

ALASKA LNG PROJECT	DOCKET No. CP17-___-000 RESOURCE REPORT No. 8 APPENDIX M – VIEWSHED ANALYSIS	Doc No: USAI-PE-SRREG-00- 000008-000 DATE: APRIL 14, 2017 REVISION: 0
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**APPENDIX M    VIEWSHED ANALYSIS**






## **VIEWSHED ANALYSIS**

**USAI-PE-SRREG-00-000008-000**

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## 1.0 PURPOSE

The Viewshed Analysis and Mitigation Plan is in response to the Project Visual Resources Study and simulations of visual resource contrasts at Key Observation Points (KOPs) (see Appendix L of Resource Report No. 8). In locations where contrast is anticipated, mitigation measures are recommended and are included in this analysis as general in nature, and are subject to further engineering and environmental design prior to construction.

A complete list of sensitive visual resources within 15 miles of the Project is included as Attachment A of Appendix L. Maps of sensitive visual resource areas are in Appendix K. These areas, along with agency consultation, were used to determine the selection of KOPs.

## 2.0 IMPACTS AND MITIGATION

Impacts to visual resources are described in Sections 8.14 and 8.15 and in Appendix L of Resource Report No. 8. In summary, visual analysis studies were conducted within 15 miles of the Project Planning Area. For the purposes of this analysis, the Project Planning Area includes the locations of all Project facilities as well as locations off the ROW material storage or construction access roads. The visibility of Project features from these areas was confirmed through a line-of-sight analysis using available Digital Elevation Model (DEM) information (topography) and distance to the Project features. The results of the DEM analysis include the locations of parks, refuges, trails, historic sites, communities, and other areas that could be impacted by the Project. This information, analysis and the background research is included in Appendix L. The DEM visual analysis study concluded that of the 113 potentially sensitive visual resources, 54 were potentially visible from the Project corridor (see Table 8.13.1-1 of Resource Report No. 8). Of note, siting of Project facilities considered visual contrasts, particularly for national historic sites, in order to maintain the view and reduce visual effects.

Tables 1 and 2 summarize the impacts and proposed mitigation measures at KOPs with the highest visual contrast. Simulations at these KOPs and additional detail for each are included in Section 5.0 of Appendix L of Resource Report No. 8.

**Table 1. Key Observation Points with the Greatest Visual Contrast during Construction**

KOP	Location	Approx. Pipeline MP	Construction Contrast Summary	Proposed Mitigation
KOP U	George Parks Highway - Please provide a highway milepost	658	View of Mainline from the George Parks Hwy. Moderate to no contrast is anticipated, with weak contrast introduced to landform and moderate contrast introduced to structure and vegetation in the short term.	Minimize vegetation clearing. If lights are employed during construction, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP 40	George Parks Highway – Please provide a highway milepost	648	View of the adjacent Mainline, camp, and pipe storage yard. Strong to weak contrast is anticipated in the short term, including weak to moderate contrast in structure, moderate to strong contrast in vegetation, and weak to strong contrast in landform.	Minimize vegetation cutting and maintain a vegetation screen at the intersection with the George Parks Highway to the extent practicable. Locate structures at an angle to road opening after accommodating AKDOT&PF requirements for access from the highway. If lights are employed during construction, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP 31	Parks Highway MP 224	553	View of Mainline and pipe storage yard approximately 0.5 miles to the north. Moderate to weak contrast is anticipated in the short term, including moderate contrast to structure and vegetation, and weak contrast to landform.	Minimize vegetation clearing. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward to minimize glare.
KOP K	McKinley Chalet Resort – MP 238.9 Parks Hwy	536	View of Mainline, approximately 0.03 mile northeast. Weak contrast is anticipated to vegetation and structure, and no short-term contrast is anticipated to landform besides a weak contrast in landform color.	Minimize vegetation clearing. If lights are employed during construction, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP 29	Fox Creek Crossing – MP 241.0 Parks Hwy	534	View of Fox Creek Bridge crossing approximately 0.1 mile to east. Moderate to weak contrast is anticipated in the short term, including moderate contrast in structure and weak contrast in vegetation and landform.	Minimize vegetation clearing. If lights are employed during construction, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.

**Table 1. Key Observation Points with the Greatest Visual Contrast during Construction**

KOP	Location	Approx. Pipeline MP	Construction Contrast Summary	Proposed Mitigation
KOP 28	Nenana River Crossing – MP 242.8 Parks Hwy	532.6	View of Nenana River pipeline aerial crossing adjacent. Strong to moderate contrast is anticipated in the short term to landform, water, vegetation, and structure.	Minimize vegetation clearing. Locate new bridge adjacent to the existing bridge using similar materials and colors. If lights are employed during construction, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP J	Denali RV Park and Motel – MP 245.1 Parks Hwy, Healy, AK	530	View of material site, approximately 0.01 mile east, and Mainline, 0.19 mile east. Moderate short-term contrast would be created in vegetation and structure due to machinery and equipment. Contrast to landform would be weak to nonexistent.	Minimize vegetation removal. Locate entry to the storage yard at an angle to the road. If lights are employed during construction, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP 26	Otto Lake Road/RST 709 – Healy, AK	528	View of Mainline approximately 1.2 mile to the south. Weak contrast is anticipated to vegetation; no short-term contrast is anticipated to landform or water besides a weak contrast in landform color.	Minimize vegetation clearing. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward to minimize glare.
KOP 14	Dalton Highway North of Yukon River Camp – MP 60 Dalton Hwy	355	View of Five Mile Camp and pipe storage yard 0.11 mile to the northwest. Moderate short-term contrast would be created in vegetation and structure due to machinery and equipment. Weak contrast is anticipated to landform.	Minimize vegetation removal. Locate entry to the storage yard at an angle to the road after accommodating AKDOT&PF driveway/access requirements. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward to minimize glare.
KOP A	Coldfoot Camp – MP 175 Dalton Hwy	241	View of camp approximately 0.06 mile east and pipe storage yard approximately 0.1 mile east. Strong to weak contrast is anticipated in the short term, including weak contrast in landform and structure, and moderate to strong contrast in vegetation.	Use similar colors—grays, tans—for materials. Minimize vegetation clearing.

**Table 1. Key Observation Points with the Greatest Visual Contrast during Construction**

KOP	Location	Approx. Pipeline MP	Construction Contrast Summary	Proposed Mitigation
KOP 9	Marion Creek Campground – MP 179.7 Dalton Hwy	237	View of Mainline approximately 0.1 mile to the west. Moderate contrast would be introduced to vegetation and structure from clearing and equipment, and weak contrast would be introduced to landform.	Minimize cutting of vegetation. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward to minimize glare.
KOP 7	Pullout Below Atigun Pass on the Dalton Highway MP	219	View from the trail looking southwest to the Mainline and pipe storage yard 0.3 mile to southwest. Weak contrast created to landform, vegetation, and structure by construction machinery and equipment.	Limit vegetation clearing to areas within the permanent and temporary construction ROW of the proposed Mainline only. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward to minimize glare.
KOP 3	Galbraith Lake Campground View to the North – MP 274.7 Dalton Hwy	144	View of Galbraith Lake Camp and Pipe Storage Yard 0.4 mile to the north. Short-term weak contrast expected from the smooth textures, darker colors, and geometric forms of materials stored in the pipe storage yard and the structures developed for the camp.	Establish work camp and pipe storage yard in previously disturbed areas. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward in order to minimize glare.
KOP 2	355 Mile Wayside on the Dalton Highway	65	View of the Mainline approximately 0.7 mile to the east. Weak contrast created by clearing for cut and fill.	Use previously disturbed areas during construction to minimize visual impacts. Winter construction will visual conflicts with tourism.
KOP 1	Terminus of Dalton Highway at Deadhorse – MP 415 Dalton Hwy	10	View of GTP and Prudhoe Camp approximately 7.5 miles to the northwest. No contrast from the construction activities is expected in this location.	Minimize vegetation clearing. If lights are employed during construction, turn off when not needed, and aim away from recreation areas and downward to minimize glare.



**Table 2. Key Observation Points with the Greatest Visual Contrast during Operations**


<b>KOP</b>	<b>Location</b>	<b>Approx. Pipeline MP</b>	<b>Operations Contrast Summary</b>	<b>Mitigation</b>
KOP U	George Parks Highway - Please provide a highway milepost	658	View of Mainline approximately 0.0 mile. Weak long-term contrast is anticipated to landform and moderate to weak contrast is anticipated to vegetation. No long-term contrast is anticipated to structure.	Minimize vegetation clearing and employ BMPs to restore vegetation.
KOP 40	George Parks Highway – Please provide a highway milepost	648	View of the adjacent Mainline, camp, and pipe storage yard. Long-term contrasts at this location depend on whether the materials site is used after the construction phase. In this case, long-term contrasts would be similar to short-term contrasts. Contrast is anticipated to be weak to moderate for landform and vegetation.	Minimize vegetation cutting and maintain vegetation screen at the intersection with the George Parks Highway to the extent practicable. Employ BMPs to revegetate area. Minimize the use of smooth, reflective surfaces and use non-contrasting colors. If lights are employed during operation, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP 31	Parks Highway MP 224	553	View of Mainline and pipe storage yard approximately 0.5 miles to the north. Moderate to no contrast is anticipated in the long term. Moderate contrast would be created to vegetation by clearing, weak contrast to landform, and no long-term contrast to structure.	Employ BMPs to revegetate area. If lights are employed during operation, turn off when not needed, and aim away from recreation areas and downward to minimize glare.
KOP K	McKinley Chalet Resort – MP 238.9 Parks Hwy	536	View of Mainline, approximately 0.03 mile northeast. Moderate to weak contrast is anticipated in vegetation and landform. No long term contrast is anticipated in structure.	None
KOP 29	Fox Creek Crossing – MP 241.0 Parks Hwy	534	View of Fox Creek Bridge crossing approximately 0.1 mile to east. Moderate to weak contrast is anticipated in the long term, including moderate contrast in structure and weak contrast in landform, water, and vegetation.	Develop bridge with a low profile to minimize visibility. Employ BMPs to revegetate area. Minimize the use of smooth, reflective surfaces and use non-contrasting colors. If lights are employed during operation, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.

**Table 2. Key Observation Points with the Greatest Visual Contrast during Operations**

KOP	Location	Approx. Pipeline MP	Operations Contrast Summary	Mitigation
KOP 28	Nenana River Crossing – MP 242.8 Parks Hwy	532.6	View of Nenana River pipeline aerial crossing adjacent. Strong to moderate contrast is anticipated in the long term to landform, water, vegetation, and structure. The strongest contrast would be to structure, created by the proposed bridge.	Minimize the use of smooth, reflective surfaces and use non-contrasting colors. Minimize vegetation clearing and employ BMPs to restore vegetation. Construct a pedestrian walkway across the pipe bridge to conceal the pipe and tie in to existing use associated with vehicle pullout.
KOP J	Denali RV Park and Motel – MP 245.1 Parks Hwy, Healy, AK	530	View of material site, approximately 0.01 mile east, and Mainline, 0.19 mile east. Long-term contrasts at this location depend on whether the materials site is used after the construction phase. In this case, long-term contrasts would be similar to short-term contrasts. Contrast is anticipated to be weak to moderate for landform and vegetation.	Minimize vegetation cutting, and maintain vegetation screen along the George Parks Highway to the extent practicable. Employ BMPs to revegetate area. Minimize the use of smooth, reflective surfaces and use non-contrasting colors. If lights are employed during operation, turn them off when not needed and aim them away from recreation areas and downward to minimize glare.
KOP 26	Otto Lake Road/RST 709 – Healy, AK	528	View of Mainline approximately 1.2 mile to the south. Weak contrast is anticipated to vegetation, as well as to landform color. No long-term contrast is anticipated to landform form, line, or texture. No long-term contrast is anticipated to structure.	Minimize vegetation clearing and employ BMPs to restore vegetation.
KOP 14	Dalton Highway North of Yukon River Camp – MP 60 Dalton Hwy	355	View of Five Mile Camp and pipe storage yard 0.11 mile to the northwest. No short- or long-term contrast anticipated.	Minimize vegetation clearing and employ BMPs to restore vegetation.
KOP A	Coldfoot Camp – MP 175 Dalton Hwy	241	View of camp approximately 0.06 mile east and pipe storage yard approximately 0.1 mile east. Long-term contrasts at this location depend on whether the camp is used after the construction phase. In this case, long-term contrasts would be similar to short-term contrasts. Contrast is anticipated to be weak for landform and structure, and weak to strong for vegetation.	Use similar colors—grays, tans—for materials. Minimize vegetation clearing. Use BMPs to restore vegetation.

**Table 2. Key Observation Points with the Greatest Visual Contrast during Operations**

<b>KOP</b>	<b>Location</b>	<b>Approx. Pipeline MP</b>	<b>Operations Contrast Summary</b>	<b>Mitigation</b>
KOP 9	Marion Creek Campground – MP 179.7 Dalton Hwy	237	View of Mainline approximately 0.1 mile to the west. Weak contrast would be introduced to landform and moderate contrast to vegetation due to clearing. No long-term contrast in structure anticipated.	Minimize clearing of vegetation, retain/restore vegetative screen.
KOP 7	Pullout Below Atigun Pass on the Dalton Highway MP	219	View from the trail looking southwest to the Mainline and pipe storage yard 0.3 mile to southwest. Weak long-term contrast would be created in landform and vegetation by grading and clearing.	Minimize vegetation clearing and employ BMPs to restore vegetation.
KOP 3	Galbraith Lake Campground View to the North – MP 274.7 Dalton Hwy	144	View of Galbraith Lake Camp and Pipe Storage Yard 0.4 mile to the north. No contrast expected in the area during operation.	None
KOP 2	355 Mile Wayside on the Dalton Highway	65	View of the Mainline approximately 0.7 mile to the east. Weak contrast created by clearing and change in vegetation.	Use of best management practices (BMPs) to restore vegetation.
KOP 1	Terminus of Dalton Highway at Deadhorse – MP 415 Dalton Hwy	10	View of GTP and Prudhoe Camp approximately 7.5 miles to the northwest. Contrast created by GTP facility operation is expect to be weak to none.	Minimize the use of smooth, reflective surfaces and use non-contrasting colors. If lights are employed during operation, turn off when not needed, and aim away from recreation areas and downward to minimize glare.

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## 2.1 REDUCE VISUAL CONTRAST DURING CONSTRUCTION AND OPERATIONS

To the extent practicable, Project features would be collocated with existing infrastructure (i.e., TAPS, Dalton Highway, Tesoro Refinery) to reduce potential visual contrast. One of the main contrasts the Project facilities would create to the landscape is the introduction of new forms, lines, colors, and textures in the viewshed. Locating proposed buildings near existing buildings would reduce the amount of structural contrast, because development is already located in the viewshed.

During construction, visual contrast would be created by construction crews, equipment, materials, vegetation clearing, land grading, access roads, and other associated facilities required in the construction phase. Short-term impacts would be directly or indirectly related to construction. Direct short-term impacts would be created by the presence of work crews and camps, machinery, equipment, and materials, lighting, and associated infrastructure, which would create a strong contrast in structure in the viewshed. Indirect short-term impacts include the vegetation regrowth period following construction. New vegetation may be lighter green, short, and patchy in texture compared to other vegetation in the viewshed. Nighttime activities and activities in the winter season may introduce light, which would create contrast to immediate views.

Recommended mitigation includes maintaining or creating vegetative screens between construction locations and public roads to the extent practicable, and angling access roads as permissible by AKDOT&PF driveway permit requirements and turning radii for vehicles to decrease the visibility from public roads into locations such as camps and storage areas. Depending on construction methods and time, mitigation may also include the use of downcasted lighting at night or during the winter season.

Long-term impacts would be directly or indirectly related to operation. Direct long-term impacts would be created by the presence of facilities and equipment related to operation. Indirect long-term impacts include contrast in vegetation, including the vegetation regrowth period following construction. Nighttime activities and activities in the winter season may introduce light, which would create contrast to immediate views.

Recommended mitigation includes maintaining vegetative screens between long-term facilities and public spaces like roads, replanting vegetation following the construction phase, and locating permanent access roads at angles to the main roads to decrease visibility into facility areas (to the extent allowed by permitting and drivability requirements). Mitigation may also include the use of downcast lighting. Mitigation is recommended to avoid long-term lighting that will impact nearby viewers, particularly in the winter months when Alaska is dark much of the day.


The following subsections provide the general approach proposed for mitigating potential impacts of visual resource contrast.

## 2.2 REDUCE VISUAL CONTRAST BY DESIGN

The following are design techniques for mitigating visual impacts provided by the Bureau of Land Management (BLM): Design Techniques for Mitigating Visual Impacts (BLM 1986). The applicability of these measures will be evaluated during final design and permitting.

### 2.2.1 LANDFORM/WATER BODY

1. Reduce Size of Cut and Fill Slopes. Consider:
  - relocating to an area with less slope.
  - changing road width, grade, etc.
  - changing alignment to follow existing grades.
  - prohibiting dumping of excess material on downhill slopes.
2. Reduce Earthwork Contrasts. Consider:

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- rounding and/or warping slopes.
  - retaining rocks, trees, drainage, etc.
  - toning down freshly broken rock faces with asphalt emulsion spray or with gray point.
  - adding mulch, hydromulch, or topsoil.
  - shaping cuts and fills to appear as natural forms.
  - cutting rock areas so forms are irregular.
  - designing to take advantage of natural screens (i.e., vegetation, land forms).
  - grass seeding of cuts and fills.
3. Maintain the Integrity of Topographic Units. Consider:
- locating projects away from prominent topographic features.
  - designing projects to blend with topographic forms in shape and placement.

### 2.2.2 VEGETATION.


1. Retain Existing Vegetation. Consider:
  - using retaining walls on fill slopes.
  - reducing surface disturbance.
  - protecting roots from damage during excavations.
2. Enhance Revegetation. Consider:
  - mulching cleared areas.
  - controlling planting times.
  - furrowing slopes.
  - planting holes on cut/fill slopes.
  - choosing native plant species.
  - stockpiling and reusing topsoil.
  - fertilizing, mulching, and watering vegetation.
3. Minimize Impact on Existing Vegetation. Consider:
  - partial cut instead of clear cut.
  - using irregular clearing shapes.
  - feathering/thinning edges.
  - disposing of all slash.
  - controlling construction access.
  - utilizing existing roads.
  - limiting work within construction area.
  - selecting type of equipment to be used.
  - minimizing clearing size (i.e., strip only where necessary).
  - grass seeding of cleared areas.
4. Maintain the Integrity of Vegetative Units. Consider:
  - utilizing the edge effect for structure placement along natural vegetative breaks.

### 2.2.3 STRUCTURES.

1. Minimize the Number of Visible Structures.
2. Minimize Structure Contrast. Consider:


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- using earth-tone paints and stains.
  - using cor-ten steel (self-weathering).
  - treating wood for self-weathering.
  - using natural stone surfaces.
  - burying all or part of the structure.
  - selecting paint finishes with low levels of reflectivity (i.e., flat or semi-gloss).
3. Redesign Structures that do not Blend/Fit. Consider:
    - using rustic designs and native building materials.
    - using natural appearing forms to complement landscape character (use special designs only as a last resort).
    - relocating structure.
  4. Minimize Impact of Utility Crossings. Consider:
    - making crossings at right angles.
    - setting back structures at a maximum distance from the crossing.
    - leaving vegetation along the roadside.
    - minimizing viewing time.
    - utilizing natural screening.
  5. Recognize the Value and Limitations of Color. Consider:
    - that color (hue) is most effective within 1,000 feet. Beyond that point color becomes more difficult to distinguish and tone or value determines visibility and resulting visual contrast.
    - that using color has limited effectiveness (in the background distance zone) in reducing visual impacts on structures that are silhouetted against the sky.
    - painting structures somewhat darker than the adjacent landscape to compensate for the effects of shade and shadow.
    - selecting color to blend with the land and not the sky.

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### 3.0 REFERENCES

Bureau of Land Management. 1986. Manual H-8431, Visual Resource Management, Washington, DC: Bureau of Land Management.

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## 4.0 ACRONYMS AND TERMS

Term	Definition
BLM	Bureau of Land Management
BMP	Best management practice
GTP	Gas Treatment Plant
MOF	material offloading facility
MP	milepost
PBU	Prudhoe Bay Unit
Project	Alaska LNG Project
PTTL	Point Thomson Gas Transmission Line
ROW	right-of-way
USFS	U.S. Forest Service
VRM	Visual Resource Management