



Enjoy the View — Visual Resources Inventory Report

Gates of the Arctic National Park and Preserve

Natural Resource Report NPS/GAAR/NRR—2016/1295



ON THE COVER

Photograph of the view toward Walker Lake from near the eastern boundary of Gates of the Arctic National Preserve
Photograph courtesy of the National Park Service

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Contents

	Page
Abstract.....	v
Acknowledgments.....	v
Introduction.....	1
Methods.....	3
Visual Resource Inventory Overview	3
View Selection.....	4
Scenic Inventory Value	7
Summary of Findings.....	8
Landscape Character at Gates of the Arctic National Park and Preserve	8
Scenic Quality, Importance Ratings and Scenic Inventory Values	8
Northern Alignment.....	9
Southern Alignment.....	13
Viewshed Analysis	14
Conclusions.....	17

Figures

Figure 1. Ambler Mining District Industrial Access Road Alternative Overview.....	2
Figure 2. Gates of the Arctic National Park and Preserve Visual Resource Inventory Viewpoints	6
Figure 3. Scenic Inventory Value Matrix.....	7
Figure 4. View from High Elevation Viewpoint, Right-of-Way West High	10
Figure 5. View from Low Elevation Viewpoint, Kobuk River Right-of-Way North.....	12
Figure 6. Composite viewshed depicting the number of viewpoints that view the landscape where Ambler Road is proposed and the associated Scenic Inventory Values of those areas.	15

Tables

Table 1. Views Inventoried at Gates of the Arctic NPP 5

Table 2. Scenic Quality, View Importance Ratings and Scenic Inventory Values 9

Appendices

	Page
Appendix A: Scenic Quality and View Importance Rating Methods	19
Appendix B: Viewpoint Panoramas.....	21
Appendix C: Viewshed Analysis	27

Abstract

At Gates of the Arctic National Park and Preserve (GAAR) the visual setting is a vital element to providing opportunities for wilderness recreation and traditional subsistence uses in an undisturbed, natural landscape. As authorized in its enabling legislation, the Ambler Mining District Industrial Road is proposed to pass through the Preserve to provide access to the mining district southwest of the park. This visual resource inventory (VRI) was undertaken to identify the scenic quality and importance of the visual landscape to the NPS and its visitors and provides a baseline against which to compare potential impacts of the proposed routes for the road.

The NPS inventory process consists of two components – scenic quality and view importance. The inventory determined that nearly all views have high scenic quality. The views from all locations lacked any evidence of human presence except from a high elevation viewpoint on the west side of Walker Lake, where a visible cabin added a positive element to the view. Importance Values were mostly rated as moderate to low with one view each very high and one as very low.

Subsequent viewshed analyses showed that relatively small areas of GAAR would potentially have a view of one of the two proposed routes, and the majority of these areas are within the National Preserve. Of the visible area from the northern and southern alternatives, approximately 49% and 41%, respectively, received a *Very High* Scenic Inventory Value. Because it is located farther away, the southern alternative would be less visible from within the park/wilderness area.

Acknowledgments

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Keywords

Gates of the Arctic National Park and Preserve, scenery, scenic inventory, scenic resources, viewsheds, visual resources.

Introduction

The purpose of the National Park Service (NPS) as articulated in the NPS Organic Act is to “...conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” With this central mission NPS has been entrusted with some of the most spectacular and historically significant landscapes throughout the country.

With the approach of the NPS centennial, Director Jonathan B. Jarvis issued a 5-year “Call to Action” plan for moving NPS toward its second century of meeting its mission. The purpose of the Enjoy the View Call to Action item is to ensure that by protecting visual resources and air quality the NPS can actively preserve these stunning and historically significant views for future generations.

Each unit of the national park system has special visual characteristics that are often a central component to the unit’s management and visitor experience. Visitors typically rank scenic views as one of the top five reasons for visiting a park (Kulezsa, 2013). Inspiring vistas can lift the human spirit, expand our sense of place, and provide connections to the natural world and our history as a country.

The purpose of Gates of the Arctic National Park and Preserve (GAAR) is to preserve the vast, wild, undeveloped character and environmental integrity of Alaska’s central Brooks Range and to provide opportunities for wilderness recreation and traditional subsistence uses (Alaska, 1980). A vital element to achieving this purpose is the provision of an undisturbed, natural landscape. Visitors to GAAR not only include those pursuing back-country recreation, but also local residents who frequent the lands in the park and preserve for traditional subsistence uses. Often many views extend beyond park boundaries and can be affected by actions outside the park that affect the visual landscape. At GAAR, the Ambler Mining District Industrial Access Road (Ambler Road) is proposed to cross a portion of the Preserve. The requirement to provide a right-of-way for this road was included in the Alaska National Interest Lands Conservation Act (ANILCA) that established GAAR and the purpose of the right-of-way is to provide access to the Ambler mining district located southwest of the park.

Through its participation in the Enjoy the View Call to Action, GAAR completed a visual resource inventory for a portion of the park and preserve where two alternatives for the Ambler Road are proposed (Figure 1). The inventory covered less than 200,000 acres which represents a small fraction of the 7.5 million acre park.

The specific objectives of the visual resources inventory were to:

1. Conduct visual resource inventory to establish a baseline crucial for park planning and internal and external decisions that may impact scenic, cultural, and natural resources.
2. Identify, describe, and map scenic resources in the vicinity of the proposed Ambler Road alternatives.
3. Provide an understanding of the value of scenic views to inform the visual impact assessment that would identify impacts of the Ambler Road on GAAR.

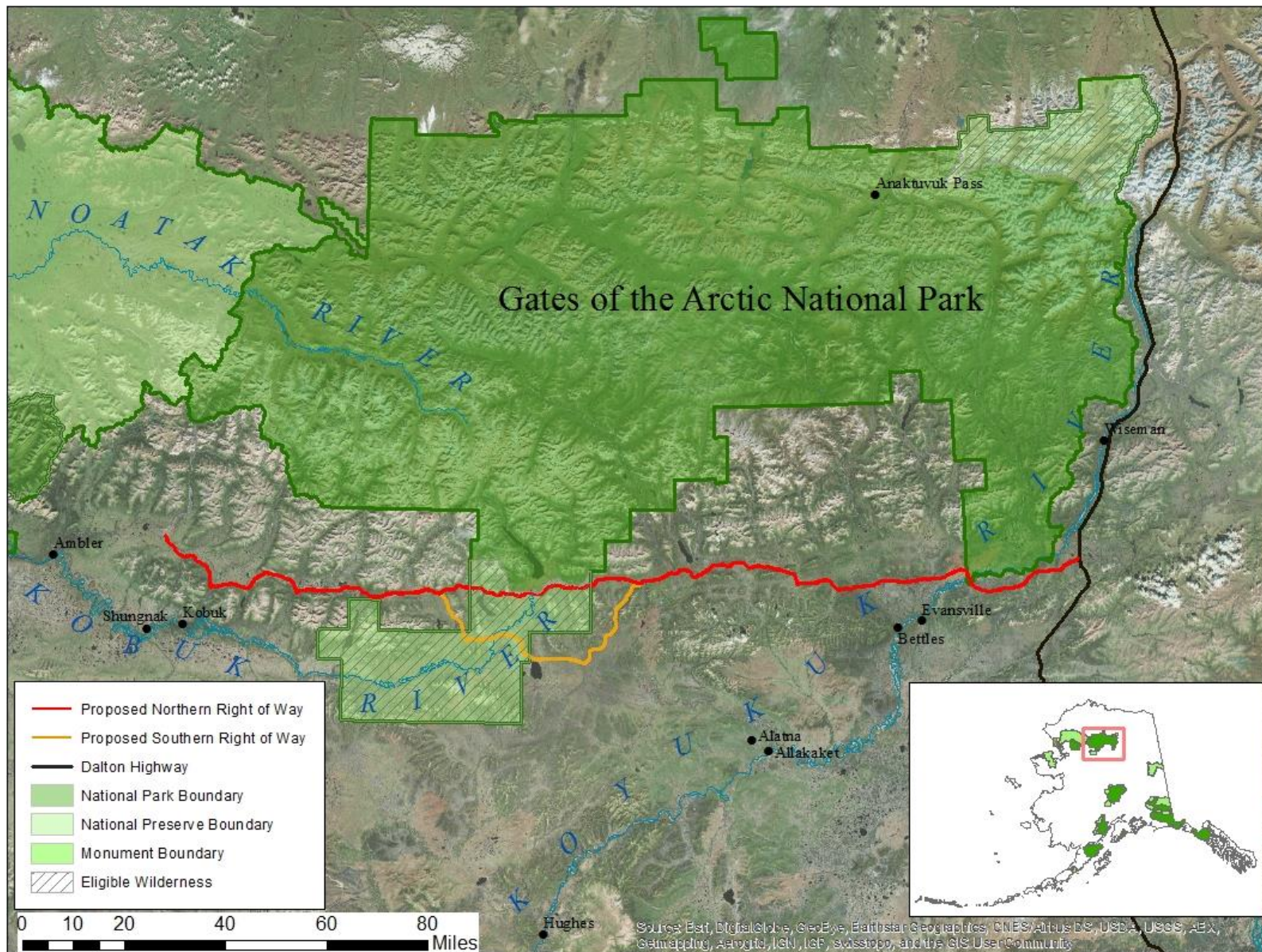


Figure 1. Ambler Mining District Industrial Access Road Alternative Overview

Methods

Visual Resource Inventory Overview

The concept of inventory of the visual landscape, and its subsequent management as a resource, has been in place at the federal agency level since the 1970s. The BLM and the U.S. Forest Service (USFS) are two of the most prominent agencies that have developed and implemented visual resource programs to manage the scenic values of the large areas of lands they manage. Other agencies including the Federal Highway Administration and the US Army Corps of Engineers also have developed methods to evaluate the visual impacts of projects. A review of these systems found that all recognized the need to establish baseline conditions or inventory of the existing conditions (Churchward et al. 2013). These inventory processes incorporate an evaluation of scenic quality or aesthetic value of the landscape as well as a measure of public concern or sensitivity to potential changes in the landscape. The NPS VRI is based on the fundamentals of visual resource inventory developed by the BLM, USFS and other federal agencies, as well as systems developed for specific NPS units such as Blue Ridge Parkway (Sullivan and Meyer 2014, NPS 2008). Values of the landscape to Alaska Natives and other cultural values are not included in the inventory as those assessments would be performed by cultural resource and ethnographic experts in consultation with affected groups.

The visual resource inventory at GAAR focused on identifying key facts about the visual landscape in the vicinity of Ambler Road. The unit of inventory was “a view” consisting of the viewpoint, the viewed landscape, and potential viewers, i.e., park visitors. The inventory consists of both fieldwork associated with view-description and scenic-quality ratings, and an office-based process for assigning importance values to the views. A summary of the two components is provided below and additional information can be found in Appendix A.

The inventory fieldwork process included collection of a variety of descriptive data concerning the view, as well as assessments of the scenic quality of the view and its importance to NPS visitors. At GAAR visitors include those seeking recreational activities as well as local residents who frequent parks lands for purposes that include subsistence activities. While the inventory does include basic identification of cultural resources, it is primarily focused on the recreational visitors and does not seek to assess the cultural values of the landscape to local residents and their subsistence activities. The Scenic Quality (SQ) rating is the value of the viewed landscape based on its perceived visual attractiveness, as determined by the aesthetic composition of the visual elements. Scenic quality assessment was conducted in the field on July 26-27, 2014 by an NPS team that included Andrew Ackerman, a social scientist, Marcy Okada, a cultural anthropologist, and visual resource specialists Mark Meyer of the NPS Air Resource Division, and Bob Sullivan of Argonne National Laboratory. A second set of points was inventoried by DOWL HKM on September 18, 2014. DOWL is the engineering and environmental planning contractor for the Alaska Industrial Development and Export Authority, the agency proposing the road. The process for each inventory included photo documentation, written descriptive information about each viewpoint and viewed landscape that helps to inform the rating process, and the scenic quality rating for each view. The scenic quality rating was conducted as a group discussion exercise resulting in a single scenic quality value for the

view. The rating was based on scores from three scenic quality factors: landscape character integrity, vividness, and visual harmony. Scenic quality ratings fall into five classes: from A to E; Class A views had the highest scenic quality and Class E the lowest.

The view importance rating identifies NPS and visitor values for the view and also identifies key descriptive information about the viewpoint and viewed landscape that helps inform the rating process. The View Importance (VI) evaluation for each viewpoint of the NPS inventory was conducted by GAAR and Air Resources Division staff on August 28, 2014. The VI evaluation for each viewpoint of the DOWL inventory was conducted by staff from DOWL, GAAR, and the Air Resources Division on November 4, 2014. Importance of a view involved assessments of the following factors: view importance, viewed landscape importance, and viewer concern. Each factor was assessed by a team of NPS staff and resulted in a single view importance rating for each view. View importance ratings fell into five classes: from 1 to 5; Class 1 views had the highest view importance and Class 5 the lowest.

View Selection

NPS staff at GAAR selected 21 views for the visual resource inventory to provide an overview of the area where the Ambler Road alternatives are planned. (Table 1, Figure 2). There are no established roads in the park or preserve and much of the park is designated wilderness. The views were selected to represent the potential viewer experience as one might move through the landscape in the course of recreational or subsistence activities. Points were selected at elevated locations as well as low vantage points along the edges of lakes and the Kobuk River to represent a river runner's viewpoint. While viewpoints were generally selected along each of the two alternative routes, many would have visibility of both alternative routes. One location initially selected was dropped from the inventory process because it would not have visibility of either alternative route.

Table 1. Views Inventoried at Gates of the Arctic NPP

#	View Name	Latitude Coordinate*	Longitude Coordinate*	Bearing (L/R)	Approximate Width of View (deg.)
1	Right of Way West – Low	67.040283°	-154.74425°	148 SE/323 NW	175
2	Walker Lake West - High	67.10899°	-154.42191°	344 N/146 SE	162
3	Kobuk River Right of Way – North	67.019703°	-154.319804°	297 NW/90 E	153
4	Walker Lake South – South View	67.05728°	-154.31427°	89 E/265 W	176
	Walker Lake South – North View	67.05728°	-154.31427°	262 NW/70 NE	168
5	Right of Way West – High	67.04099°	-154.26195°	29 NE/265 W	204
6	Walker Lake Southeast	67.09871°	-153.26195°	210 SW/297 NW	87
7	Upper Kobuk River	67.180367°	-153.9925°	185 S/20 N	195
8	Right of Way East Boundary	67.028246°	-153.964289°	258 SW/92 SE	194
9	Right of Way South Reed River West	66.91256°	-154.74203°	48 NE/270 W	222
10	Nutuvukti Summit	66.988304°	-154.639003°	240 SW/20 N	140
	Nutuvukti Summit South	66.988304°	-154.639003°	110 SE/180 S	70
11	Nutuvukti Lake	67.014805°	-154.717925°	311NW/63 SE	112
12	Reed River 3	66.918084°	-154.793109°	105 SE/253 SW	148
13	Reed River 1	66.887351°	-154.817825°	8 N/190 S	182
14	Kobuk River South, Ridge 3	66.856656°	-154.800827°	230 SW/89 E	219
15	Kobuk River South 1	66.894505°	-154.634497°	136 E/206 S	70
16	Kobuk River South 2	66.907188°	-154.578679°	141 SE/288 NW	147
17	Kobuk River South 3	66.958383 °	-154.421007°		
18	Kobuk Ridge 1	66.890759°	-154.56529°	240 SW/60 NE	180
19	Hogatza Summit	66.91658°	-154.174922°	280 W/95 E	175

* Datum – World Geodetic System 1984

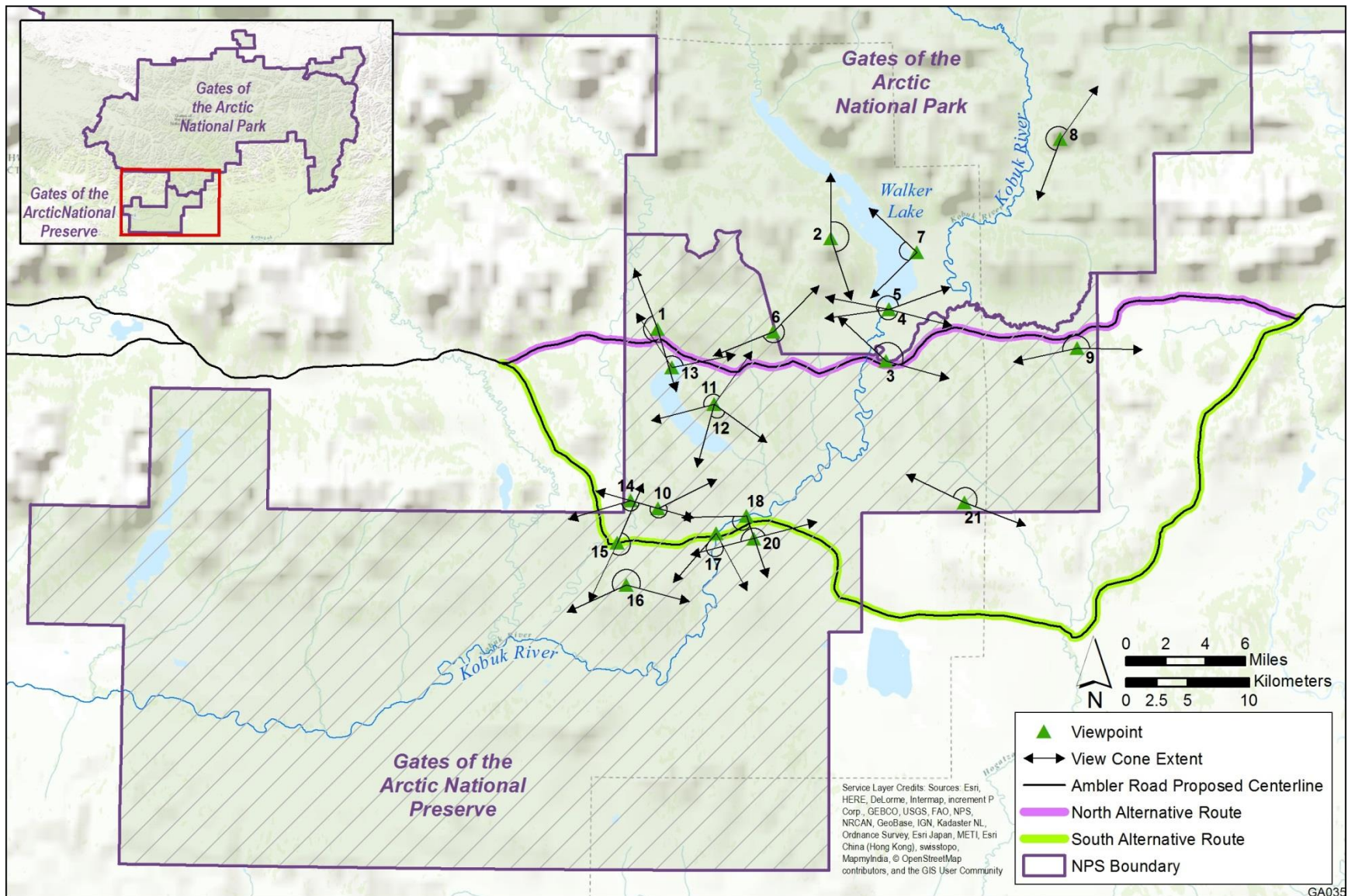


Figure 2. Gates of the Arctic National Park and Preserve Visual Resource Inventory Viewpoints

Scenic Inventory Value

The Scenic Inventory Value (SIV) is the combination of the Scenic Quality (SQ) and View Importance Ratings (VIR) and is derived using a matrix (Figure 3) to arrive at one of five possible SIVs ranging from Very Low (VL) to Very High (VH). The SIV and all other data collected during the scenic quality and view importance evaluations are stored in a geospatial database. The database is a repository for spatial and other inventory data for the visual resource inventories conducted by NPS units

Scenic Inventory Value Matrix						
		View Importance Rating				
		1	2	3	4	5
Scenic Quality	A	VH	VH	VH	H	M
	B	VH	VH	H	M	L
	C	H	H	M	L	L
	D	H	M	L	VL	VL
	E	M	L	VL	VL	VL

Figure 3. Scenic Inventory Value Matrix

Summary of Findings

Landscape Character at Gates of the Arctic National Park and Preserve

GAAR is located in north central Alaska, a vast area with contemporary human developments. The park primarily encompasses the Brooks Range but also includes a small area of the interior bottomlands ecoregion in the preserve portion where the Ambler Road alternative routes are located (EPA). The visual character of the park is influenced by the mountain range topography in contrast with the low hills and wide flat areas of the bottomlands. The physical landscape consists of the steep, rugged peaks of the Brooks Range and the low, rolling hills and wide, flat areas of the bottomlands. Vegetation in the mountains is sparse with alpine tundra and barrens at higher elevations and dwarf scrub at lower elevations. The bottomlands south of the mountains are underlain by permafrost and support mostly scattered black spruce (*Picea mariana*) and vast areas of shrubs and sedge-tussock bogs. Several large lakes are located near the base of the Brooks Range, and mountain valleys typically have steep, incised drainages that sometimes combine to create major rivers. Walker Lake is located near the Park/Preserve boundary and is one of the primary recreation locations in the area, as it serves as the starting point for river trips down the Kobuk River. The Kobuk River traverses the Preserve in a generally northeast to southwest direction and the very flat topography of the bottomlands results in a very sinuous river course across the landscape. Near lakes and rivers, forest vegetation is more diverse and includes such species as white spruce (*P. glauca*), balsam poplar (*Populus balsamifera*), and willows (*Salix* spp.) that add visual interest to the landscape. During the summer when this study was conducted, the colors in the landscape are primarily a wide range of greens of the vegetation along with the light to medium grays of the barren areas of the mountains and hilltops, the blue/black/silver of water bodies and the white of snow on higher elevation peaks. Throughout the year colors vary dramatically by season, with a range of greens and grays in the summer, yellow and orange in the brief autumn, and blanketed in white through the long winter. The landscape provides an undeveloped setting for activities including, backpacking, camping, hunting, and river rafting.

Scenic Quality, Importance Ratings and Scenic Inventory Values

This section provides a brief summary of the inventory results of the NPS and DOWL teams and the ratings are shown in Table 2. The discussion is generally organized by each alternative route, though as noted, both alternative routes could be visible from many of the viewpoints. Because of similarities in view characteristics, the discussion of the inventory results for the alternative routes is further organized by grouping the high-elevation viewpoints together and the low-elevation viewpoints together. Panoramic photos of the views from each viewpoint are provided in Appendix B.

Table 2. Scenic Quality, View Importance Ratings and Scenic Inventory Values

#	View Name	Scenic Quality Rating	View Importance Rating	Scenic Inventory Value
1	Right of Way West – Low	A	4	H
2	Walker Lake West - High	A	3	VH
3	Kobuk River Right of Way – North	A	4	H
4	Walker Lake South	B	3	H
5	Walker Lake South	A	2	VH
6	Right of Way West – High	A	3	VH
7	Walker Lake Southeast	B	3	H
8	Upper Kobuk River	A	3	VH
9	Right of Way East Boundary	A	4	H
10	Right of Way South Reed River West	B	4	M
11	Nutuvukti Summit	A	3	VH
12	Nutuvukti Summit South	B	4	M
13	Nutuvukti Lake	B	5	L
14	Reed River 3	A	4	H
15	Reed River 1	B	4	M
16	Kobuk River South, Ridge 3	A	4	H
17	Kobuk River South 1	B	3	H
18	Kobuk River South 2	C	3	M
20	Kobuk Ridge 1	A	3	VH
21	Hogatza Summit	A	4	H

Northern Alignment**High Elevation Viewpoints**

The views selected for the Northern Alternative at elevated locations include: #2 – Walker Lake West High, #6 – Right-of-Way West High, #8 – Upper Kobuk, #9 - Right-of-Way East Boundary, and #11 – Nutuvukti Summit.

Scenic Quality – All of the views received a Scenic Quality rating of A. The elevated locations offered expansive views of the low lying areas along with multiple hills and mountains that provided bold forms and colors on the landscape. The Walker Lake West High and Upper Kobuk views also

included the named lake and river, respectively, further adding interest to the view. None of the views had visual intrusions except for Walker Lake West High, in which a cabin was visible on the west edge of the lake. Rather than diminishing the view, the cabin added interest and was considered a positive addition to the view. The proposed Ambler Road would be visible from all viewpoints, with the Right-of-Way West High and Right-of-Way East Boundary views overlooking low valley areas where viewers would see approximately 14 miles and 17 miles respectively, of the proposed route (Figure 4). Nutuvukti Summit overlooked the proposed route where the route passes north of Nutuvukti Lake, and where it would be set in the landscape of the lake and low surrounding hills. The Walker Lake West High and Upper Kobuk viewpoints were more distant from the proposed route, although the road could traverse a substantial portion of the view from the Walker Lake West High viewpoint. From the Upper Kobuk viewpoint the surrounding mountains somewhat limited the visibility of the low lying areas where the proposed route is located, but from the elevated position, any visible sections would be quite noticeable.



Figure 4. View from High Elevation Viewpoint, Right-of-Way West High

View Importance – View Importance for the views from all of the elevated viewpoints was rated as 3 except for #9 (the view from the Right-of-Way East viewpoint), which received a rating of 4. Since the viewpoints selected are representative of a wilderness, back-country recreation experience they are not formally designated scenic overlooks. There are no facilities or specific publicity for the viewpoints, although the Walker Lake area of GAAR is widely publicized. None of the viewpoints, or the general area, is expected to be highly visited, and the location of viewpoint #9 near the east boundary of the Preserve could be expected to see even fewer visitors than might be expected in the area closer to Walker Lake. While visitation is low, the wilderness experience of GAAR is one of its

primary interpretive themes, and park visitors expect the landscape for a back-country experience to be free of development or other visual intrusions and would be highly sensitive to changes that could diminish that experience.

Scenic Inventory Values – The combination of high Scenic Quality and a moderate to low level of View Importance resulted in a Scenic Inventory (SIV) value of *Very High* for all viewpoints except viewpoint #9 at the East Boundary, which fell into the *High* SIV category (Figure 2). These values indicate that the Park’s goals for managing the visual landscape should be to retain the existing character to the extent possible, in the context of other uses, resources, and management requirements.

Low Elevation Viewpoints

The views selected for the Northern Alignment that are at lower elevations include: #1 – Right-of-way West Low; #3 – Kobuk River Right-of-way, North; #4 – Walker Lake South, South View; #5 Walker Lake South, North View; #7 – Walker Lake Southeast, #13 - Nutuvukti Lake.

Scenic Quality – Three of these views (Right-of-way West Low, Kobuk River Right-of-way, North and Walker Lake South, North View) received a SQ rating of A and the remaining three received a rating of B (Table 2). Most of the low elevation viewpoints were selected to represent the potential visitor experience in the vicinity of Walker Lake, the Kobuk River, and Nutuvukti Lake, and generally do not have the expansive views of the high elevation viewpoints. The Right-of-Way West Low view represented a back-country view in proximity to the proposed right-of-way. It was at a slightly higher elevation than the plains to the south and has a view of Nutuvukti Lake and hills beyond, and the lake and landforms added interesting shapes, lines and color to the view. From the Kobuk River Right-of-Way North viewpoint, the river was a dominant visual feature and this view represented a typical potential view of river travelers (Figure 5). There were some low surrounding hills that enclosed part of the view to the south, but the view to the northwest was open to the distant mountains of the Brooks Range which created a strong backdrop. Near Walker Lake, the lake was a prominent foreground element set against the dramatic backdrop of mountains from the north view on the south side of the lake (#5). The view south from this location (#4) did not have the same interesting landform and color, though it was representative of what that same viewer might see in the direction of the proposed Right-of-Way. At the Walker Lake Southeast and Nutuvukti Lake viewpoints, the lake was a prominent feature in the foreground, but the views had less-interesting landforms and colors than the views from higher elevations.



Figure 5. View from Low Elevation Viewpoint, Kobuk River Right-of-Way North

View Importance – Similar to the View Importance ratings for the high elevation views, the View Importance ratings for the low elevation views were moderate to low (Table 2). One view (Walker Lake South, North View) was rated higher because of the potential for an increased number of visitors starting out on river trips from Walker Lake, and the importance of Walker Lake as a National Natural Landmark. The view at Kobuk River Right-of-Way North received a rating of 4 due to reduced potential for visitors as one is further from Walker Lake but retained a level of importance because it is a Wild and Scenic River. The area around Nutuvukti Lake is expected to have lower visitation than the other areas and is not publicized to the extent of Walker Lake, so the view from near the lake (#13) received a view-importance rating of 5 (*Very Low*). As at the higher elevation viewpoints, wilderness as an interpretive theme is still an important element at these locations and visitors would expect the landscape to be free of intrusions.

Scenic Inventory Values – Because of the range of importance ratings, the SIVs for the lower elevation viewpoints ranged from *Very High* for the Walker Lake South-North View to *Moderate* for Nutuvukti Lake (Table 2). The SIV for the remaining viewpoints are all *High*. While the SQ ratings are lower, relative to the higher elevation locations, ratings are still high and coupled with higher visitation rates in the Walker Lake area, SIVs for these viewpoints reinforce the notion that the undisturbed natural landscape is important to retain.

Southern Alignment

High Elevation Viewpoints

The viewpoints selected for the Southern Alignment that are at elevated locations include: #10 – Right-of-Way South, Reed River West; #12 – Nutuvukti Summit South; #16 – Kobuk River South, Ridge 3; #20 – Kobuk Ridge 1; and #21 Hogatza Summit.

Scenic Quality – Three of these views (Kobuk River South, Ridge 3, Kobuk Ridge 1 and Hogatza Summit) received a SQ rating of A and the remaining two received a SQ rating of B. Similar to the views along the Northern Alignment, the elevated locations offered expansive views, mostly with a high level of visual interest stemming from landforms and colors. The views from the Right-of-Way South, Reed River West and Nutuvukti Summit South viewpoints had weaker focal points, somewhat muted colors, and the landforms were considered to be weaker elements, resulting in the slightly reduced rating. None of the views had visible man-made elements or other features that were inconsistent with the natural landscape. All viewpoints would have extensive views of the proposed Ambler Road route, though Nutuvukti Summit and Hogatza Summit were approximately 6-7 miles away, and visibility of the road would be somewhat reduced.

View Importance – All the views received an Importance Rating of 4 except for the view from Kobuk Ridge 1 which received a rating of 3. Similar to the views associated with the Northern Alignment, the views are representative of potential visitor views, although the expected visitation at a particular point is expected to be low. Overall visitation in the vicinity of the Southern Alignment might be lower than for the Northern Alignment because of the distance from Walker Lake. The lake is a key access point for park visitors and sees greater use relative to the area of the southern road alignment. Though all locations are within the Preserve section of the unit, the back-country, primitive recreation experience would still be an expectation, and is a substantial component of the interpretive themes for the unit as a whole.

Scenic Inventory Values – The combination of high scenic quality and Importance Ratings that were somewhat lower than at elevated locations resulted in *Moderate to High* SIVs for the Northern Alignment. One view, Kobuk Ridge 1, had an SIV of *Very High*. Overall, the SIVs still indicate a high value of the visual landscape for park visitors in this area of the Preserve.

Low Elevation Viewpoints

The viewpoints selected for the Southern Alignment that are at lower elevations include: #14 -Reed R3; #15 Reed R1; #17 – Kobuk River South 1; and #18 – Kobuk River South 2.

Scenic Quality –The low elevation views for the Southern Alignment were similar to the Northern Alignment and received somewhat lower SQ ratings with only one view (Reed R3) receiving a SQ rating of A. In this view, the river was a strong focal point, and there were strong lines associated with the river and surrounding landforms. Another viewpoint along a river (Kobuk River South 2) received a SQ rating of C because beyond the river itself, there was nothing of interest in the view. It was somewhat enclosed by forested banks along the river, and there was little visible beyond the banks. Slightly downstream from this location was the Kobuk River South 1 viewpoint, located near where the Southern Alignment would cross the river. The view received a SQ rating of B, and while

it does have forested bank in part of the view, the low hills and distant views added interesting forms and colors. The view from the Reed R1 viewpoint was similar to the Kobuk River South 1 view, with some interesting color and landforms beyond the river, while the river itself was only a modest focal point. None of the low-elevation views for the Southern Alignment had inconsistent elements.

View Importance – View Importance ratings were 4 for the two views along the Reed River and 3 for the two views along the Kobuk River. The wilderness and back-country recreation experience is an important part of the interpretive message throughout GAAR, but the Reed River would likely receive fewer visitors relative to the Kobuk River. The Kobuk River is the primary river for rafting in this area of the Preserve, and is more publicized for this purpose.

Scenic Inventory Values – The resulting SIVs were *High* for the Reed R3 view and the Kobuk River South 1 view, and *Moderate* for the Reed R1 view and the Kobuk River South 2 view. The increased View Importance rating for the Kobuk River South 2 view resulted in a moderate level of overall value even though the SQ rating was the lowest of all views evaluated. While there were two *Moderate* ratings for views, the SIVs indicate that the visual landscape is important in the area of the Southern Alignment, though slightly less so compared to the Northern Alignment.

Viewshed Analysis

After the inventory fieldwork was completed, supplemental viewshed analysis work was performed to provide a better understanding of the level of visibility of each road alignment. Argonne National Laboratory performed that analysis using elevation and alignment route alignment data provided by the project proponent. The viewshed analysis was conducted using the Viewshed tool in ArcGIS, a GIS software program from ESRI, Inc. that is commonly used for geospatial analyses. The process also followed the recommended practices for using offset and radius attributes in the viewpoint attribute table field as set forth in, “Using Viewshed and Observer Points for Visibility Analysis,” part of the ESRI tool documentation (<http://desktop.arcgis.com/en/arcmap/10.3/tools/3d-analyst-toolbox/using-viewshed-and-observer-points-for-visibility.htm>). The methodology used is consistent with recommended practices, as described in Sullivan and Meyer (2014) and BLM (2013). A detailed explanation of the analysis methodology and maps of the results are provided in Appendix C. Figure 6 depicts the overall visibility of the landscape from all viewpoints. The map shows the number of viewpoints from which the landscape where the Ambler Road is proposed would be visible as well as the associated SIV that was determined during the inventory. The Northern Alignment passes through a landscape that generally has very high SIV and is visible from three or more locations, while the Southern Alignment passes through a landscape visible from fewer locations and with lower SIVs. A detailed explanation of the analysis methodology and maps of the results are provided in Appendix C.

Northern Alignment

The Northern Alignment would be visible from approximately 167,623 acres of GAAR (Figure A-1). Of the visible area, approximately 88,647 acres or 41% has a SIV of *Very High* (Figure A-2). 39,165 acres or 45% of the area with *Very High* SIV would be located within the park or wilderness portion of GAAR (Figure A-2).

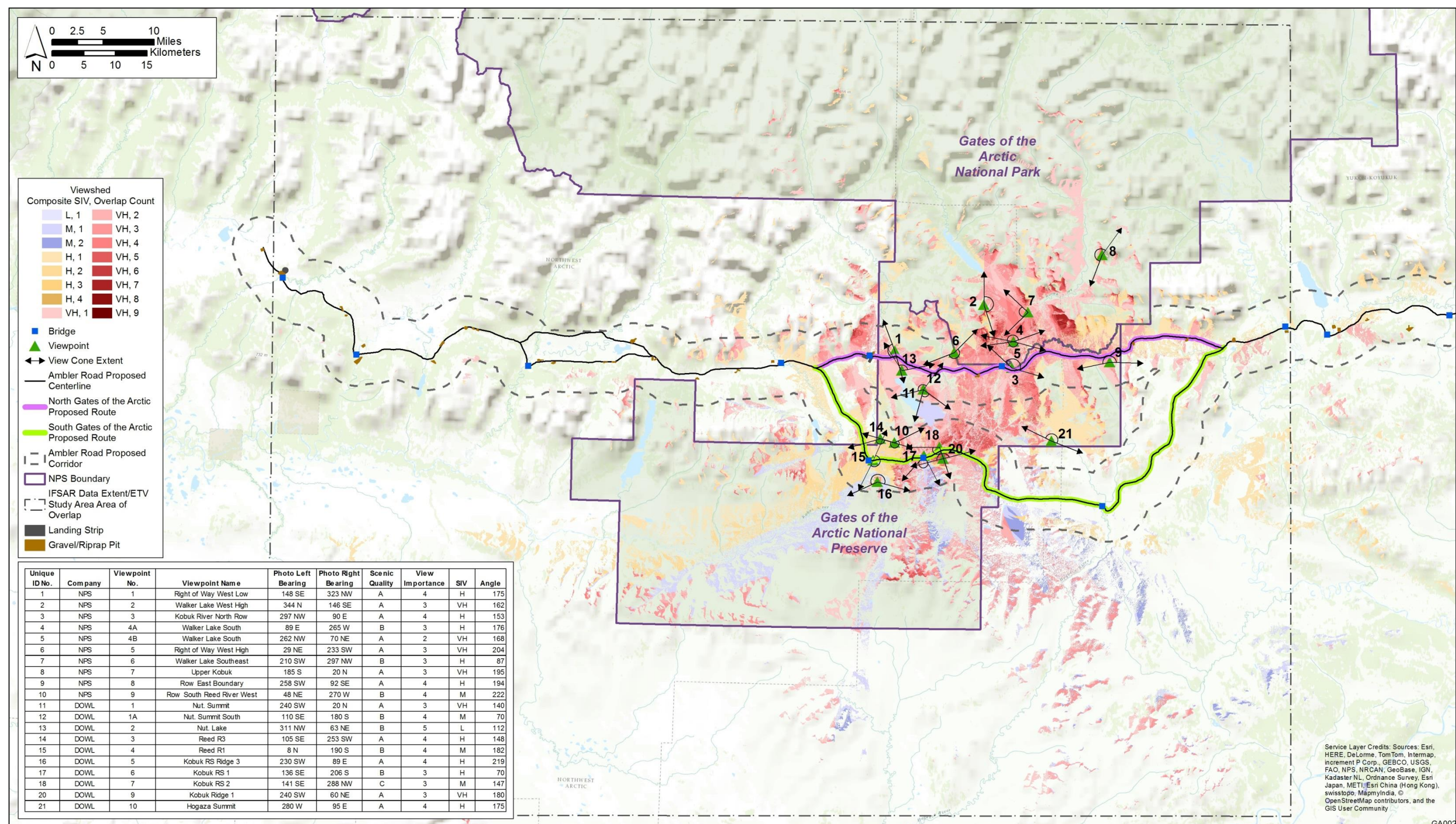


Figure 6. Composite viewshed depicting the number of viewpoints that view the landscape where Ambler Road is proposed and the associated Scenic Inventory Values of those areas.

Southern Alignment

The Southern Alignment would be visible from approximately 166,428 acres of GAAR (Figure A-3). Of the visible area approximately 81,428 acres or 49% has an SIV of *Very High* and 18,324 acres or 22.5% of the area with a *Very High* SIV is within the park/wilderness area of GAAR (Figure A-4).

Bridges

Proposed bridges constructed to cross major rivers will be large structures, and could be visible from areas far away from the rivers. The Northern Alignment would require one bridge crossing within the Preserve, while the Southern Alignment would require two bridge crossings. The inventory and viewshed analysis were completed prior to receiving complete design information, but based on preliminary information the heights of the bridges were assumed to be approximately 27 feet above the water surface. The bridge required for the Northern Alignment would be visible from limited, high-elevation areas within the park/wilderness area, while one bridge for the Southern Alignment would not be visible at all from within the Park/Preserve, and the second would be visible from very limited areas (Figure A-5).

Kobuk River

The Kobuk River is one of the primary recreation areas for this part of GAAR. The viewshed analysis assessed the visibility of each alignment route from the river from the perspective of a viewer on the river. The Northern Alignment would be visible from approximately 3.93 miles of the river while the Southern Alignment would be visible from approximately 3.73 miles (Figure A-6).

Conclusions

A vital element to providing opportunities for wilderness recreation and traditional subsistence uses in GAAR National Park and Preserve (GAAR) is an undisturbed, natural landscape. The Ambler Mining District Industrial Road is proposed to pass through the Preserve portion of GAAR to provide access to the mining district southwest of the park. This Visual Resource Inventory was undertaken to identify the scenic quality and importance of the visual landscape to the NPS and its visitors and provides a baseline against which to compare potential impacts of the proposed routes for the road. Because there are no established scenic overlooks or improvements, the viewpoints selected for the inventory were meant to be representative of the potential views of back-country visitors. Selected viewpoints included elevated locations that often had distant views and low-elevation locations representing views close to rivers, that were often more limited in how far one might be able to see.

With one exception, the views were determined to have a Scenic Quality rating of *A* or *B*. The views from all locations lacked any evidence of human presence except from the high elevation viewpoint on the west side of Walker Lake, where a cabin at the lake edge was visible. The high elevation locations offered distant views of the Brooks Range as well as the vast flat areas and low rolling hills of the bottomlands. The Kobuk or Reed Rivers were visible from some of these locations as well, adding interest to the views. From the low-elevation viewpoints, views were somewhat more limited in extent, as might be expected, but most still had views of the Brooks Range or low hills, as well as a wider variety of vegetation, especially along the banks of the rivers or lakes. At the Kobuk River South 2 viewpoint, the view was dominated by the river and there was little else of interest because the vegetation and topography substantially limited the extent of the view. This view received a Scenic Quality rating of *C*.

Importance Values were mostly rated as 3 or 4 with one view each being rated as 1, 2 and 5. Because they were selected as representative locations, the expected number of visitors at any one location was expected to be low. Views associated with Walker Lake, a National Natural Landmark, and the Kobuk River, a designated Wild River in the Wild and Scenic River system raised the importance of those views, as did the likelihood of experiencing a slightly higher level of visitation. All views represented the wilderness purpose and interpretive themes of GAAR, and viewers to any of the locations are likely to be very sensitive to changes in the natural landscape, as they are expecting a primitive, backcountry recreation setting.

Subsequent viewshed analyses showed that relatively small areas of GAAR would potentially have a view of one of the two proposed routes, and the majority of these areas are within the National Preserve. Of the visible area from the northern and Southern Alignments, approximately 49% and 41%, respectively, received a *Very High* SIV. Because it is located farther away, the Southern Alignment would be less visible from within the park/wilderness area. Major bridge crossings of both alignments would be primarily visible from the Preserve, and mostly limited to higher elevation viewpoints except in proximity to the bridge. Visibility of the bridges over the Kobuk River would be similar, with the bridge for the Northern Alignment visible from approximately 3.9 miles and the south alignment visible from approximately 3.1 miles of river.

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Appendix A: Scenic Quality and View Importance Rating Methods

Scenic Quality

Assessing scenic quality involves field-based assessments of: Landscape Character Integrity, Vividness and Visual Harmony.

Each component was assessed in the field while viewing the landscape from a viewpoint, and the assessments required that the group evaluate three factors for each component. All factors were equally weighted.

Landscape Character Integrity

Scenic integrity indicates the degree of intactness and wholeness of the landscape character identified in the landscape description section. The highest scenic integrity ratings were given to those landscapes which have little or no deviation from the character valued for its aesthetic appeal.

The rating process assumes that in order to have the highest degree of integrity, i.e. a high quality example of the identified landscape character, the view must:

- Have most or all of the key elements of landscape character present;
- Have elements that are of high quality and in the appropriate condition for the landscape character, i.e. well built, well cared for, or, for historic/rustic landscapes, appropriately worn/aged; and
- Be relatively free of elements that are inconsistent with the landscape character.

Vividness

Vividness is the degree to which landscape elements are distinctive or striking enough to make a view memorable. The rating assumes that to have a high degree of vividness, the view must:

- Contain one or more dominant visual features or focal points;
- Contain striking forms and/or lines; and
- Contain striking colors, textures, or visible motion.

Visual Harmony

Visual harmony is the extent to which there is a pleasing array of visual elements in a landscape, usually as a result of a sense of visual order, compatibility, and completeness between and among the land forms, water forms, vegetation, or built elements visible in the landscape. The approach assumes that a high degree of visual harmony is achieved when:

- There is a clearly recognizable structure, pattern, or order to the spatial relationships of the landscape elements;
- The landscape elements display pleasing scale relationships; and
- The landscape displays pleasing color relationships.

Scenic quality ratings fall into five classes from A to E. Class A views have the highest scenic quality and Class E the lowest.

Importance Values

The view importance rating identifies NPS and visitor values for the viewpoint, the viewed landscape and the viewers. The view importance rating is an office-based exercise. Each component is assessed by a team of NPS staff. In the same manner as Scenic Quality, the process requires that the group evaluate three factors for each component and all factors are equally weighted.

Viewpoint Importance

Viewpoint importance assesses the extent to which the viewpoint is publicized and managed for visitors. The rating system assumes that to have the highest importance rating the viewpoint must:

- Be extensively publicized, especially for its scenic views, in NPS or external communications and media (e.g. hiking guides, web sites, movies).
- Have facilities that have been added or are planned for the viewpoint area to enhance the visitor experience and;
- Have a high level of interpretive services that contribute to the visitors' enjoyment of scenic, historical, cultural scientific or other NPS values of the unit.

Viewed Landscape Importance

Viewed landscape importance assesses the extent to which the elements in the viewed landscape are publicized and used for interpretation. The assessment also evaluates how important special designations such as Wilderness or historic sites are within the view. The viewed rating system assumes that to have the highest level of importance the viewed landscape must:

- Be extensively publicized, especially for its scenic views, in NPS or in external communications or media (e.g. hiking guides, web sites).
- Consist of all or mostly specially designated areas, or nationally/regionally significant scenic, historic, cultural, or scientific features or landmarks (e.g. wilderness areas, cultural landscapes).
- Strongly illustrate the NPS unit's scenic character or important interpretive themes and/or be connected to the unit's goal for visitor experience

Viewer Concern

The evaluation of viewer concern relies primarily on the knowledge and professional judgment of NPS staff, and the rating system assumes that to have the highest level of viewer concern:

- The viewpoint must have a high level of visitation in relation to other viewpoints in the park;
- Viewers generally spend an extended period of time at the viewpoint; and
- Most visitors would be unusually sensitive to potential changes in a view because they are seeking views of natural character or historic significance.

View importance ratings fall into five classes from 1 to 5. Class 1 views have the highest view importance and Class 5 the lowest.

Appendix B: Viewpoint Panoramas



1) Right of Way West – Low View Direction: Southwest Approximate Width of View: 175 degrees



2) Walker Lake West – High View Direction: Northeast Approximate Width of View: 162 degrees



3) Kobuk River Right of Way – North View Direction: Northeast Approximate Width of View: 153 degrees



4a) Walker Lake South – South View View Direction: South Approximate Width of View: 176 degrees



4b) Walker Lake South – North View View Direction: Southeast Approximate Width of View: 168 degrees



5) Right of Way West – High View Direction: Southwest Approximate Width of View: 204 degrees



6) Walker Lake Southeast View Direction: West Approximate Width of View: 87 degrees



7) Upper Kobuk River View Direction: West Approximate Width of View: 195 degrees



8) Right of Way East Boundary View Direction: N/A Approximate Width of View: 194 degrees



9) Right of Way South Reed River West View Direction: Southeast Approximate Width of View: 222 degrees



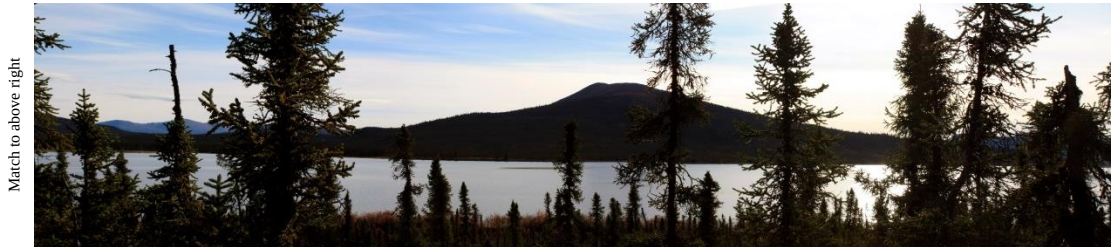
10a) Nutuvukti Summit View Direction: Northwest Approximate Width of View: 140 degrees



10b) Nutuvukti Summit South View Direction: South east Approximate Width of View: 70 degrees

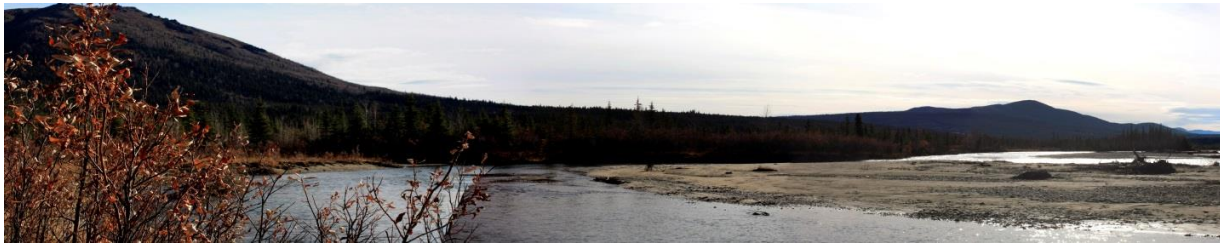


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11) Nutuvukti Lake View Direction: Northeast/South Approximate Width of View: 112 degrees



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12) Reed River 3 View Direction: South Approximate Width of View: 148 degrees



13) Reed River 1 View Direction: West Approximate Width of View: 182 degrees



14) Kobuk River South, Ridge 3 View Direction: Northwest
degrees

Approximate Width of View: 219



15) Kobuk River South 1

View Direction: South

Approximate Width of View: 70 degrees



16) Kobuk River South 2
degrees

View Direction: Southwest

Approximate Width of View: 147



17) Kobuk River South 3

View Direction: Southwest

Approximate Width of View:



18) Kobuk Ridge 1 View Direction: North Approximate Width of View: 180 degrees



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Match to above right

19) Hogatza Summit View Direction: North Approximate Width of View: 175 degrees

Appendix C: Viewshed Analysis

GATES OF THE ARCTIC NATIONAL PARK AND PRESERVE:

VIEWSHED ANALYSIS PARAMETERS AND SPATIAL ANALYSIS METHODOLOGY

Emily A. Zvolanek and Robert Sullivan

This document describes methods and data used by Argonne National Laboratory Environmental Science Division (Argonne) staff to conduct viewshed analysis and related geospatial analysis for the Gates of the Arctic National Park and Preserve (GAAR) scenic resources inventory.

Task 1 Viewshed Analyses Using IFSAR-Derived Elevation Data

Under this task, using IFSAR-derived digital and surface elevation models (DEMs and SEMs), Argonne conducted geographic information system (GIS) viewshed analyses for key observations points (KOPs) included in the GAAR scenic resources inventory. As was done for the original GAAR viewshed analysis, Argonne ran multiple viewsheds for each KOP, using multiple viewshed origin points in the immediate vicinity of the KOPs, in order to increase viewshed accuracy.

In addition to running viewsheds for the inventory KOPs, Argonne used a grid-based approach to run viewshed analyses from the proposed Ambler Road proposed right-of-way (ROW) that were combined into a composite viewshed that indicated those lands within the extents of the IFSAR-derived elevation data within that would have visibility of at least one location along the Ambler Road.

Sampling points throughout the Ambler Road proposed corridor were created in 2014 by converting the proposed corridor into a 1 mile x 1 mile grid system and then creating a point at the highest elevation within each grid. The dataset used to determine the highest point within each grid was a 60 meter digital elevation model from the Natural Resources Conservation Service of the U.S. Department of Agriculture. These sampling points were then used as viewpoint inputs in a viewshed analysis.

A Python script, attached at the end of this document, was used to create a viewshed of each viewpoint. The sampling point feature class contained fields that the script used as viewshed parameters. Offset A, the vertical distance added to each viewpoint, was set to 1.75 meters, or the average height of a person. Offset B, the vertical distance added to each elevation cell, was set to the default value of zero. Radius 2, the maximum search distance from the viewpoint, was set to 80,467 meters (50 miles). The elevation dataset used was 4.9998787 meter cell Digital Surface Model interferometric synthetic aperture radar (IFSAR) received from the National Park Service (NPS). The data were projected to a coordinate system appropriate for Alaska: NAD 1983 CORS96 Alaska Albers. The Python script instructed the viewshed analysis to correct for curvature of the earth. The resultant viewsheds were merged together to create composite viewsheds for the northern and southern route alternatives.

After NPS expressed concern that the Ambler Road proposed corridor (a three-mile buffer on either side of the proposed Ambler Road centerline) was too wide an area for the viewshed analysis, narrower corridors for the northern and southern route alternatives were created. Sampling points within 0.5 mile of the Ambler Road proposed centerline were identified and their corresponding viewsheds were used to create new northern and southern route alternative composite viewsheds. These new viewsheds for the northern and southern routes were used to complete the analyses in Task 3.

Task 2: Develop Scenery Conservation Program (SCP) Inventory Map Products

Under this task, using the GAAR scenic resource inventory data, Argonne conducted GIS and other analyses to develop scenic inventory maps in accordance with methods specified in the visual inventory documentation. These maps depict the KOPs, associated view cones, viewsheds, the proposed Ambler Road right-of-way (ROW) and centerline, and scenic inventory values (SIVs), including composite SIVs where views overlap. The KOP coordinates, view cones, and SIV values were provided by NPS. A Python script was developed to calculate composite SIV values. The Python script was previously provided to NPS ; text for that script is provided at the end of this document.

The Python script examined the scenic quality (SQ), view importance (VI), and SIV values of the views from the 21 KOPs. Where KOP viewsheds overlapped, the highest SIV rating within the area of overlap was assigned as the composite SIV output value. For example, if one KOP viewshed had a moderate SIV rating and an overlapping viewshed in the same area had a high SIV rating, the high rating was extracted for the composite viewshed. The composite viewshed also contains a field indicating the number of overlapping viewsheds within that polygonal area. The composite viewshed includes the maximum spatial extent of all KOP viewsheds, and has within the attribute table the composite SQ, VI, and SIV scores.

Task 3: Additional Spatial Analyses for Comparison of Northern and Southern Route Alternatives

Under this task, using the GIS products developed under Task 1 and 2, Argonne conducted GIS and other analyses to facilitate comparison of potential visual impacts from selection of the northern or southern routes for the proposed Ambler Road. All subtasks within Task 3 used the same geospatial extent: the intersection of the Enjoy the View study area boundary with the IFSAR data extent. Therefore, any portion of GAAR that was outside this extent was not included.

Subtask 1

The objective of Subtask 1 was to determine the linear distance of the Ambler Road and the count and acreages of airstrips, bridges, and gravel pits along both the northern and southern route alternatives that are visible from the KOPs defined for Tasks 1 and 2. The bridge, airstrip, and sand/gravel data were provided by NPS. To obtain these calculations, the individual and composite viewsheds from the 21 KOPs were used.

Each polygon viewshed was intersected with the sand/gravel pit and airstrip data to determine the acreage of overlap. The Select by Location function was used to determine the number of bridge

points located in each KOP viewshed. Because there was much overlap among the KOP viewsheds, the results could not be summed for a cumulative value. The composite KOP viewshed was used to determine the acreage of sand/gravel pits and airstrips and the count of bridge points across the entire area. These data were included in a spreadsheet provided to NPS as a product deliverable.

Subtask 2

The objective of Subtask 2 was to determine the acreage of land inside GAAR that has visibility of either the northern or southern alternative routes. This task did not differentiate between the Park and Preserve boundaries, and was a straightforward intersection of the route alternative viewsheds with the Park/Preserve footprint.

Subtask 3

The objective of Subtask 3 was to identify areas within GAAR with a SIV value of very high that also have visibility of at least one point along either alternative road corridor in the GAAR Park and Preserve. This task differentiated between wilderness lands (those lands in the Park) and non-wilderness lands (those lands in the Preserve). To perform this analysis, the composite KOP viewshed was queried for a SIV score of very high. This subset of the KOP data was then intersected with first the northern route alternative and then the southern route alternative. The KOP-road viewshed results were then intersected with the Park and Preserve boundaries, respectively.

Subtask 4

The objective of Subtask 4 was to examine a specific segment of the Kobuk River and determine the linear distance of that segment that would have visibility of at least one location along the proposed road alternatives or of a bridge, airstrip, or sand/gravel pit on the alternative routes. This analysis used the Northern and Southern route alternative viewsheds and the same bridge, airstrip, and sand/gravel pit data as Subtask 1. The Kobuk River segment was extracted from USGS National Hydrography Dataset flowline data, between coordinates 67.117069, -154.197596 and 66.857508, -154.655791. To determine the length of the Kobuk River segment that could have views of the bridges, airstrips, and sand/gravel pits, viewsheds were processed from the bridge points and centroids of the airstrips and sand/gravel pits. The same Python script was used to generate the infrastructure viewsheds as was used to generate the road sampling point viewsheds. Based on sponsor expertise, the bridges were assigned an Offset A value of 27 feet above ground level. The airstrips and sand/gravel pits were assigned an Offset A value of 10 feet above ground level. The Offset B value, Digital Surface Model data, and curvature of the earth were the same inputs as the road alternative viewsheds. Once all the viewshed analyses were completed, the river segment centerline was intersected with the viewshed results to determine which infrastructure features could be seen from the river.

Project Deliverables

Project deliverables include poster-sized maps in ESRI GIS format and in Adobe Acrobat PDF format, a Microsoft Excel spreadsheet with acreage calculations and feature counts, and two Python scripts used for viewshed analysis and composite SIV determination.

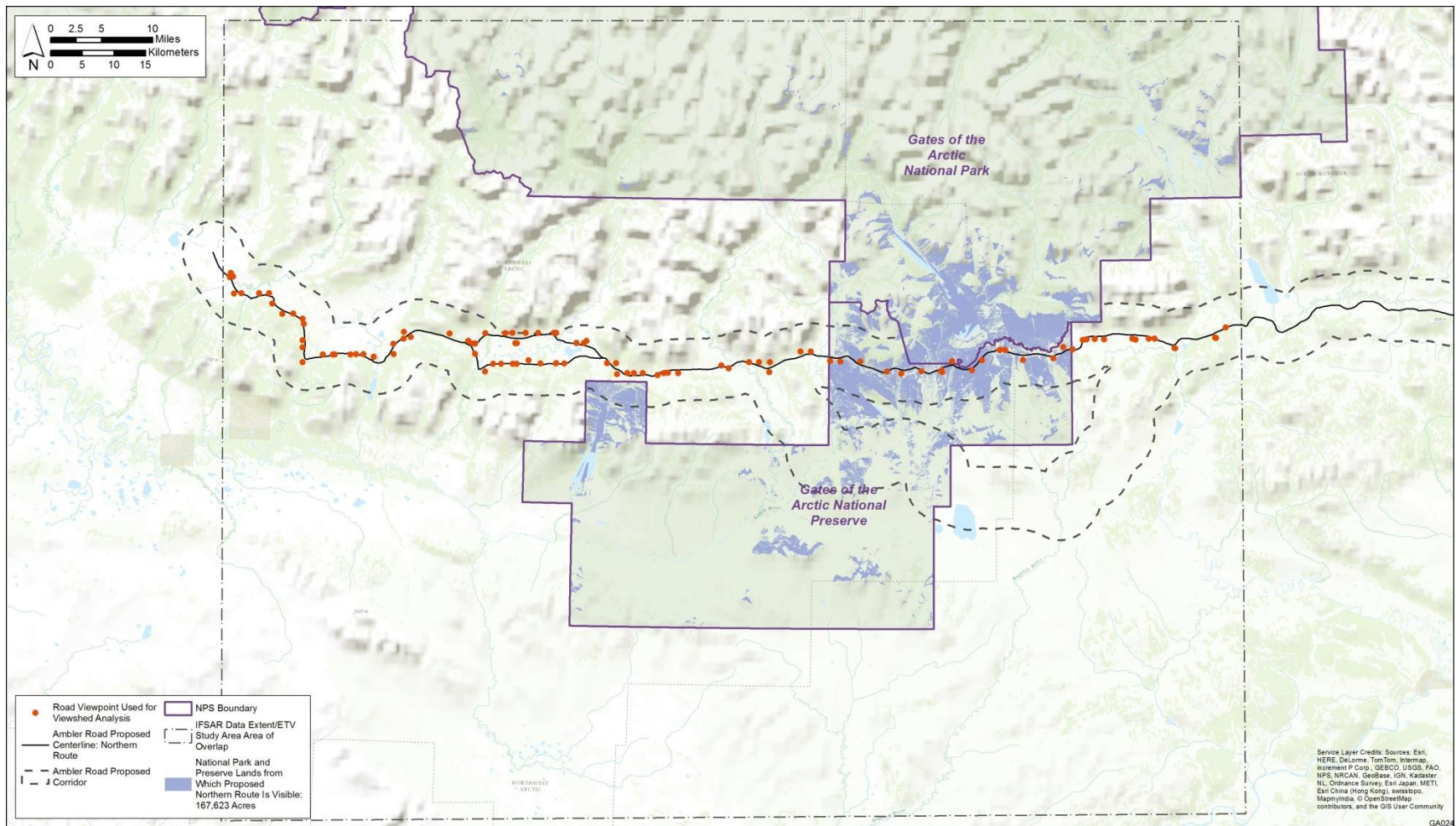


Figure A-1. Road viewpoints used for viewshed analysis of northern alignment

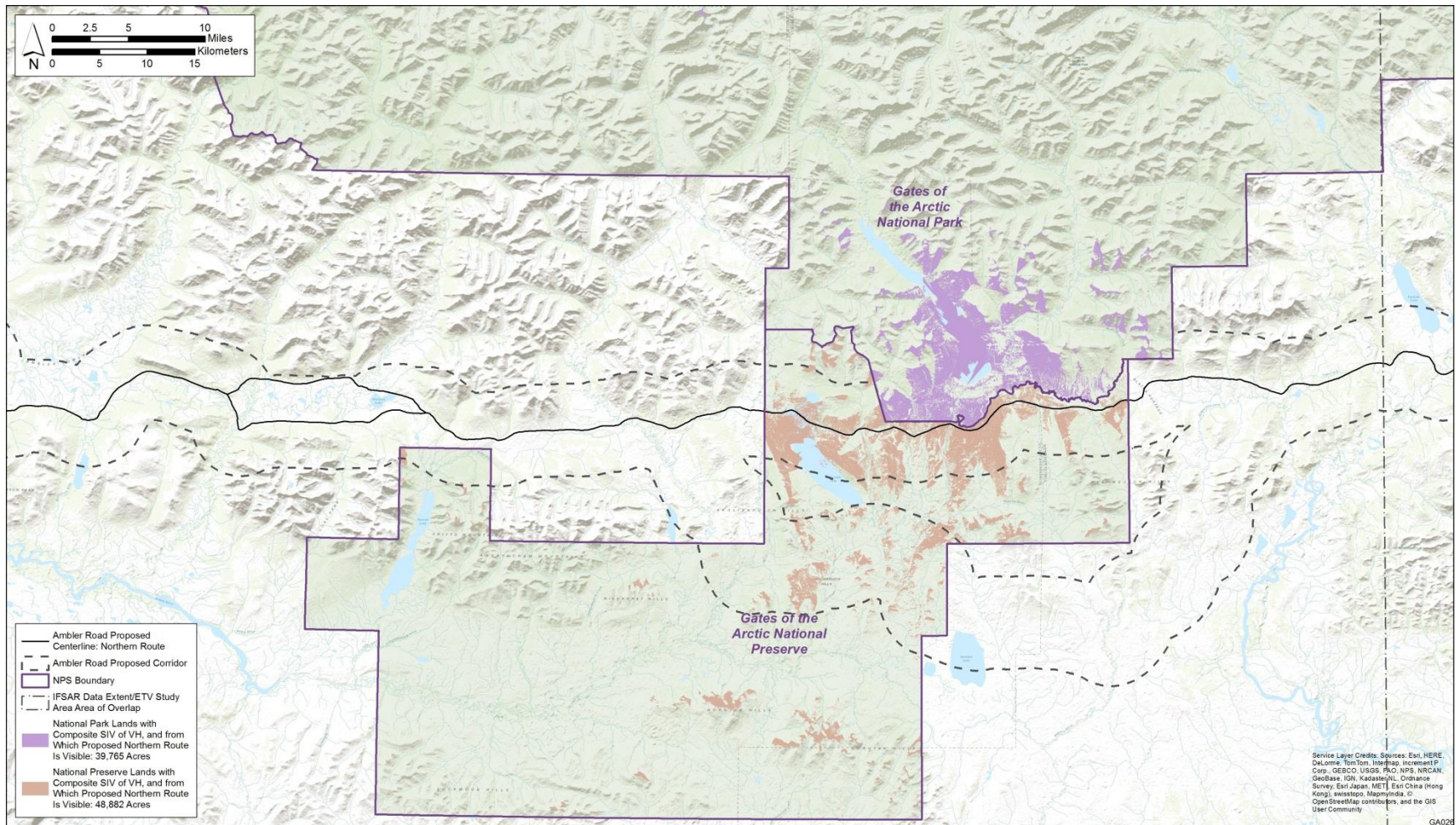


Figure A-2. Park and preserve lands visible from northern alignment

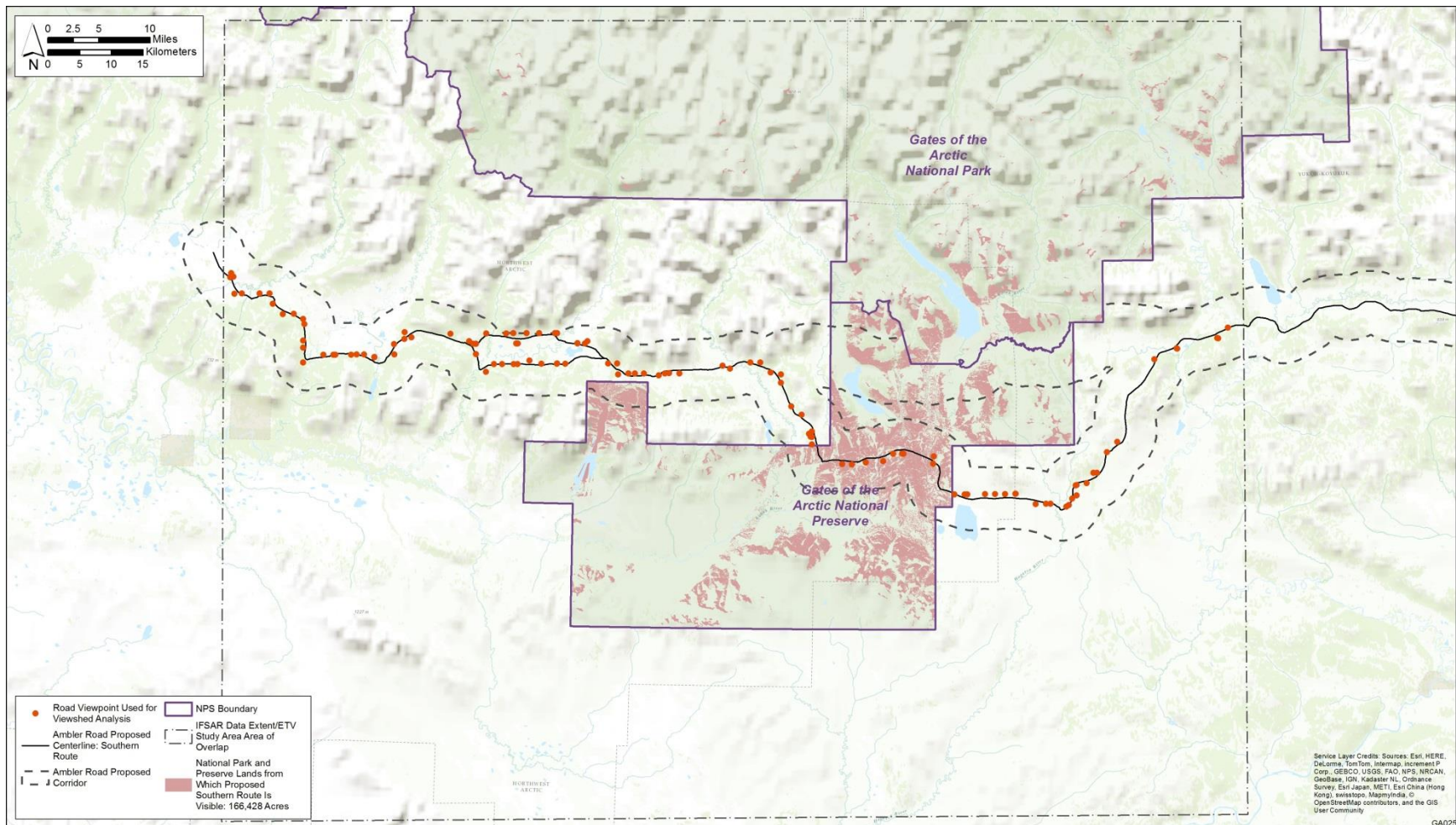


Figure A-3. Road Viewpoints used for viewshed analysis of southern alignment

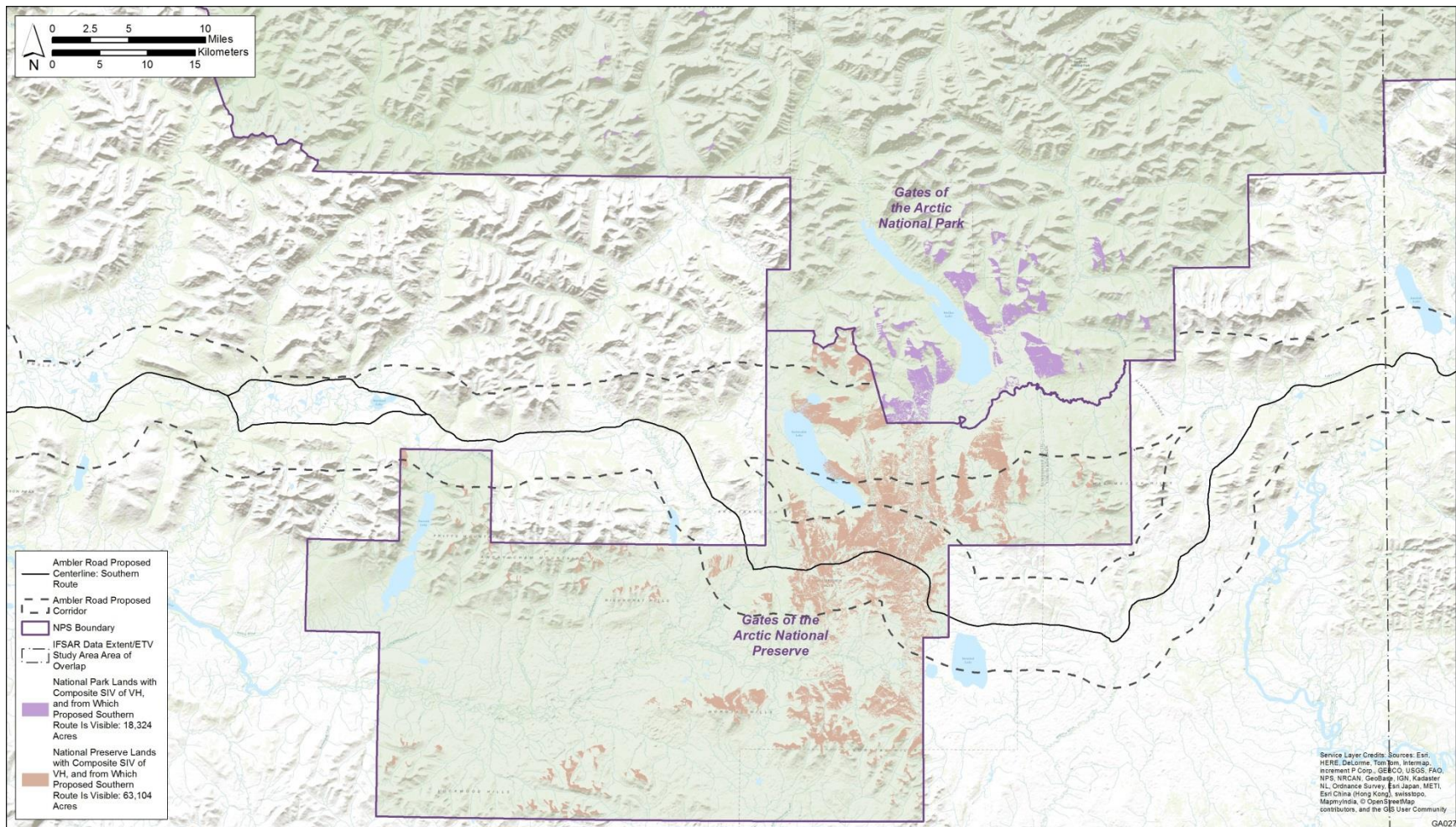


Figure A-4. Park and preserve lands visible from southern alternative.

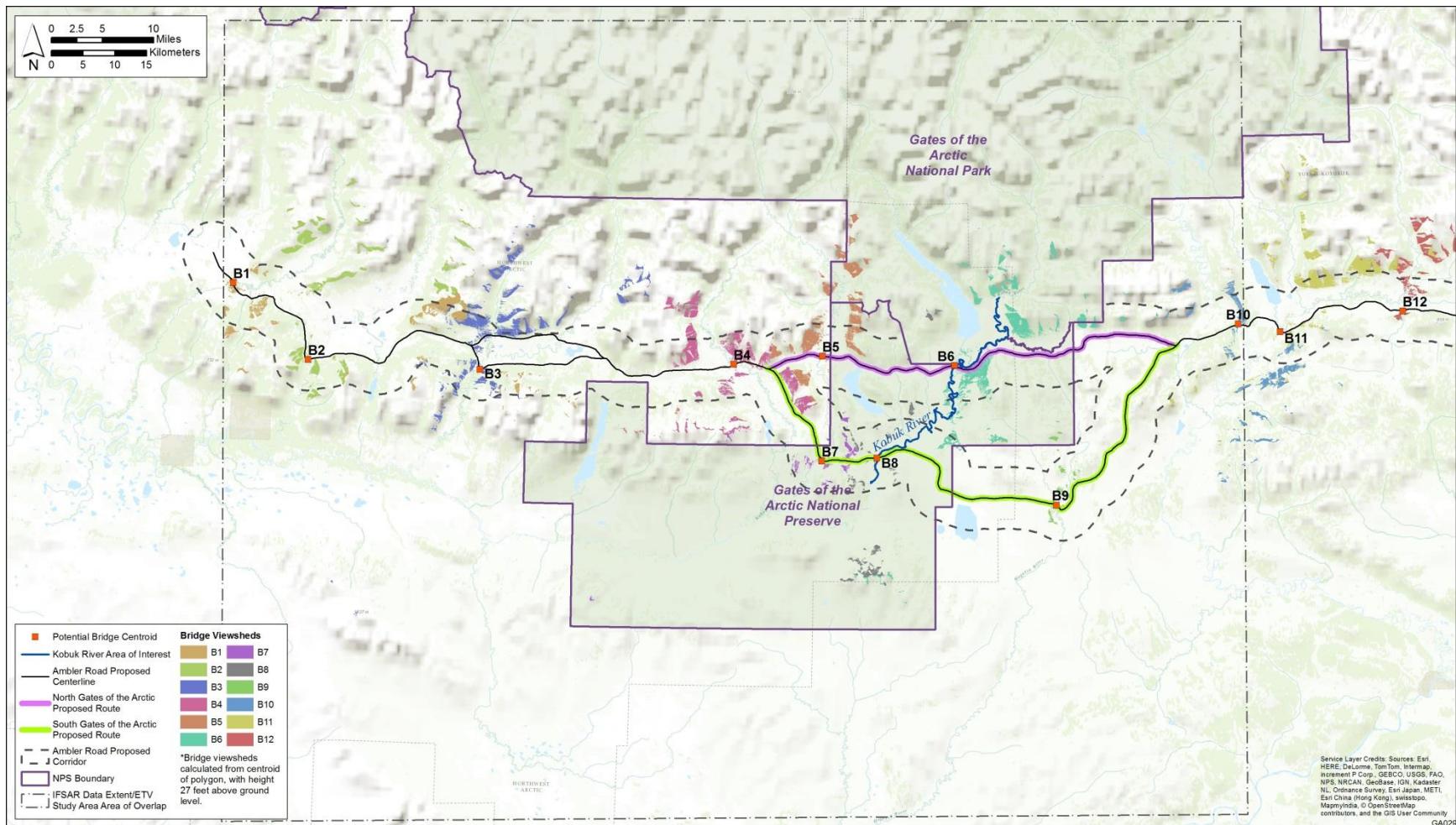


Figure A-5. Park and preserve areas visible from proposed bridge locations

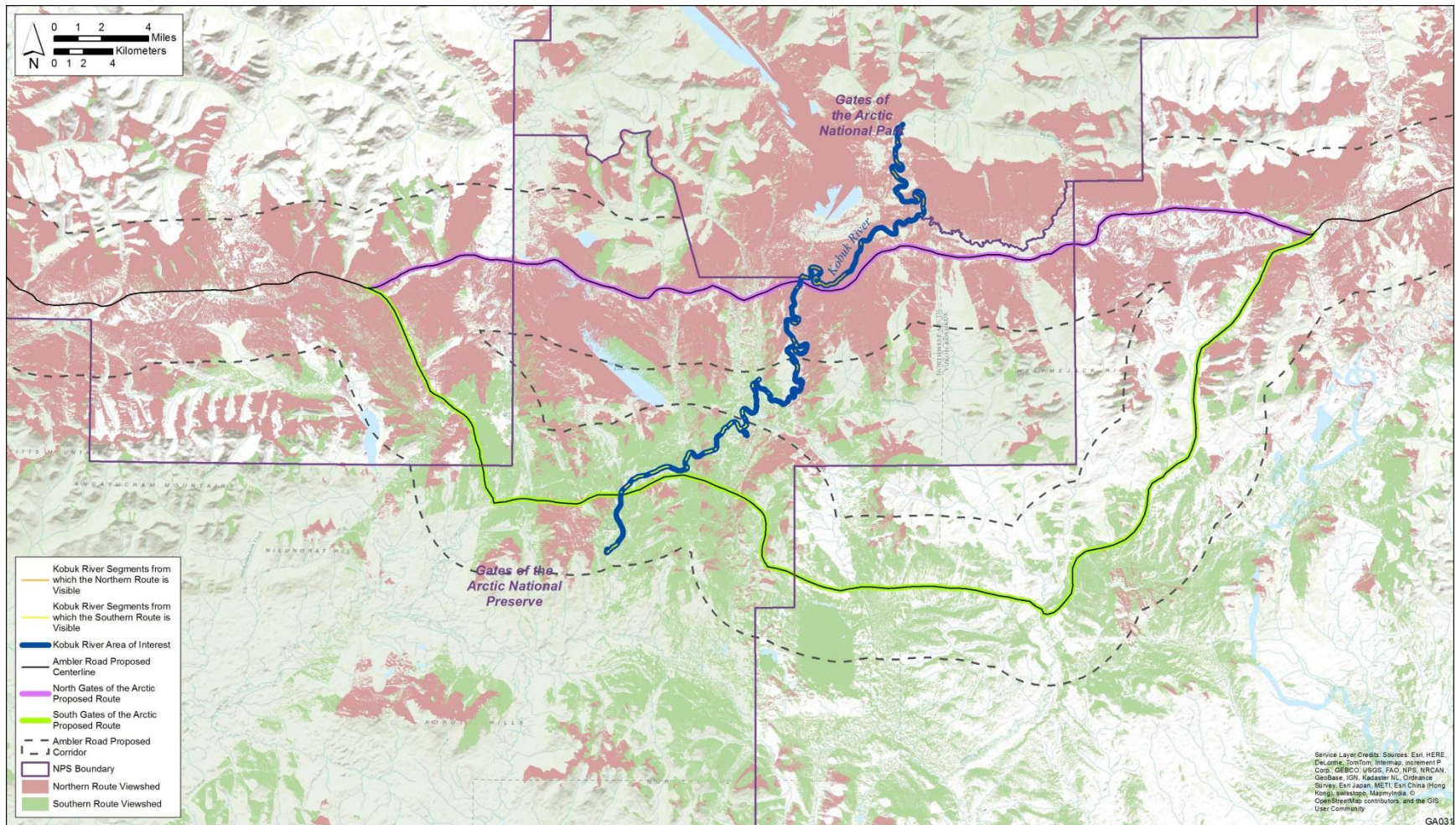


Figure A-6. Kobuk River segments from which the northern and southern alignments would be visible.

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

NPS 195/134040, September 2016

National Park Service
U.S. Department of the Interior



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