individual facilities may not match the totals listed for the overall component.
[1] Includes Quarry B and Quarry C; Quarry A is within the footprint of the bulk tailing storage facility (TSF).
[2] Includes access road to compressor station.
[3] Includes onshore standalone sections of the natural gas pipeline (i.e., not adjacent to an access road). The footprint assumes a 100-foot wide impact corridor (40 feet to account for the trench and side-cast material, and 60 feet for construction access); which is being considered permanent impacts at this time since a restoration plan has yet to be developed. It is likely that much of this area would be restored within 2 years of construction.

K2.1.2 Summary of Project Phases

Table K2-2 presents a summary and schedule of the four project phases (construction, operations, closure, and post-closure) used to describe the project and assess impacts throughout the EIS.

Table K2-2: Summary of Project Phases

Phase	Activity	Absolute Year (Y)	Construction Year (CY)	Operations Year (OY)	Closure Year (CY)
Construction (4 years)	Construction	Y1 – Y4	CY1 – CY4	-	-
	Commissioning Activities	Y4	CY4 – occurs in parallel with final construction	-	-
	Pre-production mining/dewatering	Y3 – Y4	CY3-CY4 – occurs in parallel with construction	-	-
Operations (20 years)	Operations	Y5 – Y24	-	OY1 – OY20	
Closure (20 years)	Closure	Y25 – Y45	-	-	CLY1 - CLY20
Post-closure (perpetuity)	Monitoring	Y46-perpetuity	-	-	CLY21-perpetuity

K2.1.3 Applicant's Proposed Construction Schedule

Table K2-3 presents a high-level overview of the proposed construction schedule.

Table K2-3: Proposed Construction Schedule

Construction Activity	Estimated Start	Estimated End
Access Infrastructure		
Amakdedori port site capture (land by barge)	May Y1	-
North and south ferry terminal site capture	June/July Y1	-
Construct temporary access Amakdedori to Kokhanok	June Y1	September Y1

Table K2-3: Proposed Construction Schedule

Construction Activity	Estimated Start	Estimated End
Construct temporary access north ferry terminal to mine site	July Y1	November Y1
Access road construction (south)	September Y1	July Y2
Access road construction (north)	November Y1	October Y2
Construct major bridges	June Y2	September Y2
Amakdedori port and dock construction	September Y1	September Y2
Construct south ferry terminal	June Y2	September Y2
Construct north ferry terminal	June Y2	September Y2
Access complete	-	October Y2
Ferry vessel construction and launch	September Y2	September Y3
Pipeline		
Pipeline construction along road segments	November Y1	October Y2
Cook Inlet sub-sea pipeline placement	June Y2	August Y2
Anchor Point compressor station	June Y3	August Y3
Iliamna Lake sub-lake placement	June Y3	July Y3
Pipeline complete	-	September Y3
Mine Site		
Site capture (establish construction infrastructure)	November Y1	August Y2
Major site earthworks	September Y2	May Y4
Mill and infrastructure construction	May Y3	October Y4
Pit pre-production mining	September Y3	October Y4
Commencement of operations	October Y4	-

Source: PLP 2018-RFI 037

K2.1.4Mining Phases, Material Type, and Volumes

Table K2-4 summarizes the types and volumes of material proposed to be mined during pre-production and production mining.

Table K2-4: Proposed Material to be Mined

Mining Period	Material Type	Quantity
Pre-production (during the construction phase)	Overburden	21.5 million tons
	Potentially acid generating (PAG) waste rock	11.6 million tons
Production (during the operations phase)	Overburden	68 million tons
	Mineralized material process plant fed	1,291 million tons
	Non-potentially acid generating (NPAG) waste rock	13 million tons
	PAG waste rock	39 million tons

Source: PLP 2018d

K2.1.5Mining Supplies, Processing Reagents, and Material

Table K2-5 lists the average annual quantities of fuel, mining, milling, and miscellaneous consumables, as well as common mining supplies, processing reagents, and materials. Typical packaging for transportation is also provided.

Table K2-5: Mine Site Supplies and Quantities

Material/Supply/Reagent	Use	Shipping/Preparation	Annual Consumption[1]
Diesel fuel	Vehicles and blasting	6,350-gallon ISO tank-containers	16 million gallons
Lubricants	Vehicles and equipment	Drums and totes in containers	1,000 tons
Ammonium nitrate prill	Blasting	Bulk container	17,500 tons
Primers, detonators, and detonating cord	Blasting	Specialized packaging as required	112,000 Units
Blasting emulsion ingredients	Blasting	Specialized packaging as required	8,000 tons
Packaged explosives	Blasting	Specialized packaging as required	Included in miscellaneous supplies.
Haulage truck and other tires	Vehicles	Bulk containers/break bulk	1,000 tons
Ground-engaging tools	Drilling and loading	Bulk containers	Included in miscellaneous supplies.
Calcium oxide (quick lime)	pH modifier; depresses pyrite in the copper-molybdenum flotation process.	Calcium oxide pebbles (80%) shipped in specially adapted shipping containers. Pebbles would be crushed and mixed with water to form lime slurry at the lime plant.	120,000 tons
Sodium ethyl xanthate	Copper collector; used in the rougher flotation circuit.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20% solution and stored in collector storage tank. Mix and storage tanks vented externally with fans.	8,000 tons
Fuel oil (Diesel)	Used in the flotation process.	Shipped in tanker trucks and stored in the main head tank in the copper-molybdenum concentrator area.	Included in diesel fuel total.
Sodium hydrogen sulfide (NaHS)	Copper depressant used in the copper-molybdenum separation processes.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20% solution and stored in the NaHS storage tank.	4,000 tons
Carboxy methyl cellulose	Depressant; anionic polymer used to depress clay and related gangue	Pelletized reagent shipped in 1-ton bags. Mixed with process water in the agitated dispersant tank to form 20% solution and	1,000 tons

[1] Numbers as presented are approximate and have been averaged and rounded as appropriate for ease of reference.

Table K2-5: Mine Site Supplies and Quantities

Material/Supply/Reagent	Use	Shipping/Preparation	Annual Consumption[1]
	material in the bulk cleaner flotation circuit.	stored in dispersant storage tank.	
Methyl isobutyl carbinol	Frother; maintains air bubbles in the flotation circuits.	Shipped in 20-foot specialized ISO containers and stored in the frother storage tank.	4,000 tons
Depressant (sodium silicate)	Clay or silica gangue mineral depressant used in the copper-molybdenum separation process.	Pelletized reagent shipped in 1-ton bags. Mixed with process water to form 20% solution and stored in the sodium silicate storage tank.	3,000 tons
Anionic polyacrylamide	Thickener aid.	Pelletized reagent shipped in 1-ton bags. Vendor package preparation system comprised of a bag breaking enclosure to contain dust, dry flocculent metering, and a wet jet system to combine treated water with the powdered flocculent in an agitated tank for maturation. Prepared in small batches and transferred to a flocculent storage tank.	Included in miscellaneous supplies.
Polyacrilic acid	Anti-scalant for the lime production process.	Liquid shipped in 35-cubic-foot specialized container tanks in protected rectangular framework.	Included in miscellaneous supplies.
Nitrogen	Nitrogen used in the molybdenum flotation circuit to depress copper sulfides.	Provided by a vendor-supplied pressure swing adsorption nitrogen plant. This equipment separates nitrogen from air for use in the mineral-process plant.	15,000 tons
Grinding media	Steel balls for use in grinding mills.	Bulk containers	55,000 tons
Miscellaneous supplies	N/A	Bulk containers/break bulk	30,000 tons

Notes:
ISO = International Organization for Standardization
[1] Numbers as presented are approximate and have been averaged and rounded as appropriate for ease of reference.
Source: PLP 2018k

K2.1.6 Material Sites

Construction materials would be excavated from borrow material sites along the transportation corridor roads. Table K2-6 provides information for Action Alternative 1 material sites, including the estimated quantities, size, type of material, use of material and if blasting is required. Table K2-7 provides information for Action Alternative 1 - Kokhanok East Ferry Terminal Variant material sites. Figure K2-1a and Figure K2-1b show the location of material sites proposed for Action Alternative 1, including the Kokhanok East Ferry Terminal Variant.

Table K2-6: Action Alternative 1 Material Site Quantities Estimates

Site	Quantity (cubic yards)	Size (acres)[1]	Type	Blasting Required (Yes/No)	Use
Port Access Road					
MS-A01	600,000	9	Rock & Gravel	Yes	Road, Pipeline
MS-A02	500,000	9	Rock & Gravel	Yes	Road, Pipeline
MS-A03	400,000	20	Rock	Yes	Road, Pipeline
MS-A04	400,000	22	Rock	Yes	Road, Pipeline
MS-A05	700,000	19	Rock	Yes	Road, Pipeline
MS-A06	400,000	19	Rock	Yes	Road, Pipeline
MS-A07	500,000	20	Rock	Yes	Road, Pipeline
MS-A08	400,000	22	Rock	Yes	Road, Pipeline, Port
Mine Access Road					
MS-T01	700,000	10	Rock & Gravel	Yes	Road, Pipeline
MS-T02	200,000	13	Gravel	No	Road, Pipeline
MS-T03	200,000	8	Gravel	No	Road, Pipeline
MS-T04	300,000	10	Gravel	No	Road, Pipeline
MS-T05	100,000	9	Rock & Gravel	Yes	Road, Pipeline
MS-T06	500,000	9	Gravel	No	Road, Pipeline
MS-T07	700,000	14	Gravel	No	Road, Pipeline
Iliamna Spur Road					
MS-N01	200,000	10	Gravel	No	Road, Pipeline
MS-N02	300,000	9	Gravel	No	Road, Pipeline
MS-N03	200,000	9	Gravel	No	Road, Pipeline
Action Alternative 1 Total	7,300,000	241			

Notes:
[1]Represents area of permanent impacts. Numbers are approximate and rounded.
Sources: PLP 2018-RFI 035; PLP 2018h, 2018k

Table K2-7: Action Alternative 1 - Kokhanok East Ferry Terminal Variant Material Site Quantities Estimates

Site	Quantity (cubic yards)	Size (acres)[1]	Type	Blasting Required (Yes/No)	Use
Port Access Road					
MS-A04	400,000	22	Rock	Yes	Road, Pipeline
MS-A05	700,000	19	Rock	Yes	Road, Pipeline
MS-A06	400,000	19	Rock	Yes	Road, Pipeline
MS-A07	500,000	20	Rock	Yes	Road, Pipeline
MS-A08	400,000	22	Rock	Yes	Road, Pipeline, Port
MS-K01	800,000	68	Rock	Yes	Road, Pipeline
Kokhanok East Spur Road					
MS-K02	300,000	26	Rock	Yes	Road, Pipeline
MS-K03	500,000	52	Rock	Yes	Road, Pipeline
Mine Access Road					
MS-T01	700,000	10	Rock & Gravel	Yes	Road, Pipeline
MS-T02	200,000	13	Gravel	No	Road, Pipeline
MS-T03	200,000	8	Gravel	No	Road, Pipeline
MS-T04	300,000	9	Gravel	No	Road, Pipeline
MS-T05	100,000	9	Rock & Gravel	Yes	Road, Pipeline
MS-T06	500,000	9	Gravel	No	Road, Pipeline
MS-T07	700,000	14	Gravel	No	Road, Pipeline
Iliamna Spur Road					
MS-N01	200,000	10	Gravel	No	Road, Pipeline
MS-N02	300,000	9	Gravel	No	Road, Pipeline
MS-N03	200,000	9	Gravel	No	Road, Pipeline
Action Alternative 1 - Kokhanok East Ferry Terminal Variant Total	7,400,000	349			

Notes:
[1]Represents area of permanent impacts. Numbers are approximate and rounded.
Sources: PLP 2018-RFI 035; PLP 2018h, 2018k

K2.1.7Water Extraction Sites

Water extraction from sources along the transportation corridor would be necessary to support project construction and operations. Table K2-8 provides information for Action Alternative 1 water extraction sites, including the waterbody type, use, years and season of use, and estimated extraction rate and volumes. Table K2-9 provides information for Action Alternative 1 Kokhanok East Ferry Terminal Variant water extraction sites. Figure K2-1a and Figure K2-1b show the location of water extraction sites proposed for Action Alternative 1, including the Kokhanok East Ferry Terminal Variant.

Table K2-8: Action Alternative 1 Water Extraction Site Quantity Estimates

Water Extraction Site	All-Season (Yes/No)	Water Body Type	Use	Years of Use	Extraction	
					Rate (gpm)	Annual Volume (gal)
Port Access Road						
WES-01	Yes	stream	Construction	Life of mine	1,000	5M
WES-02	Yes	stream	Construction & Testing	3	500	3M
WES-03	Yes	lake	Construction	Life of mine	500	1M
WES-04	Yes	stream	Construction	3	500	2M
WES-05	Yes	lake	Construction	Life of mine	500	1M
WES-06	Yes	pond	Construction	3	500	1M
WES-07	Yes	stream	Construction	Life of mine	500	1M
WES-08	Yes	lake	Construction	3	500	1M
WES-09	Yes	stream	Construction & Testing	3	1,000	1M
WES-10	Yes	lake	Construction & Testing	Life of mine	1,000	8M
Mine Site Access Road						
WES-11	Yes	lake	Construction	Life of mine	1,000	8M
WES-12	Yes	stream	Construction	3	500	1M
WES-13	Yes	stream	Construction	Life of mine	500	1M
WES-14	Yes	stream	Construction	3	500	1M
WES-15	Yes	lake	Construction	3	1,000	5M
WES-16	Yes	stream	Construction & Testing	Life of mine	500	1M
WES-17	Yes	pond	Construction	3	500	1M
WES-18	Yes	pond	Construction	3	500	1M
Iliamna Spur Road						
WES-19	Yes	lake	Construction	Life of mine	500	1M
WES-20	Yes	stream	Construction	3	1,000	5M
				Action Alternative 1 Total		49M

Sources: PLP 2018-RFI 022; PLP 2018h, 2018k

Table K2-9: Action Alternative 1 Kokhanok East Ferry Terminal Variant Water Extraction Site Quantity Estimates

Water Extraction Site	All-Season (Yes/No)	Waterbody Type	Use	Years of Use	Extraction	
					Rate (gpm)	Annual Volume (gal)
Port Access Road						
WES-01	Yes	stream	Construction	life of mine	1,000	5M
WES-02	Yes	stream	Construction & Testing	3	500	3M
WES-03	Yes	lake	Construction	life of mine	500	1M
WES-04	Yes	stream	Construction	3	500	2M
WES-05	Yes	lake	Construction	life of mine	500	1M
WES-06	Yes	pond	Construction	3	500	1M
WES-KE36	Yes	lake	Road and pipeline construction	life of mine	1,000	8M
WES-KE37	Yes	lake	Road and pipeline construction	3	500	3M
Kokhanok East Spur Road						
WES-KE38	Yes	stream	Road and pipeline construction	3	500	3M
WES-KE39	Yes	lake	Road and pipeline construction	3	500	3M
Mine Site Access Road						
WES-11	Yes	lake	Construction	life of mine	1,000	8M
WES-12	Yes	stream	Construction	3	500	1M
WES-13	Yes	stream	Construction	life of mine	500	1M
WES-14	Yes	stream	Construction	3	500	1M
WES-15	Yes	lake	Construction	3	1,000	5M
WES-16	Yes	stream	Construction & Testing	life of mine	500	1M
WES-17	Yes	pond	Construction	3	500	1M
WES-18	Yes	pond	Construction	3	500	1M
Iliamna Spur Road						
WES-19	Yes	lake	Construction	life of mine	500	1M
WES-20	Yes	stream	Construction	3	1,000	5M
Action Alternative 1 - Kokhanok East Ferry Terminal Variant Total						55M

Sources: PLP 2018-RFI 022; PLP 2018h, 2018k

K2.1.8 Access Roads to Water Extraction Sites

All-season gravel roads would be necessary to access some of the water extraction sites proposed for Action Alternative 1 (see Figure K2-1a and Figure K2-1b). Table K2-10 provides details on the location and approximate length and acreage of each planned access road. These apply to the Action Alternative 1 base case and the Action Alternative 1 - Kokhanok East Ferry Terminal Variant.

K2.2 ACTION ALTERNATIVE 2– NORTH ROAD AND FERRY

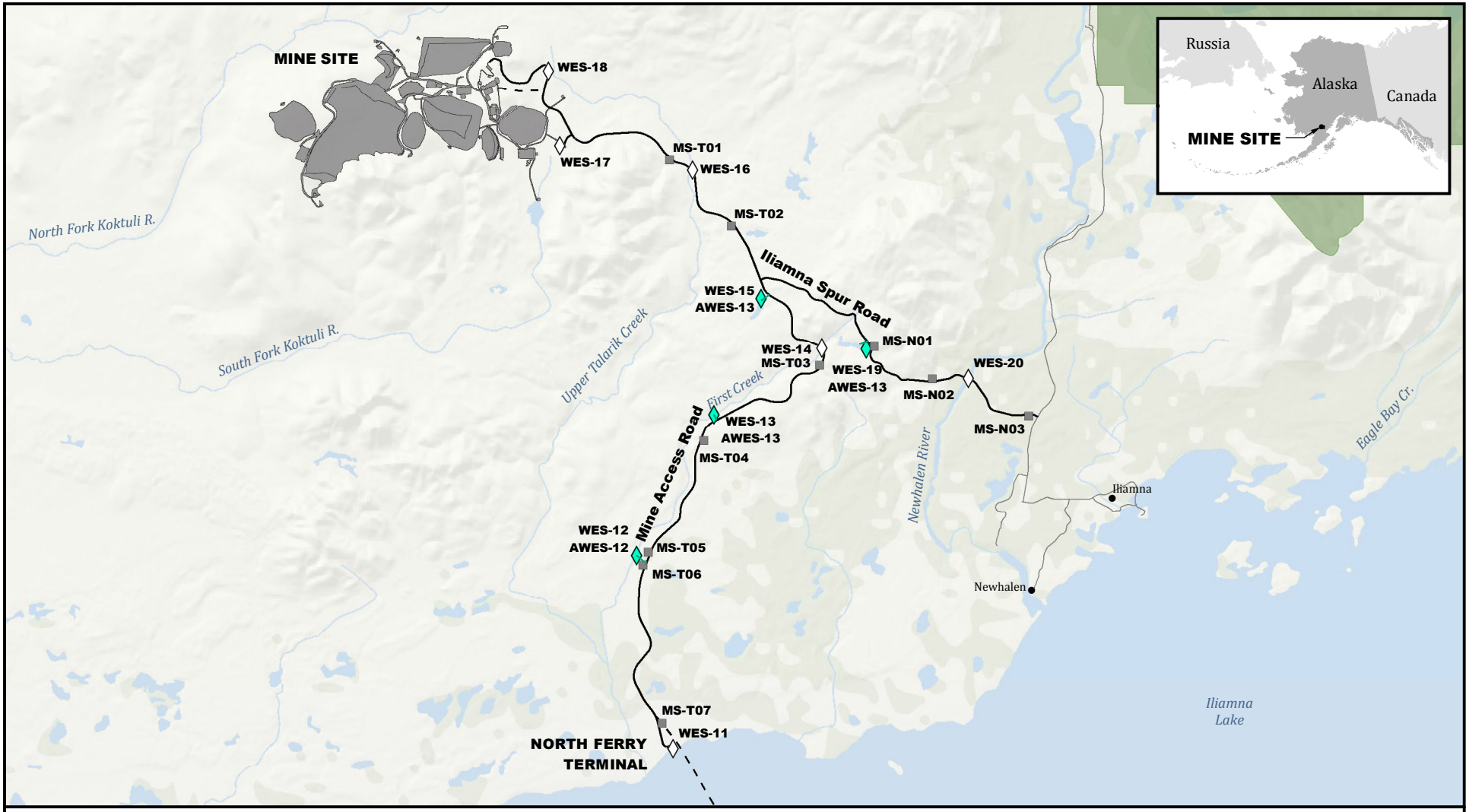
K2.2.1 Action Alternative 2 Project Components Footprints

Table K2-11 provides summary of the Action Alternative 2 project footprint for each of the four project components (mine site, transportation corridor, port, and natural gas pipeline) described in Chapter 2 of the EIS.

Table K2-10: Action Alternative 1 Water Extraction Site Access Roads

Name	Nearest Mile Post	Length (miles)	Acres[1]
AWES-01	MP-0	<1	1
AWES-12	MP-5	<1	1
AWES-13	MP-13	<1	1
AWES-15	MP-16	<1	1
AWES-19	MP-6	<1	1
Total		1	5

Notes:
[1]Represents area of permanent impacts. Numbers are approximate and rounded.
Source: PLP 2018jFigure K2-1a: Action Alternative 1 Material Sites and Water Extraction Sites



Sources: PLP 2018; ADNR

Note: The displayed features are the permanent footprint unless otherwise specified.

US Army Corps of Engineers

2 0 2 4

Miles

Action Alternative 1

- Material Site
- Water Extraction Site
- Water Extraction Site with Access Road
- Transportation Corridor
- Natural Gas Pipeline
- Mine Site

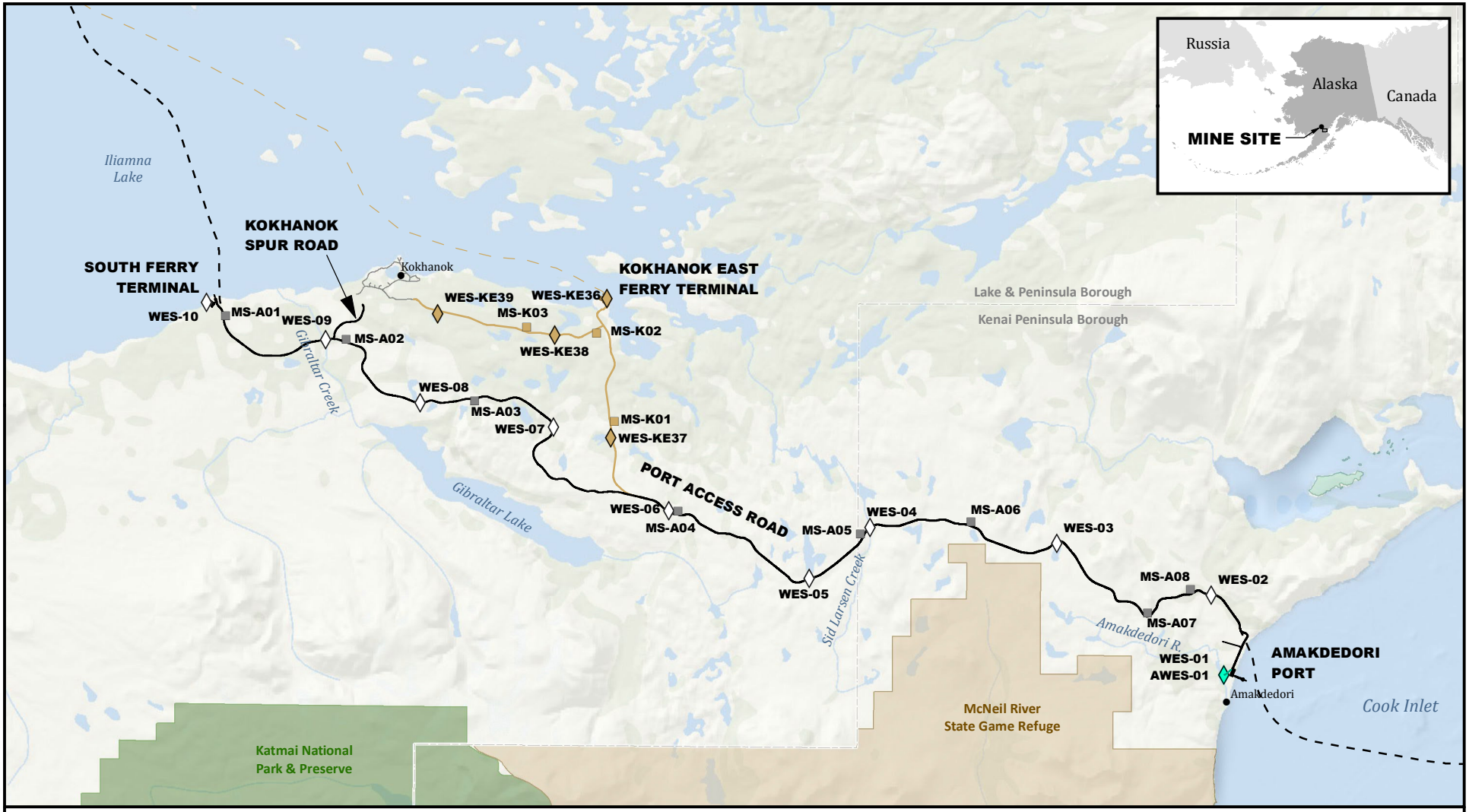
Other Features

- Borough Boundary
- Existing Road Infrastructure
- National Park

ACTION ALTERNATIVE 1 - MATERIAL SITES AND WATER EXTRACTION SITES

PEBBLE PROJECT EIS

FIGURE K2-1a



Sources: PLP 2018; ADNR

Note: The displayed features are the permanent footprint unless otherwise specified.

US Army Corps of Engineers

2 0 2 4

Miles

Action Alternative 1

- Material Site
- Water Extraction Site
- Water Extraction Site with Access Road
- Transportation Corridor
- Natural Gas Pipeline

Kokhanok East Ferry Variant

- Material Site
- Water Extraction Site
- Ferry Route

Other Features

- Local Roads
- Borough Boundary
- National Park
- National Wildlife Refuge
- State Game Refuge/Sanctuary

ACTION ALTERNATIVE 1 - MATERIAL SITES AND WATER EXTRACTION SITES

PEBBLE PROJECT EIS

FIGURE K2-1b

Table K2-11: Action Alternative 2 Permanent Project Footprint

Project Component	Facility	Permanent Footprint (acres)
Mine Site	Open Pit	608
	Quarries[1]	873
	Stockpiles	480
	Mineral Processing Facilities	113
	Bulk Tailings Storage Facility	2,958
	Pyritic Tailings Storage Facility	1,071
	Main Water Management Pond	955
	Water Management Ponds	66
	Sediment/Seepage Collection Systems	358
	Mine Site Infrastructure	86
	Onsite Access Roads	606
	Mill Site Power Plant	22
	Waste Management Facilities	17
	Water Treatment Plants	27
	Mine Site Total	**8,241**
Transportation Corridor	Access Roads	715
	Ferry Terminals	25
	Material Sites	422
	Transportation Corridor Total	**1,164**
Diamond Point Port	Onshore dredge material storage areas	16
	Shore-based facilities	25
	Marine facilities	14
	Dredge area	58
	Diamond Point Port Total	**112**
Natural Gas Pipeline	Compressor station pad[2]	5
	Stand-alone onshore pipeline segments[3]	516
	Material Sites	306
	Pipeline Construction Access Roads	29
	Natural Gas Pipeline Total	**856**
Action Alternative 2 Total		**10,341**

Notes:
Footprints are based on project GIS data (PLP 2018h) and represent permanent impacts. Numbers are rounded to the nearest whole number; therefore, the sum of individual facilities may not match the totals listed for the overall component.
[1] Includes Quarry B and Quarry C; Quarry A is within the footprint of the bulk TSF.
[2] Includes access road to compressor station.
[3] Includes onshore stand-alone sections of the natural gas pipeline (e.g., not adjacent to an access road). The footprint assumes a 100-foot wide impact corridor (40 feet to account for the trench and side-cast material, and 60 feet for construction access); which is being considered permanent impacts at this time since a restoration plan has yet to be developed. It is likely that much of this area would be restored within 2 years of construction.

K2.2.2Material Sites

Construction materials would be excavated from borrow material sites along the transportation corridor roads. Table K2-12 provides information for Action Alternative 2 material sites, including the estimated quantities, size, type of material, use of material and if blasting is required. Figure K2-2a and Figure K2-2b show the location of material sites identified for Action Alternative 2.

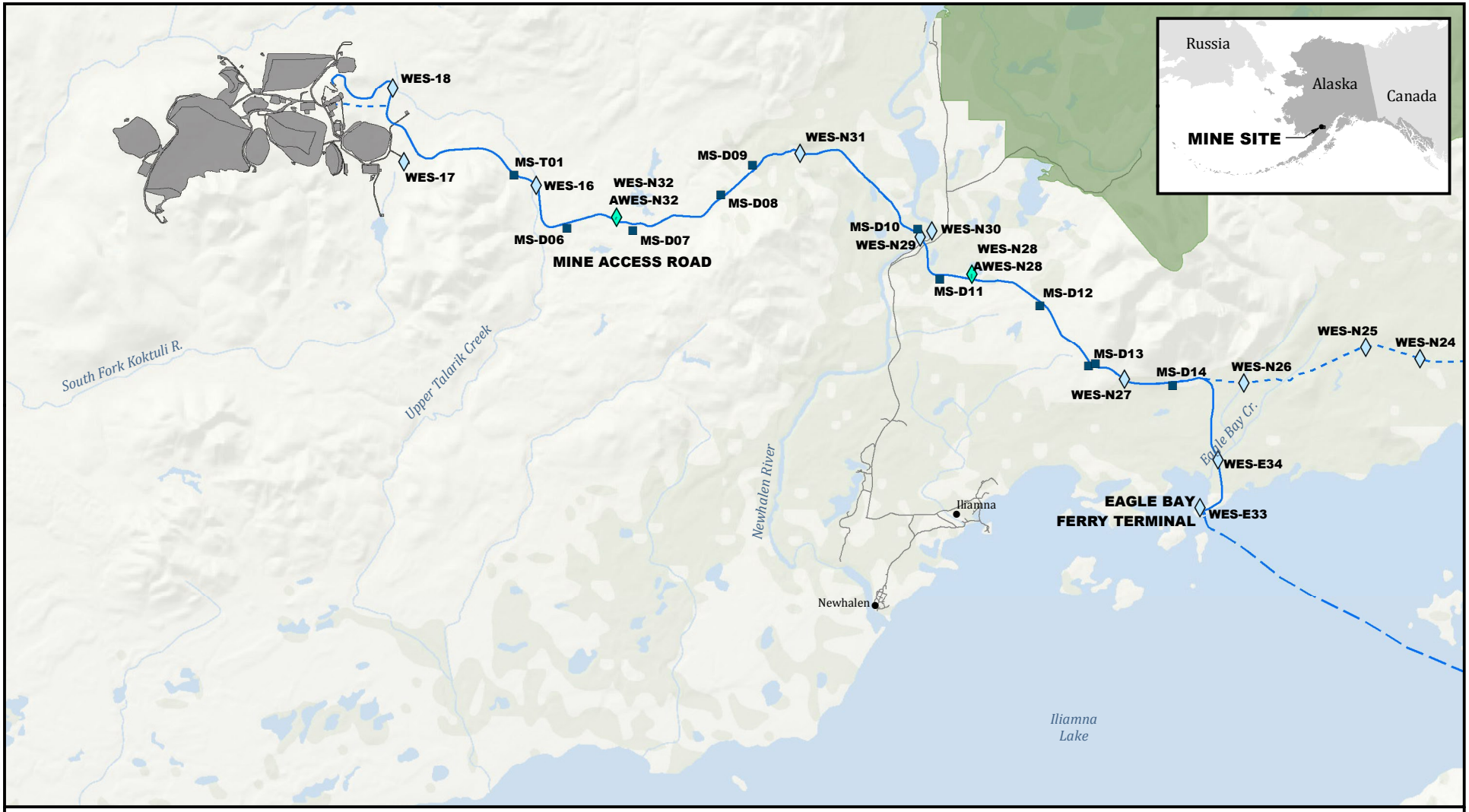
Table K2-12: Action Alternative 2 Material Site Quantities Estimates

Site	Quantity (cubic yards)	Size (acres)[1]	Type	Blasting Required (Yes/No)	Use
Port Access Road					
MS-D23	125,000	6	Rock	Yes	Road, Pipeline
MS-D24	351,000	25	Rock	Yes	Road, Pipeline
MS-D25	66,000	13	Gravel	No	Road, Pipeline
MS-D26	100,000	12	Gravel	No	Road, Pipeline
MS-D27	168,000	12	Rock	Yes	Road, Pipeline
MS-D28	102,000	13	Gravel & broken rock scree	No	Road, Pipeline
Mine Access Road					
MS-T01	700,000	10	Rock and gravel	Yes	Road, Pipeline
MS-D06	960,000	47	Sand and gravel	Yes	Road, Pipeline
MS-D07	750,000	54	Gravel	No	Road, Pipeline
MS-D08	432,000	23	Gravel	No	Road, Pipeline
MS-D09	390,000	40	Gravel	No	Road, Pipeline
MS-D10	308,000	24	Gravel	No	Road, Pipeline
MS-D11	488,000	38	Gravel	No	Road, Pipeline
MS-D12	735,000	47	Gravel	No	Road, Pipeline
MS-D13	293,000	27	Gravel	No	Road, Pipeline
MS-D14	210,000	32	Gravel	No	Road, Pipeline
Transportation Component Sum	6,178,000	422			
Natural Gas Pipeline					
MS-PL-D01	50,000	4	Rock	Yes	Pipeline
MS-PL-D02	100,000	3	Gravel	No	Pipeline
MS-PL-D03	50,000	3	Rock	Yes	Pipeline
MS-D15	90,000	19	Gravel	No	Pipeline
MS-D16	197,000	21	Gravel	No	Pipeline
MS-D17	329,000	37	Gravel and sand	No	Pipeline
MS-D18	416,000	42	Gravel and sand	No	Pipeline
MS-D19	124,000	21	Gravel	No	Pipeline
MS-D20	270,000	36	Rock	Yes	Pipeline

Table K2-12: Action Alternative 2 Material Site Quantities Estimates

Site	Quantity (cubic yards)	Size (acres)[1]	Type	Blasting Required (Yes/No)	Use
MS-D21	162,000	36	Gravel	No	Pipeline
MS-D22	113,000	13	Gravel	No	Pipeline
MS-D31	158,000	45	Gravel	No	Pipeline
MS-D32	110,000	24	Gravel	No	Pipeline
Pipeline component Sum	2,169,000	306			
Action Alternative 2 Total	8,347,000	728			

Notes:
[1]Represents area of permanent impacts. Numbers are approximate and rounded.
Sources: PLP 2018-RFI 035; PLP 2018h, 2018k



Sources: PLP 2018; ADNR

Note: The displayed features are the permanent footprint unless otherwise specified.

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Miles

Action Alternative 2

- Material Site
- Water Extraction Site
- Water Extraction Site with Access Road
- Transportation Corridor
- Ferry Route
- Natural Gas Pipeline
- Mine Site

Other Features

- Local Roads
- National Park

ACTION ALTERNATIVE 2 - MATERIAL SITES AND WATER EXTRACTION SITES

PEBBLE PROJECT EIS

FIGURE K2-2a

Sources: PLP 2018; ADNR

Note: The displayed features are the permanent footprint unless otherwise specified.

US Army Corps of Engineers

2 0 2 4

Miles

Action Alternative 2

- Material Site
- Water Extraction Site
- Water Extraction Site with Access Road
- Pipeline Construction Access
- Transportation Corridor
- Ferry Route
- Natural Gas Pipeline

Other Features

- Local Roads
- Borough Boundary
- National Park

ACTION ALTERNATIVE 2 - MATERIAL SITES AND WATER EXTRACTION SITES

PEBBLE PROJECT EIS

FIGURE K2-2b

K2.2.3Water Extraction Sites

Water extraction from sources along the transportation and natural gas pipeline corridors would be necessary to support project construction and operations. Table K2-13 provides information for Action Alternative 2 water extraction sites, including the waterbody type, use, years and season of use, and estimated extraction rate and volumes. Figure K2-2a and Figure K2-2b show the location of water extraction sites identified for Action Alternative 2.

Table K2-13: Action Alternative 2 Water Extraction Site Quantity Estimates

Water Extraction Site	All-Season (Yes/No)	Waterbody Type	Use	Years of Use	Extraction	
					Rate (gpm)	Annual Volume (gal)
Port Access Road						
WES-N05	Yes	stream	Road and pipeline construction	life of mine	500	3M
WES-N06	Yes	stream	Road and pipeline construction	3	500	3M
WES-N07	Yes	stream	Road and pipeline construction	3	500	3M
WES-N08	Yes	pond	Road and pipeline construction	life of mine	500	5M
WES-N09	Yes	stream	Road and pipeline construction	3	500	3M
WES-N10	Yes	river	Road and pipeline construction	life of mine	1,000	8M
Mine Access Road						
WES-16	Yes	stream	Construction & Testing	life of mine	500	1M
WES-17	Yes	pond	Construction	3	500	1M
WES-18	Yes	pond	Construction	3	500	1M
WES-E33	Yes	lake	Road and pipeline construction	life of mine	1,000	8M
WES-E34	Yes	stream	Road and pipeline construction	3	500	3M
WES-N27	No	stream	Road and pipeline construction	3	500	3M
WES-N28	Yes	lake	Road and pipeline construction	3	500	3M
WES-N29	Yes	river	Road and pipeline construction	life of mine	1,000	8M
WES-N30	Yes	river	Road and pipeline construction	3	1,000	5M
WES-N31	No	stream	Road and pipeline construction	3	500	3M

Table K2-13: Action Alternative 2 Water Extraction Site Quantity Estimates

Water Extraction Site	All-Season (Yes/No)	Waterbody Type	Use	Years of Use	Extraction	
					Rate (gpm)	Annual Volume (gal)
WES-N32	Yes	pond	Road and pipeline construction	3	500	3M
Natural Gas Pipeline[1]						
WES-N11	No	stream	Pipeline construction	3	500	3M
WES-N12	Yes	stream	Pipeline construction	life of mine	500	3M
WES-N13	Yes	river	Pipeline construction	3	1,000	8M
WES-N14	Yes	lake	Pipeline construction	life of mine	500	3M
WES-N15	No	stream	Pipeline construction	3	500	3M
WES-N16	No	stream	Pipeline construction	3	500	3M
WES-N17	No	stream	Pipeline construction	3	500	3M
WES-N18	No	lake	Pipeline construction	3	500	3M
WES-N19	No	stream	Pipeline construction	3	500	3M
WES-N20	Yes	stream	Pipeline construction	life of mine	1,000	8M
WES-N21	No	stream	Pipeline construction	3	500	3M
WES-N22	Yes	stream	Pipeline construction	life of mine	1,000	3M
WES-N23	Yes	stream	Pipeline construction	3	1,000	5M
WES-N24	Yes	stream	Pipeline construction	3	500	3M
WES-N25	Yes	stream	Pipeline construction	3	500	3M
WES-N26	Yes	stream	Pipeline construction	3	500	3M
WES-P01	Yes	stream	Pipeline construction and testing	1	500	3M
WES-P02	Yes	stream	Pipeline construction	1	500	1M
WES-P03	Yes	stream	Pipeline construction and testing	1	500	3M
WES-P04	No	stream	Pipeline construction	1	500	1M
					Action Alternative 2 Total	132M

Notes:
[1]Includes water extraction sites located along stand-alone portions of the natural gas pipeline corridor (i.e., not adjacent to transportation corridor access roads).
Sources: PLP 2018-RFI 022; PLP 2018h, 2018k

K2.2.4 Access Roads to Water Extraction Sites

All season gravel roads would be necessary to access some of the water extraction sites proposed for Action Alternative 2 (see Figure K2-2a and Figure K2-2b). Table K2-14 provides details on the location and approximate length and acreage of each planned access road.

Table K2-14: Action Alternative 2 Water Extraction Site Access Roads

Name	Nearest Mile Post	Length (miles)	Acres[1]
AWES-N28	N/A	<1	<1
AWES-N32	N/A	<1	<1
AWES-P01	N/A	<1	<1
Total		<1	1

Notes:
[1]Represents area of permanent impacts. Numbers are approximate and rounded.
N/A = not available
Source: PLP 2018j

K2.3 ACTION ALTERNATIVE 3 – NORTH ROAD ONLY

K2.3.1 Action Alternative 3 Project Components Footprints

Table K2-15 provides summary of the Action Alternative 3 project footprint for each of the four project components (mine site, transportation corridor, port, and natural gas pipeline) described in Chapter 2 of the EIS.

Table K2-15: Action Alternative 3 Permanent Project Footprint

Project Component	Facility	Permanent Footprint (acres)
Mine Site	Open Pit	608
	Quarries[1]	873
	Stockpiles	479
	Mineral Processing Facilities	113
	Bulk Tailings Storage Facility	2,796
	Pyritic Tailings Storage Facility	1,071
	Main Water Management Pond	955
	Water Management Ponds	66
	Sediment/Seepage Collection Systems	358
	Mine Site Infrastructure	87
	Onsite Access Roads	613
	Mill Site Power Plant	22
	Waste Management Facilities	17
	Water Treatment Plants	27

Table K2-15: Action Alternative 3 Permanent Project Footprint

Project Component	Facility	Permanent Footprint (acres)
	Mine Site Total	**8,086**
Transportation Corridor	Access Roads	1,036
	Material Sites	717
	Transportation Corridor Total	**1,753**
Diamond Point Port	Onshore dredge material storage areas	16
	Shore-based facilities	25
	Marine facilities	14
	Dredge area	58
	Diamond Point Port Total	**112**
Natural Gas Pipeline	Compressor station pad[2]	5
	Stand-alone onshore pipeline segments[3]	81
	Material Sites	10
	Natural Gas Pipeline Total	**97**
	Action Alternative 3 Total	**10,047**

Notes:
Footprints are based on project GIS data (PLP 2018h) and represent permanent impacts. Numbers are rounded to the nearest whole number; therefore, the sum of individual facilities may not match the totals listed for the overall component.
[1] Includes Quarry B and Quarry C; Quarry A is within the footprint of the bulk TSF.
[2] Includes access road to compressor station.
[3] Includes onshore stand-alone sections of the natural gas pipeline (e.g., not adjacent to an access road). The footprint assumes a 100-foot wide impact corridor (40 feet to account for the trench and side-cast material, and 60 feet for construction access); which is being considered permanent impacts at this time since a restoration plan has yet to be developed. It is likely that much of this area would be restored within 2 years of construction.

K2.3.2Material Sites

Construction materials would be excavated from borrow material sites along the transportation corridor roads. Table K2-16 provides information for Action Alternative 3 material sites, including the estimated quantities, size, type of material, use of material and if blasting is required. Figure K2-3 shows the location of material sites identified for Action Alternative 3.

Table K2-16: Action Alternative 3 Material Site Quantities Estimates

Site	Quantity (cubic yards)	Size (acres)[1]	Type	Blasting Required (Yes/No)	Use
North Access Road					
MS-D06	960,000	47	Sand and gravel	Yes	Road, Pipeline
MS-D07	750,000	54	Gravel	No	Road, Pipeline
MS-D08	432,000	23	Gravel	No	Road, Pipeline
MS-D09	390,000	39	Gravel	No	Road, Pipeline
MS-D10	308,000	24	Gravel	No	Road, Pipeline

Table K2-16: Action Alternative 3 Material Site Quantities Estimates

Site	Quantity (cubic yards)	Size (acres)[1]	Type	Blasting Required (Yes/No)	Use
MS-D11	488,000	38	Gravel	No	Road, Pipeline
MS-D12	735,000	47	Gravel	No	Road, Pipeline
MS-D13	293,000	27	Gravel	No	Road, Pipeline
MS-D14	210,000	32	Gravel	No	Road, Pipeline
MS-D15	120,000	19	Gravel	No	Road, Pipeline
MS-D16	263,000	21	Gravel	No	Road, Pipeline
MS-D17	438,000	37	Gravel and sand	No	Road, Pipeline
MS-D18	555,000	42	Gravel and sand	No	Road, Pipeline
MS-D19	165,000	21	Gravel	No	Road, Pipeline
MS-D20	360,000	36	Rock	Yes	Road, Pipeline
MS-D21	216,000	36	Gravel	No	Road, Pipeline
MS-D22	150,000	13	Gravel	No	Road, Pipeline
MS-D23	125,000	6	Rock	Yes	Road, Pipeline
MS-D24	351,000	25	Rock	Yes	Road, Pipeline
MS-D25	66,000	13	Gravel	No	Road, Pipeline
MS-D26	100,000	12	Gravel	No	Road, Pipeline
MS-D27	168,000	12	Rock	Yes	Road, Pipeline
MS-D28	102,000	13	Gravel & broken rock scree	No	Road, Pipeline
MS-D31	210,000	45	Gravel	No	Road, Pipeline
MS-D32	146,000	24	Gravel	No	Road, Pipeline
MS-T01	700,000	10	Rock and gravel	Yes	Road, Pipeline
Transportation Component Sum	8,801,000	717			
Natural Gas Pipeline					
MS-PL-D01	50,000	4	Rock	Yes	Pipeline
MS-PL-D02	100,000	3	Gravel	No	Pipeline
MS-PL-D03	50,000	3	Rock	Yes	Pipeline
Pipeline component Sum	200,000	10			
Action Alternative 3 Total	9,001,000	727			

Notes:
[1]Represents area of permanent impacts. Numbers are approximate and rounded.
Sources: PLP 2018-RFI 035; PLP 2018h, 2018k

K2.3.3Water Extraction Sites

Water extraction from sources along the transportation corridor would be necessary to support project construction and operations. Table K2-17 provides information for Action Alternative 3 water extraction sites, including the waterbody type, use, years and season of use, and estimated extraction rate and volumes. Figure K2-3 shows the location of water extraction sites identified for Action Alternative 3.

Table K2-17: Action Alternative 3 Water Extraction Site Quantity Estimates

Water Extraction Site	All-Season (Yes/No)	Waterbody Type	Use	Years of Use	Extraction	
					Rate (gpm)	Annual Volume (gal)
North Access Road						
WES-16	Yes	stream	Construction & Testing	life of mine	500	1M
WES-17	Yes	pond	Construction	3	500	1M
WES-18	Yes	pond	Construction	3	500	1M
WES-N05	Yes	stream	Road and pipeline construction	life of mine	500	3M
WES-N06	Yes	stream	Road and pipeline construction	3	500	3M
WES-N07	Yes	stream	Road and pipeline construction	3	500	3M
WES-N08	Yes	pond	Road and pipeline construction	life of mine	500	5M
WES-N09	Yes	stream	Road and pipeline construction	3	500	3M
WES-N10	Yes	river	Road and pipeline construction	life of mine	1,000	8M
WES-N11	No	stream	Road and pipeline construction	3	500	3M
WES-N12	Yes	stream	Road and pipeline construction	life of mine	500	3M
WES-N13	Yes	river	Road and pipeline construction	3	1,000	8M
WES-N14	Yes	lake	Road and pipeline construction	life of mine	500	3M
WES-N15	No	stream	Road and pipeline construction	3	500	3M
WES-N16	No	stream	Road and pipeline construction	3	500	3M
WES-N17	No	stream	Road and pipeline construction	3	500	3M
WES-N18	No	lake	Road and pipeline construction	3	500	3M

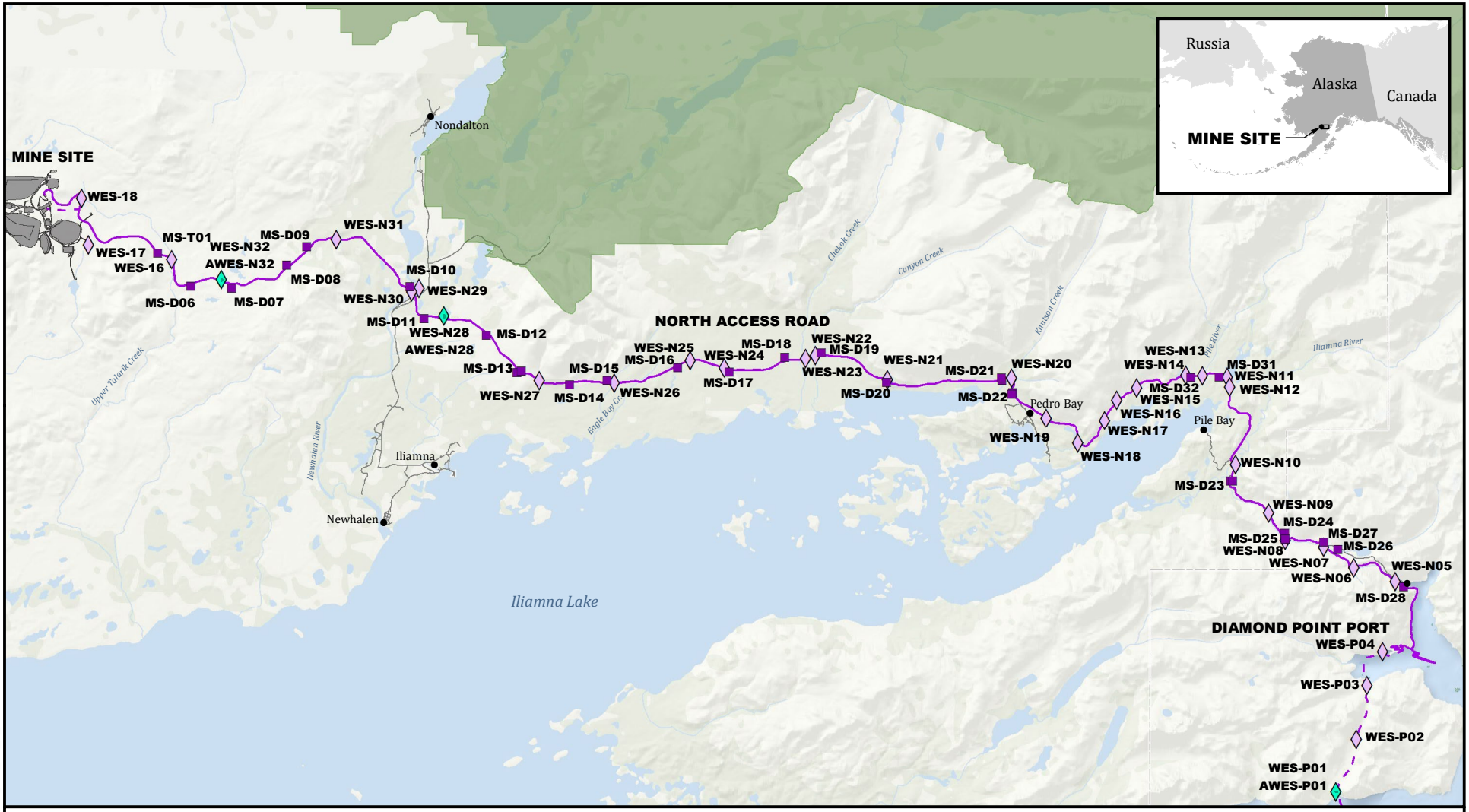
Table K2-17: Action Alternative 3 Water Extraction Site Quantity Estimates

Water Extraction Site	All-Season (Yes/No)	Waterbody Type	Use	Years of Use	Extraction	
					Rate (gpm)	Annual Volume (gal)
WES-N19	No	stream	Road and pipeline construction	3	500	3M
WES-N20	Yes	stream	Road and pipeline construction	life of mine	1,000	8M
WES-N21	No	stream	Road and pipeline construction	3	500	3M
WES-N22	Yes	stream	Road and pipeline construction	life of mine	1,000	3M
WES-N23	Yes	stream	Road and pipeline construction	3	1,000	5M
WES-N24	Yes	stream	Road and pipeline construction	3	500	3M
WES-N25	Yes	stream	Road and pipeline construction	3	500	3M
WES-N26	Yes	stream	Road and pipeline construction	3	500	3M
WES-N27	No	stream	Road and pipeline construction	3	500	3M
WES-N28	Yes	lake	Road and pipeline construction	3	500	3M
WES-N29	Yes	river	Road and pipeline construction	life of mine	1,000	8M
WES-N30	Yes	river	Road and pipeline construction	3	1,000	5M
WES-N31	No	stream	Road and pipeline construction	3	500	3M
WES-N32	Yes	pond	Road and pipeline construction	3	500	3M
Natural Gas Pipeline[1]						
WES-P01	Yes	stream	Pipeline construction and testing	1	500	3M
WES-P02	Yes	stream	Pipeline construction	1	500	1M
WES-P03	Yes	stream	Pipeline construction and testing	1	500	3M
WES-P04	No	stream	Pipeline construction	1	500	1M
Action Alternative 3 Total						121M

Notes:
[1]Includes water extraction sites located along stand-alone portions of the natural gas pipeline corridor (i.e., not adjacent to transportation corridor access roads).
Sources: PLP 2018-RFI 022; PLP 2018h, 2018k

K2.3.4 Access Roads to Water Extraction Sites

All-season gravel roads would be necessary to access some of the water extraction sites proposed for Action Alternative 3 (see Figure K2-3). These access roads would be the same as presented in Table K2-14 for Action Alternative 2.



Sources: PLP 2018; ADNR

Note: The displayed features are the permanent footprint unless otherwise specified.

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Miles

Action Alternative 3

- Material Site
- Water Extraction Site
- Water Extraction Site with Access Road
- Natural Gas Pipeline
- Transportation Corridor
- Mine Site

Other Features

- Local Roads
- Borough Boundary
- National Park

ACTION ALTERNATIVE 3 - MATERIAL SITES AND WATER EXTRACTION SITES

PEBBLE PROJECT EIS

FIGURE K2-3

K3.1 INTRODUCTION TO AFFECTED ENVIRONMENT

Information about traditional ecological knowledge (TEK) and the approach taken by the US Army Corps of Engineers (USACE) to collect TEK is outlined in Section 3.1, Introduction to Affected Environment. The information collected is below.

K3.1.1 Scoping Comments

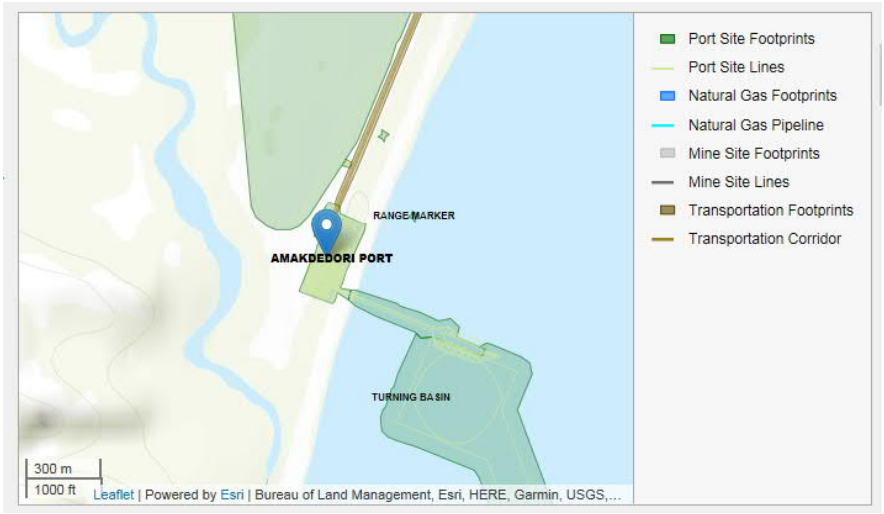
Scoping comments were pulled from the Scoping Report (Appendix A). Comments received that pertain to the topics listed in Section 3.1, Introduction to Affected Environment, are listed below.

- Fish
  - The area that makes up the headwaters is full of underwater streams in which small fry/fingerlings swim as they emerge. They sometimes swim into lakes and ponds of the region and often get too big to get out; they are called landlocked salmon.
  - Many species of fish are used for subsistence harvest, not just salmon.
  - The people in Seldovia have a long tradition of subsistence fishing for herring in Kamishak Bay. The herring also support other animals that we subsist on.
  - The placement of the tailings impoundment facility located on the North Fork of the Koktuli River is prime king salmon habitat.
- Wildlife
  - Exploration activities at the site have caused caribou to avoid the area.
  - Helicopter traffic during exploration disrupted subsistence activities. Particularly, helicopter traffic impacts spring waterfowl hunting (geese), displaces caribou, and impacts the Koktuli River.
- Birds
  - Kamishak Bay is home to a large seabird nesting colony.
  - Bald eagles nest and feed along the coast and along all of the major salmon spawning rivers in the Bristol Bay and Cook Inlet regions, with a relatively high number of golden eagles also found here.
- Marine Mammals
  - Incorporate traditional knowledge on freshwater seals in Iliamna Lake, and be aware that there is a Freshwater Seal Commission.
  - The proposed ferry could strike seals in Iliamna Lake, which would congregate in the open water created by the icebreaking ferry.
- Vegetation
  - Over 80 edible and medicinal plants grow and are harvested in the project area including several species of berries, wild peas, wild onions, ferns, cow parsnip, rosehips, and many others.
- Subsistence activity
  - Be sure to include Kodiak Island to your analysis, as it has important subsistence areas that could be impacted by the project.
  - The road corridor would go through winter moose hunting area in the Talarik Creek watershed.
  - The Nushugak, Mulchatna, and Koktuli watersheds are the hunting and fishing areas for people of New Stuyahok.

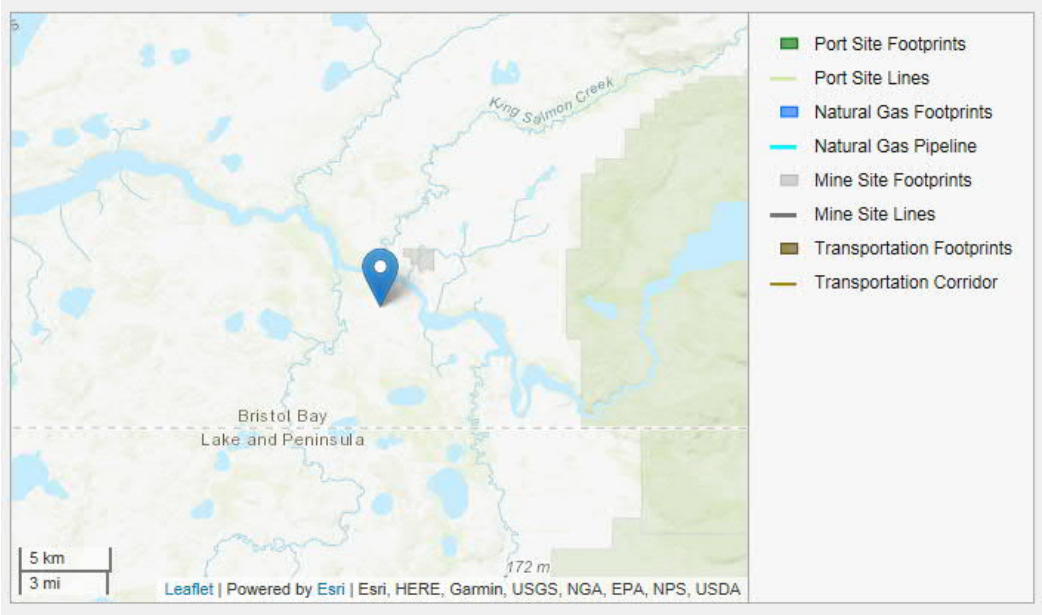
  - The Amakdedori area has been historically used for early subsistence activities, including salmon harvest.
  - The mountain behind Nondalton is traditional subsistence area.
  - The Frying Pan Lake area is important to Nondalton people and shared with other neighboring people.
  - The people in Seldovia have a long tradition of subsistence fishing for herring in Kamishak Bay. The herring also support other animals that we subsist on.
  - The residents along Iliamna Lake rely on access to small islands for the harvest of bird eggs in the spring.
  - A chart on the Bristol Bay seasonal subsistence gathering cycle was submitted.
- Culturally important areas
  - The Amakdedori port area has been used as a site for a cultural camp, subsistence use areas, and school field trips.
  - There are ancestral burial grounds at/near the proposed Amakdedori port, along the road route on the south side of Iliamna Lake, and on the road route to the south ferry dock.
  - This region of Alaska contains several recorded rock art (petroglyph) sites. No doubt more such sites remain to be discovered. Many of the rock art panels are on shorelines and only visible during low tide; thus, it is easy for archaeological surveys to miss these important cultural resources.
- Navigation
  - While lower Cook Inlet and Kamishak Bay do not have ice or currents to the same extent as the upper Cook Inlet, Lower Cook Inlet is not nearly as protected as the waters of upper Cook Inlet, and Kamishak Bay experiences challenging winter sea conditions.
  - No depths are recorded on navigation charts for Iliamna Lake. Some rocks on the chart do not exist; others are not where the charts show them to be. Some are not on the charts at all. There are places where the depth goes from 400 feet to 30 feet.
  - The wind has pushed ice on the north shore of Iliamna Lake in piles as high as 50 feet and could damage the proposed ferry terminal.
  - The east winds on Iliamna Lake are strong and generate large waves that would make the proposed ferry unreliable and dangerous; winds can reach 100 miles per hour.
  - A disabled ferry could be blown by the wind onto the shoreline such as at Eagle Bluffs.

Scoping comments that referenced a geographic location via the online comment form web mapping feature are below.

- Culturally important areas

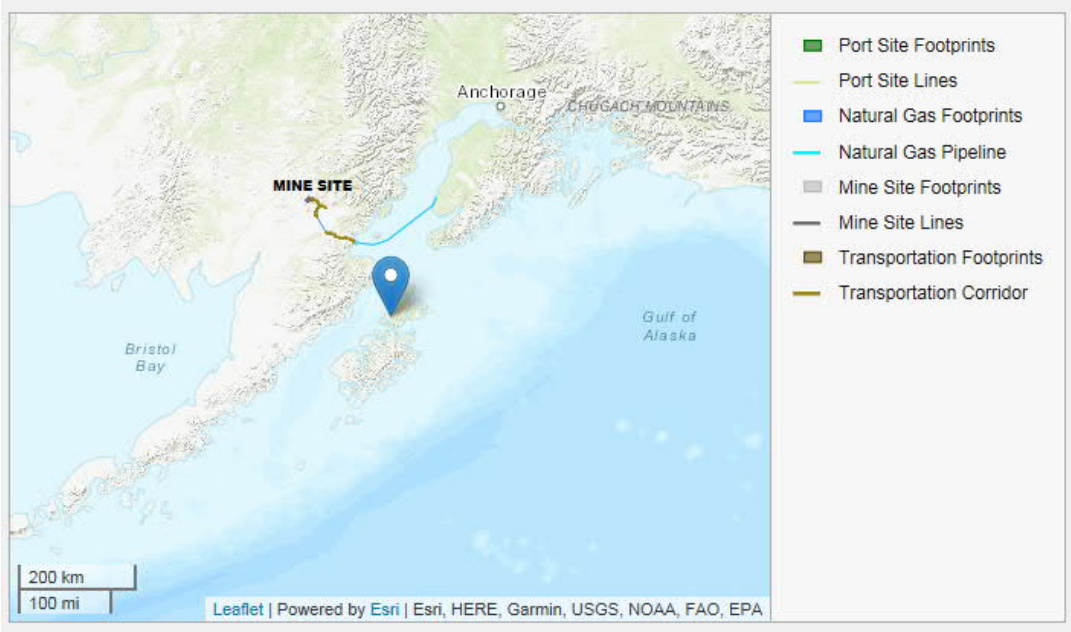
Applicable Comment
The proposed dredge storage and port site on this map is overlaid on the Amakdedori Native Village. This is also the site of cultural learning camps, subsistence use areas, and school field trips. … Survey work needs to include consultation with local tribal governments to apply religious and culturally appropriate research methods. Any alternatives will need to address meaningful mitigation to the loss of access to historical cultural resource sites and to living cultural resource sites. Loss of access and location changes to the traditional learning camps and school field trips to the Amakdedori Native Village will need to be made in consultation with the Kokhanok school and parents. Alternative locations for these teachings would need to include other cultural sites of the Kachemak Tradition. … 

- Subsistence Activity

Applicable Comment
It worries me that the mine could impact animals, fish and berries that my friends and I gather for subsistence. A lot of us depend on the land and water for food. It offsets the high cost of living and shipping food into the area. We rely on moose, caribou, bear, many berries etc. …    

- Subsistence Activity

Applicable Comment
My husband and I have a setnet site on Raspberry Island. We are especially concerned about transport plans across Lake Clark and Cook Inlet. We learned during the Exxon oil spill the spills in one place can impact fisheries and habitats along a wide swath. Although the spill was in Prince William Sound we found oil on our beaches in the Kodiak District and our fisheries was shut down.



K3.1.2 Existing Documents

K3.1.2.1 Environmental Baseline Document

The Environmental Baseline Document (EBD) Chapter 23, Subsistence, contains the detailed results of a study done by Stephen R. Braund & Associates (SRB&A) in coordination with the Alaska Department of Fish and Game (ADF&G) (SRB&A 2011b). Two major elements of this study were to survey residents, and then follow up with interviews. The data (e.g., tables, charts, and maps) used to determine the environmental baseline for Section 3.9, Subsistence in this Environmental Impact Statement (EIS) reflect the findings of this study. In this way, TEK regarding areas of subsistence use and harvest data are incorporated, and would be reflected in pertinent EIS chapters.

K3.1.2.2 EPA Watershed Study

Appendix D in Volume 2 of the EPA *Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska* is a study of TEK and cultural characterization in the Nushagak and Kvichak watersheds, conducted by Boraas and Knott (Boraas et al. 2013). The study was based on interviews in the region. Information from this study that would be considered TEK and pertains to the topics presented in listed in Section 3.1 is listed below.

- Fish
  - That is spring water [at Kijik]. It does not freeze. That is why you can go over there and get a sockeye salmon in March; it might have a green head, and it is

red, but it is still a sockeye salmon. You can go over there on New Year's Day and get a fresh sockeye salmon.

- But, I think, when they are spawning, that is where they hit the spring waters, where it does not freeze. It is always open, even in the dead of the winter. It is always open; you got to be careful there. Especially up in Lake Clark, around Kijik. It is, man, 30 below zero, and still open water.
- They are sensitive, very sensitive. If you put something bad in the water the fish will sense it. They will probably not go up the river, they will go somewhere else. If they spawn here and they notice something different they will move to another spot. The fish are very sensitive.
- For quite a few years there when we were building up the king salmon run we did not even fish in June. It was just to build up those runs. It is kind of ironic that the kings we built up are on the Koktuli River where that mine is going to go. It is almost a whole decade that we sacrificed to build up that run. We built it up and now it might go away.
- You do not see Bristol Bay having troubles because our ecosystem is whole and not damaged. We are very appreciative of what we have. In relationship to the mine the place I work up here is the Bristol Bay Economic Development Corporation and… one of the companies we bought is Ocean Beauty Seafoods which is one of the largest salmon producers in Alaska. We put up 161 million pounds of commercially caught goods in a year. So I talk to the people and if there is a mine that goes in like pebble and we have copper coming out and affecting our fish, are you interested in buying our fish? These are customers we sell 300-400 thousand pound lots to. No, we are not interested….We don't want ourselves and our kids to eat contaminated foods.
- They [Salmon] would not go there [where water is contaminated]. They are also very sensitive to temperature. They have a really keen sensory acuity, not only them, but all the critters, all the birds. …They are so sensitive in every aspect of that word.

- Wildlife
  - You cannot even get meat like you used to; you cannot even go out hunting for moose or caribou. Nothing is here anymore; everything is disappearing. I know, you know [name] could verify too. There used to be so much caribou, we would see them all over the road, all over the lake, everything.
  - Since the Pebble Mine started their exploration, I speak for everyone around here that we have not had the big caribou herds that come through here anymore.
  - The drill wells are making all the noise. We were over there, my wife and I were over there last spring, and when we went over there to check out the Pebble, there [we] saw three other helicopters right in the same area, and that is lots of traffic. We have not had caribou meat around here ever since. Have not had caribou meat caught here in probably the last 6 years.
- Vegetation
  - What they used to say, was the first time, when they first moved down to fish camps, then this wild celery, I do not know if you know what that is, but we eat those. They go up on the mountainside and pick lots of that, and then they peel it, they peel the peelings off and we eat the inside part.

- Subsistence activity areas
  - In Easter they went up to Koliganek the next village up. He said people up there caught white fish and pikes. He said the water is good upriver, it is not like down here. I think it is the water that is coming down from up Mulchatna. He thinks it's from them working on that pebble up there [Pebble Mine].
- Culturally important areas
  - There are 10,000 cache pits [at the Kijik archaeological site on Lake Clark] and they are still counting; over 200 houses, which are huge. So it was pretty big.
- Weather and climate
  - There is open water all over. They got drilling rigs that are sitting on open water. You cannot walk up there with knee boots you got to have hip boots there is so much water this year. The ground is saturated.

K3.1.3 Cooperating Agencies

Cooperating agencies review and comment on draft sections of the EIS during development. During that process, some information was presented that would qualify as TEK. Information received pertaining to the topics listed in Section 3.1 is listed below.

- Cultural Resources
  - The village site at Amakdedori, cabins and trails, have significant personal and cultural value to a number of individuals in the borough. The old cabins, trails, and village have personal meaning to many who reside in the borough.

K3.1.4 Tribal Consultation

Information was also collected during government-to-government consultation meetings between the USACE and Tribes. Comments received that pertain to the topics in Section 3.1, Introduction to Affected Environment, are listed below.

- Wildlife
  - Participants stated that the bears move widely across the region from Amakdedori to the mine site and beyond.
  - The road would cross caribou migration paths. Caribou are coming back to the area, the lichen crop is robust.
  - There have been changes in caribou and moose migration patterns due to disturbances associated with Pebble mine exploratory activities conducted over the last decade.
  - Belugas are changing their diets because their food is not available for them anymore.
- Weather and climate
  - The mine site is in bowl, in right wind conditions, can hear noise from the mine.
- Subsistence Use Areas
  - Razor clams on the east side of Cook Inlet are declining so a lot of people dig razor clams on the west side, at Amakdedori. Aquatic resources like clams, crab, herring and shrimp have declined on the east side of Cook Inlet.

K3.6 COMMERCIAL AND RECREATIONAL FISHERIES

K3.6.1 Commercial Fisheries Data

The following tables (Table K3.6-1 through Table K3.6-7) support Section 3.6, Commercial and Recreational Fisheries.

Table K3.6-1: 20-Year Average Harvest Distribution by Species (Percent)

Species	Naknek/ Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
Sockeye	97	99	97	86	71	94
Chinook	0	0	0	1	1	0
Coho	0	0	0	1	1	0
Chum	2	1	2	7	19	4
Pink	0	0	0	6	8	2

Note: Percentages may not equal 100 due to rounding
Source: ADF&G 2018m

Table K3.6-2: 20-Year Annual Bristol Bay Salmon Harvest by District

	Naknek/ Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
20-Year Min.	602,061	2,369,459	526,114	2,761,086	198,926	10,721,140
20-Year Max.	16,885,517	12,143,186	6,705,869	13,334,168	1,082,937	40,592,915
20-Year Median	8,513,405	7,082,486	2,450,220	6,734,064	778,472	26,391,928
20-Year Average	8,220,622	6,829,737	2,901,849	7,263,097	764,344	26,041,124
1998-2007 Average	5,610,865	6,073,337	2,193,520	6,886,841	710,810	21,643,701
2008-17 Average	10,830,378	7,586,138	3,610,179	7,639,353	817,879	30,438,547

Source: ADF&G 2018m

Table K3.6-3: Annual Bristol Bay Salmon Escapement by District

	Naknek/ Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
20-Year Min.	2,303,463	927,054	596,332	1,389,975	128,118	6,200,639
20-Year Max.	15,033,216	2,600,982	2,599,186	7,705,277	390,080	22,366,676
20-Year Median	6,133,492	1,233,900	898,110	2,461,579	203,148	11,596,386
20-Year Average	6,443,397	1,298,181	1,045,789	2,603,847	225,016	11,616,230
1998-2007 Average	5,849,785	1,250,897	906,198	2,585,897	242,983	10,835,760
2008-17 Average	7,037,010	1,345,465	1,185,379	2,621,797	207,049	12,396,700

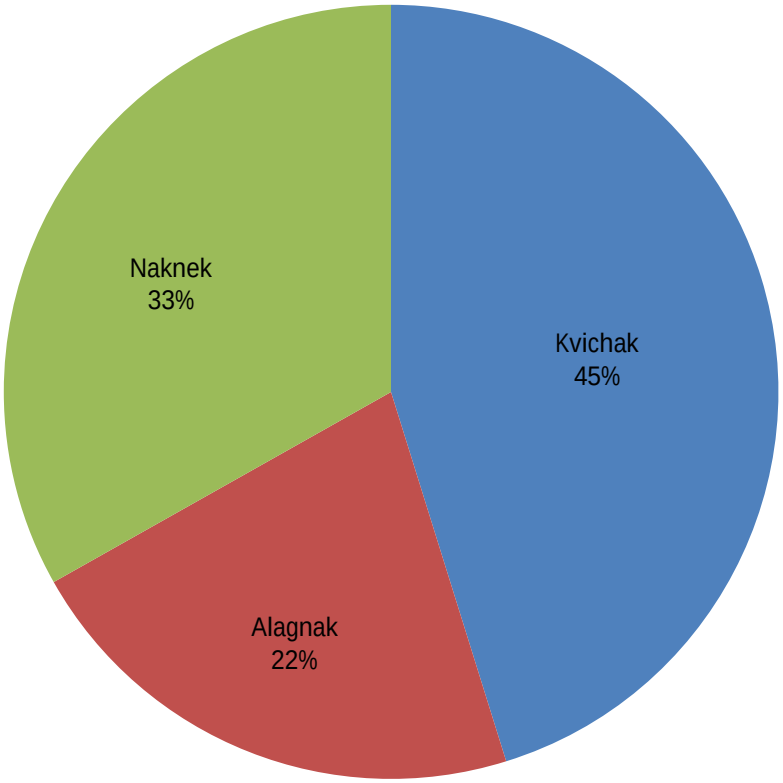
Source: ADF&G 2018m

Table K3.6-4: Inshore Sockeye Salmon Run by River System, 1998-2017, Naknek-Kvichak District (Thousands of Fish)

	Kvichak	Alagnak	Naknek	Total
20-Year Min. Run Size	707	234	1,402	3,337
20-Year Max. Run Size	15,466	11,629	8,794	31,566
20-Year Median Run Size	5,694	2,530	4,718	15,361
20-Year Average	6,675	3,192	4,901	14,751
1998-2007 Average	4,381	2,436	5,196	11,996
2008-17 Average	8,969	3,949	4,605	17,506

Note: Due to rounding, district total runs may not equal the sum of the rows.
Source: ADF&G 2018m

Figure K3.6-1: Inshore Sockeye Salmon Run by River System, 1998-2017, Naknek-Kvichak District



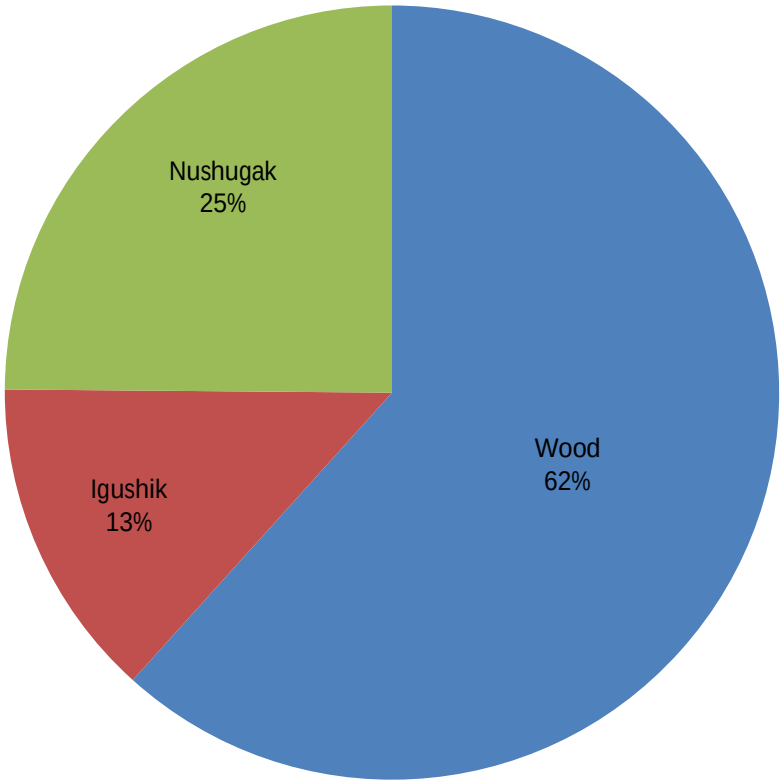
Source: ADF&G 2018m

Table K3.6-5: Inshore Sockeye Salmon Run by River System, 1998-2017, Nushagak District (Thousands of Fish)

Year	Wood	Igushik	Nushagak	Total
20-Year Min. Run Size	2,449	207	674	4,053
20-Year Max. Run Size	11,064	2,394	7,700	20,028
20-Year Median Run Size	5,278	1,315	2,198	8,962
20-Year Average	5,768	1,258	2,328	9,353
1998-2007 Average	5,619	1,206	2,027	8,852
2008-17 Average	5,917	1,310	2,628	9,855

Note: Due to rounding, district total runs may not equal the sum of the rows.
Source: ADF&G 2018m

Figure K3.6-2: Inshore Sockeye Salmon Run by River System, 1998-2017, Nushagak District



Source: ADF&G 2018m

Table K3.6-6: Comparison of Vessels Used in the Bristol Bay Drift Gillnet Fishery, by Residency of Permit Holder

	Group	1983	1988	1993	1998	2003	2008
Average age of Vessels (years)	Bristol Bay Residents	9	11	14	18	22	26
	Other Alaska Residents	9	11	14	17	21	24
	Residents of Other States	11	12	13	16	20	24
	Average	10	11	14	17	21	25
Average horsepower of vessels	Bristol Bay Residents	239	279	282	294	287	337
	Other Alaska Residents	243	271	315	345	350	373
	Residents of Other States	252	286	335	368	372	382
	Average	245	278	311	366	366	364
Average displacement of vessels (gross tons)	Bristol Bay Residents	10	12	12	12	12	12
	Other Alaska Residents	12	13	13	13	14	15
	Residents of Other States	12	12	13	14	14	14
	Average	11	12	13	13	13	14
Average fuel capacity of vessels (gallons)	Bristol Bay Residents	239	288	292	294	287	299
	Other Alaska Residents	306	334	364	357	357	360
	Residents of Other States	283	311	348	352	350	364
	Average	276	311	331	335	331	341
Percent of vessels with refrigeration capacity	Bristol Bay Residents	0.5%	0.5%	2.3%	4.5%	5.5%	7.7%
	Other Alaska Residents	1.3%	2.3%	7.5%	13.7%	15.3%	20.8%
	Residents of Other States	0.5%	2.0%	8.1%	15.5%	17.8%	22.2%
	Average	0.8%	1.6%	6.0%	11.2%	12.9%	16.9%

Source: NEI 2009

K3.6.2 Area N, P, S, and T Freshwater Guide Logbook Data

The table below summarizes 2011-2014 data from the Alaska Department of Fish and Game's (ADF&G) Freshwater Guide Logbook program, which requires fishing guides in the state of Alaska to record the location, number of clients, and catch/harvest for every guided trip. Included in Table K3.6-7 is the average number of businesses reporting for a waterbody, the average annual number of trips taken, and the average number of days fished. In addition, the table shows the number of times in the 4-year span that the ADF&G reported program data. For example, Upper Talarik Creek appears in the data for 3 out of 4 years between 2011 and 2014. On average, five businesses reported a total of 16 trips and 48 fishing days per year. Table K3.6-7 highlights waterbodies that could be affected by an aspect of the project or unanticipated releases.

Table K3.6-7: Comparative Estimates of Sport Fishing Effort, Days

Waterbody	Average of 2011-2014 Data			
	Appear-ances in Data (Max=4)	Business Operating	Trips	Days
Area N				
Big River Lakes	4	26	757	2,932
Wolverine Creek mouth (by Big River Lakes)	4	17	500	1,959
Kustatan River	4	28	242	1,027
Crescent Lake	4	17	176	606
Kamishak River	4	8	133	356
Big River	4	8	89	328
Other sites (South of North Forelands)	1	12	61	231
Other lakes and streams	2	7	57	190
Crescent River (Grecian River)	3	9	38	155
Sites south of North Forelands	2	13	47	150
Chuitna River	4	8	26	111
Bachatna Creek	4	8	19	80
Coal Creek (into Beluga Lake)	3	4	18	58
Other sites between North Forelands and Susitna drainage	1	5	11	31
Area P				
Kenai River – Cook Inlet to Soldotna Bridge	4	146	4,449	15,389
Kenai River – Skilak Inlet to Kenai Lake	4	46	2,490	7,673
Kasilof River – below Sterling Highway	4	79	1,825	5,996
Kenai River – Moose River to Skilak outlet	4	94	1,724	5,562
Kenai River – Soldotna Bridge to Moose River	1	67	886	2,823
Kenai River – Soldotna Bridge to Moose R	3	52	690	2,227
Kasilof River – above Sterling Highway	4	21	146	478
Russian River	4	11	151	342
Other streams	4	7	64	271
Deep Creek	4	5	44	164
Kenai River – guided, reach not specified	4	11	43	127
Other lakes	4	10	39	117
Anchor River	4	7	52	115
Ninilchik River	1	4	30	111
Quartz Creek	4	9	36	79
Kasilof River – guided, reach not specified	2	6	12	33

Table K3.6-7: Comparative Estimates of Sport Fishing Effort, Days

Waterbody	Average of 2011-2014 Data			
	Appear-ances in Data (Max=4)	Business Operating	Trips	Days
Bench Lake (Johnson Trail)	1	5	11	28
Hidden Lake	1	4	7	24
Afonasi Lake	1	4	4	14
Area S				
Alagnak (Branch) River	4	18	1,292	2,776
Copper River (Iliamna Lake area)	4	11	613	1,466
Kvichak River	4	19	548	1,288
Moraine Creek	4	18	463	1,047
Kulik River	4	12	382	972
Iliamna River	4	7	185	430
Battle River	4	15	94	293
Gibraltar River	4	9	123	289
Kukaklek River (Big Ku) (into Alagnak)	4	9	105	220
Tazimina River	4	6	95	214
Iliamna Lake	4	8	76	223
Nanuktuk Creek	4	13	92	195
Newhalen River	3	9	58	174
Lake Clark	4	12	59	161
Lower Talarik Creek	4	8	55	148
Nonvianuk River (into Alagnak)	4	7	49	108
Funnel Creek	4	9	32	73
Kijik River	4	5	18	60
Little Kulik (into Nanuktuk Creek)	2	6	28	56
Other lakes and streams	3	6	19	52
Upper Talarik Creek	3	5	16	48
Chekok Creek	2	7	19	46
Nonvianuk Lake	1	9	18	38
Kontrashibuna Lake	2	4	12	38
Kijik Lake	3	5	8	27
Area T				
Nushagak River – sonar site to outlet of Mulchatna	4	28	1,153	3,577
Nushagak River – Black Point upstream to Sonar Site	4	21	847	2,513

Table K3.6-7: Comparative Estimates of Sport Fishing Effort, Days

Waterbody	Average of 2011-2014 Data			
	Appear-ances in Data (Max=4)	Business Operating	Trips	Days
Togiak River System	3	6	732	1,571
Togiak River and Lake drainage	1	7	707	1,509
Agulowak River	4	6	715	1,355
Other lakes and streams	2	10	478	992
Other streams	2	7	339	675
Nushagak River – upstream from mouth of Mulchatna River	4	13	352	670
Wood River Lakes system	4	8	293	628
Agulukpak River	4	10	306	586
Mulchatna River	4	6	135	342
Nuyakuk River (Tikchik-Nuyakuk Lake system)	1	12	151	329
Aleknagik Lake	4	6	93	194
Other lakes	2	4	86	168
Nushagak River system (excluding Mulchatna drainage)	2	10	53	143
Wood River	1	7	56	129
Nushagak River System (including Harris Creek and King Salmon River)	1	6	38	119

Source: Sigurdsson and Powers 2012, 2013, 2014; Powers and Sigurdsson 2016

K3.7 CULTURAL RESOURCES

K3.7.1Mine Site

The Alaska Heritage Resource Survey (AHRS) lists 11 cultural resource locations in the mine site analysis area, shown in Table K3.7-1. The mine site analysis area is defined as a 3-mile buffer around the mine site footprint. Of these sites, two are currently in the mine footprint (ILI-00218 and ILI-00251, in **bold**). Select notes from Stephen R. Braund & Associates (SRB&A) reports (SRB&A 2015a) are included in brackets.

Table K3.7-1: Known AHRS Locations in the Mine Site Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00196	ILI-00196	Site consists of an isolated artifact located on an alluvial fan next to a stream bed. It appears to be a biface reduction flake made of gray chert. Intensive testing of the surrounding area failed to locate further cultural material. No gray chert source material was located nearby.	Prehistoric
ILI-00212	Rock Stack and Circle Site	A 1 meter diameter circle of cobbles with a very large cobble in the center. The rocks appear to be larger and rounder than the rocks in the surrounding area, which are fractured and heavily covered with black lichen. Nearby (50m) is a collapsed stack of similar stones.	Prehistoric
ILI-00214	Wiggly Lake Camp 2	This site consists of two rock features, a deposit of rifle cartridges of two different calibers, and some antler and bone pieces. The fire ring is a circle nearly a meter in diameter with a line of rocks bisecting the circle down the center. Some burned material was visible beneath the rocks. Nearby to the southeast was an area with numerous cartridges including .223, .338 and 7mm magnum rounds and a tent ring about 12 feet in diameter consisting of 5-8 cobbles resting on the surface of the tundra. Possible stakes made from antler and bone fragments are also nearby. [In 2012, SRB&A conducted subsurface testing at the site and did not locate any subsurface cultural material.]	Unknown
ILI-00215	Wiggly Lake Camp 3	The site consists of a ring of cobbles approx. 12' in diameter on the surface of the tundra. [SRB&A recorded this site in 2008 as a ring of cobbles that measured approximately 12 feet in diameter. When SRB&A revisited the site in 2012, the field crew mapped in the identified faunal remains, a hearth, and rifle cartridges and mapped these features using a Trimble GPS, and conducted multiple subsurface tests in the area. The field crew did not relocate the ring of cobbles. None of the subsurface tests in 2012 produced any cultural material.]	Unknown
ILI-00216	Wiggly Lake Camp 4	This site consists of a 20' diameter ring of large cobbles on a flat stretch of tundra. Nearby were [sic.] several sets of caribou antlers. Associated surface finds included some food wrappers, water and oil bottles, and stakes made from antler and bone.	Unknown

Table K3.7-1: Known AHRS Locations in the Mine Site Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00217	Wiggly Lake Camp 5	This site is a relatively large camp that includes a tent ring approximately 20 feet in diameter consisting of large cobbles. A plastic water container with bear bite marks, a kerosene can, a firewood stockpile and a stacked pile of caribou antlers were found below the esker on a flat area of tussock tundra. Nearby on the tussock flats a horseshoe pitch with horseshoes and rebar pins were::found. A few fire pits were on the flats toward the lake in tussock tundra. [SRB&A relocated the site in 2012 and mapped it with a Trimble GPS. Multiple subsurface tests were conducted, all of which were negative for cultural materials. However, personal communication with the makers of the horseshoes, Regent Sports Corporation, allowed SRB&A to determine that the set of horseshoes identified were made during the 1960s.]	Historic, Modern
ILI-00218	**Isolated Lithic Find**	**This site consisted of one possible microblade or blade core. The core was found on the surface of the tundra. No other lithics were found on the surface or in test pits excavated nearby.**	Prehistoric
ILI-00251	**ILI-00251**	**Site consists of two flakes of green silicified mudstone on an eroded blowout surface. One flake is blade-like. The location is an excellent hunting area as game trails run in the bottom of the canyon. The canyon below the site is the choke point for entry to the G Valley, which cuts through the mountain roughly NNE to SSW with a pass leading to the South Fork Koktuli from the North Fork Koktuli and broad areas of relatively shallow sloped well vegetated land in the valley. In 2013, archaeologists from Stephen R. Braund & Associates (SRB&A) returned to the site and conducted subsurface testing to identify additional cultural material and define the boundaries of the site. SRB&A excavated 17 shovel tests at regular intervals across the landform away from the terrace edge. None of the subsurface tests were positive.**	**Prehistoric**
ILI-00254	ILI-00254	ILI-00254 is a modern to historic winter fur trapping camp located in a cottonwood patch on the south side of Groundhog Mountain along a tributary of Upper Talarik Creek. The creek drains a lake higher up on the mountain which is located in a steep walled canyon. The site consists of two square flat areas that were leveled out to approximately the size of a 10x10 foot wall tent, with the downhill area cut into the root bed of a large cottonwood tree. The uphill area was leveled with less cutting into the soil. Near these tent footprints, cottonwood tree limbs were removed with an axe in the past while one tree in the patch had an axe cut blaze on it to indicate where the camp was. On the surface was a well rusted steel round gasoline can with a Chevron logo still visible where it lay. Local person indicated that the site probably belonged to either “Butchy” Hobson or one of the Koktelash family from Nondalton and was a winter fur hunting camp at least 30 years in age.	Historic
ILI-00260	ILI-00260	Site is on top of a moraine at the outlet of Frying Pan Lake and consists of 54 pieces of lithic debitage and a carbon sample from between 0 and 5 cm below surface in one subsurface test. Three other subsurface tests on the landform did not reveal additional cultural materials. The moraine is oriented E to W and is bounded by a draw on its N side, a creek valley on its S and the lake outlet which flows perpendicular to the moraine at its E end. The moraine slopes uphill to the W, culminating in a knoll before merging with the lower slope of Kaskanak Mountain. The position of the moraine and knoll with its view of Frying Pan Lake and the lake valley suggest the site was used as a hunting lookout. In 2013, archaeologists from SRB&A returned to ILI-00260 to conduct subsurface testing to better define the site boundaries. SRB&A excavated 12 shovel tests, none of which were positive for cultural material.	Prehistoric

Table K3.7-1: Known AHRS Locations in the Mine Site Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00269	PGCO4 2012-3	On the slope of a small ridge, this feature consists of a collection of cobbles. These cobbles are stacked in a semi-circular pattern with the opening facing down-slope to the N. The view shed is comprised of the valley with one of the Talarik's tributaries. The stones appear to have been settled for at least 20 years.	Unknown

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
m = meter(s)
cm = centimeter(s)
GPS = global positioning system
Source: SBR&A 2011a, 2015a; AHRS 2018

K3.7.2 Alternative 1 Transportation Corridor

The AHRS lists seven cultural resource locations in the Alternative 1 transportation corridor analysis area, defined as a 1-mile buffer around the Alternative 1 transportation corridor footprint, shown in Table K3.7-2. There are no reported AHRS resources in the transportation corridor footprint. It is expected that this list will grow through ongoing consultation and incorporation of data from additional investigations regarding cultural resources in the transportation corridor.

Table K3.7-2: Known AHRS Sites in the Alternative 1 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00008	Old Kakhonak, Kakonak, Kokhanok	Eskimo village, with a population of 28, listed in the 1890 census. The site was apparently abandoned as residents moved to the present village during the 1940-1950s. Yarborough, in two surveys, noted two or three graves, upright poles from an apparent cache, the remains of a 4m x 5m log cabin, a 2m x 1.1m x .6m deep depression, and a shallow 2m x 5m rectangular feature.	Historic
ILI-00044	Amakdedori Village	Village site consisting of five house pits of two rooms each, with connecting passages and five smaller square pits. All are located on the second and third vegetated beach ridges, which are being eroded by the creek. Testing of two house features by Reger (1980) identified historic artifacts and floor deposits dating to AD 1883-1912.	Prehistoric
ILI-00056	Gibraltar Lake Village	BIA investigators noted some 12-15 house pits within a 70m x 120m site area on the north bank of the outlet of Gibraltar Lake. The pits, which are poorly defined, appear to cluster on two adjacent mounds, separated by about 45m. A shovel test in the westernmost loci revealed cultural material (beneath the sod and a thin layer of Katmai Ash) consisting of burnt bone, charcoal, and fire cracked rock in a sandy silt matrix, to a depth of about 75cm. A single basalt flake was noted and a C14 date of BP 860+/-60 was obtained.	Prehistoric
ILI-00218	Isolated Lithic Find	This site consisted of one possible microblade or blade core. The core was found on the surface of the tundra. No other lithics were found on the surface or in test pits excavated nearby.	Prehistoric, Protohistoric

Table K3.7-2: Known AHRS Sites in the Alternative 1 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00241	ILI-00241	Site is a prominent knoll with bedrock outcroppings with veins of quartz and chalcedony. This site is smaller than the similar site ILI-00240, with two outcrop mounds surrounded by an area of bare bedrock. The knoll is surrounded by a litter of quartz fragments including clear, milky, and fractured pieces. This distribution of material may indicate that the site had been used by prehistoric toolmakers, with the fragments examined and the unusable ones discarded.	Unknown
ILI-00261	ILI-00261	Site is on a glacial ridge. The ground surface is up to 50 percent exposed till and gravel. The cultural materials at the site consists of one piece of lithic debitage observed on the surface among the gravel. Two subsurface tests conducted on the ridge did not result in the identification of a subsurface component at the site.	Prehistoric
ILI-00269	PGCO4 2012-3	On the slope of a small ridge, this feature consists of a collection of cobbles. These cobbles are stacked in a semi-circular pattern with the opening facing down-slope to the N. The view shed is comprised of the valley with one of the Talarik's tributaries. The stones appear to have been settled for at least 20 years.	Unknown

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
BIA = Bureau of Indian Affairs
cm = centimeter
m = meter(s)
Source: AHRS 2018

K3.7.2.1 Alternative 1 - Kokhanok East Ferry Terminal Variant

There are nine AHRS locations in the Alternative 1 transportation corridor analysis area under the Kokhanok East Ferry Terminal Variant. Two AHRS locations listed in Table K3.7-2, ILI-00008 and ILI-00056, are not in the Alternative 1 transportation corridor analysis area in the Kokhanok East Ferry Terminal Variant. There are four additional AHRS locations in the Alternative 1 transportation corridor analysis area under the Kokhanok East Ferry Terminal Variant not included in Table K3.7-2 above. Those locations are described in Table K3.7-3, below.

Table K3.7-3: Additional Known AHRS Sites in the Alternative 1 Kokhanok East Ferry Terminal Variant Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00025	Saint Peter and Paul Chapel, Kakhonak	Russian Orthodox church built about 1940. Consists of a 25'-6" x 15' nave and sanctuary and an attached 8'-1" x 9'-2" vestibule. The exterior is shingle and corrugated metal. A 2011 survey by THRC stated that the condition of the church was "dilapidated" and a new church has been built (1984) to the SE. [NATREG] Russian Orthodox Church built about 1940. Consists of a 25'6"x 15' nave and sanctuary and an attached 8'1"x 9'2" vestibule. The exterior is shingle and corrugated metal.	Historic
ILI-00126	Henry Olympic Allotment Cemetery on Kakhonak Bay	Site consists of a small cemetery containing three graves, all marked with Russian Orthodox crosses. One of the coffins was eroding out of the ground. No other archaeological remains were located on the property.	Historic

Table K3.7-3: Additional Known AHRS Sites in the Alternative 1 Kokhanok East Ferry Terminal Variant Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00127	Pottery and Stone Beads Eroding Out	No description.	No data
ILI-00262	Kokhanok Bia School	The building is currently a single-story frame building measuring 68ft x 18ft in plan, a ridgeline at 11ft and a very low-slope roof, with a satellite dish abutting the W facade. Built ca. 1957 the Kokhanok BIA building served as a school from the late 1950s into at least the 1980s. The building contains basic attributes found in some period BIA schools in Alaska, but has undergone substantial alterations since 1973. Comparison of the 1973 building with the current makes evident an addition built on to the original N end as well as the removal of some of the original fenestration and removal of the original siding. The building currently houses administrative offices.	Historic

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
BIA = Bureau of Indian Affairs
cm = centimeter
ft = feet
THRC = Territory Heritage Resource Consulting
Source: AHRS 2018

K3.7.3 Amakdedori Port

Recent work completed by HDR (2018-RFI 025) archaeologists on behalf of Pebble Limited Partnership (PLP) resulted in the identification of one new archaeological site in the Amakdedori port facility boundaries (HDR-AMK-01). The Global Positioning System (GPS) locational data for the Amakdedori Village (ILI-00044) was also corrected, but still falls outside of the port facility footprint. One other site, ILI-00291, is the Agram shipwreck, and in the analysis area, but outside the boundaries of the offshore development. Table K3.7-4 shows known AHRS sites in the Amakdedori port analysis area, and no sites are in the project footprint.

Table K3.7-4: Known AHRS Locations in the Amakdedori Port Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00044	Amakdedori Village	Village site consisting of five house pits of two rooms each, with connecting passages and five smaller square pits. All are located on the second and third vegetated beach ridges, which are being eroded by the creek. Testing of two house features by Reger (1980) identified historic artifacts and floor deposits dating to AD 1883-1912.	Prehistoric
ILI-00291	Agram Shipwreck	On October 12, 1923 at 8:45 am the wooden gas screw cannery tender Agram was washed ashore and became a total wreck on a beach between Chinik Bay and Amakdedori Native Village. […] According to Doug Reger, who surveyed this stretch of the coast in 1980, no shipwreck remains were visible beyond the large amount of debris on Amakdedori beach, which is known for drift debris. The ship's remains may still be present below the waterline, although the high energy environment has likely compromised the wreck's structural integrity. References: U S Customs Wreck Report; The H W McCurdy Marine History of the Pacific Northwest (1966), p. 344; "Wrecked tars live on weird edibles" The Helena Daily Independent, November 24, 1923, p.2.	Historic

Table K3.7-4: Known AHRS Locations in the Amakdedori Port Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00295	ILI-00295	HDR-AMK-01 is a prehistoric lithic scatter located approximately 160 meters west of the shoreline of Cook Inlet. The site consists of two secondary flakes 60 meters apart, in an area of eroded dune formations. Artifact 1 is a white to opaque cryptocrystalline silicate (CCS) secondary flake measuring 3.4 centimeters (cm) long by 3.3 cm wide, and 0.7 cm thick. Artifact 2 is also a secondary flake, is composed of light brown fine grained volcanic rock, and is located 60 meters northeast of Artifact. Artifact 2 measures 6.0 cm long by 4.8 cm wide, and 0.4 cm thick […]. Both artifacts were left in their originally identified locations.	Prehistoric, Protohistoric

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
Source: AHRS 2018

K3.7.4 Alternative 1 Natural Gas Pipeline

All of the AHRS locations listed for the Alternative 1 transportation corridor and Amakdedori port also fall within the natural gas pipeline corridor. There are three additional AHRS locations that fall within the natural gas pipeline corridor on the Kenai Peninsula in the 1-mile buffer zone around the compressor station as shown in Table K3.7-5. One of the sites intersects the project footprint and is in bold in the table below.

Table K3.7-5: Known AHRS Locations in the Alternative 1 Natural Gas Pipeline Analysis Area

AHRS No.	Site Name	Summarized Description	Period
SEL-00164	Clabo Midden Site	This site consists of blue mussel shell midden with charcoal, some bone, and massive stone mauls. The midden is in the Clabo garden. No surface features were seen and no testing was done. The site area would have been covered with Sitka Spruce before clearing.	Prehistoric
SEL-00368	Whiskey Gulch Site 1	During a survey of a high probability zone near Whiskey Gulch a total of five shovel tests were carried out in a localized undisturbed area within a gently-sloping landform on a coastal bluff. One shovel test was positive revealing possible flaked stone artifacts at a depth of approx. 63cm BS. This included a bipolar flake (with a crushed distal platform) and a possible core fragment.	Prehistoric
SEL-00379	**Sterling Highway**	**The Sterling Highway is approximately 138 miles long and runs from the Seward Highway to the end of the Homer Spit. The highway is owned by the Alaska DOT&PF and is located within the Kenai Peninsula Borough. From the eastern terminus at Mile 36.495 on the Seward Highway, the Sterling Highway runs west through a portion of the Chugach National Forest and continues through the community of Sterling and the city of Soldotna, where it provides access to the Kenai Spur Highway leading to Kenai and Nikiski. The Sterling Highway then runs south, approximately parallel to the western coastline of the peninsula and the Cook Inlet, providing access to Kasilof and passing through the communities of Ninilchik and Anchor Point before terminating in Homer at the ferry terminal located at the end of a 5-mile sand spit. Construction began in 1947 and the highway was formally opened to the public in 1950. (A portion of the Sterling Highway designated as Interstate Highway System is under the Interstate Exemption [2005] and is exempt from Section 106 Review.)**	**Historic**

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
Source: AHRS 2018

K3.7.5 Alternative 2 Transportation Corridor

A preliminary review of the AHRS data indicate that there are 21 AHRS locations in the Alternative 2 transportation corridor analysis area, defined as a 1-mile buffer around the transportation corridor footprint, and two of those sites are within the transportation corridor footprint. Table K3.7-6 shows known AHRS locations in the transportation corridor analysis area those in the footprint are in **bold**.

Table K3.7-6: Known AHRS Locations in the Alternative 2 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00021	Lonesome Bay Village	Former Native village in an estimated 5 acre clearing.	Prehistoric
ILI-00010	Old Iliamna	Eskimo village reported by Petroff as "Ilyamna" in the 1880 Census; about 1935 the residents moved to a new location. Teben'kov (1852) noted an "Odinochka" at this location. It has been reported that the site consists of a church, burial ground, and 20-30 house remains; and that the last Native residents moved to Pile Bay in 1936.	Historic
ILI-00019	Zip Creek	Three house depressions, one of which was a double house. On a grassy hill slope on the west shore of the creek. Area is about 50 yards x 50 yards. Two other grassy areas of this hill may have sites also, possibly fish camps.	Prehistoric
ILI-00032	**Knutson Bay**	**Townsend reported that four to five houses were located at the head of Knutson Bay, within a quarter of a mile of each other. Three of them are on the trail behind the house of Mr. Fred Blayden. Three of the houses in the area were single room surface dwellings, measuring 20' x 20'. The other two are double room, semi-subterranean structures; the larger room measures 20' x 20', the smaller room measures 10' x 10'.**	**Historic**
ILI-00043	Iliamna Mission, Iliamna Village	Abandoned site of a Russian Orthodox church identified on USS No. 893 (1908). Villagers moved to Pedro Bay 1940-1941.	Historic
ILI-00057	Hanak Site	BIA investigators noted one or two house pits and several small cache pits on the northwestern shore of this large lake. Three 50cm x 50cm subsurface tests, excavated to a depth of 5-60 cm, revealed only a possible organic staining about 15 cm below the surface. The site apparently postdates the 1912 Katmai Ash.	Historic
ILI-00131	Iliamna River Bridge	Built around 1934, this bridge originally spanned Eagle River, north of Anchorage. It was relocated in 1946 to its present location on the Williamsport to Pile Bay Road. The bridge is a Stratton standard riveted steel through truss, with timber decking plank. The bridge measures 180' long by 12' wide. It is enclosed by steel girders with an opening 11'8" high by 12' wide. Most recent bridge repairs were done in 1997. A temporary bridge was built alongside the original in 2003.	Historic

Table K3.7-6: Known AHRS Locations in the Alternative 2 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00132	**Williamsport to Pile Bay Road**	**The Williamsport to Pile Bay Road is a 1 lane, 15.5 mi. seasonal road that provided the shortest surface route for six communities around Iliamna Lake. The road follows a traditional Den'aina Athabascan trail portage over the Chigmit Mountains and was originally built in the 1930's by the Alaska Road Commission. By 1932, the road supported small truck traffic. With the installment of the Iliamna River Bridge in 1946, the portage terminus changed from the Iliamna River at Foss's Landing to Pile Bay at Lake Iliamna. Lyle and Carl Williams subsequently began a truck freighting business, with Lyle at Pile Bay and Carl at Williamsport. The road expansion combined with the Williams' freighting operations provided an opportunity that allowed boats direct overland access to Lake Iliamna and Bristol Bay. Carl took the first Bristol Bay fishing boat over the Portage around 1938. [DOE] The road follows a traditional Dena'ina Athabaskan trail portage over the Chigmit Mountains. Near the summit the dirt road is less than 11' wide with a 750' drop. Improvements began in 1917 to the trail. In 1937 the W terminus of the road was rerouted to Pile Bay. The road is now one lane, 15.5 miles long, used seasonally.** **[Note: National Register Eligible]**	**Historic**
ILI-00135	ILI-00135	The site consists of a single large cache pit on a prominent bluff immediately E of a stream. The stream supports a large spawning population of sockeyes. The cache pit is roughly square, 3.5m x 3.5m and 1.25m in depth. Tests conducted inside and adjacent to the pit were all negative. The pit contained approx. 5 cm of Katmai Ash, so its excavation predates 1912. The ash appears to have been compressed so it is possible that the pit was also in use after 1912. [DOE] Site is a large square depression. It has a depth of approx. 1.25 m and a width of 3.5 m. Single test inside pit revealed approx. 5 cm of Katmai ash beginning at a depth of 10cm below ground surface and excavated to a depth of 50cm with no cultural material recovered.	Prehistoric, Historic

Table K3.7-6: Known AHRS Locations in the Alternative 2 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00197	O'Hara House	This rectangular, front-gabled home is 1-, or perhaps 1 1/2 stories (photos show an upper story, or loft, within the roof), built in the early 1950s. It was built from lumber milled locally by Carl Williams, as well as from lumber collected from a house that had been demolished in the late 1940s or early 1950s. The earlier residence was built in the early 1940s by Lyle Williams, just N of where the O'Hara house is now. A depression and some scattered debris (bottles, cans) are the only remnants on the property. Although there are no dimensions given on the BIA site inventory record, the provided photos show the O'Hara house to be approximately 20' x 24'. The exterior is sided with green, mineral surfaced roll roofing over 1x6 shiplap. A door is in both the north and S elevations. A window is next to the door in the S elevation, though not in the N elevation, though there is a window in both N and S gable ends. The E and W elevations both have 2 windows. All windows seem to be 3 over 3 sash. In 2007 the native allotment was scheduled to be sold and the building possibly demolished. [DOE] This is a rectangular, wood frame, one and a half story building that measures 23'x 17'2", with 4"x 6" timbers laid directly on grade. The exterior walls are horizontal 1"x 6.5"-8" planking butted together with sawdust insulation and cellotex on the interior walls. On the E, S and W exterior walls rolled roofing material covers the lumber. The gable roof is covered with rolled roofing material. Roof rafters are spaced 24" on center and range in size from 1.5"-2" wide x 6" deep. The chamfered ends overhang 16" on the E and W elevation. On the S elevation there is a door and two fixed six paned windows, one to the left of the door and the other in the gable peak. A on grade plank platform measuring 6'6"x 5' is in front of the door. A frame dog house with wood shingle roof is attached to the SW corner of the house. In both the E and W elevation are two fixed six pane windows. The N elevation has a door and a window in the gable end and the remains of a shed roofed covered entry.	Historic
ILI-00198	Pile Bay Townsite Historic District	N/A	Historic
ILI-00199	Antenna	The site consists of a 4" diameter iron pipe erected by Carl Williams and used as the base of his HF radio antenna. The antenna wire originally strung between pipes is no longer present. In 2007 the pipe was erect and well supported by tight guy wires.	Historic
ILI-00200	Powerplant	Power plant built by Jack Vantrease in the early 1950s. In 2007 it was located adjacent to the Vantrease warehouse/store but was originally erected across the portage road from Seversen's warehouse. It was skidded to the present location circa 1957 and used to provide electricity to the Vantrease buildings. The structure is a frame building covered with corrugated metal sheets. It measures 8' x 16.5' and rests on large wood beams laid on grade. The rear wall is hinged, it opens and swings down to form a ramp.	Historic

Table K3.7-6: Known AHRS Locations in the Alternative 2 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00211		Referencing USS 7804, the BIA crew located a 6.71m x 4.57m depression on an E-W axis. The maximum depth of the depression is approx. 1.8 m. The berms are well defined and overgrown with grasses, moss and shrubs. Four well developed trees are present within the depression. On the E side of the depression, two 55-gal drums are 3/4 buried and upon inspection, hints of a possible entrance way to the cabin. Debris is scattered around the premises. Tin can, plastic shelving, and fuel cans were identified. Remnants of a prefabricated aluminum storage building/shed measuring 2.44m x 3.05m were adjacent to the depression on the N side. The underlying organic mat of sod was removed before the shed was place on the surface. Two wall are intact but failing. The interior contained failed roof panels and cut wood.	Historic
ILI-00218	Isolated Lithic Find	This site consisted of one possible microblade or blade core. The core was found on the surface of the tundra. No other lithics were found on the surface or in test pits excavated nearby.	Prehistoric, Protohistoric
ILI-00226	ILI-00226	Site consists of lithic debitage recovered from a subsurface context. Two shovel tests yielded 13 flakes, cultural material was 0-20cm below surface. SRB&A has begun processing a bulk hearth sample collected from the 2009 testing. Processing of the bulk sample has yielded small bone fragments, one flake, and burned botanical remains.	Prehistoric
ILI-00241	ILI-00241	Site is a prominent knoll with bedrock outcroppings with veins of quartz and chalcedony. This site is smaller than the similar site ILI-00240, with two outcrop mounds surrounded by an area of bare bedrock. The knoll is surrounded by a litter of quartz fragments including clear, milky, and fractured pieces. This distribution of material may indicate that the site had been used by prehistoric toolmakers, with the fragments examined and the unusable ones discarded.	Unknown
ILI-00244	ARC Camp	ARC CAMP ADJACENT TO WILLIAMSPORT-PILE BAY ROAD	Historic
ILI-00247	Williamsport Historical Occupation/Land Use Area	Cultural remains located at Williamsport on the Williams family property include the former cement foundation of Carl Williams' home. A modern cabin has been built on the 1940s cement foundation, although three sides of the foundation are still visible. The original foundation is estimated to have been about 20 ft X 20 ft. Also present are the remains of the log cabin lived in by Ed McCammet and later by the Williams family. It is possible that this log cabin was once the ARC cabin at Williamsport, given that Ed McCammet was reported to have lived in the ARC cabin. The cabin has collapsed and the remaining timbers are largely embedded in river sediments and gravels and in poor condition. A gravesite is also present. The property currently contains gravel roadpads, numerous storage and staging areas, and a standing building.	Historic
ILI-00261	ILI-00261	Site is on a glacial ridge. The ground surface is up to 50 percent exposed till and gravel. The cultural materials at the site consists of one piece of lithic debitage observed on the surface among the gravel. Two subsurface tests conducted on the ridge did not result in the identification of a subsurface component at the site.	Prehistoric

Table K3.7-6: Known AHRS Locations in the Alternative 2 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00269	PGCO4 2012-3	On the slope of a small ridge, this feature consists of a collection of cobbles. These cobbles are stacked in a semi-circular pattern with the opening facing down-slope to the N. The view shed is comprised of the valley with one of the Talarik's tributaries. The stones appear to have been settling into the ground for at least 20 years.	Unknown

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
BIA = Bureau of Indian Affairs
cm = centimeters
ft = feet
gal = gallon(s)
HF = hi-fi (high fidelity)
m = meter(s)
mi = miles
Source: AHRS 2018

K3.7.6 Alternative 2 Natural Gas Pipeline

There are 20 AHRS locations in the Alternative 2 analysis area for the natural gas pipeline corridor. The AHRS locations within the pipeline facility footprint are indicated in Table K3.7-7 below in **bold**.

Table K3.7-7: Known AHRS Sites in the Alternative 2 Natural Gas Pipeline Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00005	Dutton	Mining camp named for G.W. Dutton who was its first postmaster in 1905. The post office was discontinued in 1909. A 1 1/2-story, gable roofed, wood frame structure (possibly the post office/residence) was still standing in August 1988. Some structural damage had occurred to one wall, but the wood throughout the rest of the structure appeared to be with little or no rot.	Historic
ILI-00021	Lonesome Bay Village	Former Native village in an estimated 5 acre clearing.	Prehistoric
ILI-00022	St Nicholas Chapel, Pedro Bay	This 1890 chapel is one of the few to retain its excellent original lines with no obvious alterations. Of hewn-log construction, the main portion forms a 15' square with an adjunct that forms the altar end being in the form of a truncated (five-sided) octagon. There is a gable roof over the square portion and a modified hip roof over the octagonal space. There is a shed vestibule. The roof is shingled and has two crosses. [NATREG] St Nicholas Chapel in the village of Pedro Bay at the eastern end of Lake Iliamna on the Alaska Peninsula was built in 1890. The rectangular building consists of a 15' square nave with a gable roof and a five-sided octagonal altar area with a hip roof. There is a small shed roof vestibule at the W of the structure. The log structure is covered with tar paper on the S side. The shingled roof houses two unadorned crosses, the larger one at the center of the roof and the lesser one at the W end of the ridge line.	Historic
ILI-00026	ILI-00026	Two slightly semi-subterranean houses in the trees. Although not tested, the houses are believed to be slightly later than those at ILI-001 and ILI-003.	Historic

Table K3.7-7: Known AHRS Sites in the Alternative 2 Natural Gas Pipeline Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00027	White Rock Site	Three large, single room, slightly semi-subterranean house on a ridge above a dry marsh. One house was partially excavated by Townsend in 1969. The site apparently equates in time with ILI-003. Yarborough noted that the site consists of two house pits and six cache pits on a south sloping ridge between two small streams. Both of the house pits have only a single room and only the smaller has an obvious entry way. The larger depression, the southern third of which Townsend excavated, measures 7.4m x 6.5m x .6-.7m deep (two possible entryways were later noted in its west wall). The other, smaller and shallower, depression measures 4.3m x 3.5m, with a 1.1m wide entry. Five of the six cache pits are rectangular to almost square, while the sixth is nearly round. They range in size from 1.35m x .9m to 3.2m x 3m and are .45-1m deep. The largest may be the feature that Townsend counted as a house pit.	Historic
ILI-00043	Iliamna Mission, Iliamna Village	Abandoned site of a Russian Orthodox church identified on USS No. 893 (1908). Villagers moved to Pedro Bay 1940-1941.	Historic
SEL-00164	Clabo Midden Site	This site consists of blue mussel shell midden with charcoal, some bone, and massive stone mauls. The midden is in the Clabo garden. No surface features were seen and no testing was done. The site area would have been covered with Sitka Spruce before clearing.	Prehistoric
ILI-00047	ILI-00047	Yarborough located six cache pits on the west shore of a salmon spawning pond, just south of the road right-of-way. The pits are oval to rectangular in shape, and measure from .9m x .8m x .5m deep to 2.1m x 1.8m x 1m deep.	Prehistoric
ILI-00048	ILI-00048	Yarborough located a total of three house pits and five cache pits within the originally proposed road right-of-way, 320' southwest of runway station 11+13. The houses measured 3.9m x 3.7m x .5-1.1m deep, 3.2m x 2m x .4m deep, and 2.9m x 2.6m x .4-.6m deep. The cache pits measured from 2.4m x 2m x .55-.6m deep to .83m x .55m x.55-.8m deep.	Prehistoric
ILI-00049	ILI-00049	Yarborough located four large multi-room house pits and five cache pits surrounded by a fairly thick growth of black spruce and alders. House 1 has a 7m x 5m main room, a 3.5m x 3m room off its east wall, and an entry way in its west wall. House 2 has a 9 m x 7 m main room, a 3 m x 2 m room to the east, and a 4 m x 3 m room at its northwest corner. House 3 has a 7m x 6m main room, a 3m x 4m room off its southwest wall, and an entry way in its northwest wall. House 4 has a 7m x 6m main room, a 3.5m x 3m room off its west wall, and an entry way in the east wall. Two small round cache pits are adjacent to House 2; three larger rectangular cache pits were noted adjacent to House 3, adjacent to House 2, and between House 1 and House 2. A test in the center of House 1 revealed an approx. 20cm thick layer of charcoal and fire cracked rock, with some animal bone, under 9cm of humus and 4cm of ash. [DOE] Site ILI-049 consists of four large, multi-roomed house pits and several smaller cache pits.	Prehistoric
ILI-00050	ILI-00050	Yarborough located a single house pit and two possible cache pits within the right-of-way of the proposed runway. The house measured about 4m x 4m x 1m deep. The feature is within what appeared to be an old stream channel. Although two tests failed to yield cultural material, Yarborough was confident that this was a house pit, as the walls are almost vertical and the depression is deeper than the rest of the channel.	Prehistoric

Table K3.7-7: Known AHRS Sites in the Alternative 2 Natural Gas Pipeline Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00135	ILI-00135	The site consists of a single large cache pit on a prominent bluff immediately E of a stream. The stream supports a large spawning population of sockeyes. The cache pit is roughly square, 3.5m x 3.5m and 1.25m in depth. Tests conducted inside and adjacent to the pit were all negative. The pit contained approx. of Katmai Ash, so its excavation predates 1912. The ash appears to have been compressed so it is possible that the pit was also in use after 1912. [DOE] Site is a large square depression. It has a depth of approx. 1.25 m and a width of 3.5 m. Single test inside pit revealed approx. of Katmai ash beginning at a depth of 10cm below ground surface and excavated to a depth of 50cm with no cultural material recovered.	Prehistoric, Historic
ILI-00218	Isolated Lithic Find	This site consisted of one possible microblade or blade core. The core was found on the surface of the tundra. No other lithics were found on the surface or in test pits excavated nearby.	Prehistoric, Protohistoric
SEL-00368	Whiskey Gulch Site 1	During a survey of a high probability zone near Whiskey Gulch a total of five shovel tests were carried out in a localized undisturbed area within a gently-sloping landform on a coastal bluff. One shovel test was positive revealing possible flaked stone artifacts at a depth of approx. 63cm BS. This included a bipolar flake (with a crushed distal platform) and a possible core fragment.	Prehistoric
ILI-00293	ILI-00293	"Fire ring" exposed by private landowner during original clearing for garden, reported to have been under "several feet of soil". Current landowner reported that the area was protected and now supports a re-vegetated stand of spruce trees on the S side of the existing garden area (which at the time of reporting had been present for 20+ years). Additional clearing in the area did not expose further material. [Reported in 2015 through NRCS consultation for a high tunnel that would cover the garden area.]	No data
ILI-00131	Iliamna River Bridge	Built around 1934, this bridge originally spanned Eagle River, north of Anchorage. It was relocated in 1946 to its present location on the Williamsport to Pile Bay Road. The bridge is a Stratton standard riveted steel through truss, with timber decking plank. The bridge measures 180' long by 12' wide. It is enclosed by steel girders with an opening 11'8" high by 12' wide. Most recent bridge repairs were done in 1997. A temporary bridge was built alongside the original in 2003.	Historic

Table K3.7-7: Known AHRS Sites in the Alternative 2 Natural Gas Pipeline Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00132	**Williamsport to Pile Bay Road**	**The Williamsport to Pile Bay Road is a 1 lane, 15.5mi. seasonal road that provided the shortest surface route for six communities around Iliamna Lake. The road follows a traditional Den'aina Athabascan trail portage over the Chigmit Mountains and was originally built in the 1930s by the Alaska Road Commission. By 1932, the road supported small truck traffic. With the installment of the Iliamna River Bridge in 1946, the portage terminus changed from the Iliamna River at Foss's Landing to Pile Bay at Lake Iliamna. Lyle and Carl Williams subsequently began a truck freighting business, with Lyle at Pile Bay and Carl at Williamsport. The road expansion combined with the Williams' freighting operations provided an opportunity that allowed boats direct overland access to Lake Iliamna and Bristol Bay. Carl took the first Bristol Bay fishing boat over the Portage around 1938. Near the summit the dirt road is less than 11' wide with a 750' drop. Improvements began in 1917 to the trail. In 1937 the W terminus of the road was rerouted to Pile Bay.** **[Note: National Register Eligible]**	
SEL-00379	**Sterling Highway**	**The Sterling Highway is approximately 138 miles long and runs from the Seward Highway to the end of the Homer Spit. The highway is owned by the Alaska DOT&PF and is located within the Kenai Peninsula Borough. From the eastern terminus at Mile 36.495 on the Seward Highway, the Sterling Highway runs west through a portion of the Chugach National Forest and continues through the community of Sterling and the city of Soldotna, where it provides access to the Kenai Spur Highway leading to Kenai and Nikiski. The Sterling Highway then runs south, approximately parallel to the western coastline of the peninsula and the Cook Inlet, providing access to Kasilof and passing through the communities of Ninilchik and Anchor Point before terminating in Homer at the ferry terminal located at the end of a 5-mile sand spit. Construction began in 1947 and the highway was formally opened to the public in 1950. (A portion of the Sterling Highway designated as Interstate Highway System is under the Interstate Exemption [2005] and is exempt from Section 106 Review.)**	
ILI-00006	Chekok	Eskimo village, now abandoned, listed in the 1880 census as "Chikak," with a population of 51. Townsend saw three house pits, two of which were surface and one which was semi-subterranean, in 1960.	Historic
ILI-00032	ILI-00032	Townsend reported that four to five houses were located at the head of Knutson Bay, within a quarter of a mile of each other. Three of them are on the trail behind the house of Mr. Fred Blayden. Three of the houses in the area were single room surface dwellings, measuring 20' x 20'. The other two are double room, semi-subterranean structures; the larger room measures 20' x 20', the smaller room measures 10' x 10'.	

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
cm = centimeter
m = meter(s)
mi = mile(s)
DOE = Department of Energy
Source: AHRS 2018

K3.7.7 Alternative 3 Transportation Corridor

The AHRS locations in the Alternative 3 transportation corridor are the combined total of the Alternative 2 transportation corridor and natural gas pipeline analysis areas (Table K3.7-8). However, because there are no ferry terminals for Alternative 3, AHRS sites in those analysis areas are not included in the Alternative 3 transportation corridor for a total of 22 AHRS locations in the Alternative 3 transportation corridor. One site is in the footprint and shown in **bold**.

Table K3.7-8: Known AHRS Sites in the Alternative 3 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00006	Chekok	Eskimo village, now abandoned, listed in the 1880 census as "Chikak," with a population of 51. Townsend saw three house pits, two of which were surface and one which was semi-subterranean, in 1960.	Historic
ILI-00021	Lonesome Bay Village	Former Native village in an estimated 5 acre clearing.	Prehistoric
ILI-00022	St Nicholas Chapel, Pedro Bay	This 1890 chapel is one of the few to retain its excellent original lines with no obvious alterations. Of hewn-log construction, the main portion forms a 15' square with an adjunct that forms the altar end being in the form of a truncated (five-sided) octagon. There is a gable roof over the square portion and a modified hip roof over the octagonal space. There is a shed vestibule. The roof is shingled and has two crosses. [NATREG] St Nicholas Chapel in the village of Pedro Bay at the eastern end of Lake Iliamna on the Alaska Peninsula was built in 1890. The rectangular building consists of a 15' square nave with a gable roof and a five-sided octagonal altar area with a hip roof. There is a small shed roof vestibule at the W of the structure. The log structure is covered with tar paper on the S side. The shingled roof houses two unadorned crosses, the larger one at the center of the roof and the lesser one at the W end of the ridge line. [Note: Listed on the National Register 1980]	Historic
ILI-00032	ILI-00032	Townsend reported that four to five houses were located at the head of Knutson Bay, within a quarter of a mile of each other. Three of them are on the trail behind the house of Mr. Fred Blayden. Three of the houses in the area were single room surface dwellings, measuring 20' x 20'. The other two are double room, semi-subterranean structures; the larger room measures 20' x 20', the smaller room measures 10' x 10'.	Historic
ILI-00043	Iliamna Mission, Iliamna Village	Abandoned site of a Russian Orthodox church identified on USS No. 893 (1908). Villagers moved to Pedro Bay 1940-1941.	Historic
ILI-00026	ILI-00026	Two slightly semi-subterranean houses in the trees. Although not tested, the houses are believed to be slightly later than those at ILI-001 and ILI-003.	Historic

Table K3.7-8: Known AHRS Sites in the Alternative 3 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00027	White Rock Site	Three large, single room, slightly semi-subterranean house on a ridge above a dry marsh. One house was partially excavated by Townsend in 1969. The site apparently equates in time with ILI-003. Yarborough noted that the site consists of two house pits and six cache pits on a south sloping ridge between two small streams. Both of the house pits have only a single room and only the smaller has an obvious entry way. The larger depression, the southern third of which Townsend excavated, measures 7.4m x 6.5m x .6-.7m deep (two possible entryways were later noted in its west wall). The other, smaller and shallower, depression measures 4.3m x 3.5m, with a 1.1m wide entry. Five of the six cache pits are rectangular to almost square, while the sixth is nearly round. They range in size from 1.35m x .9m to 3.2m x 3m and are .45-1m deep. The largest may be the feature that Townsend counted as a house pit.	Historic
ILI-00047	ILI-00047	Yarborough located six cache pits on the west shore of a salmon spawning pond, just south of the road right-of-way. The pits are oval to rectangular in shape, and measure from .9m x .8m x .5m deep to 2.1m x 1.8m x 1m deep.	Prehistoric
ILI-00048	ILI-00048	Yarborough located a total of three house pits and five cache pits within the originally proposed road right-of-way, 320' southwest of runway station 11+13. The houses measured 3.9m x 3.7m x .5-1.1m deep, 3.2m x 2m x .4m deep, and 2.9m x 2.6m x .4-.6m	Prehistoric
ILI-00049	ILI-00049	Yarborough located four large multi-room house pits and five cache pits surrounded by a fairly thick growth of black spruce and alders. House 1 has a 7m x 5m main room, a 3.5m x 3m room off its east wall, and an entry way in its west wall. House 2 has a 9m x 7m main room, a 3m x 2m room to the east, and a 4m x 3m room at its northwest corner. House 3 has a 7m x 6m main room, a 3m x 4m room off its southwest wall, and an entry way in its northwest wall. House 4 has a 7m x 6m main room, a 3.5m x 3m room off its west wall, and an entry way in the east wall. Two small round cache pits are adjacent to House 2; three larger rectangular cache pits were noted adjacent to House 3, adjacent to House 2, and between House 1 and House 2. A test in the center of House 1 revealed an approx. 20cm thick layer of charcoal and fire cracked rock, with some animal bone, under 9cm of humus and 4cm of ash. [DOE] Site ILI-049 consists of four large, multi-roomed house pits and several smaller cache pits.	Prehistoric
ILI-00050	ILI-00050	Yarborough located a single house pit and two possible cache pits within the right-of-way of the proposed runway. The house measured about 4m x 4m x 1m deep. The feature is within what appeared to be an old stream channel. Although two tests failed to yield cultural material, Yarborough was confident that this was a house pit, as the walls are almost vertical and the depression is deeper than the rest of the channel.	Prehistoric
ILI-00131	Iliamna River Bridge	Built around 1934, this bridge originally spanned Eagle River, north of Anchorage. It was relocated in 1946 to its present location on the Williamsport to Pile Bay Road. The bridge is a Stratton standard riveted steel through truss, with timber decking plank. The bridge measures 180' long by 12' wide. It is enclosed by steel girders with an opening 11'8" high by 12' wide. Most recent bridge repairs were done in 1997. A temporary bridge was built alongside the original in 2003 (Note: National Register Eligible)	Historic

Table K3.7-8: Known AHRS Sites in the Alternative 3 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00132	**Williamsport to Pile Bay Road**	**The Williamsport to Pile Bay Road is a 1 lane, 15.5mi. seasonal road that provided the shortest surface route for six communities around Iliamna Lake. The road follows a traditional Den'aina Athabascan trail portage over the Chigmit Mountains and was originally built in the 1930s by the Alaska Road Commission. By 1932, the road supported small truck traffic. With the installment of the Iliamna River Bridge in 1946, the portage terminus changed from the Iliamna River at Foss's Landing to Pile Bay at Lake Iliamna. Lyle and Carl Williams subsequently began a truck freighting business, with Lyle at Pile Bay and Carl at Williamsport. The road expansion combined with the Williams' freighting operations provided an opportunity that allowed boats direct overland access to Lake Iliamna and Bristol Bay. Carl took the first Bristol Bay fishing boat over the Portage around 1938. Near the summit the dirt road is less than 11' wide with a 750' drop. Improvements began in 1917 to the trail. In 1937 the W terminus of the road was rerouted to Pile Bay** **[Note: National Register Eligible]**	**Historic**
ILI-00135	ILI-00135	The site consists of a single large cache pit on a prominent bluff immediately E of a stream. The stream supports a large spawning population of sockeyes. The cache pit is roughly square, 3.5m x 3.5m and 1.25m in depth. Tests conducted inside and adjacent to the pit were all negative. The pit contained approx. of Katmai Ash, so its excavation predates 1912. The ash appears to have been compressed so it is possible that the pit was also in use after 1912. [DOE] Site is a large square depression. It has a depth of approx. 1.25 m and a width of 3.5 m. Single test inside pit revealed approx. of Katmai ash beginning at a depth of 10cm below ground surface and excavated to a depth of 50cm with no cultural material recovered	Prehistoric, Historic
ILI-00218	Isolated Lithic Find	This site consisted of one possible microblade or blade core. The core was found on the surface of the tundra. No other lithics were found on the surface or in test pits excavated nearby.	Prehistoric, Protohistoric
ILI-00226	ILI-00226	Site consists of lithic debitage recovered from a subsurface context. Two shovel tests yielded 13 flakes, cultural material was 0-20cm below surface. SRB&A has begun processing a bulk hearth sample collected from the 2009 testing. Processing of the bulk sample has yielded small bone fragments, one flake, and burned botanical remains.	Prehistoric
ILI-00241	ILI-00241	Site is a prominent knoll with bedrock outcroppings with veins of quartz and chalcedony. This site is smaller than the similar site ILI-00240, with two outcrop mounds surrounded by an area of bare bedrock. The knoll is surrounded by a litter of quartz fragments including clear, milky, and fractured pieces. This distribution of material may indicate that the site had been used by prehistoric toolmakers, with the fragments examined and the unusable ones discarded.	No data
ILI-00244	ARC Camp	ARC CAMP ADJACENT TO WILLIAMSPORT-PILE BAY ROAD	Historic

Table K3.7-8: Known AHRS Sites in the Alternative 3 Transportation Corridor Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00247	Williamsport Historical Occupation/Land Use Area	Cultural remains located at Williamsport on the Williams family property include the former cement foundation of Carl Williams' home. A modern cabin has been built on the 1940s cement foundation, although three sides of the foundation are still visible. The original foundation is estimated to have been about 20 ft X 20 ft. Also present are the remains of the log cabin lived in by Ed McCammet and later by the Williams family. It is possible that this log cabin was once the ARC cabin at Williamsport, given that Ed McCammet was reported to have lived in the ARC cabin. The cabin has collapsed and the remaining timbers are largely embedded in river sediments and gravels and in poor condition. A gravesite is also present. The property currently contains gravel roadpads, numerous storage and staging areas, and a standing building.	Historic
ILI-00261	ILI-00261	Site is on a glacial ridge. The ground surface is up to 50 percent exposed till and gravel. The cultural materials at the site consists of one piece of lithic debitage observed on the surface among the gravel. Two subsurface tests conducted on the ridge did not result in the identification of a subsurface component at the site.	Prehistoric
ILI-00269	PGCO4 2012-3	On the slope of a small ridge, this feature consists of a collection of cobbles. These cobbles are stacked in a semi-circular pattern with the opening facing down-slope to the N. The view shed is comprised of the valley with one of the Talarik's tributaries. The stones appear to have been settling into the ground for at least 20 years.	No data
ILI-00293	ILI-00293	"Fire ring" exposed by private landowner during original clearing for garden, reported to have been under "several feet of soil". Current landowner reported that the area was protected and now supports a re-vegetated stand of spruce trees on the S side of the existing garden area (which at the time of reporting had been present for 20+ years). Additional clearing in the area did not expose further material. [Reported in 2015 through NRCS consultation for a high tunnel that would cover the garden area].	No data

K3.7.8 Alternative 3 Natural Gas Pipeline

The Alternative 3 natural gas pipeline shares the same 22 AHRS locations as the Alternative 3 transportation corridor, and includes the three AHRS locations on the Kenai and two AHRS locations along the land-based portion of the pipeline before Diamond Point for a total of 27 AHRS locations in the Alternative 3 natural gas pipeline corridor.

The five AHRS sites within the Alternative 3 natural gas pipeline analysis area in addition to those in the transportation corridor are indicated in Table K3.7-9. The AHRS location within the facility footprint is indicated in **bold**.

Table K3.7-9: Known AHRS Sites in the Alternative 3 Natural Gas Pipeline Analysis Area

AHRS No.	Site Name	Summarized Description	Period
ILI-00005	Dutton	Mining camp named for G.W. Dutton who was its first postmaster in 1905. The post office was discontinued in 1909. A 1 1/2-story, gable roofed, wood frame structure (possibly the post office/residence) was still standing in August 1988. Some structural damage had occurred to one wall, but the wood throughout the rest of the structure appeared to be with little or no rot.	Historic
SEL-00164	Clabo Midden Site	This site consists of blue mussel shell midden with charcoal, some bone, and massive stone mauls. The midden is in the Clabo garden. No surface features were seen and no testing was done. The site area would have been covered with Sitka Spruce before clearing.	Prehistoric
ILI-00218	Isolated Lithic Find	This site consisted of one possible microblade or blade core. The core was found on the surface of the tundra. No other lithics were found on the surface or in test pits excavated nearby.	Prehistoric, Protohistoric
SEL-00368	Whiskey Gulch Site 1	During a survey of a high probability zone near Whiskey Gulch a total of five shovel tests were carried out in a localized undisturbed area within a gently-sloping landform on a coastal bluff. One shovel test was positive revealing possible flaked stone artifacts at a depth of approx. 63cm BS. This included a bipolar flake (with a crushed distal platform) and a possible core fragment.	Prehistoric
SEL-00379	**Sterling Highway**	**The Sterling Highway is approximately 138 miles long and runs from the Seward Highway to the end of the Homer Spit. The highway is owned by the Alaska DOT&PF and is located within the Kenai Peninsula Borough. From the eastern terminus at Mile 36.495 on the Seward Highway, the Sterling Highway runs west through a portion of the Chugach National Forest and continues through the community of Sterling and the city of Soldotna, where it provides access to the Kenai Spur Highway leading to Kenai and Nikiski. The Sterling Highway then runs south, approximately parallel to the western coastline of the peninsula and the Cook Inlet, providing access to Kasilof and passing through the communities of Ninilchik and Anchor Point before terminating in Homer at the ferry terminal located at the end of a 5-mile sand spit. Construction began in 1947 and the highway was formally opened to the public in 1950. (A portion of the Sterling Highway designated as Interstate Highway System is under the Interstate Exemption [2005] and is exempt from Section 106 Review.)**	**Historic**

Descriptions of known sites as provided are verbatim from the AHRS database and have not been edited.
ADOT&PF = Alaska Department of Transportation & Public Facilities
Source: AHRS 2018