Section 3

Ambler Mining District Industrial Access Project
National Park Service
SF-299 Supplemental Narrative

Prepared on behalf of:

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7. Project Description (describe in detail): (a) Type of system or facility, *(e.g., canal, pipeline, road);* (b) related structures and facilities; (c) physical specifications *(length, width, grading, etc.);* (d) term of years needed; (e) time of year of use or operation; (f) Volume or amount of product to be transported; (g) duration and timing of construction; and (h) temporary work areas needed for construction.

(a) Proposed Facility.

The project would construct a new 211-mile roadway along the southern flanks of the Brooks Range, extending west from the Dalton Highway to the south bank of the Ambler River (Appendix 3A: Figure 3-1). The road is being designed as an industrial access road to provide ingress to the Ambler Mining District (the District). The road would provide surface transportation access to the mining district to allow for expanded exploration, mine development, and mine operations at mineral prospects throughout the District. Access to the road would be controlled and primarily limited to mining-related industrial uses, although some commercial uses may be allowed under a permit process.

The Alaska Industrial Development and Export Authority (AIDEA) is requesting a right-of-way (ROW) for the industrial access road as well as one material site and access roads to reach water sources and material sites. The ROW requested is 250 feet wide in most areas, although in a few areas, with bridge crossings and steep terrain, the ROW width may need to be up to 400 feet wide. Potential measures to reduce the footprint in these areas could be evaluated in more detailed design stages. AIDEA would hold the ROW granted and the road, but may procure road design, construction, maintenance and operation services through third-parties. This is a proven AIDEA business model and was successfully used to construct the Delong Mountain Transportation System (DMTS) which provides access to the Red Dog Mine in northwest Alaska. AIDEA owns the DMTS but it was constructed and is operated and maintained by private parties under contract to AIDEA.

Description of the Preferred Corridor Within Gates of the Arctic National Park and Preserve (GAAR):

Figure 3-2 of Appendix 3A provides a plan view map of the preferred alignment within GAAR. The preferred alignment enters GAAR near Station 3950+00 (Latitude 67.0338°/Longitude -154.8055°) and exits GAAR near Station 5325+00 (Latitude 67.0434°/Longitude -153.9265°). The proposed corridor travels 26 miles east-west along the northern boundary of the Western (Kobuk River) unit of the Gates of the Arctic Preserve. The preferred corridor crosses into GAAR just west of the Continental Divide, north of the Helpmejack Hills, and south of the southern boundary of the GAAR wilderness. The corridor roughly parallels the GAAR wilderness boundary from the eastern boundary of the Preserve to the Kobuk River crossing, after crossing two unnamed waterways with medium sized bridges (spans up to 140 feet long).

The corridor hugs the lower flanks along the north side of the Helmejack Hills, avoiding the shallower valley elevations with substantial wetland features and maintaining distance from Kichalaska Creek. As the alignment approaches the Kobuk River, it heads to the southwest along the north flank of the Helpmejack Hills before making a perpendicular crossing of the Kobuk River. The proposed Kobuk River crossing is 2.5 miles south of Walker Lake.

After crossing the Kobuk River, the corridor crosses a large valley to the southwest of Walker Lake and heads toward Nutuvukti Lake, crossing two additional unnamed waterways with medium sized bridges. After crossing the valley, the alignment traverses the southern flanks of the mountains north of Nutuvukti

Lake. It hugs the lower elevations of these mountains as it skirts the north side of Nutuvukti Lake, coming within 1/4 mile of the northern lake shore. After passing Nutuvukti Lake, the alignment heads generally east across another valley floor before exiting GAAR.

Construction of the roadway within GAAR would require the installation of bridges, culverts, and access roads to reach material sites and water sources. One material site is proposed within GAAR, in the large valley southwest of Walker Lake (near Station 4520+00). The proposed material site consists of approximately 47 acres (see Appendix 3A: Figure 3-2).

The proposed ROW through GAAR would typically be 250 feet wide. The ROW widens to 360 feet between Stations 4290+00 and 4300+00 near the crossing of an unnamed stream. It widens again to 400 feet from Station 4635+00 to 4650+00 on the western side of the Kobuk River crossing. Another expansion of the ROW to 300 feet is proposed due to topography near Station 4785+00. Access roads to water sites would be requested between Station 4010+00 to 4015+00, near Station 4990+00, and between Station 5180+00 and 5185+00. A 47-acre material site is proposed near Station 4530+00. A turnout lane is proposed near Station 4570+00.

Table 1 summarizes the overall project footprint and the footprint of each of the major project elements within GAAR for both the preferred and alternative corridors. The footprint is based on the daylight limits for the project elements. Temporary construction effects are estimated with a 10-foot buffer around the daylight limits. Permanent and temporary impacts in wetlands and streams are discussed in more detail in the U.S. Army Corps of Engineers (USACE) application (Section 5: Tables 4 through 6).

Table 1: Proposed Project Footprint within GAAR for the Preferred and Alternative Corridors

Project Elements	Quantity	
	Preferred Corridor	**Alternative Corridor**
Corridor Endpoints	67.0338°/-154.8055° to 67.0434°/ -153.9265° Sta. 3950+00 – Sta. 5325+00	66.9094°/-154.8516° to 66.8401°/ -154.3660° Sta. 505+00 – Sta. 1445+00
Overall Project Footprint (*Acres*)	331	341
Industrial Access Road Length (*Miles*)	26	18
Industrial Access Road (IAR) Footprint (*Acres*)	277	208
Support Access Road (SAR) Footprint (*Acres*)	7	21
Airstrip Footprint (*Acres*)	0	51
Material Sites Footprint (*Acres*)	47	61
Material Sites (*No.*)	1	1
Bridges (*No.*) – Small (<50 feet)	0	0
Bridges (*No.*) – Medium (50 – 140 feet)	4	0
Bridges (*No.*) – Large (>140 feet)	1	2
Culvert (*No.*) – Minor (3 feet)	533	316
Culvert (*No.*) – Moderate (4 – 10 feet)	2	0
Culvert (*No.*) –Major (>10 feet)	4	1

Description of the Alternative Corridor Within GAAR

Figure 3-2 of Appendix 3A provides a plan view map of the alternative alignment within GAAR. The alternative alignment starts at Station 505+00 (Latitude 66.9094°/Longitude -154.8516°) and continues to Station 1445+00 (Latitude 66.8401°/Longitude -154.3660°).

The alternative corridor travels 18 miles east-west across the narrowest portion of the western (Kobuk River) unit of GAAR. The alternative corridor crosses into the preserve just west of the Continental Divide, south of the Helpmejack Hills, and 12 miles south of the southern boundary of GAAR wilderness. The corridor crosses the eastern boundary of the preserve north of Norutak Lake, turning north along western flank of the Helpmejack Hills to avoid the shallower valley elevations that contain substantial wetland features. Nearing the Kobuk River, the corridor angles to the northwest and crosses an unnamed waterway in a broad valley. At this point, the corridor is 8 miles south of the southern boundary of GAAR wilderness.

As the corridor approaches the Kobuk River, the corridor heads west and parallels the Kobuk River to the south. The corridor is within 1/2 mile of the Kobuk River for approximately 3 miles, constrained by hills located to the south, before making a perpendicular crossing of the Kobuk River. The proposed Kobuk River crossing is approximately 5 miles north of the Lower Kobuk Canyon and eight miles southwest of the Upper Kobuk Canyon. The corridor is approximately 4 miles south of Nutuvukti Lake at the Kobuk River crossing.

After crossing the Kobuk River, the corridor continues west, climbing through a pass in the Akoliakruich Hills and leaving the Kobuk River valley. The corridor descends into the Reed River valley, crossing an unnamed waterway near its confluence with the Reed River. From there, the corridor then parallels the Reed River to the south, approaching within 1/4 mile of the Reed River, for approximately 1 mile before turning north and making a perpendicular crossing of the Reed River. The corridor continues north, climbing into an elevated valley in the Akoliakruich Hills before exiting GAAR and crossing into the Beaver Creek valley.

Construction of the roadway within GAAR would require the installation of bridges and culverts, the development of one material site (see Appendix 3A: Figure 3-2), and water and material site access roads.

The alternative ROW through GAAR would typically be 250 feet wide. The ROW widens to 275 feet between Stations 570+00 and 575+00 due to topographic features. It widens to 325 feet again between Station 715+00 and Station 735+00. Another expansion of the ROW to 255 feet is proposed between Station 1250+00 and 1255+00. Access roads to water sites would be requested near Station 905+00, between Station 1310+00 to 1315+00, and near Station 595+00. A material site would be proposed near Station 860+00. This site is proposed to be used as a long-term maintenance site with a support airstrip. A turnout lane is proposed at Station 980+00.

(b) Related Structures and Facilities along the entire road corridor, including water crossings.

The project would require the construction of numerous support structures including: bridges, culverts, maintenance stations, turnouts, material sites, material site access roads, maintenance stations, and airstrips. Figure 3-3 of Appendix 3A illustrates the major project elements along the entire proposed project corridor from the Dalton Highway to Ambler Mining District. Estimated quantities and dimensions for project elements along the entire corridor for both the preferred and alternative alignments are summarized in the Corridor Supplemental Narrative (Section 2) Table 2.

Table 3 in the Corridor Supplemental Narrative (Section 2 of the consolidated application) provides definitions and quantities of the proposed water crossing structures for the full length of the preferred and alternative alignments. Proposed locations of bridges and culverts for the proposed corridor are shown on the maps submitted as part of the USACE permit application attached to this submittal (Attachment 5, Appendix 5-B). Locations of bridges and culverts on the alternative alignment through GAAR are shown on the maps in Appendix 3B: Map Set 3-1. Table 2 summarizes the water crossing structures within GAAR.

Table 2: Summary of Water Crossing Structures
Preferred and Alternative Alignments in GAAR

Crossing Classification	Definition (*Diameter or Span*)	Quantity	
		Preferred Alignment	Alternative Alignment
Culverts			
Minor Culverts	3 Feet	533	316
Moderate Culverts	4 to 10 Feet	2	0
Major Culverts	11 to 20 Feet	4	1
Bridges			
Small Bridges	< 50 Feet	0	0
Medium Bridges	50 to 140 Feet	4	0
Large Bridges	> 140 Feet	1	2

Where possible, crossings were located where floodplains are narrow to reduce floodplain impacts. Approach terrain was also evaluated to minimize necessary cut and grading during construction; locations with high terraces and bluffs along the stream channel were avoided when possible. Bridge and culvert spans were dictated by bankfull width; all perennial streams were assumed to support anadromous and/or resident fish populations and structures sizes were selected to span at a minimum the bankfull width.

AIDEA is not proposing to install fiber optic cables as part of this project; however, AIDEA believes that communications companies may be interested in installing communications cables in the future and that this should be considered as a reasonably foreseeable project in the environmental review process.

(c) Physical Specifications.

The Corridor Supplemental Narrative (Section 2) provides information on the physical specification of the project, including cross-sections (Appendix 2A: Figures 2-4 to 2-7) for each phase of the project.

Plan and profile figures for the preferred and alternative alignments within GAAR are included in Appendix 3B: Map Sets 3-2 and 3-3. Additionally, detailed maps of the proposed and alternative alignments within GAAR are provided in Appendix 3B: Map Sets 3-4 and 3-5.

Construction of Phase III (full build out) of the entire corridor from the Dalton Highway to the Ambler Mining District will require an estimated 12.3 million cubic yards (cy) of fill. Roadway borrow material for embankments would likely be Type C Selected Material, a clean fill material low in organics and frozen matter. It is anticipated structural fill would be made up of Type A or Type B Selected Material and the surface course would be constructed with either D-1 or E-surface material. Riprap needs are estimated at 100,000 cy. Maintenance needs are estimated at 2 inches of material over the entire road each year for the 50-year road life. A total of 41 potential material sites have been identified along the corridor. These sites have an estimated capacity to provide 10.25 million cy of riprap and 42.23 million cy of gravel, so these sites have sufficient resources for the project.

Construction of the portion of the preferred road corridor within the Kobuk Unit of GAAR would require an estimated 1.77 million cy beyond materials available from cuts within GAAR. Road maintenance over the life of the project would require an estimated 1.36 million cy, based on 2 inches of material over the road surface every year for 50 years. This results in a total need for 3.13 million cy in GAAR over the 50-year life of the project. The estimated material available from the identified material site on the preferred corridor within GAAR is 180% of the total estimated need.

An estimated 2.16 million cy would be needed for road construction on the alternative corridor through GAAR, beyond materials available from cuts within GAAR. Maintenance would require an estimated 0.93 million cy, based on 2 inches of material over the road surface every year for 50 years. This results in a total need for 3.09 million cy in GAAR over the 50-year life of the project. The estimated material available from the identified material site on the alternative corridor within GAAR is 134% of the total estimated need.

(d) Term of years needed.

The roadway corridor is expected to be in operation for up to 50 years. The life span of the roadway corridor is dependent upon the success of exploration and extraction efforts within the Ambler Mining District. AIDEA is requesting a 250-foot wide ROW generally, with a wider ROW requested in certain areas as described in Section 7(a) on pages 2-3 of this narrative. AIDEA is also asking for ROW or permits for a material site and water sources described in Section 7(a), and for a maintenance site and airstrip. All ROW and permits would be requested for a 50-year term.

(e) Time of year of use or operation.

Use of the Phase I pioneer road would occur from August through April, with use in the spring/early summer months restricted due to the shallow embankment construction and spring break up conditions. Following the completion of Phase II, the roadway would be operational year round.

(f) Volume or amount of product to be transported.

The Corridor Supplemental Narrative (Section 2) provides information on the volume of product to be transported, the type of vehicles using the road and how other permitted traffic (such as local communities and emergency response) may use the road.

(g) Duration and timing of construction.

The Corridor Supplemental Narrative (Section 2) provides information on the duration and timing of construction for the project.

(h) Temporary work areas needed for construction.

A total of 41 potential material sites have been preliminarily identified to provide gravel and riprap for the entire preferred alignment; 46 potential material site locations have been tentatively identified to meet the needs of the alternative alignment. These areas are shown on Figure 3-3 in Appendix 3A. One material site is proposed within GAAR along the preferred alignment and one material site has been identified within GAAR along the alternative alignment (Appendix 3A: Figure 3-2). Three of the material sites along the industrial access road alignment would be expected to be developed into long-term roadway maintenance facilities. These are identified as areas with landing strips on Figure 3-3 in Appendix 3A. One material site is proposed for a maintenance station in GAAR as identified with a landing strip in Figure 3-2 in Appendix 3A. Most material sites would require access roadways of varying lengths to connect the borrow location to the proposed roadway. Additionally, access roads would be constructed to provide access to water sources for construction and maintenance activities.

The Corridor Supplement Narrative (Section 2) provides additional information on temporary staging and construction areas and stabilization and restoration.

8. Attach a map covering the area and show location of project proposal.

Maps of the entire proposed corridor are provided in Appendix 2B. Detailed maps (1:4800 scale maps) of the preferred (northern) corridor (Figures N1 – N24) and the alternative (southern) corridor (Figures S1 – S19) through GAAR are included in Appendix 3B: Map Sets 3-4 and 3-5. Aerial photography and LIDAR imagery has already been provided to the National Park Service.

13a. Describe other reasonable alternative routes and modes considered.

The Corridor Supplement Narrative (Section 2) provides information on alternative routes and modes considered for the project corridor and identification of the corridor proposed for the project.

Within Gates of the Arctic National Preserve, two alignments were identified (Appendix 3: Figure 3-2). The alternative alignment is located south of the proposed corridor (preferred alignment) through the narrowest portion of GAAR.

13b. Why were these alternatives not selected?

The explanation of why other alternatives evaluated were not selected is provided in the Corridor Supplement Narrative (Section 2).

Two alignments have been identified in GAAR. Using the northern option through GAAR, the proposed industrial access road alignment from the Dalton Highway to the mining district totals 211 miles, with 26 miles within the boundaries of GAAR. The southern option through GAAR increases the total length of the proposed corridor from the Dalton Highway to the mining district to 224 miles, of which 17.8 miles are within the boundary of GAAR. The northern option was identified as the preferred option, based on engineering feasibility factors and feedback from Upper Kobuk River communities (DOT&PF, 2012). From an engineering perspective, the northern option has better subsurface conditions, requiring less embankment material per mile, and gravel and riprap material sources are more readily available along this option. Finally, residents, elders, and subsistence advisors from the upper Kobuk communities provided feedback that a more southerly option would have substantially greater impacts to important cultural and subsistence areas (DOT&PF, 2012).

Table 3 presents a comparison of the proposed corridor from the Dalton Highway to the Ambler Mining District and an alternative corridor using the southern route through GAAR using the scoring criteria described in the DOT&PF Summary Report (included in Appendix 2C). Since these criteria were developed and used by DOT&PF to do a generalized ranking evaluation between several alternatives at a reconnaissance level, and not to distinguish between variations on one corridor, the ranking in Table 3 provides limited useful information in terms of distinguishing between the two variations on the corridor.

Table 3: Criterion and Scoring for the Proposed Corridor and the Alternative Corridor[1]
(Lat 67.0490°/Long 153.5500° to Lat 67.0174°/155.0339°)
(Station 3600+00 to 5915+00))

Criterion	**Proposed Corridor**		**Alternative Corridor (Southern Route through GAAR)**	
	Amount	Rating	Amount	Rating
1. Corridor Length (*miles*)	43	5	61	5
2. Federal CSUs	1	5	1	5
3. Wild and Scenic Rivers	1	5	1	5
4. Salmon/Sheefish River Total	2	5	5	5
4a. Mapped Anadromous	0	-	0	-
4b. Assumed Anadromous	2	-	5	-
5. Caribou Habitat	Less	5	Less	5
6. Threatened or Endangered Species/Critical Habitat	None	5	None	5
7. Material Site Availability	100	5	100	5
8. Total Large Bridges	11/850	5	11/840	5
8a. Bridges Over 1,500 Feet	0	5	0	5
9. Construction Cost (*in millions*)	$86.59	5	$144.79	5
10. Annual Maintenance Cost (*in millions*)	$1.83	5	$2.60	5
11. Wetland Habitat Impacts (*miles)*	19	5	37	4
Ranking	**1**	**60**	**2**	**59**

[1]*See description of criteria and ranking in DOT&PF Summary Report included in Appendix 2C.*

The discussion above provides information on why each of the alternatives identified by DOT&PF is not an economically and environmentally feasible alternative. While all of the possible alternatives identified in Section 2: Table 4 present significant challenges, the Elliott Highway, amongst those alternatives and excluding the route described expressly in ANILCA, minimized environmental impacts more than other options listed. Such minimization includes, but is not limited to, potential effects on endangered species and the migration routes and habitat for the Western Arctic Caribou Herd. This explains the ranking of the Elliott Highway route in Section 2: Table 4.

Based on these parameters, the Elliott Highway is listed as the next best route that does not cross the GARR based on a number of environmental and economic factors, and that determination is not based solely on the circumstance that it does not cross a CSU.

13c. Give an explanation as to why it is necessary to cross Federal Lands.

The Corridor Supplement Narrative (Section 2) explains why it is necessary to cross federal lands.

14. List authorizations and pending applications filed for similar projects which may provide information to the authorizing agency.

The Corridor Supplement Narrative (Section 2) provides a summary of potential permits, consultations, or other activities which may require approval from Federal or State agencies.

15. Provide statement of need for project, including the economic feasibility of items such as (a) cost of proposal (construction, operation, and maintenance); (b) estimated cost of next best alternative; and (c) expected public benefits.

The Corridor Supplement Narrative (Section 2) provides the purpose and need for the project, including the economic feasibility, the cost of alternatives and expected public benefits.

16. Describe probable effects on the population in the area, including the social and economic aspects, and the rural lifestyles.

Describe the probable effects of a road through Gates of the Arctic National Preserve on human uses of the area; include effects on recreational, subsistence and other economic uses, and effects on rural and traditional lifestyles.

The Corridor Supplement Narrative (Section 2) provides information on the potential effects of the road corridor on recreation, subsistence and other economic uses, and effects on rural and traditional lifestyles.

Introduction of the road corridor through GAAR will change the recreation experience in the Preserve, as visitors may see the road from the Kobuk River and some other vantage points. However, the number of visitors to the Preserve is limited, and the number that would encounter the road is expected to be low.

17. Describe likely environmental effects that the proposed project will have on: (a) air quality; (b) visual impact; (c) surface and ground water quality and quantity; (d) the control or structural change on any stream or other body of water; (e) existing noise levels; and (f) the surface of the land, including vegetation, permafrost, soil, and soil stability.

(a) Provide an estimate of the quantity and type of air emissions (point source and fugitive dust) that will occur during the construction and operation of the proposed road and project changes that these emissions will have on local and general air quality.

The Corridor Supplement Narrative (Section 2) provides information on potential air quality effects.

(b) Describe effects on visual and scenic qualities of the landscape of proposed road.

Evaluating the effect on the visual environment requires consideration of the visual character and quality of the area, viewer exposure to the area, and viewer sensitivity. The proposed road alignment crosses primarily through undeveloped areas with high scenic quality. The presence of a roadway, associated facilities, and vehicular traffic would affect the visual character and visual qualities of the area by introducing a man-made structure into an undeveloped area. Viewer exposure to the road may occur at any point in the Preserve, but most visitors to this area would be expected to be at Walker Lake or on the Kobuk River. The level of use in other portions of the Preserve is expected to be fairly low. It is likely visitors to the Preserve would be fairly sensitive to the scenic quality of the area. The magnitude of the effects on the visual and scenic qualities would be expected to be most noticeable at and near the areas where the proposed road crosses the Kobuk River. Effects would be less when the road corridor is visible in the middle or background of the view.

Provide a graphical viewshed analysis of the road and related structures on the landscape.

This visual analysis focused on identifying portions of the road having a potential visual impact based on the physical size of road features and the location of the road alignment in relation to terrain features and water bodies.

Appendix 3C discusses potential visual impacts of the proposed road and includes graphic simulations for the preferred corridor and the alternative corridor. The preliminary visual impact analysis simulates the footprint associated with the construction of a 32' wide crushed aggregate road, and illustrates its potential effect on the scenic quality of the landscape. It is intended to act as a tool for informing decisions regarding the selection of a route and mitigation measures. In support of this analysis, a scenic quality evaluation was conducted at 20 different observation points and visual simulations were developed for six key observation points (KOPs) along the preferred northern route and four KOPs along the alternative southern route. The locations of observations points and KOPs are presented in Appendix 3A: Figure 3-4 and Appendix 3C: Figure 3.

Development of the simulations employed design drawings, LIDAR contour maps, high resolution aerial photography and GIS data exported to Google Earth to determine the alignment and location of the road in each panorama with as much accuracy as possible. The lines were drawn in a very light color to ensure the alignment would be visible. The color does not necessarily represent the actual color of the road after construction but was selected to contrast with the existing landscape. Road colors are expected to range from light gray to tan to reddish brown depending on the materials available at the various materials sites. Note that the top photo in each set of figures in Appendix 3C depicts current conditions while the bottom photo presents the simulation of the proposed road within the panorama.

The proposed road may be visible from some high points and would be visible to visitors on the Kobuk River at or near the bridge crossing. GAAR visitors are estimated at 795 to 910 visitors per year with the vast majority visiting between May and October (NPS, 2011). Walker Lake is the sixth most popular visitor entry location with a total of 232 visitors entering there from 2000 to 2007, with annual numbers ranging from 4 to 63. Nutuvuki accounted for 24 entries from 2000 to 2007, with annual numbers ranging from 0 (in four years) to 13. Given GAAR's size and the relatively low number of visitors, the number of visitors likely to be affected by views of the road is anticipated to be fairly low.

Re-vegetation of fill slopes with native seed, trees and/or shrubs on topsoil could be used as a mitigation technique to reduce the contrast between the gravel road and the existing forest.

(c) Provide current water quality data on major wetlands and water bodies.

The Corridor Supplement Narrative (Section 2) provides information on water quality, wetlands and water bodies.

Describe potential consequences to surface seasonal water flow, including quality and quantity from construction and operation of road.

The Corridor Supplement Narrative (Section 2) provides information on potential consequences to surface seasonal water flow, including quality and quantity from construction and operation of the road.

(d) The control or structural change on any stream or other body of water.

The Corridor Supplement Narrative (Section 2) and the USACE permit application (Section 5) provide information on potential consequences to streams and other water bodies.

(e) Quantify changes to ambient natural soundscape due to noise from the project, including construction and operation.

Noise is generally defined as unwanted sound, and can be intermittent or continuous, steady or impulsive, stationary or transient. Noise levels heard by humans and animals are dependent on variables, including distance and ground cover between the source and receiver and atmospheric conditions. Perception of noise is affected by intensity, frequency, pitch, and duration. Noise can influence people or animals by interfering with normal activities or diminishing the quality of the environment.

Noise levels are quantified using units of decibels (dB); A-weighted decibels (dBA) closely correlate to the frequency response of normal human hearing. For environmental noise studies, noise levels are typically described using A-weighted equivalent noise levels, Leq, during a certain time period. The Leq metric uses a single number to describe the constantly fluctuating instantaneous ambient noise levels at a receptor location during a period of time (in this case, 1 hour) and accounts for all of the noises and quiet periods that occur during that time period.

According to the NPS, an extrinsic sound is any sound not forming an essential part of GAAR's purpose, such as aircraft or vehicle traffic noise. The NPS uses the natural ambient metric (Lnat) to estimate what the acoustical environment would be without the contribution of extrinsic sounds (NPS, 2013). In addition, the Lmax metric denotes the maximum instantaneous noise level recorded during a measurement period.

The 90th percentile-exceeded noise level, L90, is a metric that indicates the single noise level that is exceeded during 90% of a measurement period, although the actual instantaneous noise levels fluctuate continuously. The L90 noise level is typically considered the ambient noise level.

In August through September 2013 and June through August 2014, the NPS completed ambient noise level measurements at seven selected locations within the GAAR boundaries. The data from the five measurement locations on Walker and Nutuvukti lakes adjacent to the preferred alignment was used for this analysis (Appendix 3D: Figure 1). Ambient L90 noise levels ranged from 17 to 36 dBA, and the NPS determined natural ambient levels, Lnat, from the measured data which ranged from 18 to 37 dBA (NPS, 2014).

The Cadna-A software program was used to complete the noise level predictions using algorithms from the International Organization for Standardization (ISO) Standard 9613-2 (Attenuation of Sound during Propagation Outdoors, Part 2: General Method of Calculation). The predicted noise levels in this report should be assumed to be average noise levels, and significant positive and negative deviations from the averages can occur (Harris, 1998).

The GAAR ambient natural soundscape is characterized by natural sounds in most areas, including wildlife, birds, insects, flowing water, wind, etc. Manmade noise includes aircraft overflights (planes and helicopters) and localized use of snowmachines, boats, rafts, and all-terrain vehicles. The Kobuk River corridor supports numerous recreational activities from motorized and non-motorized river travel, subsistence and sport hunting, wildlife observation, and backpacking. Most human use adjacent to the preferred and alternative alignments is along the Kobuk River and at Walker Lake (Appendix 3D: Figure 1). Visitors to GAAR are estimated at 795 to 910 per year (NPS, 2011). Given GAAR's size, it is estimated that the number of visitors in the vicinity of the road would be much lower than this.

A total of 25 selected locations were analyzed, including NPS's five Soundscape Inventory noise level measurement locations along Walker and Nutuvukti lakes (NPS, 2014), and 20 NPS observation point locations used for the GAAR Visual Impact Analysis (Appendix 3D: Figure 1) (DOWL HKM, 2014).

The change in the ambient environment as a result of truck traffic was calculated as the 1-hour Leq, Leq(h). The predicted Leq(h) frequency spectrum was compared to the NPS-measured L90 and Lnat levels. The comparison of the predicted Leq(h) to the L90 and Lnat levels determined the expected reaction of people to the change in the ambient environment during the hours that trucks are traveling the road.

Operational Noise

The results of the analysis for hourly truck traffic at each location are summarized in Tables 4 and 5 and presented graphically and in tabular form by frequency in the technical report included as Appendix 3D. Noise contours of predicted Leq(h) values are shown on Figures 2 and 3 of Appendix 3D.

For the preferred alignment, the heavy trucks are predicted to be audible at 10 out of the 25 selected locations. In general, the 10 locations include the south end of Walker Lake, the Nutuvukti Lake area, and the GAAR boundaries. Although audibility would depend on the ambient noise level at a given location, if the trucks are audible, their audible noise is estimated to be a "moderate" level at two locations, "faint" at four locations, and "very faint" at four locations. The Leq(h) for hourly truck traffic is predicted to be less or equal to than the ambient L90 noise level at 20 locations which would invoke a minimal human response, to be between one and 10 dBA greater than the L90 at three locations which would typically invoke a moderate human response, and more than 10 dBA greater than the ambient at two locations which may invoke a high response and be twice as loud or more compared to the ambient noise.

For the alternative alignment, the heavy trucks are also predicted to be audible at 10 out of the 25 selected locations. The 10 locations include the Reed and Kobuk river areas. Although audibility would depend on the ambient noise level at a given location, if the trucks are audible, their audible noise is estimated to be a "moderate" level at three locations, "faint" at six locations, and "very faint" at one location. The Leq(h) for hourly truck traffic is predicted to be less or equal to than the ambient L90 noise level at 21 locations which would invoke a minimal human response, to be between one and 10 dBA greater than the L90 at one location which would typically invoke a moderate response, and more than 10 dBA greater than the ambient at three locations which may invoke a high response and be twice as loud or more compared to the ambient noise.

As noted above, the number of visitors in the vicinity of the road would be expected to be fairly low.

Table 4: Noise Analysis Summary – Preferred Alignment

Location (see Figure 1, Appendix 3D)	Audibility		Comparison to Ambient Noise Level	
	Predicted Lmax (*dBA*)	Subjective Evaluation if Audible	Predicted Leq(h) (*dBA*)	Expected Human Reaction
NPS MEAS LOC: Walker Lake, North	-4		2	Minimal
NPS MEAS LOC: Walker Lake, Swan Island	6		8	Minimal
NPS MEAS LOC: Walker Lake, South	20	Very faint	19	Moderate
NPS MEAS LOC: Nutuvukti Lake, North	35	Faint	28	Moderate
NPS MEAS LOC: Nutuvukti Lake, South	17	Very faint	14	Minimal
Reed R1	0		4	Minimal
Reed R2	-1		3	Minimal
Reed R3	3		7	Minimal
ROW S Reed W	4		6	Minimal
Kobuk R S, Ridge 1	6		6	Minimal
Kobuk R S, Ridge 2	0		4	Minimal
Kobuk R S1	3		5	Minimal
Kobuk R S2	4		6	Minimal
Kobuk R S3	14	Very faint	12	Minimal
KobukR, N. ROW	54	Moderate	42	High
ROW W, High	12	Very faint	19	Minimal
ROW West, Low	56	Moderate	43	High
Nutuvukti Lake 1	34	Faint	28	Minimal
Nut Summit	22	Faint	18	Minimal
Walker W, High	7		9	Minimal
Walker Lk SE	12		12	Minimal
Upper Kobuk	2		5	Minimal
Hogaza Summit	3		8	Minimal
ROW E Boundary	36	Faint	29	Moderate
Kobuk R S, Ridge 3	-2		2	Minimal

Note: Refer to Appendix A in the Noise report in Appendix 3D for the detailed data results and graphs.

Table 5: Noise Analysis Summary – Alternative Alignment

Location (Figure 1, Appendix 3D)	Audibility		Comparison to Ambient Noise Level	
	Predicted Lmax (*dBA*)	Subjective Evaluation if Audible	Predicted Leq(h) (*dBA*)	Expected Human Reaction
NPS MEAS LOC: Walker Lake, North	Too low		-12	Minimal
NPS MEAS LOC: Walker Lake, Swan Island	-5		-5	Minimal
NPS MEAS LOC: Walker Lake, South	-2		3	Minimal
NPS MEAS LOC: Nutuvukti Lake, North	3		9	Minimal
NPS MEAS LOC: Nutuvukti Lake, South	8		12	Minimal
Reed R1	59	Moderate	45	High
Reed R2	27	Faint	21	Minimal
Reed R3	26	Faint	23	Minimal
ROW S ReedW	24	Faint	22	Minimal
Kobuk R S, Ridge 1	37	Faint	30	Moderate
Kobuk R S, Ridge 2	31	Faint	25	Minimal
Kobuk R S1	58	Moderate	44	High
Kobuk R S2	52	Moderate	41	High
Kobuk R S3	14	Very faint	12	Minimal
KobukR, N. ROW	1		5	Minimal
ROW W, High	1		5	Minimal
ROW West, Low	0		7	Minimal
Nutuvukti Lake 1	2		9	Minimal
Nut Summit	7		9	Minimal
WalkerW, High	-4		0	Minimal
Walker Lk SE	-4		0	Minimal
Upper Kobuk	-4		-2	Minimal
Hogaza Summit	8		11	Minimal
ROW E Boundary	5		7	Minimal
Kobuk R S, Ridge 3	22	Faint	18	Minimal

Note: Refer to Appendix A in the Noise report in Appendix 3D for the detailed data results and graphs.

Construction Noise

Road construction may cause localized, intermittent, short-duration noise impacts that would increase the overall noise levels in the area. Construction noise would vary by construction phase, types of equipment used, and distance between activities and a listener location.

Noise Mitigation

Options for reducing the truck traffic noise along the road are limited and include reducing the speed of the traffic, barriers, and using quieter trucks.

Reducing traffic speed can reduce Lmax noise levels of a truck pass-by and the Leq(h) noise levels for multiple trucks during 1-hour of time. Traffic noise levels are reduced by approximately 1 to 2 dBA for every 5 mph reduction in speed, and therefore, a 10 to 20 mph reduction in speed would be needed to make a clearly noticeable reduction in noise (Tables 4 and 5). However, lower speed also means it would take longer for trucks to complete a route from the mining district to Fairbanks, and the truck noise at any specific location within GAAR would be present for longer periods of time.

Barriers, such as man-made walls or earthen berms along the side of a road, are only effective for noise mitigation when they are tall enough and long enough to completely block the direct line-of-sight between the entire truck and the listener location. Therefore, barriers would not be practical for noise-sensitive locations at considerably higher elevation than the road (Appendix 3D: Figure 1). Also, barriers are most effective when the listener is located within a few hundred feet of the road. Listeners located more than 0.1 miles away from the road would receive little, if any, benefit from a barrier.

Noise from heavy trucks is predominantly from the engine and exhaust system. Therefore, high-grade mufflers would be installed on all trucks using the road to reduce vehicle noise.

During construction, contractors could use the following techniques to reduce construction noise levels in the GAAR:

1. Place stationary noise sources away from noise-sensitive locations.
2. Turn idling equipment off.
3. Drive equipment forward instead of backward; lift instead of drag materials; and avoid scraping or banging activities.
4. Use quieter equipment with properly sized and maintained mufflers, engine intake silencers, less obtrusive backup alarms (such as manually adjustable, self-adjusting, or broadband sound alarms instead of traditional “beep-beep-beep” alarms), engine enclosures, or noise blankets.
5. Purchase and use new equipment rather than using older equipment. New equipment tends to be quieter than older equipment due to new technology, improvements in mechanical efficiency, improved casing and enclosures, etc. Also implement a regular maintenance and lubrication schedule to ensure that equipment is operating properly.

Conclusion

Based on the predicted noise levels, one alignment is not substantially better than the other acoustically. The haul trucks traveling on each alignment are predicted to be audible at 10 out of the 25 selected locations, and the noise, if audible, is predicted to be considered moderate to very faint. The Leq(h) truck noise is predicted to exceed the ambient L90 noise levels at five locations for the preferred alignment (Table 4) and four locations for the alternative alignment (Table 5).

The acoustical effect of an alignment is geographic. The preferred alignment would affect the south end of Walker Lake, the Nutuvukti Lake area, and the GAAR boundaries. The alternative alignment would affect the Reed and Kobuk river areas. Therefore, determining the more beneficial acoustical alignment would depend on which areas are determined to be the most noise-sensitive to human and wildlife receptors.

Provide a description of the grades on the route alignments and their effects on noise from operation of vehicles the proposed road.

Although braking and engine noise are the major contributor to highway noise, most highway noise is generally the result of tires hitting the ground and forcing air outwards at high rates of speed. Shrubs and trees do not act as significant noise barriers, but terrain can. Evaluating potential noise from the proposed road is a function of terrain and both the road's vertical profile and its cross-section. Looking at the highway cross section, if there is an up-hill grade on one side, the hill would act as a noise barrier reflecting highway noise. If on another side the grade is down-hill, the noise propagation would follow the grade.

The maximum haul road gradient is limited to 10% and gradients over 8% were avoided when practical. The longest stretch of 10% gradient is no longer than one-half mile. In these areas, noise would not reach as far if one side of the road contains a steep grade.

In all areas, ground surface type affects the amount of noise reflected by the ground. Vegetated ground reflects less noise that paved ground. It is expected that the native tundra would reflect very little noise, and reduce the overall propagation of noise within the corridor.

The results of additional noise analysis, including development of noise contours and modeling of potential noise levels at key points is presented in Appendix 3D.

(f) The surface of the land, including vegetation, permafrost, soil, and soil stability.

The Corridor Supplement Narrative (Section 2) provides information on potential consequences to the land surface, including vegetation, permafrost and soil stability.

Wetlands and Vegetation

Provide mapping by vegetation type. Species of particular concern include lichen and T&E species.

Vegetation mapping for the majority of the corridor, and particularly the portion of the corridor within GAAR, is provided in the Preliminary Wetland Delineation Report that was submitted as part of the original SF299 Consolidated Application in November 2015 (see excerpts in Appendix 2F).

Provide plan for obtaining native plant seed and/or cuttings for reclamation and restoration after spills.

AIDEA would work with the Alaska Plant Material Center and the NPS to develop a plan for obtaining native plant seed and/or cuttings to be used for restoration and reclamation needs.

Provide wetlands delineation using the Cowardin Classification of Wetlands and Deepwater Habitats by a qualified wetland professional.

The Corridor Supplement Narrative (Section 2) provides information on wetlands. Appendices 2F and 2G provide wetland delineation reports.

Quantify the amount of wetlands crossed, and describe consequences to hydrology and wetland functions.

The Corridor Supplement Narrative (Section 2) provides information on wetlands. Appendices 2F and 2G provide wetland delineation reports.

Table 6 provides a comparison of the overall size of the individual watersheds crossed by the project alignments within GAAR and project impacts by watershed. The impacts listed in this table include all impacted wetlands, Waters of the U.S., and upland areas. Table 7 provides a comparison of the overall size of the individual watersheds crossed by the alternative project alignment and the resulting impacts from construction of this surface transportation route.

**Table 6: Comparison of Watershed Sizes and Total Impact Areas
Preferred Alignment within GAAR**

Hydrologic Unit Code[1]	HUC Name	Size[1] (*Acres*)	Potential Impacts[2] (*Acres*)	Impact Percentage of HUC
19050302	Upper Kobuk River	2,987,287	331	0.011

[1]*USGS, 2014*

**Table 7: Comparison of Watershed Sizes and Total Impact Areas
Alternative Alignment within GAAR**

Hydrologic Unit Code[1]	HUC Name	Size[1] (*Acres*)	Potential Impacts[2] (*Acres*)	Impact Percentage of HUC
19050302	Upper Kobuk River	2,987,287	341	0.011

[1]*USGS, 2014*

The proposed project footprint would represent impacts of less than a 0.02 percent in the watershed. This loss would have minimal impacts and not affect the overall physical, biological, and chemical processes of the habitats, including wetlands contained in each watershed.

Table 3A-1 in Appendix 3A provides information on the footprint for major project elements and the amount of wetland, open water and upland impacts from each element for the preferred and alternative corridors within GAAR. The USACE application in Section 5 provides additional information on impacts to wetlands and Waters of the U.S,

The localized impacts to wetland and stream processes are assessed by the following categories: direct, indirect, induced, and cumulative.

Direct wetland impacts from construction of the proposed roadway and ancillary facilities would be limited to the project footprint where ground disturbing activities would occur. Anticipated direct impacts to wetlands and Waters of the U.S. on the preferred project corridor within GAAR are estimated at 130 acres (40 percent of the overall design footprint within GAAR). The impacted habitat types for both the preferred and alternative alignments within GAAR are described in Table 8. All directly impacted wetland would require a Section 404 Permit from the USACE for the dredge and fill of wetlands prior to the beginning of construction activities.

Table 8: Habitat Types Directly Impacted by Preferred and Alternative Corridors in GAAR

Habitat Type (Cowardin, 1979)	Habitat (Viereck et al, 1992)	Preferred Alignment		Alternative Alignment	
		Impacts (*Acres*)	Impacts (*Percent*)	Impacts (*Acres*)	Impacts (*Percent*)
Emergent Wetlands	Mesic and Wet Graminoid Herbaceous	1	0.30%	1	0.29%
Forested Wetlands	Closed Needle-leaved and Mixed Forests; Open Needle-leaved and Mixed Forests, Needle-leaved and Mixed Woodlands	61	18.42%	117	34.31%
Scrub-shrub Wetlands	Closed Dwarf Tree, Tall, and Low Scrub; Dwarf Tree Scrub Woodland; Open Dwarf Tree, Tall and Open Low Scrub	67	20.24%	73	21.41%
Pond/Riverine	Water	1	0.30%	1	0.29%
Upland[1]	N/A[1]	201	60.73%	149	43.70%
	Total	331	100%	341	100%

[1]*Uplands are not distinguished under Viereck, et al.*

Indirect impacts to wetlands occur from bisecting habitats or changing hydrological surface flow patterns. Design efforts to minimize impacts to wetlands and streams included traversing upland habitats with less than ten percent longitudinal grades; avoiding sloughs, ponds, and lakes, typically by a minimum of 50 feet; and, locating river crossings at straight sections, avoiding braided or multiple channels, and crossing rivers at the narrowest point where feasible. Other design minimization measures included shifting of the alignment to impact lower value wetlands and following existing roads or trails where possible.

Wetland habitats are rated on the physical, biological, and chemical process they perform, and are assigned a corresponding value (low, moderate, or high). Wetland habitats rated as high value regardless of their locality include ponds, lakes, and river habitats, while the value ratings for scrub-shrub, forested, and emergent wetlands vary dependent on their abundance within a watershed. For instance, as a result of scarcity within the watershed, emergent wetlands were considered high value. The functional rating of each wetland type is summarized in Table 9.

Table 9: Functional Rating of Wetlands by Watershed and Type

Watershed	Wetland Type			
	Emergent	Forested	Scrub-Shrub	Ponded, Lake, or River
Upper Kobuk River	High	Moderate	Moderate	High

As part of the design process, rivers, rills, and swales were identified through both desktop analysis and field survey efforts. The project design has incorporated efforts to maintain hydrologic connectivity, such as using the bankfull widths of defined channels to determine culvert and bridge sizes. Areas where the proposed roadway footprint requires the fill of wetlands and does not contain a defined channel, minor culverts (less than three-foot diameter) would be installed approximately every 150 feet. These efforts would maintain hydrologic connectivity between bisected wetlands and minimize impacts to the physical, biological, and chemical processes from the construction of the proposed roadway.

Additional information regarding wetland functions and hydrology may be found in the Preliminary Wetland Delineation Report that was submitted as part of the original SF299 Consolidated Application in November 2015 (see excerpts in Appendix 2F).

Consequences to hydrology and wetland functions.

The Corridor Supplement Narrative (Section 2) provides information on consequences to hydrology and wetlands.

Lichen

Lichen make up a substantial portion of the vegetation in GAAR and serve an important role as a major food source for caribou migrating through the area (Neitlich and Hasselback, 1998). Lichens also create community infrastructure and nesting material for insects, birds, and small mammals. Additionally, some lichen species fix nitrogen, which is important in nutrient-poor systems. Steep and rocky alpine sites tend to favor lichen over vascular plants, which need more soil and moisture to thrive.

A number of lichen surveys have been conducted in GAAR over the years with a 1998 report noting that a total of 260 macrolichens were known or reported in GAAR (Neitlich and Hasselback, 1998). A more recent survey of lichen in Arctic National Parks identified 491 unique species, including 351 macrolichens, 138 microlichens and 2 basidiolichens (Holt and Neitlich, 2010). This survey effort identified 24 lichen species unique to GAAR. GAAR sample sites included in this survey were all in the Park portion of GAAR, north of the proposed corridor.

Threatened and Endangered Plant Species

There are no known occurrences of plant species listed as threatened or endangered under the Endangered Species Act in the study area.

Provide map and description of existing permafrost in the project area. Describe actions that will be taken to stabilize permafrost overlain by a road.

Appendix 2A: Figure 2-10 in the Corridor Supplement Narrative (Section 2) illustrates existing permafrost in the project area.

Table 10 presents descriptions and quantities of permafrost encountered along the proposed alignment from the Dalton Highway to the mining district and along the entire corridor if the alternative alignment through GAAR is used.

Table 10: Permafrost along the Corridor from Dalton Highway to Ambler Mining District

Permafrost	Preferred Alignment		Alternative Alignment	
	Miles of Corridor	Percentage	Miles of Corridor	Percentage
Mountainous Area Underlain by Continuous Permafrost	26	100	5	26%
Lowland and Upland Area Underlain by Moderately Thick to Thin Permafrost	0	0	13	74%
Lowland and Upland Area Underlain by Discontinuous Permafrost	0	0	0	0
Total	**26**	**100.0**	**18**	**100.00**

Describe the soil types to be encountered in road construction and maintenance. Describe any expected issues with soil stability and the measures to be taken to address these issues.

The Corridor Supplement Narrative (Section 2) provides information on soil types and soil stability issues.

Kobuk Wild River: Describe potential changes to free-flowing nature, water quality and outstandingly remarkable values (ORVs) of the Kobuk Wild River (per Wild and Scenic Rivers Act). Present measures to minimize effects on the Kobuk Wild River.

The free-flowing Kobuk Wild River consists of a combination of both flat and white waters spanning the Upper and Lower Kobuk Canyon in GAAR. The proposed project would require a 430-foot span bridge across the Kobuk River just south of the wilderness boundary near the confluence of the Walker Lake outlet into the Kobuk River. The bridge would likely consist of three 130-foot spans supported by piers; three piers would be constructed within the river channel between the bridge abutments. Piers are anticipated to be constructed using steel piles with concrete caps. Bridge abutments would likely be protected with riprap mats placed along the river banks.

Impacts on the hydrologic processes associated with the river would be limited to the immediate vicinity of the bridge. The proposed crossing location is along a fairly straight portion of the river where the river is against a bluff that has blocked it from migrating further to the west. The proposed bridge is not anticipated to impact the active channel location, geometry, slope, or form. There may be minor effects on channel width and roughness in the immediate vicinity of the crossing. No effects are anticipated on existing flow patterns (amount or timing), surface and subsurface flow characteristics, or aggradation/degradation of the channel. Overall impacts on the floodplain would be minor and localized to the immediate vicinity of the bridge. Impacts to adjacent uplands, soils, and riparian vegetation would occur due to construction of the bridge approaches, abutments, and any stabilization required on the bank at the river crossing.

Although the project would result in some work in the bed and on the banks of the river, the bridge would be designed to minimize impacts on river flow and to allow continued navigation on the river by riverboats and rafts. Since the free-flowing classification associated with the Wild and Scenic Rivers Act refers to the lack of impoundments on the river, the proposed addition of a bridge would not be considered to change the free-flowing designation on the river.

Table 11 documents ORVs for the Kobuk Wild River, existing conditions, and potential effects.

Table 11: Summary of ORV Existing Conditions and Potential Effects of the Proposed Project

ORV	ORV Description[1]	Potential Effects
Scenic Quality	Wide valley with sweeping vistas of nearby hills and low mountains, Walker Lake, two canyons. There are currently no man-made structures or facilities within the viewshed.	The majority of the length of the river would be unaffected. Scenic values would change substantially in the vicinity of the road crossing as a man-made structure would be visible. Other views of the road corridor may be visible in the mid-ground and background from some view points along the river.
Recreational Opportunities	Exceptional float river, a few short stretches of extremely rugged rapids (up to class V), good opportunities for sport hunting (in preserve only), wildlife observation, and backpacking. The Kobuk River corridor supports numerous recreational activities from motorized and non-motorized river travel, subsistence and sport hunting, wildlife observation and backpacking. Most use in the vicinity of the proposed road corridor is along the Kobuk River and at Walker Lake.	The proposed project would have little effects on recreational opportunities along the Kobuk River. Recreational activities would be limited and/or restricted during construction, but impacts are anticipated to be short-term and temporary. The recreation experience may be changed in the vicinity of the road crossing as the bridge and road would be visible for some distance on the river as you approach the crossing area.
Geologic Features	Endicott Mountains of central Brooks Range, upper and lower Kobuk canyons. The geologic features are as they were at designation of the river.	The proposed road would have little impact on these geologic features.
Fish, Wildlife and Plants	Variety of fish and wildlife, one of largest concentrations of sheefish, wintering grounds for western arctic caribou herd, one of the largest continuous spruce forest areas in the Brooks Range. According to the ADF&G information on the seasonal ranges for the Western Arctic Caribou Herd, the Preserve is within the Migratory Area and Outer Range for this caribou herd (Appendix 4A, Figure 4-6).	The proposed project may have an adverse effect on individual fish, animals, and plants during construction and during operation. Negative effects from construction on fish and wildlife would be expected to be temporary. Effects on migrating caribou are not anticipated to occur at a population level, although there may be some effects on individual caribou during migration. The loss of plants and habitat along the proposed corridor would be expected to have minor effects due to the size of the area affected compared to the extent of habitat available.
Cultural Resources	Highly significant potential for archeology because of continuous occupation and links between inland Eskimo people. The cultural resources are as they were at designation of the river.	Proposed project construction and operation would comply with Section 106 of the National Historic Preservation Act. Project development would include consultation with NPS, the State Historic Preservation Office and Native entities with ties to the area to identify potential effects and, if required, stipulations to address these effects.

[1]*ORV descriptions are from the General Management Plan/Land Protection Plan/Wilderness Suitability Review (NPS, 1986).*

Construction of the proposed project would likely result in short-term effects on water quality during the construction period, but these would be mitigated through appropriate sediment and erosion control measures, such as stabilizing disturbed areas as quickly as possible and completing in water construction during winter months when river flows are at a minimum. Construction would also result in short term effects on fish habitat from disturbance of the river bed and banks. Long-term effects on water quality and fish habitat in the river would be expected to be minor.

Potential mitigation/minimization measures for the proposed road and bridge crossing would include: designing the Kobuk River bridge to minimize effects on water flow and fish migration; use of clean temporary diversion structures (e.g., Super Sack containers) during construction activities, working in low-water conditions when the need for diversion and dewatering requirements are lessened, minimizing use of riprap by exploring bioengineering alternatives for bank protection and stabilization, placement of pilings to allow for unimpeded river traffic; and restricting in-water construction during critical migration and spawning movements. These measures would minimize potential negative impacts on soils, habitat, wildlife, subsistence, and recreation.

Spills

Provide an estimate of the probability of fuel, chemical, and ore spills including frequency and magnitude. Provide a plan(s) of action for dealing with fuel spills, ore spills and other contaminant spills during road construction and operation, including response capability.

The Corridor Supplement Narrative (Section 2) provides information on the potential for spills of hazardous materials.

Cultural features

A 2013 field survey by Northern Land Use Research Alaska, LLC. (NLURA) used Light Detection and Ranging (LiDAR) data to identify Locations of Interest (LOIs) within the project corridor which were the focus of the work (NLURA, 2013). Using helicopter and pedestrian surveys, NLURA recorded two new sites in 2013, both near the western end of the proposed route. One site is located between the Shungnak and Ambler rivers and the other is located southeast of the Kogoluktuk River. Both sites contain prehistoric and historic components.

Prior to 2013 field survey, 118 sites were identified in the Alaska Heritage Resources Survey (AHRS) within one mile of the corridor centerline. Of these, 70 are prehistoric sites, 46 historic, one is a protohistoric site, and one is a modern site. The sites are generally clustered in two areas: near Bettles and within and adjacent to GAAR. However, this distribution should not be considered representative of historic habitation patterns, but rather the history of cultural resource surveys in the area.

Many of the known sites are near Bettles and related to the Old Bettles Historic District, consisting of a trading post, associated cabin sites, a store, and various outbuildings. The known prehistoric sites, predominantly recorded in and near GAAR, are typically small lithic scatters and isolates that have been interpreted as short-term camps (NLURA, 2014).

Recent modifications to the proposed corridor move it farther from the sites near Bettles. The eastern end of the proposed corridor near the Dalton Highway has not been evaluated for cultural features. Refinement of the corridor through GAAR after the initial cultural resource studies were complete resulted in some alignment adjustments. This resulted in some of the proposed alignment being outside the corridor evaluated during initial cultural resource surveys. Therefore, it is anticipated that additional cultural resource field work would be conducted on the east end of the corridor and in GAAR upon completion of the scoping process.

Wilderness

Describe changes to wilderness characteristics from the project, including construction and operation.

The Corridor Supplement Narrative (Section 2) provides information on changes to wilderness characteristics.

18. Describe the probable effects that the proposed project will have on (a) populations of fish, plant life, wildlife, and marine life, including threatened and endangered species; and (b) marine mammals, including hunting, capturing, collecting, or killing these animals.

(a) The Corridor Supplement Narrative (Section 2) provides information on possible effects on fish populations, plant life, wildlife and marine life, including threatened and endangered species.

(b) The Corridor Supplement Narrative (Section 2) provides information on possible effects on marine mammals.

19. State whether any hazardous material, as defined in this paragraph, will be used, produced, transported or stored on or within the right-of-way or any of the right-of-way facilities, or used I the construction, operation, maintenance or termination of the right-of-way or any of its facilities. "Hazardous material" means any substance, pollutant or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. 9601 et seq., and its regulations. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the Resource Conservation and Recovery Act of 1976 (RCRA), as amended, 42 U.S.C. 9601 et seq., and its regulations. The term hazardous materials also includes any nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCLA Section 101(14), 42 U.S.C. 9601 (14), nor does the term include natural gas.

The Corridor Supplement Narrative (Section 2) provides information on hazardous materials and ore concentrates that may be transported on the proposed road.

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