

# Graphite Creek Project Visual and Aesthetic Resources Technical Report

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## Abbreviations

ADNR	Alaska Department of Natural Resources
BLM	Bureau of Land Management
FHWA	Federal Highway Administration
GIS	Geographic Information System
Graphite One	Graphite One (Alaska) Inc.
KOP	key observation point
MP	milepost
Project	Graphite Creek Project
USDOT	United States Department of Transportation
WMF	waste management facility



# 1 Introduction

HDR Engineering, Inc. (HDR) has been contracted by Graphite One (Alaska), Inc. to provide environmental baseline services in support of the proposed Graphite Creek mining development on the Seward Peninsula of Alaska. As part of the baseline conditions analysis, HDR has prepared a visual inventory of current viewshed conditions and has created photo simulations that project the visual impact that the proposed Graphite Creek Project (Project) would have on visual and aesthetic resources from specific, pre-determined locations around the study area.

The purpose of the baseline visual and resources study is to analyze the existing landscape character and quality in the study area, to provide a framework for comparing the existing scenic conditions to potential landscape changes related to the proposed Project, and to provide a basis for future determinations of the visual effects of the proposed Project.

The visual and aesthetic resources of a community or area include the physical features that comprise the visible landscape and vistas such as water, vegetation, and topography as well as human-made features such as buildings, roads, utilities, and structures, combined with the viewer response to the area.

## 1.1 Location and Context

The Project is located within State of Alaska-owned lands in the Southwest Seward Peninsula Region. This region includes land within drainages surrounding the northern side of Norton Sound. Rivers within the Project area include the Sinuk and Cobblestone Rivers, and Imuruk Basin is a major waterbody north of the proposed mine site. As described by the Alaska Department of Natural Resources (ADNR) Northwest Area Plan for State Lands, “many parts of the region consist of gently rolling coastal lowlands, although hilly to some mountainous terrain occurs in the northeastern parts of the region. The pattern of vegetation reflects proximity to the coast, and the distribution of lowland and upland (hilly) areas. With the lowlands, which concentrate along the coast, wet tundra is characteristic, while a mixture of high brush and alpine tundra is typical of the remaining areas of uplands” (ADNR 2008).

No major industries or developments are within the Project’s viewshed. Ground-disturbing resource exploration within the viewshed is limited, with the majority of historic and current exploration occurring in association with the graphite deposit that is the focus of this Project.

Three major roads originate from Nome: Nome-Teller Road, Kougarok Road, and Nome-Council Road (ADNR 2008). The proposed Mosquito Pass access road would be visible from the viewshed of Kougarok Road. No interconnected utilities are within the viewshed that contribute to horizontal visual features (Barr 2025).

The study area for visual resources is defined in this evaluation as a 25-mile viewshed radius from the mine site and a 10-mile viewshed radius from the Mosquito Pass access road. Natural

visual boundaries to the viewshed are the Kigluaik Mountains. The natural landform slopes from 4,714 feet (from Mount Osbourne, the highest peak of the Kigluaik Mountains) to approximately sea level at the Imuruk Basin to the north. In the Cobblestone River valley, the terrain is much steeper, ranging from approximately 308-foot elevation on the valley floor to more than 3,150-foot elevation. Water is a primary visual element, with the basin, lakes, slow streams, and meandering rivers. During summer, contrast occurs between the greens, reds, grays, and browns of vegetation and barren soils as well as the blues and grays of the waterbodies, and white patches of snow. During other times of the year, less color variation occurs as vegetation returns to a dormant state, and the landscape becomes covered with snow.

Visual modifications primarily occur far outside the study area except for historical mining structures within or adjacent to the proposed mine site. Visual modifications outside the study area include structures and infrastructure associated with the communities of Mary's Igloo, Teller, Brevig Mission, and Port Clarence as well as settlements along Kougarok Road. The community of Nome also has substantial modifications to the natural environment from homes, businesses, internal community roads, roads to the local landfill and the water supply lake, and a public airport. The study area itself is largely unmodified from its natural state.

Viewers range from residents of the communities in the area to recreational visitors, as well as hunting and fishing camps. The area is also used for subsistence purposes; therefore, hunters, fishers, and gatherers are also a constituent group. The area receives overflights for sightseeing and traveling to camps, and Imuruk Basin receives some traffic in the form of boats and float planes.

## 2 Methodology

Visual and aesthetic resources are determined, defined, and categorized using standard desktop and field methods. There is a process for how key observation points (KOPs) are determined, and there is specific terminology for how the landscape and its features are described. The four major phases in the process of creating a visual resources study are study area establishment; visual inventory of resources, which include photography and technical rendering and simulations; qualitative descriptions, which are presented in Section 3; and suggested modifications and mitigations for potential adverse effects (presented in Section 5). The subsections below detail the methods used for evaluating the visual and aesthetic resources for the Project.

Because the State of Alaska has no standard protocol for describing and analyzing aesthetic resources, a combination of federal guidelines was used. The Federal Highway Administration (FHWA) guidelines (2015) were used to define the area of visual effect and to provide definitions for distance zones (foreground, middle ground, background). The Bureau of Land Management's manual *Visual Resource Contrast Rating* (1986) was used to define the

qualitative descriptions of the landscape features, as this method is better suited to the information available on the volume, frequency, purpose, and duration of use for viewer groups in the Project area.

## **2.1 Study Area Establishment**

The first step in the process of evaluating visual and aesthetic resources is to develop a study area. HDR conducted a desktop review and viewshed analysis to support the KOP selection process and to support the 2025 photograph collection fieldwork. To establish a study area, HDR followed the U.S. Department of Transportation, FHWA 2015 Guidelines for the Visual Impact Assessment of Highway Projects (USDOT 2015).

HDR determined the study area for the Project by using the Viewshed (Spatial Analyst) geoprocessing tool on ArcGIS Pro. The study area was determined to be the area within a 25-mile radius from the center of the proposed mining operation, and within 10 miles of the access road. These distances were determined based upon the physical limitations of human vision and the effect of general atmospheric conditions at this location's base elevation (sea level). The viewshed was further refined by using Viewshed geoprocessing tool which assists in determining the visibility of different points within the viewshed based on topographical features and possible obstructions.

The Viewshed geoprocessing tool determines the raster surface locations visible to a set of observer features. The visibility of each cell center in a raster input is determined by comparing the altitude angle to the cell center with the altitude angle to the local horizon. Points of interest were determined by identifying common recreation, subsistence, and land use areas across the landscape where Project facilities may be visible (Figure 1). The altitudes of Project features were input into the tool to account for the height of project components.

## **2.2 Inventory Phase**

The purpose of the inventory phase is to define the existing conditions of the affected environment and affected viewer groups. Describing how the landscape currently appears provides the basis of comparison to how the landscape and viewshed can change as a result of the Project. This Visual Resources Technical Report, including the photography and visual simulations, constitutes the inventory phase for current and projected conditions. The comparison of current and anticipated visual contrasts provides the initial analysis of visual resources and aesthetics of the Project.

### **2.2.1 Photography**

On July 14, 2025, Kevin Torpy with Graphite One, obtained high-resolution photographs and documented atmospheric and site conditions for the KOPs. The photographs were taken using

a tripod-mounted Nikon D750 single lens reflex camera, set to the highest resolution, and taken without using zoom with a Nikon ED AF-S Nikkor 18-35 mm lens. The same photographer and the same camera were used at all KOPs for consistency between equipment, quality of composition, and other user and equipment-related factors. All photographs were collected on the same day to provide maximum consistency in seasonal, weather, atmospheric, and light conditions. Original RAW images were then transmitted to the Visualization Designer to create simulations of the proposed Project. The field notes of the visual resources photographer are provided in Appendix A.

## 2.2.2 Technical Rendering and Simulations

For creating photo simulations, HDR converted existing DTMs and new roadway surfaces into AutoCAD files and then imported them into modeling software – 2024 3ds Max (Autodesk) with the V-Ray 7 (Chaos) rendering engine. Next, an accurate GPS-based geospatial camera point for each photograph was established to be used in the photo simulations. The points were exported out of Global Mapper 25 (GIS software) into 3ds Max. Once the 3D geometry and the camera locations have been imported into 3ds Max, each photograph's metadata was consulted to inform the rendering process. This metadata includes camera make and model, date and time of exposure, f-stop settings, shutter speed, and focal length.

The rendering software uses real-world lighting and camera setups, so the exact camera settings used in each photograph can be replicated in the rendering software. This data includes the image processor settings for any make and model of camera. In the 3d space, V-Ray's real-world sunlight settings is able to recreate daylight conditions for any location and time of day. After importing the 3D geometry, camera locations, and all relevant daylight and camera settings, the virtual camera's viewpoint was matched up with each background photograph. Satellite imagery is also used to match the background images to verify the simulation is in the correct bearing.

Once all the above elements are incorporated, realistic renderings of the new road surfaces and mine facilities are made. Finally, the resulting rendered images are layered on background images in Adobe Photoshop (version 2025), and photo simulations are produced that are both seamless and accurate with the plans and engineering data provided.

These visual simulations perform the function of creating a projected visual inventory of proposed Project features and a basis for the analysis of the anticipated visual contrast of proposed Project features.

## 2.3 Visual and Aesthetic Resources Description Methods

Qualitative description of the existing conditions is an important step in the process of viewshed analysis as it provides a starting point and vocabulary for defining visual characteristics. The following two subsections provide the methodology used when describing aspects of physical elements.

### 2.3.1 Describing Topography, Spatial Relationships, and Natural Elements

When discussing the existing conditions when viewed from the KOPs, specific terminology is used. Methodology and descriptors for aspects of topography, spatial relationships, and natural elements used in Section 3 are defined in this subsection.

Vegetation height and type (deciduous, evergreen, etc.) play a large role in describing landscape and seasonal variations. Vegetation heights described in this report were based on designations using the lowest value within the given range (Viereck et al 1992) since it is most representative of the surrounding landscape:

- Tall shrubs = greater than 5 feet tall
- Low shrubs = 8 inches (0.66 foot) to 5 feet tall
- Dwarf shrubs = less than 8 inches (use 0 foot as low value)
- Herbaceous = no height provided in Viereck (assume low value of 0 foot)

The spatial relationships of visual elements to each other and their distance from the viewer are important factors for the perception of degrees of contrast, texture, and vividness of color. The farther away something is from the viewer, the greater the role that atmospheric conditions have on the viewers' perception of landscape elements. For this reason, the spatial relationship of the landscape is described in terms provided by the Federal Highway Administration (FHWA 2015) of the following viewshed distances:

- Foreground = 0.25 to 0.50 mile from viewer
- Middle ground = 3 to 5 miles from the foreground
- Background = from the foreground to the limits of visibility

When describing the existing conditions and anticipated contrasts, consistent vocabulary was used to describe visual elements in the viewsheds; these standard terms are described and defined in BLM Manual 8431- *Visual Resource Contrast Rating* (BLM 1986). The elements of visual resources that are essential to discuss in terms of degree of contrast are form, line, color,

and texture (BLM 1986). Along with those four elements of visual description, the following factors were considered:

- Distance
- Relative size or scale
- Season
- Light conditions
- Spatial relationship
- Atmospheric conditions

This report also provides preliminary analysis of anticipated visual contrasts of the Project provided under each KOP in the Anticipated Visual Contrast subsections. The degree of contrast and the criteria used in this report are defined by the Bureau of Land Management’s *Visual Resource Contrast Rating Manual* (BLM 1986) and are provided in Table 1.

**Table 1. Degree of Visual Contrast Criteria**

Degree of Contrast	Criteria
None	• The element contrast is not visible or perceived
Weak	• The element contrast can be seen but does not attract attention
Moderate	• The element contrast begins to attract attention and begins to dominate the characteristic landscape
Strong	• The element contrast demands attention, will not be overlooked, and is dominant in the landscape

Source: BLM 1986

### 2.3.2 Seasonal Light, Color, and Texture Variations

Due to technical and logistical constraints of accessing the Project area during winter, this report focuses on summer daylight conditions at each KOP. Seasonal variations, such as winter and nighttime conditions were taken into consideration in the analyses presented in Section 3 and the suggested modifications and mitigations for seasonal variations are presented in Section 5.

Compared to other regions of the United States, the tundra environment and conditions of western and northern Alaska create unique challenges in making facility designs and visual mitigations that would be equally effective year-round. Between the summer and winter seasons, there are extreme differences in color, texture, and level of light within the same landscape. The two elements of contrast that have the most variability between seasons are color and light due to snow coverage in the winter and near continuous daylight in the summer. These two elements have an inverse relationship with each other depending on the season. In the summer, the color of constructed facilities could have a strong degree of contrast to the vegetation of the natural environment but would have a weak to moderate degree of contrast in the winter. Conversely, the effects that artificial light would have in the summer on the viewshed

would be none-to-weak due to the extensive hours of daylight, whereas in the winter, artificial light would create a moderate to strong contrast.

Based on the amount of subsistence activity that takes place in and around Imuruk Basin, it is likely that the greatest number and variety of groups would be able to view the Project facilities during the summer. Therefore, the facilities and structures of the Project would be observed more frequently during parts of the year with the least snow present. The color scheme of the mine facilities, if not selected to match summer vegetation conditions, could have a moderate to strong contrast to the visual landscape. In the winter, snow would help to create a uniform color, texture, and line minimizing the visual presence of the development no matter the color of the buildings and facilities. However, the removal of rock from the mine and gravel sources, the deposition of rock onto the Waste Management Facility (WMF), and the clearing and travel on roads would create a dark contrast over the white snow in areas of on-going mining activities.

Artificial light pollution is also a consideration for visual resources. Between the vernal equinox in March and the autumnal equinox in September, the hours of daylight exceed the hours of darkness. This difference reaches an extreme in the summer when the longest daylight of the summer solstice (including dawn and dusk twilights) lasts nearly 22 hours. As a result, artificial lighting from the Project would have a weak contrast during the summer. This ratio of daylight to nighttime hours is reversed in the winter, however, with the winter solstice having only approximately three hours and 54 minutes of daylight.

These changing conditions in seasonal light, color, and texture, though not depicted in renderings, were considered when describing the anticipated visual contrasts when viewed from each KOP

### 3 Key Observation Points

Viewers may interact with the study area from all distance zones- foreground, middle ground, and background. However, due to the lack of a developed road system to the proposed Project area, most views would fall within the middle to background range. For the purpose of visual resource inventory and comparison to possible future development, KOPs are centered on sites or corridors where people are likely to be, particularly within areas where there is an expectation for a pleasant or natural view. In this section, existing conditions and the anticipated effects that the Project features may have on the landscape are qualitatively discussed using the terminology from Section 2.3.1. and are described and defined in BLM Manual 8431- *Visual Resource Contrast Rating* (BLM 1986).

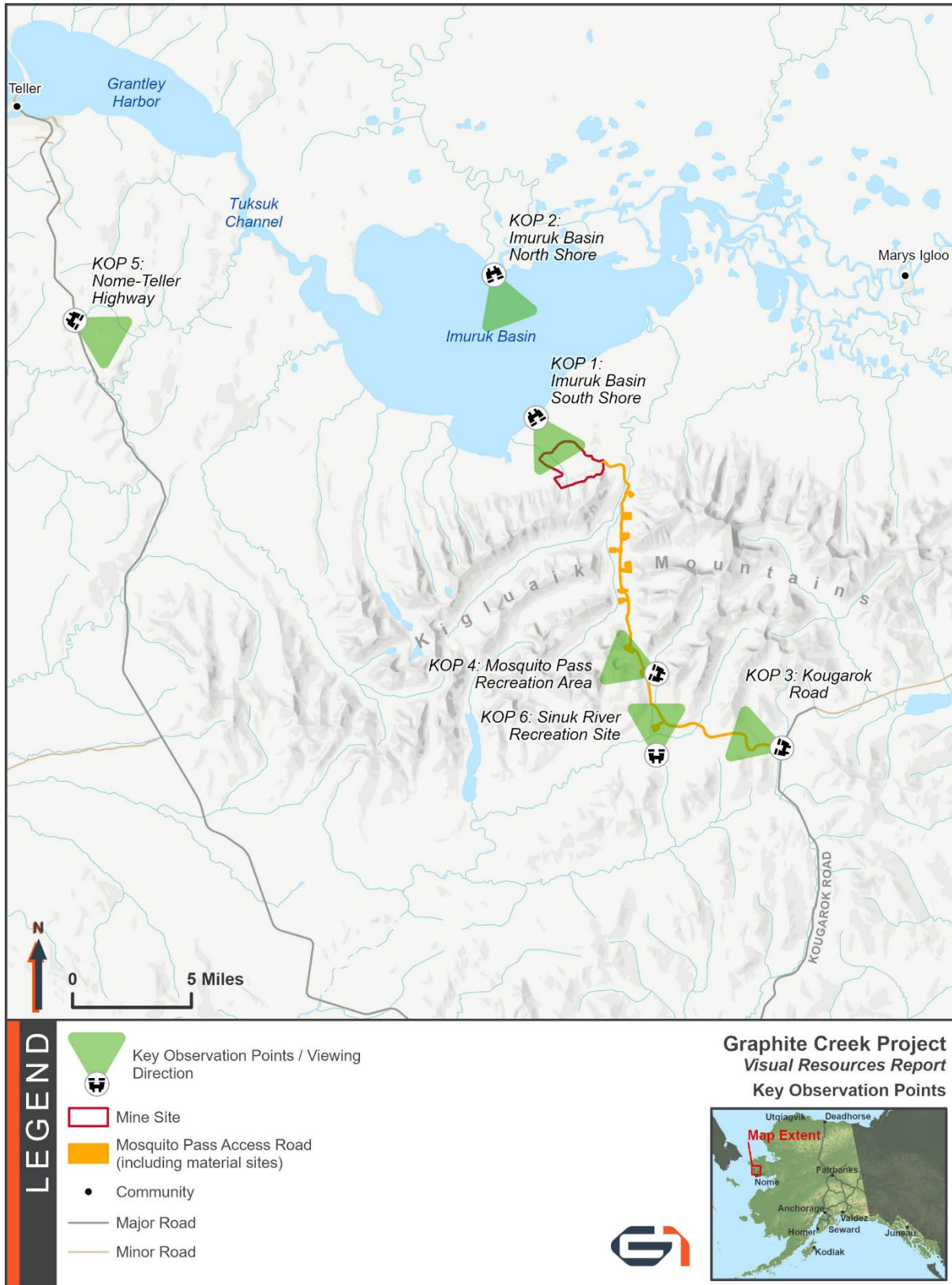
Six KOPs were determined during the scoping processes from community feedback regarding areas and viewsheds that hold importance for cultural, subsistence, recreational, or aesthetic

reasons. The KOPs, location, and reason for selection are detailed in Table 2 and are shown in Figure 1.

**Table 2. Key Observation Points for Proposed Project Features**

Observation Point	Latitude	Longitude	Rationale for KOP site selection
KOP 1: Imuruk Basin South Shore	65.07165	-165.61008	General vista of the Project area and Kigluaik Mountains from the south shore of Imuruk Basin. This KOP would be the closest viewshed in this report to the Project area.
KOP 2: Imuruk Basin North Shore	65.158461	-165.669560	General vista of the basin and Kigluaik Mountains from the north shore of Imuruk Basin
KOP 3: Kougarok Road	64.86985	-165.26179	This KOP would have a partial view of the access road from the existing highway
KOP 4: Mosquito Pass Recreation Area	64.91567	-165.44015	Fishing site that would have views of the access road
KOP 5: Nome-Teller Highway	65.13114	-166.27458	KOP is adjacent to a community-identified moose area; offers a view of the proposed Project area from an elevated location
KOP 6: Sinuk River Recreation Site	64.866350	-165.441047	Recreation site that would have a view of the proposed access road

**Figure 1. Location and Viewing Direction of KOPs**



## 3.1 KOP 1: Imuruk Basin South Shore

### 3.1.1 Existing Conditions

The proposed barge landing was selected as a key observation point because it is within a community-identified area that is important for subsistence use. KOP 1 is three miles from the center point of the mine facilities, making it the closest KOP to the proposed mining operations (Figure 1). The landscape is panoramic with slope-toe spatial positioning of the focal feature, the Kigluaik Mountains.

KOP 1 is in an area of dense, low-lying tundra vegetation in the foreground; hills with similar tundra vegetation in the middle ground, and the Kigluaik Mountains in the background with alpine vegetation growing sparser as the elevation increases (Figure 2). Vegetation in the viewshed of KOP 1 is classified as herbaceous, dwarf shrubs, and low shrubs, with diffuse edges between the vegetation groups. Open water is not visible in the viewshed that would offer reflection or glare, but lingering snow in the mountain draws provides a bright contrast to the mountain terrain.

The vertical elements of the landscape in the viewshed of KOP 1 are limited to the mountains in the background. There are no visible roads, industrial or agricultural developments, buildings or structures, or linear infrastructures like transmission lines visible in the viewshed of KOP 1. From this angle of view, the tundra in the fore and middle ground provides horizontal lines that are simple and sloping, and the Kigluaik Mountains create a degree of complexity and ruggedness against the skyline.

Dominant colors in this summertime viewshed are green, brown, and reddish brown of the vegetation. Other primary colors of the viewshed include blue and white of the sky, and gray, brown, and black of exposed earth and rocky mountainsides. Because of the low and dense vegetation, the summertime textures of KOP 1 can be classified as medium grain, with dense and even level of density and regularity, and a low contrast of texture and color. The background, due to atmospheric perspective, appears to have fine grain texture, with shading from the mountain draws and ridges providing a sparse level of density with uneven regularity.

**Figure 2. KOP 1 Existing Conditions, July 2025**



**Figure 3. KOP 1 Anticipated Visual Contrast Digital Rendering for year 20 of the mine life (Summer Conditions)**



### 3.1.2 Anticipated Visual Contrast of the Project

The nearest edge of the WMF portion of the Project would be approximately 1.5 miles from KOP 1, placing the front edge of the development in the middle ground of the viewshed.

The construction of the mine buildings and facilities would create the first visual changes viewed from KOP 1. When active mining begins, soil disturbance in the form of ground cuts and benches made into the mountain would be visible in the background, with the mine facilities visible in the middle ground. As the ore deposit is mined, the overburden and rock separated from the ore would be placed in a mound forming the WMF. During active mining, the mine structures and facilities will be visible until a point in production when the mound of the WMF reaches a height that would fully obscure the structures. Figure 3 shows the mining operations in approximately years 11 through 20 in which the WMF obscures the structures and buildings. The WMF is depicted as a sloped mound in the middle ground, and the top benches of the mine pit are visible over the top of the WMF.

The form and relative size of the Project, when viewed from KOP 1, would create a moderate contrast to existing conditions when compared to the scale of the landscape. Please refer to Table 1 for degree of contrast criteria. The presence of new development in the otherwise natural panorama would draw viewers' attention because of the contrast between developed and undeveloped features.

The notable differences to the changes in visual resources would come from the new lines and textures the Project would create within the natural setting. The straight, horizontal lines and the flat, smoother texture of the mining benches would contrast with the vertical and diagonal lines of the Kigluaik Mountain Range and the matte, varied surface of the vegetation and natural mountainside. The flat rock surfaces of the mine pit would have different, more noticeable, reflective qualities than the natural surface which, due to its irregularity, absorbs and diffuses light in more directions. Another visual element within the viewshed of KOP 1 would likely be from artificial light occurring during the darker, shorter days of winter. Artificial light would create a glow on the horizon and skyline, and against low cloud cover; and light could be reflected from the snow in the landscape. The degree of contrast from artificial light in the winter from KOP 1 could be moderate to strong. Suggested modifications and mitigations are discussed in Section 5.

## 3.2 KOP 2: Imuruk Basin North Shore

### 3.2.1 Existing Conditions

The north shore of Imuruk Basin was selected as a KOP because it would offer a wide view of the Project within the larger landscape. This KOP is looking south across the water towards the proposed mine site, approximately nine miles away. The landscape is panoramic with the dominant focal feature being the Kigluaik Mountains in the background.

The foreground of this KOP is dominated by Imuruk Basin, a shallow estuary. The middle ground is comprised of the southern shore of Imuruk Basin and the toe slopes of the Kigluaik Mountains with even low-growing vegetation. The background consists of the Kigluaik Mountains with sharp peaks rising above the rounded slopes of the middle ground (Figure 4). Vegetation in the viewshed of this KOP is classified as herbaceous, dwarf shrubs, and low shrubs, with banded edges between the vegetation groups, particularly visible in drainages in the middle ground. The expanse of open water in the foreground offers reflection of the sky and opposite shoreline and can amplify the illumination of the foreground with glare. Snow in the mountain draws provides a bright contrast to the mountain terrain highlighting the texture and depth of the Kigluaik Mountains.

The vertical elements of the landscape in the viewshed of KOP 2 are limited to the mountains in the background. There are no visible roads, industrial or agricultural developments, buildings or structures, or linear infrastructures like transmission lines visible in the viewshed of this KOP. From this angle of view, shoreline and hills of the middle ground provide horizontal lines that are simple and gently sloping, and the Kigluaik Mountains create a degree of complexity and ruggedness against the skyline.

Dominant colors in this summertime viewshed are blues and whites of the water and sky. Other primary colors of the viewshed include green, brown, and reddish brown of the vegetation, and gray, brown, and black of exposed earth and rocky mountainsides. Because of the viewing distance and the low and dense vegetation, the summertime textures of KOP 2 can be classified as fine grain, with dense and even level of density and regularity, and a low contrast of texture and color.

Figure 4. KOP 2 Existing Conditions, July 2025



Figure 5. KOP 2 Anticipated Visual Contrast Digital Rendering for year 20 of the mine life (Summer Conditions)



### **3.2.2 Anticipated Visual Contrast of the Project**

The nearest edge of the WMF would be approximately 7.7 miles from KOP 2, placing the development in the background of the viewshed.

Construction of the mine buildings and facilities would be the first visual changes to occur within KOP 2. When active mining begins, soil disturbance in the form of ground cuts and benches made into the mountain, and the mine facilities, would be visible in the background. As the ore deposit is mined, the overburden and rock separated from the ore would be placed in a mound forming the WMF. During active mining, the mine structures and facilities would be visible until a point in production when the mound of the WMF reaches a height that would fully obscure the structures. Figure 5 shows the point in the mining operations, at approximately year 10 through 20 of operations, in which the WMF obscures the structures and buildings.

The form and relative size of the Project, when viewed from KOP 2, would create a weak to moderate contrast to existing conditions when compared to the scale of the landscape. Please refer to Table 1 for degree of contrast criteria. The presence of new development in the otherwise natural panorama would draw the viewers' attention because of the contrast between developed and undeveloped features, but it would not dominate the characteristic landscape.

The differences to the changes in visual resources would come from the new lines and textures the Project would create within the natural setting. The straight, horizontal lines and the flat, smoother texture of the mining benches would contrast with the vertical and diagonal lines of the Kigluaik Mountain Range and the matte, varied surface of the vegetation and natural mountainside. The flat rock surfaces of the mine pit would have different, more noticeable, reflective qualities than the natural surface which, due to its irregularity, absorbs and diffuses light in more directions. At this distance from the KOP, these differences in line and texture would result in a weak degree of contrast.

The Project would be entirely within the background of the viewshed for KOP 2. At this distance, contrasts in color would be weak. The most noticeable visual element within the viewshed of KOP 2 would likely be from artificial light occurring during the darker, shorter days of winter. Artificial light would create a glow on the horizon and skyline, and against low cloud cover; and light could be reflected from the snow in the landscape or from the ice-covered Imuruk Basin. The degree of contrast from artificial light in the winter from KOP 2 could be moderate to strong. Suggested modifications and mitigations are discussed in Section 5.

## 3.3 KOP 3: Kougarok Road

### 3.3.1 Existing Conditions

The junction of Kougarok Road and the proposed Project Access Road was selected as a KOP because it would be the portion of the Access Road that would be most visible and accessible by the greatest number of constituents. KOP 3 is located at approximately milepost (MP) 28 on Kougarok Road (Figure 1). The landscape is panoramic with side-slope spatial positioning of a foothill of the Kigluaik Mountains and the wide, U-shaped Hudson Creek valley. Kougarok Road is not visible in the viewshed of KOP 3 because the viewer is standing on the edge on the road, putting the visual presence of the road underneath and behind the viewer.

KOP 3 is in an area of dense, low-lying tundra vegetation in the foreground; hills with similar tundra vegetation in the middle ground and background (Figure 6). Vegetation in the viewshed of this KOP is classified as herbaceous, dwarf shrubs, and low shrubs, with diffuse to banded edges between the vegetation groups. Although there are waterbodies in the viewshed, open water that would offer reflection or glare is obscured by vegetation.

The vertical elements of the landscape in the viewshed of KOP 3 are limited to the hills in the middle ground and background. There are no industrial or agricultural developments, buildings or structures, or linear infrastructures like transmission lines visible in the viewshed of KOP 3; Kougarok Road is the point where KOP 3 is taken from but is not itself visible within this static observation point. From this angle of view, the tundra in the fore and middle ground provides horizontal lines that are simple and sloping, and the hills create a sweeping undulation against the skyline.

Dominant colors in this summertime viewshed are green, brown, and reddish brown of the vegetation. Other primary colors of the viewshed include blue and white of the sky, and gray, brown, and black of exposed earth and rocky hillsides. Because of the low and dense vegetation, the summertime textures of KOP 3 can be classified as medium grain, with dense texturization with a graded to uneven regularity, and a low contrast of texture and color. The background, due to atmospheric perspective, appears to have fine grain texture, with shadowing providing a sparse level of texture density with uneven regularity.

**Figure 6. KOP 3 Existing Conditions, July 2025**



**Figure 7. KOP 3 Anticipated Visual Contrast Digital Rendering for year 20 of the mine life (Summer Conditions)**



### **3.3.2 Anticipated Visual Contrast of the Project**

KOP 3 is adjacent to the proposed Mosquito Pass Access Road and material site MS02, placing the development in the foreground of the viewshed.

The form and relative size of the Project, when viewed from KOP 3, would create strong contrast to existing conditions. Please refer to Table 1 for degree of contrast criteria. The presence of new development in the otherwise natural panorama would draw the viewers' attention. Because the new development would be in the foreground of the KOP 3 viewshed, it becomes a dominant feature at this location (Figure 7).

The low, horizontal form of the access road and MS02 would create weak contrasts with the topography of the landscape. The differences to the changes in visual resources, however, would primarily come from the new colors and textures of the constructed features that the Project would create within the natural setting. In the summer, the gravel Access Road would appear to be a large area of bare ground and would be a strong contrast to the low, dense, even vegetation. The texture of the landscape would change from softer and irregular vegetative texture to hard, regular, smooth textures and straight lines of the road, embankments, bridge, and guard rails. In the winter, the presence of snow covering the embankments and the road would visually homogenize the textures and colors of the landscape, thereby reducing the degree of contrast to weak for this element of contrast.

Artificial light from headlights, and dust plumes from vehicles driving along the unpaved road, would create an intermittent moderate contrast within the viewshed of KOP 3 throughout the construction, operation, and reclamation phases of the Project. The degree of the dust contrasts would be more evident in the summer, and the degree of the artificial light contrast would be stronger in the winter. Suggested modifications and mitigations are discussed in Section 5.

## **3.4 KOP 4: Mosquito Pass Recreation Area**

### **3.4.1 Existing Conditions**

This KOP was selected because it is a popular recreation site along the proposed access route that has aesthetic value for recreationists. The location of KOP 4 would be approximately 0.45 mile away from proposed Project features and would have a view of the access road and of a Project quarry and borrow materials site. KOP 4 is an area that is known for fishing along Windy Creek.

KOP 4 is in the Windy Creek valley of the Kigluaik Mountains. The landscape is panoramic with a creek-side positioning. The topography in this view encompasses the eastern aspect of a portion of the Kigluaik Mountains, with peaks of various heights and definitions.

The foreground of KOP 4 includes sparse to medium density, low-lying tundra vegetation interspersed with coarse, unevenly dispersed bare rocks that are large cobble to boulder size.

The middle ground has denser, low-lying vegetation at lower elevations closer to Windy Creek. The topography rises in the middle ground with the toe slope of the mountains, and the rocky hillsides becomes sparse with unevenly distributed vegetation. In this location, the mountains of the middle ground obscure farther views; however, in the background of the viewshed that is visible, vegetation is sparse and unevenly distributed as in the middle ground (Figure 8). Vegetation in the viewshed of this KOP is classified as herbaceous, dwarf shrubs, and low shrubs, with diffuse edges between the vegetation groups and with a gradation of vegetation distribution going from more to less dense as the elevation increases. Open water is visible in the fore- to middle ground of the viewshed that offers visual interest and reflection or glare.

The vertical elements of the landscape in the viewshed of KOP 4 are limited to the mountains in the background. There are no visible roads, industrial or agricultural developments, buildings or structures, or linear infrastructures like transmission lines visible in the viewshed of this KOP. From this angle of view, the tundra in the fore and middle ground provides horizontal lines that are simple and sloping, and the Kigluaik Mountains create a degree complexity of form and ruggedness against the skyline.

Dominant colors in this summertime viewshed are green and reddish brown of the vegetation, and gray, brown, and black of the exposed rocks and mountainsides. Other primary colors of the viewshed include blue and white of the sky, and gray, brown, and black of exposed earth and rocky mountainsides. The foreground of KOP 4 is dominated with unevenly dispersed gray boulders and large cobbles creating a complex and coarse landscape texture. The foreground has a diffuse edge with the middle ground, with Windy Creek providing a smoother and reflective surface along the transition, and boulders trailing into the distance. The middle ground has a band of low dense vegetation that soon gives way to the gray and black mountain slopes. The mountains in the background have a fine grain texture from this distance, and the peaks create a low to medium level of complexity along the skyline.

Figure 8. KOP 4 Existing Conditions July 2025



Figure 9. KOP 4 Anticipated Visual Contrast Digital Rendering for year 20 of the mine life (Summer Conditions)



### **3.4.2 Anticipated Visual Contrast of the Project**

The proposed Mosquito Pass Access Road would be approximately 0.45 mile from KOP 4, placing the road within the foreground and the material site within the middle ground of this viewshed (Figure 9).

The form and relative size of the Project, when viewed from KOP 4, would create weak contrast to existing conditions. Please refer to Table 1 for degree of contrast criteria. The form of the access road and material site follow that of the landscape. Construction of the material site would introduce new vertical lines into the mountainside, but the contrast would be weak, as the disturbance would be limited in height and would not disrupt any natural ridgelines.

The color and textural differences of the Proposed Action would create a weak degree of contrast to the natural landscape. The road would be constructed from native material sourced from the immediate vicinity and would therefore match the color palette of the viewshed. The textures of the road and the material site would be finer-grained than the landscape, which would reflect light more readily than the coarse surfaces of the natural rock and cobbles. From this distance from KOP 4, and from this viewing angle, the development would have fewer seasonal contrasts between summer and winter.

With the development at this distance from KOP 4, artificial light from headlights, and dust plumes from vehicles driving along the unpaved road, would create an intermittent, weak contrast within the viewshed throughout the construction, operation, and reclamation phases of the Proposed Action. The degree of the dust contrasts would be more evident in the summer, and the degree of the artificial light contrast would be stronger in the winter. Suggested modifications and mitigations are discussed in Section 5

## **3.5 KOP 5: Nome-Teller Highway**

### **3.5.1 Existing Conditions**

KOP 5, on the Nome-Teller Highway, was selected as a key observation point because it is a community-identified area that is important for subsistence use, particularly a moose hunting area. This location would be the farthest KOP from the proposed Project. KOP 5 is located on a ridge, providing a sweeping panorama of the landscape with Imuruk Basin to the north, and the Kigluaik Mountains to the south.

The KOP is in an area of dense, low-lying tundra vegetation in the foreground; hills with similar tundra vegetation in the middle ground, and the Kigluaik Mountains in the far background. Vegetation types and color variation of the mountainsides is not discernible from this distance (Figure 10). Vegetation in the viewshed of this KOP is classified as herbaceous and dwarf shrubs, with diffuse edges between the vegetation groups. There is no distinct difference or border between the vegetation groups in the landscape distances. Open water is visible in the

background of the viewshed, but it would not be a factor in affecting the nature or degree of visual contrast of the Project on the natural environment.

The vertical elements of the landscape in the viewshed of KOP 5 are limited to the mountains in the far background. There are no visible roads, industrial or agricultural developments, buildings or structures, or linear infrastructures like transmission lines visible in the viewshed of this KOP. From this angle of view, the tundra in the fore and middle ground provides horizontal lines that are simple and sloping, and the Kigluaik Mountains create a degree of complexity against the skyline.

Dominant colors in this summertime viewshed are green, brown, and reddish brown of the vegetation. Other primary colors of the viewshed include blue and white of the sky. Exposed rock of hillsides is not an obvious visual feature of the fore or middle ground of this KOP. Because of the low, regular, and very dense vegetation, the summertime textures of KOP 5 can be classified as fine grain and have a low contrast of texture and color. The background, due to atmospheric perspective, appears to have fine grain texture; shading and features of the Kigluaik Mountains are not easily discernable.

**Figure 10. KOP 5 Existing Conditions, July 2025**



**Figure 11. KOP 5 Anticipated Visual Contrast Digital Rendering for year 20 of the mine life (Summer Conditions)**



### **3.5.2 Anticipated Visual Contrast of the Project**

At over 20 miles away, the Project would be in the background of KOP 5. Distance and atmospheric conditions would make the constructed Project not easily discernable, even in fair weather. For the visual elements of form, line, color, and texture, the degree of contrast would be none-to-weak for all seasons (Figure 11).

The visual element that has the potential to have a higher degree of contrast would be sky glow from artificial lighting. In the summer, artificial lighting from the Project would not be perceived under most conditions, thereby providing a no-to-weak degree of contrast to the natural environment. However, in the extended darkness of wintertime and with foggy conditions, artificial light would be readily perceived at this distance due to the lack of other development in the viewshed. Any artificial light in this natural landscape would be easily perceived at night or in the wintertime. Depending on atmospheric conditions, the degree of contrast of artificial light within this viewshed could be weak to moderate. Suggested modifications and mitigations are discussed in Section 5.

## **3.6 KOP 6: Sinuk River Recreation Site**

### **3.6.1 Existing Conditions**

KOP 6 was selected as a key observation point for its position within the Sinuk River Valley, a popular area for off-road recreationists. The landscape is panoramic with a valley floor positioning. The topography in this view includes southern aspects of a portion of the Kigluaik Mountains, with peaks of various heights and definitions.

The foreground of KOP 6 includes sparse to medium density, low-lying tundra vegetation interspersed with medium grain bare rock. The middle ground has denser vegetation with uneven distribution of larger, darker shrubs following drainages to the Sinuk River which runs right to left along the viewshed. Vegetation in the middle ground is also interspersed with bare soils of river or creek banks, scree of mountainsides, and glacially tilled gravel bars or moraines. In the background of the viewshed, alpine vegetation grows sparser as the elevation increases (Figure 12).

Vegetation in the viewshed of this KOP is classified as herbaceous and dwarf shrubs, with diffuse edges between the vegetation groups and with a gradation of vegetation distribution. Open water is not visible in the viewshed that would offer reflection or glare, but lingering snow in the mountain draws provides a bright contrast to the mountain terrain.

The vertical elements of the landscape in the viewshed of KOP 6 are limited to the mountains in the background. There are no visible roads, industrial or agricultural developments, buildings or structures, or linear infrastructures like transmission lines visible in the viewshed of this KOP. From this angle of view, the tundra in the fore and middle ground provides horizontal lines that

are simple and sloping, and the Kigluaik Mountains create a degree complexity with their undulating forms extending from the toe slopes in the middle ground to the extent of sight in the background.

Dominant colors in this summertime viewshed are green, brown, and reddish brown of the vegetation. Other primary colors of the viewshed include blue and white of the sky, and gray, brown, and black of exposed earth and rocky mountainsides. Because of the low, irregular vegetation and exposed rocks, the summertime textures of KOP 6 can be classified as medium grain, with an even level of density and regularity, and a low contrast of texture and color. The background, due to atmospheric perspective, appears to have fine grain texture, with shading from the mountains onto the valleys providing a sparse level of density with uneven regularity.

Figure 12. KOP 6 Existing Conditions, July 2025



Figure 13. KOP 6 Anticipated Visual Contrast Digital Rendering for year 20 of the mine life (Summer Conditions)



### **3.6.2 Anticipated Visual Contrast of the Project**

The proposed Mosquito Pass Access Road and material site MS06 are a mile or more away from KOP 6, making their position within the viewshed as being in the middle ground (Figure 13).

The form and relative size of the Project, when viewed from KOP 6, would create weak contrast to existing conditions. Please refer to Table 1 for degree of contrast criteria. The form of the access road and material site follow that of the landscape. Construction of the material site would introduce new vertical lines into the mountainside, but the contrast would be weak, as the disturbance would be limited in height and would not disrupt any natural ridgelines. The line of the access road would not be continuous in the viewshed as it would be hidden behind existing topography at times.

The color and textural differences of the Project would create a weak degree of contrast to the natural landscape. The road would be constructed from native material sourced from the immediate vicinity and would therefore match the color palette of the viewshed. The textures of the road and the material site would be finer grained than the landscape, which would reflect light more readily than the coarse surfaces of the natural rock and vegetation. From this distance, the Project would have fewer seasonal contrasts between summer and winter than viewsheds from other KOPs.

With the development at this distance from KOP 6, artificial light from headlights, and dust plumes from vehicles driving along the unpaved road, would create an intermittent, weak contrast within the viewshed throughout the construction, operation, and reclamation phases of the Project. The degree of the dust contrasts would be more evident in the summer, and the degree of the artificial light contrast would be stronger in the winter. Suggested modifications and mitigations are discussed in Section 5.

## 4 Summary

Among the KOPs, KOP 1 would be the location where the buildings and structures of the mine facilities would be most visible; therefore, the color palette of the mine facilities should be selected with this viewshed in mind. As mentioned in Section 2.5, the largest number and variety of constituents would have the opportunity to observe the mine facilities during the summer. The degree of color contrast in the summer for the mine facilities has the potential to be strong; however, with the use of a complementary, summer color palette and glare-reducing paints or coatings, the degree of color contrast can be reduced to weak. Suggested modifications and mitigations are discussed in Section 5.

Many of the possible views of the proposed Project facilities would be obscured by distance and topography, including the WMF. Facility buildings would primarily be visible from aircraft; however, aerial viewers are limited in number and/or frequency compared with other viewer groups. The visual presence of the facility structures and buildings can be reduced through modifications such as color selection and glare reduction. The most common visual contrast that would be seen from each KOP would come from artificial lighting, which can be lessened with the implementation of design modifications or mitigation.

## 5 Suggested Modifications and Mitigations

This section outlines recommended modifications or best practices during the construction and operation of the Project that would avoid, minimize, or otherwise compensate for potential adverse impacts to visual and aesthetic resources.

- When possible, grade or slope the WMF in a way that, when viewed from KOP1, the angles complement the lines of the middle ground and background landscape.
- When constructing the WMF over time, attempt to reduce visual texture uniformity for a more natural appearance. Along the slopes that have a high degree of uniformity, use boulder placement and grouping to mimic patches of outcrop or exposed rock in the broader landscape.
- Initiate revegetation measures as soon as practicable wherever possible; revegetation efforts need not wait until the start of the reclamation phase of the Project.
- Paint the facilities and buildings in a color that complements the surrounding summer vegetation with the KOP 1 viewshed in mind, as this is the nearest KOP to the proposed mine facilities. The Imuruk Basin area is more likely to be visited by a greater number and variety of constituents in the summer months. To reduce visual impacts in the summer, the visibility of the facilities could be greatly reduced by using a paint color that complements the adjacent vegetation. Use matte or non-reflective paints where possible, and where safety permits, to reduce glare and obvious differences in texture.

- Use directional and downward-shaded lighting to help reduce atmospheric glow and light reflection off the snow. Lighting fixture side shields used on the periphery of the mining complex facilities can greatly reduce glare and intensity of light pollution over long distances of the tundra in the winter.
- Lower speed limits to reduce dust plumes from vehicles.
- Use road treatments to manage fugitive dust.

## 6 References

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