Ambler Mining District Access

Summary Report

May 2012

AMBLER MINING DISTRICT ACCESS

SUMMARY REPORT

AKSAS 63812

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APPENDICES (Attachment A on CD)

LIST OF ACRONYMS

ACEC ..... Areas of Critical Environmental Concern
ADF&G ..... Alaska Department of Fish and Game
AHRS ..... Alaska Heritage Resource Survey
ANILCA ..... Alaska National Interest Lands Conservation Act
ARRC ..... Alaska Railroad Corporation
AWC ..... Anadromous Waters Catalog
BLM ..... Bureau of Land Management
CD ..... compact disk
CSU ..... Federal Conservation System Units
DEC ..... Alaska Department of Environmental Conservation
DMTS ..... Delong Mountain Transportation System
DNR ..... Alaska Department of Natural Resources
DOT&PF ..... Alaska Department of Transportation and Public Facilities
GANPP ..... Gates of the Arctic National Park and Preserve
KVNP ..... Kobuk Valley National Park
NPS ..... National Park Service
NRHP ..... National Register of Historic Places
NWR ..... National Wildlife Refuge
USACE ..... United States Army Corps of Engineers
USCG ..... United States Coast Guard
USFWS ..... United States Fish and Wildlife Service
WACH ..... Western Arctic Caribou Herd
WSR ..... Wild and Scenic Rivers

EXECUTIVE SUMMARY

The Ambler Mining District Access project will identify, design, and construct a transportation corridor from the Ambler mineral belt to either a port location on the west coast of Alaska or the surface transportation system in Alaska's Interior. Both road and rail options are being evaluated. The selected corridor is intended to provide surface transportation access to state lands and facilitate exploration and development of mineral resources along the Ambler mining belt.

The project study area extends from the Ambler mineral belt south to Nenana and from the Dalton Highway to the west coast of Alaska. Initially, eight potential corridors were identified within the project study area. These eight corridors are addressed in Section 3 of this report. In 2011, the Kanuti Flats Corridor was excluded based on terrain considerations, and variations of the Brooks East Corridor were developed based on an aerial investigation and consultation with the National Park Service. The initial Brooks East Corridor options are addressed in Section 5 of this report. A final set of Brooks East corridor revisions was completed in 2012 to incorporate data collected during field surveys and community meetings. These corridor refinements are described in Section 6 of this report.

This Summary Report compiles information collected and presented in separate technical memoranda that individually address design criteria, cost, hydrology, geotechnical, and environmental considerations for the eight original corridors. This document evaluates the eight original corridors and two iterations of Brooks East Corridor refinements based on specific criterion and a scoring system. The criterion evaluated and the scores assigned for each corridor are based on data collected to date. Criterion and scores may change as field studies and additional community outreach are completed.

Twelve criteria were selected for evaluation based on community discussions and project team preliminary research. These criteria include: (1) Corridor Length, (2) Federal Conservation System Units, (3) Wild and Scenic Rivers, (4) Salmon/Sheefish Rivers, (5) Caribou Habitat, (6) Threatened and Endangered Species/Critical Habitat Areas, (7) Wetland Habitats, (8) Availability of Material Sites, (9) Large Bridges, (10) Construction Cost, (11) Maintenance

Costs, and (12) Special Considerations. The results of this evaluation are summarized in Tables ES-1 through ES-8.

Both rail and road options were evaluated for this project. Considerations specific to rail construction and operations were documented. Rail corridors are not rated as highly as road corridors, due to the costs associated with rail construction and maintenance. Road corridors that connect to the Dalton Highway rate the highest, due to their relatively shorter lengths, lower costs and avoidance of wetlands, critical habitats and federal conservation system units.

Meetings with communities across the study area were held between January 2011 and March 2012 to provide information on this study, and to gather information and feedback from the communities regarding potential access to the Ambler mineral belt. Information from these meetings was incorporated into these evaluations and will inform the engineering and environmental processes as the project moves forward. Meetings were also held with the National Park Service to discuss considerations related to corridors that cross through the Gates of the Arctic National Park and Preserve.

Cultural and subsistence resource information was not specifically evaluated for this report due to the lack of corridor specific data, though early input received during community meetings was factored into the corridor refinements. Corridors selected for further technical investigation will be assessed for these resources as part of future studies.

Table ES-1: Roadway Corridor Evaluation Summary

Criterion	Brooks East	Kanuti Flats	Elliott Hwy	Parks Hwy[1]	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length (miles)	220	240	370		260	250	330	340
Federal CSU (unit/miles/percentage of corridor)	GANPP/ 26 miles/11%[2]	None	None		KVNP/NNP/CKNM/ 114 miles/44%	Selawik NWR/ 94 miles/38%	Selawik NWR/ 77 miles/23%	Selawik NWR/ 77 miles/23%
Wild and Scenic Rivers	Kobuk WSR[2]	None	None		Salmon WSR	Selawik WSR	Selawik WSR	Selawik WSR
Salmon/Sheefish Rivers Total	26	54	56		76	85	71	77
Mapped Anadromous	5	14	8		13	2	23	26
Assumed Anadromous	21	41	48		63	83	48	51
Caribou Habitat	Less	Less	Less		More	More	More	More
Threatened/Endangered Species/Critical Habitat	None	None	None		Steller's eider/yellow-billed loon/polar bear	yellow-billed loon/polar bear	yellow-billed loon	spectacled eider/polar bear/yellow-billed loon
Wetland Habitats (miles)	82	115	88		40	144	78	98
Material Site Availability (percent of corridor with material site within 10 miles)	100%	75%	84%		70%	10%	57%	58%
Total Large Bridges (number/length in ft)	13/5,000 ft	14/5,440 ft	12/7,360 ft		19/8,440 ft	24/9,250 ft	21/7,470 ft	25/7,890 ft
Bridges Over 1,500 ft	None	None	Yukon River/2,720 ft		Noatak River/1,560 ft	None	None	None
Major Stream Crossings	161	212	251		213	221	185	193
Construction Cost[3] (in millions)	$430	$510	$990		$720	$860	$960	$950
Annual Maintenance Cost[4] (in millions)	$8.50	$9.10	$13.50		$9.50	$9.20	$12.80	$13.10
Special Considerations								
Port Construction	No	No	No		No	Yes	Yes	Yes
Very Large River Crossings	None	None	Yukon River		Noatak River	None	None	None

1. Same as Rail Corridor Summary Comparison - See Table ES-7.
2. Access through GANPP was identified in ANILCA.
3. Cost rounded to tens of millions.
4. Annual maintenance cost for road and maintenance camps.

Table ES-2: Roadway Corridor Scoring Summary

Criterion	Brooks East	Kanuti Flats	Elliott Hwy	Parks Hwy[1]	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length	5	5	2		4	5	3	3
Federal CSU	5	5	5		0	0	0	0
Wild and Scenic Rivers	5	5	5		0	0	0	0
Salmon/Sheefish Rivers	5	4	4		2	1	2	2
Caribou Habitat	5	5	5		0	0	0	0
Threatened/Endangered Species/Critical Habitat	5	5	5		0	0	3	0
Wetland Habitats	3	2	3		4	1	3	2
Material Site Availability	5	3	4		2	0	1	1
Total Large Bridges	5	5	2		1	0	2	2
Construction Cost	5	4	3		4	3	3	3
Annual Maintenance Cost	5	4	2		4	4	2	2
Total Score	**53**	**47**	**40**		**21**	**14**	**19**	**15**

1. Same as Rail Corridor Summary Comparison - See Table ES-8.

Table ES-3: 2011 Brooks East Corridor Options Evaluation Summary

Criterion	Option A	Option B	Option C	Option D	Option E	Option F
Corridor Length (miles)	240	250	250	210	220	220
Federal CSU (unit/miles/percentage of corridor)	None	None	None	GANPP 12/6%[1]	GANPP 12/6%[1]	GANPP 12/7%[1]
Wild and Scenic Rivers	None	None	None	Kobuk WSR	Kobuk WSR	Kobuk WSR
Salmon/Sheefish Rivers Total	36	35	33	22	24	20
Mapped Anadromous	8	8	8	4	6	4
Assumed Anadromous	28	27	25	18	18	16
Caribou Habitat	Less	Less	Less	Less	Less	Less
Threatened/Endangered Species/Critical Habitat	None	None	None	None	None	None
Wetland Habitats (miles)	27	29	33	22	24	28
Material Site Availability (percent of corridor with material site within 10 miles)	77%	78%	78%	93%	94%	94%
Total Large Bridges (number/length in ft)	10/4,420 ft	13/5,620 ft	11/4,880 ft	11/4,220 ft	14/5,420 ft	12/4,680 ft
Bridges Over 1,500 ft	None	None	None	None	None	None
Major Stream Crossings	187	191	180	163	167	156
Construction Cost[2] (in millions)	$500	$550	$550	$440	$440	$440
Annual Maintenance Cost[3] (in millions)	$8.40	$9.30	$9.30	$8.30	$8.50	$8.60
Special Considerations						
Port Construction	No	No	No	No	No	No
Very Large River Crossings	None	None	None	None	None	None

1. Access through GANPP was identified in ANILCA.
2. Cost rounded to tens of millions.
3. Annual maintenance cost for road and maintenance camps.

Table ES-4: 2011 Brooks East Corridor Options Scoring Summary

Criterion	Option A	Option B	Option C	Option D	Option E	Option F
Corridor Length	5	5	5	5	5	5
Federal CSU	5	5	5	5	5	5
Wild and Scenic Rivers	5	5	5	5	5	5
Salmon/Sheefish Rivers	5	5	5	5	5	5
Caribou Habitat	5	5	5	5	5	5
Threatened/Endangered Species/Critical Habitat	5	5	5	5	5	5
Wetland Habitats (miles)	5	5	4	5	5	5
Material Site Availability	3	3	3	5	5	5
Total Large Bridges	5	4	5	5	5	5
Construction Cost	5	4	4	5	5	5
Annual Maintenance Cost	5	4	4	5	5	5
Total Score	**53**	**50**	**50**	**55**	**55**	**55**

Table ES-5: 2012 Brooks East Corridor Options Evaluation Summary

Criterion	Option 1	Option 2	Option 3	Option 4
Corridor Length (miles)	213	203	224	214
Federal CSU (unit/miles/percentage of corridor)	GANPP 26/12%[1]	GANPP 26/13%[1]	GANPP 14/6%[1]	GANPP 14/7%[1]
Wild and Scenic Rivers	Kobuk WSR	Kobuk WSR	Kobuk WSR	Kobuk WSR
Salmon/Sheefish Rivers Total	11	17	14	20
Mapped Anadromous	3	5	3	5
Assumed Anadromous	8	12	11	15
Caribou Habitat	Less	Less	Less	Less
Threatened/Endangered Species/Critical Habitat	None	None	None	None
Wetland Habitats (miles)	60	78	41	59
Material Site Availability (percent of corridor with material site within 10 miles)	100%	100%	94%	93%
Total Large Bridges (number/length in ft)	9/4,180 ft	11/4,760 ft	10/3,950 ft	12/4,530 ft
Bridges Over 1,500 ft	None	None	None	None
Major Stream Crossings	132	142	154	164
Construction Cost[2] (in millions)	$400	$410	$430	$450
Annual Maintenance Cost[3] (in millions)	$8.30	$8.10	$8.60	$8.40
Special Considerations				
Port Construction	None	None	None	None
Very Large River Crossings	None	None	None	None

1. Access through GANPP was identified in ANILCA.
2. Cost rounded to tens of millions.
3. Annual maintenance cost for road and maintenance camps.

Table ES-6: 2012 Brooks East Corridor Options Evaluation Summary

Criterion	Option 1	Option 2	Option 3	Option 4
Corridor Length	5	5	5	5
Federal CSU	5	5	5	5
Wild and Scenic Rivers	5	5	5	5
Salmon/Sheefish Rivers	5	5	5	5
Caribou Habitat	5	5	5	5
Threatened/Endangered Species/Critical Habitat	5	5	5	5
Wetland Habitats	4	3	4	4
Material Site Availability	5	5	5	5
Total Large Bridges	5	5	5	5
Construction Cost	5	5	5	5
Annual Maintenance Cost	5	5	4	5
Total Score	**54**	**53**	**53**	**54**

Table ES-7: Rail Corridor Evaluation Summary

Criterion	Brooks East[1]	Kanuti Flats[1]	Elliott Hwy[1]	Parks Hwy A	Parks Hwy B	Parks Hwy C	Parks Hwy D	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length (miles)				430	450	420	440	260	250	330	340
Federal CSU (unit/miles/percentage of corridor)				GANPP[2]/ 26 miles/6%	None	GANPP[2]/ 26 miles/6%	None	GANPP/CKNM/114 miles/44%	Selawik NWR/94 miles/38%	Selawik NWR/77 miles/23%	Selawik NWR/77 miles/23%
Wild and Scenic Rivers				Kobuk WSR[2]	None	Kobuk WSR[2]	None	Salmon WSR	Selawik WSR	Selawik WSR	Selawik WSR
Salmon/Sheefish Rivers				71	62	84	75	76	85	71	77
Mapped Anadromous				8	9	12	13	13	2	23	26
Assumed Anadromous				63	53	72	62	63	83	48	51
Caribou Habitat				Less	Less	Less	Less	More	More	More	More
Threatened/Endangered Species/Critical Habitat				None	None	None	None	Steller's eider/yellow-billed loon/polar bear	yellow-billed loon/polar bear	yellow-billed loon	spectacled eider/polar bear/yellow-billed loon
Wetland Habitats (miles)				151	138	141	129	40	144	78	98
Material Site Availability (percent of corridor with material site within 10 miles)				96%	87%	80%	72%	70%	10%	57%	58%
Total Large Bridges (number/length in ft)				13/7,470 ft Yukon River/2,720 ft	17/10,410 ft Yukon River/2,720 ft	13/7,730 ft Yukon River/2,720 ft	17/10,670 ft Yukon River/2,720 ft	19/8,440 ft Noatak River/ 1,560 ft	24/9,250 ft None	21/7,470 ft None	25/7,890 ft None
Bridges Over 1,500 ft				257	228	309	280	213	221	185	193
Construction Cost (in millions)[3]				$1,880	$1,990	$1,990	$2,010	$1,250	$1,330	$1,560	$1,570
Annual Maintenance Cost[4] (in millions)				$17.30	$18.00	$16.90	$17.60	$10.60	$10.20	$13.80	$14.10
Special Considerations											
Port Construction				No	No	No	No	Yes	Yes	Yes	Yes
Railroad Annual Operating Cost (in millions)				$11.1	$11.6	$10.8	$11.4	$6.7	$6.3	$8.6	$8.8
Very Large Bridges				Yukon River	Yukon River	Yukon River	Yukon River	Noatak River	None	None	None

1. Same as Road Corridor Summary Comparison - See Table ES-1.
2. Access through GANPP was identified in ANILCA.
3. Cost rounded to tens of millions.
4. Annual maintenance cost for road and maintenance camps.

Table ES-8: Rail Corridor Scoring Summary

Criterion	Brooks East[1]	Kanuti Flats[1]	Elliott Hwy[1]	Parks Hwy A	Parks Hwy B	Parks Hwy C	Parks Hwy D	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length				1	1	1	1	4	5	3	3
Federal CSU				5	5	5	5	0	0	0	0
Wild and Scenic Rivers				5	5	5	5	0	0	0	0
Salmon/Sheefish Rivers				2	3	1	2	2	1	2	2
Caribou Habitat				5	5	5	5	0	0	0	0
Threatened/Endangered Species/Critical Habitat				5	5	5	5	0	0	3	0
Wetland Habitats				0	1	1	1	4	1	3	2
Material Site Availability				5	4	3	3	2	0	1	1
Total Large Bridges				2	0	2	0	1	0	2	2
Construction Cost				0	0	0	0	2	2	0	0
Annual Maintenance Cost				0	0	0	0	3	4	2	2
Total Score				**30**	**29**	**28**	**27**	**18**	**13**	**16**	**12**

1. Same as Road Corridor Summary Comparison - See Table ES-2.

1.0 INTRODUCTION

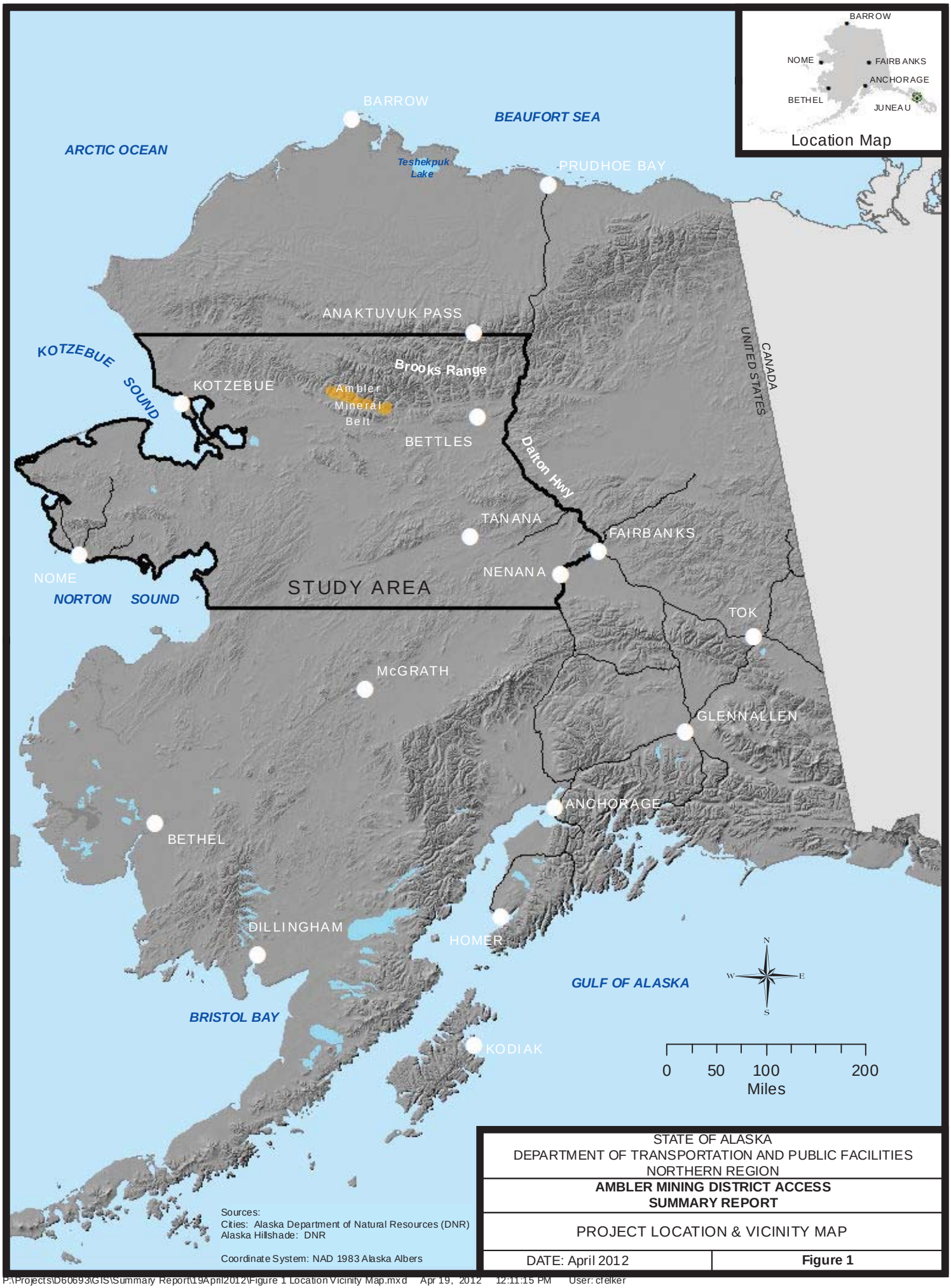
The Ambler Mining District Access project will identify, design, and construct a transportation corridor from the Ambler mineral belt to either a port location on the west coast of Alaska or the surface transportation system in Alaska's Interior. Both road and rail options are being evaluated. The selected corridor is intended to provide surface transportation access to state lands and facilitate exploration and development of mineral resources along the Ambler mineral belt.

The South Flank of the Brooks Range contains extensive mineral resources. Limited exploration efforts since the 1950's have identified significant resources of copper and other base metals (Hawley and Vant, 2009). Exploration and development of these deposits has been economically and logistically curtailed by the lack of transportation infrastructure.

The project study area extends from the southern face of the Brooks Range southward to Nenana, and from the Dalton Highway to Alaska's west coast (Figure 1). Eight potential corridors were initially identified within the project study area (Figure 2); Brooks East Corridor, Kanuti Flats Corridor, Elliott Highway Corridor, Parks Highway Railroad Corridor, Delong Mountain Transportation System (DMTS) Port Corridor, Cape Blossom Corridor, Selawik Flats Corridor, and Cape Darby Corridor. All eight corridors begin at a staging area in the Cosmos Hills just north of Kobuk. Further study led to the beginning point changing from the staging area to a gravel source on Ambler River.

This Summary Report compiles information collected and presented in separate technical memoranda that address design criteria, construction cost, hydrology, geotechnical, and environmental considerations (DOWL HKM, 2011a through 2011g; DOWL HKM, 2012). The technical memoranda are included on a compact disk (CD) at the back of this report. In addition, this Summary Report ranks each corridor, based on specific criterion using a 5-point scoring system, to aid in the decision of which corridors to evaluate in greater detail.

The criterion evaluated and the scores assigned for each corridor are based on analysis of existing published information. Criterion and scores may change as field studies and additional community outreach are completed.



Sources:
Cities: Alaska Department of Natural Resources (DNR)
Alaska Hillshade: DNR

Coordinate System: NAD 1983 Alaska Albers

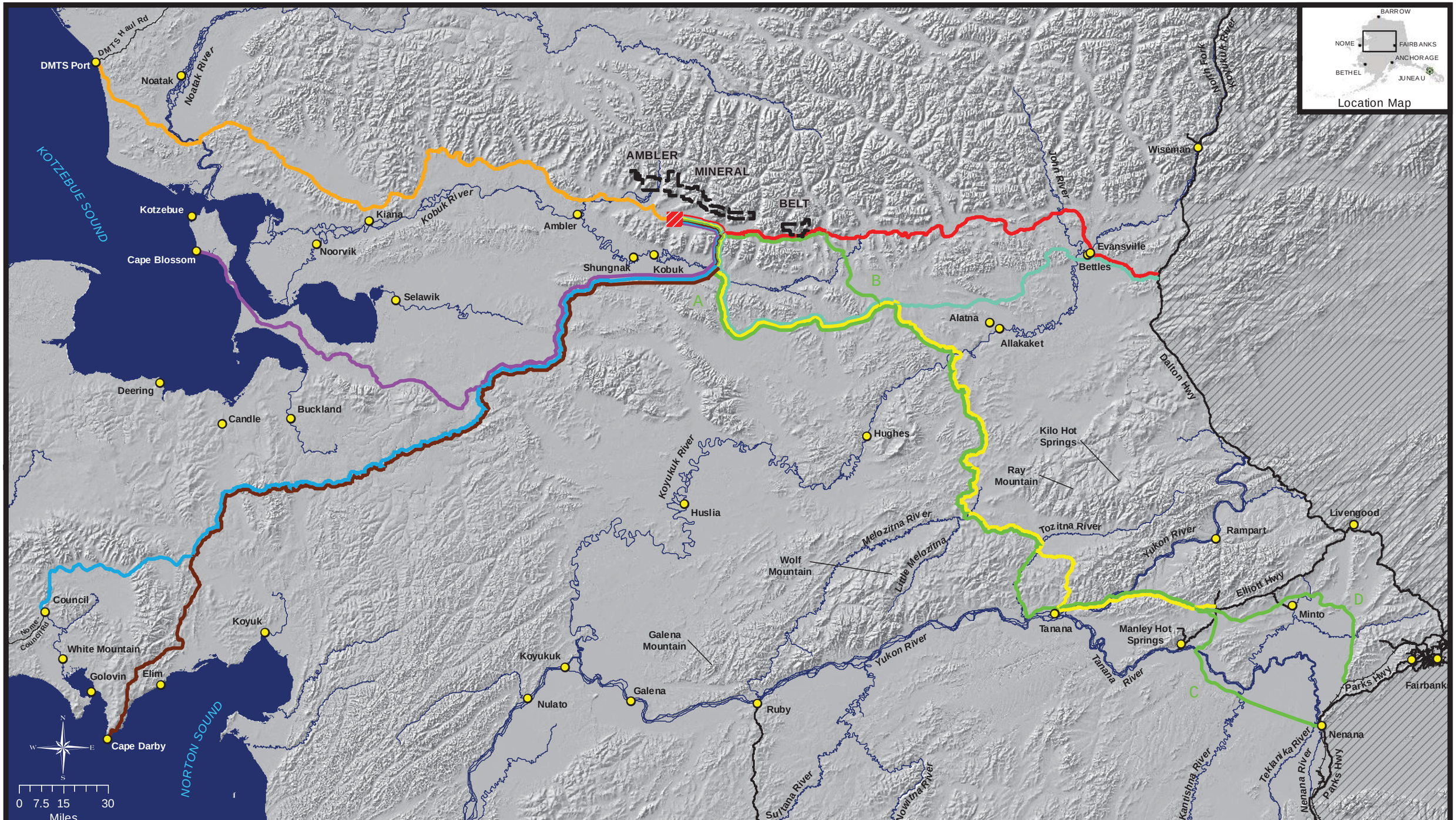
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

PROJECT LOCATION & VICINITY MAP

DATE: April 2012 | **Figure 1**

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 1 Location Vicinity Map.mxd Apr 19, 2012 12:11:15 PM User: cfelker



Communities and Place Names
Railroad
Existing Roads
Water
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area
Brooks East Corridor (Road Only)
Kanuti Flats Corridor (Road Only)
Elliott Hwy Corridor (Road Only)
Parks Hwy RR Corridor (Rail Only)
DMTS Port Corridor (Road & Rail)
Cape Blossom Corridor (Road & Rail)
Selawik Flats Corridor (Road & Rail)
Cape Darby Corridor (Road & Rail)

Sources:
Commmunities and Place Names: DNR, DOT&PF
Existing Roads: DOT&PF
DMTS Haul Road: NANA
Railroad: DNR
Alaska Hillshade: DNR
Imagery: BDL WMS: Alaska Mapped
Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
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AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

PRELIMINARY CORRIDORS

DATE: April 2012 | **Figure 2**

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2.0 CORRIDOR MATRIX CRITERIA

Evaluation criteria were selected to develop a decisional matrix for the Ambler Mining District Access project. The purpose of the matrix is to assist decision-makers in evaluating each corridor and determining which corridor(s) are the most feasible alignment(s) for more detailed field study.

Twelve criteria were selected for evaluation based on community input, guidance from Alaska Department of Transportation and Public Facilities (DOT&PF) discussions, and preliminary research. These criteria include: (1) Corridor Length, (2) Federal Conservation System Units, (3) Wild and Scenic Rivers, (4) Salmon/Sheefish Rivers, (5) Caribou Habitat, (6) Threatened and Endangered Species/Critical Habitat Areas, (7) Wetland Habitats, (8) Availability of Material Sites, (9) Large Bridges, (10) Construction Cost, (11) Maintenance Costs, and (12) Special Considerations. Although the criteria have not been weighted to reflect any relative importance of each criterion, the matrix provides sufficient information for a preliminary comparison of the corridors.

Cultural and subsistence resources are also recognized as primary considerations, but were not included in the evaluation criteria since insufficient data is available to provide a meaningful corridor comparison. In-depth research on subsistence and cultural resources will be conducted on the corridor(s) deemed to be the most feasible.

The following sections describe these criteria and the information used to evaluate them.

2.1 Evaluation Criteria Descriptions

2.1.1 Corridor Length

Corridor length is correlated with construction and maintenance costs, as well as with the potential for impacts on many different resources including wetlands, subsistence, cultural, wildlife, habitat, etc. Generally, shorter corridor lengths are preferred.

Scoring Considerations

Each corridor is evaluated and scored based on its length. The corridors were scored using the following scale:

Corridors of ≤250 miles = 5

Corridors of 251-300 = 4

Corridors of 301-350 = 3

Corridors of 351-400 = 2

Corridors of 401-450 = 1

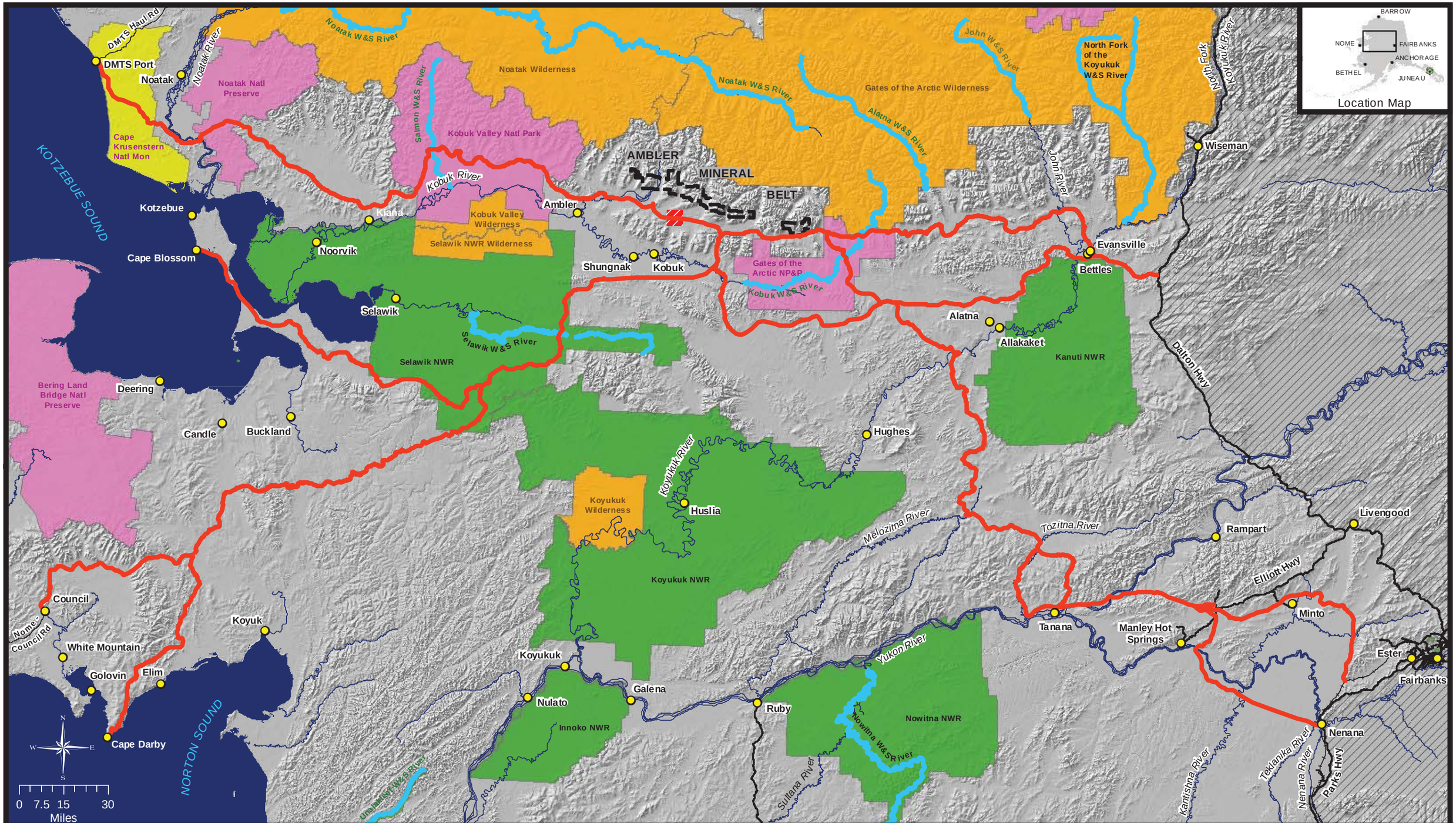
Corridors >450 miles = 0

2.1.2 Federal Conservation System Units

Within the project study area, land ownership includes the State of Alaska, Federal Conservation System Units (CSU) (National Parks and Preserves, Wilderness Areas, and National Wildlife Refuges), non-CSU federal lands, Native lands (including regional and village corporation lands and Native allotments), and other private lands (Figure 3). The CSUs in the study area were established under the Alaska National Interest Lands Conservation Act (ANILCA). Crossing state-owned land is considered positive due to reduced time and cost for acquisition of rights-of-way. Crossing federal land, particularly CSUs, is considered a negative factor due to the additional time and cost associated with acquisition of federal lands. ANILCA recognized the need for access to the Ambler mineral belt by establishing a provision for access through Gates of the Arctic National Park and Preserve (GANPP). Thus, routes that cross GANPP are given the same score as routes that do not cross CSUs.

Scoring Considerations

Each corridor is evaluated and scored based on whether it crosses a CSU. Most corridors crossing a CSU are given a score of 0 due to the time and costs associated with acquisition of federal lands. Corridors that do not run through a CSU, or corridors that cross GANPP, are given a score of 5.



- Communities and Place Names
- Railroad
- Existing Roads
- Water
- Preliminary Corridors
- Outside of Project Study Area
- Ambler Mineral Belt
- Proposed Staging Area
- Wildlife Refuge
- Wilderness
- National Park
- National Monuments

Sources:
Land Ownership: DNR
Native Corporation Boundary: DNR
Kobuk-Seward Peninsula RMP:BLM KSPRMP EIS
Central Yukon RMP: Central Yukon RMP

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
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AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

FEDERAL CONSERVATION SYSTEM UNITS

DATE: April 19, 2012 | **Figure 3**

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 3 Federal Conservation Units.mxd Apr 19, 2012 1:49:07 PM User: cfelker

2.1.3 National Wild and Scenic Rivers

The National Wild and Scenic Rivers (WSRs) System was created to preserve certain rivers with outstanding natural, cultural, and recreational value in a free-flowing condition for the enjoyment of present and future generations. The WSR designation prohibits federal support for actions such as the construction of dams or other in-stream activities that would harm the river's free-flowing condition, water quality, or outstanding resource values. Most of the WSRs in the project study area were established under ANILCA. Designated WSRs within the project study areas include the following (Figure 3):

- North Fork of the Koyukuk WSR
- Kobuk WSR
- Selawik WSR
- Noatak WSR
- Salmon WSR
- Nowitna WSR
- Unalakleet WSR
- John WSR
- Alatna WSR

Scoring Considerations

Each corridor is evaluated and scored on whether it crosses a WSR. The corridors that cross a WSR are given a score of 0 and the corridors with no crossings are given a score of 5. Again, because ANILCA recognized the need for a corridor through GANPP and across the Kobuk WSR, corridors that cross the Kobuk WSR in GANPP are given a score of 5.

2.1.4 Salmon/Sheefish Rivers

Anadromous fish identified in the project study area include five different pacific salmon species, Dolly Varden, whitefish, and sheefish. These fish are important subsistence resources for local communities. The Alaska Department of Fish and Game's (ADF&G's) Anadromous Waters Catalog was reviewed to identify anadromous waters in the project study area. Since limited mapping of anadromous waters has occurred in remote areas, such as the project study area, it is likely that there are many anadromous waters in this area that have not been mapped. The likelihood of anadromous fish presence in unmapped streams was estimated by comparing gradients of mapped streams to interconnected unmapped streams. Those with gradients of 8% or less were assumed to have a high likelihood of supporting anadromous fish populations. Waters estimated to have a high likelihood of supporting anadromous fish are counted as

anadromous waters. Minimizing the number of anadromous waters crossed results in reduced impacts on subsistence, as well as reduced costs for fish passage structures, and less time for consultation and permitting.

Scoring Considerations

Each corridor is evaluated and scored on the number of anadromous waters crossed. The corridors were scored using the following scale:

Corridors with ≤50 crossings = 5
Corridors with 51 - 60 crossings = 4
Corridors with 61 - 70 crossings = 3
Corridors with 71 - 80 crossings = 2
Corridors with 81 - 90 crossings = 1
Corridors with ≥91 crossings = 0

2.1.5 Caribou Habitat

Caribou are an important subsistence resource for communities within the project study area. Five caribou herds are known to sometimes use portions of the study area: (1) Western Arctic Caribou Herd (WACH); (2) Teshekpuk Lake Caribou Herd; (3) Galena Mountain Herd; (4) Wolf Mountain Herd; and (5) Ray Mountain Herd. The WACH is the largest herd in Alaska and uses a substantial portion of the project study area for wintering and for migration. The other caribou herds are smaller and tend to occupy smaller portions of the project study area for shorter time periods. Although available information on the WACH is dated, WACH range maps published in the WACH Cooperative Management Plan and caribou range maps in the Bureau of Land Management's Kobuk-Seward Peninsula Resource Management Plan indicate that caribou use is more concentrated in the western portion of the project study area.

Scoring Considerations

Each corridor is evaluated and scored on caribou habitat crossed. Eastern corridors that cross relatively less caribou habitat are given a 5 rating, and western corridors that cross relatively more caribou habitat are given a 0.

2.1.6 Threatened and Endangered Species and Critical Habitat Areas

Four species designated as Threatened or Endangered are present in the project study area: (1) Steller's eider; (2) spectacled eider; (3) polar bear; and (4) bowhead whale. Eiders spend most of the year in marine waters. Steller's eiders migrate through coastal portions of the project study area to reach breeding grounds outside the project study area. Spectacled eiders molt offshore in Norton Sound along the western edge of the project study area. Polar bears concentrate along the coast during open water periods, when mating, and when rearing cubs. Bowhead whales move north along the coast as sea ice recedes during spring.

The project study area contains areas designated as critical habitat for spectacled eider and polar bear. The critical habitat for spectacled eider is located within the waters of Norton Sound in the southwest section of the project study area. Multiple shorelines in the western section of the project study area are designated critical habitat or no disturbance zones for polar bear.

Corridors that may affect any of these threatened or endangered species or areas of critical habitat are considered less desirable, since construction in these areas would require consultation with federal agencies on potential effects on the species.

Scoring Considerations

Corridors that are not expected to affect any threatened or endangered species or their habitat are given a score of 5. Corridors that may affect one threatened or endangered species or its critical habitat are given a score of 3. Corridors that may affect more than one species are given a score of 0.

2.1.7 Wetland Habitats

Wetland habitats are common across the study area and are afforded protection by the Clean Water Act, which requires avoidance, minimization and mitigation of impacts to wetland habitats. Wetland habitats were identified throughout the study area based primarily on the interpretation of aerial imagery. The extent of wetland coverage and length of potential intersection of each road and railroad corridor with wetland habitats were evaluated using the methods documented in the Wetlands Mapping for Preliminary Corridors Report (DOWL HKM, 2012). The study area for the desktop wetland mapping exercise was defined as a five mile

width surrounding the proposed corridor centerlines, for consistency with the Corridor Development Memorandum (DOWL HKM, 2011b). This information will be field verified once a preferred corridor is chosen.

Scoring Considerations

Each corridor was evaluated and scored based on the total miles of wetland habitat traversed. The corridors were scored using the following scale:

Intersection of ≤30 miles = 5

Intersection of 31-60 miles = 4

Intersection of 61-90 miles = 3

Intersection of 91-120 miles = 2

Intersection of 121-150 miles = 1

Intersections of >150 miles = 0

2.1.8 Availability of Material Sites

A substantial portion of the construction and maintenance cost for surface transportation projects is related to the cost of finding, developing and transporting materials for embankments and foundations. Corridors that have material sites available every 10 miles are considered more favorable from a cost and constructability perspective than those that require importing materials from greater distances.

Scoring Considerations

Each corridor is evaluated and scored on the percent of the corridor that has a material site within 10 miles. Corridor scoring is based on the following:

>90% of corridor has material sites every 10 miles = 5

81%-90% of corridor has material sites every 10 miles = 4

71%-80% of corridor has material sites every 10 miles = 3

61%-70% of corridor has material sites every 10 miles = 2

51%-60% of corridor has material sites every 10 miles = 1

<50% of corridor has material sites every 10 miles = 0

2.1.9 Large Bridges

The project study area contains numerous rivers and streams that will require crossings. The number of large bridge crossings and total bridge lengths require special consideration since these factors account for around 50% of the estimated construction cost for the various corridors. Large bridges are classified as any bridge over 140 feet in length. Corridors with fewer large bridges and less total length of large bridges are likely to have lower construction and maintenance costs.

Scoring Considerations

Each corridor is evaluated and scored on the total length of large bridges needed. Corridor scoring is based on the following:

Corridors with <5,500 ft = 5
Corridors with 5,501- 6,000 ft = 4
Corridors with 6,001 - 7,000 ft = 3
Corridors with 7,001 - 8,000 ft = 2
Corridors with 8,001- 9,000 ft = 1
Corridors with >9,000 ft = 0

2.1.10 Construction Costs

Construction costs for each road and railroad corridor were evaluated using the design criteria documented in the Design Criteria Memorandum and unit prices documented in the Baseline Cost Memorandum (DOWL HKM, 2011c).

Roadway construction costs assume clearing, gravel surfacing, embankment, and mobilization. Also included in the roadway construction cost are truck turnouts, which are assumed to be located every 10 miles within each corridor. Construction costs for both road and rail include varying unit prices for embankment material based on the preliminary material source intervals set in the Geotechnical Memorandum (DOWL HKM, 2011d). Royalty costs of $5 per cubic yard are added where appropriate to reflect the cost of materials coming from non-state lands. A 20% contingency was applied to all embankment costs.

Hydrologic Costs

Cost estimates for drainage structures along road and rail corridors were developed using the hydraulic design assumptions described in the Preliminary Hydrology Reconnaissance Memorandum (DOWL HKM, 2011e). Historical bid tabulations for Dalton Highway projects and other Northern Region projects were used to estimate unit costs.

Bridge Costs

Proposed corridors' overall bridge costs were estimated using unit prices for the three categories of bridge sizes (small, medium, and large). Unit prices per linear foot were developed for several conceptual and proprietary bridge designs to obtain a range of individual bridge costs.

Understanding that bridge costs will vary at each crossing location based on site-specific constraints, a representative value was selected from within the range of derived bridge costs. The 65th percentile cost was selected for determining unit costs. After deriving costs per linear foot for the three bridge categories, these unit costs were applied to the span lengths of the small (140 feet) and medium (500 feet) bridge categories to arrive at "per crossing" bridge costs. Large bridges were evaluated on a lineal foot basis.

Culvert Costs

Culvert costs were considered for rolled and structural plate corrugated steel pipe culverts ranging from 4 to 20 feet in diameter. Culverts with various wall thickness (gauges) were considered to account for varying cover requirements, with 8 to 16 gauge culverts evaluated for the small culverts (less than 10-foot diameter) and 5 to 12 gauge culverts evaluated for the large culverts (10- to 20-foot diameter). Material costs were derived assuming a 95-foot-long culvert which is an average culvert length for major drainage structures on the Dalton Highway.

Fish Passage Culvert Costs

Fish passage culverts were assumed to incur additional costs associated with the need for fish passage structures and material, bank stabilization, and labor for reconstruction of channel beds.

Scoring Considerations

Each corridor is evaluated and scored based on estimated construction cost (rounded to tens of millions). Corridors were scored using the following scale:

Cost ≤$500 Million = 5
Cost >$500-750 Million = 4
Cost >$750-1,000 Million = 3
Cost >$1,000-1,250 Million = 2
Cost >$1,250-1,500 Million =1
Cost ≥$1,501 Million = 0

2.1.11 Maintenance Costs

Roadway Maintenance Costs

Maintenance costs for a roadway are assumed to be similar to Dalton Highway maintenance costs. A cost per mile was derived from data provided by DOT&PF's Dalton Highway maintenance section for FY10. The cost that is factored into each corridor is $26,100 per mile.

Roadway Maintenance Camp Costs

Additional costs are added to each roadway corridor for initial construction and annual maintenance of road maintenance camps. Maintenance camps are assumed to be required every 60 miles. The life-cycle for each maintenance camp is assumed to be 20 years, which includes the initial camp construction cost and the annual cost to maintain the camp for the 20 year duration without major upgrades or renovations. The 20 year life-cycle cost for individual corridors is included in Appendices A, C, and D.

Initial construction cost for each maintenance camp is estimated at $5.5 million, based on recent construction costs for a new maintenance facility at East Fork along the Dalton Highway. Table 1 details the assumed facility components and pricing.

Table 1: Road Maintenance Camp Construction Cost Summary

Maintenance Camp Component	Size	Total Cost
Warm storage facility	80' x 80' = 6,400 ft^2	$4,800,000
Two prime power generators and supporting structure	672 ft^2	$400,000
5-bedroom bunkhouse	24' x 60' = 1,440 ft^2	$300,000
Total Maintenance Camp Cost		**$5,500,000**

Estimated annual maintenance cost per camp is $422,000. This annual cost is estimated using FY10 costs for several existing maintenance camps provided by DOT&PF. Average past maintenance costs are escalated by approximately $90,000 per year due to increasing heating costs and larger sizes for newer facilities.

Railroad Maintenance Costs

Maintenance costs for rail corridors in Alaska are estimated using average costs reported by the Alaska Railroad Corporation (ARRC) in their 2010 Annual Report (ARRC, 2011) and discussions with ARRC staff. These approximated estimates are considered to be a best case scenario, as ARRC likely has lower costs per mile than an independent rail operator, due to substantial efficiencies of scale. Annual cost for rail maintenance is estimated at $35,000 per mile.

Railroad Maintenance Camp Costs

Additional costs are added to each rail corridor for initial construction and annual maintenance of rail maintenance camps. Maintenance camps are assumed to be required every 100 miles.

Initial construction cost for each maintenance camp is estimated at $2.5 million, based on a single pull-through maintenance structure and housing facilities for support staff. Table 2 details the assumed facility components and pricing.

Table 2: Rail Maintenance Camp Construction Cost Summary

Maintenance Camp Component	Total Cost
Two prime power generators and supporting structure	$2,200,000
5-bedroom bunkhouse	$300,000
Total Maintenance Camp Cost	**$2,500,000**

Scoring Considerations

Each corridor is evaluated and scored based on estimated annual maintenance cost. Corridors were scored using the following scale:

Cost $\leq$$8.5 Million = 5

Cost $8.6-10.5 Million = 4

Cost $10.6-12.5 Million = 3

Cost $12.6-14.5 Million = 2

Cost $14.6-16.5 Million = 1

Cost ≥$16.6 Million = 0

2.1.12 Special Considerations

Three additional considerations are briefly discussed for each corridor, but are not included for scoring: port construction, railway operating costs, and large river crossings.

Port Construction

Corridors providing surface access to the Ambler mineral belt must connect to other transportation infrastructure at their termini. Corridors that head east from the Ambler mineral belt connect with either the state highway system or the Alaska Railroad system. Corridors that head west from the Ambler mineral belt connect to coastal areas that either have existing ports or have been identified as possible deep-water port locations. Corridors that connect with existing infrastructure are considered more favorable as the cost and complexities of designing and constructing new port facilities could result in substantial delays in achieving the project's goal to support exploration and development of mineral resources in the Ambler mineral belt.

Railway Operating Costs

Rail corridors would have additional costs associated with the daily operations of keeping the railway functional. Operation costs include equipment, fuel, labor and other costs associated with operating the railway. The operating costs were estimated using average costs reported by ARRC in their 2010 Annual Report (ARRC, 2011). Annual operating costs for the railway are estimated at $25,700 per mile.

Very Large River Crossings

Crossing very large rivers such as the Yukon or Noatak Rivers presents more significant engineering and cost challenges than other rivers.

2.2 Evaluation Data Sources

Data used for corridor evaluations and comparisons in this Summary Report are documented in a number of preliminary reconnaissance memoranda (DOWL HKM, 2011a through 2011g). These reconnaissance studies were based on available data resources and have not been field

verified; the limitations of the data are outlined in the memoranda. Although the existing data is limited and generalized in nature, it provides information sufficient for a relative comparison of the proposed corridors.

3.0 INDIVIDUAL CORRIDOR ANALYSIS

The following sections summarize each corridor in relation to the 12 criteria identified earlier. Most corridors are assessed primarily as road corridors with rail considerations discussed in a final section on each corridor where rail is an option. For the Parks Highway Railroad Corridor, the corridor is assessed as a rail corridor only.

3.1 Brooks East Corridor

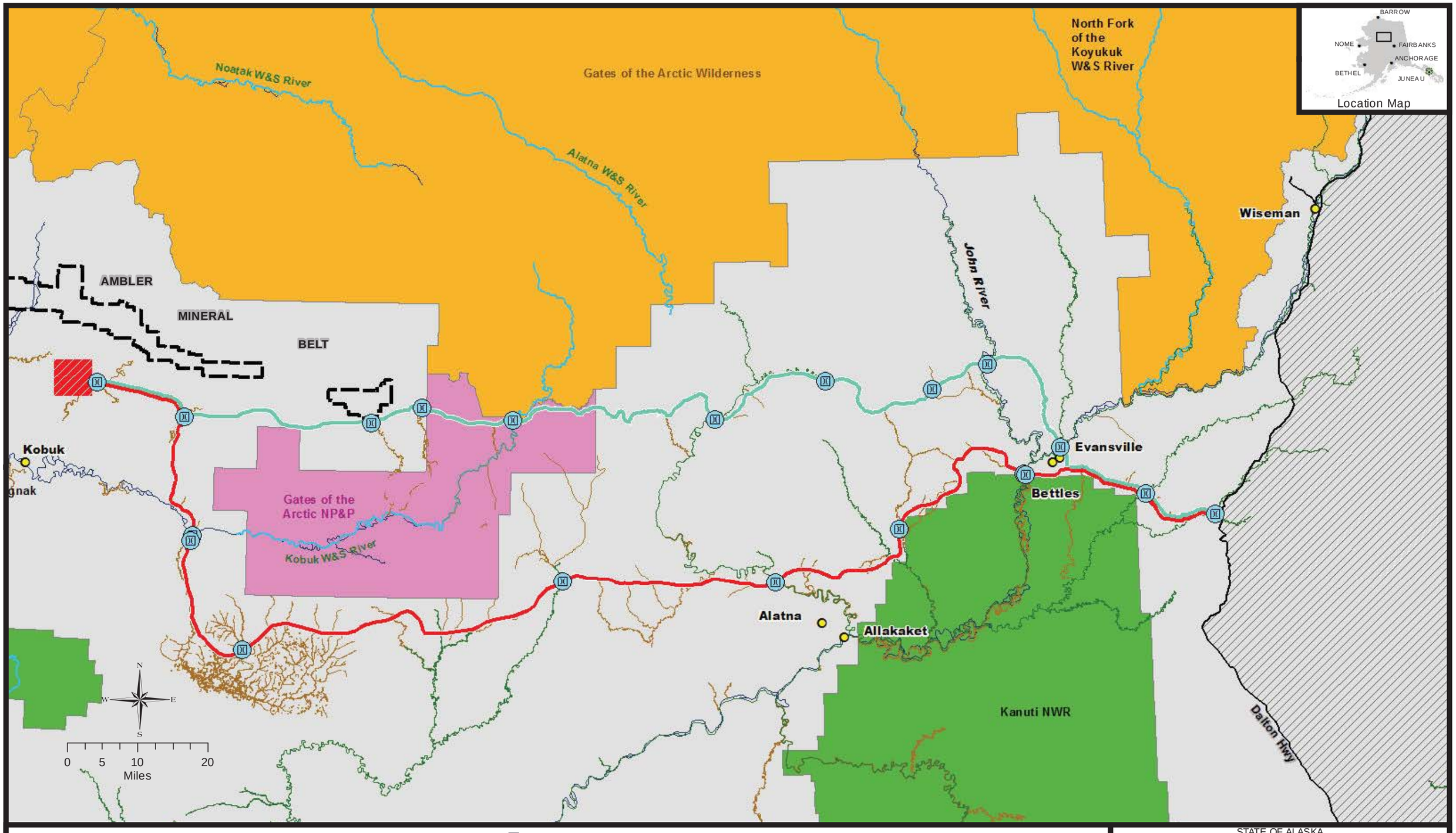
3.1.1 General Route Description

The Brooks East Corridor is the shortest option, measuring approximately 220 miles from the Ambler mineral belt to the Dalton Highway (Figures 4 and 5). The corridor leaves the Ambler mineral belt and travels east to the Dalton Highway, staying primarily in the foothills of the Brooks Range and crossing the lower portion of GANPP and the Kobuk WSR. The corridor connects to the Dalton Highway at Prospect Creek. The evaluation of this corridor is summarized in Table 3.

Table 3: Brooks East Corridor Evaluation

Criterion	Value	Score
Corridor Length (miles)	220	5
Federal CSU (unit/miles/percentage of corridor)	GANPP/26/11%	5[1]
Wild and Scenic Rivers	Kobuk WSR	5[1]
Salmon/Sheefish Rivers Total Mapped Anadromous Assumed Anadromous	26 5 21	5
Caribou Habitat	Less	5
Threatened/Endangered Species/Critical Habitat	None	5
Wetland Habitats (miles)	82	3
Material Site Availability (percent of corridor with material site within 10 miles)	100%	5
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	13/5,000 ft None 161	5
Construction Cost[2] (in millions)	$430	5
Annual Maintenance Cost (in millions)	$8.5	5
Special Considerations ANILCA Corridor through GANPP	NA	NA
	Total Score	**53**

1. Access through GANPP and across the Kobuk WSR was recognized under ANILCA.
2. Costs rounded to tens of millions.



- Communities and Place Names
- Existing Roads
- Water
- Outside of Project Study Area
- Ambler Mineral Belt
- Proposed Staging Area
- 1-Brooks East Corridor 220 Miles (Road Only)
- 2-Kanuti Flats Corridor 240 Miles (Road Only)
- Wild and Scenic Rivers
- Cataloged Anadromous Streams
- Assumed Anadromous Streams
- Wildlife Refuge
- Wilderness
- National Park
- National Monuments
- Large Bridges

Note: There is no designated critical habitat in the eastern portion of the study area.

Sources:
Cataloged Anadromous Streams: ADF&G

Coordinate System: NAD 1983 Alaska Albers

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EAST CORRIDORS: CRITICAL HABITAT, ANADROMOUS STREAMS AND LARGE BRIDGES

DATE: April 19, 2012 | **Figure 4**

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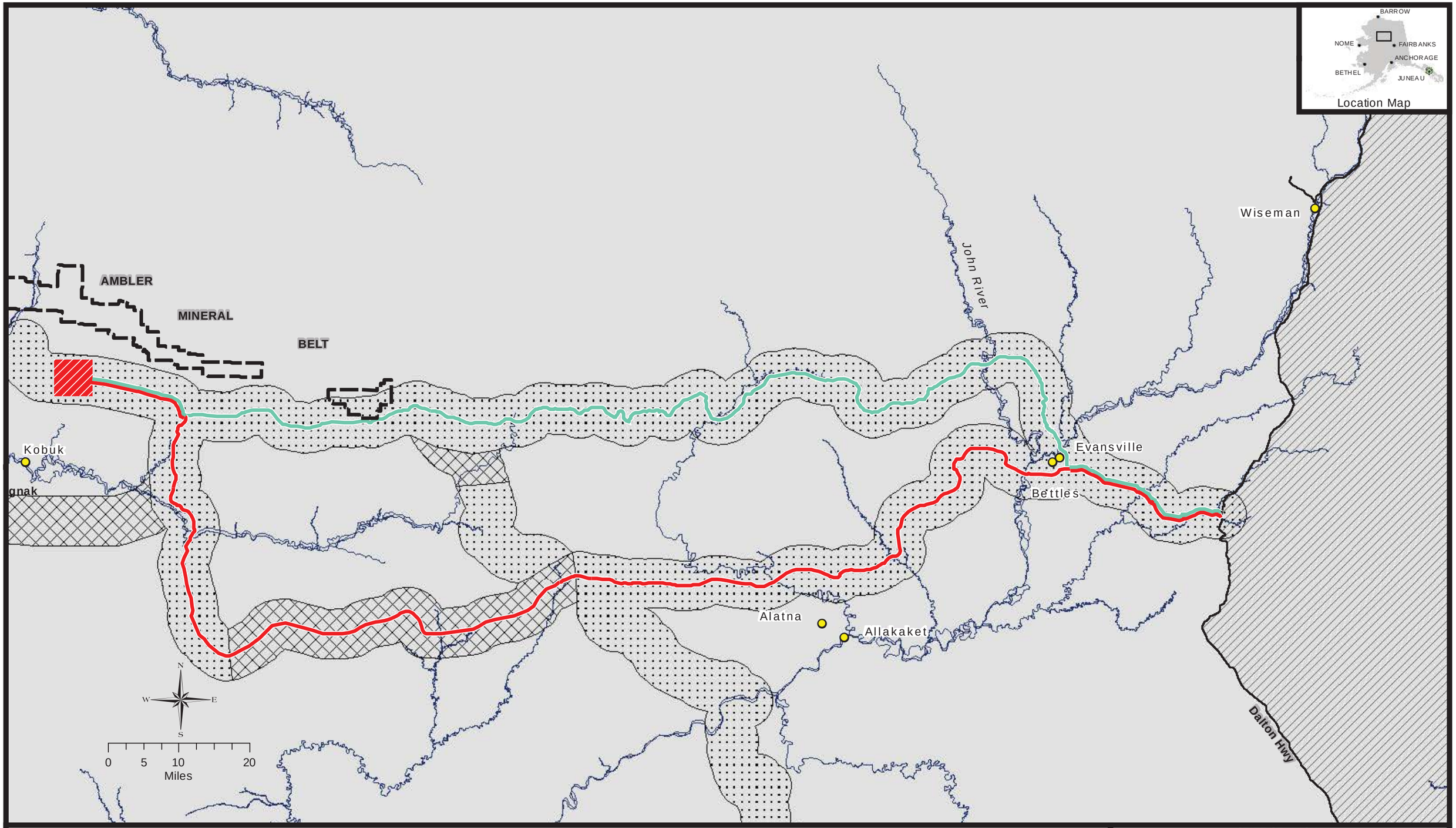

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EAST CORRIDORS
MATERIAL SITE AVAILABILITY

DATE: April 19, 2012 | **Figure 5**

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3.1.2 Corridor Length

This corridor is 220 miles long; the shortest of the potential corridors. The corridor is given a score of 5 for this criterion.

3.1.3 Federal Conservation Systems

This corridor crosses through one CSU, GANPP. The corridor passes through the preserve portion of GANPP. The length of the corridor within the CSU is approximately 26 miles, or 11% of the corridor length. Although this corridor goes through GANPP, it also is given a score of 5 for this criterion since access through GANPP is addressed in ANILCA.

3.1.4 Wild and Scenic Rivers

This corridor crosses the Kobuk WSR. The crossing is approximately 440 feet long. This corridor is given a score of 5 for this criterion, given the recognition of access through GANPP in ANILCA.

3.1.5 Salmon/Sheefish Rivers

This corridor crosses 5 mapped anadromous streams and 21 streams assumed to be anadromous, for a total of 26. This is the lowest number of anadromous streams crossed by any corridor, so this corridor is given a score of 5 for this criterion.

3.1.6 Caribou Habitat

This corridor crosses through migratory areas and the outer range of the WACH. This corridor and other corridors that head east from the Ambler mineral belt cross less habitat for this major caribou herd than those corridors that go west, and are therefore given a score of 5 for this criterion.

3.1.7 Threatened and Endangered Species and Critical Habitat Areas

This corridor does not cross through areas where threatened or endangered species or critical habitat areas are found. Hence, the corridor is given a score of 5 for this criterion.

3.1.8 Wetland Habitats

This corridor crosses through 82 miles of habitat preliminarily mapped as wetlands and is given a score of 3 for this criterion.

3.1.9 Availability of Material Sites

This corridor has material sites available every 10 miles the entire length of the corridor, and is given a score of 5 for this criterion.

3.1.10 Large Bridges

This corridor has 161 major stream crossings, including 13 large bridges that span approximately 5,000 linear feet. This corridor has one of the lowest total lengths of large bridges, and is given a score of 5 for this criterion.

3.1.11 Construction Cost

The total estimated construction cost for this corridor is $430 million (Appendix A). This is the lowest construction cost of any corridor, and the corridor is given a score of 5 on this criterion.

3.1.12 Maintenance Cost

Estimated annual maintenance cost for the Brooks East Corridor is approximately $8.5 million. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is the lowest annual maintenance cost for the corridors evaluated, and therefore the corridor is given a score of 5 on this criterion.

3.1.13 Special Considerations

None of the special considerations described in Section 2.1.12 apply to this corridor.

3.2 Kanuti Flats Corridor

3.2.1 General Route Description

This corridor is approximately 240 miles long and also extends from the Ambler mineral belt to the Dalton Highway (Figures 4 and 5). This corridor stays primarily in the lowlands south of the Brooks Range and south of GANPP. This corridor ties into Brooks East Corridor at the Prospect-Bettles Winter Trail, a few miles southeast of Evansville. The evaluation of this route is summarized in Table 4.

Table 4: Kanuti Flats Corridor Evaluation

Criterion	Value	Score
Corridor Length (miles)	240	5
Federal CSU (unit/miles/percentage of corridor)	None	5
Wild and Scenic Rivers	None	5
Salmon/Sheefish Rivers Total Mapped Anadromous Assumed Anadromous	54 14 41	4
Caribou Habitat	Less	5
Threatened/Endangered Species/Critical Habitat	None	5
Wetland Habitats (miles)	115	2
Material Site Availability (percent of corridor with material site within 10 miles)	75%	3
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	14/5,440 ft None 212	5
Construction Cost[1] (in millions)	$510	4
Annual Maintenance Cost (in millions)	$9.1	4
Special Considerations None	NA	NA
	Total Score	**47**

1. Costs rounded to tens of millions.

3.2.2 Corridor Length

This corridor is 240 miles long; one of the shortest of the potential corridors. The corridor is given a score of 5 for this criterion.

3.2.3 Federal Conservation Systems

This corridor does not cross through any CSUs, although it is in the vicinity of GANPP and the Kanuti National Wildlife Refuge (NWR). This corridor is given a score of 5 for this criterion.

3.2.4 Wild and Scenic Rivers

This corridor does not cross any WSRs. This corridor is given a score of 5 for this criterion.

3.2.5 Salmon/Sheefish Rivers

This corridor crosses 14 mapped anadromous streams and 41 streams assumed to be anadromous, for a total of 54. This is one of the lowest number of anadromous streams crossed by any corridor, so this corridor is given a score of 4 for this criterion.

3.2.6 Caribou Habitat

This corridor crosses through migratory areas and the outer range of the WACH. This corridor and other corridors that head east from the Ambler mineral belt cross less WACH habitat than corridors that head west and are given a score of 5 for this criterion.

3.2.7 Threatened and Endangered Species and Critical Habitat Areas

This corridor does not cross through areas where threatened or endangered species and critical habitat areas are found, and is given a score of 5 for this criterion.

3.2.8 Wetland Habitats

This corridor crosses through 115 miles of habitat preliminarily mapped as wetlands and is given a score of 2 for this criterion.

3.2.9 Availability of Material Sites

This corridor has material sites available every 10 miles for approximately 75% of the corridor, and is given a score of 3 for this criterion.

3.2.10 Large Bridges

This corridor has 212 major stream crossings, including 14 large bridges that span a total of 5,440 linear feet. This corridor has one of the lowest total lengths of large bridges, and is given a score of 5 for this criterion.

3.2.11 Construction Cost

The total estimated construction cost for this corridor is $510 million (Appendix A). This is the second lowest construction cost of any corridor, and the corridor is given a score of 4 on this criterion.

3.2.12 Maintenance Cost

Estimated annual maintenance cost for the Kanuti Flats Corridor is approximately $9.1 million. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is the second lowest annual maintenance cost for the corridors evaluated; this corridor is given a score of 4 on this criterion.

3.2.13 Special Considerations

None of the special considerations described in Section 2.1.12 apply to this corridor.

3.3 Elliott Highway Corridor

3.3.1 General Route Description

This corridor is the longest road corridor at approximately 370 miles long (Figures 6 and 7). This corridor heads east from the Ambler mineral belt to Siruk Creek, approximately 15 miles east of the GANPP boundary. The corridor then heads south towards Tanana and then turns east and runs along the northern edge of the Yukon River, crossing the Yukon River north of Sixteenmile Lake. The corridor then continues east to the Elliott Highway near Eureka. The evaluation of this route is summarized in Table 5.

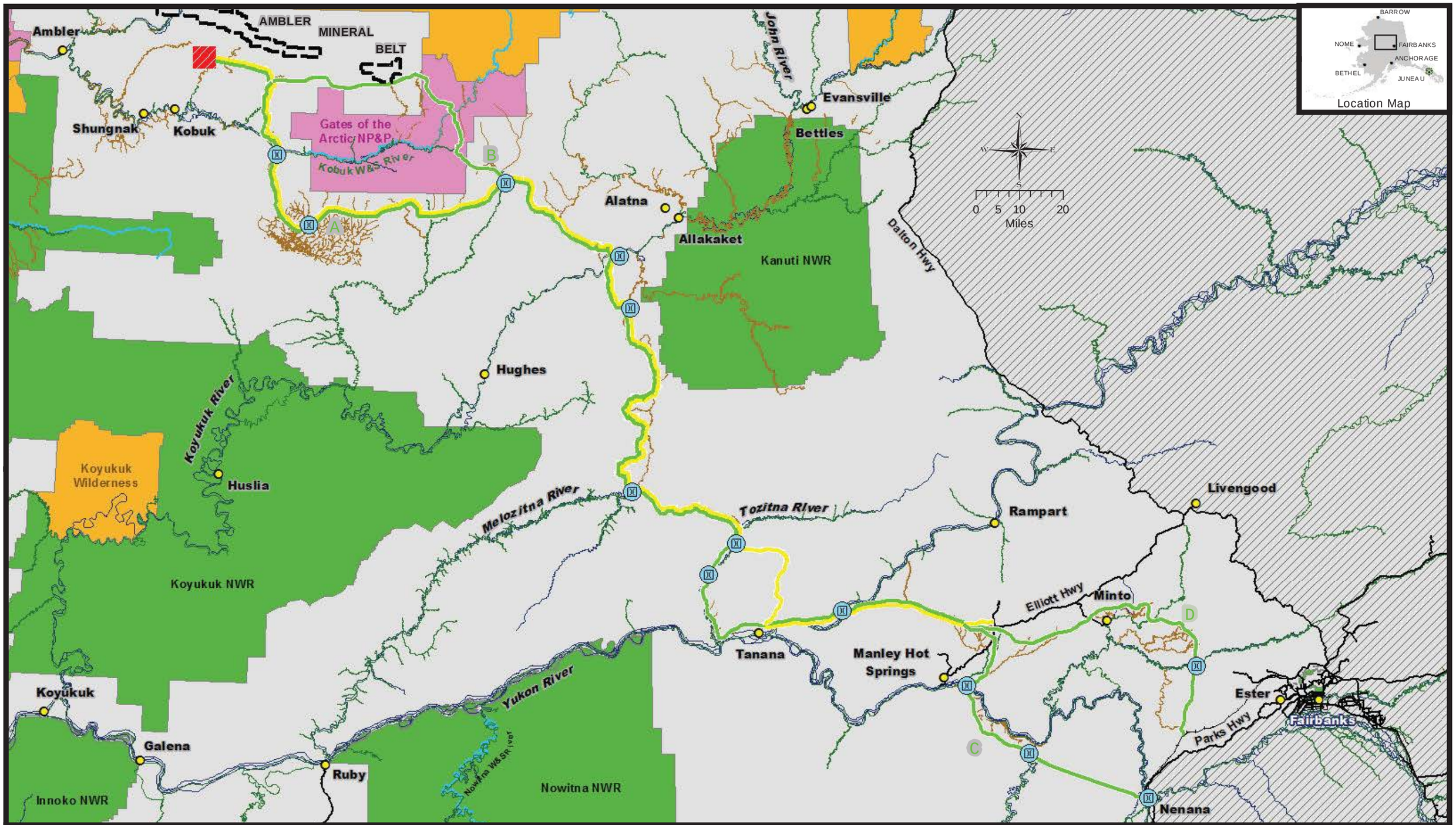
Table 5: Elliott Highway Corridor Evaluation

Criterion	Value	Score
Corridor Length (miles)	370	2
Federal CSU (unit/miles/percentage of corridor)	None	5
Wild and Scenic Rivers	None	5
Salmon/Sheefish Rivers Mapped Anadromous Assumed Anadromous	56 8 48	4
Caribou Habitat	Less	5
Threatened/Endangered Species/Critical Habitat	None	5
Wetland Habitats (miles)	88	3
Material Site Availability (percent of corridor with material site within 10 miles)	84%	4
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	12/7,360 ft Yukon River/2,720 ft 251	2
Construction Cost [1] (in millions)	$990	3
Annual Maintenance Cost (in millions)	$13.5	2
Special Considerations Yukon River Crossing	NA	NA
	Total Score	**40**

1. Costs rounded to tens of millions.

3.3.2 Corridor Length

This corridor is 370 miles long; this is the longest road corridor, but is shorter than the Parks Highway Railroad Corridors. The corridor is given a score of 2 for this criterion.



- Communities and Place Names
- Existing Roads
- Railroad
- Water
- Outside of Project Study Area
- Ambler Mineral Belt
- Proposed Staging Area
- 3-Elliott Hwy Corridor 370 Miles (Road Only)
- 4-Parks Hwy RR Corridor 420-450 Miles (Rail Only)
- Wild and Scenic Rivers
- Cataloged Anadromous Streams
- Assumed Anadromous Streams
- Wildlife Refuge
- Wilderness
- National Park
- National Monuments
- Large Bridges

Note: There is no designated critical habitat in the eastern portion of the study area.

Sources:
Cataloged Anadromous Streams: ADF&G

Coordinate System: NAD 1983 Alaska Albers

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SOUTHEAST CORRIDORS: CRITICAL HABITAT, ANADROMOUS STREAMS AND LARGE BRIDGES

DATE: April 12, 2012 | **Figure 6**

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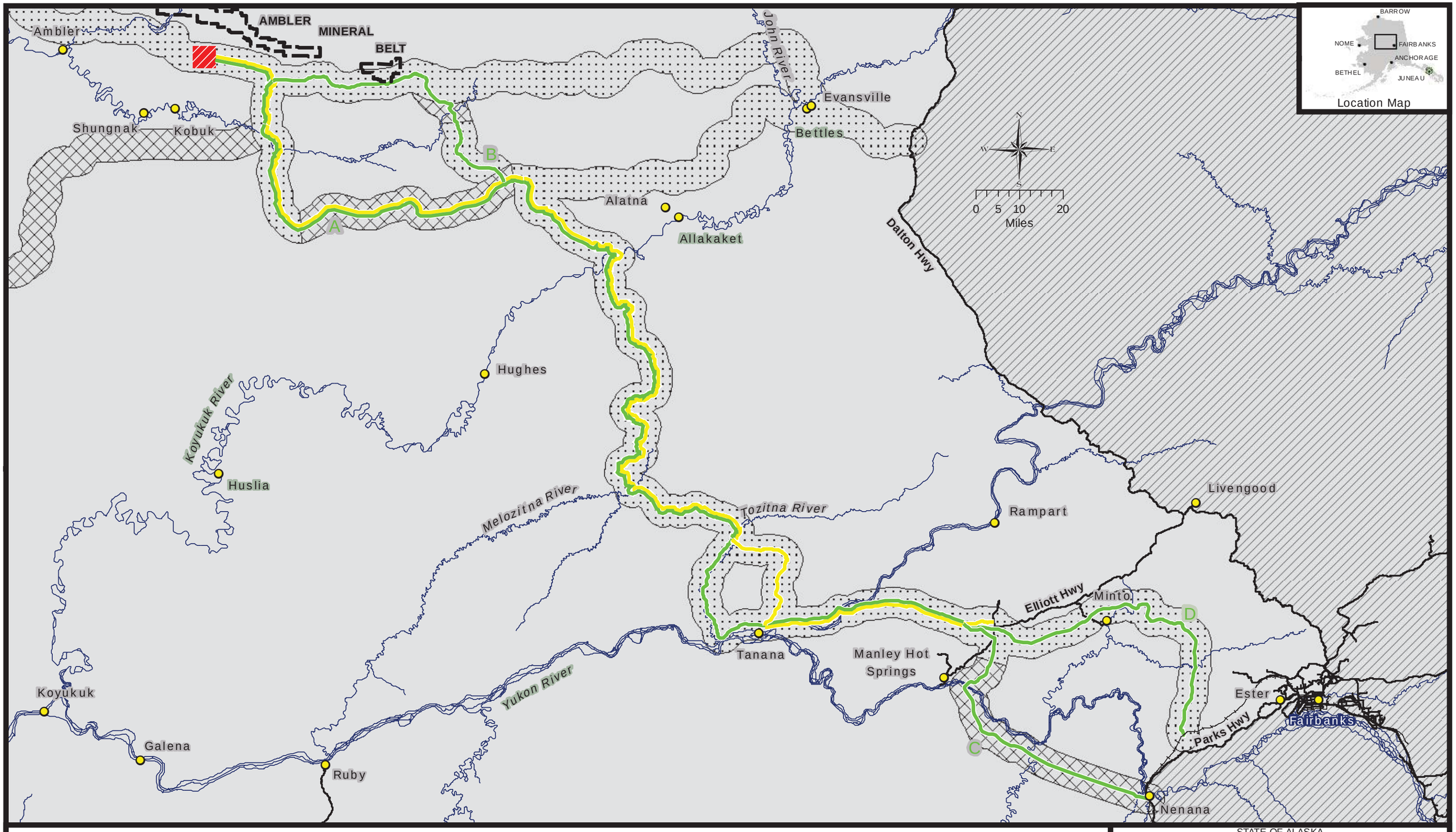

Communities and Place Names
Existing Roads
Railroad
Water

Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area

3-Elliott Hwy Corridor 370 Miles (Road Only)
4-Parks Hwy RR Corridor 420-450 Miles (Rail Only)

Corridor Segments with Material Sites at Less than 10 Mile Intervals
Corridor Segments with Material Sites at Greater than 10 Mile Intervals

Coordinate System: NAD 1983 Alaska Albers

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SOUTHEAST CORRIDORS
MATERIAL SITE AVAILABILITY

DATE: April 19, 2012 | **Figure 7**

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3.3.3 Federal Conservation Systems

This corridor does not cross through any CSUs. The corridor is given a score of 5 for this criterion.

3.3.4 Wild and Scenic Rivers

This corridor does not cross any WSRs. The corridor is given a score of 5 for this criterion.

3.3.5 Salmon/Sheefish Rivers

This corridor crosses 8 mapped anadromous streams and 48 streams assumed to be anadromous, for a total of 56. This is in the lower range of anadromous streams crossed by the corridors, so this corridor is given a score of 4 for this criterion.

3.3.6 Caribou Habitat

This corridor crosses through migratory areas and the outer range of the WACH. This corridor and other corridors that head east from the Ambler mineral belt cross the least habitat for this major caribou herd, and are given a score of 5 for this criterion.

3.3.7 Threatened and Endangered Species and Critical Habitat Areas

This corridor does not cross through areas where threatened or endangered species or critical habitat areas are found, and it is given a score of 5 for this criterion.

3.3.8 Wetland Habitats

This corridor crosses through 88 miles of habitat preliminarily mapped as wetlands and is given a score of 3 for this criterion.

3.3.9 Availability of Material Sites

This corridor has material sites available every 10 miles for 84% of its length. It is given a score of 4 for this criterion.

3.3.10 Large Bridges

This corridor has 251 major stream crossings, including 12 large bridges with a total of 7,360 feet of large bridge spans. This corridor has one of the lowest numbers of large bridges but has one of the greatest amounts of large bridge spans, and is given a score of 2 for this criterion.

3.3.11 Construction Cost

The total estimated construction cost for this corridor is $990 million (Appendix A). This construction cost is at the high end of construction costs for road corridors. The corridor is given a score of 3 on this criterion.

3.3.12 Maintenance Cost

Estimated annual maintenance cost for the Elliott Highway Corridor is approximately $13.5 million. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is the highest annual maintenance cost of all the road corridors evaluated; this corridor is given a score of 2 on this criterion.

3.3.13 Special Considerations

This corridor includes a Yukon River crossing. The Yukon River is one of the largest river systems in Alaska and poses significant engineering and permitting challenges.

3.4 Parks Highway Railroad Corridor

3.4.1 General Route Description

The Parks Highway Railroad Corridor follows the Elliott Highway Corridor from the Ambler mineral belt to the Tozitna River (Figures 6 and 7). At the Tozitna River, the railroad corridor follows the river south to the Yukon River, approximately 10 miles west of Tanana. The corridor then heads east and follows the Elliott Highway Corridor to a point approximately 5 miles west of Eureka.

Two options were evaluated for both the northern and southern portions of this railroad corridor; therefore, the length of the corridor varies from 420 to 450 miles. On the northern portion of the corridor, Option A follows the Elliott Highway Corridor to Siruk Creek. Option B follows the Brooks East Corridor from the Ambler mineral belt east to the boundary of GANPP. Option B heads south through GANPP just west of Nutuvukti Lake to Siruk Creek. Although it enters GANPP and crosses the Kobuk WSR, Option B has less steep terrain and is shorter than Option A.

On the southern portion of the corridor, Option C heads southeast from the Elliott Highway to the existing rail system at Nenana. Option D heads east and south from the Elliott Highway to the existing rail track at Dunbar.

Four corridor alignments are possible given the options at the north and south end of the corridor:

- Parks Highway Railroad Corridor A - Options B and D
- Parks Highway Railroad Corridor B - Options A and D
- Parks Highway Railroad Corridor C - Options B and C
- Parks Highway Railroad Corridor D - Options A and C

The evaluation of these corridor alignments is summarized in Table 6.

Table 6: Parks Highway Railroad Corridor Evaluation

Criterion	Corridor A	Score	Corridor B	Score	Corridor C	Score	Corridor D	Score
Corridor Length (miles)	430	1	450	1	420	1	440	1
Federal CSU (unit/miles/percentage of corridor)	GANPP/ 26 miles/6%	5[1]	None	5	GANPP/ 26 miles/6%	5[1]	None	5
Wild and Scenic Rivers	Kobuk WSR	5[1]	None	5	Kobuk WSR	5[1]	None	5
Salmon/Sheefish Rivers Mapped Anadromous Assumed Anadromous	71 8 63	2	62 9 53	3	84 12 72	1	75 13 62	2
Caribou Habitat	Less	5	Less	5	Less	5	Less	5
Threatened/Endangered Species/Critical Habitat	None	5	None	5	None	5	None	5
Wetland Habitats (miles**)**	151	0	138	1	141	1	129	1
Material Site Availability (percent of corridor with material site within 10 miles)	96%	5	87%	4	80%	3	72%	3
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	13/7,470 Yukon River/2,720 ft 257	2	17/10,410 Yukon River/2,720 ft 228	0	13/7,730 Yukon River/2,720 ft 309	2	17/10,670 Yukon River/2,720 ft 280	0
Construction Cost[2] (in millions)	$1,880	0	$1,990	0	$1,990	0	$2,010	0
Annual Maintenance Cost (in millions)	$17.3	0	$18.0	0	$16.9	0	$17.6	0
Special Considerations Annual Railway Operating Cost	$11.1	NA	$11.6	NA	$10.8	NA	$11.4	NA
Very Large Bridges	Yukon River	NA	Yukon River	NA	Yukon River	NA	Yukon River	NA
Total Score		**30**		**29**		**28**		**27**

1. Access through GANPP was recognized in ANILCA.
2. Costs rounded to tens of millions

3.4.2 Corridor Length

The corridor length for this rail corridor varies from 420 to 450 miles, as shown below (Table 7). Regardless of the options, each of these corridors is longer than any road corridor evaluated. All of the Parks Highway Railroad Corridors are given a score of 1 for this criterion.

Table 7: Parks Highway Railroad Corridor Lengths

Corridor	Options Included	Length (miles)	Score
Corridor A	B, D	430	1
Corridor B	A, D	450	1
Corridor C	B, C	420	1
Corridor D	A, C	440	1

3.4.3 Federal Conservation Systems

The primary portion of the rail corridors does not cross through any CSUs. Option B at the northern end of the corridor passes through 2.6 miles of the preserve portion of GANPP. Rail corridors using Option B (Parks Highway Corridors A and C) are given a score of 5 for this criterion, since ANILCA identified the need for an access corridor through GANPP. The rail corridors using Option A (Parks Highway Corridors B and D) are also given a score of 5.

3.4.4 Wild and Scenic Rivers

Rail corridors A and C cross the Kobuk WSR, with span lengths of approximately 400 feet. Since ANILCA includes provisions for access across the Kobuk WSR, these corridors are given a score of 5 for this criterion. Rail corridors B and D do not cross any WSRs and are also given a score of 5.

3.4.5 Salmon/Sheefish Rivers

These corridors cross between 62 and 84 streams that are either mapped or assumed to to be anadromous (Table 8). These numbers are in the high to middle range of anadromous streams crossed by all corridors, so each of these corridors are given scores from 1 to 3 for this criterion.

Table 8: Parks Highway Railroad Corridor Anadromous Streams

Corridor	Mapped	Assumed	Total	Score
Corridor A	8	63	71	2
Corridor B	9	53	62	3
Corridor C	12	72	84	1
Corridor D	13	62	75	2

3.4.6 Caribou Habitat

These rail corridors cross through migratory areas and the outer range of the WACH. These corridors cross less habitat than any of the corridors that head west and are similar to the other corridors that head east. These corridors are all given a score of 5 for this criterion.

3.4.7 Threatened and Endangered Species and Critical Habitat Areas

None of the Parks Highway Railroad Corridors traverse areas where threatened or endangered species are found. All of the Parks Highway Railroad Corridors are given a score of 5 for this criterion.

3.4.8 Wetland Habitats

The Parks Highway Railroad Corridors traverse between 129 and 151 miles of wetland habitats. Parks Highway Railroad Corridors are given a score of 0 or 1 for this criterion (Table 9).

Table 9: Parks Highway Railroad Corridor Wetlands Habitats

Corridor	Length of Wetland Habitats Traversed (miles)	Score
Corridor A	151	0
Corridor B	138	1
Corridor C	141	1
Corridor D	129	1

3.4.9 Availability of Material Sites

These corridors have material sites available every 10 miles for the majority of their lengths, and scores range from 3 to 5 for this criterion (Table 10).

Table 10: Parks Highway Railroad Corridor Material Site Availability

Corridor	Percent of Corridor w/Material Sites within 10 miles	Score
Corridor A	96%	5
Corridor B	87%	4
Corridor C	80%	3
Corridor D	72%	3

3.4.10 Large Bridges

The large bridges crossed by Parks Highway Railroad Corridors A and C are in the lower range in number of large bridges compared to other corridors. The total length of large bridges is in

the high range, and these corridors are given a score of 2 (Table 11). Parks Highway Railroad Corridors B and D are in the middle range when compared to other corridors in number of large bridges. The total length of large bridges are the highest of any corridors, so these are given a score of 0.

Table 11: Parks Highway Railroad Corridor Large Bridges

Corridor	Large Bridges	Length of Large Bridge Spans (feet)	Score
Corridor A	13	7,470	2
Corridor B	17	10,410	0
Corridor C	13	7,730	2
Corridor D	17	10,670	0

3.4.11 Construction Cost

The total estimated construction cost for these rail corridors ranges from $1,880 million for Parks Highway Railroad Corridor A to $2,010 million for Parks Highway Railroad Corridor D. All of the Parks Highway Railroad Corridors have higher construction costs than any of the road corridors evaluated. All of these rail corridors are given a score of 0 on this criterion.

3.4.12 Maintenance Cost

Estimated annual maintenance costs range from $16.9 million to $18.0 million. These costs are significantly more than the maintenance costs for any road option or for any of the other rail options. These corridors are given a score of 0 on this criterion.

3.4.13 Special Considerations

The Parks Highway Railroad Corridors will require an additional operating cost for daily operations of the railroad. Estimated annual operating costs range from $10.8 million for Parks Highway Railroad Corridor C to $11.6 million for Parks Highway Railroad Corridor B.

All of the Parks Highway Corridors cross the Yukon River, the largest river system in Alaska, and will face significant engineering and permitting challenges.

3.5 DMTS Port Corridor

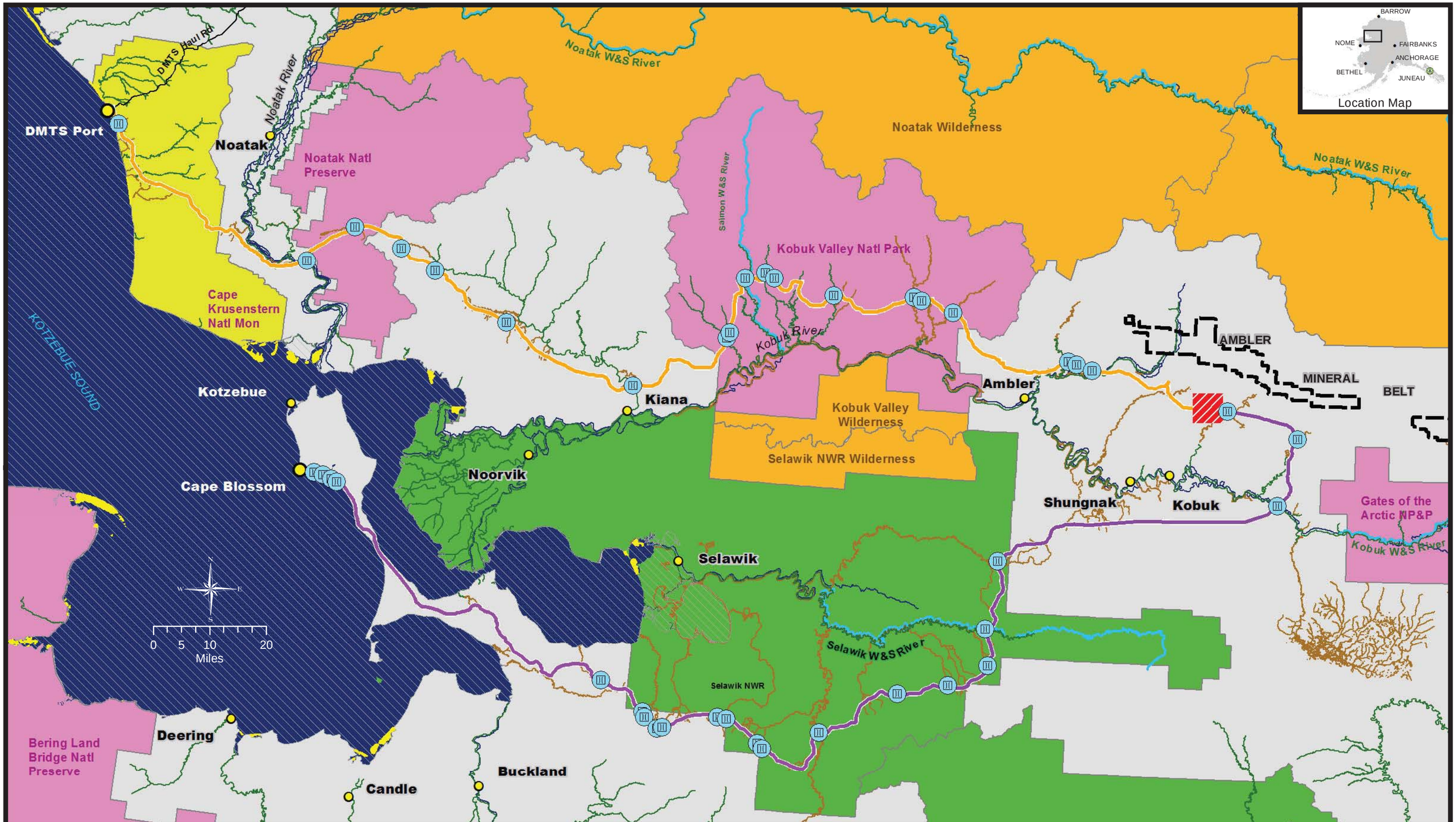
3.5.1 General Route Description

This northwest corridor extends approximately 260 miles between the Ambler mineral belt and DMTS Port (Figures 8 and 9). The corridor travels west through the Ambler Lowlands along the southern reaches of the Brooks Range, through Kobuk Valley National Park (KVNP), Noatak National Preserve (NNP) and Cape Krusenstern National Monument to the DMTS Port. The evaluation of this route is summarized in Table 12.

Table 12: DMTS Port Corridor Evaluation

Criterion	Road	Score	Rail	Score
Corridor Length (miles)	260	4	260	4
Federal CSU (unit/miles/percentage of corridor)	KVNP/NNP/CKNM/ 114 miles/44%	0	GANPP/CKNM/ 114 miles/44%	0
Wild and Scenic Rivers	Salmon WSR	0	Salmon WSR	0
Salmon/Sheefish Rivers Total Mapped Anadromous Assumed Anadromous	76 13 63	2	76 13 63	2
Caribou Habitat	More	0	More	0
Threatened/Endangered Species/Critical Habitat	Steller's eider yellow-billed loon polar bear	0	Steller's eider yellow-billed loon polar bear	0
Wetland Habitats (miles)	40	4	40	4
Material Site Availability (percent of corridor with material site within 10 miles)	70%	2	70%	2
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	19/8,440 Noatak River/1,560 ft 213	1	19/8,440 Noatak River/1,560 ft 213	1
Construction Cost[1] (in millions)	$720	4	$1,250	2
Annual Maintenance Cost (in millions)	$9.5	4	$10.6	3
Special Considerations Port Construction Annual Railway Operating Cost Very Large Rivers	 No NA Noatak River	 NA NA NA	 No $6.7 Noatak River	 NA NA NA
Total Score		**21**		**18**

1. Costs rounded to tens of millions.



- Communities and Place Names
- Existing Roads
- Water
- Ambler Mineral Belt
- Proposed Staging Area
- 5-DMTS Port Corridor 260 Miles (Road & Rail)
- 6-Cape Blossom Corridor 250 Miles (Road & Rail)
- Wild and Scenic Rivers
- Cataloged Anadromous Streams
- Assumed Anadromous Streams
- Spectacled Eider Critical Habitat
- **Polar Bear**
- Barrier Islands Critical Habitat
- Feeding Critical Habitat
- Wildlife Refuge
- Wilderness
- National Park
- National Monuments
- Large Bridges

Sources:
Cataloged Anadromous Streams: ADF&G

Coordinate System: NAD 1983 Alaska Albers

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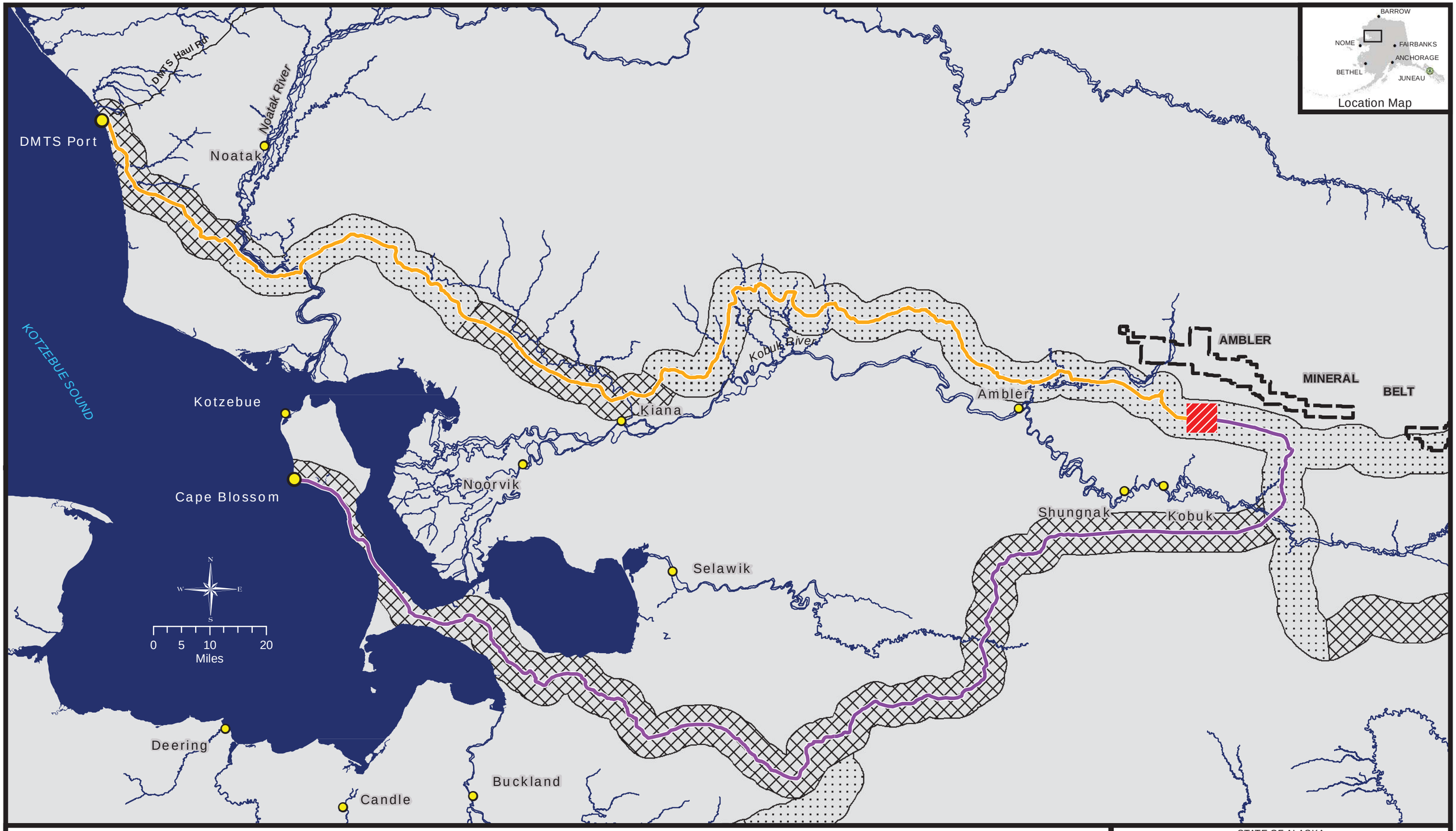
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

WEST CORRIDORS: CRITICAL HABITAT, ANADROMOUS STREAMS AND LARGE BRIDGES

DATE: April 19, 2012 | **Figure 8**

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 8 West Corridors.mxd Apr 19, 2012 5:12:21 PM User: cfelker



Communities and Place Names
Existing Roads
Water
Ambler Mineral Belt
Proposed Staging Area
5-DMTS Port Corridor 260 Miles (Road & Rail)
6-Cape Blossom Corridor 250 Miles (Road & Rail)
Corridor Segments with Material Sites at Less than 10 Mile Intervals
Corridor Segments with Material Sites at Greater than 10 Mile Intervals

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
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NORTHERN REGION

AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

WEST CORRIDORS
MATERIAL SITE AVAILABILITY

DATE: April 19, 2012 | **Figure 9**

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 9 West Corridors Material Site.mxd Apr 19, 2012 3:47:10 PM User: cfelker

3.5.2 Corridor Length

This corridor is 260 miles long; in the lower range of the potential corridors. The corridor is given a score of 4 for this criterion.

3.5.3 Federal Conservation Systems

This corridor crosses through three CSUs: KVNP, NNP, and Cape Krusenstern National Monument. The length of the corridor within the CSU is approximately 114 miles, or 44% of the corridor length. This corridor has the most mileage through CSUs, and is given a score of 0 for this criterion.

3.5.4 Wild and Scenic Rivers

This corridor crosses the Salmon WSR, with a span of approximately 360 feet. This corridor was given a score of 0 for this criterion.

3.5.5 Salmon/Sheefish Rivers

This corridor crosses 13 mapped anadromous streams and 63 streams assumed to be anadromous, for a total of 76. This is in the high range in the number of anadromous streams crossed by any corridor, so this corridor is given a score of 2 for this criterion.

3.5.6 Caribou Habitat

This corridor is completely within mapped migratory and summer range for the WACH. The corridor is given a score of 0 for this criterion.

3.5.7 Threatened and Endangered Species and Critical Habitat Areas

This corridor has the potential to affect areas where Steller's eider, yellow-billed loon, and polar bear may be found. It is given a score of 0 for this criterion.

3.5.8 Wetland Habitats

This corridor crosses through 40 miles of habitat preliminarily mapped as wetlands and is given a score of 4 for this criterion.

3.5.9 Availability of Material Sites

This corridor has material sites available every 10 miles for 70% of its length, and is given a score of 2 for this criterion.

3.5.10 Large Bridges

This corridor has 213 major stream crossings, including 19 large bridges with a total of 8,440 feet of large bridge spans. This corridor is in the higher range in numbers of large bridges and total length of large bridges, and is given a score of 1 for this criterion.

3.5.11 Construction Cost

The total estimated roadway construction cost for this corridor is $720 million for a roadway (Appendix A). This corridor is in the low range for road construction costs, and the corridor is given a score of 4 on this criterion. Construction costs for a rail system on the DMTS corridor is $1,250 million. This is in the low range of cost for rail corridors, but is much higher than the cost of any of the road corridors. The DMTS Port Rail corridor is given a score of 2 on construction cost.

3.5.12 Maintenance Cost

Estimated annual maintenance costs for the DMTS Port Corridor are approximately $9.5 million for a road corridor. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is in the lower range of maintenance costs for road corridors evaluated; this road corridor is given a score of 4 on this criterion. Annual maintenance costs for a rail corridor along this alignment are estimated at $10.6 million. These costs are significantly more than the maintenance costs for any road corridor but less than for some other rail corridors. This rail corridor is given a score of 3 on maintenance costs.

3.5.13 Special Considerations

The DMTS rail corridor would require additional costs for operation of a railroad, estimated at $6.7 million per year. This corridor also crosses the Noatak River, which is a very large river, resulting in increased engineering and permitting complexity.

3.6 Cape Blossom Corridor

3.6.1 General Route Description

This corridor connects the Ambler mineral belt to Cape Blossom on the Baldwin Peninsula and is approximately 250 miles long (Figures 8 and 9). The corridor heads east and south from the Ambler mineral belt through the Selawik National Wildlife Refuge (NWR) and then west to Cape Blossom. Although Cape Blossom is not a developed port, it has been the subject of numerous studies due to the potential for accessing deeper marine waters compared to most other locations on the west coast of Alaska. The evaluation of this route is summarized in Table 13.

Table 13: Cape Blossom Corridor Evaluation

Criterion	Road	Score	Rail	Score
Corridor Length (miles)	250	5	250	5
Federal CSU (unit/miles/percentage of corridor)	Selawik NWR/ 94 miles/38%	0	Selawik NWR/ 94 miles/38%	0
Wild and Scenic Rivers	Selawik WSR	0	Selawik WSR	0
Salmon/Sheefish Rivers Total Mapped Anadromous Assumed Anadromous	85 2 83	1	85 2 83	1
Caribou Habitat	More	0	More	0
Threatened/Endangered Species/Critical Habitat	yellow-billed loon polar bear	0	yellow-billed loon polar bear	0
Wetland Habitats (miles)	144	1	144	1
Material Site Availability (percent of corridor with material site within 10 miles)	10%	0	10%	0
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	22/9,250 None 221	0	22/9,250 None 221	0
Construction Cost[1] (in millions)	$860	3	$1,330	2
Annual Maintenance Cost (in millions)	$9.2	4	$10.2	4
Special Considerations Port Construction Annual Railway Operating Cost	 Yes NA	 NA NA	 Yes $6.3	 NA NA
Total Score		**14**		**13**

1. Costs rounded to tens of millions.

3.6.2 Corridor Length

This corridor is 250 miles long; in the lower range of corridor lengths. The corridor is given a score of 5 for this criterion.

3.6.3 Federal Conservation Systems

This corridor crosses through one CSU, Selawik NWR. The length of the corridor within the CSU is approximately 94 miles, or 38% of the corridor length. This corridor is given a score of 0 for this criterion.

3.6.4 Wild and Scenic Rivers

This corridor crosses the Selawik WSR, with a span of approximately 280 feet. This corridor is given a score of 0 for this criterion.

3.6.5 Salmon/Sheefish Rivers

This corridor crosses two mapped anadromous streams and 83 streams assumed to be anadromous, for a total of 85. This is in the high range in number of anadromous streams crossed, so this corridor is given a score of 1 for this criterion.

3.6.6 Caribou Habitat

This corridor is completely within mapped migratory and winter range for the WACH. The corridor is given a score of 0 for this criterion.

3.6.7 Threatened and Endangered Species and Critical Habitat Areas

The corridor has potential to affect areas where polar bear and yellow-billed loons could be found. The corridor is given a score of 0 for this criterion.

3.6.8 Wetland Habitats

This corridor crosses through 144 miles of habitat preliminarily mapped as wetlands and is given a score of 1 for this criterion.

3.6.9 Availability of Material Sites

This corridor has material sites available every 10 miles for only 10% of its length; it is given a score of 0 for this criterion.

3.6.10 Large Bridges

This corridor has 221 major stream crossings, including 24 large bridges that span a total of 9,250 linear feet. This corridor has one of the higher numbers of large bridges and large bridge lengths, and is given a score of 0 for this criterion.

3.6.11 Construction Cost

The total estimated roadway construction cost for this corridor is $860 million (Appendix A). This is in the middle range of road construction costs and the corridor is given a score of 3 on this criterion. Construction costs for a rail system on the Cape Blossom Corridor is $1,330 million. This is in the low range of cost for rail corridors, but is much higher than the cost of any of the road corridors. The Cape Blossom Corridor for rail is given a score of 2 on construction cost.

3.6.12 Maintenance Cost

Estimated annual maintenance cost for the Cape Blossom Corridor is approximately $9.2 million. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is in the low range of maintenance costs for the corridors evaluated; this corridor is given a score of 4 on this criterion. Annual maintenance costs for a Cape Blossom rail corridor are estimated at $10.2 million. This is the lowest maintenance cost for any rail option. This corridor is given a score of 4 on maintenance costs.

3.6.13 Special Considerations

This corridor connects to an area that has been studied and found to have good potential as a port site, but no port currently exists. Port construction costs and timeframe are not known and could complicate this option.

Operating costs for a railroad on the Cape Blossom Corridor are estimated at $6.3 million per year.

3.7 Selawik Flats Corridor

3.7.1 General Route Description

Selawik Flats Corridor extends approximately 330 miles from the Ambler mineral belt to Council, on the Seward Peninsula (Figures 10 and 11). The corridor follows the Cape Blossom Corridor from the Ambler mineral belt to near the southern boundary of the Selawik NWR. From there, the Selawik Flats Corridor heads west-southwest to Council. At Council, the corridor connects to the Nome-Council Road. The evaluation of this route is summarized in Table 14.

Table 14: Selawik Flats Corridor Evaluation

Criterion	Road	Score	Rail	Score
Corridor Length (miles)	330	3	330	3
Federal CSU (unit/miles/percentage of corridor)	Selawik NWR/ 77 miles/23%	0	Selawik NWR/ 77 miles/23%	0
Wild and Scenic Rivers	Selawik WSR	0	Selawik WSR	0
Salmon/Sheefish Rivers Total Mapped Anadromous Assumed Anadromous	71 23 48	2	71 23 48	2
Caribou Habitat	More	0	More	0
Threatened/Endangered Species/Critical Habitat	yellow-billed loon	3	yellow-billed loon	3
Wetland Habitats (miles)	78	3	78	3
Material Site Availability (percent of corridor with material site within 10 miles)	57%	1	57%	1
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	21/7,470 ft None 185	2	21/7,470 ft None 185	2
Construction Cost[1] (in millions)	$960	3	$1,560	0
Annual Maintenance Cost (in millions)	$12.8	2	$13.8	2
Special Considerations Port Construction Annual Railway Operating Cost	Yes NA	NA NA	Yes $8.6	NA NA
Total Score		**19**		**16**

1. Costs rounded to tens of millions.

Kotzebue
Kiana
Ambler
AMBLER
MINERAL
BELT
KOTZEBUE SOUND
Cape Blossom
Noorvik
Kobuk Valley
Wilderness
Selawik NWR Wilderness
Shungnak
Kobuk
Gates of the
Arctic NP&P
Kobuk W&S River
Selawik
Selawik W&S River
Selawik NWR
Alatna
Deering
Bering Land
Bridge Natl
Preserve
Candle
Buckland
Hughes
Koyukuk River
Koyukuk
Wilderness
Huslia
Melozitna River
Koyukuk NWR
Death
Valley
Council
Nome -
Council Rd
Koyuk
White Mountain
Golovin
Elim
NORTON SOUND
Cape Darby
Koyukuk
Nulato
Galena
Yukon River
Ruby
Innoko NWR
Nowitna NWR
Nowitna W&S River
0 5 10 20
Miles

BARROW
NOME
FAIRBANKS
ANCHORAGE
BETHEL
JUNEAU
Location Map

Communities and Place Names
Existing Roads
Water
Ambler Mineral Belt
Proposed Staging Area
7-Selawik Flats Corridor
330 Miles (Road & Rail)
8-Cape Darby Corridor
340 Miles (Road & Rail)
Wild and Scenic Rivers
Cataloged Anadromous Streams
Assumed Anadromous Streams
Spectacled Eider Critical Habitat
Polar Bear
Barrier Islands Critical Habitat
Feeding Critical Habitat
Wildlife Refuge
Wilderness
National Park
National Monuments
Large Bridges

Sources:
Cataloged Anadromous Streams: ADF&G

Coordinate System: NAD 1983 Alaska Albers

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NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
SUMMARY REPORT

SOUTHWEST CORRIDORS: CRITICAL HABITAT, ANADROMOUS STREAMS AND LARGE BRIDGES

DATE: May 02, 2012 | **Figure 10**

\\anc-hg-fs01\Autocad\Projects\D60693\GIS\Summary Report\19April2012\Figure 10 Southwest Corridors.mxd May 02, 2012 10:43:33 AM User: cfelker

Kotzebue
KOTZEBUE SOUND
Cape Blossom
Kiana
Noorvik
Selawik
Deering
Candle
Buckland
Ambler
AMBLER
MINERAL
BELT
Shungnak
Kobuk
Alatna
Hughes
Koyukuk River
Huslia
Melozitna River
Yukon River
Council
Nome-Council Rd
Koyuk
White Mountain
Golovin
Elim
NORTON SOUND
Cape Darby
Koyukuk
Nulato
Galena
Ruby
0 5 10 20
Miles

BARROW
NOME
FAIRBANKS
ANCHORAGE
BETHEL
JUNEAU
Location Map

- Communities and Place Names
- Existing Roads
- Water
- Ambler Mineral Belt
- Proposed Staging Area
- 7-Selawik Flats Corridor 330 Miles (Road & Rail)
- 8-Cape Darby Corridor 340 Miles (Road & Rail)
- Corridor Segments with Material Sites at Less than 10 Mile Intervals
- Corridor Segments with Material Sites at Greater than 10 Mile Intervals

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
PRELIMINARY MATERIAL SITE/GEOTECHNICAL RECONNAISSANCE

SOUTHWEST CORRIDORS
MATERIAL SITE AVAILABILITY

DATE: April 19, 2012 | **Figure 11**

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 11 Southwest Corridors Material Site.mxd Apr 19, 2012 3:52:03 PM User: cfelker

3.7.2 Corridor Length

This corridor is 330 miles long; in the middle range of the road corridors. The corridor is given a score of 3 for this criterion.

3.7.3 Federal Conservation Systems

This corridor crosses through one CSU, Selawik NWR. The length of the corridor within the CSU is approximately 77 miles, or 23% of the corridor length. The length of this corridor within the CSUs is high relative to other corridors, so this corridor is given a score of 0 for this criterion.

3.7.4 Wild and Scenic Rivers

This corridor crosses the Selawik WSR, with a span length of approximately 280 feet. The corridor is given a score of 0 for this criterion.

3.7.5 Salmon/Sheefish Rivers

This corridor crosses 23 mapped anadromous streams and 48 streams assumed to be anadromous, for a total of 71. This is in the middle range of anadromous streams crossed by any corridor, so this corridor is given a score of 2 for this criterion.

3.7.6 Caribou Habitat

This corridor is mostly within mapped migratory and winter range for the WACH. The corridor is given a score of 0 for this criterion.

3.7.7 Threatened and Endangered Species and Critical Habitat Areas

This corridor crosses through areas where yellow-billed loons may be encountered. The corridor is given a score of 3 for this criterion.

3.7.8 Wetland Habitats

This corridor crosses through 78 miles of habitat preliminarily mapped as wetlands and is given a score of 3 for this criterion.

3.7.9 Availability of Material Sites

This corridor has material sites available every 10 miles for about 57% of the corridor, and is given a score of 1 for this criterion.

3.7.10 Large Bridges

This corridor has 185 major stream crossings, including 21 large bridges with a total of 7,470 feet of large bridge spans. This corridor has neither the highest or lowest numbers of large bridges or large bridge spans, and is given a score of 2 for this criterion.

3.7.11 Construction Cost

The total estimated roadway construction cost for this corridor is $960 million (Appendix A). This is in middle range in construction cost and the corridor is given a score of 3 on this criterion. Construction costs for a rail system on the Selawik Flats corridor is $1,560 million. This is in the middle range of cost for rail corridors, but is much higher than the cost of any of the road corridors. The Selawik Flats Corridor for rail is given a score of 0 on construction cost.

3.7.12 Maintenance Cost

Estimated annual roadway maintenance cost for the Selawik Flats Corridor is approximately $12.8 million. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is in the high to middle range of maintenance costs for the road corridors evaluated; this corridor is given a score of 2 on this criterion. Annual maintenance costs for a Selawik Flats rail corridor are estimated at $13.8 million. This corridor is given a score of 2 on maintenance costs.

3.7.13 Special Considerations

This corridor connects to the Nome-Council Highway, which connects to Nome. An improved deep-water port would be required at Nome to make this corridor usable for mine production. Annual operating costs of the railroad is estimated at $8.6 million.

3.8 Cape Darby Corridor

3.8.1 General Route Description

Cape Darby Corridor extends approximately 440 miles from the Ambler mineral belt to Cape Darby at the southernmost tip of the Seward Peninsula (Figures 10 and 11). The corridor follows the Selawik Flats Corridor from the Ambler mineral belt to Death Valley. It continues south, east of Death Valley until it reaches Cape Darby. Cape Darby is similar to Cape Blossom in that it is an undeveloped location that has been identified as a possible port site with potential for deep marine water access. The evaluation of this route is summarized in Table 15.

Table 15: Cape Darby Corridor Evaluation

Criterion	Road	Score	Rail	Score
Corridor Length (miles)	340	3	340	3
Federal CSU (unit/miles/percentage of corridor)	Selawik NWR/ 77 miles/23%	0	Selawik NWR/ 77 miles/23%	0
Wild and Scenic Rivers	Selawik WSR	0	Selawik WSR	0
Salmon/Sheefish Rivers Total Mapped Anadromous Assumed Anadromous	77 26 51	2	77 26 51	2
Caribou Habitat	More	0	More	0
Threatened/Endangered Species/Critical Habitat	spectacled eider/polar bear/ yellow-billed loon	0	spectacled eider/polar bear/ yellow-billed loon	0
Wetland Habitats (miles)	98	2	98	2
Material Site Availability (percent of corridor with material site within 10 miles)	58%	1	58%	1
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings	25/7,890 ft None 193	2	25/7,890 ft None 193	2
Construction Cost[1] (in millions)	$950	3	$1,570	0
Annual Maintenance Cost (in millions)	$13.1	2	$14.1	2
Special Considerations Port Construction Annual Railway Operating Cost	Yes NA	NA NA	Yes $8.8	NA NA
Total Score		**15**		**12**

1. Costs rounded to tens of millions.

3.8.2 Corridor Length

This corridor is 340 miles long; in the middle range of road corridor lengths. The corridor is given a score of 3 for this criterion.

3.8.3 Federal Conservation Systems

This corridor crosses through one CSU, Selawik NWR. The length of the corridor within the CSU is approximately 77 miles, or 23% of the corridor length. This corridor is given a score of 0 for this criterion.

3.8.4 Wild and Scenic Rivers

This corridor crosses the Selawik WSR, with a span length of approximately 280 feet. This corridor was given a score of 0 for this criterion.

3.8.5 Salmon/Sheefish Rivers

This corridor crosses 26 mapped anadromous streams and 51 streams assumed to be anadromous, for a total of 77 streams. This is in the high to middle range of anadromous streams crossed, so this corridor is given a score of 2 for this criterion.

3.8.6 Caribou Habitat

This corridor is completely within mapped migratory and winter range for the WACH. The corridor is given a score of 0 for this criterion.

3.8.7 Threatened and Endangered Species and Critical Habitat Areas

This corridor has potential to affect areas where polar bear, spectacled eiders, and yellow-billed loons may be found, and is given a score of 0 for this criterion.

3.8.8 Wetland Habitats

This corridor crosses through 98 miles of habitat preliminarily mapped as wetlands and is given a score of 2 for this criterion.

3.8.9 Availability of Material Sites

This corridor has material sites available every 10 miles for about 58% of the corridor, and is given a score of 1 for this criterion.

3.8.10 Large Bridges

This corridor has 193 major stream crossings, including 25 large bridges that span a total of 7,890 linear feet. This corridor has one of the highest numbers of large bridges and large bridge spans, and is given a score of 2 for this criterion.

3.8.11 Construction Cost

The total estimated road construction cost for this corridor is $950 million (Appendix A). This is in the upper range of road construction costs, but lower than all the rail corridors, and the corridor is given a score of 3 on this criterion.

Construction costs for a rail system on the Cape Darby Corridor is $1,570 million. This is in the low to middle range of cost for rail corridors, but is much higher than the cost of any of the road corridors. The Cape Darby Corridor for rail is given a score of 0 on construction cost.

3.8.12 Maintenance Cost

Estimated annual road maintenance cost for the Cape Darby Corridor is approximately $13.1 million. Initial maintenance camp construction and annual maintenance are summarized in Appendix A. This is in the high range of maintenance costs for the corridors evaluated; this corridor is given a score of 2 on this criterion. Annual maintenance costs for a Cape Darby rail corridor are estimated at $14.1 million, resulting in a score of 2 on this criterion.

3.8.13 Special Considerations

This corridor connects to an area that has been identified as a potential deep-water port site, but no port currently exists. Annual rail operating costs are estimated at $8.8 million.

3.9 Rail versus Road Considerations

Two modes of transportation are addressed in evaluating the potential corridors: road and railroad. Some potential corridors would work for either road or rail, other corridors are suitable for a road but not rail. This section summarizes general advantages and disadvantages of road versus rail access.

Railroad corridors have a number of safety, efficiency, and access reliability advantages over road corridors. Railroad accidents occur much less frequently than vehicular accidents.

Between 1998 and 2008, there was an average of 3,237,000 large truck (greater than 10,000 pounds) accidents annually across the country. An average of 2,900 railroad accidents occurred during that same timeframe, not including accidents at grade crossings. Truck traffic during that period was 1.23 trillion ton-miles, compared to 1.64 trillion ton-miles of train traffic (United States Department of Transportation [USDOT], 2009). Thus, rail transport results in a lower likelihood of accidents for the same or more freight.

Rail can also move a greater volume of freight in a shorter period of time, and with less staff. An average train moves more than 500,000-ton-miles/day versus an average truck's 20,000 ton-miles/day (American Railway Engineering and Maintenance-of-Way Association [AREMA], 2003). Trains also require less energy to move freight. By design, locomotive engines require 2.5 horsepower to move a ton of freight at low speed (less than 20 miles per hour). Trucks tend to require approximately 10 to 20 horsepower/ton (Association of American Railroads [ARR], 2010).

An additional benefit of a railroad corridor is improved reliability. Snow and ice are frequent in the project study area. While this causes frequent problems for trucks, it does not typically interrupt rail freight service, making transportation via railroad more timely and dependable.

Access can also be controlled more easily with rail than with a road. It is difficult to limit access by road, without gates, fencing, institutional restrictions, and enforcement. A railroad track limits access for the general public without using gates or other control measures.

Roadway corridors do have some advantages over railroad corridors. A primary advantage of a road corridor over a rail corridor is cost. Railroads have a much higher capital cost due to more restrictive vertical geometric constraints and the added costs of railroad components, such as track, ties, ballast, and other track materials. A roadway corridor, by comparison, will only have embankment and surfacing costs. Rail tracks also require some specialized equipment for maintenance, such as tampers, to reestablish the desired railroad grade and redistribute ballast. Compared to standard earthmoving equipment used for roadway construction and maintenance, this equipment is less readily available and has less utility for other purposes.

A roadway network is easier to expand in order to connect other communities to the new corridor. A railroad network to other communities would be unrealistic with the higher cost of

materials, additional embankment costs, and low freight volume. Since railroads are developed to move massive amounts of freight, smaller loads would likely have to depend on established train schedules to move in and out of the project study area. Trucks, however, could move more freely.

Active mining operations are needed to justify the operating costs of a rail option. Without an active mine, rail operations would likely cease, access to the corridor would again be limited, and benefits of the access corridor to the area villages (i.e., reduced costs of goods and sources) would also cease. A road would remain in operation beyond the life of any mining activities.

Road corridors may also have a lower potential for adverse impacts on large mammals, such as moose and caribou. Trucks are more likely to be able to stop in time to avoid large mammals crossing the road. Railroads have a more difficult time stopping in the event of an encounter with large mammals.

Finally, in general terms, more public subsidies are available for road networks than for railroads. This could be significant for future maintenance and expansion.

4.0 COMMUNITY INPUT ON PROPOSED ACCESS

DOT&PF held numerous public meetings within the communities of the Upper Kobuk Valley and throughout the region in areas that may be affected by the proposed project. These meetings were held to solicit comments, request information about the project study area, and to discuss any preferences regarding the proposed transportation corridors or community connections to the transportation system.

Below is a list of communities and public meeting date.

- Ambler
  - January 10, 2011
  - April 26, 2011
  - December 8, 2011
- Shungnak
  - January 10, 2011
  - April 25, 2011
  - December 7, 2011
- Alatna/Allakaket
  - December 12, 2011
- Bettles/Evansville
  - December 13, 2011
- Selawik
  - December 15, 2011
- Noatak
  - January 18, 2012

- Kobuk
  - January 11, 2011
  - April 26, 2011
  - December 6, 2011
- Kiana
  - May 5, 2011
  - January 17, 2012
- Noorvik
  - December 9, 2011
- Buckland
  - January 19, 2012
- Hughes
  - January 20, 2012
- Tri-Village Meetings (Ambler, Kobuk, Shungnak)
  - May 12, 2011
  - March 15, 2012

In addition to hosting public meetings, DOT&PF employs local residents from multiple communities within the Upper Kobuk Valley to serve as cultural and subsistence resource advisors to the project. The role of the subsistence advisors is to provide input on areas that should be avoided by a transportation corridor, due to important cultural and or subsistence resources. As part of this role, they have participated in over 20 public meetings, accompanied the project team members on all fieldwork, and independently interviewed local residents and tribal elders to provide information on their opinions, concerns, preferred routes, methods and modes for the preliminary transportation corridors.

As part of the community outreach process, DOT&PF project team members conducted class room projects with high school students from the Upper Kobuk Valley in the spring of 2012. Students were taught to read and interpret topographic maps and participated in discussions about the types of criteria analyzed when selecting transportation routes. Students mapped transportation routes and demonstrated how those routes would connect to their village. The maps were presented to the class followed by a discussion regarding how topographical constraints contributed to their selected route.

Feedback from residents and tribal elders has been collected throughout the planning process. Some of the key comments and concerns expressed include:

- Interest in how development of new transportation infrastructure and long-term corridor use will affect the subsistence resources within the different communities. It was noted different communities use different resources throughout the seasons.

- Connection within and to communities is needed and would provide for improved access and reduction in fuel and freight costs, which has become a real issue out in these communities.
- Impacts of a transportation corridor on caribou migration are a concern.
- Potential effects on cultural and historic resources and gravesites should be considered.
- Job opportunities with both construction and long-term operation of a mine and road/railroad would benefit local residents and allow the opportunity to contribute to the development of their community.
- Naturally occurring asbestos that occurs in local gravel sources and potential health effects from asbestos exposure are a concern.
- Effects on Native allotments should be considered.
- Effects from a road/ rail corridor on existing snow machine or four-wheeler access trails will need to be addressed.
- The potential for environmental contamination from a mine and/or from a surface transportation corridor is a concern.
- Some comments regarding potential negative socioeconomic impacts associated with an influx of non-residents if access is developed.
- Interest in the types of regulations that are used to minimize impacts of the Dalton Highway on subsistence resources.
- Comments and questions regarding construction and maintenance costs for a transportation corridor and how the state plans to fund this.
- Some concern regarding the potential for increased traffic to and within villages and the potential for small villages to become transportation hubs overnight if communities are connected to the road system.
- The potential for increased infiltration of drugs and alcohol into the villages brought about by increased access is a concern.
- Potential alterations in the traditional way of life is a concern.
- General support for access, with some communities in favor of rail versus road options.

As part of the next planning phase for this project, DOT&PF is conducting additional detailed studies to address cultural and subsistence resources as well as other environmental and design studies related to fish streams, wetlands and vegetation, wildlife habitat, water quality, and hydrology. Comments and concerns will continually be addressed and whenever possible, incorporated into the planning process by the project team as corridors are evaluated and refined. For example, very early community input on the importance of sheefish resulted in this resource being considered as an evaluation criterion.

Road termini options were discussed in the May 2011 Tri-Village meeting, as were potential road connections between communities. Maps of potential connections discussed at the meeting are included in Appendix B.

5.0 2011 BROOKS EAST CORRIDOR REFINEMENTS

5.1 National Park Service Input on Corridors

Preliminary discussions with the National Park Service (NPS) identified three preferences for any corridors crossing through a CSU: the first preference is for the shortest route through the CSU, the second preference is to avoid wilderness boundaries, and the third preference is to avoid water bodies. Walker Lake, located in GANPP, is designated as a National Natural Landmark and was identified as a particularly sensitive water body by NPS during consultation. NPS suggested the proximity of the original Brooks East Corridor to Walker Lake would adversely impact visitors' wilderness experience and draw significant public criticism from business and cabin owners on Walker Lake. The NPS was also concerned that this route traversed the greatest distance within the CSU rather than a potentially shorter route through a narrower section of the GANPP. In May 2011, NPS staff provided input in the form of four conceptual corridor alternatives through GANPP based on the aforementioned preferences.

5.2 Further Analysis of Brooks East and Kanuti Flats Corridor Options

Following the initial review of potential corridors, two of the eastern corridors (Brooks East and Kanuti Flats) were further analyzed based on community input, agency consultation, and field investigations conducted during the 2011 field season (June to September).

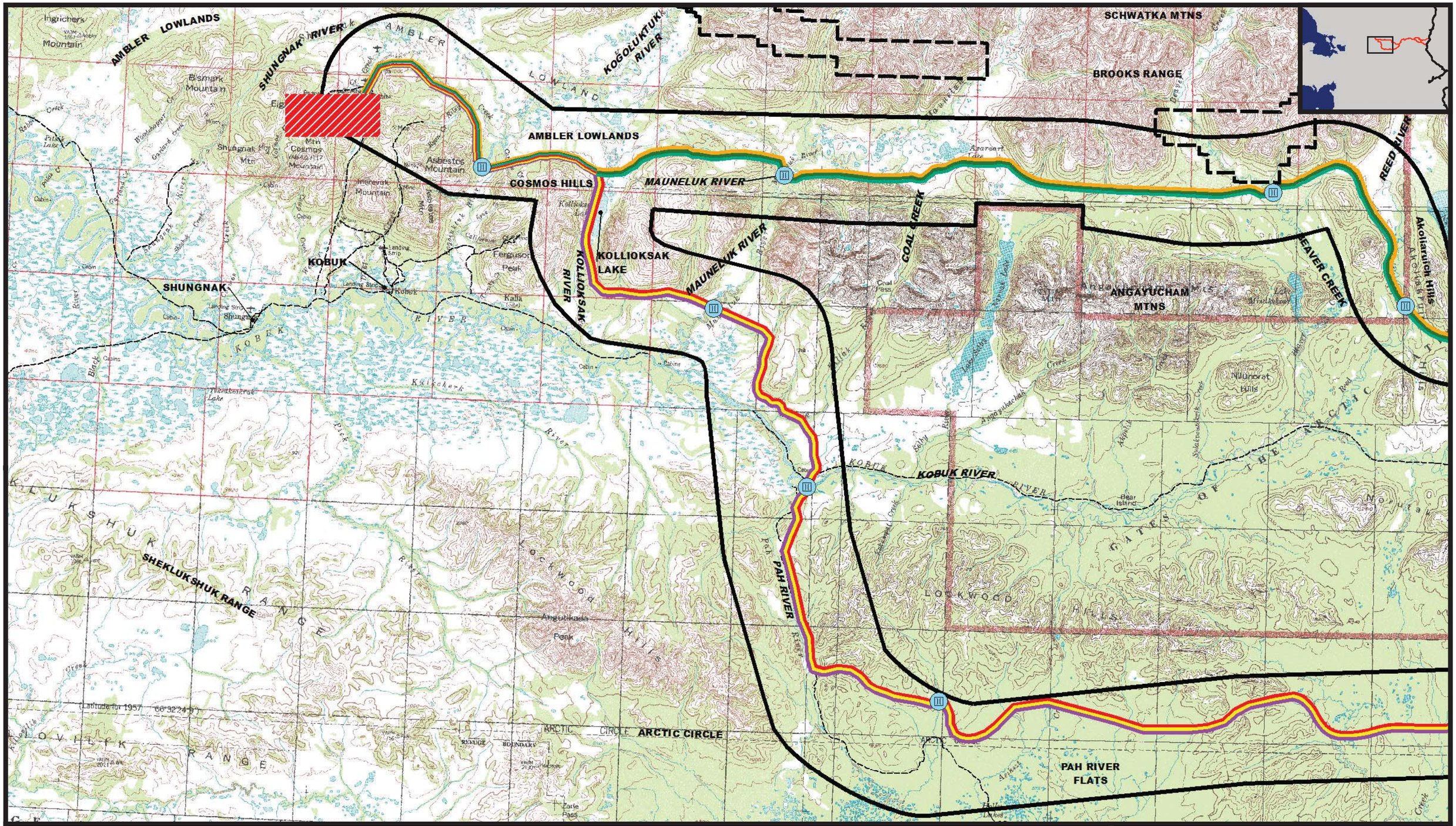
The four conceptual corridors suggested by NPS were investigated by aerial reconnaissance in June, 2011. Based on observations made during the fixed-wing aircraft overflight of the corridors, the Brooks East Corridor was refined to include an option crossing through the narrowest section of GANPP north of Norutak Lake and south of Nutuvukti Lake in the Akoliakruich Hills (Figures 12 through 14).

The Kanuti Flats Corridor was originally established based on a route that had been identified as a potential corridor to the Ambler area in a 1970 study (Tudor-Kelly-Shannon 1970). This was prior to the establishment of the Kanuti NWR in 1980 as part of ANILCA. The primary purpose of the Kanuti Flats Route was to provide a corridor alternative to the east that did not traverse GANPP. Avoidance of the Kanuti NWR required the Kanuti Flats Corridor to cross through the Alatna Hills north of the refuge. A fixed-wing aircraft overflight, conducted in June, 2011, revealed that the terrain in the Alatna Hills would be a severely limiting factor in developing an access corridor in this area.

To provide a corridor alternative to the east that does not traverse GANPP, variations of the Brooks East Corridor were developed to incorporate the western portion of the Kanuti Flats Corridor. These variations were further refined based on aerial reconnaissance and input from NPS in June, 2011. Ultimately, six Brooks East Corridor options (designated A through F) were developed for further investigation. The Kanuti Flats Corridor passing through the Alatna Hills was determined infeasible and was removed from further technical consideration.

Another fixed-wing aircraft overflight was conducted in July, 2011, for the purpose of further refining the Brooks East corridor based on terrain and potential construction concerns. Proposed crossing locations were identified at all major rivers for investigation during ground-based field work. Areas of particular interest with regards to geotechnical and environmental conditions were also identified for follow-up field work. Revisions to the Brooks East corridor included:

- The corridor (options D, E, and F) was shifted south, to the east of Norutak Lake, near the Hogatza River crossing, to an area of more favorable terrain for crossing the Helpmejack Hills (Figure 13).



Existing Roads
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area
Recommended Corridor Width
RS2477 Routes

Brooks East Option A
240 Miles
Brooks East Option B
250 Miles
Brooks East Option C
250 Miles
Brooks East Option D
210 Miles
Brooks East Option E
220 Miles
Brooks East Option F
220 Miles

N
W E
S

0 2.5 5 10
Miles

Coordinate System: NAD 1983 Alaska Albers

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NORTHERN REGION

AMBLER MINING DISTRICT ACCESS CORRIDOR DEVELOPMENT MEMORANDUM

BROOKS EAST CORRIDOR OPTIONS
Map 1 of 3

DATE: April 19, 2012 | **Figure 12**

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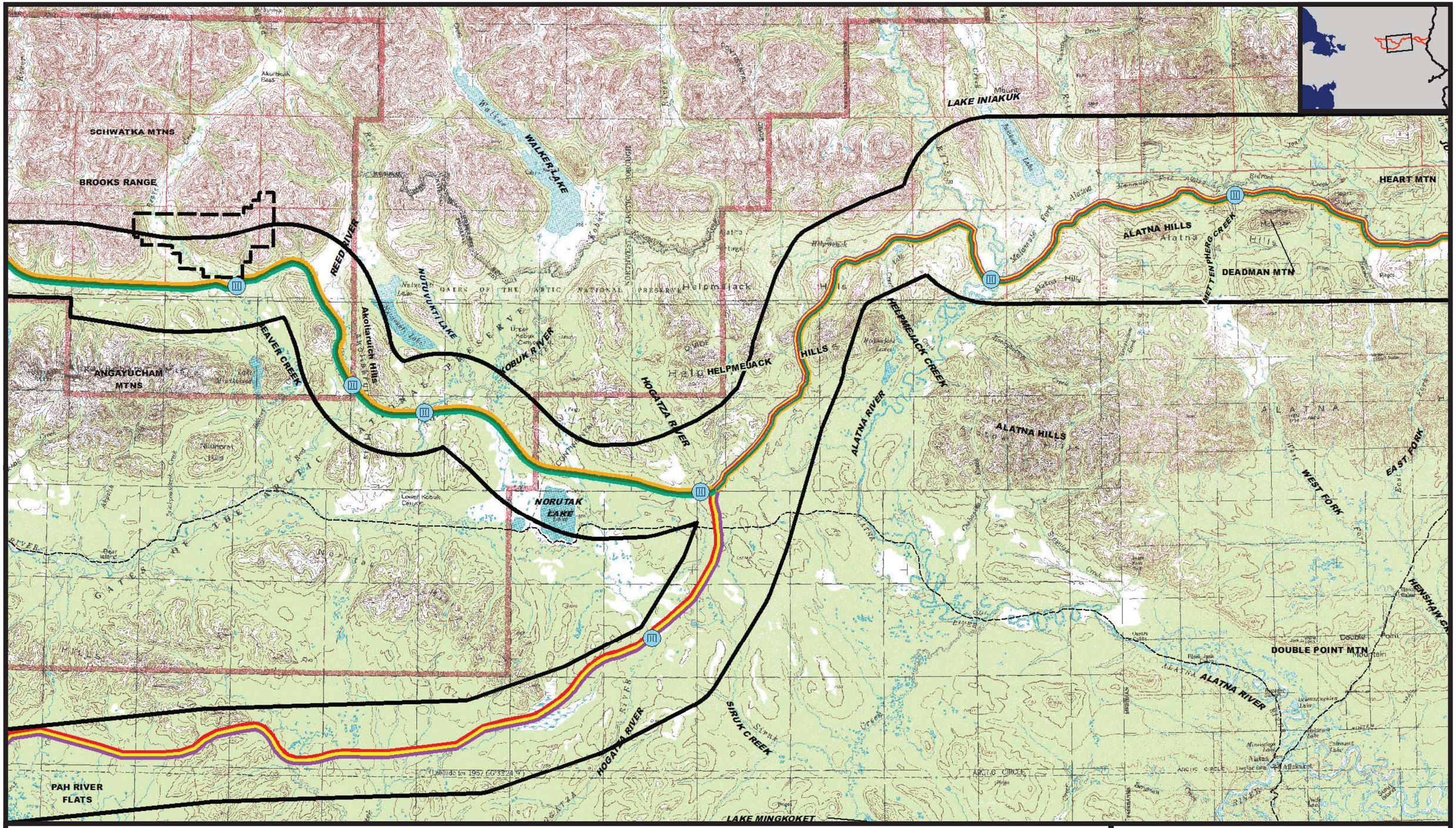

- Existing Roads
- Outside of Project Study Area
- Ambler Mineral Belt
- Proposed Staging Area
- Recommended Corridor Width
- RS2477 Routes
- Brooks East Option A — 240 Miles
- Brooks East Option B — 250 Miles
- Brooks East Option C — 250 Miles
- Brooks East Option D — 210 Miles
- Brooks East Option E — 220 Miles
- Brooks East Option F — 220 Miles

N, W, E, S

0 2.5 5 10
Miles

Coordinate System: NAD 1983 Alaska Albers

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AMBLER MINING DISTRICT ACCESS CORRIDOR DEVELOPMENT MEMORANDUM

BROOKS EAST CORRIDOR OPTIONS
Map 2 of 3

DATE: April 19, 2012 | **Figure 13**

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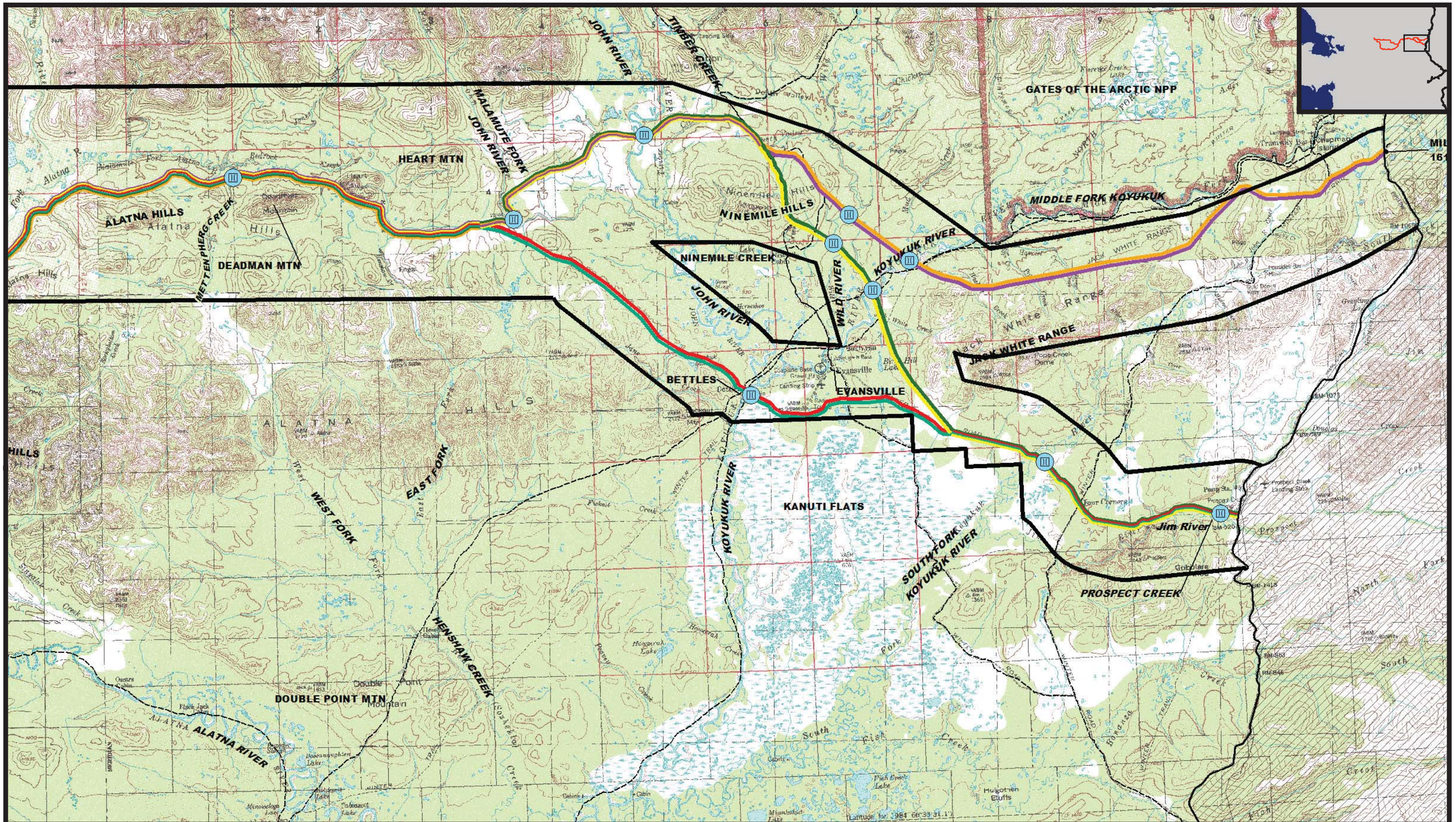

Existing Roads
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area
Recommended Corridor Width
RS2477 Routes
Brooks East Option A 240 Miles
Brooks East Option B 250 Miles
Brooks East Option C 250 Miles
Brooks East Option D 210 Miles
Brooks East Option E 220 Miles
Brooks East Option F 220 Miles

N W E S

0 2.5 5 10
Miles

Coordinate System: NAD 1983 Alaska Albers

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AMBLER MINING DISTRICT ACCESS CORRIDOR DEVELOPMENT MEMORANDUM

BROOKS EAST CORRIDOR OPTIONS
Map 3 of 3

DATE: April 19, 2012 | **Figure 14**

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- The corridor (options A, B, and C) was shifted north away from the Pah River Flats for approximately 13 miles into hilly terrain with more uplands. In addition to avoiding wetland features and anadromous streams in the Pah River Flats, the revision shortened the corridor length by approximately 4 miles (Figures 12 and 13).
- The corridor (options A, B, and C) was shifted from the Mauneluk River valley to the Kolliosak Lake valley, approximately 9 miles to the west (Figure 12). Traveling down the Mauneluk River valley would likely require construction of several large bridges, as the river meanders widely across the entire valley. Despite the constraints imposed by Kollioksak Lake and the adjacent mountains, this corridor is preferable to following the Mauneluk River valley.

5.3 Evaluation of Refined 2011 Brooks East Corridor Options

Six variations of the Brooks East Corridor (A through F), developed as described in Section 5.2, are illustrated in Figures 12 through 14 and described below.

5.3.1 General Route Descriptions

2011 Brooks East Corridor Option A (Option A) heads north out of the staging area and then east along the north side of the Cosmos Hills. This option heads south through a gap in the Cosmos Hills near Kollioksak Lake and along the Kollioksak River. It then heads east along the south side of the Cosmos Hills and then south along the north side of the Kobuk River. Option A crosses the Kobuk River near the confluence with Pah River. The option then heads south along the Pah River through the Lockwood Hills and east along the Pah River Flats south of GANPP to a point just east of the southern boundary of GANPP near the Hogatza River. From this point, Option A heads northeast through the Helpmejack Hills and then crosses the Alatna River heading east between the Brooks Range and the Alatna Hills. Near the Malamute Fork of the John River, this option heads southeast toward the Koyukuk River just south of Bettles, and east and southeast along the northern boundary of the Kanuti NWR following an existing winter trail to Prospect Creek on the Dalton Highway.

2011 Brooks East Corridor Option B (Option B) follows the Option A alignment from the staging area at the Ambler mineral belt to the Malamute Fork of the John River. From this point, Option B continues north and east approximately 15 miles before heading to the southeast on the

eastern edge of the Ninemile Hills and crossing the Koyukuk River just north of Evansville. It then connects with Option A southeast of Evansville and follows that option to Prospect Creek on the Dalton Highway.

2011 Brooks East Corridor Option C (Option C) follows the Option B alignment from the staging area near the Ambler mineral belt to Ninemile Hills. At this point, Option C heads southeast to the Koyukuk River and then east and northeast through the Jack White Range along the southern boundary of GANPP to mile 161 on the Dalton Highway.

2011 Brooks East Corridor Option D (Option D) follows Option A out of the staging area, but instead of crossing to the south of the Cosmos Hill, this option continues east along the north side of the Cosmos Hills and the Angayucham Mountains. This option heads south and east through GANPP near the Akoliaruich Hills, crossing the Kobuk River just east of the Akoliaruich Hills. The route exits GANPP just north of Norutak Lake and heads northeast through the Helpmejack Hills. This option is identical to the other Brooks East Corridor options from Helpmejack Hills to the Malamute Fork of the John River. From that point, Option D follows Option A to Prospect Creek on the Dalton Highway.

2011 Brooks East Corridor Option E (Option E) follows the Option D alignment to Ninemile Hills. Option E then heads south and east to Prospect Creek following the same alignment as Option B.

2011 Brooks East Corridor Option F (Option F) follows option D to the Malamute Fork of the John River. From that point, Option F follows Option C to mile 161 on the Dalton Highway.

5.3.2 Corridor Length

The corridor option lengths vary from 210 to 250 miles, as shown in Table 16. Regardless of the Brooks East Corridor option, these are among the shortest road corridors evaluated. All of the Brooks East Corridor options are given a score of 5 for this criterion.

Table 16: 2011 Brooks East Corridor Option Lengths

Corridor	Length (miles)	Score
Option A	240	5
Option B	250	5
Option C	250	5
Option D	210	5
Option E	220	5
Option F	220	5

5.3.3 Federal Conservation Systems

Brooks East Corridor Options A through C do not cross through any CSUs and are given a score of 5 for this criterion (Figure 15). Although the Brooks East Corridor Options D through F cross through GANPP, these corridor options are consistent with language permitting a transportation corridor through GANPP in ANILCA, and are given a score of 5.

5.3.4 Wild and Scenic Rivers

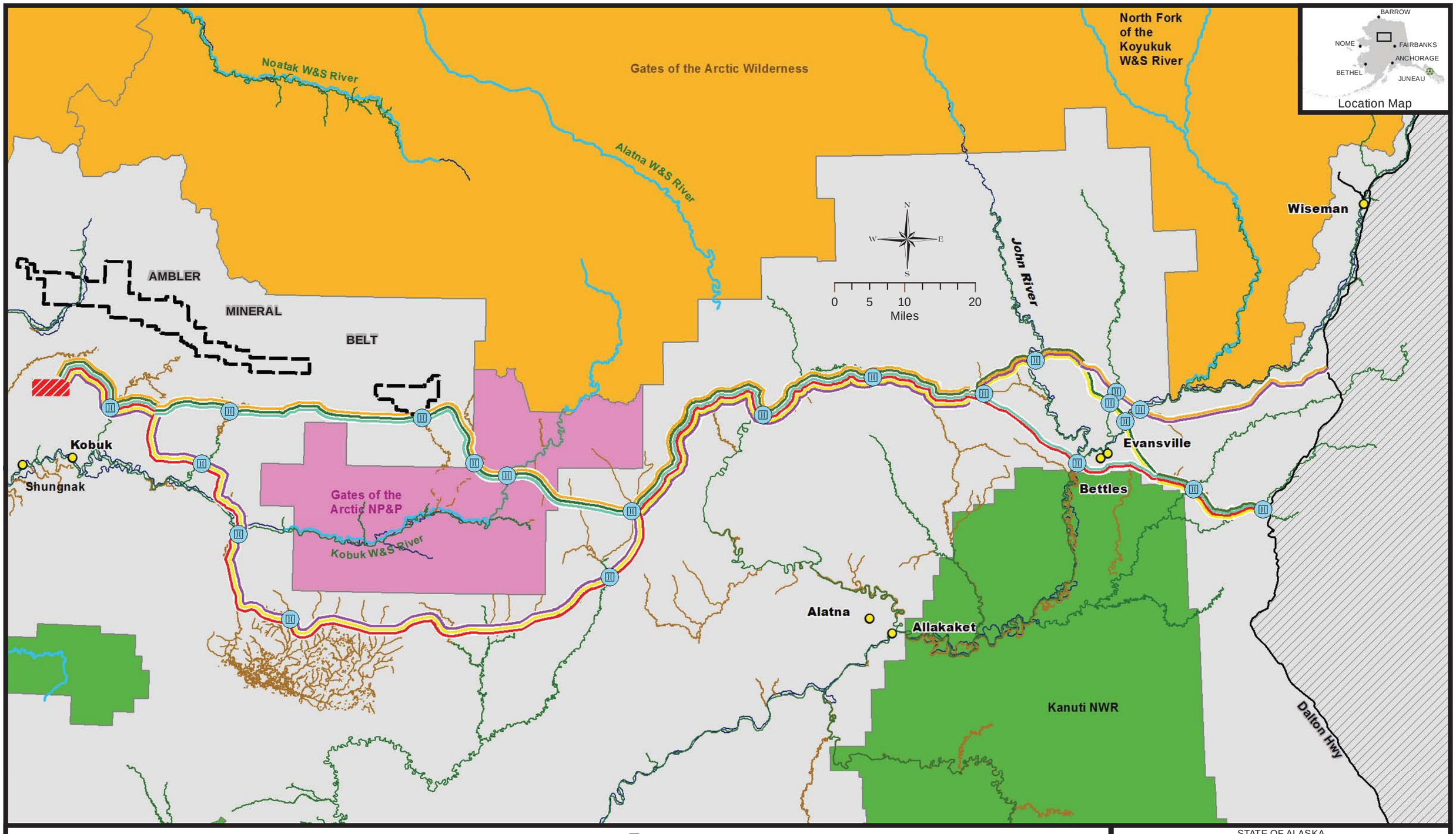
Brooks East Corridor Options A through C do not cross any designated WSRs, and are given a score of 5 for this criterion. Although the Brooks East Corridor Options D through F cross the Kobuk WSR in GANPP, these options are also consistent with the provisions for access established in ANILCA, and are given a score of 5.

5.3.5 Salmon/Sheefish Rivers

All of the Brooks East Corridor options cross less than 50 streams either mapped or assumed to be anadromous (Table 17). These corridors cross fewer anadromous streams than other corridors, and each of these corridors is given a score of 5 for this criterion.

Table 17: 2011 Brooks East Corridor Option - Anadromous Streams

Corridor	Mapped	Assumed	Total	Score
Option A	8	28	36	5
Option B	8	27	35	5
Option C	8	25	33	5
Option D	4	18	22	5
Option E	6	18	24	5
Option F	4	16	20	5



- Communities and Place Names
- Existing Roads
- Water
- Outside of Project Study Area
- Ambler Mineral Belt
- Proposed Staging Area
- Brooks East Option A 240 Miles
- Brooks East Option B 250 Miles
- Brooks East Option C 250 Miles
- Brooks East Option D 210 Miles
- Brooks East Option E 220 Miles
- Brooks East Option F 220 Miles
- Wild and Scenic Rivers
- Cataloged Anadromous Streams
- Assumed Anadromous Streams
- Wildlife Refuge
- Wilderness
- National Park
- National Monuments
- Large Bridges

Note: There is no designated critical habitat in the eastern portion of the study area.

Sources:
Cataloged Anadromous Streams: ADF&G

Coordinate System: NAD 1983 Alaska Albers

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AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

BROOKS EAST CORRIDOR OPTIONS: CRITICAL HABITAT, ANADROMOUS STREAMS AND LARGE BRIDGES

DATE: April 19, 2012 | **Figure 15**

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 15 Brooks East Corridor Options Habitat.mxd Apr 19, 2012 4:13:09 PM User: cfelker

5.3.6 Caribou Habitat

These corridor options cross through migratory areas and the outer range of the Western Arctic Caribou Herd. Corridors that head east from the Ambler mineral belt cross less caribou habitat than those heading west, and are all given a score of 5 for this criterion.

5.3.7 Threatened and Endangered Species and Critical Habitat Areas

The Brooks East Corridor options do not cross through areas where threatened or endangered species are documented. Therefore, none of these corridor options cross through areas designated as critical habitat for threatened or endangered species. These corridors are given a score of 5 for this criterion.

5.3.8 Wetland Habitats

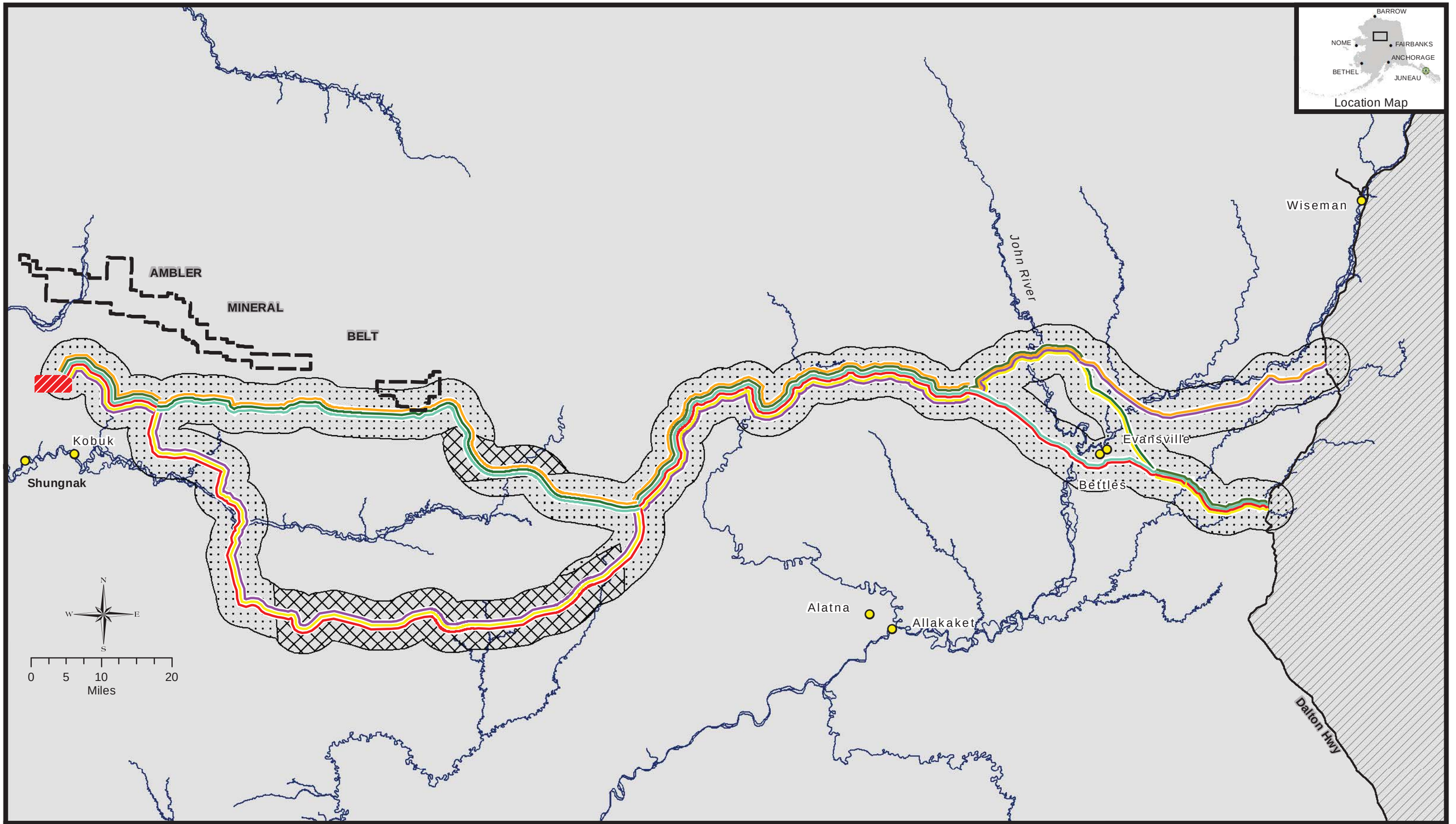
The Brooks East Corridor options cross through a significantly shorter length of wetland habitats than did any of the previous eastern corridor options. The Brooks East Corridor options intersect between 22 and 33 miles of preliminarily mapped wetland habitats (Table 18). Only the Brooks East Corridor Option C has over 30 miles of wetland habitat and is given a score of 4. All other 2011 Brooks East Corridor Options are given a score of 5.

Table 18: 2011 Brooks East Corridor Option - Wetland Habitats

Corridor	Length of Wetland Habitats Traversed (miles)	Score
Option A	27	5
Option B	29	5
Option C	33	4
Option D	22	5
Option E	24	5
Option F	28	5

5.3.9 Availability of Material Sites

Over 90% of the northern Brooks East Corridor options (Options D through F) have material sites available every 10 miles (Table 19) and are given a score of 5 for this criterion (Figure 16). The southern corridor options (Options A through C) have material sites available for 77-78% of the corridors, and are given a score of 3.



Communities and Place Names
Existing Roads
Water
Outside of Project Study Area
Ambler Mineral Belt
Proposed Staging Area

Brooks East Option A 240 Miles
Brooks East Option B 250 Miles
Brooks East Option C 250 Miles
Brooks East Option D 210 Miles
Brooks East Option E 220 Miles
Brooks East Option F 220 Miles

Corridor Segments with Material Sites at Less than 10 Mile Intervals
Corridor Segments with Material Sites at Greater than 10 Mile Intervals

Coordinate System: NAD 1983 Alaska Albers

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NORTHERN REGION

AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

BROOKS EAST CORRIDOR OPTIONS
MATERIAL SITE AVAILABILITY

DATE: April 19, 2012

Figure 16

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Table 19: 2011 Brooks East Corridor Option - Material Site Availability

Corridor	Percent of Corridor w/Material Sites within 10 miles	Score
Option A	77%	3
Option B	78%	3
Option C	78%	3
Option D	93%	5
Option E	94%	5
Option F	94%	5

5.3.10 Large Bridges

The large bridges crossed by the various Brooks East Corridor options are in the lower range compared to other corridors (Table 20). Only the Brooks East Corridor Option B has over 5,500 linear feet of large bridges required and is given a score of 4. All other 2011 Brooks East Corridor options are given a score of 5.

Table 20: 2011 Brooks East Corridor Option - Large Bridges

Corridor	Large Bridges	Length of Large Bridge Spans (feet)	Score
Option A	10	4,420	5
Option B	13	5,620	4
Option C	11	4,880	5
Option D	11	4,220	5
Option C	14	5,420	5
Option D	12	4,680	5

5.3.11 Construction Cost

The total estimated construction cost for the Brooks East Corridor options range from $440 million to $550 million, as shown in Table 21 and Appendix C. These are in the low range of construction costs for all corridors. The northern corridor options (Options D through F) and Option A are given a score of 5 on this criterion. The southern options (Options B and C) are given a score of 4.

Table 21: 2011 Brooks East Corridor Option - Estimated Construction Cost

Corridor	Construction Cost[1] (in millions)	Score
Option A	$500	5
Option B	$550	4
Option C	$550	4
Option D	$440	5
Option E	$440	5
Option F	$440	5

1. Costs rounded to tens of millions.

5.3.12 Maintenance Cost

Estimated annual maintenance cost for the Brooks East Corridor options range from $8.4 million to $9.3 million (Table 22). Initial maintenance camp construction and annual maintenance are summarized in Appendix C. This is in the low range of annual maintenance costs for the corridors evaluated. These corridor options are given a score of 4 or 5 on this criterion.

Table 22: 2011 Brooks East Corridor Option - Estimated Maintenance Cost

Corridor	Annual Maintenance Cost (in millions)	Score
Option A	$8.4	5
Option B	$9.3	4
Option C	$9.3	4
Option D	$8.3	5
Option E	$8.5	5
Option F	$8.6	5

5.3.13 Special Considerations

None of the special considerations described in Section 2.1.12 apply to these corridors.

6.0 2012 BROOKS EAST CORRIDOR REFINEMENTS

6.1 Community Input on Corridors

Comments at public meetings held in regional villages over the 2011-2012 winter were largely critical of the corridor segments crossing through the Pah River Valley (Options A, B, and C), particularly as an alternative to the original Brooks East Corridor. Options A, B, and C were identified as posing an unreasonable threat to culturally significant resources, fish habitat and subsistence fishing activities, and consequently the health and wellbeing of the entire Kobuk region using that watershed as a subsistence resource. Public comments at the majority of community meetings were in favor of revising the proposed options to include the original

Brooks East Corridor routing through GANPP based on the preference for a shorter, safer bridge crossing and avoidance of areas of important cultural resources and subsistence fishery habitats.

Frequent comments at all public meetings were related to the proximity of a proposed transportation corridor to individual communities. Residents expressed a full range of opinions regarding connectivity to a proposed corridor or to other communities. This remains an open point of discussion between the project team and local residents. Proposed corridors pass most closely to the communities of Bettles and Evansville and the majority of attendees at the public meeting there expressed a general opposition to the corridor and specifically to being connected to any public road. This input led to the re-evaluation of the location of the crossing of the Koyukuk River, and a shift of the proposed corridor further south, away from the communities. Residents of the Upper Kobuk Valley communities were not unanimously for or against being connected to the transportation system, so this will continue to be a discussion point with those communities as the project is further developed. The current proposed corridor does not connect directly with the Upper Kobuk Valley communities; however, a spur road could potentially be constructed if the communities determine that a connection is desirable.

6.2 Refinement of Brooks East Corridor Options

Following the 2011 field season, which included hydrologic, geotechnical, and environmental surveys, and continued community and agency input, the Brooks East Corridor options were further refined in March, 2012.

The corridor options passing around GANPP to the south (corridor options A, B, and C) were excluded in favor of the reintroduction of a second corridor option crossing through GANPP similar to the original Brooks East Corridor. Options A, B, and C were the longest of the 2011 Brooks East Corridors and were the subject of much concern regarding potential adverse impacts to cultural, subsistence, and environmental resources in the Kobuk and Pah River Valleys, expressed during public meetings and other community outreach efforts. The reintroduced northern option crosses GANPP north of the 2011 corridors (Options D, E, and F), diverging at the Reed River valley and continuing east to the north of Nutuvukti Lake and to the south of Walker Lake. The northern option rejoins the southern corridor option to the north of the Helpmejack Hills.

The two northernmost crossings of the Koyukuk River in the 2011 Brooks East Corridors were also revised, as these corridors (Options E and F) resulted in three additional large river crossings: the Wild River, the John River, and the Malamute Fork of the John River. Subsequently, the Brooks East Corridor was narrowed to pass south of the Ninemile Hills and north of Alatna Hills, crossing the Koyukuk River in the vicinity of Old Bettles and the confluence with the John River.

The corridor termini at the Ambler mineral belt was shifted north approximately 6 miles from the previously illustrated staging area near the Bornite Camp to a location on the Ambler River identified as a potential material site.

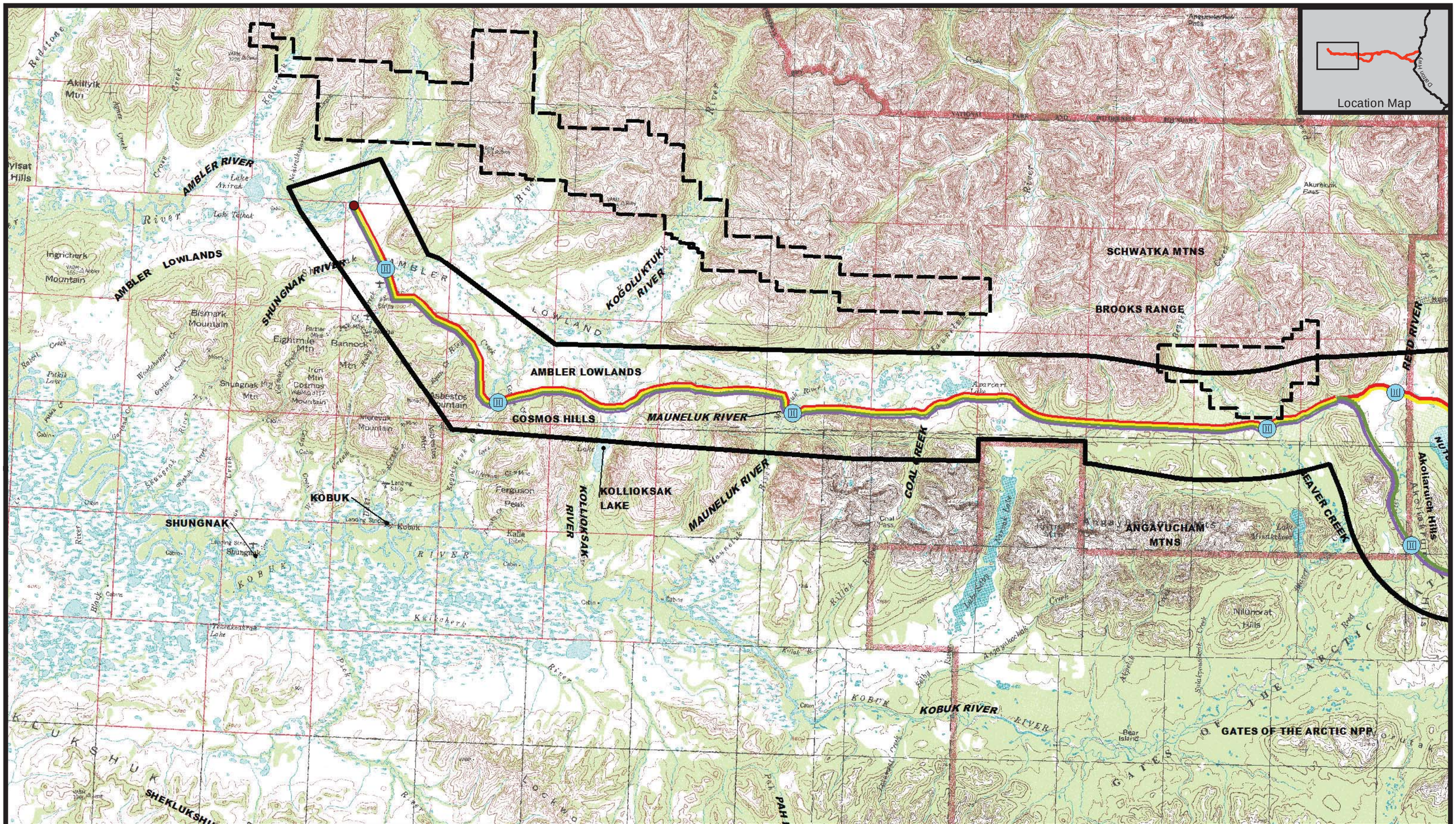
6.3 Evaluation of Refined 2012 Brooks East Corridor Options

Four variations of the Brooks East Corridor (designated as Options 1 through 4), developed as described in Section 6.2, are illustrated in Figures 17 through 19 and described below.

6.3.1 General Route Descriptions

2012 Brooks East Corridor Option 1 (Option 1) follows the same general path as the original Brooks East Corridor. The corridor heads southeast away from the Ambler River and then east along the north side of the Cosmos Hills and through GANPP. Option 1 diverges from the 2011 Option D at the Reed River valley, crossing GANPP to the south of Walker Lake. It proceeds east, remaining north of the Helpmejack Hills and the Alatna Hills. It then heads southeast, staying north of the Alatna Hills and crossing the Koyukuk River near Old Bettles, downstream of the John River confluence. From this point, Option 1 heads northeast through the north side of the Jack White Range, along the southern boundary of GANPP, to mile 161 on the Dalton Highway.

2012 Brooks East Corridor Option 2 (Option 2) follows the Option 1 alignment from the Ambler mineral belt through the crossing of the Koyukuk River and continuing east to the south of Bettles. From this point, Option 2 heads east and southeast along the northern boundary of the Kanuti NWR following an existing winter trail to Prospect Creek on the Dalton Highway.



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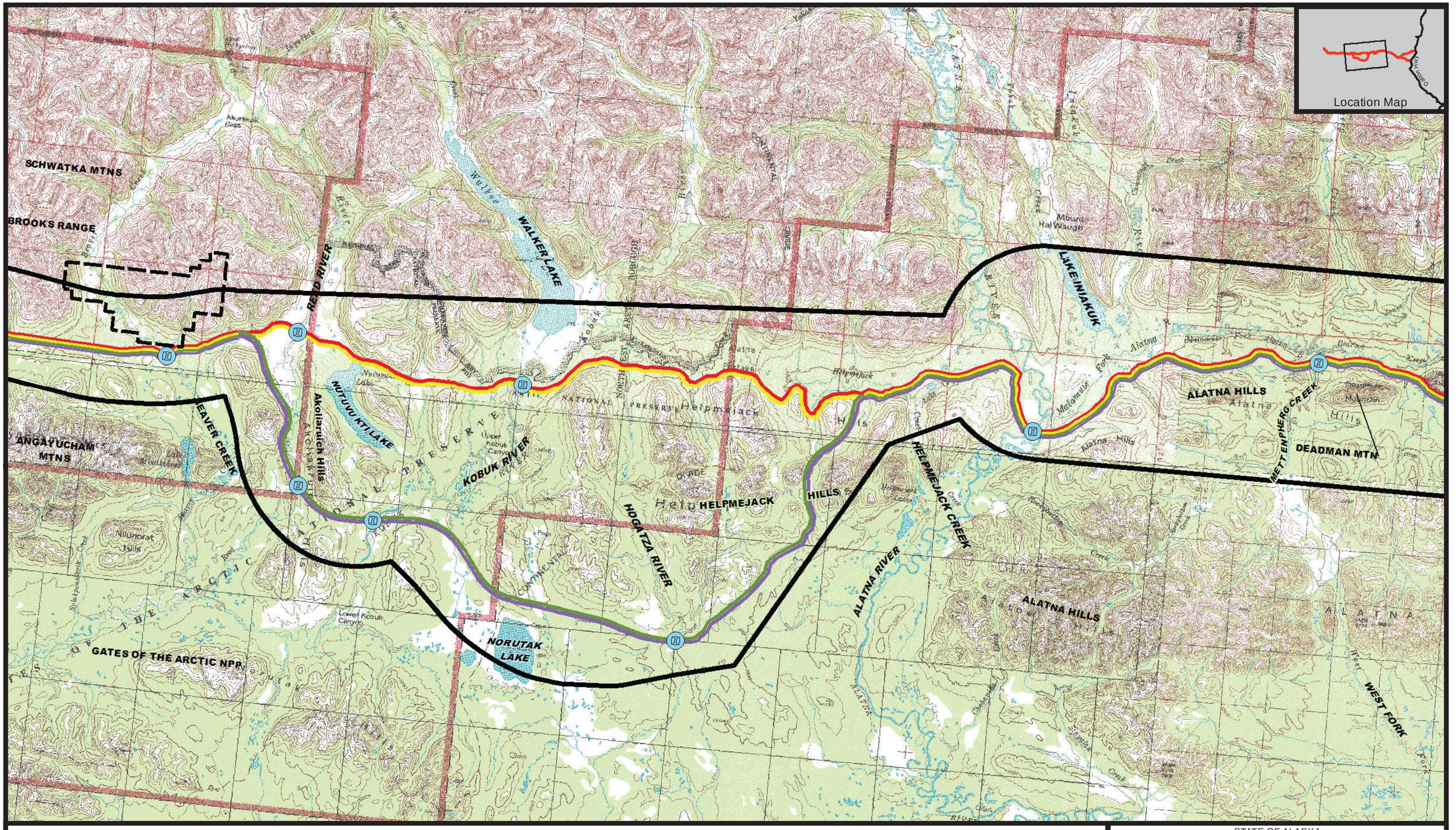
AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

2012 BROOKS EAST CORRIDOR OPTIONS Map 1 of 3

DATE: May 15, 2012

Figure 17

\\anc-hg-fs01\Autocad\Projects\D60693\GIS\Summary Report\19April2012\Figures 17-19 2012 Brooks East Options.mxd May 15, 2012 2:23:08 PM User: cfelker



Existing Roads
Outside of Project Study Area
Ambler Mineral Belt
Brooks East Corridors
Proposed Staging Area

Large Bridges

Brooks East Option #1
213 Miles (Road Only)
Brooks East Option #2
203 Miles (Road Only)
Brooks East Option #3
224 Miles (Road Only)
Brooks East Option #4
214 Miles (Road Only)

N
W
E
S

0 2.5 5 10
Miles

Source:
Quadmaps: DNR

Coordinate System: NAD 1983 Alaska Albers

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AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

2012 BROOKS EAST CORRIDOR OPTIONS Map 2 of 3

DATE: May 15, 2012

Figure 18

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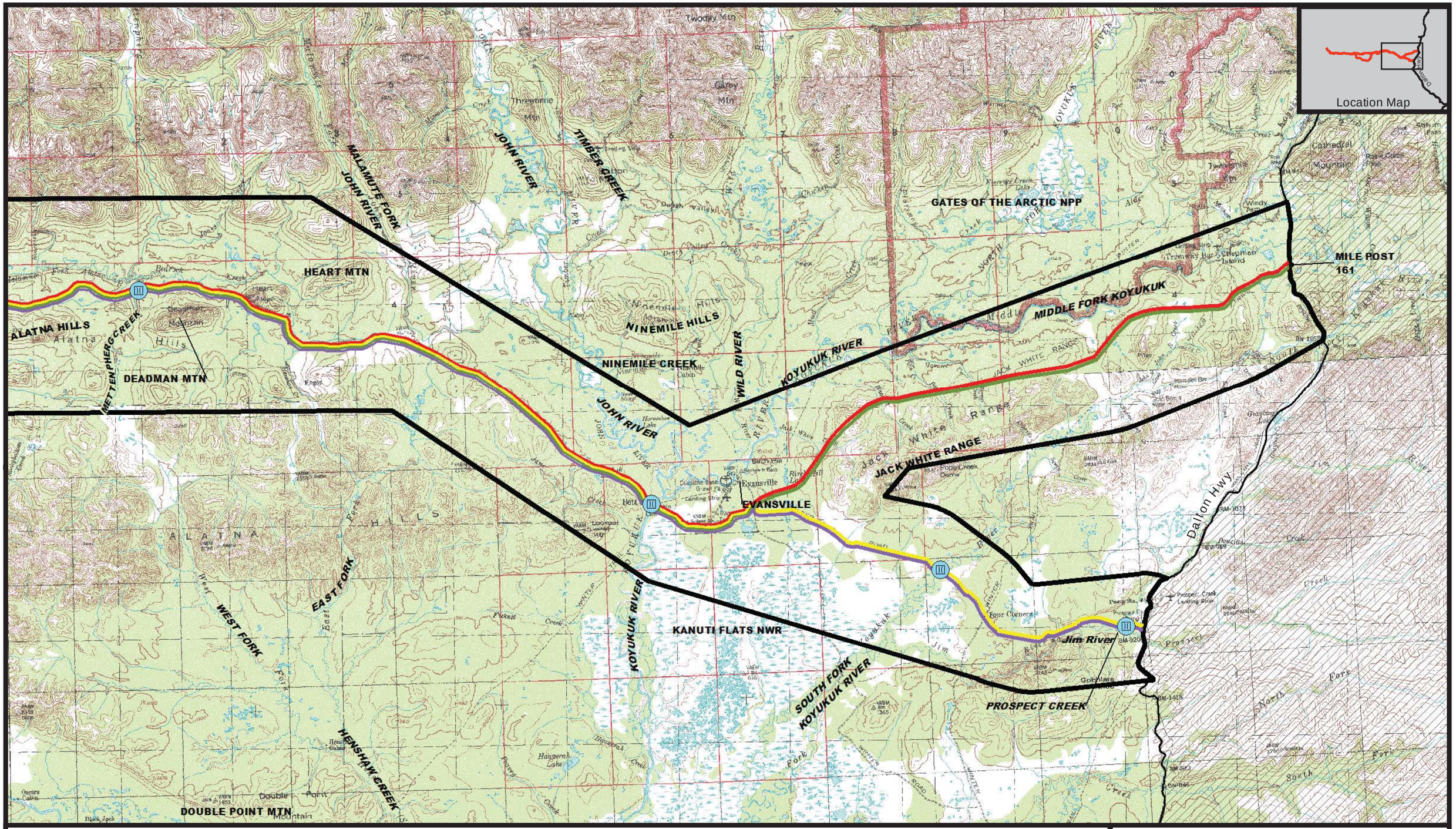

Existing Roads
Outside of Project Study Area
Ambler Mineral Belt
Brooks East Corridors
Proposed Staging Area
Large Bridges
Brooks East Option #1 213 Miles (Road Only)
Brooks East Option #2 203 Miles (Road Only)
Brooks East Option #3 224 Miles (Road Only)
Brooks East Option #4 214 Miles (Road Only)

N W E S

0 2.5 5 10
Miles

Source:
Quadmaps: DNR

Coordinate System: NAD 1983 Alaska Albers

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2012 BROOKS EAST CORRIDOR OPTIONS Map 3 of 3

DATE: May 15, 2012

Figure 19

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2012 Brooks East Corridor Option 3 (Option 3) begins along the Ambler mineral belt at the Ambler River and travels southeast along the same route as the 2011 Option D until it crosses the Koyukuk River. From this point, the corridor follows Option 1 to the northeast along the Jack White Range to milepost 161 on the Dalton Highway.

2012 Brooks East Corridor Option 4 (Option 4) begins along the Ambler mineral belt at the Ambler River and travels southeast, following the 2011 Option D to Prospect Creek on the Dalton Highway.

6.3.2 Corridor Length

The corridor option lengths vary from 203 to 224 miles, as shown in Table 23. Regardless of the Brooks East Corridor option, these are among the shortest road corridors evaluated. All of the Brooks East Corridor options are given a score of 5 for this criterion.

Table 23: 2012 Brooks East Corridor Option Lengths

Corridor	Length (miles)	Score
Option 1	213	5
Option 2	203	5
Option 3	224	5
Option 4	214	5

6.3.3 Federal Conservation Systems

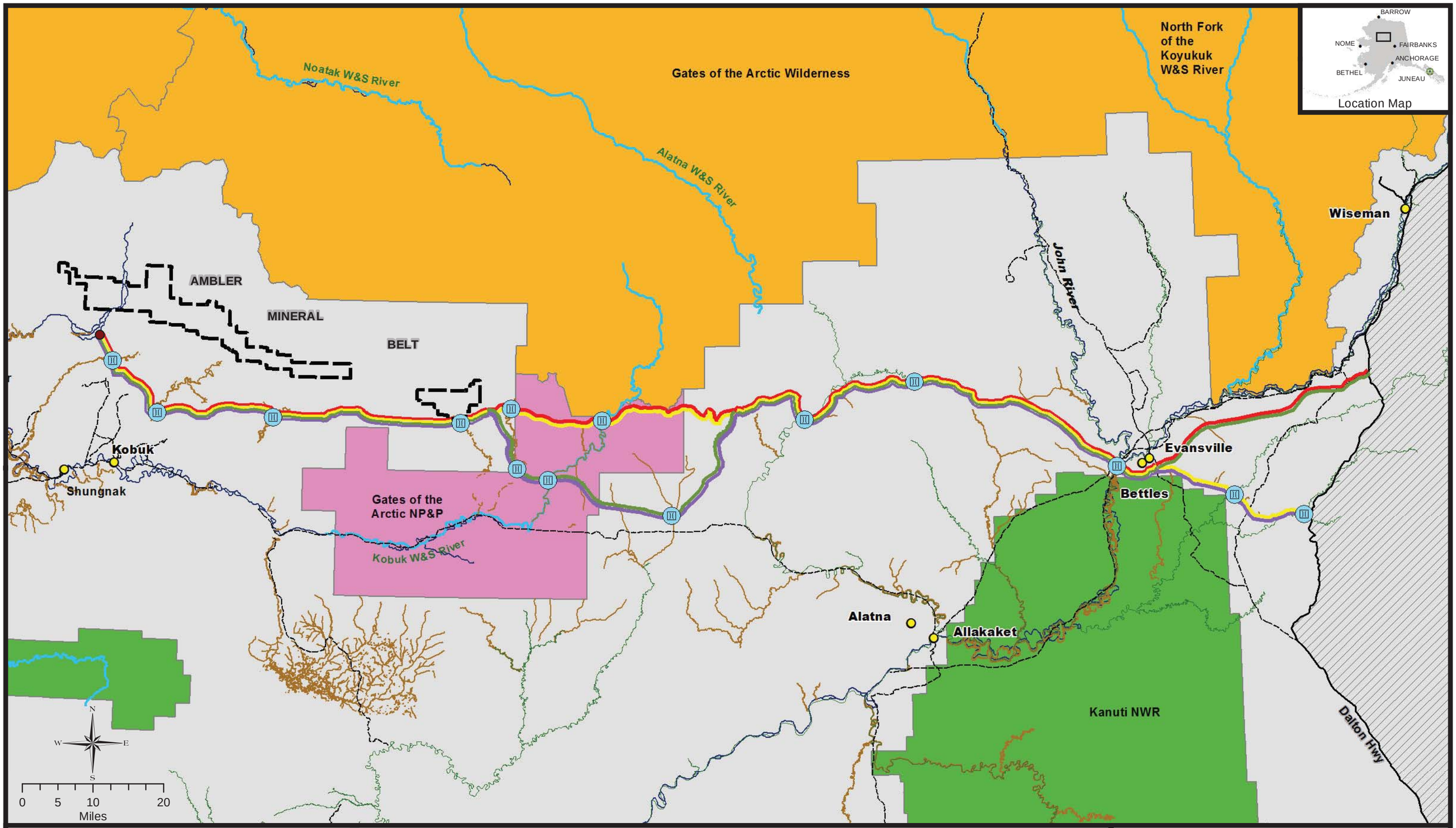
Although the Brooks East Corridors cross through GANPP (Figure 20), these corridor options are consistent with language permitting a transportation corridor through GANPP in ANILCA, and are given a score of 5.

6.3.4 Wild and Scenic Rivers

Although the Brooks East Corridors cross the Kobuk WSR in GANPP, these options are also consistent with the provisions for access established in ANILCA, and are given a score of 5.

6.3.5 Salmon/Sheefish Rivers

All of the Brooks East Corridor options cross less than 50 streams either mapped or assumed to be anadromous (Table 24). These corridors cross fewer anadromous streams than other corridors, and each of these corridors is given a score of 5 for this criterion.



- Communities and Place Names
- Existing Roads
- Water
- Outside of Project Study Area
- Ambler Mineral Belt
- Proposed Staging Area
- Wild and Scenic Rivers
- Cataloged Anadromous Streams
- Assumed Anadromous Streams
- RS2477 Routes
- Wildlife Refuge
- Wilderness
- National Park
- Large Bridges
- Brooks East Option #1 213 Miles (Road Only)
- Brooks East Option #2 203 Miles (Road Only)
- Brooks East Option #3 224 Miles (Road Only)
- Brooks East Option #4 214 Miles (Road Only)

Note: There is no designated critical habitat in the eastern portion of the study area.

Coordinate System: NAD 1983 Alaska Albers

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2012 BROOKS EAST CORRIDOR OPTIONS: CRITICAL HABITAT, ANADROMOUS STREAMS AND LARGE BRIDGES

DATE: May 02, 2012 | **Figure 20**

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Table 24: 2012 Brooks East Corridor Option Anadromous Streams

Corridor	Mapped	Assumed	Total	Score
Option 1	3	8	11	5
Option 2	5	12	17	5
Option 3	3	11	14	5
Option 4	5	15	20	5

6.3.6 Caribou Habitat

These corridor options cross through migratory areas and the outer range of the Western Arctic Caribou Herd. Corridors that head east from the Ambler mineral belt cross less caribou habitat than those heading west, and are all given a score of 5 for this criterion.

6.3.7 Threatened and Endangered Species and Critical Habitat Areas

The Brooks East Corridor options do not cross through areas where threatened or endangered species are found. Therefore, none of these corridor options cross through areas designated as critical habitat for threatened or endangered species. These corridors are given a score of 5 for this criterion.

6.3.8 Wetland Habitats

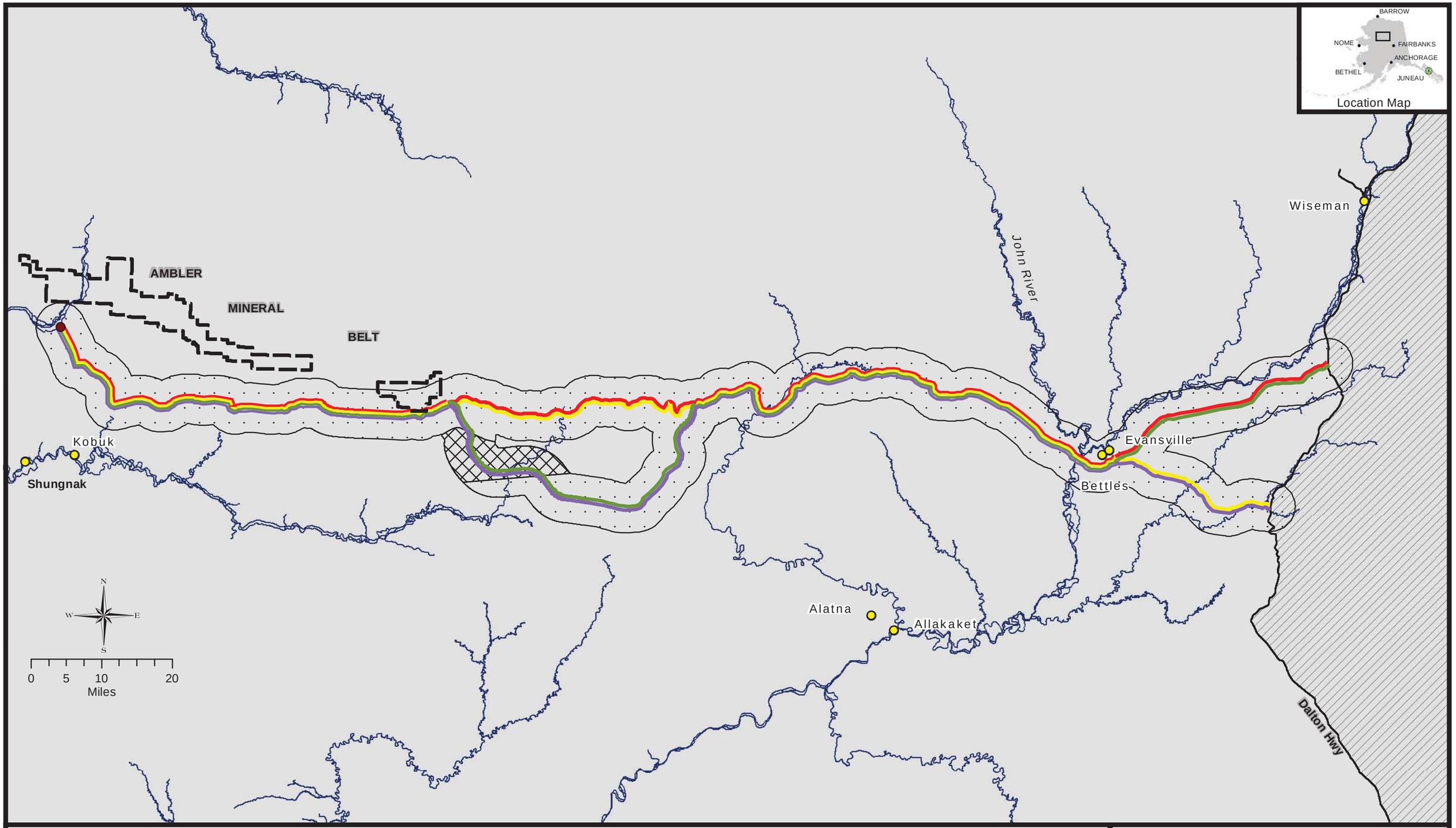
The Brooks East Corridor options cross between 41 and 78 miles of preliminarily mapped wetland habitats (Table 25). The 2012 Brooks East Corridor options are given scores of 3 or 4 for this criterion.

Table 25: 2012 Brooks East Corridor Option: Wetland Habitats

Corridor	Length of Wetland Habitats Traversed (miles)	Score
Option 1	60	4
Option 2	78	3
Option 3	41	4
Option 4	59	4

6.3.9 Availability of Material Sites

Over 90% of the Brooks East Corridor options have material sites available every 10 miles (Table 26) and are given a score of 5 for this criterion (Figure 21).



Proposed Staging Area
Communities and Place Names
Existing Roads
Water
Outside of Project Study Area
Ambler Mineral Belt

Brooks East Option #1
213 Miles (Road Only)
Brooks East Option #2
203 Miles (Road Only)
Brooks East Option #3
224 Miles (Road Only)
Brooks East Option #4
214 Miles (Road Only)

Corridor Segments with Material Sites at Less than 10 Mile Intervals
Corridor Segments with Material Sites at Greater than 10 Mile Intervals

Coordinate System: NAD 1983 Alaska Albers

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NORTHERN REGION

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2012 BROOKS EAST CORRIDOR OPTIONS:
MATERIAL SITE AVAILABILITY

DATE: May 02, 2012

Figure 21

P:\Projects\D60693\GIS\Summary Report\19April2012\Figure 21 2012 Brooks East Corridor Options Material Site.mxd May 02, 2012 3:43:17 PM User: cfelker

Table 26: 2012 Brooks East Corridor Option Material Site Availability

Corridor	Percent of Corridor w/Material Sites within 10 miles	Score
Option 1	100%	5
Option 2	100%	5
Option 3	94%	5
Option 4	93%	5

6.3.10 Large Bridges

The large bridges crossed by the various Brooks East Corridor options are in the lower range compared to other corridors (Table 27). All Brooks East Corridor Options have less than 5,500 linear feet of large bridges and are given a score of 5.

Table 27: 2012 Brooks East Corridor Option Large Bridges

Corridor	Large Bridges	Length of Large Bridge Spans (feet)	Score
Option 1	9	4,180	5
Option 2	11	4,760	5
Option 3	10	3,950	5
Option 4	12	4,530	5

6.3.11 Construction Cost

The total estimated construction cost for the Brooks East Corridor options range from $400 million to $450 million, as shown in Table 28 and Appendix D. These are in the low range of construction costs for all corridors. The corridor options are given a score of 5 on this criterion.

Table 28: 2012 Brooks East Corridor Option Estimated Construction Cost

Corridor	Construction Cost[1] (in millions)	Score
Option 1	$400	5
Option 2	$410	5
Option 3	$430	5
Option 4	$450	5

1. Costs rounded to tens of millions.

6.3.12 Maintenance Cost

Estimated annual maintenance cost for the Brooks East Corridor options range from $8.1 million to $8.6 million (Table 29). Initial maintenance camp construction and annual maintenance are summarized in Appendix D. This is in the low range of annual maintenance costs for the

corridors evaluated. Options 1, 2, and 4 are given a 5 on this criterion. Option 3 has an estimated annual maintenance cost exceeding $8.5 million and is given a 4 on this criterion.

Table 29: 2012 Brooks East Corridor Options Estimated Maintenance Cost

Corridor	Annual Maintenance Cost (in millions)	Score
Option 1	$8.3	5
Option 2	$8.1	5
Option 3	$8.6	4
Option 4	$8.4	5

6.3.13 Special Considerations

None of the special considerations described in Section 2.1.12 apply to these corridors.

7.0 SUMMARY AND CONCLUSIONS

The road and rail corridors developed for the Ambler Mining District Access project, as they are described by 12 specific evaluation criteria, are summarized in Tables 30 through 37.

Based on the reconnaissance-level evaluations and public input summarized herein, eastern road corridors (Brooks East Corridor options) have relatively more favorable conditions than rail or western road corridors. Rail corridors are not rated as highly as road corridors due to the longer length and costs associated with rail construction and maintenance. Road corridors that connect to the Dalton Highway rate the highest, due to their relatively shorter lengths, lower costs and avoidance of wetlands, critical habitats and CSUs. Although the 2012 Brooks East Corridor options cross a CSU (GANPP), specific ANILCA language allowing transportation access through GANPP results in their consideration as feasible options that will be carried forward for additional technical review and public comment.

Cultural and subsistence resource information was not specifically evaluated for this report, though early input received during community meetings was factored into some of the corridor refinements. Potential corridors selected for further technical investigation will be assessed for these resources as part of future studies.

Based on the preliminary analyses summarized herein, Brooks East Corridor Options 2 and 4 have been selected for further technical review and public comment. Although these options have a slightly higher construction cost than Options 1 and 3, the reduced maintenance costs for

the selected options result in a break-even point for costs by year 7. Additional factors including 25 fewer road miles per trip along the Dalton Highway to and from Fairbanks, and a greater separation between the boundary of GANPP and the Wild and Scenic designated portion of the Koyukuk River, were also considered as part of this selection.

Table 30: Roadway Corridor Evaluation Summary

Criterion	Brooks East	Kanuti Flats	Elliott Hwy	Parks Hwy[1]	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length (miles)	220	240	370		260	250	330	340
Federal CSU (unit/miles/percentage of corridor)	GANPP/ 26 miles/11%[2]	None	None		KVNP/NNP/CKNM/ 114 miles/44%	Selawik NWR/ 94 miles/38%	Selawik NWR/ 77 miles/23%	Selawik NWR/ 77 miles/23%
Wild and Scenic Rivers	Kobuk WSR[2]	None	None		Salmon WSR	Selawik WSR	Selawik WSR	Selawik WSR
Salmon/Sheefish Rivers Total	26	54	56		76	85	71	77
Mapped Anadromous	5	14	8		13	2	23	26
Assumed Anadromous	21	41	48		63	83	48	51
Caribou Habitat	Less	Less	Less		More	More	More	More
Threatened/Endangered Species/Critical Habitat	None	None	None		Steller's eider/yellow-billed loon/polar bear	yellow-billed loon/polar bear	yellow-billed loon	spectacled eider/polar bear/yellow-billed loon
Wetland Habitats (miles)	82	115	88		39	144	78	98
Material Site Availability (percent of corridor with material site within 10 miles)	100%	75%	84%		70%	10%	57%	58%
Total Large Bridges (number/length in ft)	13/5,000 ft	14/5,440 ft	12/7,360 ft		19/8,440 ft	22/9,250 ft	21/7,470 ft	25/7,890 ft
Bridges Over 1,500 ft	None	None	Yukon River/2,720 ft		Noatak River/1,560 ft	None	None	None
Major Stream Crossings	161	212	251		213	221	185	193
Construction Cost[3] (in millions)	$430	$510	$990		$720	$860	$960	$950
Annual Maintenance Cost[4] (in millions)	$8.50	$9.10	$13.50		$9.50	$9.20	$12.80	$13.10
Special Considerations								
Port Construction	No	No	No		No	Yes	Yes	Yes
Very Large River Crossings	None	None	Yukon River		Noatak River	None	None	None

1. Same as Rail Corridor Summary Comparison - See Table 36.
2. Access through GANPP was identified in ANILCA.
3. Cost rounded to tens of millions.
4. Annual maintenance cost for road and maintenance camps.

Table 31: Roadway Corridor Scoring Summary

Criterion	Brooks East	Kanuti Flats	Elliott Hwy	Parks Hwy[1]	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length	5	5	2		4	5	3	3
Federal CSU	5	5	5		0	0	0	0
Wild and Scenic Rivers	5	5	5		0	0	0	0
Salmon/Sheefish Rivers	5	4	4		2	1	2	2
Caribou Habitat	5	5	5		0	0	0	0
Threatened/Endangered Species/Critical Habitat	5	5	5		0	0	3	0
Wetland Habitats	3	2	3		4	1	3	2
Material Site Availability	5	3	4		2	0	1	1
Total Large Bridges	5	5	2		1	0	2	2
Construction Cost	5	4	3		4	3	3	3
Annual Maintenance Cost	5	4	2		4	4	2	2
Total Score	**53**	**47**	**40**		**21**	**14**	**19**	**15**

1. Same as Rail Corridor Summary Comparison - See Table 37.

Table 32: 2011 Brooks East Corridor Options Evaluation Summary

Criterion	Option A	Option B	Option C	Option D	Option E	Option F
Corridor Length (miles)	240	250	250	210	220	220
Federal CSU (unit/miles/percentage of corridor)	None	None	None	GANPP 12/6%[1]	GANPP 12/6%[1]	GANPP 12/7%[1]
Wild and Scenic Rivers	None	None	None	Kobuk WSR	Kobuk WSR	Kobuk WSR
Salmon/Sheefish Rivers Total	36	35	33	22	24	20
Mapped Anadromous	8	8	8	4	6	4
Assumed Anadromous	28	27	25	18	18	16
Caribou Habitat	Less	Less	Less	Less	Less	Less
Threatened/Endangered Species/Critical Habitat	None	None	None	None	None	None
Wetland Habitats (miles)	27	29	33	22	24	28
Material Site Availability (percent of corridor with material site within 10 miles)	77%	78%	78%	93%	94%	94%
Total Large Bridges (number/length in ft)	10/4,420 ft	13/5,620 ft	11/4,880 ft	11/4,220 ft	14/5,420 ft	12/4,680 ft
Bridges Over 1,500 ft	None	None	None	None	None	None
Major Stream Crossings	177	178	169	152	153	144
Construction Cost[2] (in millions)	$500	$550	$550	$440	$440	$440
Annual Maintenance Cost[3] (in millions)	$8.40	$9.30	$9.30	$8.30	$8.50	$8.60
Special Considerations						
Port Construction	No	No	No	No	No	No
Very Large River Crossings	None	None	None	None	None	None

1. Access through GANPP was identified in ANILCA.
2. Cost rounded to tens of millions.
3. Annual maintenance cost for road and maintenance camps.

Table 33: 2011 Brooks East Corridor Options Scoring Summary

Criterion	Option A	Option B	Option C	Option D	Option E	Option F
Corridor Length	5	5	5	5	5	5
Federal CSU	5	5	5	5	5	5
Wild and Scenic Rivers	5	5	5	5	5	5
Salmon/Sheefish Rivers	5	5	5	5	5	5
Caribou Habitat	5	5	5	5	5	5
Threatened/Endangered Species/Critical Habitat	5	5	5	5	5	5
Wetland Habitats (miles)	5	5	4	5	5	5
Material Site Availability	3	3	3	5	5	5
Total Large Bridges	5	4	5	5	5	5
Construction Cost	5	4	4	5	5	5
Annual Maintenance Cost	5	4	4	5	5	5
Total Score	**53**	**50**	**50**	**55**	**55**	**55**

Table 34: 2012 Brooks East Corridor Options Evaluation Summary

Criterion	Option 1	Option 2	Option 3	Option 4
Corridor Length (miles)	213	203	224	214
Federal CSU (unit/miles/percentage of corridor)	GANPP 26/12%[1]	GANPP 26/13%[1]	GANPP 14/6%[1]	GANPP 14/7%[1]
Wild and Scenic Rivers	Kobuk WSR	Kobuk WSR	Kobuk WSR	Kobuk WSR
Salmon/Sheefish Rivers Total	11	17	14	20
Mapped Anadromous	3	5	3	5
Assumed Anadromous	8	12	11	15
Caribou Habitat	Less	Less	Less	Less
Threatened/Endangered Species/Critical Habitat	None	None	None	None
Wetland Habitats (miles)	60	78	41	59
Material Site Availability (percent of corridor with material site within 10 miles)	100%	100%	94%	93%
Total Large Bridges (number/length in ft)	9/4,180 ft	11/4,760 ft	10/3,950 ft	12/4,530 ft
Bridges Over 1,500 ft	None	None	None	None
Major Stream Crossings	132	142	154	164
Construction Cost[2] (in millions)	$400	$410	$430	$450
Annual Maintenance Cost[3] (in millions)	$8.30	$8.10	$8.60	$8.40
Special Considerations				
Port Construction	None	None	None	None
Very Large River Crossings	None	None	None	None

1. Access through GANPP was identified in ANILCA.
2. Cost rounded to tens of millions.
3. Annual maintenance cost for road and maintenance camps.

Table 35: 2012 Brooks East Corridor Options Scoring Summary

Criterion	Option 1	Option 2	Option 3	Option 4
Corridor Length	5	5	5	5
Federal CSU	5	5	5	5
Wild and Scenic Rivers	5	5	5	5
Salmon/Sheefish Rivers	5	5	5	5
Caribou Habitat	5	5	5	5
Threatened/Endangered Species/Critical Habitat	5	5	5	5
Wetland Habitats	4	3	4	4
Material Site Availability	5	5	5	5
Total Large Bridges	5	5	5	5
Construction Cost	5	5	5	5
Annual Maintenance Cost	5	5	4	5
Total Score	**54**	**53**	**53**	**54**

Table 36: Rail Corridor Evaluation Summary

Criterion	Brooks East[1]	Kanuti Flats[1]	Elliott Hwy[1]	Parks Hwy A	Parks Hwy B	Parks Hwy C	Parks Hwy D	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length (miles)				430	450	420	440	260	250	330	340
Federal CSU (unit/miles/percentage of corridor)				GANPP[2]/ 26 miles/6%	None	GANPP[2]/ 26 miles/6%	None	GANPP/CKNM/114 miles/44%	Selawik NWR/94 miles/38%	Selawik NWR/77 miles/23%	Selawik NWR/77 miles/23%
Wild and Scenic Rivers				Kobuk WSR[2]	None	Kobuk WSR[2]	None	Salmon WSR	Selawik WSR	Selawik WSR	Selawik WSR
Salmon/Sheefish Rivers Mapped Anadromous Assumed Anadromous				71 8 63	62 9 53	84 12 72	75 13 62	76 13 63	85 2 83	71 23 48	77 26 51
Caribou Habitat				Less	Less	Less	Less	More	More	More	More
Threatened/Endangered Species/Critical Habitat				None	None	None	None	Steller's eider/yellow-billed loon/polar bear	yellow-billed loon/polar bear	yellow-billed loon	spectacled eider/polar bear/yellow-billed loon
Material Site Availability (percent of corridor with material site within 10 miles)				96%	87%	80%	72%	70%	10%	57%	58%
Wetland Habitats (miles)				151	138	141	129	40	144	78	98
Total Large Bridges (number/length in ft) Bridges Over 1,500 ft Major Stream Crossings				13/7,470 ft Yukon River/2,720 ft 257	17/10,410 ft Yukon River/2,720 ft 228	13/7,730 ft Yukon River/2,720 ft 309	17/10,670 ft Yukon River/2,720 ft 280	19/8,440 ft Noatak River/1,560 ft 213	22/9,250 ft None 221	21/7,470 ft None 185	25/7,890 ft None 193
Construction Cost[3] (in millions)				$1,880	$1,990	$1,990	$2,010	$1,250	$1,330	$1,560	$1,570
Annual Maintenance Cost[4] (in millions)				$17.30	$18.00	$16.90	$17.60	$10.60	$10.20	$13.80	$14.10
Special Considerations Port Construction Railroad Annual Operating Cost (in millions) Very Large Bridges				No $11.1 Yukon River	No $11.6 Yukon River	No $10.8 Yukon River	No $11.4 Yukon River	Yes $6.7 Noatak River	Yes $6.3 None	Yes $8.6 None	Yes $8.8 None

1. Same as Road Corridor Summary Comparison - See Table 30.
2. Access through GANPP was identified in ANILCA.
3. Cost rounded to tens of millions.
4. Annual maintenance cost for road and maintenance camps.

Table 37: Rail Corridor Scoring Summary

Criterion	Brooks East[1]	Kanuti Flats[1]	Elliott Hwy[1]	Parks Hwy A	Parks Hwy B	Parks Hwy C	Parks Hwy D	DMTS Port	Cape Blossom	Selawik Flats	Cape Darby
Corridor Length				1	1	1	1	4	5	3	3
Federal CSU				5	5	5	5	0	0	0	0
Wild and Scenic Rivers				5	5	5	5	0	0	0	0
Salmon/Sheefish Rivers				2	3	1	2	2	1	2	2
Caribou Habitat				5	5	5	5	0	0	0	0
Threatened/Endangered Species/Critical Habitat				5	5	5	5	0	0	3	0
Wetland Habitats				0	1	1	1	4	1	3	2
Material Site Availability				5	4	3	3	2	0	1	1
Total Large Bridges				2	0	2	0	1	0	2	2
Construction Cost				0	0	0	0	2	2	0	0
Annual Maintenance Cost				0	0	0	0	3	4	2	2
Total Score				**30**	**29**	**28**	**27**	**18**	**13**	**16**	**12**

1. Same as Road Corridor Summary Comparison - See Table 31.

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APPENDIX A

Construction and Maintenance Cost Estimates by Corridor

APPENDIX A

CONSTRUCTION AND MAINTENANCE COST ESTIMATES BY CORRIDOR

1.0 BROOKS EAST CORRIDOR

1.1 Roadway Construction Costs

Total Construction cost for the 220-mile long corridor is estimated at **$432,000,000** and consists of the following:

Table A-1: Brooks East Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.5
Water Crossings	$0.502
Corridor Cost/mile	**$2.0**
Total Corridor Cost	**$432,000,000**
Corridor Length = 220 miles	
Truck turnouts = 22 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 70% of material would be used from state lands at a unit price of $6.95/ton. 30% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.
- Embankment material includes a 20% contingency.

1.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the Brooks East Corridor is approximately $5,637,600.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-2.

Table A-2: Brooks East Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table A-3: Brooks East Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$112,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$33,000,000
Total 20-Year Maintenance Cost	$169,000,000
Estimated Annual Maintenance	**$8,450,000**

2.0 KANUTI FLATS CORRIDOR

2.1 Roadway Construction Costs

Total Construction cost for the 240-mile long corridor is estimated at **$506,000,000** and consists of the following:

Table A-4: Kanuti Flats Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.6
Water Crossings	$0.533
Corridor Cost/mile	**$2.1**
Total Corridor Cost	**$506,000,000**
Corridor Length = 240 miles	
Truck Turnouts = 24 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 64% of material would be used from state lands at a unit price of $6.95/ton. 36% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.

- Embankment material includes a 20% contingency.

2.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the Kanuti Flats Corridor is approximately $6,290,100.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-5.

Table A-5: Kanuti Flats Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-6: Kanuti Flats Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$126,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20 Year Maintenance Cost	$182,000,000
Estimated Annual Maintenance Cost	**$9,100,000**

3.0 ELLIOTT HIGHWAY CORRIDOR

3.1 Roadway Construction Costs

Total Construction cost for the 370-mile long corridor is estimated at **$986,000,000** and consists of the following:

Table A-7: Elliott Highway Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$2.2
Water Crossings	$0.480
Corridor Cost/mile	**$2.7**
Total Corridor Cost	**$986,000,000**
Corridor Length = 370 miles	
Truck Turnouts = 37 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 46% of material would be used from state lands at a unit price of $7.63/ton. 54% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.13/ton.

- Embankment material includes a 20% contingency.

3.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the Elliott Highway Corridor is approximately $9,291,600.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-8.

Table A-8: Elliott Highway Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Six new maintenance camps	$5,500,000/each	$33,000,000
Annual maintenance of **six** camps	$422,000/camp	$2,532,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-9: Elliott Highway Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	186,000,000
Maintenance Camps	$33,000,000
Annual Camp Maintenance (20 years)	$51,000,000
Total 20-Year Maintenance Cost	$269,000,000
Estimated Annual Maintenance Costs	**$13,450,000**

4.0 PARKS HIGHWAY RAILROAD CORRIDOR A

4.1 Railway Construction Costs

Total Construction cost for the 430 mile long corridor is estimated at **$1,883,000,000** and consists of the following:

Table A-10: Parks Highway Railroad Corridor A Construction Cost

Component	Cost/mile (million/mile)
Railway	$3.6
Water Crossings	$0.779
Corridor Cost/mile	**$4.4**
Total Corridor Cost	**$1,883,000,000**
Corridor Length = 430 miles	
Sidetracking = 37 miles	

- Railway construction cost assumes clearing, rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 50% of material would be used from state lands at a unit price of $8.41/ton. 50% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.91/ton.

- Embankment material includes a 20% contingency.

4.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Parks Highway Corridor A is approximately $11,100,000.

Railway Maintenance Costs

Estimated annual maintenance cost for Parks Highway Corridor A is approximately $15,100,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-11

Table A-11: Parks Highway Railroad Corridor A Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **Four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table A-12: Parks Highway Railroad Corridor A Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operating Cost (20 years)	222,000,000
Annual Rail Maintenance Cost (20 years)	302,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$345,760,000
Estimated Annual Maintenance Cost	**$17,288,000**

5.0 Parks Highway Railroad Corridor B

5.1 Railway Construction Costs

Total Construction cost for the 450-mile long corridor is estimated at **$1,985,000,000** and consists of the following:

Table A-13: Parks Highway Railroad Corridor B Construction Cost

Component	Cost/mile (million/mile)
Railway	$3.6
Water Crossings	$0.809
Corridor Cost/mile	**$4.4**
Total Corridor Cost	**$1,985,000,000**
Corridor Length = 450 miles	
Sidetracking = 35 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 54% of material would be used from state lands at a unit price of $8.41/ton. 46% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.91/ton.

- Embankment material includes a 20% contingency.

5.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Parks Highway Corridor B is approximately $11,600,000.

Railway Maintenance Costs

Estimated annual maintenance cost for Parks Highway Corridor B is approximately $15,800,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-14.

Table A-14: Parks Highway Railroad Corridor B Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **Four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-15: Parks Highway Railroad Corridor B Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operations Cost (20 years)	$232,000,000
Annual Rail Maintenance Cost (20 years)	$316,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$591,760,000
Estimated Annual Maintenance Cost	**$18,000,000**

6.0 PARKS HIGHWAY RAILROAD CORRIDOR C

6.1 Railway Construction Costs

Total Construction cost for the 420-mile long corridor is estimated at **$1,991,000,000** and consists of the following:

Table A-16: Parks Highway Railroad Corridor C Construction Cost

Component	Cost/mile (million/mile)
Railway	$3.8
Water Crossings	$0.937
Corridor Cost/mile	**$4.7**
Total Corridor Cost	**$1,991,000,000**
Corridor Length = 420 miles	
Sidetracking = 35 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 53% of material would be used from state lands at a unit price of $8.41/ton. 47% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.91/ton.

- Embankment material includes a 20% contingency.

6.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Parks Highway Corridor C is approximately $10,800,000.

Railway Maintenance Costs

Estimated annual maintenance cost for Parks Highway Corridor C is approximately $14,700,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-17.

Table A-17: Parks Highway Railroad Corridor C Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **Four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table A-18: Parks Highway Railroad Corridor C Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operations Cost (20 years)	$216,000,000
Annual Rail Maintenance Cost (20 years)	$294,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$337,760,000
Estimated Annual Maintenance Cost	**$16,900,000**

7.0 PARKS HIGHWAY RAILROAD CORRIDOR D

7.1 Railway Construction Costs

Total Construction cost for the 440-mile long corridor is estimated at **$2,006,000,000** and consists of the following:

Table A-19: Parks Highway Railroad Corridor D Construction Cost

Component	Cost/mile (million/mile)
Railway	$3.6
Water Crossings	$0.961
Corridor Cost/mile	**$4.6**
Total Corridor Cost	**$2,006,000,000**
Corridor Length = 440 miles	
Sidetracking = 34 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 54% of material would be used from state lands at a unit price of $8.41/ton. 46% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.91/ton.

- Embankment material includes a 20% contingency.

7.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Parks Highway Corridor D is approximately $11,400,000.

Railway Maintenance Costs

Estimated annual maintenance cost for Parks Highway Corridor D is approximately $15,400,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-20.

Table A-20: Parks Highway Railroad Corridor D Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **Four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-21 Parks Highway Railroad Corridor D Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Maintenance Cost (20 years)	$228,000,000
Annual Rail Maintenance Cost (20 years)	$308,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20 Year Maintenance Cost	$351,760,000
Estimated Annual Maintenance Cost	**$17,600,000**

8.0 DMTS PORT CORRIDOR ROAD

8.1 Roadway Construction Costs

Total Construction cost for the 260-mile long corridor is estimated at **$720,000,000** and consists of the following:

Table A-22: DMTS Port Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$2.2
Water Crossings	$0.643
Corridor Cost/mile	**$2.8**
Total Corridor Cost	**$720,000,000**
Corridor Length = 260 miles	
Truck turnouts = 26 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 23% of material would be used from state lands at a unit price of $10.44/ton. 77% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $12.94/ton.

- Embankment material includes a 20% contingency.

8.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the DMTS Port Corridor is approximately $6,707,700.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-23.

Table A-23: DMTS Port Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table A-24: DMTS Port Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$134,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$190,000,000
Estimated Annual Maintenance Cost	**$9,500,000**

9.0 DMTS PORT CORRIDOR RAILROAD

9.1 Railway Construction Costs

Total Construction cost for the 260-mile long corridor is estimated at **$1,252,000,000** and consists of the following:

Table A-25: DMTS Port Corridor Rail Construction Cost

Component	Cost/mile (million/mile)
Railway	$3.7
Water Crossings	$1.170
Corridor Cost/mile	**$4.9**
Total Corridor Cost	**$1,252,000,000**
Corridor Length = 260 miles	
Sidetracking = 29 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 23% of material would be used from state lands at a unit price of $10.44/ton. 77% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $12.94/ton.

- Embankment material includes a 20% contingency.

7.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for DMTS Port Corridor is approximately $6,700,000.

Railway Maintenance Costs

Estimated annual maintenance cost for the DMTS Port Corridor is approximately $9,000,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-26.

Table A-26: DMTS Port Corridor Rail Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Three new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **Three** camps	$422,000/camp	$1,266,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-27: DMTS Port Corridor Rail Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operations Cost (20 years)	$134,000,000
Annual Rail Maintenance Cost (20 years)	$180,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$25,320,000
Total 20-Year Maintenance Cost	$212,820,000
Estimated Annual Maintenance Cost	**$10,600,000**

10.0 CAPE BLOSSOM CORRIDOR ROAD

10.1 Roadway Construction Costs

Total Construction cost for the 250-mile long corridor is estimated at **$857,000,000** and consists of the following:

Table A-28: Cape Blossom Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$2.8
Water Crossings	$0.724
Corridor Cost/mile	**$3.5**
Total Corridor Cost	**$857,000,000**
Corridor Length = 250 miles	
Truck Turnouts = 26 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 40% of material would be used from state lands at a unit price of $9.34/ton. 60% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $11.84/ton.

- Embankment material includes a 20% contingency.

10.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the Cape Blossom Corridor is approximately $6,394,500.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-29.

Table A-29: Cape Blossom Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-30: Cape Blossom Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$128,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20 Year Maintenance Cost	$184,000,000
Estimated Annual Maintenance Cost	**$9,200,000**

11.0 CAPE BLOSSOM CORRIDOR RAILROAD

11.1 Railway Construction Costs

Total Construction cost for the 250-mile long corridor is estimated at **$1,332,000,000** and consists of the following:

Table A-31: Cape Blossom Corridor Rail Construction Cost

Component	Cost/mile (million/mile)
Railway	$4.1
Water Crossings	$1.336
Corridor Cost/mile	**$5.4**
Total Corridor Cost	**$1,332,000,000**
Corridor Length = 250 miles	
Sidetracking = 19 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 40% of material would be used from state lands at a unit price of $9.34/ton. 60% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $11.84/ton.

- Embankment material includes a 20% contingency.

11.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Cape Blossom Corridor is approximately $6,300,000.

Railway Maintenance Costs

Estimated annual maintenance cost for the Cape Blossom Corridor is approximately $8,600,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-32.

Table A-32: Cape Blossom Corridor Rail Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Three new maintenance camps	$2,500,000/each	$7,500,000
Annual maintenance of **Three** camps	$422,000/camp	$1,266,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-33: Cape Blossom Corridor Rail Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operations Cost (20 years)	$126,000,000
Annual Rail Maintenance Cost (20 years)	$172,000,000
Maintenance Camps	$7,500,000
Annual Camp Maintenance (20 years)	$25,320,000
Total 20 Year Maintenance Cost	$204,820,000
Estimated Annual maintenance Cost	**$10,200,000**

12.0 SELAWIK FLATS CORRIDOR ROAD

12.1 Roadway Construction Costs

Total Construction cost for the 330-mile long corridor is estimated at **$960,000,000** and consists of the following:

Table A-34: Selawik Flats Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$2.4
Water Crossings	$0.493
Corridor Cost/mile	**$2.9**
Total Corridor Cost	**$960,000,000**
Corridor Length = 330 miles	
Truck Turnouts = 33 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 43% of material would be used from state lands at a unit price of $6.95/ton. 57% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.

- Embankment material includes a 20% contingency.

12.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the Selawik Flats Corridor is approximately $8,639,100.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-35.

Table A-35: Selawik Flats Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Six new maintenance camps	$5,500,000/each	$33,000,000
Annual maintenance of **six** camps	$422,000/camp	$2,532,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-36: Selawik Flats Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$173,000,000
Maintenance Camps	$33,000,000
Annual Camp Maintenance (20 years)	$51,000,000
Total 20 Year Maintenance Cost	$256,000,000
Estimated Annual Maintenance Cost	**$12,800,000**

13.0 SELAWIK FLATS CORRIDOR RAILROAD

13.1 Railway Construction Costs

Total Construction cost for the 330-mile long corridor is estimated at **$1,559,000,000** and consists of the following:

Table A-37: Selawik Flats Corridor Rail Construction Cost

Component	Cost/mile (million/mile)
Railway	$3.8
Water Crossings	$0.908
Corridor Cost/mile	**$4.7**
Total Corridor Cost	**$1,559,000,000**
Corridor Length = 330 miles	
Sidetracking = 27 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 43% of material would be used from state lands at a unit price of $6.95/ton. 57% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.

- Embankment material includes a 20% contingency.

13.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Selawik Flats Corridor is approximately $8,600,000.

Railway Maintenance Costs

Estimated annual maintenance cost for the Selawik Flats Corridor is approximately $11,600,000.

Railway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-38.

Table A-38: Selawik Flats Corridor Rail Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **Four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-39: Selawik Flats Corridor Rail Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operations Cost (20 years)	$172,000,000
Annual Rail Maintenance Cost (20 years)	$232,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20 Year Maintenance Cost	$275,760,000
Estimated Annual Maintenance Cost	**$13,800,000**

14.0 CAPE DARBY CORRIDOR ROAD

14.1 Roadway Construction Costs

Total Construction cost for the 340-mile long corridor is estimated at **$952,000,000** and consists of the following:

Table A-40: Cape Darby Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$2.3
Water Crossings	$0.507
Corridor Cost/mile	**$2.8**
Total Corridor Cost	**$952,000,000**
Corridor Length = 340 miles	
Truck Turnouts = 34 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 66% of material would be used from state lands at a unit price of $6.95/ton. 34% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.
- Embankment material includes a 20% contingency.

14.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the Cape Darby Corridor is approximately $8,874,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-41.

Table A-41: Cape Darby Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Six new maintenance camps	$5,500,000/each	$33,000,000
Annual maintenance of **six** camps	$422,000/camp	$2,532,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table A-42: Cape Darby Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$178,000,000
Maintenance Camps	$33,000,000
Annual Camp Maintenance (20 years)	$51,000,000
Total 20 Year Maintenance Cost	$261,000,000
Estimated Annual Maintenance Cost	**$13,100,000**

15.0 CAPE DARBY CORRIDOR RAILROAD

15.1 Railroad Construction Costs

Total Construction cost for the 340-mile long corridor is estimated at **$1,574,000,000** and consists of the following:

Table A-43: Cape Darby Corridor Rail Construction Cost

Component	Cost/mile (million/mile)
Roadway	$3.7
Water Crossings	$0.932
Corridor Cost/mile	**$4.6**
Total Corridor Cost	**$1,574,000,000**
Corridor Length = 340 miles	
Sidetracking = 27 miles	

- Railway construction cost assumes clearing, Rail, ballast, sub-ballast, embankment, sidetracking for approximately 8,000 feet every 20 miles, and mobilization.

- Embankment material cost assumed approximately 66% of material would be used from state lands at a unit price of $6.95/ton. 34% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.

- Embankment material includes a 20% contingency.

15.2 Estimated Operation and Maintenance Costs

Railway Operation Costs

Estimated annual railroad operating costs for Cape Darby Corridor is approximately $8,800,000.

Railroad Maintenance Costs

Estimated annual maintenance cost for the Cape Darby Corridor is approximately $11,900,000.

Railroad Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table A-44.

Table A-44: Cape Darby Corridor Rail Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$2,500,000/each	$10,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

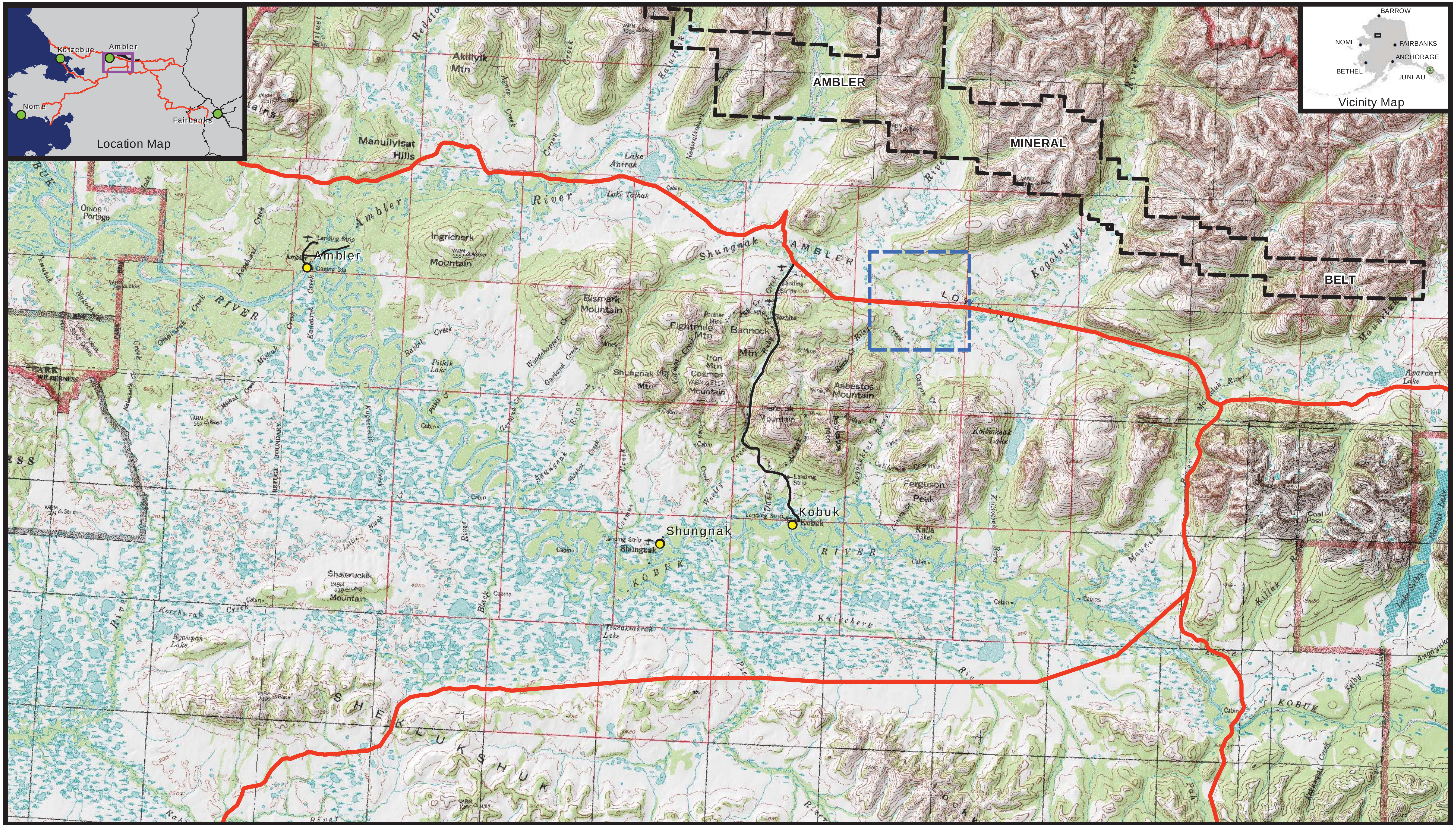
Maintenance costs for a 20-year period would consist of the following costs:

Table A-45 Cape Darby Corridor Rail Maintenance Cost Summary

Component	Total Corridor Cost
Annual Rail Operations Cost (20 years)	$176,000,000
Annual Rail Maintenance Cost (20 years)	$238,000,000
Maintenance Camps	$10,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$281,760,000
Estimated Annual Maintenance Cost	**$14,100,000**

APPENDIX B

Potential Community Road Connections, May 2011



Preliminary Corridors
Existing Road
Ambler Mineral Belt
Proposed Staging Area

N S E W

0 1.5 3 6
Miles

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS
SUMMARY REPORT

PRELIMINARY CORRIDOR ALIGNMENTS

DATE: May 14, 2012 | Figure B-1

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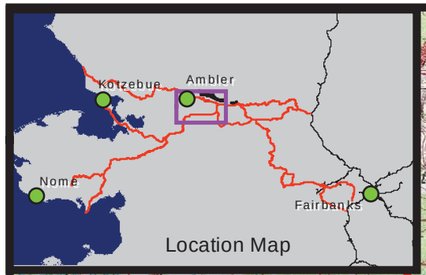

AMBLER

MINERAL

BELT

Ambler

Shungnak

Kobuk

Akillyik Mtn

Manuilysat Hills

Lake Aniruk

Lake Tahat

Ingricherk Mountain

Elsmark Mountain

Eightmile Mtn

Bannock Mtn

Iron Mtn

Cosmos Mountain

Asbestos Mountain

Ferguson Peak

Kalla

Shalaruckik Mountain

Onion Portage

Pitkik Lake

Kobuk Lake

Aparaat Lake

Coal Pass

Landing Strip

Preliminary Corridors

Ambler & Shungnak Corridors

Existing Road

Ambler Mineral Belt

Proposed Staging Area

N

W E

S

0 1.5 3 6

Miles

Coordinate System: NAD 1983 Alaska Albers

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
NORTHERN REGION

AMBLER MINING DISTRICT ACCESS SUMMARY REPORT

POTENTIAL KOBUK VALLEY COMMUNITY CONNECTIONS

DATE: May 14, 2012 | Figure B-2

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APPENDIX C

2011 Brooks East Corridor Options Cost Estimates

APPENDIX C

CONSTRUCTION AND MAINTENANCE COST ESTIMATES BY CORRIDOR

1.0 2011 BROOKS EAST OPTION A

1.1 Roadway Construction Costs

Total construction cost for the 240-mile long corridor is estimated at **$504,000,000** and consists of the following:

Table C-1: 2011 Brooks East Option A Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.7
Water Crossings	$0.442
Corridor Cost/mile	**$2.1**
Total Corridor Cost	**$504,000,000**
Corridor Length = 240 miles	
Truck turnouts = 24 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 70% of material would be used from state lands at a unit price of $7.62/ton. 30% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.12/ton.
- Embankment material includes a 20% contingency.

1.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual roadway maintenance cost for the 2011 Brooks East Option A is approximately $5,742,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table C-2.

Table C-2: 2011 Brooks East Option A Maintenance Camp Cost

Component	Cost	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table C-3: 2011 Brooks East Option A Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$115,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$171,000,000
Estimated Annual Maintenance	**$8,530,000**

2.0 2011 BROOKS EAST OPTION B

2.1 Roadway Construction Costs

Total construction cost for the 250-mile long corridor is estimated at **$550,000,000** and consists of the following:

Table C-4: 2011 Brooks East Option B Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.7
Water Crossings	$0.488
Corridor Cost/mile	**$2.2**
Total Corridor Cost	**$550,000,000**
Corridor Length = 250 miles	
Truck Turnouts = 25 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 72% of material would be used from state lands at a unit price of $7.59/ton. 28% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.09/ton.

- Embankment materials include a 20% contingency.

2.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2011 Brooks East Option B is approximately $6,525,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table C-5.

Table C-5: 2011 Brooks East Option B Maintenance Camp Cost

Component	Cost	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table C-6: 2011 Brooks East Option B Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$131,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$186,000,000
Estimated Annual Maintenance	**$9,310,000**

3.0 2011 BROOKS EAST OPTION C

3.1 Roadway Construction Costs

Total construction cost for the 250-mile long corridor is estimated at **$550,000,000** and consists of the following:

Table C-7: 2011 Brooks East Option C Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.7
Water Crossings	$0.451
Corridor Cost/mile	**$2.2**
Total Corridor Cost	**$550,000,000**
Corridor Length = 250 miles	
Truck Turnouts = 25 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 72% of material would be used from state lands at a unit price of $7.59/ton. 28% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $10.09/ton.
- Both embankment and water crossings include a 20% contingency.

3.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2011 Brooks East Option C is approximately $6,525,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table C-8.

Table C-8: 2011 Brooks East Option C Maintenance Camp Cost

Component	Cost	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table C-9: 2011 Brooks East Option C Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$131,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$186,000,000
Estimated Annual Maintenance	**$9,310,000**

4.0 2011 BROOKS EAST OPTION D

4.1 Roadway Construction Costs

Total construction cost for the 210-mile long corridor is estimated at **$441,000,000** and consists of the following:

Table C-10: 2011 Brooks East Option D Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.6
Water Crossings	$0.477
Corridor Cost/mile	**$2.1**
Total Corridor Cost	**$441,000,000**
Corridor Length = 210 miles	
Truck turnouts = 21 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 62% of material would be used from state lands at a unit price of $7.14/ton. 38% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.64/ton.

- Embankment material includes a 20% contingency.

4.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2011 Brooks East Option D is approximately $5,481,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table C-11.

Table C-11: 2011 Brooks East Option D Maintenance Camp Cost

Component	Cost	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table C-12: 2011 Brooks East Option D Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$110,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$165,000,000
Estimated Annual Maintenance	**$8,270,000**

5.0 2011 BROOKS EAST OPTION E

5.1 Roadway Construction Costs

Total construction cost for the 220-mile long corridor is estimated at **$440,000,000** and consists of the following:

Table C-13: 2011 Brooks East Option E Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.5
Water Crossings	$0.529
Corridor Cost/mile	**$2.0**
Total Corridor Cost	**$440,000,000**
Corridor Length = 220 miles	
Truck Turnouts = 22 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 71% of material would be used from state lands at a unit price of $7.13/ton. 29% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.63/ton.

- Embankment material includes a 20% contingency.

5.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2011 Brooks East Option E is approximately $5,742,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table C-14.

Table C-14: 2011 Brooks East Option E Maintenance Camp Cost

Component	Cost	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table C-15: 2011 Brooks East Option E Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$115,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$171,000,000
Estimated Annual Maintenance	**$8,530,000**

6.0 2011 BROOKS EAST OPTION F

6.1 Roadway Construction Costs

Total Construction cost for the 220-mile long corridor is estimated at **$440,000,000** and consists of the following:

Table C-16: 2011 Brooks East Option F Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.5
Water Crossings	$0.486
Corridor Cost/mile	**$2.0**
Total Corridor Cost	**$440,000,000**
Corridor Length = 220 miles	
Truck Turnouts = 22 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every 10 miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 71% of material would be used from state lands at a unit price of $7.13/ton. 29% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.63/ton.

- Embankment material includes a 20% contingency.

6.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2011 Brooks East Option F is approximately $5,742,000.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table C-17.

Table C-17: 2011 Brooks East Option F Maintenance Camp Cost

Component	Cost	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20-year period would consist of the following costs:

Table C-18: 2011 Brooks East Option F Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$115,000,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$34,000,000
Total 20-Year Maintenance Cost	$171,000,000
Estimated Annual Maintenance	**$8,530,000**

APPENDIX D

2012 Brooks East Corridor Options Cost Estimates

APPENDIX D

CONSTRUCTION AND MAINTENANCE COST ESTIMATES BY CORRIDOR

1.0 2012 BROOKS EAST OPTION 1

1.1 Roadway Construction Costs

Total Construction cost for the 213 mile long corridor is estimated at **$405,000,000** and consists of the following:

Table D-1: 2012 Brooks East Option 1 Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.5
Water Crossings	$0.43
Corridor Cost/mile	**$1.9**
Total Corridor Cost	**$405,000,000**
Corridor Length = 213 miles	
Truck turnouts = 22 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every ten miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 62% of material would be used from state lands at a unit price of $6.94 /ton. 38% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.
- Embankment material includes a 20% contingency.

1.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2012 Brooks East Option 1 is approximately $5,559,300.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table D-2.

Table D-2: 2012 Brooks East Option 1 Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table D-3: 2012 Brooks East Option 1 Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$111,186,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$166,946,000
Estimated Annual Maintenance	**$8,347,300**

2.0 2012 BROOKS EAST OPTION 2

2.1 Roadway Construction Costs

Total Construction cost for the 203 mile long corridor is estimated at **$406,000,000** and consists of the following:

Table D-4: 2012 Brooks East Option 2 Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.5
Water Crossings	$0.49
Corridor Cost/mile	**$2.0**
Total Corridor Cost	**$406,000,000**
Corridor Length = 203 miles	
Truck Turnouts = 20 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every ten miles for truck turnouts, and mobilization.

- Embankment material cost assumed approximately 62% of material would be used from state lands at a unit price of $6.95/ton. 38% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.45/ton.

- Embankment materials include a 20% contingency.

2.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2012 Brooks East Option 2 Corridor is approximately $5,298,300.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table D-5.

Table D-5: 2012 Brooks East Option 2 Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table D-6: 2012 Brooks East Option 2 Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$105,966,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$161,726,000
Estimated Annual Maintenance	**$8,086,300**

3.0 2012 BROOKS EAST OPTION 3

3.1 Roadway Construction Costs

Total Construction cost for the 224 mile long corridor is estimated at **$426,000,000** and consists of the following:

Table D-7: 2012 Brooks East Option 3 Corridor Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.5
Water Crossings	$0.40
Corridor Cost/mile	**$1.9**
Total Corridor Cost	**$426,000,000**
Corridor Length = 224 miles	
Truck Turnouts = 22 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every ten miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 62% of material would be used from state lands at a unit price of $7.13/ton. 38% of the embankment material was assumed to have a $5/yd^3 royalty added for non-state land material for a unit price of $9.63/ton.
- Both embankment and water crossings include a 20% contingency.

3.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2012 Brooks East Option 3 Corridor is approximately $5,846,400.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table D-8.

Table D-8: 2012 Brooks East Option 3 Corridor Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table D-9: 2012 Brooks East Option 3 Corridor Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$116,928,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$172,688,000
Estimated Annual Maintenance	**$8,634,400**

4.0 2012 BROOKS EAST OPTION 4

4.1 Roadway Construction Costs

Total Construction cost for the 214 mile long corridor is estimated at **$449,000,000** and consists of the following:

Table D-10: 2012 Brooks East Option 4 Construction Cost

Component	Cost/mile (million/mile)
Roadway	$1.6
Water Crossings	$0.456
Corridor Cost/mile	**$2.1**
Total Corridor Cost	**$449,000,000**
Corridor Length = 214 miles	
Truck turnouts = 21 each	

- Roadway construction cost assumes clearing, gravel surfacing, embankment, a widened roadway surface every ten miles for truck turnouts, and mobilization.
- Embankment material cost assumed approximately 62% of material would be used from state lands at a unit price of $7.14/ton. 38% of the embankment material was assumed to have a $5/yd3 royalty added for non-state land material for a unit price of $9.64/ton.
- Embankment material includes a 20% contingency.

4.2 Estimated Maintenance Costs

Roadway Maintenance Costs

Estimated annual maintenance cost for the 2012 Brooks East Option 4 is approximately $5,585,400.

Roadway Maintenance Camp Costs

Initial maintenance camp construction and annual maintenance are summarized in Table D-11.

Table C-11: 2012 Brooks East Option 4 Maintenance Camp Cost

Component	Cost/each	Total Corridor Cost
Four new maintenance camps	$5,500,000/each	$22,000,000
Annual maintenance of **four** camps	$422,000/camp	$1,688,000/yr

Maintenance costs for a 20 year period would consist of the following costs:

Table D-12: 2012 Brooks East Option 4 Maintenance Cost Summary

Component	Total Corridor Cost
Annual Road Maintenance Cost (20 years)	$111,708,000
Maintenance Camps	$22,000,000
Annual Camp Maintenance (20 years)	$33,760,000
Total 20-Year Maintenance Cost	$167,468,000
Estimated Annual Maintenance	**$8,373,400**

Ambler Mining District Access