National Park Service
U.S. Department of the Interior

Denali National Park and Preserve
Alaska Region

Denali National Park and Preserve
Polychrome Area Improvements

Environmental Assessment

2022

NPS Photo / Emily Mesner

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ON THE COVER

The Denali Park Road winds its way along the Polychrome area.

Photo by Emily Mesner, National Park Service

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ACRONYMS AND ABBREVIATIONS

ADOLWD	Alaska Department of Labor and Workforce Development
ANCSA	Alaska Native Claims Settlement Act
ARC	Alaska Road Commission
BGEPA	Bald and Golden Eagle Protection Act
CFR	Code of Federal Regulations
COVID-19	Coronavirus Disease 2019
DENA	Denali National Park and Preserve
EA	Environmental Assessment
EBRA	Expert-Based Risk Assessment
FHWA	Federal Highway Administration
MBTA	Migratory Bird Treaty Act
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
PEPC	Planning, Environment, and Public Comment
PRHD&CL	Park Road Historic District and Cultural Landscape
RFFA	Reasonably Foreseeable Future Action
SHPO	State Historic Preservation Officer
U.S.	United States
USFWS	United States Fish and Wildlife Service
VA	Value Analysis

1 INTRODUCTION

1.1 PROPOSED ACTION

The National Park Service (NPS) proposes to implement a series of engineered solutions to address several geologic hazards impacting the Polychrome section of the Denali Park Road between Mile 44 and Mile 46 in Denali National Park and Preserve (DENA), including a 400-foot steel bridge spanning the Pretty Rocks Landslide at approximately Mile 45.4. The location of the proposed project in DENA is shown in Figure 1-1. Although Pretty Rocks Landslide is the highest priority and would be addressed first, the NPS is proposing a comprehensive approach with additional improvements along this 2-mile section of road to ensure that access through the Polychrome area wouldn't be subsequently jeopardized by another nearby hazard. In addition to the construction of a bridge, the Polychrome Area Improvements project would also include the following actions:

- Excavation of uphill slopes
- Placement of excavated material on the slope below the road
- Slight road realignment and temporary widening of the road
- Construction of retaining walls and drainage improvements
- Creation of rockfall ditches and benches
- Rock scaling and/or installation of rock bolts and dowels
- Construction of a temporary platform for bridge assembly
- Construction of a partially buried retaining wall along approximately 1,000 feet of road

The project would be implemented in two phases (Figure 2-1) to expedite the start date of the first phase and allow time to secure funding and finalize designs for secondary phases. Road access through Polychrome is not anticipated during Phase I, which would take approximately 2 years; however, access would likely be allowed during Phase II with some delays or temporary restrictions expected.

The following assessment is intended to provide a detailed analysis of impacts for Phase I and a concept-level analysis of impacts for Phase II to fully disclose the overall impacts of current and future actions in the Polychrome area to the public. The NPS is the lead federal agency preparing this Environmental Assessment (EA) in compliance with the National Environmental Policy Act (NEPA; 40 Code of Federal Regulations [CFR] 1500 et seq.). The Federal Highway Administration (FHWA) is participating as a cooperating agency, which allows their adoption of this EA.

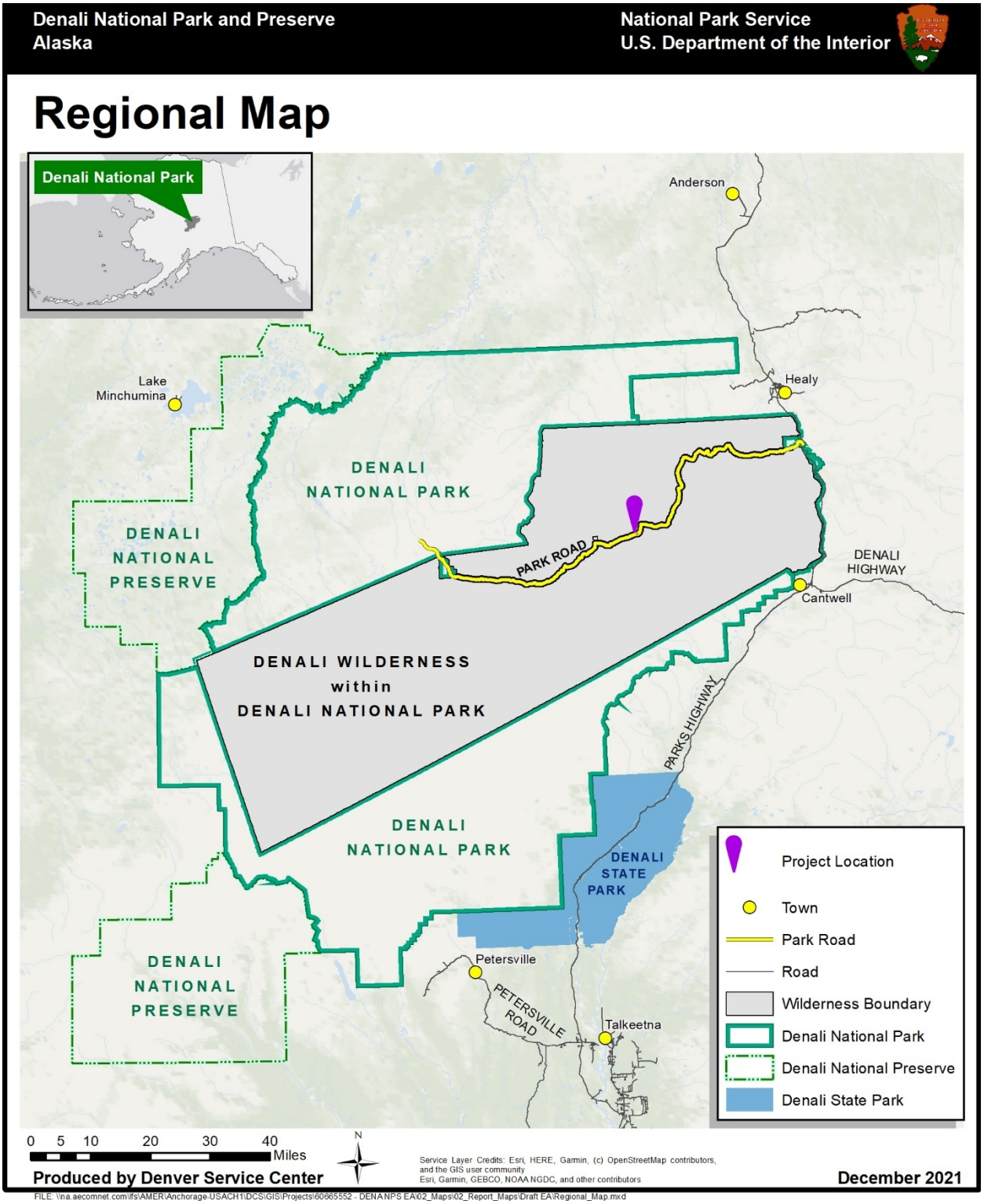


FIGURE 1-1. REGIONAL MAP

1.2 PURPOSE AND NEED

The purpose of the proposed action is to restore reliable access west of Polychrome for users of the Park Road, including visitors, staff, concessioners, and Kantishna property owners. Action is needed because the Pretty Rocks Landslide and other geohazards from Mile 44 through Mile 46 are threatening the integrity, safety, and continued viability of the Park Road as well as threatening access to 47 miles of the road west of the Pretty Rocks Landslide. As of September 2021, the NPS is no longer able to safely repair the road at Pretty Rocks and without action, that section of road would remain closed indefinitely. In addition, it is necessary to make other long-term improvements in the Polychrome area, including addressing Bear Cave Landslide, Perlite Landslide, and several rockfall areas because the safety of the road and reliable access to the 47 miles of the road west of the Pretty Rocks Landslide cannot be maintained without addressing all of these geohazards.

Landslide movement at Pretty Rocks has accelerated in recent years. The rate of road movement within the landslide evolved from a couple of inches per year prior to 2014, to inches per month in 2017, inches per week in 2018, and a few inches per day in 2019. Monitoring equipment used by DENA staff indicated that by the end of August 2021, the movement of the landslide had reached 13 to 15.5 inches per day and further acceleration is likely in the near future. The increasing movement of the landslide results in an increased risk of rockfall hazard as the loose material holding large rocks in place erodes away and the slope above the road becomes steeper. The current conditions require enhanced safety protocols, including the need for additional staff to serve as rockfall spotters during most maintenance activities in the area.

In recent years, the increased rate of movement has also required extraordinary maintenance efforts from the NPS in order to safely maintain access across the landslide. For example, over a 5-month period from fall 2020 to spring 2021, the Pretty Rocks Landslide section of the road slumped approximately 18 feet below the surrounding road grade, which required an emergency repair, the addition of about 6,000 cubic yards of material, and a delayed spring road opening. The slump required an additional 10,000 cubic yards of material and daily maintenance throughout the summer 2021 season. This limited the maintenance that the NPS could conduct on other parts of the Park Road and concerns grew about the rapid depletion of aggregate reserves. While these repairs were challenging, they were manageable until the acceleration of the slide in August 2021 proved that previous maintenance efforts would no longer be sustainable and the NPS was forced to close the Park Road at Mile 43 for the remainder of the season, 20 days earlier than scheduled. Without daily maintenance, the condition of the road quickly deteriorated and the landslide has displaced the road more than 30 feet below the surrounding road grade since September 2021. The condition of the road on September 28, 2021 is shown in Figure 1-2.

The NPS is no longer able to safely maintain the road through Pretty Rocks, without constructing a bridge that section of road would remain closed indefinitely. In addition, it is necessary for the NPS to make other long-term improvements in the Polychrome area, including addressing Bear Cave Landslide, Perlite Landslide, and several rockfall areas because without action to protect the road soon, these hazards will likely become bigger problems that would require more complex engineering solutions and be more difficult to mitigate in the future. The safety of the Polychrome section of road and access west of Mile 43 cannot be maintained without addressing all of these geohazards.

The Park Road—including the section through the Pretty Rocks Landslide and the Bear Cave Landslide—is the primary means by which most visitors experience DENA and inholders access their inholdings. The majority of park visitors use the Park Road, and most of those road users traverse the Pretty Rocks Landslide area. If left unaddressed, the Pretty Rocks Landslide and the Bear Cave Landslide would continue displacing the road, eliminating vehicular access to the western half of the Park Road and popular visitor destinations and NPS facilities including the Toklat Road

Camp, Eielson Visitor Center, Wonder Lake, Kantishna, and the most iconic views of the Alaska Range and the Denali massif, as well as the easy wilderness access this section of road provides. As a result, the majority of visitors would lose the opportunity to experience the iconic views and recreational opportunities offered along the western half of the Park Road, NPS facilities would be abandoned, and concessioners and Kantishna businesses would suffer financial loss. Providing safe access through the Polychrome area would ensure access along the only overland route in DENA and allow visitors to continue experiencing and enjoying the entirety of the Park Road and the access it provides to other areas of the park.

Source: NPS

FIGURE 1-2. DENALI PARK ROAD LOOKING WEST AT THE PRETTY ROCKS LANDSLIDE ON SEPTEMBER 28, 2021 (21-FOOT SCARP ON EASTERN SIDE)

1.3 BACKGROUND

The Park Road was originally built by the Alaska Road Commission (ARC) in the 1920s and 1930s. The 92-mile road is mostly gravel, with only the first 15 miles paved; private vehicles are restricted west of the Savage River (Mile 15) from May 20 to mid-September. The Park Road is connected to the Alaska State road system at Mile 0 and ends in Kantishna at Mile 92. In a typical visitor season, the Park Road opens to Mountain Vista (Mile 13) around mid-February, to the Teklanika Rest Stop (Mile 30) around April (after May 20, private vehicles are permitted to this point with a Teklanika River Campground permit), to the Toklat River Rest Stop (Mile 53) on May 20, to the Eielson Visitor Center (Mile 66) on June 1, and to Kantishna (Mile 89) on June 8. In the fall, the Park Road closes at the Teklanika Rest Stop before the second weekend after Labor Day, which is when DENA hosts winners of the road lottery for personal vehicle access to the Park Road. Following the road lottery, the Park Road is open to the Teklanika Rest Stop as long as weather permits (typically until mid-October). A map of visitor destinations along the Park Road is shown in Figure 1-3.

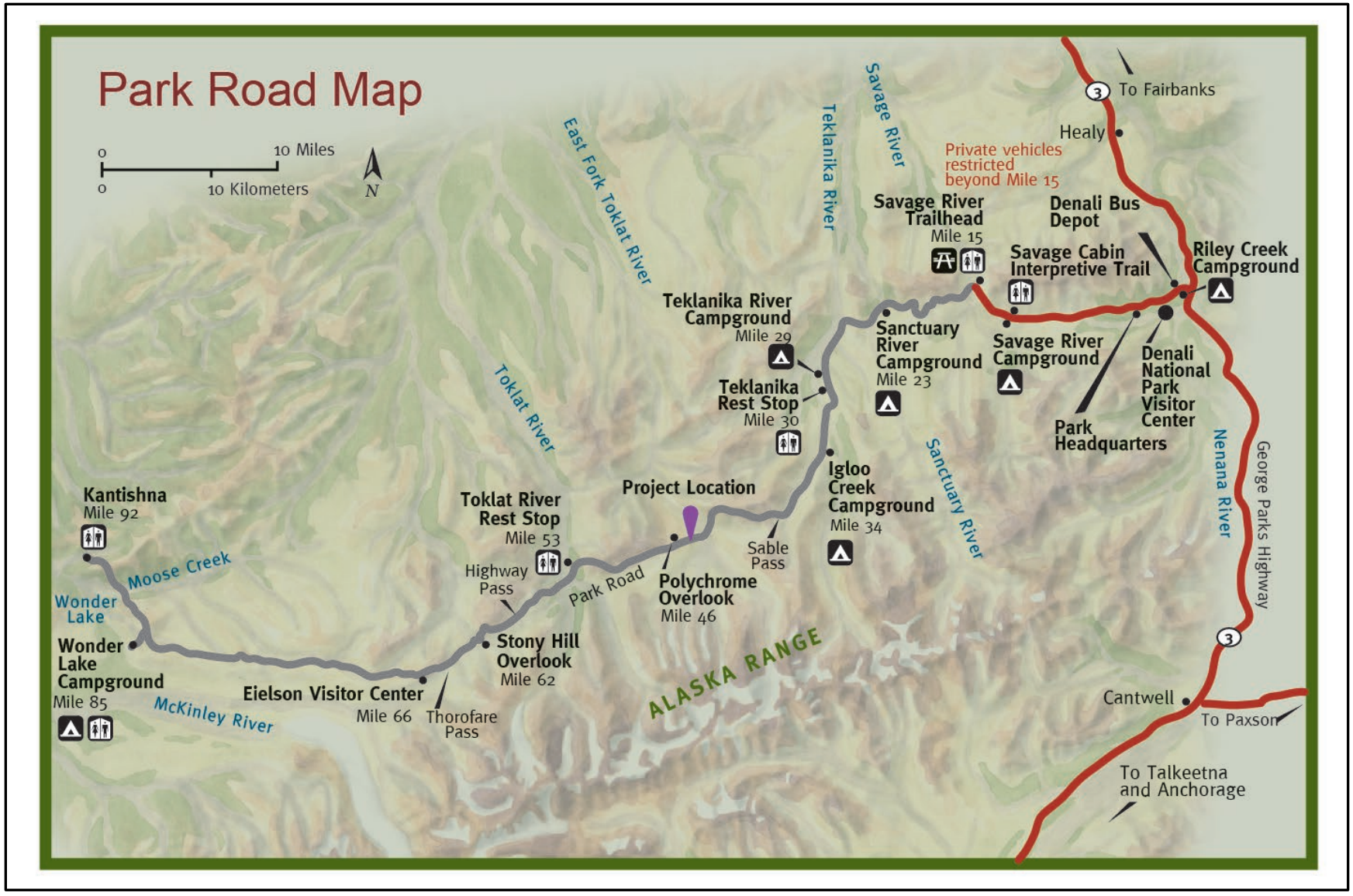


FIGURE 1-3. VISITOR DESTINATIONS ALONG THE DENALI PARK ROAD

The majority of the Park Road is listed on the National Register and is surrounded by designated wilderness, which begins 150 feet from the centerline of the original road alignment (Figure 1-1; it is important to note that the Park Road is not in designated wilderness). Halfway along the 92-mile route, the road cuts through the Polychrome area, which has several known unstable slopes including the Pretty Rocks Landslide at approximately Mile 45.4.

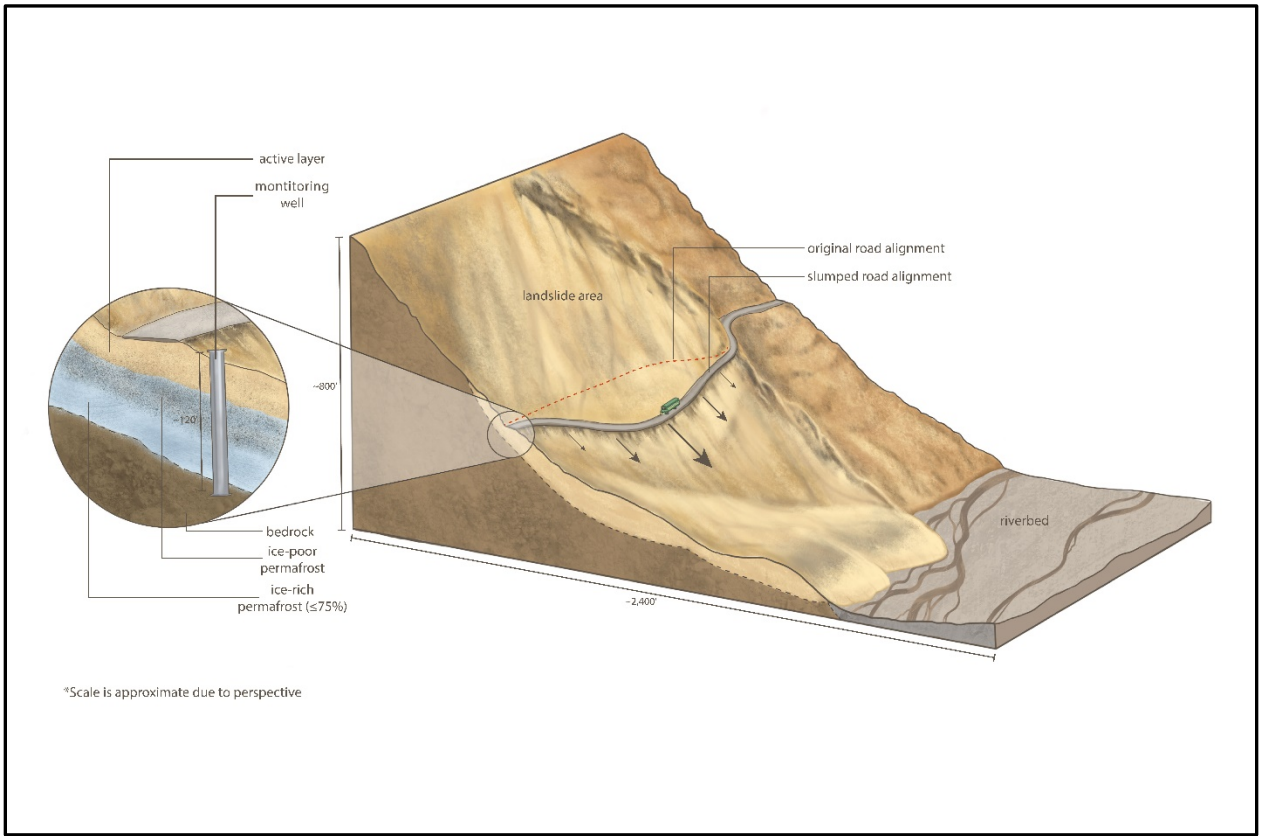
Often referred to as a landslide, Pretty Rocks is more appropriately termed a rock glacier. This rock glacier is composed of a thick (40- to 80-foot) layer of sediment and ice that is slowly sliding on top of frozen volcanic ash and clay. It flows perpendicular to the Park Road from its headscarp (i.e., the steep region of exposed soil and rock at the head of the landslide where the failure surface ruptures the ground surface) a few hundred feet upslope of the Park Road to its terminus on the valley floor, 1,400 feet downslope. Although it is more scientifically accurate to call Pretty Rocks a rock glacier, this EA will continue to refer to it as the Pretty Rocks Landslide to aid in public understanding. A composite image of the landslide area is shown in Figure 1-4.

The Pretty Rocks Landslide impacts the width of the road (approximately 20 feet in the project area) for approximately 300 linear feet. Movement at the Pretty Rocks Landslide has been observed since at least the 1980s but in 2014 NPS staff noticed a marked acceleration in landslide movement and maintenance needs at the landslide, which have continued to escalate since. Movement has been most noticeable in the areas at and above the current road grade, but activity continues into the substrate below the road grade and into the naturally deposited material piled up on the river bar below. The frozen volcanic ash and clay is thaw unstable, making it sensitive to changes in temperature and moisture. An illustration of the slumped road alignment is shown in Figure 1-5.

To the east of the Pretty Rocks Landslide there is an additional landslide area at approximately Mile 45.3 (known as the Perlite Landslide) that consists of rhyolite, perlite, and colluvium materials. Slope failures at this location are triggered in part by a natural spring emitting from a geological contact between the impermeable perlite layer and the rhyolitic colluvium in the slope. The resulting debris flowing onto the road has caused traffic delays—a large event on August 26, 2015 affected 45 linear feet of the Park Road and blocked traffic for two hours, requiring the road to be closed overnight for additional cleanup. The Perlite Landslide is also shown in Figure 1-4.

Source: BGC 2020

FIGURE 1-4. COMPOSITE IMAGE OF THE PRETTY ROCKS LANDSLIDE (OUTLINED IN RED DOTS) AND THE PERLITE LANDSLIDE (OUTLINED IN GREEN DOTS)



Source: NPS, Laurel Mundy

FIGURE 1-5. ILLUSTRATION OF THE PRETTY ROCKS LANDSLIDE

Between Mile 44 and Mile 46, there are also several unstable slopes that have been identified as high rockfall risk areas. Sight distance is limited through this section of road and the existing rockfall catchment areas are narrow, making the area a particular safety concern. Near the Perlite Landslide, a rocky slope above the road consists of decomposing rhyolite with intermittent layers of perlite. It has produced boulders up to 1 foot and has affected 550 linear feet of the Park Road. Farther to the east (around Mile 45.2), the existing road cut is over-steepened, causing instability on the lower slope. This has produced boulders up to 5 feet, as well as localized areas of raveling and undermining that has produced debris slide events up to about 9 cubic yards in volume and affected 230 linear feet of the Park Road. Around Mile 44.6, another area of loose rhyolitic rock has produced boulders up to 3 feet and affected 430 linear feet of the Park Road.

The Bear Cave Landslide (Mile 44.8) in the Polychrome area is also of concern. The unstable slope of the Bear Cave Landslide has the potential to affect the stability of approximately 1,000 feet of the Park Road. The landslide headscarp is just below the road (Figure 1-6) and erosion and regression continue to threaten the Park Road. In 1999, a project redirected subsurface and surface drainage away from the landslide area to a nearby culvert with the installation of a deep cutoff trench lined with geotextile in the uphill ditch. Although the rate of movement at Bear Cave Landslide has slowed since the drainage improvements in the 1990s, the landslide is still active. The upper edge of the

landslide has continued to get closer to the road over the last two decades and is now within 10 feet of the road (BGC 2020). If the landslide becomes a bigger problem, it would likely require a more complex engineering solution and be more difficult to mitigate. As time passes, the risk of the landslide engulfing the roadway and catastrophic road failure occurring at this location also increases.

Source: NPS, Denny Capps, 2021; imagery from 2018 LiDAR survey

FIGURE 1-6. THREE-DIMENSIONAL IMAGERY OF THE BEAR CAVE LANDSLIDE (LANDSLIDE BOUNDARY OUTLINED IN YELLOW DOTS)

1.4 ISSUES SELECTED FOR DETAILED ANALYSIS

This Environmental Assessment evaluates the following issues:

- **Geology:** Bridge construction and associated rock and scree excavation would disturb existing rock formations, scree slopes, and permafrost. Installing a bridge spanning the Pretty Rocks Landslide would allow the landslide and other associated processes to continue on to the toe of the landslide below the construction area without additional disturbance from road maintenance.
- **Socioeconomics:** Tourism in DENA primarily centers on travel along the Park Road and contributes substantially to the local, regional, and statewide economy. Providing continued safe vehicle access to the entirety of the Park Road would support the park's role in the tourism

economy inclusive of park concession contracts and privately owned businesses operating on the western end of the Park Road.

- **Visual Resources:** The addition of a bridge and retaining walls on the Park Road, as well as excavation and placement of material, would alter the visual setting of the road in the Pretty Rocks Landslide and Bear Cave Landslide areas.
- **Visitor Use and Experience:** Bridge construction and road maintenance projects would affect visitor experience by increasing long-term safety and reliability of park access. Bridge construction may temporarily disrupt recreation with loud noises and increased dust in the vicinity of the proposed project area. Project construction and operations may temporarily displace wildlife, decreasing wildlife viewing opportunities in the vicinity of the bridge. In addition, the project would be visible from the valley floor and high points in the surrounding landscape where hiking is permitted, including designated wilderness.
- **Noise/Soundscape:** The construction phase of the project would require earth movement and pile driving and/or drilling by heavy equipment that would temporarily disrupt the soundscape in the project area.
- **Wildlife:** The area provides important seasonal and year-round habitat for a variety of avian and mammalian species, especially golden eagles (*Aquila chrysaetos*), Dall's sheep (*Ovis dalli dalli*), caribou (*Rangifer tarandus*), and grizzly bear (*Ursus arctos horribilis*). The proposed project would cause minor habitat loss and disturbance to wildlife from blasting, excavation, and material placement. Temporary localized disturbances to wildlife from project construction and operations may displace wildlife.
- **Wetlands and Vegetation:** The project area is mostly on steep rock slopes sparsely vegetated with species and vegetation communities that are common in the park. Less than 1 acre of wetlands is present in the project area, the majority of which is low quality wetlands and streams that are already disrupted by the Park Road or landslide activity. The project would remove or cover approximately 14 acres of vegetation during construction and would disturb some additional vegetation by driving over it with heavy machinery.
- **Cultural Resources:** The majority of the Park Road—including the project area—is part of a historic district listed in the National Register (Mount McKinley National Park Road Historic District). The majority of the Park Road is also in an identified Cultural Landscape (Mount McKinley National Park Road Cultural Landscape). Altering the road alignment and adding new constructed features would diminish the integrity of the historic character of the road. The proposed project would also maintain access, which would preserve the historic use of this resource.
- **Wilderness:** A portion of excavation and placement of materials would occur within designated wilderness adjacent to the road. Potential bolts installed for rockfall risk reduction at several sites would be in the surface and subsurface of the wilderness. Noise and visual impacts from construction activity temporarily would diminish opportunities for solitude in wilderness areas. Maintaining road access through the Polychrome area would provide opportunities for unconfined wilderness recreation in wilderness areas accessed from the Park Road west of the project area.

1.5 ISSUES CONSIDERED BUT DISMISSED

The following issues were identified, considered, and dismissed from further analysis:

- **Air Quality:** Exhaust from large equipment would affect air quality but would be limited to a small number of machines operating during the construction period and localized in the vicinity of the project site.

- **Environmental Justice:** There would be no socioeconomic, cultural, or health impacts to low income or minority communities.
- **Hydrology:** It is assumed that there would be no impact from the proposed project to the East Fork of the Toklat River, the streams below the project area, or other hydrologic systems because the limited amount of material to be placed on the toe of the landslide is unlikely to destabilize the landslide further.
- **Floodplains:** NPS completed a floodplain delineation and found that there are not any floodplains in the immediate project area. There is a delineated floodplain below the Pretty Rocks Landslide but material deposited adjacent to the floodplain is not expected to alter floodplain elevations or flood risk in the area.
- **Subsistence:** The proposed project would not permanently diminish abundance, availability, or access to subsistence resources (Appendix A).
- **Threatened and Endangered Species:** DENA does not have any documented threatened or endangered species (Appendix B).
- **Other possible resources:** Other resources not known to exist in the project area include paleontological resources, Indian Trust Resources, and Native grave sites.

2 ALTERNATIVES

This section describes a No Action Alternative and the Action Alternative, and provides a description of alternatives considered but dismissed from further analysis.

2.1 ALTERNATIVE 1: NO ACTION

Under Alternative 1, the Park Road at Pretty Rocks would not be repaired and no bridge would be constructed; the Bear Cave Landslide, Perlite Landslide, and rockfall areas would not be addressed. The NPS would not improve the Polychrome section of road and there would be no vehicle access through the Polychrome area to the 47 miles of road west of the landslide (Mile 45.4). Access to the Kantishna inholdings would be primarily via air, and visitor transportation would continue to be limited to Mile 43 of the Park Road, indefinitely. If no action is taken to restore road access to the west district of the park, further planning would be needed to determine if NPS roads and facilities west of Polychrome would be maintained, abandoned, or restored to a natural state.

2.2 ALTERNATIVE 2: PRETTY ROCKS BRIDGE AND POLYCHROME ROAD IMPROVEMENTS

Alternative 2 is the NPS's preferred action and environmentally preferred alternative. Alternative 2 would consist of two implementation phases (Figure 2-1). The project was broken into two phases for budgetary and scheduling reasons, with Phase I focusing on the highest priority sites. Phase I would restore access through the Polychrome area by constructing a bridge over the Pretty Rocks Landslide (approximately Mile 45.4) and undertaking risk reduction measures for the Perlite Landslide (approximately Mile 45.3) and rockfall hazards near the proposed bridge. The old road alignment through the Pretty Rocks Landslide would be abandoned after bridge construction, allowing landslide processes to continue and the road to degrade naturally.

Phase II would address several additional geologic hazards in the Polychrome area, including constructing a retaining wall at the Bear Cave Landslide and undertaking risk reduction measures in rockfall areas. For both phases, workers would be housed in existing areas in the park that have been previously disturbed, including the possible use of campgrounds. The Park Road would be used to transport materials and workers to work sites.

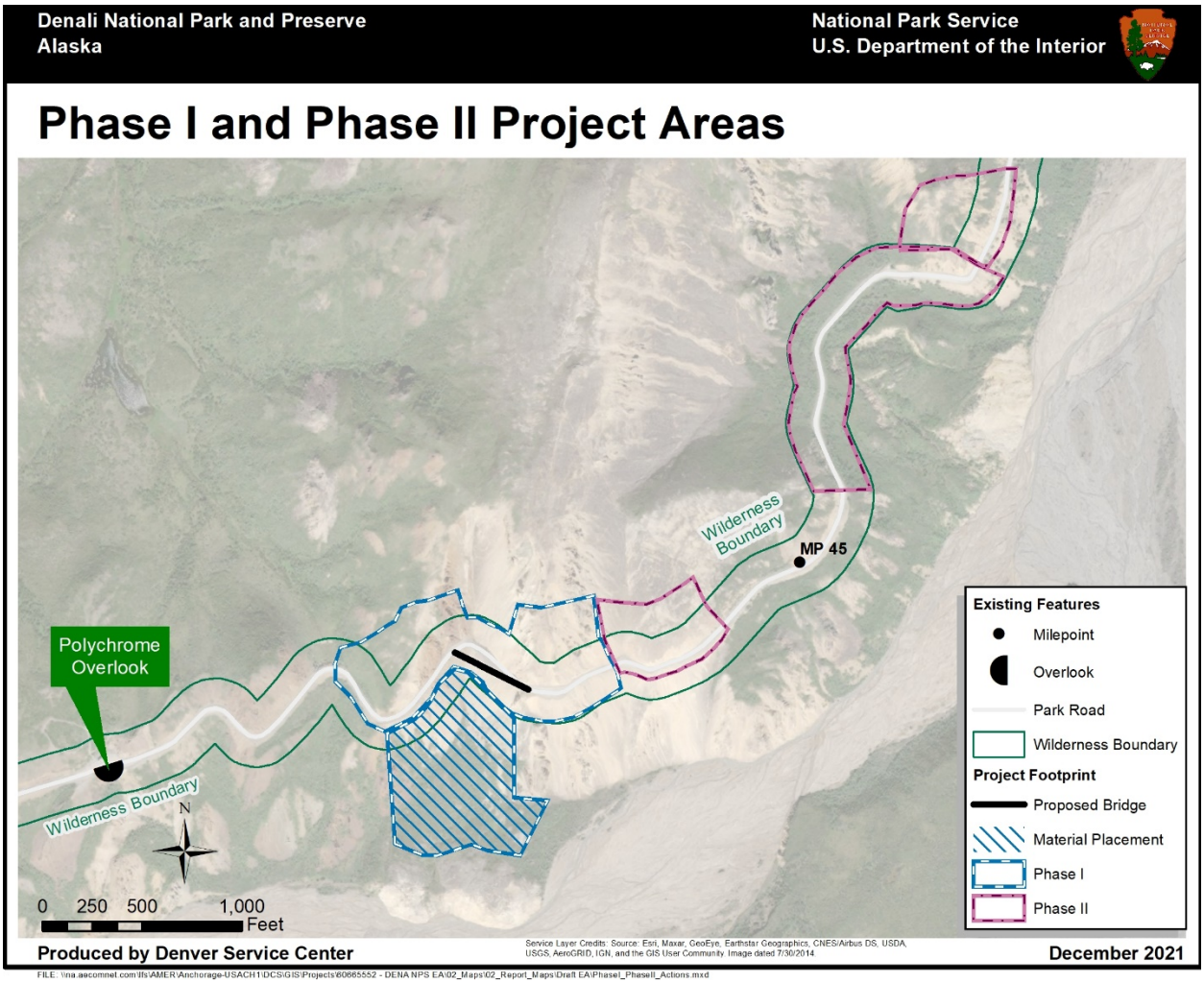


FIGURE 2-1. PHASE I AND PHASE II PROJECT AREAS

2.2.1 Phase I

Phase I (Figure 2-2) would include the following:

- Excavation of uphill slopes at the western and eastern ends of the proposed bridge location and excavation of the "rock knob" on the eastern end
- Placement of excavated material on the slope below the road
- Slight road realignment near the west side of the bridge
- Construction of retaining walls, including possible earthwork and horizontal drains, on the east side of the bridge
- Rockfall risk reduction including rockfall ditches, cut benches, rock scaling, and/or installation of rock bolts and dowels

- Construction of an approximately 400-foot steel bridge spanning the Pretty Rocks Landslide (including a temporary platform for bridge assembly on the eastern side and steel and concrete bridge abutments on both sides)
- Restriction of traffic through the project area (i.e., no visitor traffic would be allowed)

Construction equipment for Phase I may include the following:

- Excavators
- Dump trucks
- Bulldozers
- Motorized equipment
- Vibratory and/or impact hammer
- Generator
- Drill rig
- Mobile crane
- Forklifts
- Helicopter

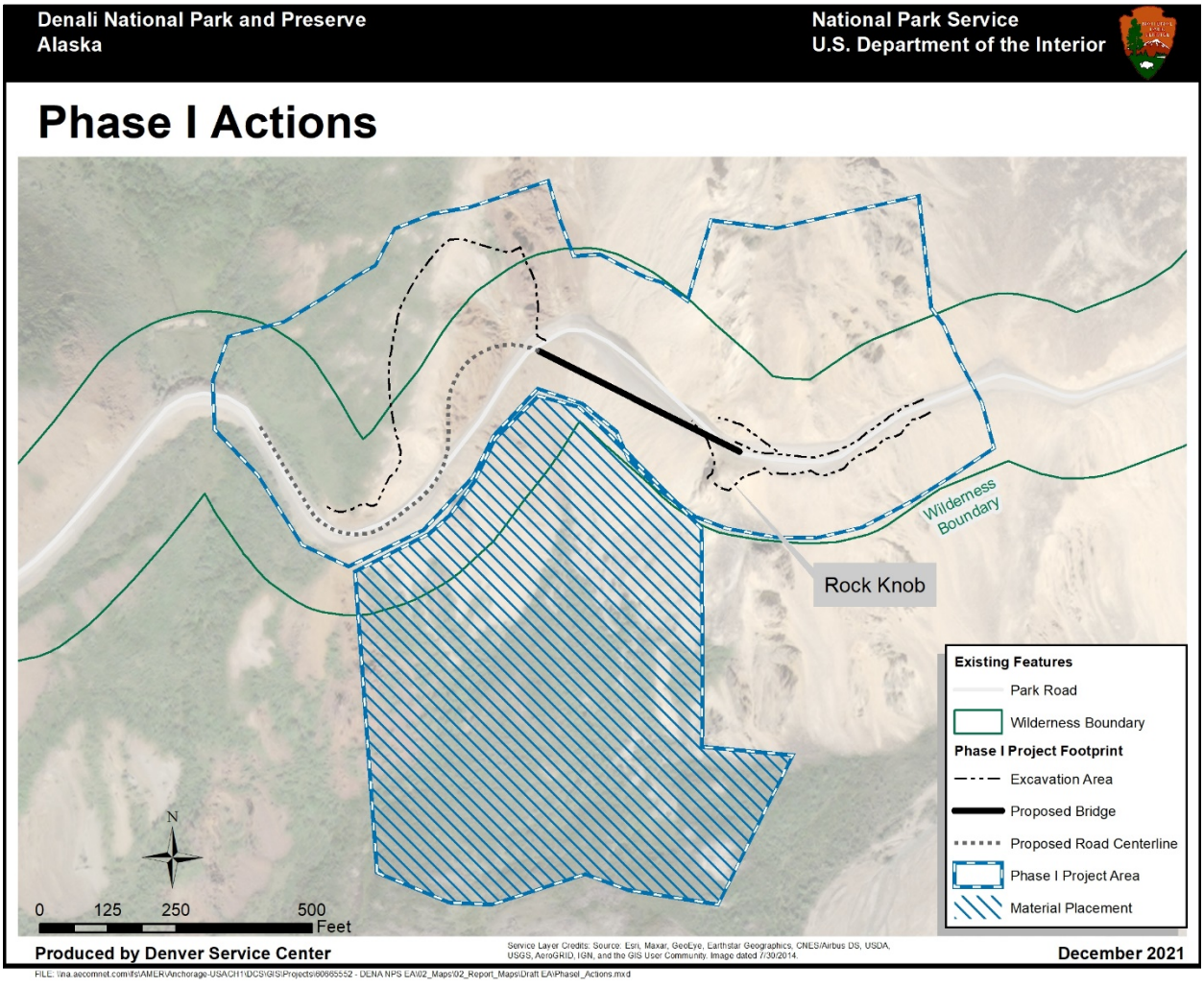


FIGURE 2-2. PHASE I ACTIONS

2.2.1.1 Excavation. Approximately 125,000 to 150,000 cubic yards of material would be excavated. Excavation of the rock would be accomplished with heavy equipment and blasting. Areas east of the landslide, including the "rock knob" on the south side of the road and the slope on the north side of the road, would be excavated to provide space for bridge construction and equipment.

The slope above the west abutment would be excavated to provide space for construction of the bridge and to accommodate a slight road realignment for vehicles turning on and off the bridge. A portion of this excavation area (less than 1 acre) would be in designated wilderness. The excavation could include a bench cut into the rock partway down the rock face to serve as a rockfall catchment area. The excavation could also include a road-level rockfall ditch. Periodic maintenance of the bench using heavy machinery would be needed, a small portion of which would be in wilderness. Excavation may also require heavy equipment to drive up the vegetated slope from the western edge of the project area, which would require temporary access of motorized vehicles through designated wilderness. Measures would be implemented to protect the vegetation from damage by heavy machinery and tracked vehicles. If feasible, equipment may be placed for excavation by helicopter, eliminating the need to drive over vegetation in wilderness. Actions are intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops while maintaining the integrity of the finished rock cut face to minimize rockfall and rock instability.

2.2.1.2 Material Placement. After swell is accounted for, the volume of material that would need to be disposed of would be slightly larger than the volume that was excavated. Excavated material that is of sufficient quality for maintenance use would be trucked off site and stored in existing DENA material storage locations (such as the Toklat pit) for use on future projects. As shown in Figure 2-2, the majority of the excavated material would be disposed of on site on the slope below the road. Approximately 10 acres of that area would be in wilderness and 0.6 acre in streams or wetlands. Some vegetation toward the toe of the landslide would be covered by excavated material. Excavated material would consist of rock and soil similar to what currently exists at the site and would be expected to look similar to existing rock/soil at the landslide. Motorized equipment would be used to move material off the roadway and into the material placement area, which would require temporary use in wilderness.

2.2.1.3 Road Realignment. On the west side of the bridge, a short section of the road would be realigned slightly to create space for an appropriate turning radius for vehicles entering and exiting the bridge. The realignment would also include shifting an additional section of road away from the eroding road edge. The realigned road corridor would be entirely outside of designated wilderness; the wilderness boundary would not shift with this realignment.

2.2.1.4 Retaining Walls. A retaining wall near the east abutment of the Pretty Rocks Bridge would be installed on the slope above the road to reduce the risk of rockfall from the excavated slope. A combination of earthwork, horizontal drains, and possibly a retaining wall would also be required to address the Perlite Landslide on the east side of the Pretty Rocks Landslide. These structures would be outside of wilderness.

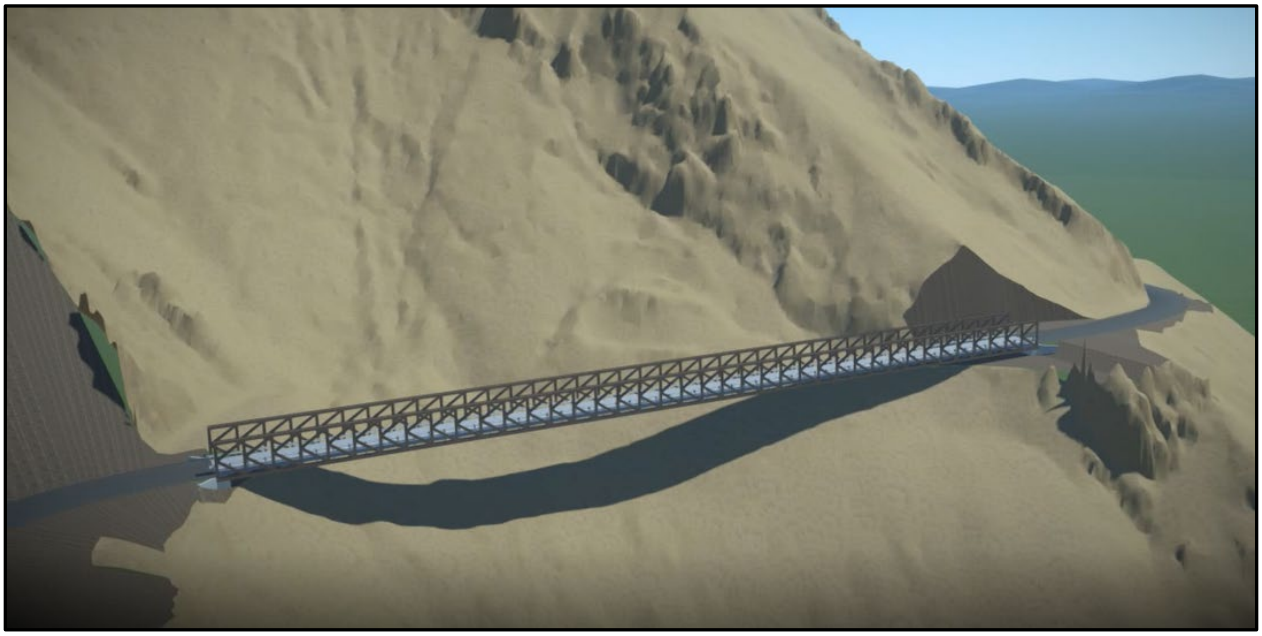
2.2.1.5 Rockfall Risk Reduction. Rockfall areas above the road to the east and west of Pretty Rocks Landslide would be addressed using a combination of rock scaling (i.e., the removal of loose or potentially unstable rocks), installation of rock bolts or dowels, and/or the creation of rockfall ditches. Rock scaling would be designed to match existing surroundings and would be conducted by workers on ropes and performed by hand using prybars; no blasting would be necessary. Installation of rock bolts would include 1-inch diameter bolts or dowels drilled into the surface and subsurface rock of the cliff face to secure hazardous rocks and would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them. Rock scaling and installation of rock bolts would occur in wilderness and would be repeated every 5 to 10 years, or as needed to reduce additional rockfall hazards.

2.2.1.6 Pretty Rocks Bridge Construction. A bridge spanning the Pretty Rocks Landslide site would be installed (Figure 2-3). The bridge would be approximately 400 feet long and have an overall width of approximately 24 feet and would be supported by two abutments, one on either end. Abutments would be steel pilings with ground anchors, which would be drilled or driven into the bedrock and fortified with concrete. The bridge would be one lane and traffic would stop at existing pullouts at either end, yielding to vehicles on the bridge.

A temporary platform would be constructed near the east abutment for use as a bridge assembly location. The platform would extend 150 feet from the south side of the road. The bridge components would be trucked to the site and stored at the temporary platform until assembly. A large crane would be used to assemble the bridge on site. Temporary platform construction would require some pile driving and concrete placement, with several dozen piles needed.

After bridge construction, the temporary platform would be removed, the staging areas would be recontoured, and the road would be restored to its historic road width where possible. Space would be preserved at both abutments for future maintenance needs.

The landscape of this area is changing due to climate change causing permafrost melt. These changing conditions may affect the longevity of the design (approximately 50 years). Currently, the overall synergy between climate change and effects on the engineered solution is unknown and unpredictable. Additional maintenance projects to retrofit the bridge may be needed in response to climate change. Future design considerations to address the possibility of melting permafrost under the bridge abutments, such as the use of thermal siphons, would be researched and evaluated to ensure longevity.



Note: The darker areas on each side of the bridge show where excavation would take place. The dark area under the bridge depicts the shadow of the bridge.
Source: FHWA 2021

FIGURE 2-3. DIGITAL REPRESENTATION OF THE PROPOSED PRETTY ROCKS BRIDGE (LOOKING EAST)

2.2.1.7 Traffic. Road access through Polychrome is not anticipated during Phase I. For safety reasons, only construction traffic would be allowed in the Pretty Rocks area during most construction activities. Incidental traffic may be facilitated as conditions permit. Visitor transportation would continue to be limited to Mile 43 of the Park Road and buses would turn around at the East Fork Bridge or the East Fork cabin site. Access to Kantishna inholdings would be primarily via air until the bridge is completed.

2.2.2 Phase II

Phase II (Figure 2-4) would include the following:

- Construction of a partially buried retaining wall along approximately 1,000 feet of road above the Bear Cave Landslide, including excavation of materials, installation of drainage improvements, and temporary widening of the road
- Rockfall risk reduction (rock bolts or dowels, rock scaling, and/or rockfall ditches)
- Visitor traffic allowed through the project area, with delays and temporary restrictions possible

Construction equipment for Phase II may include the following:

- Excavators
- Graders
- Front-end loaders
- Dump trucks
- Vibratory and/or impact hammer
- Generator
- Drill rig

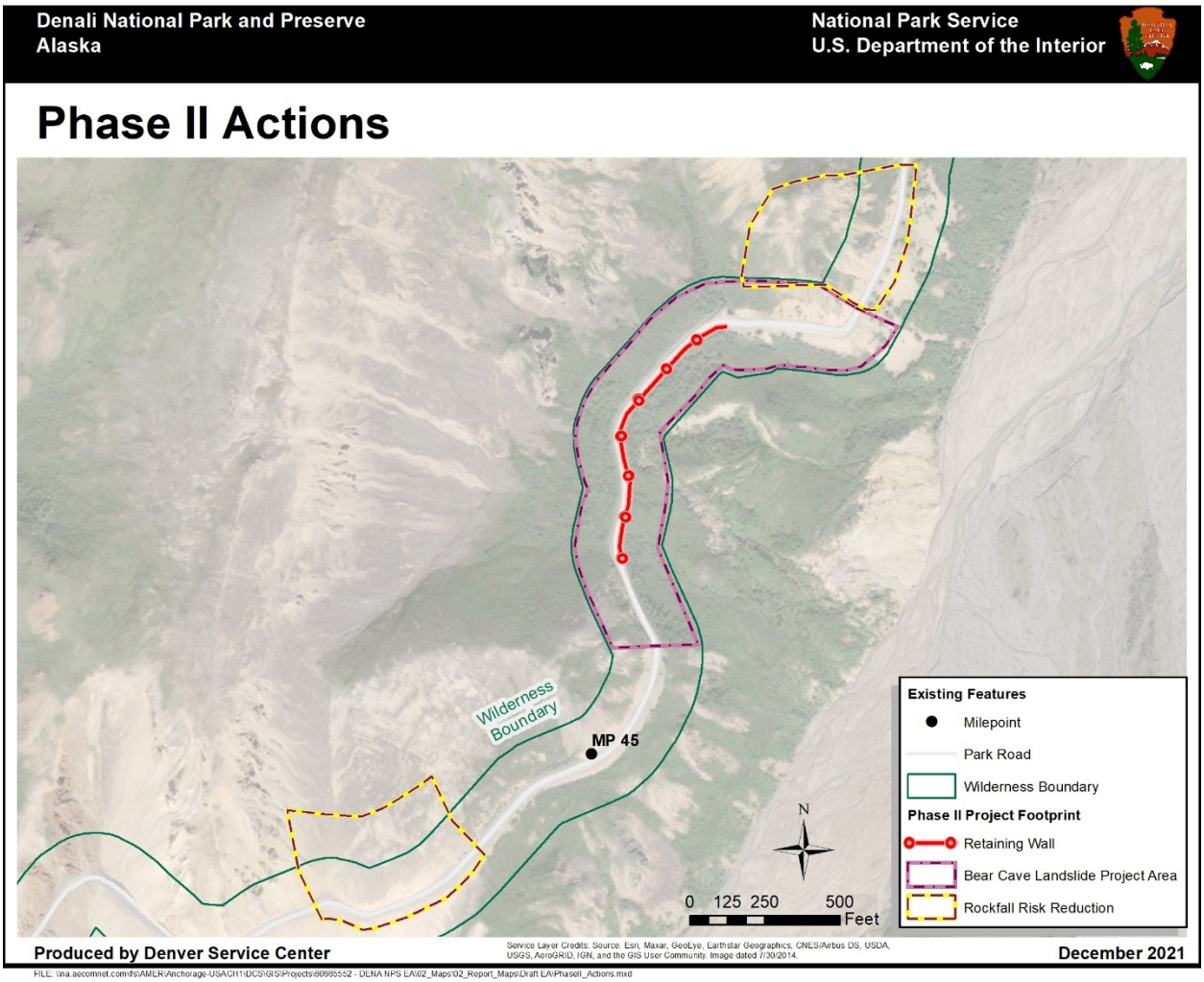


FIGURE 2-4. PHASE II ACTIONS

2.2.2.1 Retaining Wall. At the Bear Cave Landslide area, Phase II would include excavation of materials and construction of a retaining wall on the south side of the Park Road. The retaining wall would be buried approximately 30 to 60 feet deep and run approximately 1,000 feet along the road to stabilize the road edge, and would potentially require several hundred piles. The north side of the Park Road would be temporarily widened to allow traffic to pass around the construction site. Road work would also include subsurface and surface drainage improvements. The retaining wall and road widening/improvements would not be in the wilderness area. After construction of the wall, the area on the north side of the road would be recovered and the road would be returned to the existing roadway centerline and width. Disturbed areas would be revegetated to match the surrounding area. The retaining wall would be minimally visible from the surrounding area, including from backcountry areas south of the road. Equipment and materials for Bear Cave work would be stored at existing staging areas in DENA.

2.2.2.2 Rockfall Risk Reduction. Rockfall areas above the road to the east and west of Bear Cave Landslide would be addressed during Phase II (Figure 2-4) using a combination of rock scaling (i.e., the removal of loose or potentially unstable rocks), installation of rock bolts or dowels, and/or the

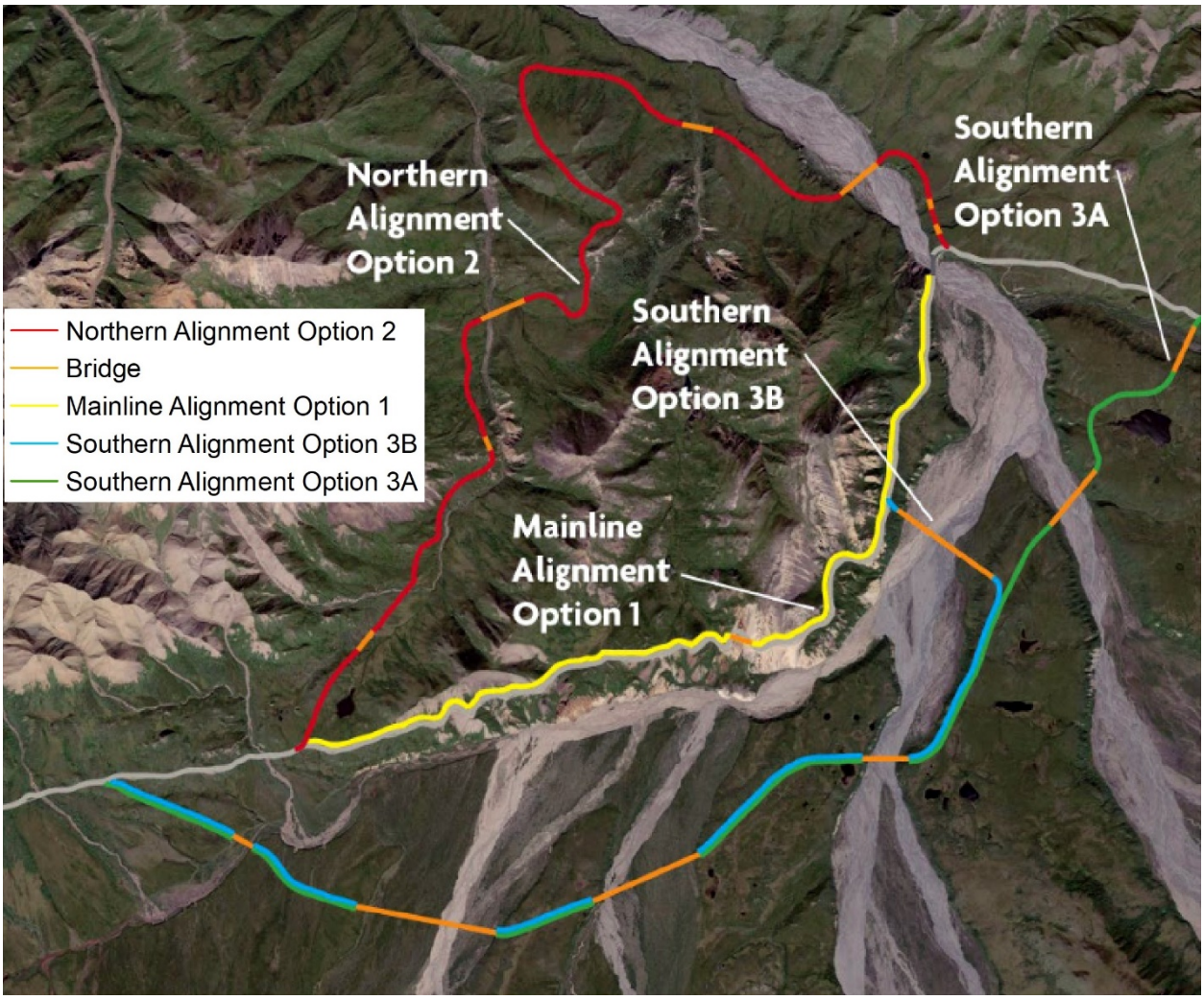
creation of rockfall ditches. Rock scaling would be designed to match existing surroundings and would be conducted by workers on ropes and performed by hand using prybars; no blasting would be necessary. Installation of rock bolts would include 1-inch diameter bolts or dowels drilled into the surface and subsurface rock of the cliff face to secure hazardous rocks and would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them. Rock scaling and installation of rock bolts would occur in wilderness and would be repeated every 5 to 10 years, or as needed to reduce additional rockfall hazards.

2.2.2.3 Traffic. Road access through the Polychrome area is anticipated during Phase II. Visitor transportation to destination points west of Pretty Rocks and regular traffic to Kantishna inholdings would be allowed. There may be some traffic delays due to single-lane use or temporary restrictions at the project sites. There could also be scheduled nighttime road restrictions for work to occur. Because rock scaling and bolting cannot occur in the dark due to safety concerns, road restrictions would be needed during some daylight hours as well.

2.3 ALTERNATIVES CONSIDERED BUT DISMISSED

2.3.1 Alignment Options Considered

In addition to the proposed project described as Alternative 2, the NPS considered the construction of a new road to bypass the Pretty Rocks Landslide. Three routes were considered in addition to the mainline alignment (proposed action): a northern alignment and two southern alignments (Figure 2-5). The FHWA conducted an Expert-Based Risk Assessment (EBRA) (BGC 2020) and the NPS developed a Value Analysis (VA) (DG&A 2020) to compare the alignments. The EBRA considered the risk associated with geohazards for each alignment and determined that the two southern alignments had the least long-term risk of road closures or road failure associated with geohazards. The EBRA analysis also revealed that improvements to the proposed correction at the Bear Cave Landslide would likely result in the mainline alignment performing as well as the southern alignments. Therefore, the mainline option (proposed action) was revised to include those improvements. The VA determined that the mainline alignment would offer the greatest value to stakeholders when weighing factors such as providing safe visits, protecting natural and cultural resources, improving visitor enjoyment, improving park operations, and providing cost-effective and environmentally responsible development. DENA leadership, along with support from the Alaska Region of the NPS and the FHWA, concluded that impacts to visitors and park resources from the northern and southern alignments would be too great to consider further. A summary of factors that went into the decision process to dismiss the reroute alternatives is provided in Table 2-1. Note that the long construction duration estimates are partially due to the short construction seasons in this area of the park.



Source: DG&A 2020

FIGURE 2-5. THREE ROUTES CONSIDERED IN ADDITION TO THE MAINLINE ALIGNMENT (PROPOSED ACTION): A NORTHERN ALIGNMENT AND TWO SOUTHERN ALIGNMENTS

TABLE 2-1. COMPARISON OF PROPOSED ACTION TO THE ALTERNATIVES THAT WERE DISMISSED

Factor	South Alignments	North Alignment	Proposed Action
Construction duration	11 to 13 years	12 to 14 years	1 to 2 years
Number of new bridges	5-8	8	1
Length of new road	5 to 6 miles	6 miles	600 feet
Designated wilderness	780 to 830 acres	748 acres	11 acres
Cost	$255-$275 million	$186 million	$91 million
Maintenance gravel need over 50-year design life	1 million cubic yards	1 million cubic yards	25,000 cubic yards

2.3.2 Removing the Upper Landslide

The NPS considered removing the upper landslide material at the Pretty Rocks Landslide from above the road, and shifting the roadway into the hillside. This alternative would require the excavation of a substantial portion of the mountain (approximately 1.1 million cubic yards), mostly from federally designated wilderness. Considering that the large volume of excavated waste material would swell to approximately 1.3 million cubic yards (approximately 10 times the amount anticipated for the proposed action) and require over 100,000 dump truck loads to haul off site, the material would need to be deposited on site below the road. The material would be placed on the toe of the landslide and immediately to the east of the landslide, in wilderness. Given the presence of permafrost and an active landslide in the area, drainage issues would cause localized instabilities contributing to unsafe conditions for operating heavy equipment on the slope. Safety hazards and the unpredictable nature of the project area during construction would not allow for reliable traffic access through the site for potentially 3 years. Due to the geology of the project area (described in Section 3.2), it was determined that this alternative would only provide a temporary solution, because excavation to reach competent bedrock to permanently reestablish a road is unachievable. In addition, the handling, transport, and placement of excavated material would be far greater than that anticipated for Alternative 2. Therefore, given the unreasonable operational and safety challenges and the insufficiency of this alternative to fulfill the purpose of restoring reliable access, the NPS dismissed removing the upper landslide from further consideration.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 APPROACH TO ANALYSIS

3.1.1 General Approach

The impact analysis for the EA includes the issues selected for detailed analysis as identified in Chapter 2. These issues include Geology, Socioeconomics, Visual Resources, Visitor Use and Experience, Noise/Soundscape, Wildlife, Wetlands and Vegetation, Cultural Resources, and Wilderness. Consistent with 40 CFR Part 1501.3(b), impacts for each resource are described in terms of affected area; degree of effect (i.e., extent to which the effect would result in a measurable change to the resource); short-term (generally construction-related) and long-term (operations-related) effects; and beneficial or adverse effects. Impacts are quantified wherever possible, and the analysis considers the timing and duration of the impacts. Additive impacts from Reasonably Foreseeable Future Actions (RFFAs) that consider the contribution of the project are discussed in a separate section following the issue-specific analyses.

The proposed action would incorporate best management practices to proactively minimize environmental impacts and comply with applicable environmental regulatory requirements. Additional mitigation measures are proposed to further reduce impacts (Table 3-1).

TABLE 3-1. PROPOSED MITIGATION MEASURES

Resource Area	Proposed Mitigation Measures
Socioeconomics Section 3.3	• Construction workers would be housed in DENA at previously disturbed locations
Visual Resources Section 3.4	• The bridge would be designed to be nonreflective and in a neutral color to reduce contrast with surroundings. • The width of the bench cut along the west abutment excavation area would be minimized and have a rough texture. • The retaining walls at the east end of the bridge and Perlite Landslide would resemble natural materials and blend into the landscape, if possible. • Excavation and rock scaling would produce rough, irregular rock faces that resemble the surrounding natural rock • Revegetation of disturbed areas would be implemented with plants salvaged from the project area and native seeds. • Shielding on construction lighting would be required to eliminate light trespass.
Visitor Use and Experience Section 3.5	• Dust management measures would be employed during Phase II.
Noise and Soundscape Section 3.6	• Broadband amplitude-adjusting backup alarms would be used on construction vehicles to reduce the noise intensity and audible distances. • Vibratory hammers would be used for pile driving, instead of impact hammers, whenever possible • The driving surface of the bridge would be a closed metal deck topped with a high-friction surface to reduce the noise of vehicles on the bridge • Approach pavement would be included on both ends of the bridge to limit the noise of vehicles coming onto the bridge and driving over the bridge
Wildlife Section 3.7	• If ground disturbing activities are conducted during the bird breeding and nesting season, measures would be implemented to avoid disturbance to active nests. • All construction activities would comply with the Migratory Bird Treaty Act and Executive Order 13186. • Construction would halt when certain wildlife are within limits established in the Code of Federal Regulations Section 13.920 to reduce disturbance.

Resource Area	Proposed Mitigation Measures
	• Nest deterrents would be included in the bridge design • Vehicles that encounter wildlife on the road or proposed bridge would be required to comply with NPS regulations, which give wildlife the right of way.
Wetlands and Vegetation Section 3.8	• Dust management measures would be employed. • Revegetation of disturbed areas would be implemented with plants salvaged from the project area and native seeds. • Stormwater and erosion control best management practices would be implemented to protect wetlands and waters during construction, including vegetation buffers and erosion control fencing • Measures would be implemented to protect the vegetation from damage by heavy machinery and tracked vehicles. • Construction vehicle and equipment inspection would be done prior to entering DENA to ensure invasive/nonnative plant species are not introduced. • Wetland areas within 100 feet of the project area would be flagged and avoided. A 0.01 acre wetland area above the road in the Phase I project area would be avoided.
Cultural Resources Section 3.9	• The above measures to reduce visual impacts would be implemented. • Mitigation for adverse effects has not been finalized and would be included in the amended Denali Park Road Programmatic Agreement. • The road realignment on the west side of the proposed bridge would be consistent with the curvilinear design of the existing road. • The historic road width (16 to 24 feet) would be restored once construction is complete
Wilderness Section 3.10	• Wilderness areas within 100 feet of the established project area would be identified and avoided. • Measures would be implemented to protect the wilderness areas from damage by heavy machinery and tracked vehicles. • The above measures to reduce visual impacts, as well as impacts to visitor experience, soundscape, wildlife, and vegetation in wilderness areas would be implemented

Notes:
DENA = Denali National Park and Preserve
NPS = National Park Service

3.1.2 Reasonably Foreseeable Future Actions

Descriptions of the RFFAs that were considered for analysis to determine if the proposed project would have additive impacts to projects planned for the next 5 years are provided in Table 3-2. All projects would occur during the summer months (April through October).

TABLE 3-2. REASONABLY FORESEEABLE FUTURE ACTIONS ALONG THE PARK ROAD

Project	Description	Timeframe
Road and Facility Maintenance, Research and Monitoring	Regular repairs to the Park Road and DENA facilities occur as part of general maintenance practices. Any vehicles or equipment needed for maintenance use on the Park Road can occur at any time, including during peak visitor hours. Normal cyclic road and facility maintenance, research, and monitoring would continue to occur east of Mile 43 regardless of the Polychrome Improvements Project.	Annually
Ghiglione Bridge	The NPS is replacing the Ghiglione Bridge (Mile 41.9). The project includes constructing a new bridge approximately 70 feet upstream (north) of its current location and removing the old bridge. The action will modify the roadway adjacent to the bridge (approximately 300 feet in total length) to soften the approach angles of vehicles entering and exiting the bridge and increase sight distances. Staging areas will be provided in the Teklanika Pit (Mile 27) and workers will be housed at Igloo Pit and Igloo Campground. Igloo Campground will be closed to visitors for two seasons. Approximately 4,200 cubic yards of fill from the old bridge abutments will be stored in place and will be removed from the project site	2022 and 2023

TABLE 3-2. REASONABLY FORESEEABLE FUTURE ACTIONS ALONG THE PARK ROAD

Project	Description	Timeframe
	within 5 years of project initiation for future projects in the park. Through traffic will be allowed during construction without major delays. This project is east of the Pretty Rocks area and will occur regardless of the Polychrome Area Improvements Project.	
Toklat Gravel Processing and Scrape	Existing compliance (NPS 2003a, b, 2020a, 2021a) allows the NPS to scrape (or mine) an average of 11,100 cubic yards of gravel annually from the bed of the Toklat River in specific locations; this gravel is then processed and stored. Typically, the scraping and processing occur in alternating years. Contractors are typically housed at Toklat. This project is west of the Pretty Rocks Landslide. It is likely that it would be dependent upon the completion of Phase I, but it is possible that it would occur concurrently with Phase II.	Annually
Eielson Visitor Center Roof Replacement	The roof of the Eielson Visitor Center is funded for redesign and replacement. The contractors for this project will be housed at Toklat. There will be no traffic delays or interruptions; however, the visitor center will be closed for 2 years while the work is being done and a visitor contact station at Toklat will likely be a substitute. This project is west of the Pretty Rocks Landslide. It is likely that it would be dependent on the completion of Phase I, but it is possible that it would occur concurrently with Phase II.	2024 and 2025

Notes:
DENA = Denali National Park and Preserve
NPS = National Park Service

3.2 GEOLOGY

3.2.1 Affected Environment

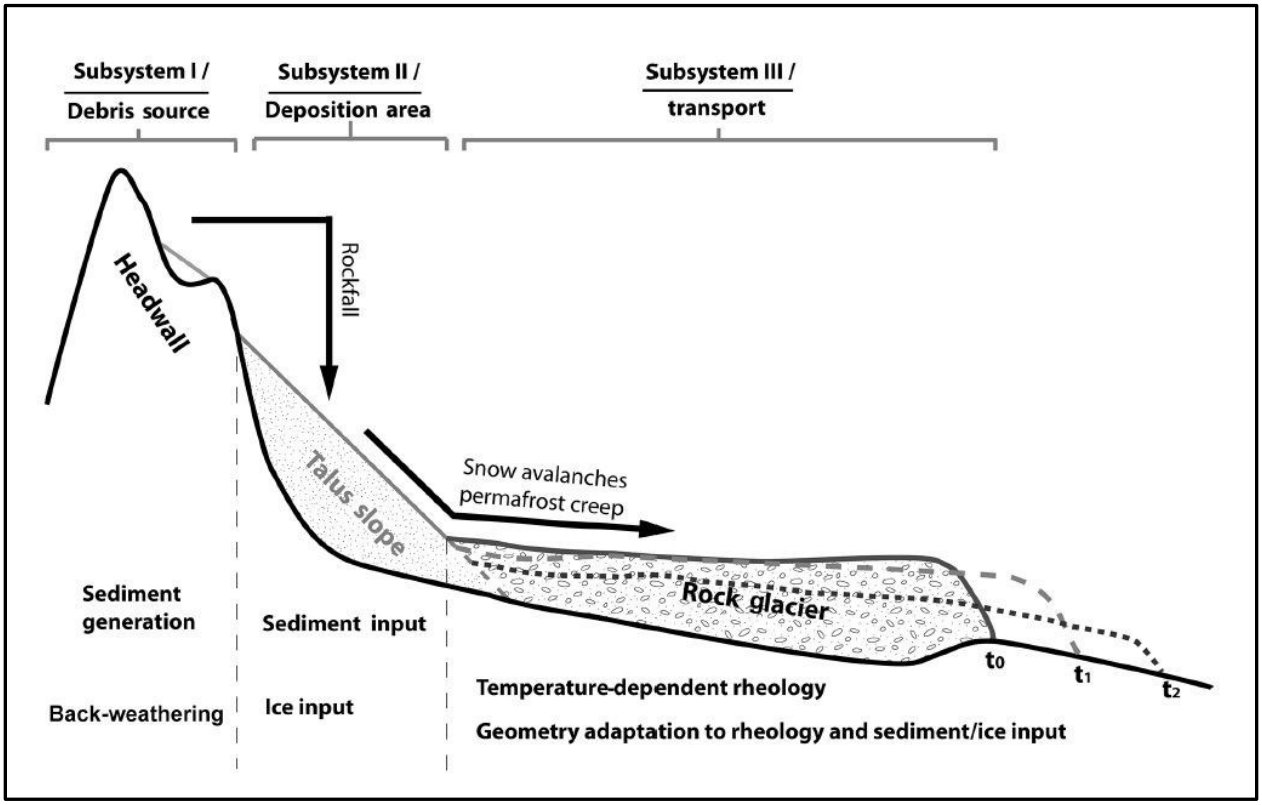
The geologic environment in the project area is dominated by exposed rock and steep slopes of loose boulders, cobbles, and gravel with thin to nonexistent soils. The Polychrome area is named for the many colors associated with a diverse suite of altered rock types. Bedrock in the project area is composed of 55-million-year-old volcanic rocks of the Teklanika Formation, which range in composition from basalt to rhyolite and include layers of altered volcanic ash. No paleontological resources or fossils are likely to be encountered in volcanic rock.

Steep slopes and landslides are naturally occurring and common throughout the mountainous terrain of the park, with over 140 known unstable slopes along the Park Road. Landslides have previously impacted the Park Road, including the 2013 Igloo landslide and the 2016 Eagle's Nest landslide (Capps et al. 2019). Landslides can be abrupt events commonly triggered by earthquakes and/or high rainfall, or can be slow-moving events influenced by moist, unstable slopes and/or the thawing of permafrost.

Permafrost, or ground that remains frozen throughout the year, can be composed of various mixtures of frozen rock, soil, and ice. Discontinuous permafrost is widespread across the park, beginning at depths varying from several feet below the surface to an indeterminate depth below the deepest measurements (120 feet) in the project area. Ground ice and permafrost have increasingly thawed and degraded as the climate has warmed in recent years (Swanson et al. 2021). Loss of permafrost and increased meltwater on steep slopes further destabilize slopes and promote landslide activity (Patton et al. 2020). Heavy rains in recent years have also contributed to increased landslide movement in the park.

The Pretty Rocks Landslide at Mile 45.4—technically a rock glacier but for purposes of this EA referred to as a landslide—is mostly composed of rhyolitic (volcanic) rock and volcanic ash. Rock glaciers are closely related to glaciers, but contain much more rocky debris with ice in the pore spaces. Rock glaciers typically only move a few inches per year, as was the case with Pretty Rocks prior to 2014. However, Pretty Rocks and some other rock glaciers around the world have begun to advance more quickly, with climate change as a major cause (Müller et al. 2016). DENA has many rock glaciers, likely numbering in the thousands, and efforts are underway to identify and classify them. Some of these rock glaciers are currently advancing beyond their historic margins.

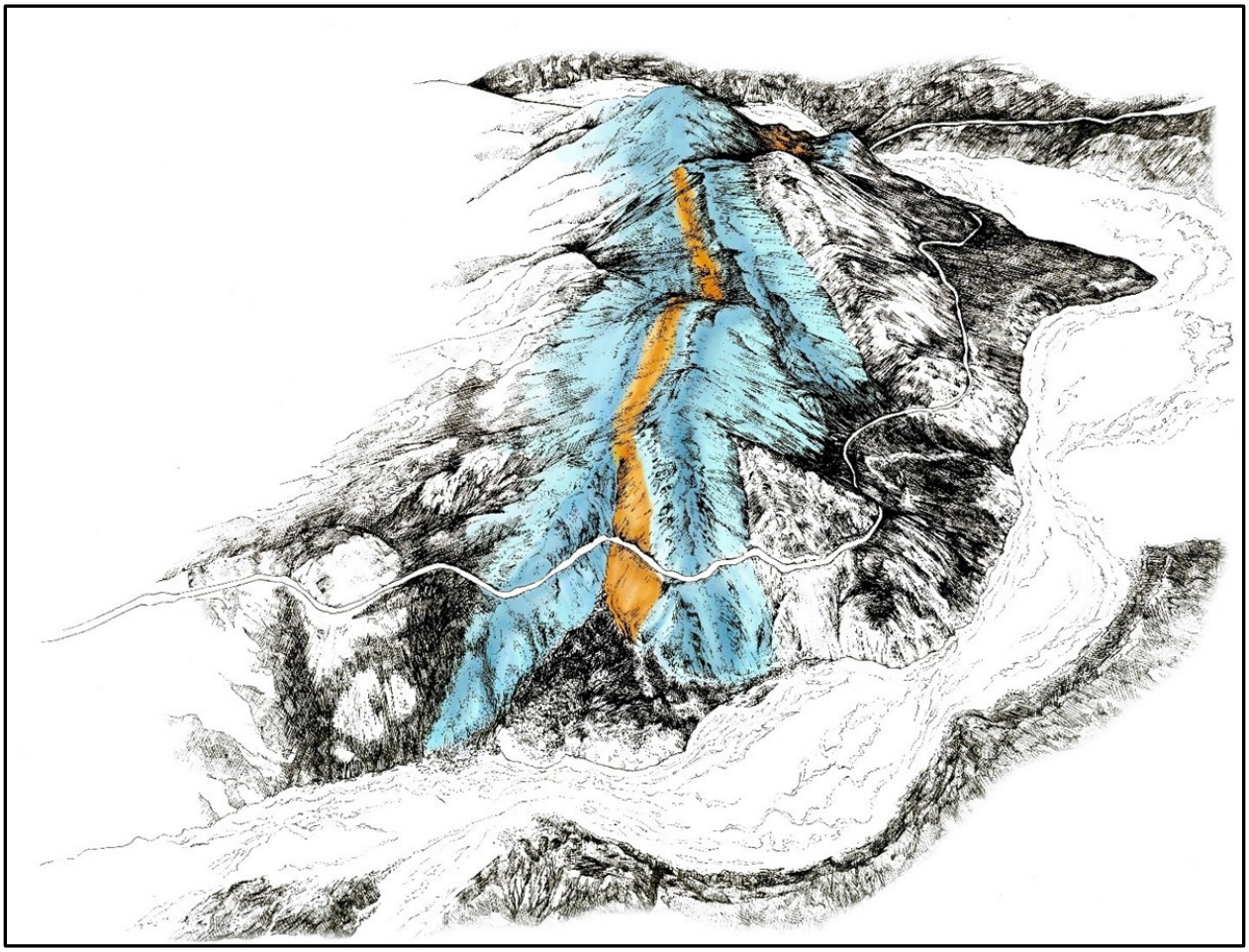
Where measured by borings, the Pretty Rocks Landslide varies from 40 to 80 feet thick, and includes an active layer that thaws seasonally at the surface, underlain by ice-poor permafrost (ice volume is equal to or less than pore space) grading to ice-rich permafrost (contains excess ice that is more ice than pore space, which makes it unstable when thawed) below (BGC 2020). The rock glacier initiates below a ridge of more competent rock approximately 300 feet upslope from the road, flows across a 300-foot section of the road, and extends 1,400 feet downslope to its terminus on the valley floor (Figure 1-5). Thawing of permafrost at the site is causing increased loss of slope stability, resulting in slumping, caving, and development of cracks and dips in the roadbed. Monitoring data indicate that increasingly heavy rains and warmer temperatures have contributed to recent accelerations in landslide movement, from 1 inch per month in 2014, to 15.5 inches per day in September 2021. A conceptual model of the evolution of a rock glacier that accurately represents the Pretty Rocks rock glacier is shown in Figure 3-1. The high volume of gravel used to fill the slumping roadbed has likely contributed to the acceleration, but the amount of contribution from increased loading is presently unknown.



Source: Müller et al. 2016 (CC Attribution3.0 License)
Arrows show sediment transport. t_0, t_1 and t_2 show rock glacier surfaces at different times resulting from variations in environmental factors such as warming and a decrease of sediment-ice input

FIGURE 3-1. CONCEPTUAL MODEL OF THE EVOLUTION OF A ROCK GLACIER

Boring data indicate that even if all the landslide material were removed from above and beneath the road, the underlying ground would still be very unstable. The rock layers were deposited horizontally about 55 million years ago in volcanic eruptions. Subsequent folding and faulting of the rock rotated the layers to approximately 60°. The blue highlighted layers shown in Figure 3-2 are mostly competent rock. The orange layer is mostly volcanic ash that has altered to clay through time. The clay is very unstable on steep slopes like those at the road. The clay is mostly frozen, but barely; much of it is within approximately 1°F of thawing. Based on borings and surface mapping, the clay is known to extend hundreds of feet into the subsurface and laterally to the north-northeast, all the way to the East Fork of the Toklat River just north of the East Fork Bridge (shown near the top of Figure 3-2). Where this clay layer intersects the East Fork of the Toklat River, landslides similar to the one at Pretty Rocks are occurring but do not intersect the road. This long, vertical layer of unstable clay makes it unfeasible to excavate the undesirable material and construct the road on competent bedrock farther in on the cliff face.



NPS Illustration by Faber 2020. Blue highlighted areas are mostly competent rock. The orange layer is mostly unstable clay. Pretty Rocks Landslide is situated where the road (white line) intersects the orange highlights. The East Fork Bridge is near top right.

FIGURE 3-2. GEOLOGIC ILLUSTRATION OF THE PRETTY ROCKS AREA

The headscarp of Bear Cave Landslide at Mile 44.8 is below and within 10 feet of the roadbed (Figure 1-6). In 1999, because of growing concerns that the slide would grow headward into the road, a project diverted surface water above the road into a trench and away from the landslide. This

effort substantially decreased the motion of the slide. However, in recent years heavy rains have once again elevated landslide motion and the headscarp continues to erode headward towards the road.

Unstable slopes in the project area also occur near the east abutment of the Pretty Rocks Bridge; and at the Phase II geohazard sites (Figure 2-1).

As the Pretty Rocks Landslide continues to flow at faster rates, the slopes above are debuttressed and over-steepened beyond the angle of repose. Therefore, like other geohazards, rockfall hazard is increasing beyond historical precedent at this site and is likely increasing at other sites.

3.2.2 Environmental Consequences

3.2.2.1 Alternative 1: No Action. Under the No Action Alternative, unstable slopes in the Polychrome area would continue to damage and obstruct the Park Road, to the point where the road would be permanently closed. No additional gravel would be harvested from the Toklat gravel source for maintenance use at Pretty Rocks Landslide. Because gravel from Toklat would be unable to be transported east of Pretty Rocks during road closure, a different source of gravel would likely be needed for road maintenance projects east of the Pretty Rocks Landslide.

3.2.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. Construction of the bridge, retaining walls, and other road improvements would reduce the potential impact from geohazards on the Park Road. Bridge construction and road realignment at the Pretty Rocks Landslide site would permanently alter existing rock formations and modify the topography of slopes surrounding the roadbed.

During Phase I, disposal of excavated rocky material at Pretty Rocks would result in accumulation of the excavated material in an area below the Park Road. The rocky material would permanently remain on the slopes below the road and may continue to migrate downslope on top of the active slide. Unstable slopes above the road would be excavated/modified to less steep conditions (i.e., less than the angle of repose—the steepest angle at which loose material is stable), which would stabilize slopes and reduce the risk of rockfall.

The construction of the bridge and abandonment of the existing road alignment would allow the Pretty Rocks Landslide and other associated processes to continue to the toe of the landslide below the construction area naturally and without additional disturbance from road maintenance.

During Phase II, rock scaling, which may need to be repeated every 5 to 10 years for maintenance, would further reduce the risk of rockfall and increase safety by removing rock and sediment. Natural landslide and erosion activities would continue but at an initially reduced rate. Eventually the slopes would likely erode again to the current steep condition.

3.2.2.3 Reasonably Foreseeable Future Actions. Completion of the proposed action would improve reliable access to the Toklat river as a gravel source in the future, which would be an additive beneficial impact to park operations.

3.3 SOCIOECONOMICS

A summary of the socioeconomic impacts of the proposed Polychrome Area Improvements Project is provided in this section. Additional details are provided in the Socioeconomic Analysis in Appendix C.

3.3.1 Affected Environment

The project area is in both DENA and the Denali Borough. The region is approximately 250 miles north of Anchorage and 110 miles south of Fairbanks (Denali Borough 2021).

3.3.1.1 Economy. The Denali Borough's economy is driven by the abundant natural resources of the region. Visitation to DENA contributes millions of dollars and supports thousands of jobs in the local, regional, and statewide economies (NPS 2021b). The western half of the Park Road directly supports approximately 35 jobs for the NPS and 30 jobs for the park's transportation concessioner, Doyon/Aramark Joint Venture. The lodges at Kantishna within the park boundaries employ between 150 to 200 workers each year, with total direct payrolls between $3 million and $6 million. More specific economic data is provided in Appendix C.

The Alaska Department of Labor and Workforce Development (ADOLWD) estimates that in 2019 (prior to the coronavirus disease 2019 [COVID-19] pandemic), there were $96.3 million in wages and salaries earned in the borough across 25,000 person-months of employment. Employment, labor force size, and unemployment in the borough are highly seasonal; the leisure and hospitality sector is both the largest source of employment and the largest source of wages, accounting for 41 percent of all wages earned (ADOLWD 2021a).

3.3.1.2 Population and Diversity. The current ADOLWD estimate of the borough's population is 1,806 residents, while the United States (U.S.) Census Bureau's American Community Survey population is 2,246 residents with a margin error of +/-367 residents (ACS 2019); the difference is due to the time of year each estimate was generated. In addition, thousands of seasonal workers live in the area for about 5 months during the summer tourism season to staff the tourism, recreation, and hospitality businesses that are open during this period. These residents are not captured in published demographic information for the region due to the fact that they are not in the area when the census takes place. More than half (approximately 1,050 year-round residents) of the borough's residents live in Healy, approximately 275 residents live in Anderson, and 190 residents live in each of the communities of Denali Park and Cantwell (ADOLWD 2021b).

3.3.1.3 Community and Household Characteristics. DENA comprises 70 percent of the Denali Borough, meaning that the federal government is the largest single landowner in the borough. The second largest landowner is the State of Alaska. The largest private landowner is Ahtna, Inc., the regional Alaska Native Claims Settlement Act corporation.

Kantishna is at the western terminus of the Park Road (Mile 89) and within DENA. The Park Road is the only vehicle access for inholdings (i.e., privately held land in DENA) from the park entrance. There are currently 20 discrete private inholdings owned by 12 different individuals and corporations. There are four operating commercial lodges, with a fifth lodge under construction. The remaining inholdings are noncommercial in nature.

Seasonal housing scarcity is a challenge in the borough; most seasonal workers stay in Healy. The roughly 1,800 year-round residents form an estimated 613 households, with a median household income of $81,700 and 6.6 percent of residents living at or below the poverty line (U.S. Census Bureau 2021). The cost of living in the borough is higher (index=130) than the U.S. national average (index=100) and slightly higher than Anchorage (index=126) (ADOLWD 2021c).

3.3.2 Environmental Consequences

3.3.2.1 Alternative 1: No Action. Under Alternative 1, no bridge would be constructed and traffic would be unable to continue to use the current alignment through the Pretty Rocks Landslide. Under the No Action Alternative, the Polychrome section of the Park Road would be closed to all traffic indefinitely, which would likely result in a durable, long-term adverse economic impact on

inholders west of the Pretty Rocks area and some tourism operators. With the indefinite road closure, a small number of business owners that depend on Park Road access west of the project area would face potential closure of their businesses or the need for substantial alteration of their business operations. There would be a loss of economic activity associated with Kantishna businesses and DENA spending into the local, regional, and state economies. Details of the specific impacts anticipated under Alternative 1 are provided in Appendix C.

3.3.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. Alternative 2 would avoid the long-term socioeconomic effects of the No Action Alternative. Alternative 2 would include beneficial impacts such as an increase in local employment in the construction sector during Phase I and Phase II. During Phase I and portions of Phase II, short-term impacts from this alternative would be similar to Alternative 1. However, there would also be less long-term adverse impact to business operations than under the No Action Alternative because the road would be open for the Denali Park businesses to use after completion of Phase I. The Denali Park Road would be closed past Mile 43 in 2022 under both the No Action Alternative and Alternative 2 so the short-term effects of a road closure would occur regardless of which alternative is selected.

The loss of one or more lodge businesses in Kantishna due to the combined effects of the COVID-19 pandemic and Phase I is possible under Alternative 2. Impacts to Kantishna area employment would result in an estimated loss of between $3 to $5 million in wages across both project phases, equating to around 100 jobs; however, it is important to note that these impacts would result regardless due to the indefinite closure of the Park Road.

While local housing is scarce, construction workers would be housed in existing areas in the park that have been previously disturbed. Therefore, impacts to local housing supply are not anticipated under Alternative 2.

3.3.2.3 Reasonably Foreseeable Future Actions. If activities for the RFFAs occurred concurrently with construction activities for the proposed project, there would be some additive socioeconomic impacts. Increased employment would be more intense for a short time, and there may be operational challenges for DENA to adequately house contractors.

3.4 VISUAL RESOURCES

3.4.1 Affected Environment

The NPS evaluates visual resources based on views, which consist of a viewpoint, viewed landscape, and the viewers. Scenic values of views are based on their value to the visitor experience and the NPS mission as well as the aesthetic qualities of the scenery.

DENA encompasses over 6 million acres of land (an area larger than the state of New Hampshire); however, the park has only one road, a few campgrounds, and 35 miles of maintained trails (NPS 2021c). Most of the park is undeveloped. There are vast tracts of land with no development and a variety of landscapes and ecosystems that are difficult to access and sometimes rarely seen by humans in the park beyond the Park Road corridor. Views of mountains, valleys, rivers, and forests exist throughout the park.

The Park Road provides access into the interior of the park and views of wilderness and Denali, the highest mountain peak in North America. The Park Road itself is the only human development visible along much of the road. In the project area, the road provides views of mountains, the East Fork of the Toklat River, the floodplains and valleys within the wilderness, and close-up views of the Pretty Rocks area. The road also provides views west of the project area, extending as far as Wonder Lake and Kantishna. In the project area, the road is narrow, gravel, and only open to traffic

authorized by the NPS. The nearest bus stop or overlook is the Polychrome Overlook, 1,800 feet west of the proposed Pretty Rocks Bridge. The project area is partially visible from this overlook.

3.4.2 Environmental Consequences

3.4.2.1 Alternative 1: No Action. Under the No Action Alternative, the road would be closed to traffic indefinitely at Mile 43 and continued degradation of the Polychrome section of the Park Road would occur. Most visitors would not be able to experience the views from the remaining 47 miles of the Park Road beyond the Pretty Rocks Landslide or from areas most easily accessible by way of the remainder of the road.

3.4.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. Construction activities on the Park Road under Phase I of the Proposed Action could focus some viewers on the construction work; however, the Park Road would be closed around the project area during Phase I of the Proposed Action, meaning there would be few viewers in the vicinity to focus on construction activities. The road closure would also result in less enjoyment of views from the remaining 47 miles of the road beyond the Pretty Rocks Landslide and associated areas. During Phase II, the Park Road would not be closed for construction, and viewers passing along the road may focus on construction work. However, the duration of the view of construction work would be very short when experienced by people passing through the area.

Impacts to visual resources during Phase I and Phase II construction would be short-term and adverse due to the increase in contrast and inconsistency from construction activities in an area where the focus is generally on the natural landscapes rather than human development (Appendix D). If construction activities occur at night, construction lighting would adversely impact nighttime viewscapes and dark night skies in an area of the park that currently has no artificial lighting.

Following construction activities, excavation, material placement, and the bridge would alter visual resources in the project area. Excavated areas at both ends of the bridge (including removal of the rock knob at the east abutment and the potential bench cut within the west abutment excavation area) would be visible from viewpoints surrounding the project area. Due to the mountainsides and contouring along the mountainside, the project area would have limited visibility. Because existing views of the project area include a large amount of exposed rock and cliff within and adjacent to the Pretty Rocks Landslide, excavation that exposes additional rock would not introduce contrast. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome at excavation areas, therefore reducing contrast. From some views, the potential bench cut along the west abutment excavation area would add a bold, smooth diagonal line that would not appear natural due to its form and texture, and thus would add contrast to these views. The retaining wall at the east end of the bridge would add another line and therefore contrast to some views. However, if the retaining wall were made of natural materials, the wall would more likely blend in with the existing natural surroundings at the east end of the bridge, thus reducing contrast.

Material placement would appear similar in color to the existing landslide, appearing as additional tan/red/brown-colored rock below the road. The size, mass, and extent of the material placement area would increase. Colors in the project area would be similar to baseline conditions, although some darker areas could be exposed as a result of excavation and material placement, and some green vegetation towards the toe of the landslide would be replaced by tan/brown/orange/red rock. The bridge would introduce a bold horizontal and straight line with a smooth-textured appearance, which would contrast with the existing diagonal lines and course texture of the landscape within and adjacent to the landslide. However, contrast with the surrounding Pretty Rocks Landslide would be reduced if the bridge were a neutral color such as brown, rust, or grey. In terms of scenic quality,

introduction of the bridge would increase the inconsistency of the road, and could make this feature appear dominant within some viewpoints of the project area. While the black gravel of the existing road segment that the bridge would replace is an inconsistency that is currently dominant from some viewpoints of the project area, over time, this area would likely be overtaken by the landslide, resulting in a decrease in contrast and inconsistency.

At the rockfall areas, the mountainside is very rocky; therefore, the removal of individual rocks (i.e., rock scaling) or installation of 1-inch rock bolts would likely not be noticeable. Exposed rocks would appear similar to surrounding rock on the mountainside and would not introduce contrast. Rock bolts would be designed to match surroundings.

Due to its location along the roadway at the mountainside crest, work at the Perlite Landslide would have limited visibility and would mostly likely be visible to viewers along the Park Road as they pass the site. A potential retaining wall at this location would introduce some contrast; however, a retaining wall made of natural materials would reduce potential contrast.

The retaining wall at the Bear Cave Landslide would be partially buried and would be minimally visible to viewers along the Park Road or elsewhere. Rock scaling and installation of rock bolts at the Phase II geohazard sites would likely not be noticeable from the road or other viewpoints because exposed rocks in these areas would appear similar to surrounding rock on the mountainside and rock bolts would be designed to match surroundings. Creation of rockfall ditches would not introduce contrast or landscape element inconsistency because ditches along the Park Road are not an uncommon sight.

From the Polychrome Overlook, a site with very high scenic quality and view importance, the Pretty Rocks Bridge would be minimally visible. Excavated areas at both ends of the bridge would appear as exposed rock, similar to the existing view, except the rock knob would be removed. Material placement may be visible in the middle ground of the view from the bridge down toward the floodplain, particularly near the toe of the landslide. However, the material would likely appear as a more continuous line of tan- to red/brown colored rock from the bridge down toward the toe of the landslide and the floodplain areas (Appendix D). The retaining wall at the east end of the bridge may be visible from the overlook. If this wall were made of natural materials, it would be more likely blend in with the natural surroundings at the east end of the bridge and reduce contrast. Rock scaling at the rockfall areas and work at the Perlite Landslide would likely not be visible from this viewpoint due to the distance from the viewer at the overlook. Modifications to Phase II geohazard sites would not be noticeable from the overlook due the intervening mountainside at the east end of the Pretty Rocks bridge.

Following construction, existing landscape elements would still be present, with the excavation and material placement areas appearing as exposed rock, a feature that is currently pervasive in existing views of the project area. Inconsistency would increase with introduction of the bridge, the potential bench cut along the west abutment excavation area, and the retaining wall at the east end of the bridge, but would decrease with disappearance of black gravel along the roadway over time. Vividness would continue to include similar forms and lines, with the road line being slightly more prominent and straight due to the bridge. New lines would be introduced to some views from the retaining wall at the east end of the bridge and the potential bench cut along the west abutment excavation area. Visual harmony would change due to the inconsistency of the bridge as a human-made feature and unnatural potential bench cut in the west abutment excavation area (due to its line and texture) in an otherwise natural-appearing view. A wide range of colors within views of the project area would continue to be present. Some darker areas may be exposed due to excavation and material placement. The bridge would add another strong focal point to some views, particularly those below the project area.

Overall, long-term impacts to visual resources from Phase I and II components would be adverse for some viewpoints and minimal for others. Implementation of the following measures would minimize impacts to visual resources:

1. Bridge color should be nonreflective and a neutral color to blend in with the existing colors of the landslide to the extent feasible. The final appearance would be approved by the NPS in consultation with the Bureau of Land Management standard environmental color chart.
2. The retaining wall at the east end of the bridge and at the Perlite Landslide should resemble natural materials and blend into the landscape, if possible, to reduce visibility.
3. To the extent feasible, the width of the bench cut along the west abutment excavation area should be minimized and have a rough texture (i.e., not smooth surface) to reduce contrast.
4. Any disturbed previously vegetated areas will be revegetated with native species.
5. The NPS should require shielding on construction lighting to eliminate light trespass. Fully shielded lights should illuminate the work area without allowing light to shine upward, sideways, or backward outside the work zone.

3.4.2.3 Reasonably Foreseeable Future Actions. The RFFAs would occur several miles away (both east and west) from the project area. Due to the distance from the project area and topography, the RFFAs would likely not be visible from the project area. Therefore, there would be no additive effects on views of or from the project area.

3.5 VISITOR USE AND EXPERIENCE

3.5.1 Affected Environment

In 2019, the park recorded 601,152 visits, with the majority occurring over the summer (NPS 2021d). Just under half of visitor days (defined as 12 visitor hours spent in the park) were at the entrance area or the first 15 miles of the Park Road; these visitor days did not include time spent in the project area at Mile 44 to Mile 46. An additional 13 percent of visitor days only went as far as the Teklanika Rest Stop at Mile 30 of the Park Road. The remaining visitor days (39 percent or 234,000) extended beyond the Teklanika Rest Stop and approached or traversed the project area (NPS 2021e); these visitor days would be most affected by both the Action and No Action Alternatives.

Use of the Park Road is a centerpiece for most visits to DENA; the character of the Park Road has long been recognized as integral to the visitor experience in the park (NPS 1997). The Park Road, including the project area, is the predominant way that visitors view wildlife, which most visitors cite as the primary reason for their visit (Fix et al. 2013). Most of the travelers on the Park Road are in a transit or tour bus and are typically 61 years or older (NPS 2012a).

Over half of all vehicle traffic on the Park Road travels west of the Pretty Rocks Landslide to access destinations such as Toklat, the Eielson Visitor Center, Wonder Lake, lodges, and Kantishna. Because the Park Road is vital to the DENA visitor experience, the NPS manages it to preserve opportunities for wildlife viewing, freedom of movement within the park, and the historic, rustic character of the road (NPS 2012a).

The Park Road also provides recreational access to DENA's vast backcountry for both day and overnight visitors. In 2019 (the last year before COVID-19-related closures impacted visitor use numbers), 26,211 overnight stays in the backcountry, and 26,382 overnight stays in a concessioner campground (overnight stay is defined as one night within a park by a visitor) were recorded (NPS 2021h). The project area overlooks a broad valley and is visible from many backcountry areas, including travel corridors popular with backcountry users. The NPS manages the backcountry to provide a visitor experience free from evidence of modern human use and deliberate landscape modifications (NPS 2006).

Acceleration of the Pretty Rocks Landslide has increased the need for road maintenance in the Polychrome area. Currently the NPS plans to keep the Park Road closed to visitor access in 2022 past Mile 43.

3.5.2 Environmental Consequences

3.5.2.1 Alternative 1: No Action. Under the No Action Alternative, the NPS would close the Park Road at Mile 43 indefinitely due to road failure. The road failure would affect the visitor experience of the roughly 234,000 visitors who access the park's western areas annually.

In addition, arranging for alternate access to the park beyond the closure may change the way that visitors plan for visits and enjoy the park features. The switch from car or bus transport to access via private aircraft could be a deterrent to many who cannot access this mode of transportation or who have a disability or health limitation that makes air transport challenging. Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. Construction for Alternative 2 is estimated to take place in 2022 through 2024. Under Phase I, the temporary closure of the Park Road to visitor traffic west of Mile 43 would result in impacts similar to those described under the No Action Alternative, but they would persist for only a short duration (approximately1 to 2 years). The temporary closures are not likely to result in long-term visitor use changes because access would be restored west of Mile 43 once Phase I is complete.

Construction activities on the Park Road under Phase I of the proposed project could distract visitors and would eliminate enjoyment of views from the road past the closure point. It is possible that workers would be using NPS campgrounds during construction which would limit that availability for the public to use some space in the campgrounds. As described in Section 3.4, there would be increased visual contrast and inconsistency from construction activities in an area where the focus is generally on natural landscapes rather than human development. These impacts would be short term, lasting only as long as the Phase I construction period.

Phase II construction periods (potentially occurring over several years) would result in some congestion due to closures and slower speeds through construction areas and the potential for visitors to be exposed to dust from construction activities, which may negatively impact visitor experience. However, dust management would be employed to reduce this impact. It is possible that workers would be using NPS campgrounds during construction, which would limit availability for public use. These impacts would be temporary, and access and dust levels would be restored to pre-project levels at the completion of Phase II.

Noise impacts during Phase I and Phase II construction activities may also decrease visitor satisfaction during construction. Activities with the greatest anticipated noise intensity would include rock drilling and blasting during scaling activities, as well as pile driving during construction of the bridge abutments and the retaining wall at the Bear Cave Landslide, which may be audible at distances of approximately 4,300 to 4,600 feet (Withers 2011; Betchkal 2013a). These impacts would be eliminated once Phase I and Phase II are complete, as noise levels generated by use of the improved Park Road are expected to be generally unchanged from current conditions. More details on noise impacts are provided in Section 3.6. While most impacts to visitor use and experience under Alternative 2 would cease after construction is complete, there would be a long-term alteration to the view due to the presence of the bridge spanning the Pretty Rocks Landslide and associated excavation and material placement, as described in Section 3.4. Long-term visual impacts of the project on visitor experience would vary depending on the viewpoint, with some views adversely affected and some only minimally altered from baseline conditions (Section 3.4). The mitigation measures for visual resources would also minimize long-term impacts to visitor experience.

Once construction is complete, this alternative would provide consistent and dependable visitor access to the western half of the park. This would be a long term beneficial impact to the visitor experience.

3.5.2.2 Reasonably Foreseeable Future Actions. If the RFFAs occurred concurrently with construction of the proposed project, there would be additive impacts that could be either adverse or beneficial. Adverse additive impacts could occur if there were additional noise and views of traffic or equipment along the road. Beneficial impacts could occur if gravel scraping and construction activities at Toklat and/or the Eielson Visitor Roof Replacement were to happen when the road is closed for the proposed action, reducing the amount of visitor exposure to those activities.

3.6 NOISE AND SOUNDSCAPE

3.6.1 Affected Environment

The Polychrome Area is a naturally energetic acoustic environment due to normal wind, water, and wildlife sounds. Approximately 9,000 vehicles pass through the area annually and current aviation best practices, which are voluntary, encourage operators to follow the Park Road corridor to avoid more remote areas of DENA's designated wilderness (Denali Aircraft Overflights Advisory Council 2012; NPS 2020b). Farther from these major travel corridors, one can expect notable natural sound contributions from water flowing through the East Fork of the Toklat River and wildlife calls. In the backcountry areas around Polychrome, natural sounds should predominate, and motorized noise intrusions should be very rare and faint: no more than 1 per day, up to 5 percent of any hour, and not exceeding 40 decibels (NPS 2006).

The Polychrome Area section of the Park Road features regular vehicle traffic during all hours of the day, with peak noise periods occurring between 8:00 a.m. and 12:00 p.m. and again near 4:00 p.m. (Betchkal 2013b). Buses using the road are the predominant source of traffic noise. The traffic noise generated by vehicles on the graded gravel is primarily caused by tire interaction with the gravel surface from the popping sound of rocks beneath tires (Betchkal 2013a).

Noises along the Park Road are intense and seasonal. Soundscape monitoring adjacent to the Park Road at Igloo Canyon concluded that vehicle noise is audible for an average of roughly 35 percent of the time between 8:00 a.m. and 10 a.m., with over 100 vehicles passing per day (Betchkal 2015). At Cathedral Mountain near Sable Pass, aircraft overflights regularly exceeded 30 events per day during the summer of 2012 (Betchkal 2013b).

Quantitatively, the NPS considers the natural ambient level to be the 50th percentile sound level that exists in the absence of human-caused noise. To estimate typical conditions of the analysis area, measurements from the Igloo Canyon monitoring site adjacent to the Park Road provide an upper bound representation of near-road areas, with a natural ambient level of 36.9 decibels (Betchkal 2015). Measurements from the Cathedral Mountain area near Sable Pass suggest that the natural ambient level decreases to 24.6 decibels (Betchkal 2013b). Therefore, this lower value can be used as a proxy for natural ambient levels in the affected area and serve as a baseline to assess noise impacts, per NPS Management Policies Section 8.2.3 (NPS 2006, 2020b).

3.6.2 Environmental Consequences

3.6.2.1 Alternative 1: No Action Alternative. Under Alternative 1, continued maintenance of the Pretty Rocks section of the Park Road would cease and continued degradation of the Polychrome section of the Park Road would occur. This alternative would reduce noise generated by vehicle traffic along the Park Road west of the project area. However, this alternative would increase noise generated by vehicle traffic along the Park Road east of the project area as a result of the increased

concentration of vehicles from the reduction of the accessible road length of 92 miles to 43 miles. The resulting restriction in vehicle access to key points of interest and private lodges would likely result in an increase in aviation trips as visitors and businesses respond to the lack of accessibility through air travel. Therefore, it is expected that the volume of daily aviation traffic would increase. While peak noise levels in DENA areas in proximity to the Park Road west of the project area would be reduced by the removal of traffic and maintenance noise, the anticipated increase in aviation trips would increase associated noise levels over a greater area of the park. With the permanent closure of the Park Road west of the project area, this circumstance of increased air trips would persist for the foreseeable future. Increased noise in the project area from increased air traffic to and from Kantishna as a possible impact of the road closure is expected but the extent is unknown.

3.6.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements.
Implementation of Alternative 2 would generate several temporary changes to the existing acoustic environment. Construction activities would slow vehicular traffic but the reduction in vehicle speed would prolong the duration of tire noise on the gravel road surface.

Heavy vehicles, earth-moving equipment, and power tools would generate noise during construction. Equipment that would be used during construction of Phase I at the Pretty Rocks Bridge would include an impact hammer and/or vibratory hammer; generators; large mobile cranes; excavators; and forklifts. A helicopter could be used to sling-load equipment for excavation which would also temporarily increase noise levels in the project area and in the flight corridor to the project area. A dozer may also be used during construction on the slope to place and shape the material to its final position. During Phase II at the Bear Cave Landslide, retaining wall construction and road widening equipment would include excavators; graders; front-end loaders; dump trucks; an impact and/or vibratory hammer; generators; drill rigs (for wall and anchor installation); and large mobile cranes. These construction noise sources (with the exception of a helicopter) have sound levels that range between 80 and 95 decibels at 50 feet (FTA 2018). Field measurements have shown construction equipment on the Park Road to be clearly audible at distances of approximately 4,300 to 4,600 feet (Withers 2011; Betchkal 2013a). During these measurements, construction noise was caused by many simultaneous sources (backup alarms were particularly noticeable) and was audible for large portions of an average day: 15 to 19 percent (3.6 to 4.6 hours of the day) (NPS 2020b). Since 2017, the use of broadband amplitude-adjusting backup alarms to reduce the noise intensity and audible distances is a standard inclusion in DENA construction contracts. Inclusion of this as a best practice would reduce the indirect impacts of noise to the visitor experience, lessen disturbance to wildlife, and reduce noise introduced to the soundscape for visitors seeking a sense of solitude in the nearby wilderness.

The activities with the greatest anticipated noise intensity include pile driving, rock drilling, and blasting. Temporary platform construction would require several dozen piles. The pile driving at Pretty Rocks would likely be related to the temporary platform, not the abutments. This would be accomplished through possible use of an impact hammer and/or a vibratory hammer during Phase I construction activities. A vibratory hammer creates less noise than an impact hammer. There is a possibility that piles would be drilled rather than driven due to the composition of the material. If pursued, this method would generate less noise than typical pile driving. At present, it is unknown how many piles would be necessary at Bear Cave Landslide for installation of the retaining wall during Phase II construction activities. Because piles are driven individually, the final quantity of piles will affect the total duration of noise generation in the study area. If a sheet pile is selected as the design, there could be several hundred piles. The pile driving at Bear Cave for the retaining wall would likely be done with a vibratory hammer

The specific timing, frequency, and duration of potential blasting and pile driving activities are not known at this time. Noise-generating activities in the project area are expected to be short-term in duration during construction. The typical construction season is during the summer and shoulder

seasons, April through October. Pile driving could be expected to last approximately 1 to 2 weeks at Pretty Rocks and could last up to one construction season at Bear Cave Landslide.

Following construction, noise levels in the park generated by use of the improved road are expected to be return to conditions prior to the road closure in 2021. The Pretty Rocks bridge deck would be topped with a high friction surface. This high-friction surface is expected to produce tire sounds of similar frequency spectrum and amplitude to those of the existing gravel roadway (Wayson 1998; Paulo 2010). Given that the bridge deck is not an open grate design, the vehicle noise of driving on the new bridge would be less than the existing condition because the paved surface of the bridge is smoother than the gravel surface and the vehicles would be moving across the bridge at a low speed (one-way traffic on the bridge and vehicles waiting for the bridge to be clear). Approach pavement (asphalt or concrete) on both ends of the bridge would limit debris/gravel coming onto the bridge, the noise of vehicles coming onto the bridge, and also maintenance needs for cleaning off the bridge deck and bearing areas of debris/gravel yearly. Vehicle bridge noise at the Polychrome Overlook Area would be the same as prior existing conditions and would be similar to a bus driving on a gravel road.

3.6.2.3 Reasonably Foreseeable Future Actions. If the proposed project happened concurrently with the Ghiglione Bridge project, there could be an additive impact from the noise generated by the construction equipment at that area. However, the bridge is sufficiently far from the proposed project that it is unlikely that a visitor would hear both at the same time.

3.7 WILDLIFE

3.7.1 Affected Environment

The area affected by the proposed project included within the park boundary for the purpose of conserving wildlife (especially Dall's sheep) is part of a vast connected landscape that provides important habitat for a variety of wildlife species. Twenty-three species of birds have been documented in the immediate vicinity of the landslide (e.g., golden eagle, gyrfalcon [*Falco rusticolus*], common raven [*Corvus corax*], willow ptarmigan [*Lagopus muta*], and various passerines [McIntyre 2021]), along with large mammals (e.g., Dall's sheep, caribou, grizzly bear, gray wolf [*Canis lupus*], and several smaller mammalian species such as hoary marmot [*Marmota monax*], Arctic ground squirrel [*Urocitellus parryii*] and collared pika [*Ochotona collaris*]) that use the area seasonally and year-round. This section describes the project area, which includes the wildlife species and habitats that may be most affected by the proposed project. This includes all areas affected by Phase I and Phase II, especially the area around the Pretty Rocks Landslide where the proposed bridge would be constructed.

Golden eagles, gyrfalcons, and common ravens have nested on the cliffs within 0.5 mile of the Pretty Rocks Landslide. Gyrfalcons and common ravens may reside in the area throughout the year. Golden eagles may also remain in the area in some years, but typically migrate out of the area by October and return to the area by March. In years when nesting occurs, golden eagle and gyrfalcon nests may be occupied from late winter (March) through the end of August; fledglings may remain in the area until October.

The vegetated slopes south of the Pretty Rocks Landslide provide breeding and nesting habitat for numerous migratory passerines (mainly warblers and sparrows) and resident species (such as willow ptarmigan). The talus slopes and cliffs north of the landslide provide breeding and nesting habitat for northern wheatear (*Oenanthe oenanthe*), Say's phoebe (*Sayornis saya*), and other species. For most species of migratory birds, breeding and nesting occurs between May 1 and July 31. For most species of resident birds, breeding and nesting occurs between February 16 and July 1.

Dall's sheep are common and relatively habituated to people and traffic throughout the project area, especially closer to Polychrome Pass Overlook. This is likely due to higher human activity in this area. Bands of rams may be observed on, near, or crossing the Park Road in the project area, particularly in the late winter and spring when the ridges are blown free of snow and vegetation is exposed. While Dall's sheep may occur in the project area throughout the year, the area is not considered a sheep migration route. Furthermore, while ewes and lambs have been observed in the project area, it is not considered a lambing area. Although the Dall's sheep population in DENA has decreased (possibly due to larger than usual spring snowfalls) and fluctuated in recent years and Dall's sheep have not been as common in the project area (NPS 2020c) as they were several years ago, the quality of habitat and its carrying capacity for Dall's sheep remains important.

Other species of large mammals, including caribou, grizzly bears, and gray wolves, use the area. Small groups of caribou use the Park Road in the project area in the summer to take advantage of the typically windy alpine conditions, which provide relief from insects and a high vantage point from which to view predators. Grizzly bears often traverse the road and feed on the hillside vegetation and berries. No confirmed bear dens have been detected in the project area. Gray wolves also move through the area, but do not typically den nearby.

Several smaller mammalian species have the potential to inhabit the project area, especially areas above and below the Pretty Rocks Landslide. These species, which include hoary marmot, Arctic ground squirrel, and collared pika, are present year-round. Arctic ground squirrel colonies, hoary marmot hibernacula/natal burrows, and collared pika territories may occur in the project area.

3.7.2 Environmental Consequences

3.7.2.1 Alternative 1: No Action. Under the No Action Alternative, continued maintenance of the Park Road would cease and continued degradation of the Polychrome section of the Park Road would occur. This could have a positive impact on wildlife as human-wildlife interactions be reduced due to limited access.

3.7.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. The proposed project has the potential to result in a variety of short-term and long-term impacts on wildlife species in the project area. Impacts would generally be localized around the proposed project area; however, there may be short-term impacts from hauling equipment and materials for the bridge beyond the immediate project area. Short-term impacts would primarily include increased human activity, dust, and construction noise (especially from rock drilling, pile driving, and blasting), which may stress and startle wildlife in the vicinity. Short-term impacts are anticipated to last for both phases of the proposed project and would be concentrated during the summer months when construction activities would be at their peak. There may be disruptions to species' normal behaviors in discrete locations, including displacement from the area, especially during periods of high construction activity (during soil excavation, removal, blasting, and pile driving); however, the disturbance to most species is anticipated to be temporary. For some species such as the hoary marmot, arctic ground squirrel, and collared pika, individuals may suffer injury and mortality from material excavation and placement downslope. Long-term impacts would include habitat alteration (removal of habitat above the Pretty Rocks Landslide, and placement of material south of the landslide), possible avoidance, and movement restriction for some species. Once bridge construction is complete, wildlife reaction to the bridge would vary, depending on the species and time of year. Considering these potential impacts to wildlife species, there are no anticipated population-level impacts from Alternative 2.

For avian species, loss or partial loss of home ranges for a few individuals could occur during soil excavation, rock removal, and placement of material downslope. There would be habitat loss at the Pretty Rocks Landslide area from excavation upslope and around the Park Road (approximately

2.1 acres) and material placement downslope (approximately 11.5 acres). There may be additional temporary impacts to habitat above the excavation area on the west side of the Pretty Rocks Landslide by heavy equipment accessing the top of the excavation area. There would also approximately 0.5 acre of habitat disturbance from installation of the Bear Cave Landslide retaining wall. Habitat disturbance from these activities would not result in population-level impacts to nesting species. If ground disturbing activities (including vegetation removal, blasting, excavation, pile driving, material placement) are conducted during the bird breeding and nesting season, measures would be implemented to avoid disturbance to active nests. All construction activities would comply with the Migratory Bird Treaty Act (MBTA) and Executive Order 13186, and consultation with the U.S. Fish and Wildlife Service (USFWS) would occur as needed.

The long-term impact on avian species is not likely to be adverse because some native vegetation would eventually recolonize the material placement site, and species that nest on rocky slopes above the Park Road would likely return to the area after cessation of construction activities.

Because a golden eagle pair has three nests directly above and adjacent to the Pretty Rocks Landslide, disturbance from construction activities during the breeding season would be an impact to the species per the Bald and Golden Eagle Protection Act (BGEPA). The NPS has a permit from the USFWS for nest disturbance from increased road activities as a result of the Pretty Rocks Landslide for this portion of the Park Road. The NPS is currently consulting with the USFWS regarding updating and extending the current permit to cover the entire construction period of the project. Because construction activities (including excavation and blasting of material from areas under the nests) have a potential to cause nest abandonment and nest failure (from rocks falling into the nest, or nest destabilization and potential loss), the NPS is currently seeking permits that cover both the loss of productivity and potential nest loss for one golden eagle pair. Because golden eagles are long-lived species with high site fidelity, the impacts to one nesting pair are not likely to result in the loss of a territory, but loss of productivity and nest(s) could occur during construction activities. Once construction is complete, the long-term effects on golden eagles nesting above the proposed bridge are unknown. Golden eagles may resume nesting in the area and are likely to benefit from the proposed bridge over the long term because periodic road-repair activities would not be needed and associated disturbance would not occur. Overall, impacts would be localized to the immediate vicinity of the Pretty Rocks Landslide and are anticipated to be temporary in duration. Therefore, the proposed project is anticipated to have no long-term adverse effects on MBTA and BGEPA-protected avian species.

For small mammals and furbearers that live year-round in the proposed action area and have relatively small home ranges (e.g., hoary marmot, Arctic ground squirrel, and collared pika), blasting, material excavation upslope, and material placement downslope could result in loss or partial loss of habitat, burrows (for hibernating, escaping predators, and raising young), territories, and the potential loss of individuals. While habitat would be removed from the upslope portion of the Pretty Rocks Landslide, placement of the material downslope would create rocky habitat that may potentially be used by these species following construction. While the loss of individuals is possible, population-level effects to these species in the park are not anticipated.

Impacts to Dall's sheep, caribou, grizzly bears, and gray wolves are likely to be short term (primarily during summer construction activities) and localized to the immediate vicinity of the project area. This includes short-term impacts (fugitive dust, noise, vehicle disturbance) to wildlife from construction vehicles transiting the Park Road east of the project area. During construction activities, there is potential for Dall's sheep (and other wildlife) to be encountered by construction workers. Because the Dall's sheep population has declined in recent years, any disturbance to Dall's sheep—especially ewes and lambs—has the potential for an increased impact from contact. 36 CFR 13.920 wildlife approach limits (300 yards from bear and 25 yards for other wildlife including moose, caribou, Dall's sheep, wolf, an active raptor nest, occupied den site) would apply to the project area

during construction. Increased limits would be required for sensitive wildlife such as Dall's sheep. Construction activities would cease when wildlife are within these limits (73 Federal Register 3186). Wildlife would be permitted to leave the construction area of their own volition. The potential need for occasional rock scaling activities (anticipated every 5 to 10 years) may create temporary, localized disturbance to wildlife, especially Dall's sheep.

One unknown effect from the project is the long-term response of Dall's sheep, caribou, and other large mammals to the presence of the proposed bridge. Because these species readily use the Park Road in this area, they are accustomed to traveling along a gravel road, but may be leery of crossing a new human-made feature in the landscape. Dall's sheep are expert climbers and may cross upslope around the bridge. However, caribou (which use the Park Road for insect relief and possibly predator avoidance) are likely to be hesitant to cross the bridge. They may congregate on the road at the bridge abutments, which may hinder their east-west movement through the area. While their direction of travel is unknown, it is plausible that they may opt to cross the landslide below the bridge.

The potential long-term impact to wildlife from noise as vehicles travel over the bridge is also unknown. However, as noise emanating from the bridge as vehicles drive across is projected to be relatively unchanged from current conditions (Section 3.6), it is unlikely to be a concern for wildlife that are already accustomed to the sound of vehicles driving along the Park Road. Vehicles that encounter wildlife on the road, proposed bridge, or nearby would be required to comply with NPS regulations for driving on the Park Road. This involves giving wildlife the right of way and waiting for wildlife to move off the road before slowly proceeding. The Denali Park Road Final Vehicle Management Plan (NPS 2012b) addresses many of the concerns that may arise from vehicle-wildlife encounters along the Park Road. Overall, impacts to large mammals are anticipated to be short term in duration and impact a few individuals in the proposed project area. While adverse reactions of wildlife to the bridge may extend for a longer duration, wildlife would still be able to move through the area in an east-west direction either above or below the bridge. Therefore, the proposed project is unlikely to result in adverse population-level impacts.

3.7.2.3 Reasonably Foreseeable Future Actions. The main anticipated additive impact from RFFAs is the potential for Dall's sheep and other wildlife to be temporarily disturbed during rock scaling maintenance activities in the project area, which may be necessary every 5 to 10 years. While the bridge would replace the need for road maintenance, rock-scaling on the adjacent slopes may be necessary in the long term. This has the potential to disturb Dall's sheep and other wildlife, if they are in the nearby vicinity. Measures would be implemented to reduce impacts to wildlife in the vicinity during rock scaling activities and no adverse population-level impacts are anticipated.

3.8 WETLANDS AND VEGETATION

3.8.1 Affected Environment

3.8.1.1 Wetlands. Wetlands within 150 feet of the Park Road between Mile 43 and 46 and an area below the Pretty Rocks Landslide were delineated in 2021 prior to preparation of the Statement of Findings for Protection of Wetlands (NPS 2021f). A large portion of the area is steep, rocky terrain that is mostly barren of vegetation. Where present, vegetation is largely dominated by dwarf shrub, low shrub birch ericaceous-willow, low shrub-sedge, and closed low shrub birch (Boggs et al. 2001).

In the approximately 190-acre study area (defined as the area that was delineated in the 2021 field study, Figure 3-3), approximately 5 percent of vegetated areas are considered wetlands and approximately 2 percent of the area is composed of riverine habitats. Excluding the road, approximately 67 percent of upland areas are vegetated and 33 percent is barren; of all vegetated areas mapped as shrub-dominated, approximately 6 percent is composed of wetlands. Wetlands in

the study area have been disrupted hydrologically because they are either bisected by the Park Road or situated on the toe of the Pretty Rocks Landslide. Wetlands identified in the study area are adjacent to steep slopes and are not connected to streams through a surface inlet or outlet, which is relatively common in the watershed.

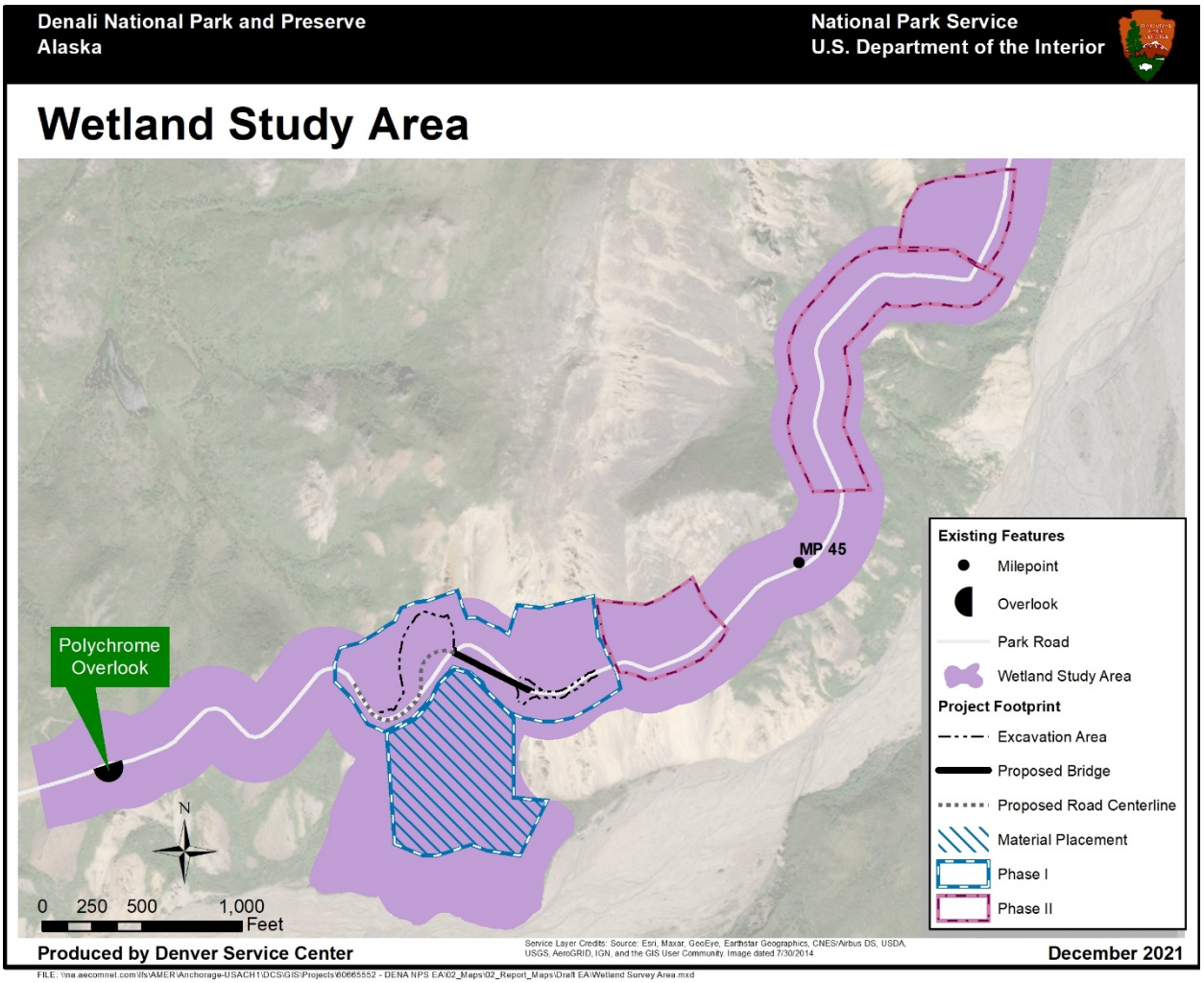


FIGURE 3-3. WETLAND STUDY AREA

The study area contains approximately 9.5 acres of jurisdictional wetland (5 percent), 3.8 acres of waters (2 percent), and approximately 177.1 acres of upland (93 percent). A description of wetlands by the classification system outlined in the Classification of Wetlands and Deepwater Habitats of the United States, the Cowardin system, (Cowardin et al. 1979) is provided in Table 3-3.

Cowardin-based wetland types in the Polychrome Improvements study area include the following:

- Palustrine Emergent Wetlands (emergent)—Emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes that are typically present for most of the growing season. Wetlands characterized by herbaceous vegetation (PEM1) consist of Lapland reedgrass (*Calamagrostis lapponica*), Bigelow's sedge (*Carex bigelowii*), Arctic hare-foot sedge (*Carex lachenalii*), alpine-tundra sedge (*Carex macrochaeta*), tufted hair grass (*Deschampsia caespitosa*), rough fescue (*Festuca altaica*), pygmy gentian (*Gentiana prostrata*),

two-flower rush (*Juncus biglumis*), tall bluebells (*Mertensia paniculata*), arctic sweet-colt's-foot (*Petasites frigida*), fowl blue grass (*Poa palustris*), tall Jacob's ladder (*Polemonium acutiflorum*), and arctic yellow violet (*Viola biflora*).

- Palustrine Scrub-Shrub Wetlands (scrub-shrub)—Scrub-shrub wetlands are dominated by shrubs, young trees, or mature trees that have been stunted due to environmental conditions. Vegetation is typically less than 20 feet tall. Wetlands characterized by shrubs (PSS1/EM1) consist of black torpedoberry (*Arctous alpinus*), swamp birch (*Betula nana*), leatherleaf (*Chamaedaphne calyculata*), golden-hardhack (*Dasiphora fruticosa*), marsh Labrador-tea (*Rhododendron tomentosum*), cloudberry (*Rubus chamaemorus*), net-vein willow (*Salix reticulata*), diamond leaf willow (*Salix pulchra*), alpine blueberry (*Vaccinium uliginosum*), and northern mountain cranberry (*Vaccinium vitis-idaea*).
- Palustrine Unconsolidated Bottom and Aquatic Bed Wetlands (ponds)—One type of ponded wetland occurs in the study area (PUBH). Ponded palustrine wetlands that have at least 25 percent bottom cover of particles smaller than stones (less than 3 inches) and a vegetation cover of less than 30 percent are considered to have unconsolidated bottoms.
- Riverine Wetlands—Riverine wetlands are freshwater wetland habitats contained within a channel, which are not dominated by trees, shrubs, emergent, moss, or lichens; and do not contain ocean-derived salts in excess of 0.5 percent. Riverine wetlands are mapped as streams (R3UBH) and included as linear feet. All streams identified in the study area have a surface water connection to the East Fork of the Toklat River, which flows into the Toklat River and the Kantishna River. One stream section was excavated and is denoted by R3UBHx.

TABLE 3-3. WETLANDS BY COWARDIN CLASS

Cowardin Class	Cowardin Description	Acre[1]	Linear Feet
Upland	N/A	177.1	N/A
PSS1/EM1B	Palustrine, scrub-shrub/emergent, saturated	9.1	N/A
PSS1/EM1C	Palustrine, scrub-shrub/emergent, seasonally flooded	0.1	N/A
PEM1B	Palustrine, emergent, saturated	0.2	N/A
PEM1C	Palustrine, emergent, seasonally flooded	0.04	N/A
PUBH	Palustrine, unconsolidated bottom, permanently flooded	0.01	N/A
R3UBH	Riverine, upper perennial, unconsolidated bottom system	N/A	4,963.3
R3UBHx	Riverine, upper perennial, unconsolidated bottom system (excavated)	N/A	165.1

Notes:
[1]Rounded to the nearest tenth.
N/A = not applicable

During the delineation, wetlands were evaluated based on their hydrogeomorphic position (i.e., the landform in which wetlands are situated) in the landscape. Wetlands in study area were found in either slope, flat, or depressional areas. This evaluation system is based on abiotic features such as the chemical characteristics of water, habitat maintenance, and water storage and transport (Brinson 1993). Wetlands and streams were assessed for functions and their overall value using the Alaska Wetland Assessment Methodology developed by the State of Alaska Department of Transportation and Public Facilities (ADOT&PF 2011).

In this methodology, a high-functioning wetland provides habitat for threatened or endangered species, is unique, and streams support fish. No wetlands or streams in the wetland study area are considered high functioning based on low to moderate scoring because they do not meet these criteria. The braided streams below the Pretty Rocks Landslide are outside of the project area and

were not considered in the 2021 wetlands survey but were studied as a part of a separate wetlands study completed in 2020 (NPS 2020d).

All wetlands are ranked as being moderate to low functioning. They can be important for a variety of wildlife species and can provide watershed protection depending on where they are situated.

The East Fork of the Toklat River and tributary is ranked as moderate functioning due to a perennial flow, natural stream channel, and the potential to support resident fish. Small perennial streams on steep slopes in the study area near the Park Road are ranked as low to moderate functioning because they are not known or believed to support fish. One stream section that occupies an excavated trench in the Bear Cave Landslide to divert water away from the Park Road is considered low functioning due to its location and human-made nature.

3.8.1.2 Vegetation. Vascular vegetation in much of the project area is sparse or absent because much of the land surface is composed of rocky outcrops along steep slopes, as well as the road itself. Diverse lichen communities are present throughout the project area.

Above the road, the Pretty Rocks Landslide is devoid of vegetation, while portions of the toe of the landslide below the road are vegetated. Vegetation is present in the project area west of the Pretty Rocks Landslide along the road corridor in the Bear Cave Landslide area and at the other road improvement sites. Diverse lichen communities are present throughout the project area; however, they are not particularly unique when considering the larger landscape and do not contain rare, threatened, or endangered species.

Where present, most vegetation is upland vegetation, while approximately 5 percent of the project area is dominated by wetland plant communities. Vegetation in the project area commonly includes alder (*Alnus incana and Alnus viridus)*; various low shrub birch; arctic willow (*Salix arctica);* narrow-leaf fireweed (*Chamaenerion angustifolium)*; and various berries, sedges, and grasses (Boggs et al. 2001; NPS 2021f).

3.8.2 Environmental Consequences

3.8.2.1 Alternative 1: No Action. Under the No Action Alternative impacts to wetlands or vegetation would occur over time as the Pretty Rocks Landslide and other rockfalls in the project area migrate downslope, altering runoff and the wetland and vegetation communities at the toe of the slope, per natural processes.

3.8.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvement. The proposed project would directly and permanently impact 0.60 acre of low- to moderate-functioning wetlands and approximately 1,000 linear feet of low to moderate-functioning streams in the project area. The wetland area at the toe of the landslide (0.59 acre) is currently being buried and moved by mass wasting caused by a combination of natural and human-induced processes. This process is likely to continue under any alternative as it is driven by changing ground conditions. Although the proposed action does directly affect this area, it does not alter the eventual outcome of permanent wetland disturbance. Approximately 0.01 acre of a wetland in the area above and west of the Pretty Rocks has been included in the project for the purpose of accessing the excavation slope and this wetland would be flagged and avoided (Section 3.1).

A list of impacted wetlands and their associated vegetation types in the project area is provided in Table 3-4. No temporary impacts to wetlands are anticipated. Any impacted wetlands under the jurisdiction of the U.S. Army Corps of Engineers (per Section 404 of the Clean Water Act) would require permitting prior to construction. Concurrent with the Section 404 process, a U.S. Environmental Protection Agency Section 401 Water Quality Certification would also be obtained. Because the proposed action would include work in wetlands, a Wetlands Statement of Findings is required to comply with NPS Director's Order #77-1, Wetland Protection, which establishes the

policies, requirements, and standards for implementing Executive Order 11990 (Protection of Wetlands)(NPS 1998).

TABLE 3-4. APPROXIMATE WETLAND IMPACTS

Cowardin Class	Habitat Function	Project Component	Area (ac)	Linear ft
PSS1/EM1C	Low to moderate	Phase I: Material Placement	0.14	N/A
PSS1/EM1B	Low to moderate	Phase I: Material Placement	0.45	N/A
PEM1B	Low to moderate	Phase I: Pretty Rocks and Perlite	0.01	N/A
R3UBH	Low to moderate	Bear Cave	N/A	834.0
R3UBHx	Low	Bear Cave	N/A	165.1
		Total	0.6	1,000

Notes:
ac = acre
ft = feet

The proposed project would directly impact vegetation along the road corridor from excavation and placement of material and sediment. The area to be excavated includes sparsely vegetated rocky slopes and tundra vegetation. The material placement area below the Park Road at the Pretty Rocks Landslide site contains portions of the vegetated toe, or lower margin, of the landslide. Up to approximately 11.5 acres of vegetation in this area could be buried under waste rock and sediment during construction. In the years following construction vegetation would likely naturally repopulate the area as the waste material settles and stabilizes.

Vegetation near the Pretty Rocks Landslide (approximately 2.1 acres) and in the road corridor around Bear Cave Landslide (approximately 0.5 acres) would be permanently lost during excavation. There may be additional temporary impacts to vegetation above the excavation area on the west side of the Pretty Rocks Landslide from heavy equipment accessing the area. Small areas of vegetation along the roadside may be impacted by construction activities at the other road improvement sites. Mitigation measures would be implemented to protect the vegetation from damage by heavy machinery and tracked vehicles during construction. The vegetation in the affected area is commonly found throughout the park and is not endangered or protected. Loss of this vegetation would not impact the park's ecosystem.

During construction, vegetation surrounding the roadbed may be temporarily covered with dust from heavy equipment operation. Dust management would be employed to reduce this impact. Lichens grow slower than vascular plants and would therefore be more sensitive to impacts from the project.

Earthwork including excavation, installation of abutments, regrading of slopes, and realignment has the potential to introduce nonnative species. Established DENA best management practices would be employed to minimize this potential impact, including inspection of equipment and vehicles for invasive/nonnative species before entering the park and revegetation of disturbed areas with plants salvaged from the project area and native seeds.

3.8.2.3 Reasonably Foreseeable Future Actions. The project would result in a small amount of impacts to wetlands and vegetation in an area that contains a large proportion of wetlands and vegetation. Although the amount of fill and cover from the RFFAs is relatively small, the project would contribute small additive impacts on wetlands and vegetation. All projects will implement avoidance and minimization measures, where applicable and regulatory mitigation measures will be followed.

3.9 CULTURAL RESOURCES

3.9.1 Affected Environment

The 92-mile Park Road Historic District and Cultural Landscape (PRHD&CL), Alaska Heritage Resources Survey ([AHRS] Number: HEA-00517) runs east to west in the foothills north of the Alaska Range in DENA. The road extends from Mile 237.3 of the George Parks Highway across several low passes and glacier-fed rivers to the historic mining district of Kantishna, which was incorporated into the park by the Alaska National Interest Lands Conservation Act in 1980. The road was originally constructed from 1922 to 1938 by the ARC. The ARC and the NPS collaborated on the road design. The road is historically significant for its association with the period of scenic road development in national parks in the 1920s and 1930s, as well as for its association with the Mission 66 park development program in the 1950s and 1960s. The road is also a rustic example of landscape engineering combining NPS aesthetic road design principles with the ARC's experience constructing roads in northern environments.

For the purposes of determining which cultural resources could be affected by the proposed project, the analyzed area included not just the project footprint where potential physical effects are likely to occur, but also a 1-mile perimeter around the project where visual, noise, and/or atmospheric effects from the proposed project could occur. Cultural resources found in this area include portions of the Mount McKinley National Park Road Historic District (HEA-00517/ HEA-00429) and Cultural Landscape, the East Fork Patrol Cabin Site (HEA-00218) and Cultural Landscape; the East Fork Bridge; and a historic archaeology site (HEA-00323) that consists of a collection of historic metal cans that may be associated with the building of the road. The historic road and its contributing features (which include the bridge and cabin site) are listed in the National Register (ADNR OHA 2021). HEA-00323 is being treated as eligible for the National Register for its association with the 1930s ARC construction camp in the Bear Cave Landslide area, and as a contributing feature to the Park Road. The historic road is associated with the period of scenic road development in national parks in the 1920s and 1930s and for its role in developing tourism in Alaska. The section of the Park Road in the project area is one of the best examples of the intentionally curvilinear and dramatic design of the road. Despite the maintenance work conducted in previous years to address the Pretty Rocks Landslide, the road in the project area maintains a high degree of design and location integrity, which contribute to its historic character.

The PRHD&CL considers the road itself, along with the geographic area, natural resources, and setting. The views of and from the road, including the precipitous drops, curvilinear design, and dramatic geology in the project area contribute to the cultural landscape. The East Fork Patrol Cabin is meaningful because of its association with two historical themes: the development of a transportation system in remote areas on interior Alaska, and the early wildlife conservation efforts of the NPS in the first national park in Alaska. A Phase I archaeological survey of the project area was conducted in September 2021 (Anders and Maughn 2021) (Figure 3-4). No previously undocumented historic or ancestral cultural resources were identified in the project area.

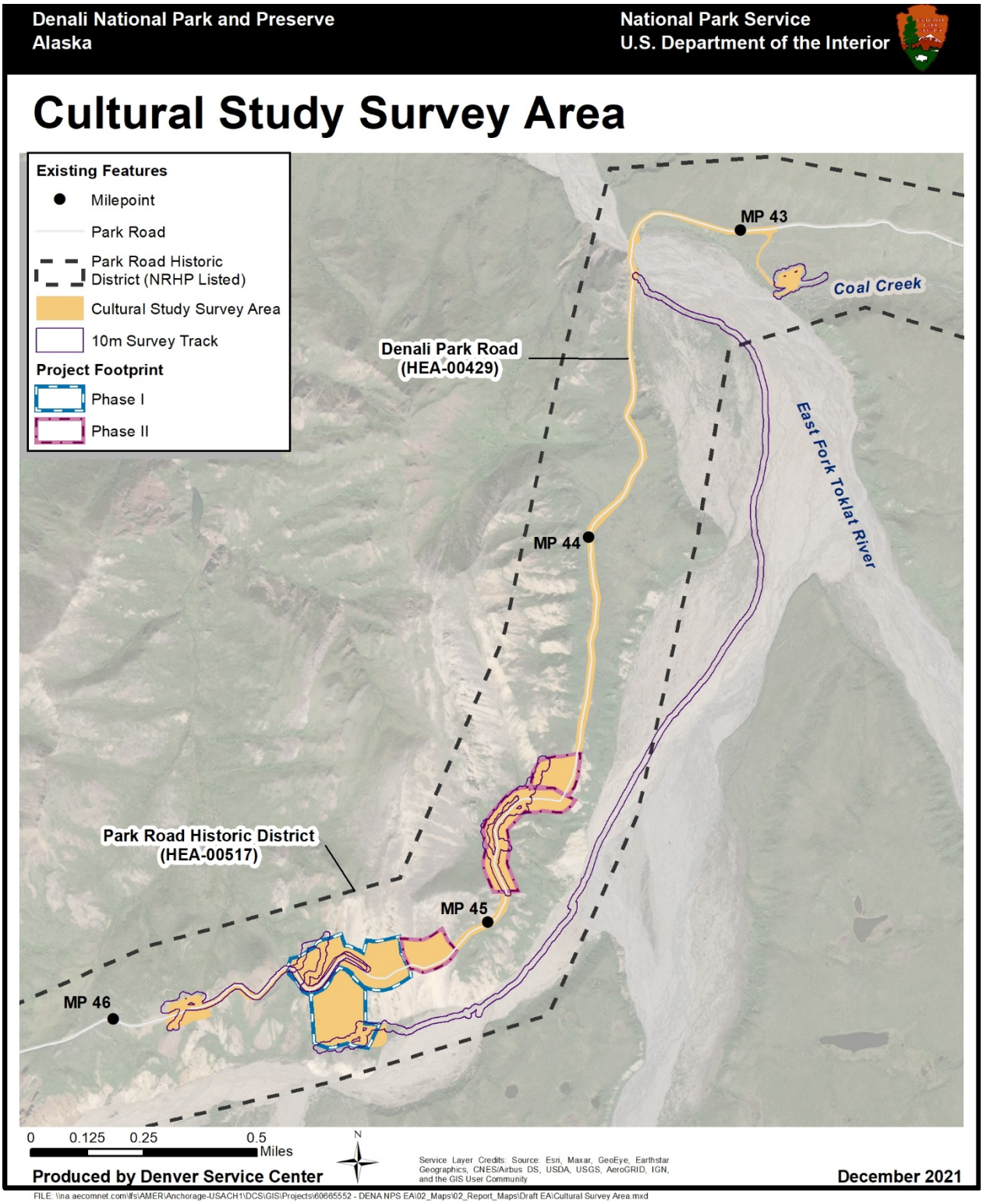


FIGURE 3-4. CULTURAL STUDY SURVEY AREA

3.9.2 Environmental Consequences

3.9.2.1 Alternative 1: No Action. Under Alternative 1, the Park Road would not be maintained beyond the East Fork of the Toklat River. Allowing the portion of the Park Road on the Pretty Rocks Landslide to degrade naturally and the abandonment of the remaining 47 miles of the Park Road west of the Pretty Rocks Landslide would result in degradation of this cultural resource and would adversely impact the integrity of the historic district by changing the historic character and setting. Closing the road just past the turn off to the East Fork Cabin may result in increased visitor use of the area and/or changes to the site and cultural landscape, which could adversely impact it. Under this alternative, the archaeology site HEA-00323 would not be affected.

Access to rural viewscapes is the key historic association that conveys why the PRHD&CL is significant and eligible for the National Register under Criteria A and C. If Alternative 1 were to be implemented, the road would no longer be maintained, and public access would no longer be possible. Over time, the characteristics of the PRHD&CL would be diminished if this alternative was implemented. Therefore, Alternative 1 would result in an adverse effect consistent with 36 CFR 800.5(d)(2).

3.9.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. The proposed project would maintain the integrity of the Park Road by retaining its original location, but would also result in long-term changes to the historic character of the Pretty Rocks section of road, which is considered an adverse effect per the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR Part 800). As determined in consultation with the Alaska State Historic Preservation Officer (SHPO), tribes (as defined by the NHPA), and other consulting parties, mitigation for the adverse effect(s) would be addressed through the NPS's development of an amendment to the existing Denali Park Road *Programmatic Agreement Between the National Park Service, Denali National Park and Preserve and the Alaska State Historic Preservation Officer Regarding Routine Maintenance, Repair, Operations, Bridge and Culvert Replacements, Geohazard Monitoring, and Emergency Maintenance on the Denali Park Road Corridor*, executed between the NPS and the SHPO August 2020. A list of those contacted to be Consulting Parties along with example letters sent is provided in Appendix B.

The proposed project would not adversely affect the East Fork Patrol Cabin Site or cultural landscape because no ground disturbance would take place at that location and no physical installation in this alternative would be visible from it. The proposed retaining wall that would be constructed during Phase II of this alternative is at the location of HEA-0323 and would likely adversely impact the site. Access to rural viewscapes is the key historic association that conveys why the historic road is significant and eligible for the National Register. As designed, Alternative 2 would allow for continued access to those viewscapes but would result in a small reroute (including allowing the portion of the road that passes through the Pretty Rocks Landslide to degrade naturally) and the introduction of incompatible elements in the PRHD&CL. Due to these factors, the project as designed would result in an adverse effect to the Park Road's integrity, which qualifies this property for inclusion in the National Register. Therefore, the NPS finds that Alternative 2 (Phase I and II) would result in an adverse effect consistent with 36 CFR 800.5(d)(2).

Although both alternatives would result in adverse effects to the PRHD&CL, Alternative 2 is currently preferred by the NPS because it would serve to minimize long-term effects to the historic property by keeping the facility maintained and accessible to the public and therefore limit effects to the historic characteristics that make the PRHD&CL eligible for the National Register.

3.9.2.3 Reasonably Foreseeable Future Actions. The Ghiglione Bridge Project would have an additive adverse effect to the PRHD&CL by altering the Park Road and diminishing historic setting.

The Eielson Visitor Roof Replacement Project may also have an additive adverse effect on the PRHD&CL.

3.10 WILDERNESS

3.10.1 Affected Environment

DENA encompasses 2 million acres of federally designated wilderness and nearly 4 million acres of eligible wilderness. The Park Road corridor cuts through the middle of the designated wilderness area. Along most of the Park Road, including the project area, the wilderness boundary generally begins 150 feet from the center of the original road alignment (Figure 2-2 and Figure 2-4), resulting in a 300-foot wide corridor along the Park Road alignment that is not within designated wilderness (with some exceptions). Any project work performed or equipment installed outside this corridor would be in designated wilderness.

DENA's wilderness character is largely unimpaired, with functioning natural ecosystems, few modern human developments, and outstanding opportunities for solitude or primitive and unconfined recreation (Burrows et al. 2016). The wilderness is predominantly undeveloped with concentrated areas of permanent structures and improvements intentionally placed outside the wilderness boundary (NPS 2017). Most development is along the Park Road corridor, which is excluded from the wilderness but affects the undeveloped quality of the wilderness character due to the sights and sounds of mechanization and development that permeate beyond the road corridor (NPS 2017). The NPS strives to maintain the untrammeled quality of the park's wilderness by practicing humility and restraint, aiming to protect the natural systems present in the wilderness by not interfering (NPS 2021g). Actions taken outside the wilderness boundary in the Park Road corridor can still have the unintended consequence of trammeling otherwise intact ecosystem processes.

Parts of the DENA wilderness have some of the quietest documented natural soundscapes in the world, while in other parts of the wilderness, aircraft and other motorized sound can be heard up to a third of each day, above the desired sound level described in the park's Backcountry Management Plan (NPS 2006). The soundscape adjacent to the Park Road is affected by traffic and other activity along the roadway. DENA's wilderness is unique in that it is easily accessible via the Park Road, but is still a vast, remote wilderness on par with other large, harder-to-access wilderness areas in Alaska.

3.10.2 Environmental Consequences

3.10.2.1 Alternative 1: No Action Alternative. Under the No Action Alternative, the Polychrome section of the Park Road would be closed to all traffic indefinitely. Visitor traffic would turn around at the East Fork Bridge at Mile 43 and there would be no road access to points west of the Pretty Rocks Landslide on the remaining 47 miles of the Park Road. Geologic processes and movements would continue to occur without restraint in the Pretty Rocks Landslide area. There would be little effect to the undeveloped quality of wilderness. The natural quality of wilderness would be both positively and negatively affected by the road closure. The area east of the closure would likely see additional use or concentration of use within the wilderness. However, with the road closure, there would be reduced visitor use west of the landslide and thereby reduced impacts to the natural quality of wilderness in that portion of the park. In addition, the natural quality may slightly benefit from deposition of additional rock and soil on the Pretty Rocks roadway section over time, therefore returning this portion of the roadway to a more natural condition. Road closure would also affect the opportunity for solitude and unconfined recreation in wilderness. The lack of road access would substantially reduce access to primitive and unconfined recreation opportunities west of the Pretty Rocks Landslide. Conversely, this would improve opportunities for solitude beyond the Pretty

Rocks Landslide due to decreased visitation and traffic west of the landslide. However, the road closure would likely lead to additional use or concentration of use within the wilderness east of the landslide, which would result in reduced opportunities for solitude in this portion of the wilderness. Presumably, flights into Kantishna would increase as a result of Kantishna no longer being accessible via the Park Road. Although Kantishna is outside of the wilderness, flight noise may be heard in the wilderness due to flightpaths and location of the airstrip near the wilderness boundary; therefore, opportunities for solitude may be reduced.

3.10.2.2 Alternative 2: Pretty Rocks Bridge and Polychrome Road Improvements. The 1964 Wilderness Act prohibits the use of motor vehicles, motorized equipment, and installations "except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act" (Public Law 88-577, Sec 4[c]). The purpose of the Wilderness Act is to preserve the wilderness character of an area for present and future generations. The proposed project would require the use of motorized vehicles and equipment to transport, excavate, and place materials in the wilderness, for maintenance of the potential bench cut, and for the potential installation of rock bolts at rockfall areas. Most impacts to wilderness would be limited to the area immediately adjacent to the road corridor, which is being impacted by activity on the road under existing conditions. Most impacts to wilderness would be adverse and short term, occurring during construction. Long-term adverse impacts to wilderness from the project would include impacts to the untrammeled, undeveloped, natural, and opportunities for solitude qualities of wilderness character due to potential permanent installations and potential periodic maintenance activities using motorized vehicles and equipment. Impacts from the project on the qualities of wilderness character are described below and were evaluated in the Minimum Requirements Analysis that was developed for this project (Appendix E).

Untrammeled — The untrammeled quality of wilderness character refers to wilderness that is essentially free from the intentional actions of modern human control or manipulation. The untrammeled quality is degraded by actions that intentionally manipulate or control ecological systems (Burrows et al. 2016). Many of the actions intended to protect the road from geohazards interfere with the natural processes of the area. Excavation and placement of excavated material in the wilderness, rock scaling, and potential rock bolting in or near the wilderness boundary would degrade the untrammeled quality by altering the ecological processes of rock weathering and movement, soil deposition and creation, and vegetation growth within the wilderness. The intention of the retaining walls is to alter landslide movement; therefore, the walls could alter geologic processes surrounding the walls. Rock scaling and potential bolting would be very localized but would also result in a small change to ecological processes. The construction of a bridge across the Pretty Rocks Landslide would allow the Pretty Rocks Landslide to occur naturally.

Undeveloped — The undeveloped quality is affected by nonrecreational structures and installations and by the use of motor vehicles, motorized equipment, or mechanical transport in wilderness. Excavation and material placement in the wilderness, along with use of heavy equipment through the wilderness, would result in temporary use of motorized vehicles and equipment in the wilderness. The maintenance of the potential bench cut in the western excavation area may require further motorized vehicle use during short intervals in the future. The potential rock bolts for rockfall areas would also require motorized equipment for drilling the rock bolts into the cliff. These bolts would be permanent installations in the wilderness; however, they would be very small (1-inch diameter).

Natural — The impacts to the natural quality of wilderness character are further evaluated in Section 3.7 and Section 3.8. Project activities would adversely affect the movement, feeding, nesting, and reproduction of wildlife in and across the road corridor including, but not limited to, caribou, grizzly bears, Dall's sheep, marmots, collared pika, arctic ground squirrels, passerines, insects, and golden eagles. Removal of cliff and rock habitat, transport of vehicles through the wilderness, and placement of excavated materials would adversely impact vegetation communities, including lichens. The geohazards being repaired by the project are also aspects of the naturally functioning

ecosystems in the area, so the impediment of the processes of rock weathering and movement, water flow, and soil creation and deposition, would have an adverse effect on the surrounding areas.

Opportunities for Solitude or Primitive and Unconfined Recreation — This quality of wilderness character is affected by the sights and sounds of development that occur inside or outside the wilderness, including impacts to the soundscape and viewshed (impacts due to noise are described in Section 3.6; impacts to the visual resources, including construction lighting, are provided in Section 3.4). All project activities, whether within the wilderness or not, would be visible and/or audible from the wilderness due to the proximity of the project sites to the wilderness boundary during construction. Project activities (including periodic maintenance activities) would use loud machinery, and would increase the number of people present in the immediate area. Therefore, opportunities for solitude would decrease during construction. The movement of equipment and materials to and from the project area would increase truck movements along the road and thus would decrease opportunities for solitude along the entire road to the site. However, the completed project would allow access to the full extent of the Park Road, including access to opportunities for solitude or primitive and unconfined recreation thus benefitting this quality. Providing this access would facilitate spreading recreational use over a greater extent of the Denali Wilderness, therefore decreasing the concentration of use and increasing opportunities for solitude. The addition of a bridge visible from the wilderness would additionally contribute to the sights and sounds of humans from the roadway.

Other Features of Value — Wilderness preserves other features of scientific, educational, scenic, or historical value. Impacts to cultural resources are provided in Section 3.9, geological processes in Section 3.2, and viewshed in Section 3.4.

Overall, there would be some adverse impacts to wilderness from Phase I and II components. Implementation of the measures to reduce impacts to the other resources discussed in this EA (such as the visual and noise measures described in Section 3.4 and Section 3.6, respectively) would reduce impacts to wilderness character.

3.10.2.3 Reasonably Foreseeable Future Actions. The road maintenance and gravel processing RFFAs would continue to affect the natural, untrammeled, and opportunities for solitude or primitive and unconfined recreation qualities of wilderness character, near where these activities occur, from noise, traffic, and changes to natural processes and habitat. The Ghiglione Bridge and Eielson Visitor Center Roof Replacement projects would result in temporary noise and construction activity, which would affect opportunities for solitude or primitive and unconfined recreation near where these projects occur. If the RFFAs were to occur concurrently with the proposed project, there could be reduced opportunities for solitude in several discrete areas of the wilderness. However, the RFFAs would be many miles away from one another and the project area, and there would be substantial opportunities for solitude in the areas of wilderness not affected by these projects.

4 CONSULTATION AND COORDINATION

4.1 CIVIC ENGAGEMENT

Civic engagement was conducted to inform the public about the Polychrome Area Improvements at the park, hear public concerns, answer questions, solicit comments, and request input on the proposed project for preparation of this EA. The public meeting press release was distributed by DENA and published to the park's Planning, Environment, and Public Comment (PEPC) website on September 29, 2021, which opened the 30-day public comment period. A postcard was mailed to post office box holders in Healy, Denali Park, and Cantwell, Alaska informing them of the public meetings, and flyers were posted in post offices in the region. DENA also sent an email-blast to stakeholders informing them of the public meetings and comment period. The comment period for the Polychrome Area Improvements project ran from September 29, 2021, through October 29, 2021, during which time the public was invited to submit comments on the planning process.

Public meetings were held virtually on October 13 and 14, 2021 due to safety considerations surrounding the COVID-19 pandemic. These meetings included a presentation that described the background of the Pretty Rocks Landslide, geological hazards in the project area, the purpose and need for the project, a description of the two alternatives, and information about the EA process, and ended with an invitation to the attendees to ask questions to NPS staff and submit comments on the EA process. A total of 108 people attended the public meeting on October 13 and 84 people attended the meeting on October 14. The NPS was also invited to and presented on the project at numerous meetings (e.g., stakeholder groups, nonprofit organizations, and state and local governments) during the civic engagement period.

During these meetings the public was invited to submit comments on the project using any of the following methods:

- electronically through the NPS PEPC website
- verbally, through email, or through text message at the public meetings
- via mail to the NPS
- via email to the NPS

At the release of the EA to the public in January 2022, the public is invited to review this document and provide comments to the NPS. Public meetings are scheduled in January 2022, and comments can be submitted using the methods described above.

4.2 AGENCY CONSULTATION

4.2.1 Endangered Species Act, Section 7

In accordance with the Endangered Species Act of 1973, the NPS requested from the USFWS an official list of the federally threatened and endangered species and designated critical habitats that may occur in the Polychrome Area Improvements project area. On October 1, 2021, the USFWS provided a list which confirmed that no federally listed species or designated critical habitats occur in the project area. This species list fulfills the requirements for consultation under Section 7(c) of the Endangered Species Act (Appendix B).

4.2.2 Migratory Bird Treaty Act and Golden Eagle Protection Act

The NPS would conduct project activities in accordance with the MBTA (16 U.S. Code Sections 703-712) by implementing the measures previously detailed in Section 3.7. In addition, the project would be conducted in accordance with the BGEPA (16 U.S. Code 668-668c) through the permitting process with USFWS. The NPS is currently seeking permits that cover both the loss of productivity and potential nest loss for one golden eagle

4.2.2 Migratory Bird Treaty Act and Golden Eagle Protection Act

The NPS would conduct project activities in accordance with the MBTA (16 U.S. Code Sections 703-712) by implementing the measures previously detailed in Section 3.7. In addition, the project would be conducted in accordance with the BGEPA (16 U.S. Code 668-668c) through the permitting process with USFWS. The NPS is currently seeking permits that cover both the loss of productivity and potential nest loss for one golden eagle pair for the 2022 and 2023 breeding seasons. The permits are necessary because the pair has three nests directly above and adjacent to the Pretty Rocks Landslide and the proposed project has the potential to result in take.

4.2.3 National Historic Preservation Act, Section 106

In accordance with Section 106 of the NHPA, the NPS has initiated consultation with the SHPO and 25 consulting parties (Appendix B). Compliance with Section 106 of the NHPA will be completed concurrently with—but as a separate process to—the EA and will provide an assessment of effects to historic properties. In November 2021, the SHPO and potential consulting parties received an NHPA Section 106 consultation letter informing them of the NHPA determination that the project would adversely affect historic properties and that they are potential consulting parties as defined in 36 CFR Part 800.2(c)(2). The letter invited them to participate as a consulting party on the agreement document to mitigate adverse effects, and also comment on the NHPA determination. Consulting parties had 30 days to review the NHPA determination and submit comments to the NPS. The public also had 30 days to review the NHPA determination and submit comments to the NPS through the PEPC website.

4.3 TRIBAL CONSULTATION

The NPS initiated consultation with 16 federally recognized American Indian tribes and Alaska Native Claims Settlement Act (ANCSA) Native corporations (Appendix B), on July 7, 2021 for most tribes and ANCSA corporations and August 10 for Doyon Limited, informing them of the proposed project and soliciting comments. The NPS also made follow-up phone calls to these tribes and ANCSA corporations in early August 2021.

In November 2021, the tribes and ANCSA corporations received an NHPA Section 106 Consultation letter informing them that they are a potential consulting party as defined in 36 CFR 800.2(c)(2). The letter invited them to participate as a consulting party on the agreement document to mitigate adverse effects, and also comment on the NHPA determination. Consulting parties had 30 days to review the NHPA determination and submit comments to the NPS.

The NPS will continue to consult with the tribes who have expressed interest in continued consultation throughout the EA process and project implementation. If any additional information regarding ethnographic resources or traditional uses is provided, the NPS will work with the concerned parties to mitigate potential impacts to cultural resources, ethnographic resources, and traditional uses associated with any element of the project.

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APPENDIX A—ALASKA NATIONAL INTEREST LANDS CONSERVATION ACT SECTION 810(A) SUBSISTENCE—SUMMARY EVALUATION AND FINDINGS

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

ANILCA	Alaska National Interest Lands Conservation Act
DENA	Denali National Park and Preserve
NPS	National Park Service

1 INTRODUCTION

This section was prepared to comply with Title VIII, Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA). It summarizes the evaluation of potential restrictions to subsistence activities that could result from the Polychrome Area Improvements along the Denali Park Road in Denali National Park and Preserve (DENA).

2 THE EVALUATION PROCESS

Section 810(a) states:

> In determining whether to withdraw, reserve, lease, or otherwise permit the use, occupancy, or disposition of public lands...the head of the federal agency...over such lands...shall evaluate the effect of such use, occupancy, or disposition on subsistence uses and needs, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy or disposition of public lands needed for subsistence purposes. No such withdrawal, reservation, lease, permit or other use, occupancy or disposition of such lands which would significantly restrict subsistence uses shall be effected until the head of such Federal agency–
>
> 1. gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to Section 805;
> 2. gives notice of, and holds, a hearing in the vicinity of the area involved; and
> 3. determines that (A) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (B) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other disposition, and (C) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

Section 202(3) of the act also states: "Subsistence uses by local residents shall be permitted in the additions to the park where such uses are traditional in accordance with the provisions in Title VIII."

Title I of the Alaska National Interest Lands Conservation Act established national parks for the following purposes:

> . . . to preserve unrivaled scenic and geological values associated with natural landscapes; to provide for the maintenance of sound populations of, and habitat for, wildlife species of inestimable value to the citizens of Alaska and the Nation, including those species dependent on vast relatively undeveloped areas; to preserve in their natural state extensive unaltered arctic tundra, boreal forest, and coastal rainforest ecosystems to protect the resources related to subsistence needs; to protect and preserve historic and archeological sites, rivers, and lands, and to preserve wilderness resource values and related recreational opportunities including but not limited to hiking, canoeing, fishing, and sport hunting, within large arctic and subarctic wildlands and on free-flowing rivers; and to maintain opportunities for scientific research and undisturbed ecosystems.
>
> . . . consistent with management of fish and wildlife in accordance with recognized scientific principles and the purposes for which each conservation system unit is

> established, designated, or expanded by or pursuant to this Act, to provide the opportunity for rural residents engaged in a subsistence way of life to continue to do so.

The potential for significant restriction must be evaluated for the proposed action's effect on ". . . subsistence uses and needs, the availability of other lands for the purposes sought to be achieved and other alternatives which would reduce or eliminate the use. . . ." (Section 810[a]).

3 PROPOSED ACTION ON FEDERAL LANDS

Alternatives 1 and 2 are described in detail in the Environmental Assessment for this project. Customary and traditional subsistence use on lands managed by the National Park Service (NPS) will continue as authorized by federal law under all alternatives. Federal regulations implement a subsistence priority for rural residents of Alaska under Title VIII of the ANILCA.

3.1 ALTERNATIVE 1—NO ACTION

Under Alternative 1, the Park Road at Pretty Rocks would not be repaired and no bridge would be constructed; the Bear Cave Landslide, Perlite Landslide, and rockfall areas would not be addressed. The NPS would not improve the Polychrome section of road and there would be no vehicle access through the Polychrome area to the 47 miles of road west of the landslide (Mile 45.4). Access to the Kantishna inholdings would be primarily via air, and visitor transportation would continue to be limited to Mile 43 of the Park Road, indefinitely. If no action is taken to restore road access to the west district of the park, further planning would be needed to determine if NPS roads and facilities west of Polychrome would be maintained, abandoned, or restored to a natural state.

3.2 ALTERNATIVE 2—PRETTY ROCKS BRIDGE AND POLYCHROME ROAD IMPROVEMENTS (PROPOSED ACTION AND PREFERRED ALTERNATIVE)

Alternative 2 would consist of two implementation phases. Phase I would restore access through the Polychrome area by constructing a bridge over the Pretty Rocks Landslide (approximately Mile 45.4) and undertaking risk reduction measures for the Perlite Landslide (approximately Mile 45.3) and rockfall hazards near the proposed bridge. The old road alignment through the Pretty Rocks Landslide would be abandoned after bridge construction, allowing landslide processes to continue and the road to degrade naturally.

Phase II would address several additional geologic hazards in the Polychrome area, including constructing a retaining wall at the Bear Cave Landslide and undertaking risk reduction measures in rockfall areas. For both phases, workers would be housed in existing areas in the park that have been previously disturbed, including the possible use of campgrounds. The Park Road would be used to transport materials and workers to work sites.

4 AFFECTED ENVIRONMENT

Subsistence uses in DENA are permitted in accordance with Titles II and VIII of the ANILCA. Section 202(3)(a) of the act allows local residents to engage in subsistence uses, where such uses are traditional in accordance with the provisions in Title VIII. The designated Denali Wilderness, which are lands within former Mount McKinley National Park, are closed to subsistence uses.

A regional population of approximately 280 eligible local rural residents qualifies for subsistence use of park resources outside the wilderness boundaries. Resident zone communities for Denali National Park are Cantwell, Minchumina, Nikolai, and Telida. By virtue of their residence, local rural residents of these communities are eligible to pursue subsistence activities in DENA, but only outside of designated wilderness areas. Local rural residents who do not live in the designated resident zone communities, but who have customarily and traditionally engaged in subsistence activities within the park additions, may continue to do so pursuant to a subsistence permit issued by the park superintendent. The community of Healy is adjacent to the park; however, it is not a designated resident zone community and therefore Healy residents are not eligible to subsistence hunt, fish, or trap anywhere in the park (Brown et al. 2016).The NPS realizes that DENA may be especially important to certain communities and households in the area for subsistence purposes. The resident zone communities of Minchumina and Telida use DENA lands for trapping and occasional moose hunting along area rivers. Nikolai residents have used park resources in the past, though the population is currently declining. Cantwell is the largest resident zone community for DENA, and local residents hunt moose and caribou, trap, and harvest firewood and other subsistence resources in the park and Kantishna.

Primary subsistence species, by edible weight, are moose, caribou, furbearers, and fish. Varieties of subsistence fish include coho, king, pink and sockeye salmon. Dolly varden, grayling, lake trout, northern pike, rainbow trout and whitefish are also among the variety of fish used by local people. Beaver, coyote, land otter, weasel, lynx, marten, mink, muskrat, red fox, wolf, and wolverine are important furbearer resources. Rock and willow ptarmigan, grouse, ducks, and geese are important subsistence wildlife resources.

ANILCA authorizes use of some motorized surface transportation methods (e.g., motorboats, snowmachines) for subsistence activities in DENA only if these methods have been traditionally employed. Similarly, off-highway vehicles can be used in areas where they have been traditionally used for subsistence purposes and only on designated trails. Airplanes are not permitted for providing access to the ANILCA park additions or the preserve for subsistence taking of fish and wildlife and subsistence users may not land outside of DENA and walk in to engage in subsistence hunting and trapping. However, qualified subsistence users may use aircraft in the park to carry supplies to a base camp or cabin but may not use aircraft to work a trapline in the park (NPS 2021).

The NPS recognizes that patterns of subsistence use vary from time to time and from place to place depending on the availability of wildlife and other renewable natural resources. A subsistence harvest in any given year many vary considerably from previous years because of such factors as weather, migration patterns and natural population cycles. However, the pattern is assumed to be generally applicable to harvests in recent years with variations of reasonable magnitude.

5 SUBSISTENCE USES AND NEEDS EVALUATION

To determine the potential impact on existing subsistence activities, three evaluation criteria were analyzed relative to existing subsistence resources that could be impacted. The evaluation criteria are:

1. the potential to reduce important subsistence fish and wildlife populations by (a) reductions in abundance; (b) redistribution of subsistence resources; or (c) habitat losses
2. the effect the action might have on subsistence fishermen or hunter access
3. the potential for the action to increase fishing or hunting competition for subsistence resources

5.1 THE POTENTIAL TO REDUCE POPULATIONS

Provisions of the ANILCA and federal and state regulations provide protection for fish and wildlife populations in DENA.

Construction of the Pretty Rocks Bridge and Polychrome Road Improvements (Alternative 2) has the potential to stress or displace individual animals in the vicinity of the project area, including grizzly bears, caribou, Dall's sheep, and willow ptarmigan. Effects would be most probable during the construction period (estimated to begin in August 2022 and run through September 2023 for Phase I, and begin in the Spring of 2024 for Phase II) and could persist at low levels during the operation of the new bridge and the existing road segments in the Polychrome area. Wildlife in the area have largely adapted to the presence of vehicles during summer months. The proposed project would not result in significant adverse impacts on the distribution or migration patterns of subsistence resources. Therefore, no change in the availability of subsistence resources is anticipated as a result of the implementation of this proposed action.

5.2 RESTRICTION OF ACCESS

Section 811 of the ANILCA addresses "Access" for subsistence as follows: "The Secretary shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands." Traditional access for Title VIII subsistence uses should not be significantly restricted under the proposed action.

Alternative 2 (Proposed Action) is not anticipated to significantly limit or restrict the access to subsistence uses within the additions of Denali National Park or Denali National Preserve established by the ANILCA. The Park Road would be temporarily closed at Mile 43 during Phase 1 of Alternative 2, which is expected to take place during the 2022 and 2023 subsistence hunting seasons. Therefore, qualified subsistence hunters from Cantwell would have limited access lands in Kantishna during this period, but the access is expected to return to pre-project levels once vehicles are allowed to travel past the Mile 43 closure. Access to the Kantishna inholdings would be maintained throughout construction by road (when possible) or by air. Federal and state regulations ensure the continued viability of fish and wildlife populations.

5.3 INCREASE IN COMPETITION

Alternative 1 (No Action) and Alternative 2 (Proposed Action) are not expected to result in increased competition for fish, wildlife, or other resources that would significantly impact subsistence users in DENA. Federal and state regulations ensure the continued viability of particular fish or wildlife populations.

6 AVAILABILITY OF OTHER LANDS

The proposed project is site-specific to the vicinity of the Pretty Rocks Landslide and geohazards in the Polychrome area in DENA. It has been determined that no other federally managed lands would be suitable for this project.

7 ALTERNATIVES CONSIDERED

Two alternatives were analyzed for this project and are described in detail in the Environmental Assessment. These alternatives occur within the same area of DENA, where Title VIII subsistence uses are not authorized. Neither of the two alternatives proposed would significantly restrict subsistence uses on other adjacent federally managed lands.

8 FINDINGS

This analysis concludes that the proposed action will not result in a significant restriction of subsistence uses.

9 REFERENCES

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APPENDIX B—CONSULTATION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fairbanks Fish And Wildlife Conservation Office
101 12th Avenue
Room 110
Fairbanks, AK 99701-6237
Phone: (907) 456-0203 Fax: (907) 456-0208

In Reply Refer To: October 01, 2021
Consultation Code: 07CAFB00-2022-SLI-0001
Event Code: 07CAFB00-2022-E-00002
Project Name: Polychrome Area Improvements Environmental Assessment

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Fairbanks Fish And Wildlife Conservation Office
101 12th Avenue
Room 110
Fairbanks, AK 99701-6237
(907) 456-0203

Project Summary

Consultation Code: 07CAFB00-2022-SLI-0001
Event Code: Some(07CAFB00-2022-E-00002)
Project Name: Polychrome Area Improvements Environmental Assessment
Project Type: BRIDGE CONSTRUCTION / MAINTENANCE
Project Description: The proposed project to address several geologic hazards along approximately two miles of the Denali Park Road (mile 44-46) is referred to as the “Polychrome Area Improvements” project and has been separated into two phases:

Phase I
•Excavation of the uphill slope to the east and west of the bridge to accommodate construction activities and traffic. Some of the excavated material would be stored or used to temporarily maintain the existing road across the landslide, and the rest would be placed below the road.
•Slight realignment of the road on the west side of the bridge to allow for a proper turning radius for buses and other vehicles getting on and off the bridge
•Installation of a retaining wall east of the landslide, on the uphill slope.
•Construction of a 400-foot launchable modular steel truss bridge to span the Pretty Rocks landslide. A temporary platform would be installed on the east side to extend the staging area during bridge construction.
•Rock scaling, rock reinforcement with bolts, and creation of a rockfall ditch to mitigate rockfall hazards.

Phase II
•Construction of a retaining wall on south side of the road and roadway shift at Bear Cave slump
•Rock scaling, rock reinforcement with bolts, creation of rockfall ditches, and laying back uphill slopes at several additional sites to mitigate rockfall hazards.

The project is scheduled to begin in 2023 but given the recent road closure and the anticipated challenge to repair and maintain the road through Pretty Rocks in 2022, NPS and FHWA are pursuing contracting and funding options to be able to begin sooner.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@63.5360274,-149.81603975325476,14z

Counties: Denali County, Alaska

Endangered Species Act Species

There is a total of 0 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

A list of the consulting parties receiving NPHA Section 106 Correspondence is provided in Table B-1. Examples of the letters mailed July 7, 2021 and November 19, 2021 are also provided in this appendix.

TABLE B-1. CONSULTING PARTIES

Organization Name	Name	Title	Mailing Address	Polychrome Initiation Letters	Polychrome Invitation Letter (Phone Call Follow-Up)	Polychrome Consultation Letters (Mail)	Polychrome Consultation Letters (Email)
Regional Corporations							
Ahtna, Inc.	Michelle Anderson	President	PO Box 649 Glenallen, Alaska 99588	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Doyon Limited	Aaron Schutt	President	1 Doyon Place, Suite 300 Fairbanks, Alaska 99701	Mailed 8/10/2021	8/4/2021 Doyon Limited formally requested consultation on 10/4/2021	11/19/2021	11/22/2021
CIRI Corporation	Sophie Minich	President	PO Box 93330 Anchorage, Alaska 99509	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Tanana Chiefs Conference	"PJ" Pollack B. Simon Jr.	President	122 1st Avenue, Suite 600 Fairbanks, Alaska 99701	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Tribes							
Native Village of Cantwell	Rene Nicklie	President	Post Office Box 94 Cantwell, Alaska 99729	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Manley Hot Springs Village	Raymond Woods	First Chief	Post Office Box 105 Manley Hot Springs, Alaska 99756	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Nenana Native Association	Conrad McManus	First Chief	Post Office Box 369 Nenana, Alaska 99760	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Nikolai Village	John Vernon	First Chief	Post Office Box 9107 Nikolai, Alaska 99691	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Native Village of Tanana	Victor Joseph	Executive Director	Post Office Box 130 Tanana, Alaska 99777	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Telida Village	Steven Nikolai	First Chief	PO Box 9104 Nikolai, Alaska 99691	Mailed 7/7/2021	8/4/2021	11/19/2021	11/22/2021
Village Corporations							
Seth-De-Ya-Ah Corporation	Board of Directors	--	615 Bidwill Avenue, Suite 407 Fairbanks, Alaska 99701	Mailed 7/7/2021	--	11/19/2021	--

Organization Name	Name	Title	Mailing Address	Polychrome Initiation Letters	Polychrome Invitation Letter (Phone Call Follow-Up)	Polychrome Consultation Letters (Mail)	Polychrome Consultation Letters (Email)
Tozitna, Limited	Board of Directors	--	Post Office Box 129 Tanana, Alaska 99777	Mailed 7/7/2021	--	11/19/2021	11/22/2021
Toghotthele Corporation	Kathy Morgan	Board Chair	PO Box 249 Nenana, Alaska 99760	Mailed 7/7/2021	--	11/19/2021	11/22/2021
BEAN RIDGE Corporation	Dorothy Shockley	President	615 Bidwill Avenue Suite 401 Fairbanks, Alaska 99701	Mailed 7/7/2021	--	11/19/2021	--
MTNT, Limited	Michelle Christiansen	CEO	1500 W. 33rd Avenue, Suite 100 Anchorage, Alaska, 99503	Mailed 7/7/2021	---	11/19/2021	11/22/2021
Local Government							
Denali Borough	Clay Walker	Mayor	PO Box 480 Healy, Alaska 99743	Not Sent	--	11/19/2021	11/22/2021
Matanuska-Susitna Borough	Vern Halter	Mayor	350 East Dahlia Avenue Palmer, Alaska 99645	Not Sent	--	11/19/2021	11/22/2021
Other							
Denali Citizens Council	Charlie Loeb	President	PO Box 78 Denali Park, Alaska 99755	Not Sent	--	11/19/2021	11/22/2021
Lake Minchumina Traditional Council	Robert Thompson	Chair	PO Box 53 Kaktovik, Alaska 99747	Not Sent	--	11/19/2021	--
Talkeetna Community Council	Jonathan Korta	Chair	PO Box 608 Talkeetna, Alaska 99676	Not Sent	--	11/19/2021	11/22/2021
Talkeetna Historical Society	Sharon Montagnino	President	PO Box 76 Talkeetna, Alaska 99676	Not Sent	--	11/19/2021	--
Matanuska-Susitna Borough Historic Preservation Board	--	--	--	Not Sent	--	Sent via Borough Letter	11/22/2021
State Historic Preservation Officer	Judith Bittner	Ms.	550 W. 7th Avenue, Suite 1310 Anchorage, Alaska 99501-3565	Mailed 7/7/2021	--	--	11/19/2021
Alaska Department of Transportation	Joseph Kemp	Acting Northern Region Director	2301 Peger Road Fairbanks, Alaska 99709	Not Sent	--	Not Sent	11/24/2021

Organization Name	Name	Title	Mailing Address	Polychrome Initiation Letters	Polychrome Invitation Letter (Phone Call Follow-Up)	Polychrome Consultation Letters (Mail)	Polychrome Consultation Letters (Email)
Declined Consultation							
Native Village of Minto	Joseph Alexander	Chief	PO Box 58026 Minto, Alaska 99758	Mailed 7/7/2021	8/4/2021 No longer would like to be contacted by DENA for consultation	--	--

Notes:
-- = no data

United States Department of the Interior

NATIONAL PARK SERVICE
Denali National Park & Preserve
Mile 237 Parks Highway
P.O. Box 9
Denali Park, AK 99755

IN REPLY REFER TO:
D30 (DENA)

July 1, 2021

President Michelle Anderson
Ahtna, Inc.
Post Office Box 649
Glenallen, Alaska 99588

Dear President Anderson,

This letter is intended to introduce and invite you to consult on a proposed project to address multiple landslides and other geohazards from miles 43-48 of the Denali Park Road (the Polychrome Area). These landslides have the potential to greatly disrupt transportation, negatively impact visitor experience, cause resource damage, inhibit commercial services, and affect public safety. Denali National Park and Preserve (DENA), in cooperation with the Federal Highway Administration (FHWA), is proposing a suite of engineered solutions to address these geohazards, including the construction of a bridge to span the large landslide at mile 45.5 known as the Pretty Rocks landslide.

DENA and FHWA will begin resource surveys and scoping for the project this summer in preparation for completing the project's environmental documentation, and we will send additional information this fall. If you are interested in being a consulting party on this project please let us know within 30 day of receipt of this letter.

We look forward to working with you to assure that our land management activities thoroughly consider, address, and protect places of importance and tribal concerns. Please feel free to contact our National Historic Preservation Act Coordinator Phoebe Gilbert at (907) 505-9157 or by email at phoebe_gilbert@nps.gov if you have any questions or concerns and we look forward to this continued conversation.

Sincerely,

Brooke Merrell

Brooke Merrell
Deputy Superintendent
Denali National Park and Preserve

Attachment: Figure 1. Project Location and Overview Map

CC: Phoebe Gilbert (DENA)

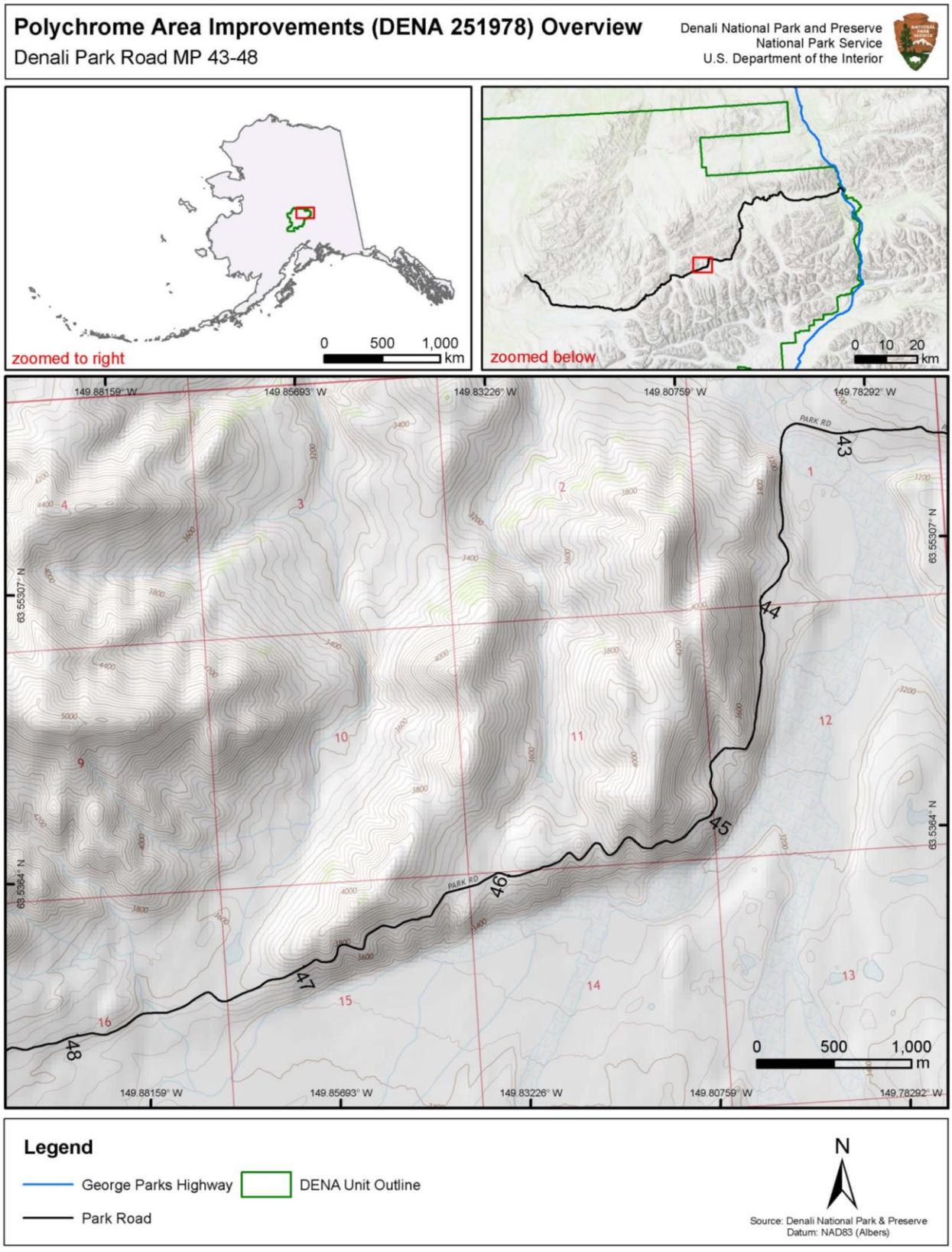

Figure 1: Polychrome Area Improvements (DENA 251978) Location and Overview

PROJECT LINKS

Project Home

Plan Process

Meeting Notices

Links

Document List

Open For Comment (1)

Comment Now »

Comment period closes
Dec 19, 2021

at 11:59 PM Mountain Time in
17 Days, 9 Hours, 39 Min.

Denali National Park and Preserve » Polychrome Area Improvements Environmental Assessment » Document List » Document Contents

National Historic Preservation Action Section 106 Consultation for the Polychrome Area Improvements Project

Denali National Park and Preserve (DENA) is planning a project to address geological hazards from mile 44 to 46 of the Denali Park Road (Park Road). Details of the proposed project and the National Historic Preservation Act (NHPA) Section 106 determination can be found in the "National Historic Preservation Action Section 106 Consultation for the Polychrome Area Improvements Project" attachment. Section 106 of the NHPA requires federal agencies to take into account the effects of their projects on historic properties. Based on our review, as designed this project would adversely affect historic properties. We have reached the NHPA, Section 106, determination of "Historic Properties Adversely Effected" (36 Code of Federal Regulations [CFR] Part 800.5).

We invite you to comment on the NHPA determination and to provide input on a forthcoming agreement document to mitigate the adverse effects. If you have any comments on the NHPA determination or want to comment on the agreement document, please do so by December 19th, 2021 (per 35 CFR 800.5(c)).

Please Submit Comments to:

Phoebe Gilbert
Cultural Resources Program Manager
Denali National Park and Preserve
907-505-9157
phoebe_gilbert@nps.gov

Comment Now »

Comment Period: 11/19/2021 - 12/19/2021

*Comment period closes **Dec 19, 2021** at 11:59 PM Mountain Time in:*
***17** Days, **9** Hours, **39** Min.*

Document Content:

FINAL_Section_106_letter-Public_Distribution_20211118.pdf *(9.6 MB, PDF file)*

United States Department of the Interior

NATIONAL PARK SERVICE
Denali National Park & Preserve
Mile 237 Parks Highway
P.O. Box 9
Denali Park, AK 99755

IN REPLY REFER TO:

D30 (DENA)
Phoebe Gilbert
Cultural Resources Program Manager
Denali National Park
907-505-9540 (o)
phoebe_gilbert@nps.gov

Subject: National Historic Preservation Act Section 106 Consultation for the Polychrome Area Improvements Project

Denali National Park and Preserve (DENA) is planning a project to address geological hazards from Mile 44 to 46 of the Denali Park Road (Park Road). Please find below details of the proposed project and the National Historic Preservation Act (NHPA) Section 106 determination. Section 106 of the NHPA requires federal agencies to take into account the effects of their projects on historic properties. Based on our review, as designed this project would adversely affect historic properties. We have reached the NHPA, Section 106, determination of "Historic Properties Adversely Effected" (36 Code of Federal Regulations [CFR] Part 800.5).

PROJECT DESCRIPTION

The National Park Service (NPS) proposes to implement a series of engineered solutions to address eight identified unstable slopes from Mile 44 to 46 along the Denali Park Road (Figure 1)—including the hazard posed by the acceleration of the Pretty Rocks Landslide—in DENA. The Pretty Rocks Landslide (at approximately Mile 45.4 of the Park Road) is one of several known landslides in the area and is threatening the integrity, safety, and continued viability of approximately 300 linear feet of the Park Road as well as access to the 47 miles of road west of Pretty Rocks. Monitoring data indicate that the Pretty Rock Landslide's rate of movement has increased dramatically in recent years and current maintenance efforts are no longer sustainable in the face of continued and accelerating movement. This proposed undertaking requires review and consultation under the NHPA, and this letter is sent to you as a potential consulting party as defined in 36 CFR 800.2(c).

The proposed project is considered by the NPS to be undertaking pursuant to 36 CFR800.3(a) that has the potential to affect historic properties and is subject to Section 106 of the NHPA of 1966 (54 United States Code 306108). The Federal Highway Administration is a cooperating agency for the undertaking and has designated the NPS as the lead federal agency for the purposes of Section 106.

This letter is organized to describe the two project alternatives that the NPS is currently considering, delineate the Area of Potential Effect (APE), identify and evaluates historic properties in the APE, assesses the effects to historic properties, and outline steps to resolve adverse effects to historic properties.

PROJECT ALTERNATIVES

ALTERNATIVE: 1 NO ACTION

Under Alternative 1, no bridge would be constructed, and the NPS would not maintain the current road alignment through the Pretty Rocks Landslide. The Polychrome section of road would be closed to all traffic indefinitely. Visitor traffic would turn around at the Toklat East Fork bridge at Mile 43 and there would be no road access to points west of Pretty Rocks Landslide (Mile 45.4) on the remaining 47 miles of the Park Road.

ALTERNATIVE 2: PRETTY ROCKS BRIDGE AND POLYCHROME ROAD IMPROVEMENTS (NPS PREFERED ALTERNATIVE)

Alternative 2 would consist of two phases of development. Phase I would restore access across the Pretty Rocks Landslide by constructing a bridge spanning approximately 400 feet over the Pretty Rocks Landslide at approximately Mile 45.4. This phase includes excavation at the west and east ends of the bridge, material placement below the road, installation of a retaining wall at the east abutment, development of a temporary platform for bridge assembly, and geohazard mitigation at the Perlite site. Phase II would maintain the road in place by addressing several additional geologic hazards. This phase includes installation of a retaining wall at the Bear Cave slump below the road grade and addressing three additional rockfall sites with rock bolts, rock scaling, and/or rockfall ditches. Workers would be housed at the Toklat Road Camp (unless Toklat is not accessible to workers; then a location east of Mile 42 would be used).

Alternative 2: Phase I

Phase I would include excavation at the west and east ends of the bridge, material placement, installation of a retaining wall at the east abutment, geohazard mitigation at the Perlite site, and construction of a bridge. Staging and storage would occur in areas that are already used for these purposes and no vegetation clearing would be necessary. The Park Road would be used to transport materials and workers to work sites.

Excavation

Approximately 115,000 cubic yards of material would be excavated. Excavation would be accomplished by rock removal with heavy equipment and blasting. The rock knob to the east of the landslide would be excavated to provide space for the east abutment of the bridge and a temporary staging platform. The uphill slope above the east abutment would also be excavated to allow construction vehicles and traffic to use the existing roadway to access the west side during periods of construction. A cut side retaining wall would be permanently installed to allow access around the east abutment during construction and to reduce the risk of future failure from the cut slope above.

The slope above the west abutment would be excavated to provide space for construction of the bridge and to accommodate vehicles turning on and off the bridge. A portion of this excavation area (less than 1 acre) would be in designated wilderness. The excavation wall could include a bench cut into the rock partway down the rock wall to serve as a rockfall catchment area. The excavation could also include a road-level rockfall ditch. Periodic maintenance of the bench using heavy machinery would be needed, a small portion of which would be in wilderness. Excavation would also require some transport of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. Excavation areas would be contoured to match surroundings, and any vegetation damage from equipment access would be restored after use.

Material Placement

After swell of 20 percent for deposition is accounted for, excavated material would need to be disposed of. Much of the material would be of insufficient quality for use as aggregate or roadbed material; however, if appropriate, a portion of the material would be trucked off site and stored in DENA for use on future projects or to fill the slump in the existing road while maintaining limited access during construction. Storage would occur in existing storage locations. The majority of the excavated material would be placed in the area below the roadway above the toe of the landslide and approximately 10.25 acres of that area would be in wilderness. Mechanical tracked equipment would be used to move material off the roadway and into the material placement area, which would require temporary access in wilderness. Anticipated equipment to be used during material placement includes excavators, dump trucks, and bulldozers on the slope that would be placing and shaping the material into its final position. Some vegetation toward the toe of the landslide would be covered by excavated material. Excavated material would consist of rock and soil similar to what exists at the site and would be expected to look similar to existing rock/soil at the landslide.

Road Realignment

An approximately 250-foot section of the road on the west side of the bridge would be realigned slightly to create a turning radius for buses and other vehicles to navigate the road. The realignment would include a shift of 5 to 10 feet, which would be designed to avoid a geohazard in that area along the south side of the road.

Perlite Site

The Perlite site is near the east abutment and is a rockfall, debris slide, and slump that creates a geohazard along 170 feet of the Park Road. Rock scaling (i.e., the removal of loose or potentially unstable rocks) would be conducted at the site likely by workers on ropes using prybars and cranes; no blasting would be conducted. Rock scaling would be designed to match contours and existing surroundings. In addition, 1-inch diameter bolts would be drilled into the subsurface rock of the cliff face to secure hazardous rocks, some of which would occur in the wilderness area. Rock bolts would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them.

Pretty Rocks Bridge Construction

The NPS would construct a steel bridge spanning the Pretty Rocks Landslide site (Figure 2). The bridge would be approximately 400 feet long and have an overall width of 24 feet and would be attached to abutments at both ends. Abutments would be concrete and steel pilings drilled into the bedrock. The bridge would be one lane and traffic would stop at existing pullouts at either end, yielding to vehicles on the bridge.

A temporary platform would be constructed near the east abutment for use as a bridge assembly location. The platform would be approximately 150 feet long and extend 150 feet from the south side of the road. The bridge components would be trucked to the site and stored at the temporary platform until assembly. Bridge assembly is estimated to take 30 days. Bridge abutment and temporary platform construction would require some pile driving and concrete placement, with an estimated 16 piles needed. Equipment for bridge construction would include a vibrator hammer; generator; drill rig for ground anchor and micropile installation; large mobile cranes; excavators; and forklifts.

After bridge construction, the east and west abutment areas would be recontoured and revegetated as needed to match the surrounding areas and to restore the road width to the historic character. Bridge maintenance would occur at both abutments when needed and thus a

small amount of space, after the majority of the space was recontoured, would be preserved at both abutments for future maintenance needs. Visitor Traffic

During construction, the existing Park Road across the landslide would be minimally reconstructed for construction use. Regular visitor road traffic through the site would not be accommodated during most construction activities for safety reasons; however, limited traffic may be accommodated during some construction periods with the possibility for some visitor traffic in the later stages of Phase I. When the road is temporarily closed to through traffic, traffic would likely turn around at the East Fork Toklat River Bridge (Mile 43). Access to the Kantishna inholdings would be primarily by air; additional access would be via road when possible.

Alternative 2: Phase II

Phase II (Figure 1) would include installation of a retaining wall or earthwork at the Bear Cave slump and addressing three additional geohazard sites. Staging and storage would occur in areas that are already used for these purposes and no vegetation clearing would be necessary. The Park Road would be used to transport materials and workers to work sites.

Bear Cave Slump

At the Bear Cave area, Phase II would include excavation of materials and construction of a retaining wall on the south side of the Park Road. The retaining wall would be buried approximately 30 to 60 feet deep and run 1,000 feet along the road edge to stabilize the road edge. The north side of the Park Road would be temporarily widened in the Bear Cave area to allow traffic to pass around the construction site, and would be returned to the original width at the end of construction. After construction of the wall, the area on the north side of the road would be recovered and the road would be returned to the existing roadway centerline and width. Road work would also include drainage ditch improvements and excavation in this area. The retaining wall and road widening/improvements would not be within the wilderness area. The retaining wall would be made of steel, concrete, and wood and it would be minimally visible from the surrounding area, including from backcountry areas south of the road. Construction equipment necessary for wall construction and road widening would include excavators; graders; front end loaders; dump trucks; vibrator hammer; generator; drill rig for wall and anchor installation; and large mobile cranes. Equipment and materials for Bear Cave work would be stored at existing staging areas in DENA.

The disturbed areas of the road would be revegetated and recontoured to match the surrounding area after project completion and rehabilitation.

Other Sites

Three additional geohazard sites (Sites 863, 864, and 870) would be addressed during Phase II. At these sites, Phase II would include engineered solutions to mitigate rockfall hazards such as rock scaling, installation of rock bolts, and creation of rockfall ditches. Rock scaling would be repeated every 5 to 10 years or as needed to reduce rockfall hazards. Some of the activities related to rock bolting and rock scaling at these three additional sites could impact wilderness. Rock bolts would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them.

Visitor Traffic

Through traffic would be accommodated during Phase II. There may be some delays allowing only one-way traffic or for safety at certain times. There could also be scheduled closures during the day for periods of time. Rock scaling and bolting cannot occur in the dark for the safety of construction personnel. Therefore, traffic delays and holds during daylight hours would be needed. This is similar to current practices for road maintenance in DENA.

AREA OF POTENTIAL EFFECT (APE)

The APE is the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if such properties exist (36 CFR Part 800.16[d]). For the proposed project, the APE is between approximately Mile 44 and 46 along the Park Road; it was developed to encompass the proposed project alternatives that include potential solutions to address ongoing geohazards, including the construction of a bridge to span the Pretty Rocks Landslide. The APE includes 70.16 acres where potential physical effects are likely to occur and encompasses excavation and/or filling activities, material placement, bridge construction areas, rockfall mitigation sites, drainage ditch improvements, retaining wall construction, revegetation and recontouring, as well as potential equipment staging and storing locations. The APE also includes a 1-mile perimeter that surrounds the boundary of the National Register of Historic Places (National Register)-listed Park Road Historic District (PRHD) (HEA-00517/MMK-00195)[1] from Mile 43 to 46 where visual, noise, and/or atmospheric effects from the proposed undertaking may potentially occur. This APE includes 5,562.90 acres (Figure 3).

RESULTS OF INVENTORY AND RECORDS CHECK

DENA cultural resource records and Geographic Information System (GIS) data were reviewed previous to this project and the physical APE was surveyed in August of 2021 (Anders 2021). Portions of PRHD and the East Fork Patrol Cabin Site and Cultural Landscape (CL) (HEA-00218) are in the physical APE. Contributing resources of the PRHD include the East Fork Patrol Cabin Site and the East Fork Toklat River Bridge. HEA-00323 (East Fork Can Dump), a historic archeology site, is also within the physical APE. There are no additional historic properties in the APE that includes the 1-mile perimeter around the PRHD (Figure 4).

PARK ROAD HISTORIC DISTRICT AND CULTURAL LANDSCAPE (HEA-00429/MMK-00171, HEA-00517/MMK-00195)

The 92-mile Park Road Historic District and Cultural Landscape (PRHD&CL) runs east to west in the foothills north of the Alaska Range in DENA. The road extends from Mile 237.3 of the George Parks Highway across several low passes and glacier-fed rivers to the historic mining district of Kantishna, which was incorporated into the park by the Alaska National Interest Lands Conservation Act in 1980. The road was originally constructed from 1922 to 1938 by the Alaska Road Commission (ARC). The ARC and the NPS collaborated on the road design. The road is historically significant for its association with the period of scenic road development in national parks in the 1920s and 1930s, as well as for its association with the Mission 66 park development program in the 1950s and 1960s (Criterion A). The road is also a rustic example of landscape engineering combining NPS aesthetic road design principles with the ARC's experience constructing roads in northern environments (Criterion C).

The areas of significance are Entertainment/Recreation and Transportation for its relation to automobile tourism and Landscape Architecture for its aesthetically oriented design. The period of significance begins in 1922 when the route was originally cleared. It extends to 1972, when the Park

[1] Note that the Park Road Historic District and Cultural Landscape was originally listed in the National Register under the historic name of "Mount McKinley National Park Road Historic District" (NRIS #100004070) and more recently referred to as "Denali Park Road Historic district." For the purposes of this letter, this resource is referred to as the "Park Road Historic District and Cultural Landscape" or PRHD&CL because a Cultural Landscape Report for the Park Road was completed in 2018 (MIG). Alaska AHRS numbers include the abbreviation of a USGS Quadrangle name followed by the resource number.

Road shuttle bus system was implemented. The PRHD&CL is significant at a national level because it serves as one of the most important corridors for tourism in a national park in Alaska.

The PRHD&CL retains integrity in the areas of significance of entertainment/recreation, transportation, and landscape architecture for the period of significance (1922 to 1972). Overall, the PRHD&CL conveys its historical significance through its location, setting, design, materials, workmanship, feeling, and association. Despite several minor realignments along the road, including a 0.2-mile reroute beginning at Mile 4, most of the alignment of the Park Road has not been altered by the NPS or ARC since the period of significance. Consequently, most of the road remains in its original location. Development in the PRHD&CL and its viewshed is minimal. The federally designated DENA wilderness that surrounds the district ensures the preservation of the biotic communities and undeveloped nature of the setting.

Overall, the material associated with the road structure reflects the conditions during the period of significance. Primarily native materials continue to be used, with an earthen roadbed and gravel surface material. Pavement is limited from Mile 1.8 to 15, which conveys the feeling and association with the mid-twentieth century use of the road and its association with the Mission 66 era.

The PRHD&CL retains integrity of design by exhibiting characteristics of a NPS scenic road with alignments associated with the Mission 66 era (particularly between Mile 1.8 to 30) that do not detract from the feeling of isolation and wilderness. The preservation of the road alignment, which provides views of the landscape and access to wilderness, and the control of expansion of the road footprint are the most significant elements of the district's integrity. Aspects that allow the road to convey the aesthetic and historic feeling of the historic period include the relatively low design speed, the curvilinear alignment of the road, the exposure of the landscape unprotected by guardrails on the slopes of Polychrome Mountain and between Stony Creek and Grassy Pass, and the panoramic views that result from minimal obstructions.

Prior to the opening of the Denali Highway (Alaska Route 8) in 1957, there were very few private vehicles anywhere on the Park Road, and traffic decreased farther west. Because most of the visitor and vehicular activity originates at the eastern end of the road (near the Alaska Railroad and the George Parks Highway) plans to improve the road have typically been based on a telescoping approach; the road becomes more primitive traveling west. The Mission 66 proposal of 1956-1966 to pave the road to Mile 31 and to make it a uniform width (and "oiled") from there to the Eielson Visitor Center at Mile 66 was halted due to a national outcry over excessive improvements to a wilderness road.

The area of the undertaking at Polychrome Pass provides one of the most stunning views along the entire road. This section of road is also one of the narrowest and is several hundred feet above the valley floor below. The road route was etched at Pretty Rocks in Polychrome Pass in August of 1930 with hand tools; the following summer it was established using steam shovels and dynamite. The Pretty Rocks road section has been slumping for decades and has undergone annual maintenance since at least the 1940s to address landslides and other geohazards, including widening and infilling. As early as 1943, the slumps have been large enough to close—or nearly close—the road. A January 1943 memo from Superintendent Frank Been to the NPS director stated the following:

> Between 42 Mile and 52 Mile the roadbed has sunk in many places so that a large amount of hauling will be required to stabilize the roadbed . . . . Sloughing from deep cuts on steep mountain sides between Mile 42 and Mile 47 and between Mile 66 and Mile 69 was so heavy last fall that the road was almost closed. It is expected that road widening and reducing the cut slope will be necessary this summer to prevent closing the road and to eliminate hazard from falling boulders (Been 1943).

In 1973, the road was closed for 8 hours due to slides on Polychrome Pass and Stoney Hill (NPS 1973); in 1990, torrential rains caused major rock and mud slides in Polychrome pass, which

resulted in road travel being prohibited or restricted over a 9-day period until conditions stabilized (NPS 1990). In 1987, drains and geotextile were placed at Pretty Rocks in an effort to mitigate the slumping (NPS 1986); these have failed in subsequent years.

In addition to the East Fork Patrol Cabin Site and Cultural Landscape (detailed below), the East Fork Toklat River Bridge is a contributing feature of the PRHD&CL and is located in the APE. This three-span, four-beam steel bridge is at Mile 43.5 and was constructed in 1956 with a cast-in-place concrete deck, concrete piers, and concrete abutments; it is 283 feet long and 28.5 feet wide. This bridge is a contributing feature of the PRHD&CL and is considered part of the Mission 66 program. Although the bridge replacement program began before Mission 66 in the park, the Mission 66 program addressed overall development in parks and often accelerated projects initiated prior to Mission 66 (Wackrow et al. 2020). Historic and existing condition photographs of the PRHD&CL are shown in Figure 5 through Figure 26.

EAST FORK PATROL CABIN SITE AND CULTURAL LANDSCAPE (HEA-00218) (EAST FORK CABIN & CL)

The East Fork Cabin & CL is a contributing feature of the PRHD&CL. Constructed between 1929 and 1930, this site is approximately 0.25-mile south of Mile 42.8 (Wackrow et al. 2020). The East Fork Cultural Landscape includes both the Cabin Site (HEA-00218) and the East Fork Coal Mine (HEA-00485). The Coal Mine site is outside the APE and will not be discussed in detail.

The ARC used the site as a base camp for road construction in the late 1920s and 1930s. The East Fork Cabin served as a cook house and food storage for ARC employees who lived in multiple canvas tents. The camp extended from the East Fork Cabin toward the East Fork of the Toklat River. Even before the Park Road was completed in 1938, the NPS used the ARC cabin for winter dogsled patrols. After the road was complete, the cabin served as a summer base camp for wildlife researchers (Welzenbach 2017).

The East Fork Cabin was the fourth ARC cabin to be built. This cabin served as the base for road construction crews working on the East Fork Bridge and Polychrome Pass. The crews positioned their white canvas tents in the area between the cabin, Coal Creek to the south, and the East Fork River to the west (Welzenbach 2017).

The East Fork ARC Camp likely operated from 1929 through 1938. By 1985 the cabin maintained its ongoing use as summer quarters for a backcountry ranger and during the winters by NPS dogsled patrols and the Denali Dog Tours concessioner (Evans 1985).

Wildlife biologist Adolph Murie and botanist Louise Murie lived in the East Fork Cabin for eight summers between 1939 and 1970, including consecutive summers from 1939 to 1941 (Evans 1985, 1986; Bryant 2011). From the East Fork and Igloo Cabin base camps, Adolph studied wolves, birds, grizzly bears, and other wildlife. Adolph's book *The Wolves of Mount McKinley* was published in 1944.

Adolph and Louise, along with Olaus and Margaret Murie, are renowned in the NPS and conservation communities for their scientific research and successful advocacy for wildlands. Based on his research in Yellowstone National Park and DENA, Adolph was an early advocate for the role of predators in an ecosystem and successfully promoted the elimination of wolf eradication. He also strongly opposed additional development of DENA and persuasively argued for the retention of the gravel surface on the western portions of the Park Road when paving was proposed in the 1950s. The Murie Science and Learning Center at Denali is dedicated to the Murie family's research and conservation efforts.

The East Fork site's scientific legacy was continued with the installation of the Dean Cabin. The cabin has provided a base for research operations since 1975. Housing in DENA's interior has

allowed scientists more direct and regular access to their research subjects. Ultimately, multi-year studies based out of the site—including those done by the Muries—provided a greater understanding of the park's ecosystems.

The Dean Cabin is a noncontributing resource in the East Fork Patrol Cabin Cultural Landscape. A different wood building appears in some historic photographs west of the East Fork Cabin, but that building has a gable roof and is much closer to the East Fork Cabin. The Dean Cabin was built in 1975 and is not contributing to the East Fork Cabin Site or Cultural Landscape as it was constructed after the period of significance.

The East Fork Cabin is meaningful to the state of Alaska because of its association with two historical themes; the development of a transportation system in remote areas on interior Alaska, and the early efforts of the NPS to practice wildlife conservation in the first national park in Alaska. It is eligible under Criterion A for transportation and conservation.

EAST FORK CAN DUMP (HEA-00323)

Known as the East Fork can dump, HEA-00323 consists of seven cans situated in vegetation and was first recorded in 2000. Of the cans, three were CORONA brand, the standard #3 coffee can size, blue with light color lettering, and a solder dot on one end. One of these cans was modified with a twisted wire bale added. Two other cans were the same size but had plug-in lid openings and factory-made bales attached. The last two cans were the smallest, and neither had soldered closures.

During survey of the physical APE in 2021 surficial evidence of HEA-00323 was not identified, but subsequent review of archival photographs suggests that the reported ARC camp at this location was much larger than originally thought, and there is the potential for encountering unidentified historic material associated with the 1930s ARC camp at this location. Additional fieldwork specifically addressing this site would be necessary to determine if historic materials associated with this camp are in the project area, and to inform any necessary avoidance, minimization, or mitigation measures. For the purpose of this report, HEA-00323 is being treated as eligible for the National Register under Criterion A for its association with the 1930s ARC construction camp in the Bear Cave survey area, and as a contributing feature to the PRHD&CL (HEA-00517/MMK-00195).

RECOMMENDATIONS

This section provides recommendations concerning the project's potential to affect historic properties. Due to the potential for adverse effects to historic properties, NPS considered two project alternatives consistent with the requirements of 36 CFR Part 800.6 to identify potential opportunities to avoid, minimize, or resolve adverse effects.

EAST FORK PATROL CABIN SITE AND CULTURAL LANDSCAPE

The proposed project is essential to keeping the road open as a viable travel route for park visitors and to continue the historic use of the road. None of the proposed alternatives would adversely affect the East Fork Patrol Cabin Site and Cultural Landscape because no ground disturbance would take place at that location and no physical installations from Alternative 2 (Phase I or Phase II) of the project will be visible from it.

PRHD&CL (ALTERNATIVE 1 NO ACTION)

Alternative 1 (No Action) would result in an ***adverse effect*** to the PRHD&CL because it would result in the closure and change in use of the PRHD. No vehicles would be able to drive past Mile 43 due to the existing geohazards thus diminishing the road's historic associations with national park

access and publicly accessible viewsheds. Alternative 2 (NPS preferred alternative) of the proposed undertaking would also ***adversely affect*** the PRHD&CL pursuant to 36 CFR Part 800.5(d)(2).

Integrity of Location

The location of the PRHD&CL would largely remain the same under this alternative as no portion of the road would be rerouted. That portion of the road that has been damaged by the landslide would not be repaired and thus not returned to its original location.

Integrity of Design

The design of the PRHD&CL would be diminished by the lack of maintenance to that portion of the road subject to closure. That portion of the road damaged by the landslide would not be repaired and thus the road's design at that location would remain diminished.

Integrity of Setting

The setting of the PRHD&CL would be diminished by the lack of maintenance to that portion of the road subject to closure. While the natural setting of the PRHD&CL would remain intact, the manmade setting would be diminished by the lack of road maintenance to the PRHD&CL, the lack of road use by the public, and the visible damage to the PRHD&CL from the landslide.

Integrity of Materials and Workmanship

The materials and workmanship of the PRHD&CL would be diminished by the lack of maintenance to that portion of the road subject to closure. That portion of the road damaged by the landslide would not be repaired and thus the road's materials and workmanship at that location would remain diminished.

Integrity of Feeling

The integrity of feeling associated with the PRHD&CL would be diminished by the lack of maintenance to that portion of the road subject to closure as well as that portion of the road that would not be repaired as a result of the landslide.

Integrity of Association

The historical association of the PRHD&CL related to public access and the road's various viewing platforms would be diminished in that portion of the road subject to closure. Without access by the public, the original function of the road as a scenic route would not be readily evident.

PRHD&CL (ALTERNATIVE 2 PRETTY ROCKS BRIDGE AND POLYCHROME ROAD IMPROVEMENTS) (NPS PREFERRED ALTERNATIVE)

The following sections describe how each aspect of integrity of the PRHD&CL is affected by Alternative 2.

Integrity of Location

While minor alignment adjustments have been made at Savage River, Ghiglione Creek, North Face Corner, and a few other locations, much of the road route has not changed since the period of significance. The proposed undertaking would result in a small reroute on the west side of the Pretty Rocks Landslide; this is very near a known realignment that is just east of Polychrome Overlook (between Mile 45.5 and 45.6). The proposed realignment is small in length and is very close to the historic road alignment and is a minor adverse effect to this element of integrity. The three alternatives considered but dismissed from consideration consisted of a north reroute and two southern reroutes. These options would have resulted in miles of new road and the abandonment of

the original alignment for the majority of the current physical APE. Alternative 2 minimized the amount of reroute needed and retains almost all the historic location of the road in the project area.

Integrity of Design

The road retains integrity of design by exhibiting characteristics of an a NPS scenic road and improved elements associated with the Mission 66 era to Teklanika. Sections of the road that have been significantly widened or raised after 1968 do not fully reflect the historic period. However, the alignment has been minimally altered since 1938. The preservation of the road's curvilinear alignment that responds to the landscape's topography and the control of expansion of the road footprint are the most critical factors in the retention of the road's historic integrity. The proposed reroute would be minimized by creating a sinuous curve emulating the undulating design ethos of the PRHD&CL. The design for this small realignment was specifically chosen in part to align with the curving nature of the park road. A straight cut through from the west end of the bridge to the Polychrome Overlook was discussed but dismissed from consideration in part due to the adverse effect it would have to the PRHD&CL. The proposed bridge width is 24 feet, which is the upper limit of the design standard for this section of road.

Integrity of Setting

The road retains integrity of setting and includes the physical environment within the boundary of the historic corridor and within the viewshed of the road outside of the historic district. It is anticipated that this element of integrity would be adversely affected by the proposed Phase I rock removal due to the large amount of material that would be removed from the western end of the bridge's location, the resulting scars on the mountain, and the removal of the rock feature on the eastern side of the bridge. Rock removal and rock bolting proposed in Phase II may also adversely affect the integrity of setting if they leave large scars on the hillsides or a visible from vehicles on the park road.

Integrity of Materials and Workmanship

The road retains integrity of materials and workmanship and it is anticipated that the undertaking would adversely impact these elements of integrity due to proposed bridge installation and other modern installations (rock bolts). Primarily native materials were used during the original construction of the road. In the late 1960s, the road was paved to the Savage River Bridge. Much of the road remains unpaved but has been surfaced with gravel. Overall, the material associated with the road structure reflect the conditions during the late period of significance. The installation of a steel bridge at this location on the Park Road is not in keeping with the integrity of materials and workmanship and would be an adverse effect. The retaining wall on the east end of the bridge may also adversely affect the park road depending on the materials and design of the wall.

Integrity of Feeling

The road retains integrity of feeling. Important aspects that allow the road to convey the aesthetic and historic sense of the period of significance include the relatively low design speed, the curvilinear alignment of the road, the minimal footprint, and the exposure unprotected by guardrails on the slopes of Polychrome Mountain and between Stony Creek and Grassy Pass. While the paving, modern signage, and increased traffic along the road does not reflect the early historic period, the road continues to provide access into the remote park and highlight the vast awe-inspiring landscape, which was the primary intention of the original design. The proposed installation of a bridge on Polychrome Mountain would affect the feeling of a small section of the project area (the necessary design of the bridges sides would provide a protected feel where it was once unprotected and would block the view and exposure at that location). The other proposed design elements of the undertaking (e.g., the s-shaped reroute, keeping to the road design standards) would help retain

integrity through the project area. The Bear Cave Slump improvements would result in retention of the feeling of the road at that location as well.

Integrity of Association

The Park Road retains integrity of association. The road corridor continues to convey the period of collaboration between the ARC and the NPS during the initial road construction process. In addition, the first 31 miles of the road in many ways convey the 1950s and 1960s road improvements associated with Mission 66 and the opening of the Denali Highway. The road also remains unpaved after the Savage River Bridge, reflecting the wilderness conservation movement at the end of the Mission 66 era. Therefore, the corridor retains integrity of association. The proposed undertaking would not adversely affect the road's integrity of association because the project would not impact the road corridor's conveyance of the period of collaboration between the ARC and NPS during the initial road construction process.

EAST FORK CAN DUMP (HEA-00323)

A proposed retaining wall that would be constructed during Phase II of Alternative 2 of the undertaking is at the location of HEA-00323 and would likely adversely impact the site. If Alternative 2 (Phase II) is not implemented for several years, additional survey and shovel testing is recommended at the location of HEA-00323 to see if the site still retains integrity. If that is not possible, the site should be treated as a contributing feature to the PRHD and its destruction from the proposed undertaking would be treated as an adverse effect. It is recommended that ground disturbance for the Bear Cave portion of Phase II be monitored by appropriate cultural resource staff. The East Fork Can Dump would not be affected by Alternative 1 (No Action).

OTHER EFFECT MINIMIZATION RECOMMENDATIONS

Ground disturbances for the remainder of the undertaking would be periodically monitored by appropriate cultural resource staff. If cultural resources or items protected by the Native American Graves Protection and Repatriation Act, Archeological Resources Protection Act, or the National Historic Preservation Act are discovered during project implementation, all project-related activities in the vicinity of the discovery would be stopped and the park archaeologist would be notified immediately. In consultation with the State Historic Preservation Officer and other consulting parties, DENA would determine a course of action per 36 CFR Part 800.13.

SUMMARY FINDING OF EFFECT

Access to rural viewscapes is the key historic association that conveys why the PRHD&CL is significant and eligible for the National Register under NRHP Criteria A and C. If Alternative 1 (No Action) were to be implemented, the road would no longer be maintained, and public access would no longer be possible. Over time, the characteristics of the PRHD&CL would be diminished if this alternative was implemented. Alternative 1, therefore, would result in an ***adverse effect*** consistent with 36 CFR 800.5(d)(2).

As designed, Alternative 2 would allow for continued access to those viewscapes but would result in a small reroute and the introduction of incompatible elements in the PRHD&CL. Due to these factors, as designed the project would result in an *adverse effect* to the Park Road's integrity, which qualifies this property for inclusion in the National Register. Therefore, the NPS finds that Alternative 2 (Phase I and II) would result in an ***adverse effect*** consistent with 36 CFR 800.5(d)(2).

While both alternatives would result in adverse effects to the PRHD&CL, Alternative 2 is currently preferred by NPS as it would serve to minimize long term effects to the historic property by keeping

the facility maintained and accessible to the public and thus limit effects to the historic characteristics that make the PRHD&CL eligible for the NRHP.

RESOLUTION OF ADVERSE EFFECTS

The NPS will consult with the Alaska State Historic Preservation Officer, Tribes, and other consulting parties to resolve adverse effects through an agreement document. This will likely occur through an amendment to the existing "Programmatic Agreement Between the National Park Service, Denali National Park and Preserve and the Alaska State Historic Preservation Officer Regarding Routine Maintenance, Repair, Operations, Bridge and Culvert Replacements, Geohazard Monitoring, and Emergency Maintenance on the Denali Park Road Corridor."

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ATTACHMENT: ADDITIONAL FIGURES AND MAPS

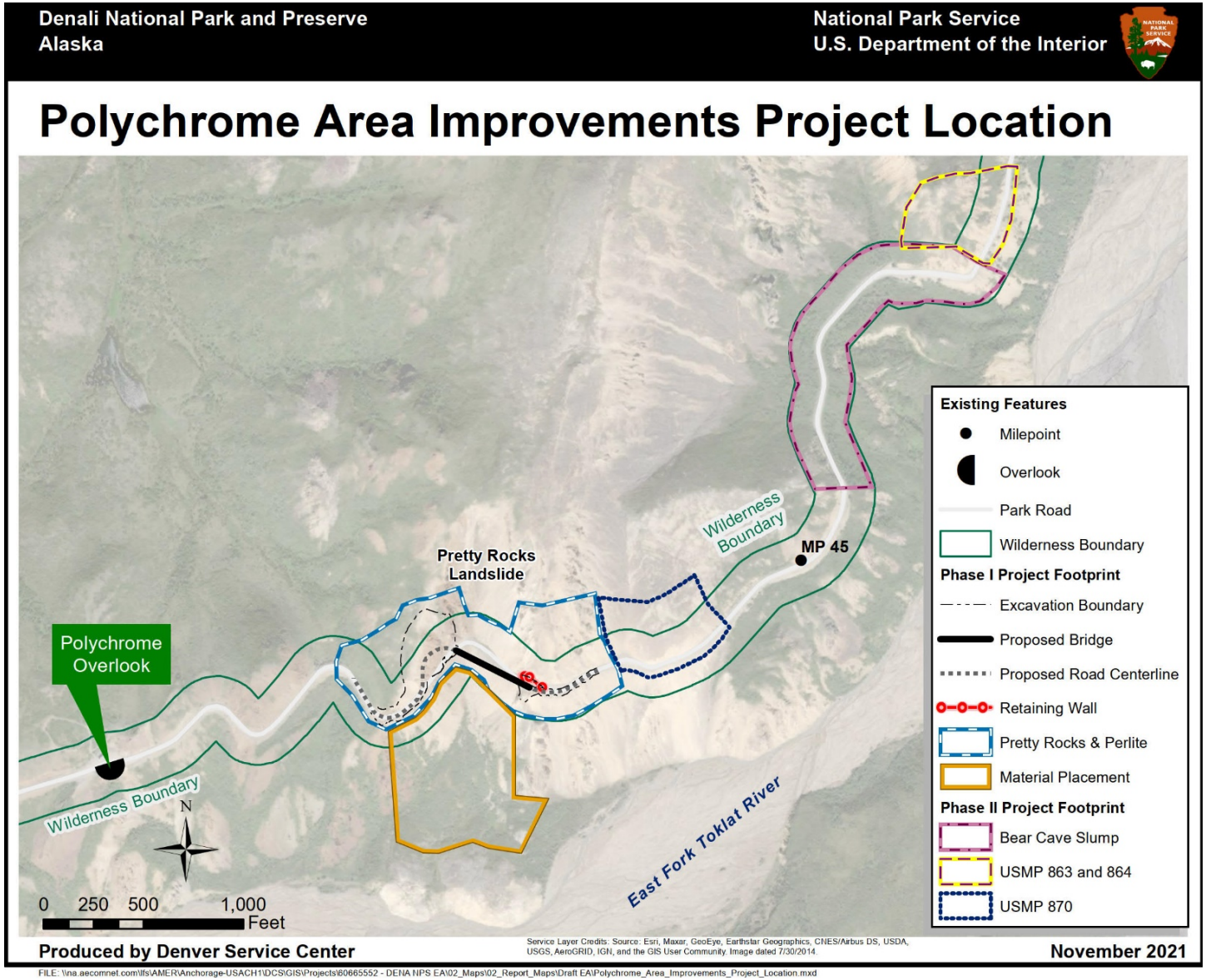
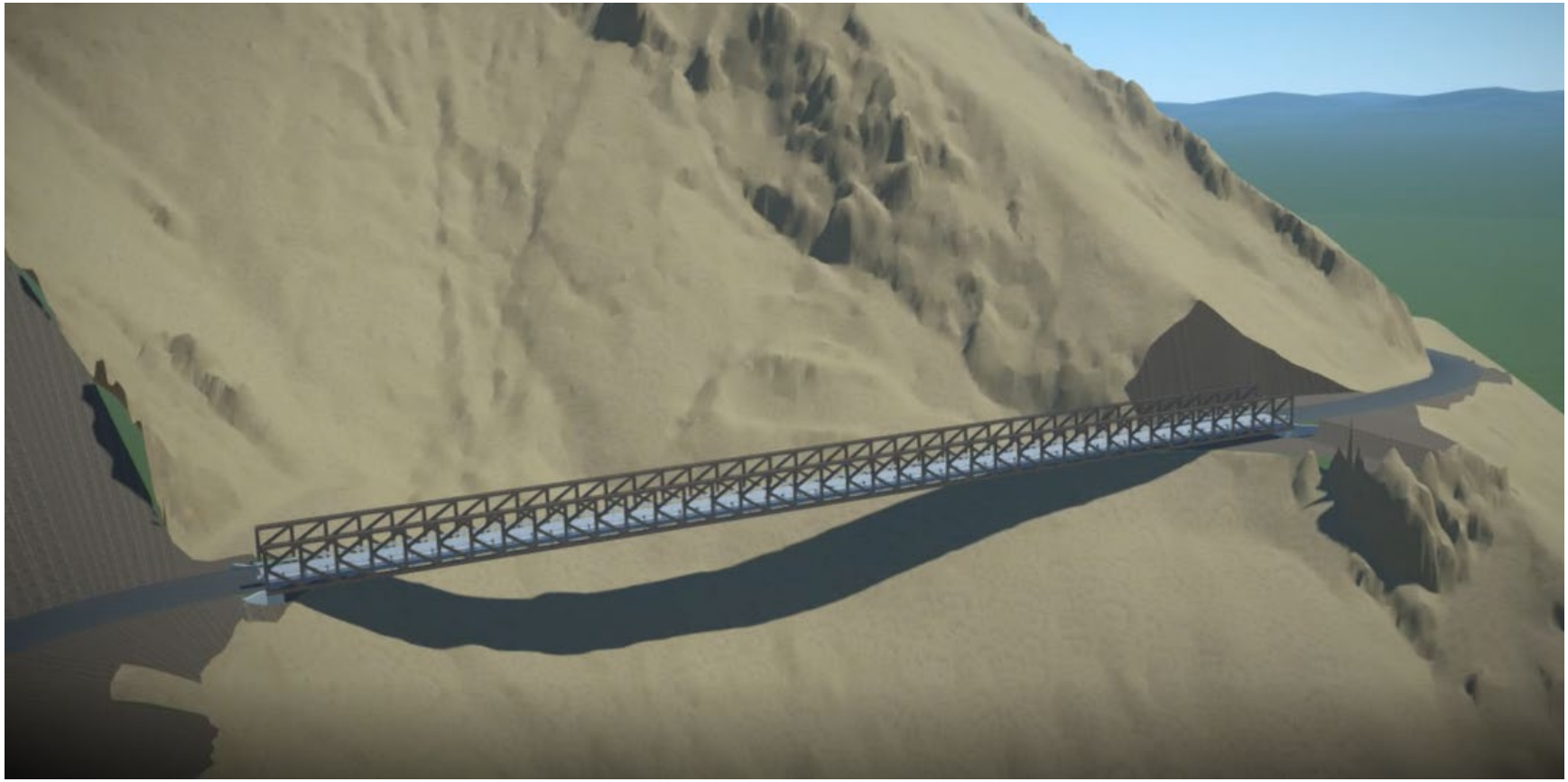


FIGURE 1: MAP OF ALTERNATIVE 2, PHASE I AND PHASE II ACTIONS



Note: The darker areas on each side of the bridge show where excavation would take place. The dark area under the bridge depicts the shadow of the bridge.

FIGURE 2. DIGITAL REPRESENTATION OF THE PROPOSED PRETTY ROCKS BRIDGE (LOOKING EAST)

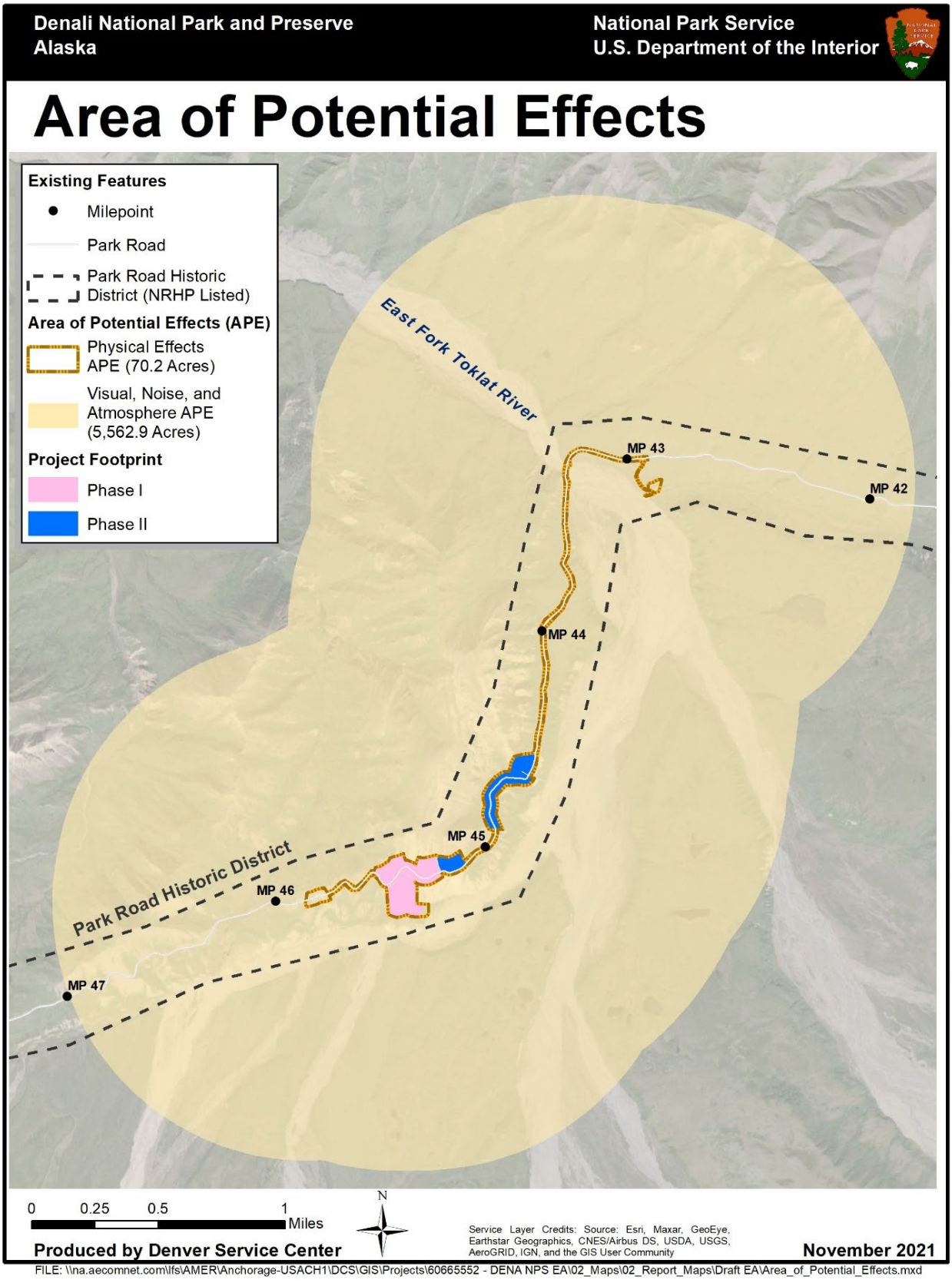


FIGURE 3. NHPA SECTION 106 AREA OF POTENTIAL EFFECTS

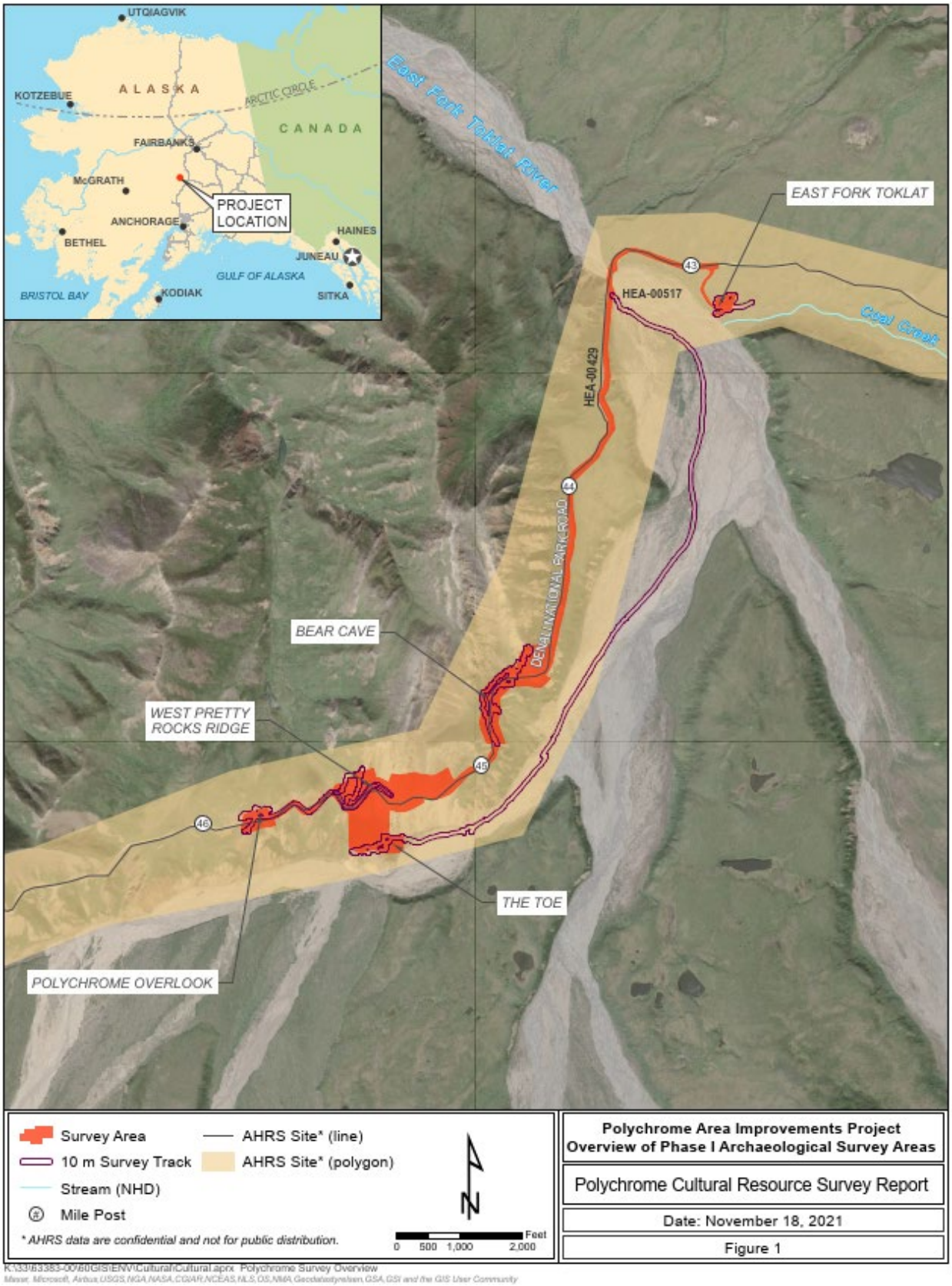


FIGURE 4. POLYCHROME AREA IMPROVEMENTS PROJECT OVERVIEW OF PHASE I ARCHAEOLOGICAL SURVEY AREAS

FIGURE 5. EAST FORK CABIN, MILE 43, 1928. (ALASKA STATE LIBRARY, ALASKA ROAD COMMISSION COLLECTION 61-2-278).

FIGURE 6. ETCHING THE ROAD IN AT PRETTY ROCKS (LOOKING EAST), AUGUST 1930 (ALASKA STATE LIBRARY, ALASKA ROAD COMMISSION COLLECTION, 61-2-230).

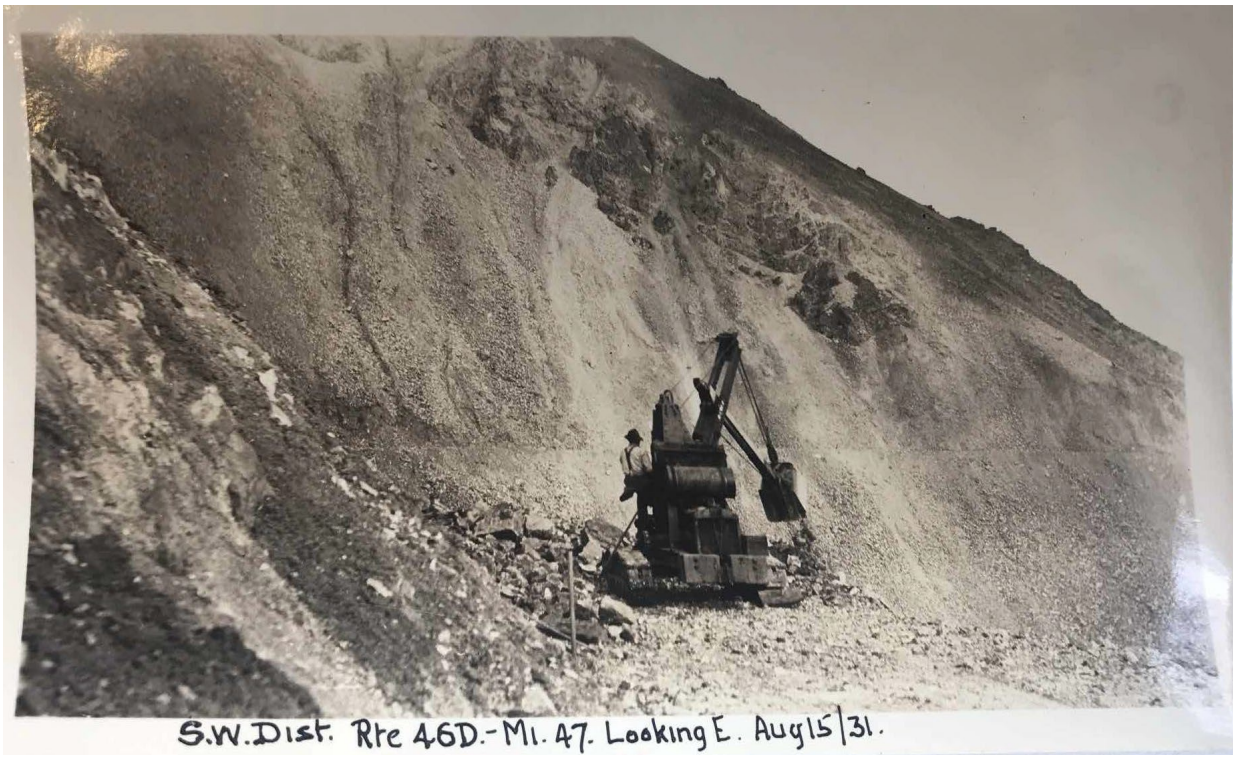


FIGURE 7. HIGH LINE ROAD BEING BUILT AT PRETTY ROCKS IN AUGUST OF 1931 (EDMUNDS COLLECTION, BOX 1, ANCHORAGE MUSEUM).

FIGURE 8. ARC CAMP, MILE 45 NEAR THE BEAR CAVE SLUMP, CA. 1930S (ALASKA STATE LIBRARY ALASKA ROAD COMMISSION COLLECTION, 61-2-237).

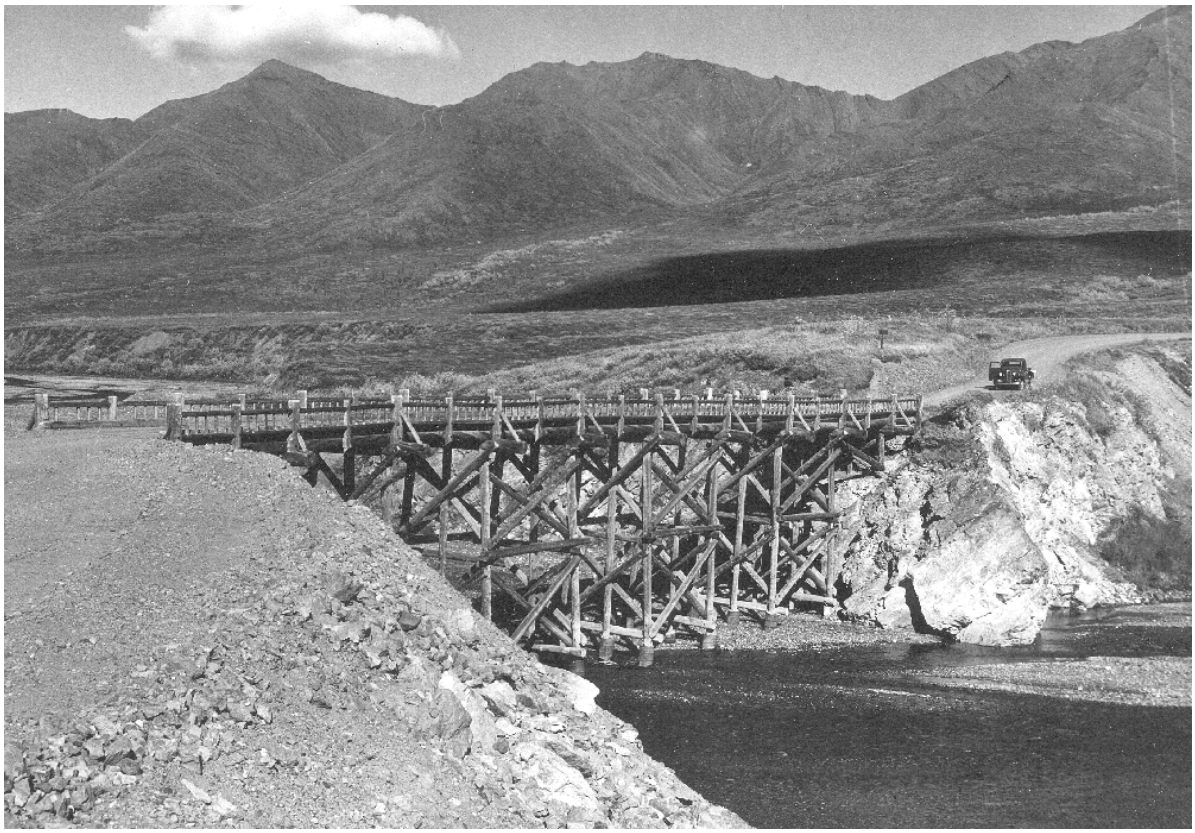


FIGURE 9. TOKLAT EAST FORK BRIDGE (TIMBER), SEPTEMBER 1949 (NPS PHOTO).

FIGURE 10. EAST FORK CABIN AND CAMP, AUGUST 1958 (NPS PHOTO).

FIGURE 11. ADOLPH AND LOUISE MURIE, 1965 (NPS PHOTO).

FIGURE 12. INSTALLING GEOSYNTHETIC LAYER REINFORCEMENT AT PRETTY ROCKS, 1987 (FEDERAL HIGHWAYS PHOTO).

FIGURE 13. INSTALLING SUBSURFACE DRAINAGE, PRETTY ROCKS, 1987 (FEDERAL HIGHWAYS PHOTO).

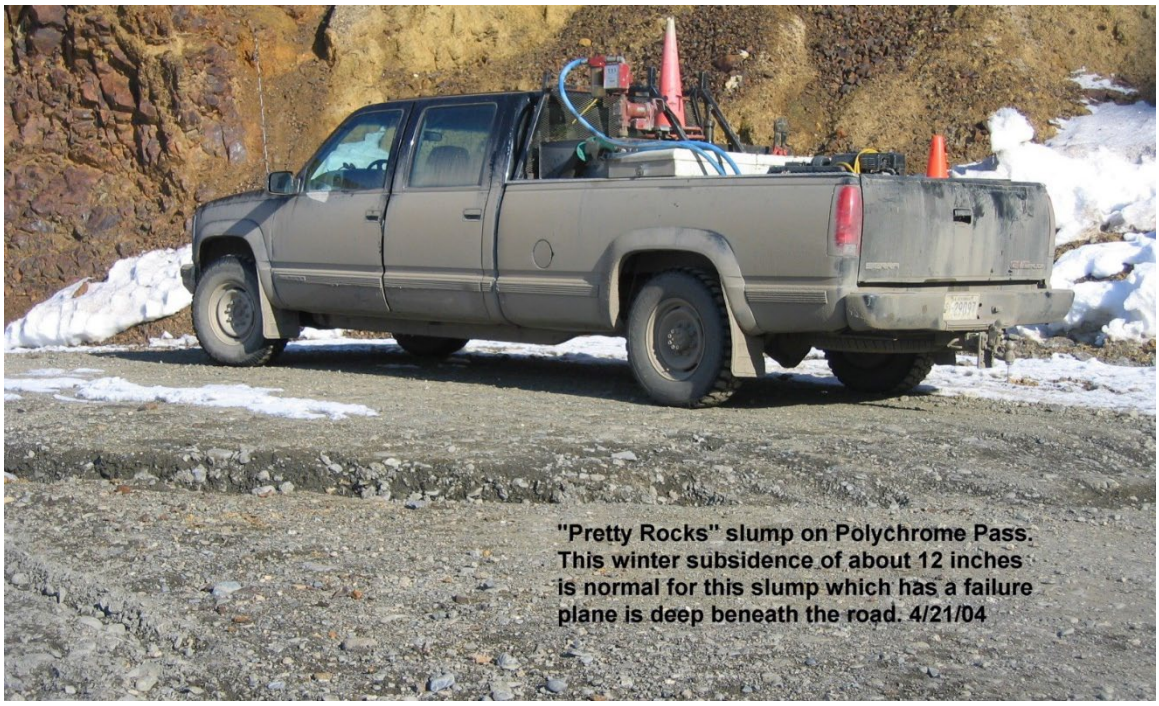


FIGURE 14. 2004 PHOTO FROM A FEDERAL HIGHWAYS PRESENTATION ON THE PRETTY ROCKS LANDSLIDE (FEDERAL HIGHWAYS PHOTO).

FIGURE 15. EAST FORK CABIN, AUGUST 2006 (NPS PHOTO).

FIGURE 16. PRETTY ROCKS LANDSLIDE LOOKING EAST, AUGUST 2014 (NPS PHOTO).

FIGURE 17. PRETTY ROCKS LANDSLIDE LOOKING EAST WITH SLUMPED/ CRACKED ROAD, APRIL 2015 (NPS PHOTO).

FIGURE 18. PRETTY ROCKS LANDSLIDE LOOKING EAST, OCTOBER 2016 (NPS PHOTO).

FIGURE 19. PRETTY ROCKS LANDSLIDE LOOKING NORTHEAST, OCTOBER 2016 WITH EVIDENCE OF ROCK SIDE ON MOUNTAIN FACE ABOVE THE ROAD (NPS PHOTO).

FIGURE 20. PRETTY ROCKS SLUMP LOOKING EAST WITH SLUMP, SPRING 2016 (NPS PHOTO)

FIGURE 21. PRETTY ROCKS LANDSLIDE LOOKING NORTH, FEBRUARY 2018 (NPS PHOTO)

FIGURE 22. PRETTY ROCKS LANDSLIDE, FEBRUARY 2018; PEOPLE ARE STANDING ON SLUMPED SECTION OF ROAD, GRAVEL IN FOREGROUND IS UNSLUMPED ROAD (NPS PHOTO).

FIGURE 23. THE EASTERN PRETTY ROCKS LANDSLIDE SCARP THROUGH THE ROAD ON 3/22/2019. THE ROAD HAD BEEN LAST GRADED ON 9/14/2018. SURVEY ROD HELD BY PARK EMPLOYEE IS 6.5 FEET (2.0 M) TALL AND IS PLACED NEAR CENTER-LINE OF THE ROAD (NPS PHOTO).

FIGURE 24. PANORAMIC VIEW OF EASTERN PRETTY ROCKS LANDSCAPE SCARP THROUGH THE ROAD ON 09/28/2021.

FIGURE 25. VIEW OF EASTERN PRETTY ROCKS LANDSCAPE SCARP THROUGH THE ROAD ON 09/07/2021, LOOKING EAST.

FIGURE 26. VIEW OF EASTERN PRETTY ROCKS LANDSCAPE SCARP THROUGH THE ROAD ON 09/13/2021, LOOKING WEST.

APPENDIX C—FINAL SOCIOECONOMIC ANALYSIS REPORT

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ACRONYMS AND ABBREVIATIONS

ACS	American Community Survey
ADLWD	Alaska Department of Labor and Workforce Development
AHFC	Alaska Housing Finance Corporation
CDP	Census-Designated Place
COVID-19	Coronavirus Disease 2019
DENA	Denali National Park and Preserve
FAA	Federal Aviation Administration
NPS	National Park Service
U.S.	United States

1 SOCIOECONOMIC ANALYSIS

This document provides a high-level overview of the socioeconomic conditions around Denali National Park and Preserve (DENA) to support the Polychrome Area Improvements Project Environmental Assessment.

1.1 ANALYTICAL AREA

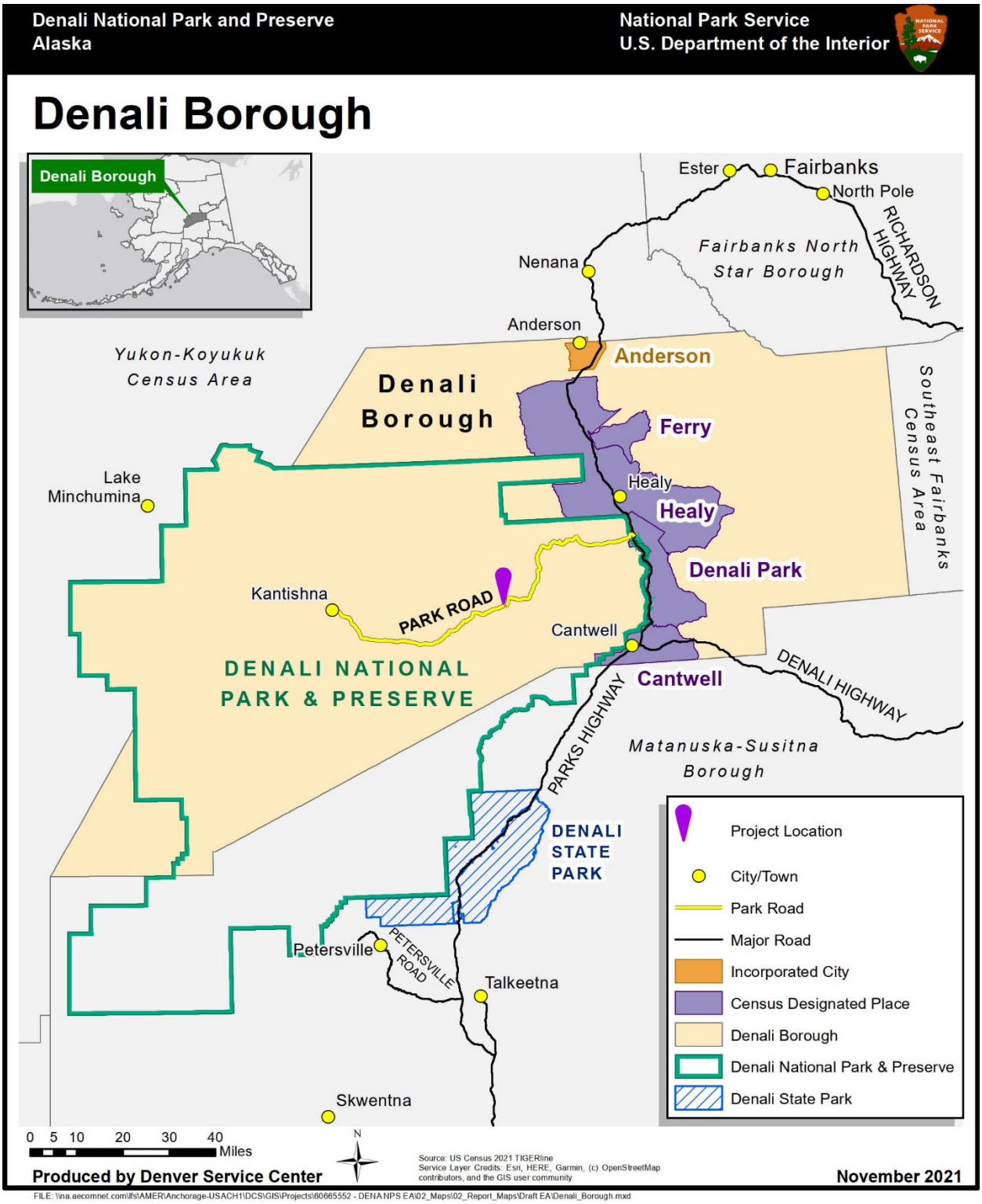
The Polychrome Area Improvements project area is wholly contained within both DENA and the Denali Borough. The region is approximately 250 miles north of Anchorage and 110 miles south of Fairbanks (Denali Borough 2021a). The borough is bounded by the Fairbanks North Star Borough to the north, the Matanuska-Susitna Borough to the south, the Yukon-Koyukuk Census Area to the west, and the Southeast Fairbanks Census Area to the east (Figure 1). As with all Alaska boroughs, the Denali Borough formed around specific population centers and economic resources that make it possible to support an organized government and associated services. The Denali Borough formed in 1990 around the recognized population centers of the city of Anderson, Denali Park Census-Designated Place (CDP), Ferry CDP, Healy CDP, and Cantwell CDP; and around the economic drivers of DENA, the Clear Space Force Station in Anderson, the Usibelli Coal Mine in Healy, the Parks Highway transportation corridor, and Denali Highway junction in Cantwell. The borough seat is the community of Healy.

Both the No Action Alternative and Action Alternative for the proposed project have the potential to affect local socioeconomic conditions particularly in the unincorporated community of Kantishna. Kantishna is at the western terminus of the Denali Park Road (Mile 89) and wholly contained within DENA. The road is the only vehicle access from the park entrance for inholdings (i.e., private properties) in this area. Inholdings are both noncommercial and commercial in nature. There are currently 20 discrete private inholdings owned by 12 different individuals and corporations. There are four actively operating lodges, a fifth lodge that closed after 2019, and a sixth lodge that is under construction. Collectively, these lodges employ approximately 150 to 200 workers annually with total direct payrolls between $3 and $6 million. The remaining inholdings are currently noncommercial in nature.

1.1.1 Temporal Frame

This analysis primarily uses data from calendar year 2019 and earlier. For many sources, 2019 is the last calendar year with complete data or estimates. In addition, 2020 and 2021 saw economic conditions “out-of-historic-norms” because of the Coronavirus Disease 2019 (COVID-19) pandemic. For example, DENA visitation decreased from over 600,000 in 2019 to just under 55,000 in 2020 (NPS 2021a). Visitation in 2021 was substantially higher than 2020, but likely still a modest percentage of historic norms. The analysis expects that visitation would return to normal in the coming years under historic access and health conditions. However, the analysis recognizes that for the communities and business that depend on historic visitor counts, the last two summer seasons have been anything but normal and many businesses are not as healthy or robust as they would be under typical conditions.

The remainder of this section describes the borough’s current socioeconomic characteristics and how these characteristics might change under the proposed project’s No Action Alternative and Action Alternative.



Source: Alaska Department of Labor and Workforce Development 2021a

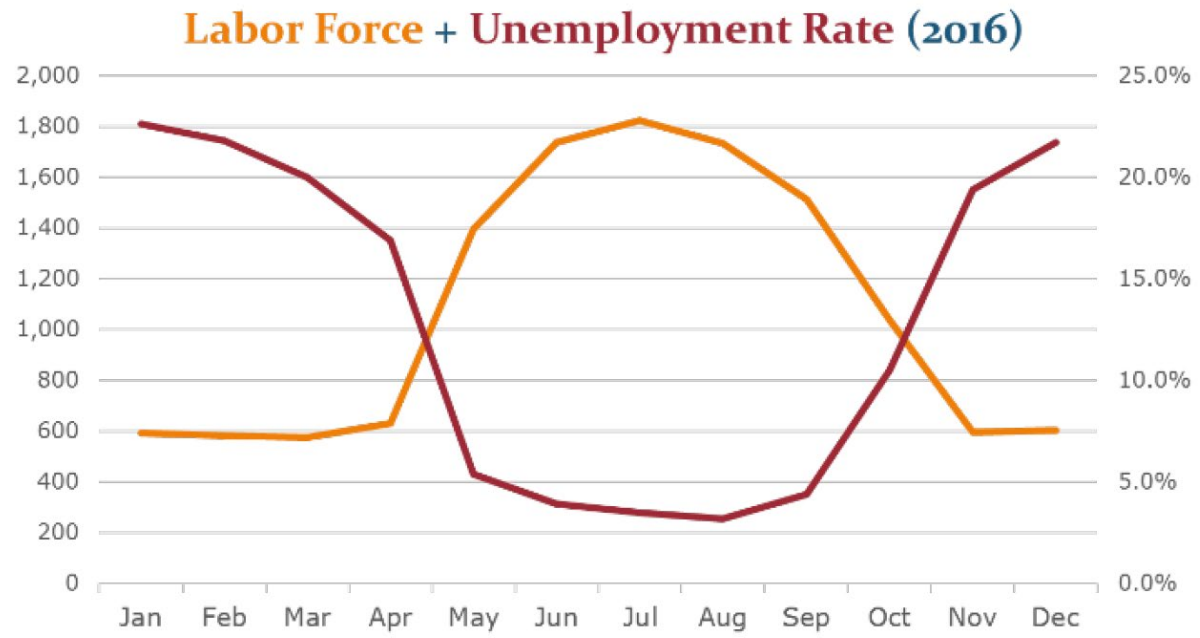
FIGURE 1. DENALI BOROUGH AND RECOGNIZED COMMUNITIES

1.2 ECONOMY

The Denali Borough's economy is driven by the abundant natural resources of the region; every sector of the economy is influenced by these resources whether its federal expenditures related to managing DENA; private industry such as Usibelli Coal Mine and Golden Valley Electric Association leveraging local coal deposits; or local government and leisure and hospitality businesses capturing a portion of visitor expenditures.

1.2.1 Employment and Wages

Employment and wages in the borough reflect the influence of the region's resources. In addition to the major employers noted above other major employers include: the Clear Space Force Station, Alaska Railroad Corporation, State of Alaska, Denali Borough, Denali Borough School District, and Holland America. The Alaska Department of Labor and Workforce Development (ADLWD) estimates that in 2019 (pre-COVID-19 pandemic) there were $96.3 million in wages and salaries earned in the borough across 25,000 person-months of employment. Employment, labor force size, and unemployment in the borough are highly seasonal with the peaks of all the measures being three to five times higher than their troughs (Figure 2 and Table 1). ADLWD data indicate that in a typical December and January there are 800 to 900 wage and salary jobs in the borough compared to 3,800+ jobs in August. The Leisure and Hospitality sector is both the largest source of employment and the largest source of wages accounting for 58 percent of person-months of employment and 41 percent of all wages earned. The next largest source of employment is the Trade, Transportation, and Utilities sector (13 percent of employment person-months); while the next largest single sector source of wages is the federal government through employment in DENA and at Clear Space Force Station (Table 1).



Source: Denali Borough 2018

FIGURE 2. MONTHLY LABOR FORCE AND UNEMPLOYMENT RATE

TABLE 1. 2019 DENALI BOROUGH WAGE AND SALARY EMPLOYMENT BY MONTH, TOTAL ANNUAL WAGES, AND AVERAGE MONTHLY WAGES

Sector	Monthly Employment												Total Annual Wages ($M)	Avg Monthly Wages
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Trade, Transportation, Utilities	138	142	152	196	329	419	454	448	376	280	186	139	$13.2	$4,045
Education and Health Services	21	20	20	24	24	31	26	38	22	21	21	22	$0.7	$2,438
Leisure and Hospitality	159	189	204	343	1953	2585	2639	2711	2237	1030	493	217	$40.2	$2,725
Federal Government	148	150	166	173	241	247	247	241	242	193	153	163	$14.4	$6,089
State Government	21	20	20	20	20	22	22	23	22	21	20	20	$1.8	$7,207
Local Government	136	151	144	143	144	131	117	128	137	146	152	145	$5.2	$3,103
All Other Sectors	184	184	190	202	227	257	255	250	224	202	200	206	$20.8	$8,047
Total Employment	807	856	896	1,101	2,938	3,692	3,760	3,839	3,260	1,893	1,225	912	$96.3	$3,826

Source: ADLWD 2021b

1.2.2 DENA Visitor Use and Economic Contributions

1.2.2.1 Visitor Use. In 2019, DENA recorded 601,152 visitor days[1]; a number which is just under the 5-year average of 605,000 visitor days. Just under half of visitor days (48 percent) occurred at the entrance area or in the first 15 miles of the park road. These visitor days never interacted with the project area. An additional 13 percent of visitor days only went as far as Teklanika at Mile 30 of the Park Road. The remaining visitor days (39 percent or 234,000) extended beyond Teklanika and therefore traversed the project area (NPS 2021b). It is these visitor days that would be most affected by both the Action Alternative and No Action Alternative.

1.2.2.2 Visitor Economic Contribution. The National Park Service's (NPS's) *2019 National Park Service Visitor Spending Effects* estimates that in 2019 DENA visitors spent an average of $1,020 per visitor day and that aggregate visitor spending totaled just under $613 million. This spending made its way through the local, state, and national economies as vendors purchased labor and supplies, paid taxes, and invested in their businesses. In total, the NPS estimates that spending at DENA supported 7,490 jobs, generated $288 million in labor income, and created a total economic output of $874 million (NPS 2021c).

1.3 POPULATION AND DIVERSITY

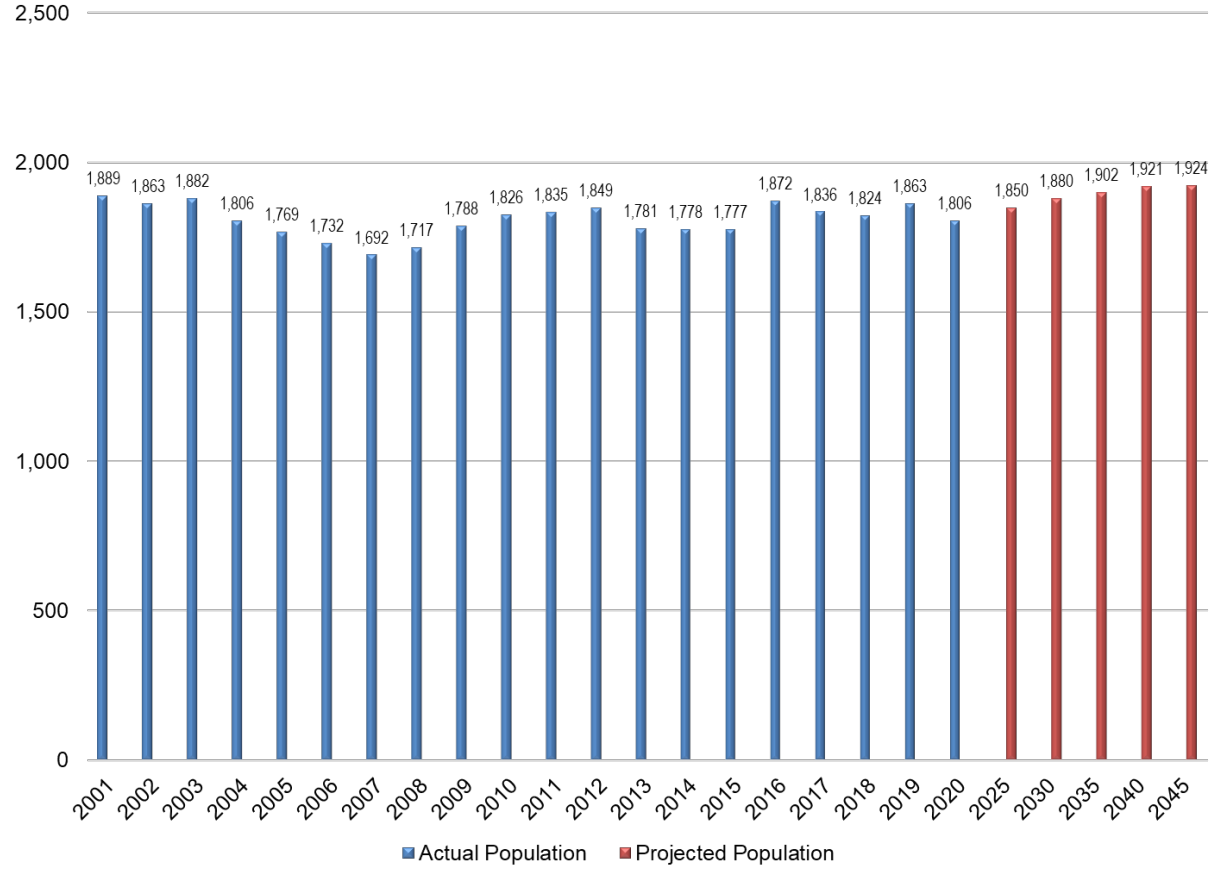
The borough is home to between 1,800 and 2,250 year-round residents (ADLWD 2021c; ACS 2019). In addition, nearly 3,000 workers come to staff the seasonal summer tourism, recreation, and hospitality businesses. During this peak, nonresident workers represent nearly 70 percent of the labor force (ADLWD 2021d). More than half (i.e., approximately 1,050 year-round residents) of the borough's residents live in Healy, with approximately 275 living in Anderson, and 190 residents in Denali Park and Cantwell, respectively (ADWLD 2021c). The population of the borough is approximately 84 to 90 percent White (depending on source data; ACS 2019; ADWLD 2021a), which makes the borough substantially less diverse than Alaska, which is approximately 65 percent White (ACS 2019).

1.3.1 Population

The current ADWLD estimate of the borough's population is 1,806 residents while the United States (U.S.) Census Bureau's American Community Survey population is 2,246 residents with a margin error of +/-367 residents.[2] ADWLD data (Figure 3) show that over the last 20 years, the Denali Borough's population has fluctuated inside a relatively tight band ranging from high of 1,889 residents (2001) to a low of 1,692 residents (2007).[3] The 20-year average population is 1,809, which is very close to the current population estimate. Over the next 25 years, ADLWD's population projections predict that the borough's population will increase at rates ranging from 0.1 percent to 0.3 percent per year; rates that are roughly half the 0.3 percent to 0.6 percent annual growth rates

[1] A visitor day is one person visiting the park for 1 day. Unique individuals can count for multiple visitor days. For example, a visitor who entered the park 10 different times on 10 different days would count for 10 visitor days, as would one visitor who visited the park for one trip that lasted 10 consecutive days.
[2] The difference between these two estimates may reflect when during the year the estimate is generated. The ADWLD estimate is based on the April Census administration date while the American Community Survey estimate may reflect measurement taken during seasonal population increases (ACS 2019). The difference between the two estimates will be rectified by the release of county-level data from the 2020 U.S. Census by the U.S. Census Bureau in late 2021 or 2022. For the remainder of this section the analysis uses the ADWLD population estimates.
[3] The dip between 2001 and 2005 was primarily experienced by the city of Anderson, which is home to Clear Space Force Station (the Clear Air Force Station). The city's population decreased from 628 to 246 between 1990 and 2010 because of staffing changes at the base (Fried 2021).

expected for the state. The current best estimate for 2045 is 1,924 year-round residents, which would represent a 6.5 percent increase from the 2020 estimate.



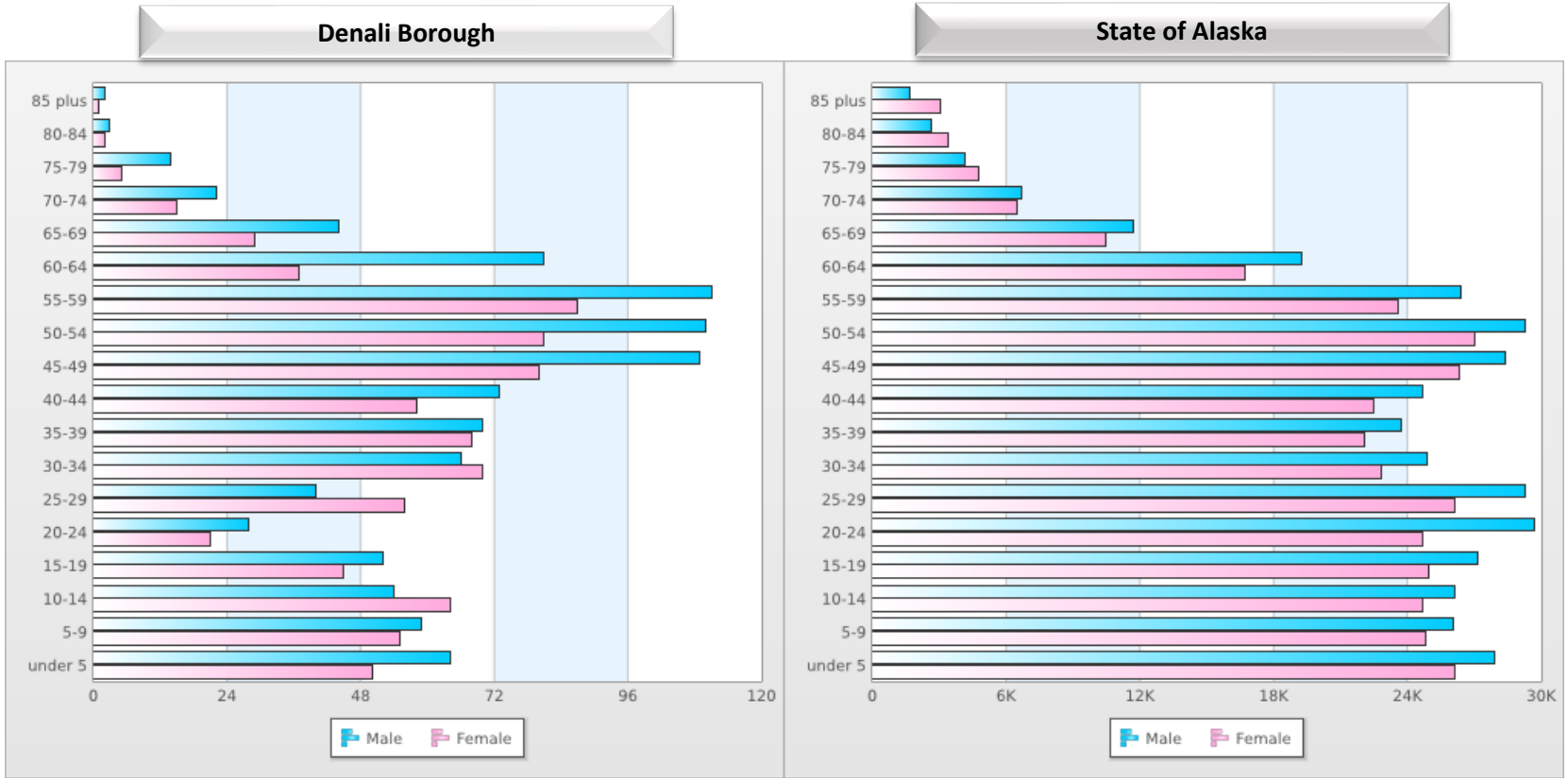
Source: ADLWD 2021c

FIGURE 3. DENALI BOROUGH JULY 1 POPULATION ESTIMATES

1.3.2 Age and Ethnic Composition

The Denali Borough's resident population is substantially older, whiter, and more likely to be male than Alaska as whole.

The average age of a Denali Borough resident is 41.9 years; an average that is expected to drop over the next 20 years to approximately 40 years as the "Baby Boom" generation ages out of the population. In contrast, the average age statewide is 35.5; an average that is expected to rise to 37.3 years by 2045. In short, the average resident of Denali Borough is nearly 6.5 years older than the average Alaskan. The primary driver of this difference is that residents under age 40 compose a much smaller portion of the borough's age structure than they do in the statewide age structure; a fact that is noticeable in ADLWD's population pyramids (Figure 4). Other information that is readily apparent in the population pyramids is that the ratio of males to females in the borough is skewed toward males even more so than the state's sex ratio. Statewide, there are 1.06 males for every female, while in the Denali Borough there are 1.17 males for every female (ADLWD 2021a).



Source: ADWLD 2021a

FIGURE 4. DENALI BOROUGH AND STATEWIDE AGE AND SEX COMPOSITION

The Denali Borough's population is more racially homogenous than the state. The most recent estimates from the American Community Survey estimate that 84.2 percent of borough residents identify solely as White, compared to 64.6 percent of Alaska residents. Borough residents are less than 58 percent to 100 percent likely to identify as solely Black, American Indian or Alaska Native, Asian, or Native Hawaiian/Pacific Islander depending on the racial group. Borough residents are 17 percent more likely than Alaskans to identify as two or more races; however, this group represents just 9.6 percent of the borough's population (Table 2).

TABLE 2. DENALI BOROUGH AND STATEWIDE RACIAL COMPOSITION

Category	Alaska	Denali Borough	Differential	
			Percentage Point	Percentage
White	64.6%	84.2%	19.6%	30.3%
Black or African American	3.3%	1.2%	-2.1%	-63.6%
American Indian and Alaska Native	14.9%	2.2%	-12.7%	-85.2%
Asian	6.2%	2.6%	-3.6%	-58.1%
Native Hawaiian/Pacific Islander	1.2%	0.0%	-1.2%	-100.0%
Two or more races	8.2%	9.6%	1.4%	17.1%

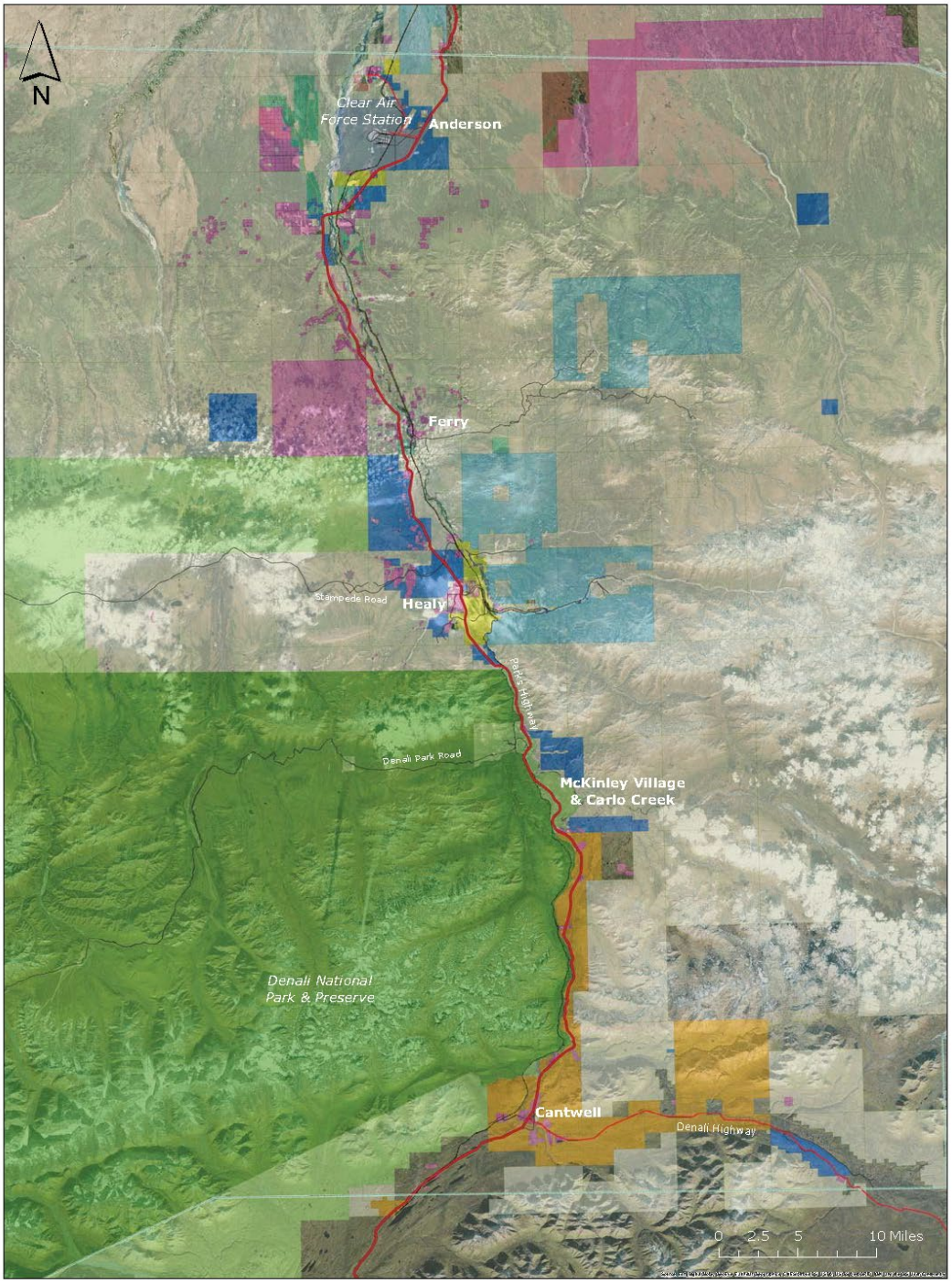
Source: ACS 2019

1.4 COMMUNITY AND HOUSEHOLD CHARACTERISTICS

As noted above, the project area is wholly contained within the Denali Borough and is outside the recognized population centers. Therefore, the No Action Alternative and Action Alternative have the potential to affect both the borough's communities and its households outside the immediate project area. This section covers baseline land use, household characteristics, income and poverty, education, and government.

1.4.1 Land Use and Ownership

The Denali Borough encompasses 12,777 square miles; 70 percent is within DENA. The NPS, along with Clear Space Force Station, make the federal government the largest single landowner in the borough. The second largest landowner is the State of Alaska. The largest private landowner is Ahtna, Incorporated, which is the regional Alaska Native Claims Settlement Act corporation. Other important landowners include the Denali Borough, the Alaska Railroad Corporation, the City of Anderson, the Alaska Mental Health Trust Authority, and the University of Alaska (Figure 5).



Source: Denali Borough 2018

FIGURE 5. MAP OF DENALI BOROUGH LAND OWNERSHIP

1.4.2 Households, Housing and Real Estate

The roughly 1,800 residents of the Denali Borough form an estimated 613 households. Seasonal housing scarcity is a challenge in the Denali Borough. The Denali Borough's 2018 *Denali Borough Land Use and Economic Development Plan* describes the borough's housing stock and housing market:

> Housing is a persistent challenge in the borough. Several factors contribute summer housing shortages and limited opportunities for new or potential residents to find a home or property. Most land in populated areas or accessible by existing roads is owned by public agencies, or is privately owned but not likely to be available on the market in the foreseeable future. Much of the Tri-Valley Subdivision in Healy is owned by Alaska Railroad, with long-term land leases to businesses and residents who live or operate establishments within the subdivision.

Housing for seasonal workers is especially scarce in the summer because there are few available rentals in the community. Although many homeowners have benefited from offering part or all of their home as a vacation rental, conversion of summer housing to short-term rentals has further reduced the summer housing supply. Several tourist businesses have secured temporary employee housing or trailers for their workers, but limited location options for new housing has caused friction with neighboring residents and concern about new growth (Denali Borough 2018). The U.S. Census Bureau estimates that there are 1,765 housing units in the borough; however, the Alaska Housing Finance Corporation estimated that there were 1,402 housing units in 2017 (U.S. Census Bureau 2021; AHFC 2017), with approximately 700 year-round occupied units and the remainder seasonally occupied or otherwise vacant. The average home is roughly 1,780 square feet and approximately 25 percent of the units are pre-1980s homes that have not been retrofitted to be more energy efficient (AHFC 2017). The estimated median home value is $223,000, while the median gross rent is $865 (U.S. Census Bureau 2021).

1.4.3 Income, Cost of Living, and Poverty Rates

The Denali Borough's "better than Alaska-median" economic indicators reflect the presence of high-quality jobs provided by the NPS, Clear Space Force Station, Usibelli Coal Mine, Golden Valley Electric, Denali Borough, Denali Borough School District, and other local employers. U.S. Census Bureau data indicate that the median household income of $81,700 in the Denali Borough is roughly 5 percent higher than the Alaska median household income of $77,600. However, the percentage of people living in poverty (6.6 percent) is roughly 35 percent lower than the statewide figure of 10.1 percent (U.S. Census Bureau 2021). The percentage of children living in food insecure households is estimated at 18 percent. This proportion is typical for a road-network borough in Alaska, but substantially lower than the 35 percent and 22 percent of children experiencing food insecurity in the neighboring Yukon-Koyukuk and Southeast Fairbanks census areas, respectively (Alaska Children's Trust 2021). According to the U.S. Department of Defense's Outside the Continental United States Cost-of-Living Index, the cost of living in the borough is higher (index=130) than the national average (index=100) and slightly higher than Anchorage (index=126), but on par with communities such as Fairbanks (index=132) and Delta Junction (index=132) (ADLWD 2021e).

1.4.4 Education

Educational attainment in the Denali Borough tends to be somewhat lower than average educational attainment in Alaska. American Community Survey data for 2015 to 2019 estimated that 92.8 percent of borough residents over age 25 hold at least high school diploma or equivalent compared to

98.5 percent of Alaskans; and 29.6 percent of residents over age 25 hold at least a Bachelor's degree compared to 41.1 percent of all Alaskans (ACS 2019).

The borough is home to the Denali Borough School District, which runs three schools in Anderson, Cantwell, and Healy (Tri-Valley School). The school district also runs the Denali PEAK Correspondence School; roughly 5 percent of the correspondence school's students live in the borough (Denali Borough 2018). Attendance has dropped at the physical schools over the past several years from 310 students in 2000/2001, to 250 students in 2010/2011, to 165 students in 2020/2021. In contrast, the Denali PEAK Correspondence School has become one of the most successful correspondence schools in the state with 987 enrollees in 2020/2021 (Alaska Department of Education and Early Development 2021).

1.4.5 Government, Public Services, Taxes and Public Utilities

The Denali Borough is a nonunified Home Rule Borough under the laws of the State of Alaska. Home Rule boroughs may exercise all legislative powers not prohibited by law or chart. As an organized borough, the Denali Borough must operate a local school district and engage in planning, platting, and land use regulation. In addition, the borough operates a landfill and provides solid waste management. The borough's single largest source of income is an overnight accommodation tax that generated $2.8 million in Fiscal Year 2020 (74 percent of all revenue), but just $0.75 million in Fiscal Year 2021 because of the COVID-19 pandemic.[4] The second and third largest sources of income are Federal Payments in Lieu of Taxes ($0.4 million) and State of Alaska Community Assistance Payments ($0.35 million). These three revenue sources account for 91 to 93 percent of the budget. The borough also taxes alcohol and marijuana and has a severance tax on gravel, coal, and limestone. Roughly two-thirds of the budget is used to support the school district, while the remaining one-third goes to government services (general government, volunteer fire services, nonprofit grants, and nonprofit emergency services) (Denali Borough 2021b).

The Denali Borough operates a landfill and multiple transfer stations, and the Golden Valley Electric Association provides electric power. Homes and businesses rely on well water and septic systems. There is no gas utility as there is in more densely populated areas farther south.

1.5 SOCIOECONOMIC EFFECTS OF THE ALTERNATIVES

1.5.1 Alternative 1: No Action

On October 14, 2021, the NPS announced that it expected that landslide movement over Winter 2021/2022, "will exceed the park's ability to restore or maintain the road surface to safely allow for bus traffic." Under Alternative 1, the Park Road at Pretty Rocks would not be repaired and no bridge would be constructed; the Bear Cave Landslide, Perlite Landslide, and rockfall areas would not be addressed. The NPS would not improve the Polychrome section of road and there would be no vehicle access through the Polychrome area to the 47 miles of road west of the landslide (Mile 45.4). Access to the Kantishna inholdings would be primarily via air, and visitor transportation would continue to be limited to Mile 43 of the Park Road, indefinitely. If no action is taken to restore road access to the west district of the park, further planning would be needed to determine if NPS roads and facilities west of Polychrome would be maintained, abandoned, or restored to a natural state.

[4] The borough generates $4.1 million in overnight severance taxes in Fiscal Year 2019. The period covered by this fiscal year (July 2018-June 2019) was the last period where severance taxes were unaffected by the COVID-19 pandemic.

1.5.2 Alternative 2 (Action Alternative): Pretty Rocks Bridge and Polychrome Road Improvements

Alternative 2 is the NPS's preferred action and environmentally preferred alternative. Alternative 2 would consist of two implementation phases (Figure 6). The project was broken into two phases for budgetary and scheduling reasons, with Phase I focusing on the highest priority sites. Phase I would restore access through the Polychrome area by constructing a bridge over the Pretty Rocks Landslide (approximately Mile 45.4) and undertaking risk reduction measures for the Perlite Landslide (approximately Mile 45.3) and rockfall hazards near the proposed bridge. The old road alignment through the Pretty Rocks Landslide would be abandoned after bridge construction, allowing landslide processes to continue and the road to degrade naturally.

Phase II would address several additional geologic hazards in the Polychrome area, including constructing a retaining wall at the Bear Cave Landslide and undertaking risk reduction measures in rockfall areas. For both phases, workers would be housed in existing areas in the park that have been previously disturbed, including the possible use of campgrounds. The Park Road would be used to transport materials and workers to work sites.

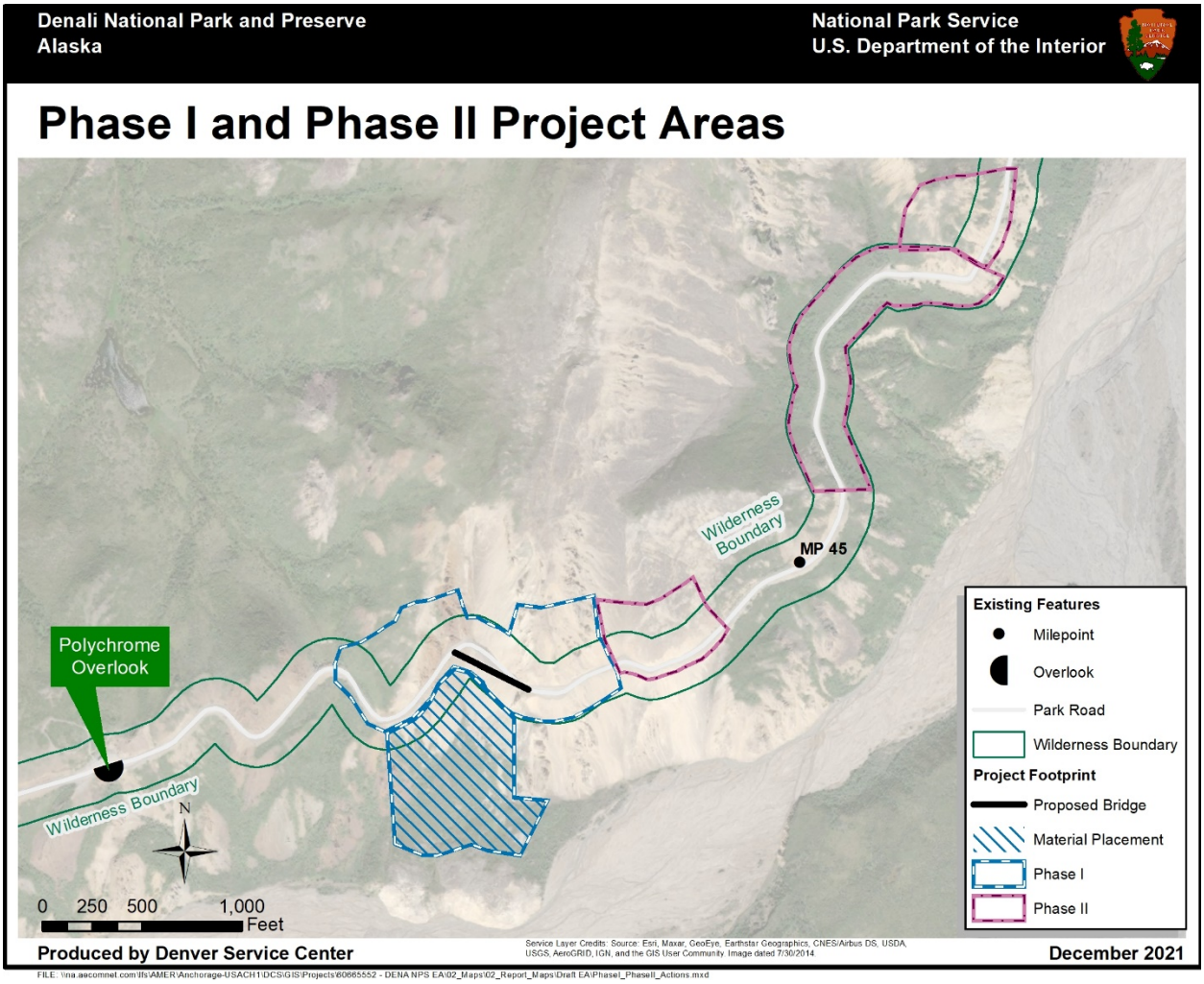


FIGURE 6. PHASE I AND PHASE II PROJECT AREAS

Phase I of the project would begin as early as July 2022 and likely extend through October 2023. Construction work would occur from July to October in 2022 and then shut down for the winter. Construction would resume in 2023 in April and continue through October. If funding is not available in Fiscal Year 2022, the road would remain closed in 2022 as described in the No Action Alternative; construction would begin when funds are known to be available in 2023 and extend through 2024. During construction, the existing Park Road across the landslide would be minimally reconstructed for construction use. Road access through Polychrome is not anticipated during Phase I. For safety reasons, only construction traffic would be allowed in the Pretty Rocks area during most construction activities. Incidental traffic may be facilitated as conditions permit. Visitor transportation would continue to be limited to Mile 43 of the Park Road and buses would turn around at the East Fork Bridge or the East Fork cabin site. Access to Kantishna inholdings would be primarily via air until the bridge is completed.

Phase II would begin after Phase I. Road access through the Polychrome area is anticipated during Phase II. Visitor transportation to destination points west of Pretty Rocks and regular traffic to Kantishna inholdings would be allowed. There may be some traffic delays due to single-lane use or temporary restrictions at the project sites. There could also be scheduled nighttime road restrictions for work to occur. Because rock scaling and bolting cannot occur in the dark due to safety concerns, road restrictions would be needed during some daylight hours as well.

1.5.3 Stakeholder-Raised Factors Affecting the Duration and Magnitude of the Socioeconomic Effects

During meetings and interviews conducted in September and October 2021, inholders consistently expressed thoughts about the following topics that would affect their usage of their properties and their associated business operations.

1.5.3.1 The Effect of Uncertainty. Both commercial and noncommercial inholders expressed that an element under the NPS's control that would help them mitigate business losses and the effect on their usage of the proposal would be to create as much certainty as possible over the next couple years. Inholders are still in the process of mitigating the effects of uncertainty driven by the COVID-19 pandemic and indicated that road issues made keeping their businesses and usage viable more difficult. Multiple inholders indicated that the sooner they knew about the NPS's plan for whether the road would be open in 2022, the easier business planning would be, even if that meant that their road usage might be restricted. The NPS created a level of certainty about 2022 with their October 14, 2021 announcement that the road would not be open to visitor traffic in 2022. Inholders still have had questions about whether the announcement means that they would not have any road access in 2022, including for maintenance and consumables.

1.5.3.2 Maintenance and Consumables. The Park Road is the primary form of access for inholders, and they have designed their interactions with—and usage of—their properties around the road's historic operating conditions. For the lodge operators, this design means that nearly all consumables (e.g., fuel, food, supplies) travel across the road as do services such as septic pumping and building contractors. Both lodge operators and nonlodge inholders use the road to move vehicles and equipment to their properties. Inholders consistently expressed that having some access before the road was closed for Phase I in 2022 or 2023 would allow them to pre-position food, fuel, construction materials, and vehicles while accessing critical services like septic pumping. They indicated that having this access would give them a better chance of operating during the road closure.

1.5.3.3 Kantishna Airport Conditions and Design Standards. As noted above, the business models of the lodges operating in Kantishna and the proposed business model of the lodge under construction are designed around road access. Each operating lodge depends on hundreds of round

trips on the Park Road annually. The only other access points for inholders are via fixed-wing aircraft at the Kantishna Airport (FAA Location Identifier: 5Z5, in the northwest corner of the park, near the Kantishna inholdings) and rotary aircraft access to the airport and directly to properties. In 2008 (the last year with available data), the airport recorded less than 1,000 enplanements (FAA 2021). In contrast, inholders estimated that the area serves approximately 40,000 visitor days a year (Hamm 2021). The airport consists of one gravel runway that is 1,887 feet long. Although it is up to the pilot to determine whether an aircraft can safely land at the airport, it is generally designed for the Cessna 206, an aircraft that holds six passengers including the pilot or up to 1,400 pounds of cargo (including fuel) (Hamm 2020). The airport can also accommodate a DHC-2 Beaver, an aircraft that holds six passengers plus the pilot and co-pilot or a total load of up to 2,100 pounds. The runways are not long enough to accommodate common Alaskan aircraft such as the Piper Navajo (PA-31), Cessna Grand Caravan (208B), or the Beechcraft King Air (200/300/350).

Given its design and capacity, the Kantishna airport is not capable of replacing the road for the purpose of visitor access or supplying inholders in Kantishna. The runway is not long enough to accommodate the right type of aircraft necessary to bring heavier loads such as equipment or septage. To accommodate approximately 40,000 visitor days coming to Kantishna a year across a season of approximately 100 days, the airport would have to accommodate approximately 100 round trips or more (200+ takeoffs and landings combined) per day; a volume that is neither achievable or safe given the unique weather conditions in Kantishna and the lack of any localized ground or airspace control.

During their interviews, several stakeholders said they were analyzing what it would take for them to convert to air-only operations during Phase I of the Action Alternative. They acknowledged that if they operated with this model that they would have to severely reduce their overall capacity and lower employment.

1.5.3.4 NPS Maintenance of NPS Assets. Stakeholders expressed concern about how the NPS would maintain NPS assets in DENA's western district, particularly the road and the airport. The lodges use the road to access recreation sites and historic usage activities as part of their guest experience and the airport is critical to any chance of continued operations in both alternatives. There is concern that without regular maintenance these assets will degrade quickly, potentially aggravating or accelerating negative economic effects.

1.5.4 Discussion of Potential Socioeconomic Effects

Both the Action Alternative and No Action Alternative will both affect the local and regional economies and underlying socioeconomic conditions. However, No Action Alternative (Alternative 1) would result in negative socioeconomic effects of much greater duration and magnitude than the Action Alternative (Alternative 2).

1.5.4.1 Effects of the No Action Alternative. Given the NPS's October 14, 2021 announcement, the analysis interprets the No Action Alternative to mean that the road will remain impassable for the foreseeable future. This alternative would likely result in durable, long-term negative economic impacts on inholders west of the Pretty Rocks Landslide area and tourism operators reliant access to the western end of DENA such as the Doyon Aramark Denali National Park Tours Joint Venture. With the closure of the road the current business models of a small number of businesses, which depend on access west of the project area, would no longer be viable. Inholders face the choice of substantially altering their operating models or closing their operations. The road failure would also affect the visitor experience of the roughly +/-234,000 visitors who access DENA's western district and it could result in fewer visitor nights spent in the Denali Borough and possibly the state of Alaska. The analysis expects independent travelers to be more sensitive than tour travelers whose time in the area is determined by their tour operators.

The following socioeconomic effects are **certain** or **very highly likely** under the No Action Alternative:

- The need for inholders to modify their long-term business and property-usage plans
- Loss of one or more lodge businesses in Kantishna with financial losses including business income, physical assets, and property values
- Permanent loss of a large portion of the direct jobs and income associated with Kantishna businesses
- A large loss of income (and concomitant loss of employment opportunities) associated with the Doyon/Aramark joint venture because four of their six historically offered tours extend beyond Mile 43
- Increased opportunities for air transportation businesses to take visitors to Kantishna
- A shifting of visitor nights from the Kantishna area to the DENA entrance area
- Greater usage of—and pressure on—the Kantishna airport and the privately owned Denali Airport (FAA Location identifier: AK06)[5]
- Loss of business development activity currently planned for the Kantishna area (for investors this would potentially mean the loss of investments already made)
- Loss of direct DENA jobs associated with the DENA's western district and indirect effects of loss of those jobs from the community
- Loss of economic activity associated with Kantishna businesses spending into the local, regional, and state economies

The following socioeconomic effects are **possible, but less likely** under the No Action Alternative:

- A long-term loss of visitor days (and concomitant park fees and tax revenues) associated with visitors staying fewer days in the DENA area
- A shifting or adjustment of package-tour operator schedules to include less time in the DENA area
- An increase in visitation to other Alaska natural sites in place of time at DENA
- A small loss in population associated with reduced employment opportunities

The following socioeconomic effects are **unlikely** under the No Action Alternative:

- Substantial business uncertainty for many business operators outside the park
- Substantial loss of visitor nights or days around DENA
- Substantial permanent disruption of the regional economy
- Substantial loss of permanent residents; effects on the housing market
- Substantial changes in the structure of the local economy including government tax revenues
- Effects on the age, ethnic, or educational composition of the local economy

1.5.4.2 Effects of the Action Alternative. Alternative 2 would avoid many of the long-term socioeconomic effects of the No Action Alternative. Because the road has essentially failed, Alternative 2 provides for a restoration of economic activity and a lessening of losses under the No Action Alternative. The analysis describes the effects of the alternative relative to pre-failure closure (i.e., 2019 baseline) except where noted. In addition, note that the provision of some inholder road access in 2022 could further mitigate the effects of the No Action Alternative.

[5] The Kantishna airport is traditionally served via the McKinley Park Airport, but usage at that airport is capped per the NPS.

The following socioeconomic effects are **highly likely** under Alternative 2:

- An increase in local employment in the construction sector during Phase I and Phase II
- A substantial, but temporary, reduction in visitor nights (and associated business income) in Kantishna during Phase I and Phase II with Phase 1 effects being much larger than Phase II effects
- A temporary reduction in Kantishna area employment (approximately 100 jobs presuming some transition to an air-based model) and direct employment wages (approximately $3 to $5 million across both phases) during Phase I and Phase II
- Reduced gross income for gross transportation businesses that take visitors west of the Pretty Rocks Landslide area during Phase I and portions of Phase II
- Increased opportunities for air transportation businesses to take visitors to Kantishna during Phase I
- A shifting of visitor nights from the Kantishna area to the DENA entrance area during Phase I and portions of Phase II
- Greater usage of—and pressure on—the Kantishna airport (in the northwest corner of DENA near the Kantishna inholdings), and either the McKinley National Park Airport (in the northeast corner of the park), or the privately owned Denali Airport (outside the northeast corner of the park) during Phase I and portions of Phase II[6]
- Loss of economic activity associated with Kantishna businesses spending into the local, regional, and state economies during Phase I and portions of Phase II
- Delay of currently planned business development activity for the Kantishna area

The following socioeconomic effects are **possible**, but **less likely** under the Action Alternative:

- Loss of one or more lodge businesses in Kantishna due to the combined effects of COVID-19 and Phase I

The following socioeconomic effects are **unlikely** under the Action Alternative:

- Permanent loss of direct DENA jobs associated with the DENA's western district and indirect effects of loss of those jobs from the community
- Long-term reductions in visitor days
- A shifting or adjustment of package-tour operator schedules to include less time in the DENA area
- An increase in visitation to other Alaska natural sites in place of time at DENA
- Any changes in population associated with reduced employment opportunities
- Long-term loss of visitor nights or days around DENA
- Permanent disruption of the regional economy
- A change in the number of permanent residents or effects on the housing market
- Substantial changes in the structure of the local economy
- Effects on the age, ethnic, or educational composition of the local economy

[6] Usage at the McKinley Park Airport is capped via operator agreements with the NPS.

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APPENDIX D—VISUAL ANALYSIS

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ACRONYMS AND ABBREVIATIONS

AECOM	AECOM Technical Services, Inc.
DENA	Denali National Park and Preserve
NPS	National Park Service
SIV	Scenic Inventory Value
VP	Viewpoint

1 INTRODUCTION

According to the Organic Act of 1916, part of the purpose for the National Park Service (NPS) and national Parks is "to conserve the scenery and the natural and historic objects and the wildlife therein." The NPS's Visual Resource Program offers a systematic service-wide approach for inventorying and understanding scenic views within park units. In 2016, the NPS launched a standardized visual resource inventory program, which was used to inventory Denali National Park and Preserve (DENA) in 2018.

The following visual assessment has been prepared to analyze potential visual impacts from construction and implementation of a series of road safety measures to address geohazards from Mile 44 to Mile 46 along Denali Park Road in DENA (Figure 1-1).

AECOM Technical Services, Inc. (AECOM) prepared the following visual analysis by reviewing data from the DENA Visual Resource Inventory for one of the four viewpoints used in the analysis and identifying existing visual conditions for the remaining three viewpoints. AECOM also prepared illustrations[1] of each of the viewpoints with three of the proposed project components added into the view: the Pretty Rocks bridge, excavation areas, and material placement area. The visual analysis compares changes in visual resources between existing and proposed conditions at each viewpoint. Temporary impacts to visual resources from construction activities are not included in this analysis.

[1] Prepared illustrations are conceptual in nature and do not represent the actual final conditions. Bridge design and material excavation/deposition locations, shape, and extent are subject to change based on the final engineering design.

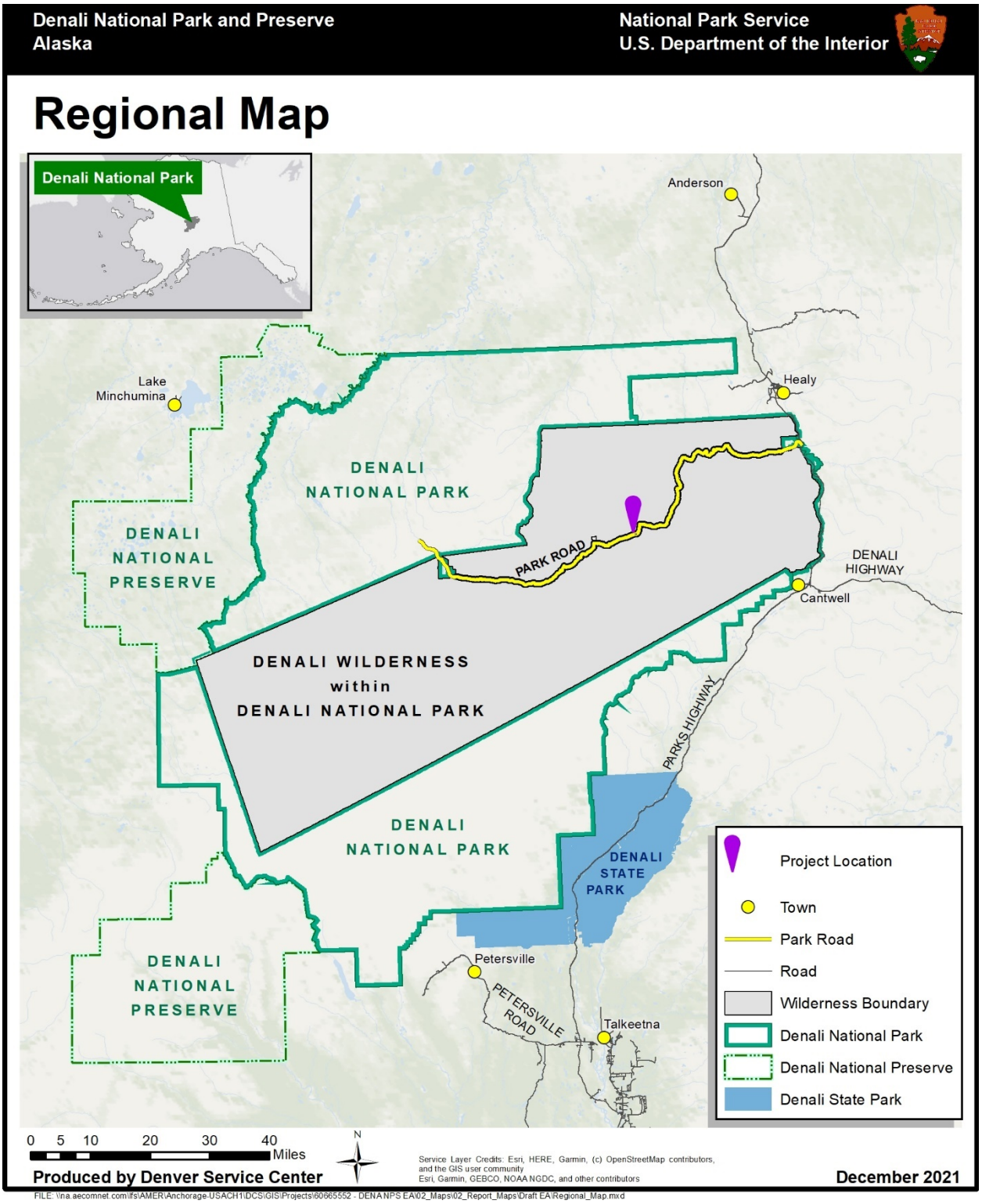


FIGURE 1-1. MAP OF REGION SURROUNDING THE PROPOSED PROJECT

2 PROJECT DESCRIPTION

The Pretty Rocks Landslide and other geohazards from Mile 44 through Mile 46 are threatening the integrity, safety, and continued viability of the Park Road. Landslide movement at Pretty Rocks has been observed for decades but has accelerated in recent years. The increased rate of movement has required extraordinary maintenance efforts from the NPS in order to safely maintain access across the landslide; current maintenance efforts are no longer sustainable in the face of accelerating movement. To address the Pretty Rocks Landslide and other geohazards on the Park Road, the NPS has proposed the Polychrome Area Improvements project, which is a series of engineered solutions to address several geologic hazards impacting the Polychrome section of the Denali Park Road between Mile 44 and Mile 46 in Denali National Park and Preserve (Figure 2-1). The purpose of the proposed action is to restore reliable access west of Polychrome for users of the Park Road, including visitors, staff, concessioners, and Kantishna property owners.

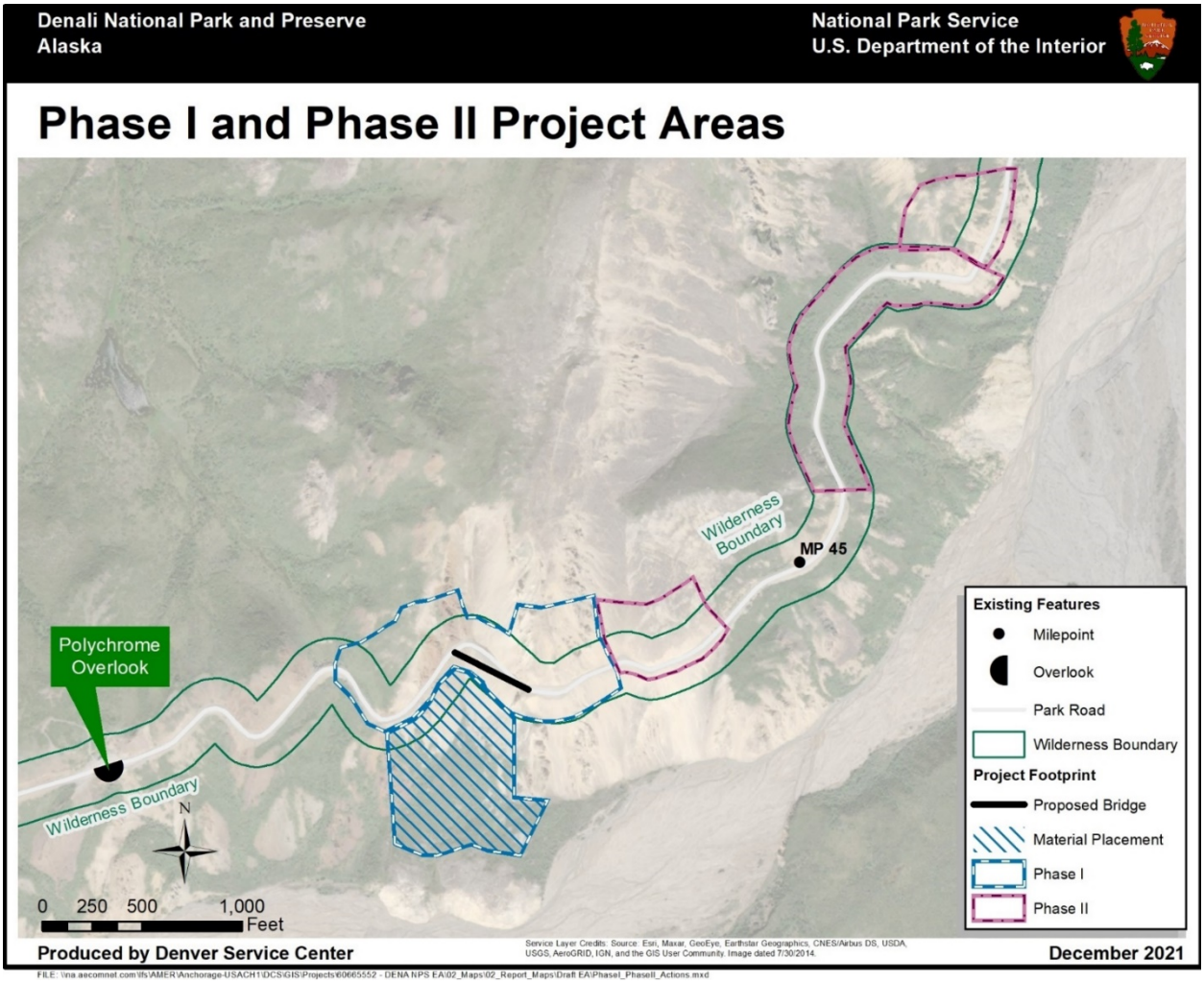


FIGURE 2-1. PROPOSED PROJECT AREAS

The project would be implemented in two phases. Phase I would restore access through the Polychrome area by constructing a bridge over the Pretty Rocks Landslide (approximately Mile 45.4) and undertaking risk reduction measures for the Perlite Landslide (approximately Mile 45.3) and

rockfall hazards near the proposed bridge (Figure 2-2). Phase II would address several additional geologic hazards in the Polychrome area, including constructing a retaining wall at Bear Cave Landslide and undertaking risk reduction measures in rockfall areas (Figure 2-3). For both phases, workers would be housed in existing areas in the park that have been previously disturbed, including the possible use of campgrounds. The Park Road would be used to transport materials and workers to work sites.

The project area includes the road corridor and the wilderness in the vicinity of Mile 44 through Mile 46 of the Park Road. The majority of the Park Road—including the project area—is listed on the National Register of Historic Places.

The Phase 1 and 2 components are described in the following sections.

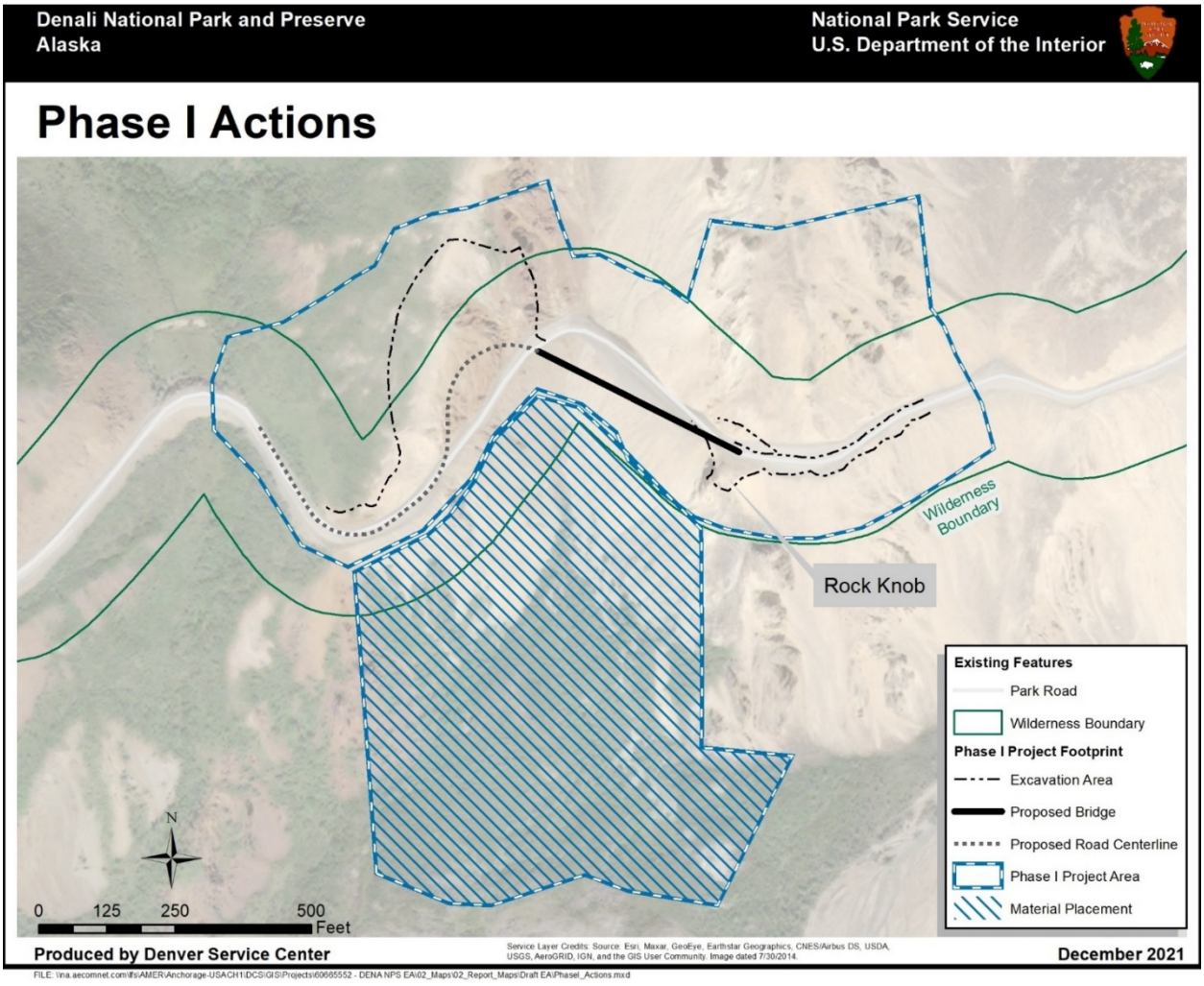


FIGURE 2-2. PROPOSED PROJECT SITE PHASE I COMPONENTS

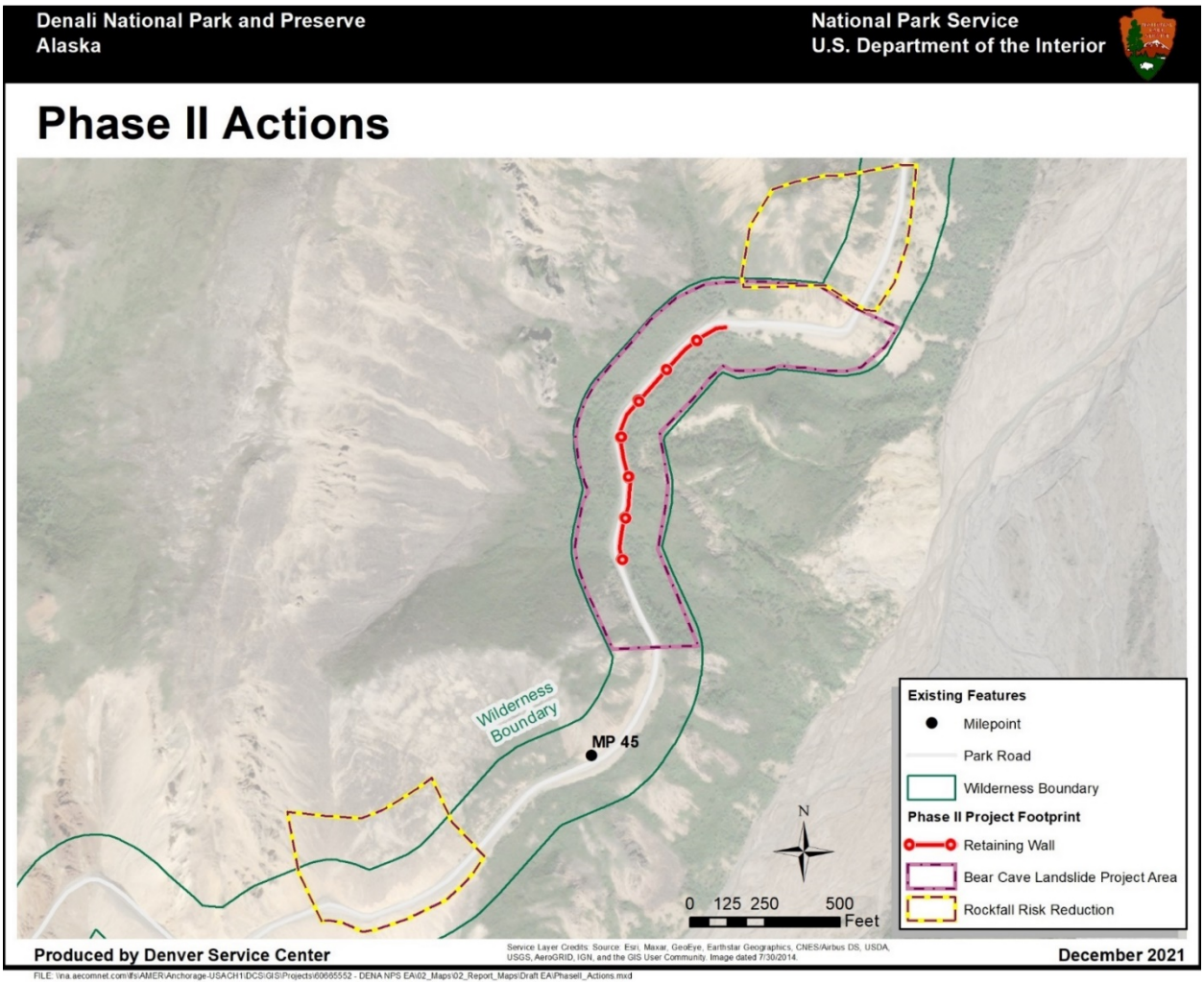


FIGURE 2-3. PROPOSED PROJECT SITE PHASE II COMPONENTS

2.1 PHASE I IMPROVEMENTS

2.1.1 Pretty Rocks Bridge

A bridge spanning the Pretty Rocks Landslide site would be installed. The bridge would be approximately 400 feet long with an overall width of approximately 24 feet and would be supported by two abutments, one on either end. Abutments would be steel pilings with ground anchors, which would be drilled or driven into the bedrock and fortified with concrete. The bridge would be one-lane and traffic would stop at existing pullouts at either end, yielding to vehicles on the bridge.

A temporary platform would be constructed near the east abutment for use as a bridge assembly location. The platform would extend 150 feet from the south side of the road. The bridge components would be trucked to the site and stored at the temporary platform until assembly. A large crane would be used to assemble the bridge on site. Temporary platform construction would require some pile driving and concrete placement, with several dozen piles needed.

After bridge construction, the temporary platform would be removed, the staging areas would be recontoured, and the road would be restored to its historic road width where possible. Space would be preserved at both abutments for future maintenance needs.

2.1.2 Road Realignment

On the west side of the bridge, a short section of the road would be realigned slightly to create space for an appropriate turning radius for vehicles entering and exiting the bridge. The realignment would also include shifting an additional section of road away from the eroding road edge. The realigned road corridor would be entirely outside of designated wilderness; the wilderness boundary would not shift with this realignment.

2.1.3 Excavation

Approximately 125,000 to 150,000 cubic yards of material would be excavated. Excavation of the rock would be accomplished with heavy equipment and blasting. Areas east of the landslide, including the "rock knob" on the south side of the road and the slope on the north side of the road, would be excavated to provide space for bridge construction and equipment.

The slope above the west abutment would be excavated to provide space for construction of the bridge and to accommodate a slight road realignment for vehicles turning on and off the bridge. A portion of this excavation area (less than 1 acre) would be in designated wilderness. The excavation could include a bench cut into the rock partway down the rock face to serve as a rockfall catchment area. The excavation could also include a road-level rockfall ditch. Periodic maintenance of the bench using heavy machinery would be needed, a small portion of which would be in wilderness. Excavation may also require heavy equipment to drive up the vegetated slope from the western edge of the project area, which would require temporary access of motorized vehicles through designated wilderness. Measures would be implemented to protect the vegetation from damage by heavy machinery and tracked vehicles. If feasible, equipment may be placed for excavation by helicopter, eliminating the need to drive over vegetation in wilderness. Actions are intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops while maintaining the integrity of the finished rock cut face to minimize rockfall and rock instability.

2.1.4 Material Placement

After swell is accounted for, the volume of material that would need to be disposed of would be slightly larger than the volume that was excavated. Excavated material that is of sufficient quality for maintenance use would be trucked off site and stored in existing DENA material storage locations (such as the Toklat pit) for use on future projects. As shown in Figure 2-2, the majority of the excavated material would be disposed of on site on the slope below the road. Some vegetation toward the toe of the landslide would be covered by excavated material. Excavated material would consist of rock and soil similar to what currently exists at the site and would be expected to look similar to existing rock/soil at the landslide. Motorized equipment would be used to move material off the roadway and into the material placement area, which would require temporary use in wilderness.

2.1.5 Retaining Walls

A retaining wall near the east end of the Pretty Rocks bridge would be installed on the slope above the road to reduce the risk of rockfall from the excavated slope. A combination of earthwork, horizontal drains, and possibly a retaining wall would also be required to address the Perlite

Landslide on the east side of the Pretty Rocks Landslide. These structures would be outside of wilderness.

2.1.6 Rockfall Risk Reduction

Rockfall areas above the road to the east and west of Pretty Rocks Landslide would be addressed using a combination of rock scaling (i.e., the removal of loose or potentially unstable rocks), installation of rock bolts or dowels, and/or the creation of rockfall ditches. Rock scaling would be designed to match existing surroundings and would be conducted by workers on ropes and performed by hand using prybars; no blasting would be necessary. Installation of rock bolts would include 1-inch diameter bolts or dowels drilled into the surface and subsurface rock of the cliff face to secure hazardous rocks and would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them. Rock scaling and installation of rock bolts would occur in wilderness and would be repeated every 5 to 10 years, or as needed to reduce additional rockfall hazards.

2.2 PHASE II IMPROVEMENTS

2.2.1 Retaining Wall

At the Bear Cave Landslide area, Phase II would include excavation of materials and construction of a retaining wall on the south side of the Park Road. The retaining wall would be buried approximately 30- to 60-feet deep and run approximately 1,000 feet along the road to stabilize the road edge. The north side of the Park Road would be temporarily widened to allow traffic to pass around the construction site. Road work would also include subsurface and surface drainage improvements. The retaining wall and road widening/improvements would not be in the wilderness area. After construction of the wall, the area on the north side of the road would be recovered and the road would be returned to the existing roadway centerline and width. Disturbed areas would be revegetated to match the surrounding area. The retaining wall would be minimally visible from the surrounding area, including from backcountry areas south of the road. Equipment and materials for Bear Cave work would be stored at existing staging areas in DENA.

2.2.2 Rockfall Risk Reduction

Rockfall areas above the road to the east and west of Bear Cave Landslide would be addressed during Phase II (Figure 2-3) using a combination of rock scaling, installation of rock bolts or dowels, and/or the creation of rockfall ditches. Rock scaling would be designed to match existing surroundings and would be conducted by workers on ropes and performed by hand using prybars; no blasting would be necessary. Installation of rock bolts would include 1-inch diameter bolts or dowels drilled into the surface and subsurface rock of the cliff face to secure hazardous rocks and would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them. Rock scaling and installation of rock bolts would occur in wilderness and would be repeated every 5 to 10 years, or as needed to reduce additional rockfall hazards.

2.3 REGIONAL AND PROJECT SETTING

Created in 1917 to protect Dall's sheep from overhunting, DENA now encompasses approximately 6 million acres, which is mostly devoid of human development. There is only one road in DENA and only one road entrance. The 92-mile Park Road begins in a low taiga forested area on the east side of the park and rises and falls through the mountains until it ends at Kantishna in the west. The Park

Road is paved until Mile 15 (Savage River Rest Area) and then transitions to gravel ; noncommercial traffic is allowed on the road until this point. Beyond this point, public traffic is generally restricted to buses. The road narrows after Mile 31 (Teklanika River); therefore, the road at the project site is narrow, gravel, and only open to traffic authorized by the NPS. Bicycles are allowed on the entire 92 miles of road.

The Park Road is a narrow band of nonwilderness surrounded by wilderness in DENA. The wilderness generally begins 150 feet from the centerline of either side of the road. Therefore, views from the road are of mountains, rivers, floodplains, and forest within the wilderness area and for much of the roadway, the road itself is the only human development visible. DENA offers opportunities for hiking, backpacking, bird watching, wildlife viewing, flightseeing, bicycling, photography, camping, skiing, dog sledding, and mountaineering.

3 VISUAL ANALYSIS METHODS

The project site and surrounding area were reviewed for locations where visitors may be able to detect visual impacts from the Polychrome Area Improvements project. The NPS identified four views for the visual assessment. For each view, the viewpoints and photos were chosen to document existing conditions, prepare illustrations of the viewpoints with the project, and analyze impacts to visual resources.

The NPS Visual Resource Inventory is based on views, which consist of a viewpoint, viewed landscape, and the viewers. Scenic values of views are based on their value to the visitor experience and the NPS mission as well as the aesthetic qualities of the scenery. Two processes are used in the inventory to lead to ratings for scenic quality and view importance. These two processes are:

1. The landscape description and scenic quality assessment process identifies and describes visible elements of the viewed landscape and assesses the scenic quality of the view.
2. The view importance assessment identifies and describes key attributes of the viewpoints, viewed landscape, and the viewers that determine the importance of the view to NPS and to the visitor experience.

The ratings for scenic quality and view importance are combined into a Scenic Inventory Value (SIV) for the view. The information gathered in the inventory process is stored in the Enjoy the View Database, a geospatial database available to the NPS. The following sections describe the information that is used to develop the scenic quality and view importance ratings and how these ratings are used to develop the SIV.

3.1 SCENIC QUALITY RATING

Scenic quality is defined by the NPS as:

> …the value of the viewed landscape based on its perceived visual attractiveness, as determined by the aesthetic composition of the visual elements. Scenic quality is a primary reason (but not the sole reason) for conserving scenic values in a viewed landscape; it is well established that high-quality scenery attracts NPS visitors and enhances the visitor experience. (Sullivan and Meyer 2016)

Assessing scenic quality involves field-based assessments of three factors: Landscape Character Integrity, Vividness, and Visual Harmony. For each factor, three equally weighted components are assigned a rating of 1 to 5 points based on a predetermined scale and criteria. The total score

indicates the scenic quality rating, which is one of five classes from A to E, with Class A views having the highest scenic quality and Class E views having the lowest.

Landscape Character Integrity: The degree of intactness and wholeness of the landscape character. Landscapes that have little or no deviation from the identified landscape character type have the highest integrity ratings.

Vividness: The degree to which landscape elements are distinctive or striking enough to make a view memorable.

Visual Harmony: 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.

3.2 VIEW IMPORTANCE RATING

View Importance "identifies NPS and visitor values for the view" (Sullivan and Meyer 2016). Similar to scenic quality, assessing view importance involves assessments of three factors: viewpoint, viewed landscape, and viewer. For each factor, three equally weighted components are assigned a rating. The total score indicates the view importance rating, which is one of five classes from 1 to 5, with Class 1 views having the highest view importance and Class 5 views having the lowest.

Viewpoint Importance: Assesses the extent to which the viewpoint is publicized and managed for visitors.

Viewed Landscape Importance: Assesses the extent to which the elements in the viewed landscape are publicized and used for interpretation. The importance of special designations, such as congressionally designated Wilderness or National Historic Sites, are also evaluated within the view.

Viewer Concern: Assesses the usage and value of the view to visitors for purposes related to scenic enjoyment.

3.3 SCENIC INVENTORY VALUE

Combining the scenic quality and view importance ratings using the matrix provided in Table 1 produces the SIV. The five SIV ratings include: Very Low (VL), Low (L), Moderate (M), High (H), or very High (VH) (Sullivan and Meyer 2016).

TABLE 1. SIV MATRIX

Scenic Quality Rating	View Importance Rating				
	1	2	3	4	5
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

Notes:
SIV = Scenic Inventory Value

4 VISUAL RESOURCE INVENTORY

This section includes descriptions of the visual elements in the viewed landscape and an assessment of scenic quality for each selected viewpoint in the proposed project area.

4.1 VIEWPOINT DESCRIPTIONS AND SCENIC INVENTORY VALUE

The following four viewpoints were selected because they are the viewpoints where visitors would be most likely to see the Polychrome Area Improvements Project (Figure 4-1). Illustrations of the project from each viewpoint are provided in Attachment A to depict the existing conditions and post-project conditions. These illustrations are conceptual in nature and do not represent the actual final conditions. Bridge design and material excavation/deposition locations, shape, and extent are subject to change based on the final engineering design.

Only one of the four viewpoints, Viewpoint 1 Polychrome Overlook, has existing inventory information. Scenic quality and view importance information provided below for that viewpoint is from the Visual Resource Inventory conducted for DENA in 2018 (NPS 2018). For the other three viewpoints, scenic quality is described based on best judgement from viewing photographs, but no ratings were assigned.

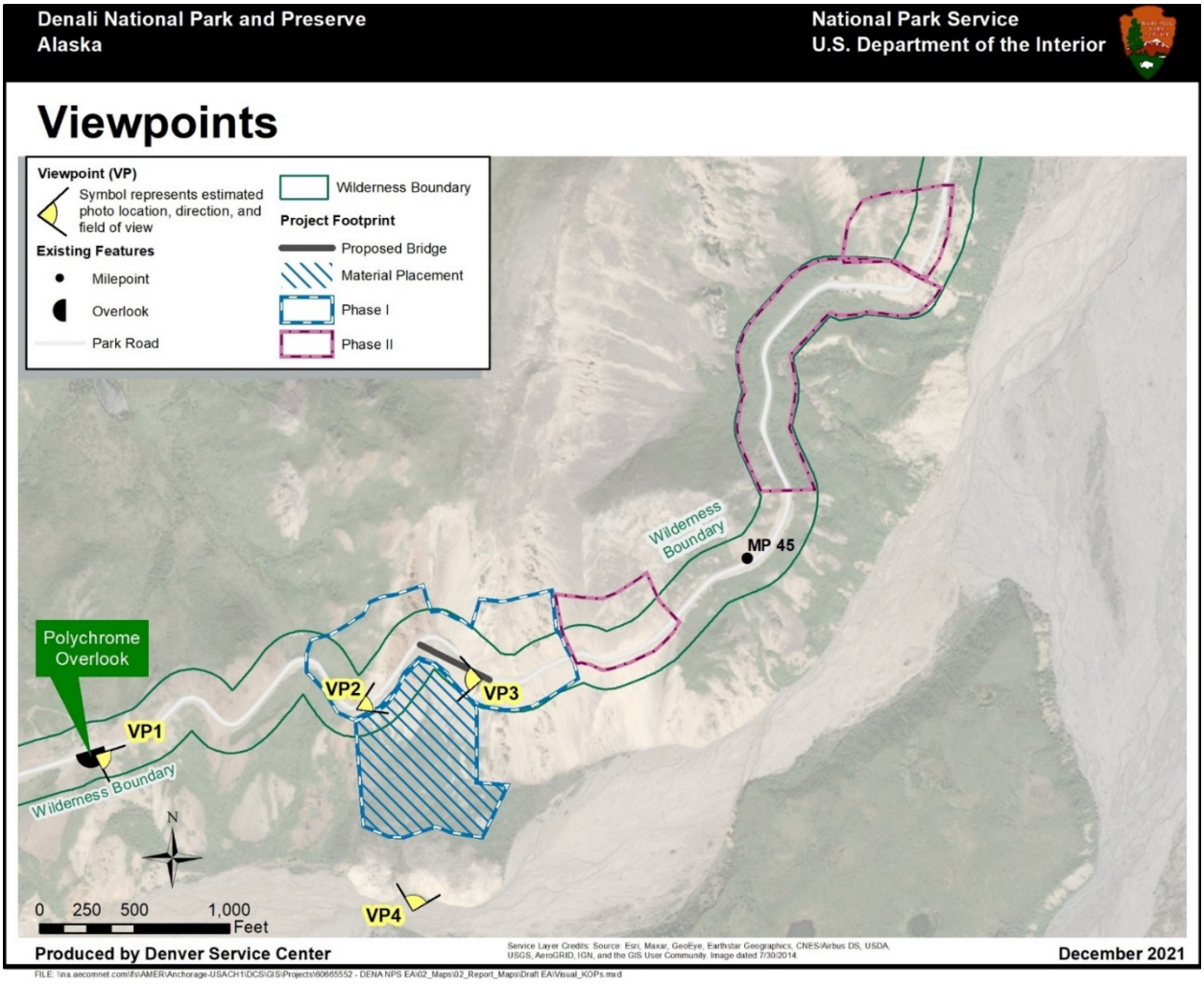


FIGURE 4-1. VIEWPOINTS MAP

4.1.1 Viewpoint 1 (VP1) Polychrome Overlook

Viewpoint Description

- 1,808 feet from the proposed Pretty Rocks bridge (west end abutment). View from Polychrome Overlook looking east, south, and west toward the valley below and the surrounding mountains, with many branches of the East Fork Toklat River in view.

Scenic Quality

Landscape Character Integrity

- Most landscape character elements are present, but not trees
- Inconsistent elements include a small stretch of Park Road and one culvert
- Minor social trailing is present but hard to discern

Vividness

- There are many very bold focal points
- Landforms are varied and strong
- The name Polychrome (i.e., "many colors") captures the color vividness

Visual Harmony

- Spatial relationship: River bars, valley floor, and mountain range are well balanced
- Scale relationship: View is well balanced
- Color harmony: Wide range of colors present

Scenic Quality Rating

- Scenic quality rating is A

View Importance

Viewpoint Importance

- Polychrome Overlook is highly publicized on the park website, the park brochure map, and many publications about Denali
- Management includes road design, extensive road maintenance, infrastructure present, and a short loop trail
- Interpretive services include wayside exhibit, narrated bus tours, interpretation by shuttle bus drivers

Viewed Landscape Importance

- Photos of the viewed landscape are ubiquitous in NPS and external publications
- Designated areas include Denali Wilderness, Mount McKinley National Park Road Historic District and Mount McKinley National Park Road Cultural Landscape
- All interpretive themes are illustrated except the Denali massif

Viewer Concern

- Approximately 35 to 40 percent of park visitors reach this overlook on the limited-access portion of the Park Road
- Tour, shuttle, and park inholder buses stop here long enough for visitors to enjoy the view and hike the short loop trail
- The primary visitor activity at the overlook is to view and photograph the scenery

View Importance Rating

- View Importance rating is 1

Scenic Inventory Value

- SIV is Very High

4.1.2 Viewpoint 2 (VP2) West Bridge Abutment

Viewpoint Description

- 475 feet from the proposed Pretty Rocks bridge (west end abutment) at the west end of the excavation area and new road alignment curve at the west end of the bridge. View from left to right includes the existing cliff at the west bridge abutment/excavation area, the Park Road, Pretty Rocks Landslide above and below the roadway, and existing rock knob at the east bridge abutment. View can be much more focused on one mountain or off the road to the south, in comparison to Viewpoint 1.

Scenic Quality

Landscape Character Integrity

- Landscape elements within this view are more limited than at Viewpoint 1; landscape elements include mountains/cliffs that are naturally treeless
- Inconsistent elements include a small stretch of Park Road and the gravel layers applied to the roadway that are sliding down the hill, as well as a small weather station below the roadway
- Landscape elements appear in good condition (i.e., do not appear manipulated), the inconsistent element of the roadway is not in good condition

Vividness

- The main focal point within the viewpoint is the roadway due to its color and line form, another focal point is the diagonal rock slope edge due to its line and darker color
- Forms include the rugged cliffs, the angular mountain, and smooth/flat roadway; lines include the roadway, angular tilt of the mountain/rocks, as well as the skyline along the mountain
- Color is vivid

Visual Harmony

- View is focused on the mountain slope and roadway
- The roadway is somewhat unbalanced in terms of size in comparison to the mountain slope because the layers of gravel are expanding the roadway size relative to the mountainside
- The colors within this viewpoint are more limited than Viewpoint 1 with mostly neutral colors like tan, light brown and grey; although there are pockets of darker colors on the rocks, the roadway provides the most color contrast with black/dark grey color due to the newer gravel

4.1.3 Viewpoint 3 (VP3) East Bridge Abutment

Viewpoint Description

- 44 feet from the east end of the proposed Pretty Rocks bridge (east end abutment). View includes the mountains and floodplain in the distance on the left side of the view and the mountain, cliffs and landslide in the center of the view, with gravel from the roadway in the immediate foreground of the view.

Scenic Quality

Landscape Character Integrity

- Landscape elements within this view are somewhat more limited than at Viewpoint 1 because the view includes less of the background panorama view; however, most landscape elements are present except trees
- Inconsistent elements include a small stretch of Park Road, which is visible mostly as a line break across the mountain/cliffs
- Landscape elements appear in good condition (i.e., do not appear manipulated)

Vividness

- There are many very bold focal points
- Landforms are varied and include the rugged cliffs, granular foreground landslide, and smoother floodplains and river in the background; lines include the roadway, angular tilt of the mountain/rocks, as well as the river and floodplain channel in the background
- There are many vivid colors present within the landslide, mountain/cliff, floodplain and mountains

Visual Harmony

- Most elements (except for mountains in the background) are layered diagonally from right to left
- View is heavily focused on the foreground mountain/landslide with only a small portion of the view showing the background floodplain and mountains
- Wide range of colors present

4.1.4 Viewpoint 4 (VP4) Riverbed

Viewpoint Description

- 1,328 feet below (i.e., downhill from) the proposed Pretty Rocks bridge within the floodplain at the base of the mountains, near the toe of the landslide. This viewpoint is within the wilderness looking up toward the roadway.

Scenic Quality

Landscape Character Integrity

- Landscape elements within this view are limited in comparison to Viewpoints 1 and 3 because the view is focused on the mountain; landscape elements include mountains, cliffs, and the floodplain/valley floor in the foreground
- The inconsistent element is a stretch of Park Road; the roadway itself is not visible, but there is a faint line through the center to upper portion of the view where the road crosses the mountain
- Landscape elements appear in good condition (i.e., do not appear manipulated)

Vividness

- There are many focal points from cliffs to the mountain top to the contrasting rocks and vegetation in the foreground
- Landforms are varied and include the rugged cliffs, granular foreground rocks and floodplain, and pyramidal mountain top; lines include the roadway, mountain top outline, and angular tilt of the mountain and red cliffs, as well as the straight line of the floodplain in the foreground
- Colors are very vivid including green vegetation, dark red/purple cliffs, tans/greys of the mountain and white of the rock in the foreground

Visual Harmony

- View is well balanced with rounded landforms in the foreground leading up to the taller mountain top in the background
- Scale of the view leads the eye up to the mountain top
- Wide range of colors present

5 VISUAL ANALYSIS

The proposed project's attributes that would affect visual resources and the distance zones from which these attributes would likely be visible are described in this section. The anticipated impacts from the proposed project to visual resources at each viewpoint are also described.

5.1 POLYCHROME AREA IMPROVEMENT ATTRIBUTES

The main attributes of the proposed project that would affect visual resources (the Pretty Rocks bridge, excavations, material placement, and retaining walls) are described in the following sections. The distance zones in which these attributes may be visible are also described.

5.1.1 Pretty Rocks Bridge and Excavations

The Pretty Rocks bridge would be a one-lane, 400-foot long steel bridge as shown in Figure 5-1. Excavation would occur at both ends of the bridge and the roadway would be altered at the west end of the bridge to curve into the hillside more than the existing road alignment. The rock knob at the east abutment would be excavated. The excavation area at the west abutment could include a bench cut into the rock partway down the rock wall to serve as a rockfall catchment area.

Excavation would require some transport of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. However, any impacted vegetation on the back side of the slope would not be visible from the roadway or the four viewpoints. After bridge construction, the east and west abutment areas would be revegetated as needed to match the surrounding areas. Excavation would be intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops while maintaining the integrity of the finished rock cut face to minimize rockfall and rock instability.

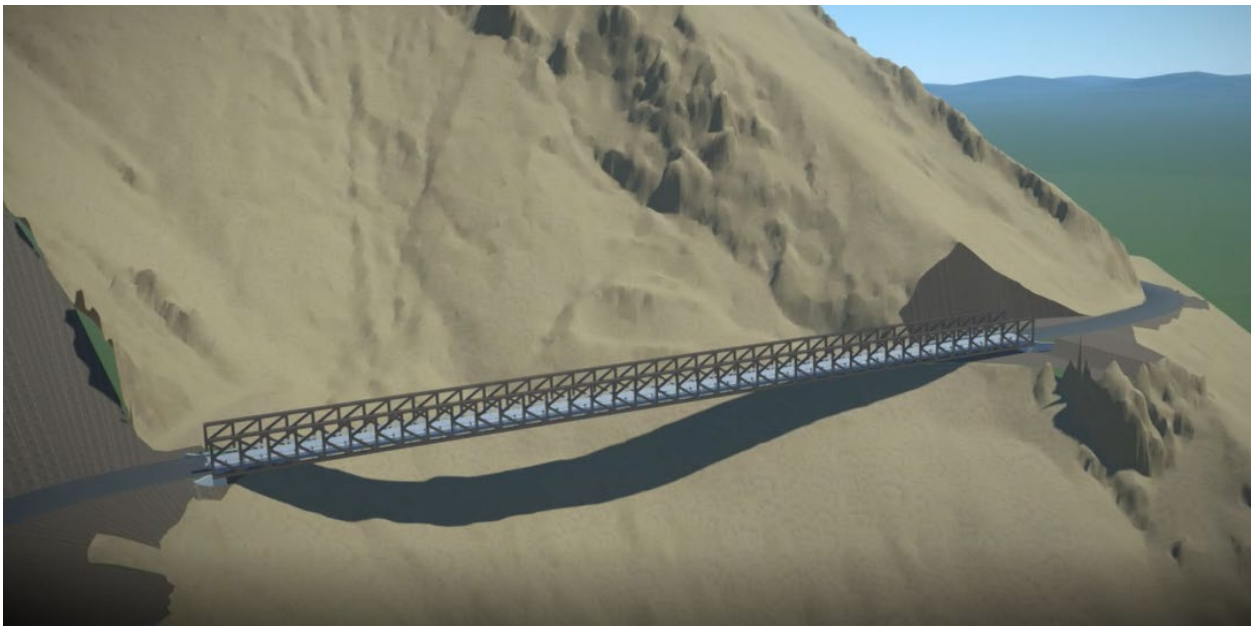


FIGURE 5-1. DIGITAL REPRESENTATION OF THE PROPOSED PRETTY ROCKS BRIDGE (LOOKING EAST)

5.1.2 Material Placement

Most of the excavated material would be placed in the landslide area. As shown in Figure 2-1 and Figure 2-2, excavated material would be placed in the area below the roadway down toward the toe of the landslide. Some vegetation below the roadway and toward the toe of the landslide would be covered by excavated material. Excavated material would consist of rock and soil similar to what currently exists at the site and would be expected to look similar to existing rock/soil at the landslide.

5.1.3 Retaining Walls

The Bear Cave Landslide retaining wall would be buried and therefore minimally visible from the surrounding area, including from backcountry areas south of the road; however, drainage ditch improvements on the north side of the road would be visible while on the roadway. Due to the location of the Bear Cave Landslide site farther east along the Park Road from the bridge site, the Bear Cave Landslide site would not be visible from any of the four viewpoints. Therefore, the Bear Cave Landslide retaining wall is not discussed further. A retaining wall near the east end of the Pretty Rocks bridge would be installed on the slope above the road to reduce the risk of rockfall from the excavated slope. A combination of earthwork, horizontal drains, and possibly a retaining wall would also be required to address the Perlite Landslide on the east side of the Pretty Rocks Landslide. The retaining wall construction areas would be revegetated to match the surrounding areas after project completion.

5.1.4 Visibility and Distance Zones

Due to the road curves and mountains, the bridge would be visible for visitors on the Park Road on only a small portion of the road. In this small section of roadway, the most visible views would be on approach to the bridge; the bridge would visible just before, on, and just after in the foreground of the view. The bridge would not be visible east of Viewpoint 3 due to the mountainside, and the bridge would likely not be visible from farther west than Viewpoint 1.

Similar to the bridge, excavation areas would have limited visibility due to road curves and mountains. The east abutment excavation and removal of the rock knob, as well as the bench cut and west abutment excavation area, would be more visible from the west due to mountain curvatures that would make the excavation areas not visible east of Viewpoint 3. From areas west of Viewpoint 3, the bench cut and west abutment excavation area would be more noticeable than the east end excavation area and retaining wall due to the larger size of the excavation area and removal of some mountain curvature near the excavation area. Due to its location along the roadway and at the mountainside crest, the potential retaining wall at the Perlite Landslide would only be partially visible from areas west of Viewpoint 3. Because of the scale of the work, removal of individual rocks for rock scaling or placement of 1-inch rock bolts would likely be visible from only very close range.

The excavated material would likely be visible from a large area due to the size of the area where material would be placed, the loss of vegetation toward the toe, and the color of the rock/soil that would be placed in the landslide area. However, the material would appear to fit with the landscape setting due to the existing exposed rock/soil on the landslide and near the toe just above the floodplain.

More specific visual changes are described under each viewpoint in the following sections.

5.2 VISUAL CHANGES BY VIEWPOINT

The following sections describe the changes to visual resources at each viewpoint from the proposed project.

5.2.1 Viewpoint 1—Polychrome Overlook

The Pretty Rocks Bridge would be minimally visible from the Polychrome Overlook (Viewpoint 1). The bridge would be in the middleground of the view and would be partially hidden by the hillside, shown in illustrations provided in Attachment A. Excavation for the bridge would be noticeable from Viewpoint 1, including both at the east end of the bridge where the rock knob would be removed and excavation along the slope above the west abutment (orange shaded areas on illustration in Attachment A). The excavation at both ends of the bridge would appear as exposed rock from Viewpoint 1, similar to the existing view. The retaining wall at the east end of the bridge may be visible from Viewpoint 1. If this wall were made of natural materials, it would be more likely to blend in with the natural surroundings at the east end of the bridge and reduce contrast. Rock scaling at the rockfall areas and work at the Perlite Landslide would likely not be visible from this viewpoint due to the distance from the viewer at Viewpoint 1. Modifications to geohazard sites in Phase II would not be noticeable from Viewpoint 1 due the intervening mountainside at the east end of the Pretty Rocks bridge.

Material placement would be visible in the middleground of the view from the bridge down toward the floodplain due to the amount of excavated material and loss of vegetation, particularly near the toe of the landslide (purple shaded area on illustration in Attachment A). However, the excavated material would consist of rock and soil similar to what is present within the landslide farther uphill toward the top of the mountain. The material would be expected to look similar in color to existing rock/soil present within the landslide. Therefore, the excavated material would likely appear as a more continuous line of tan to red/brown colored rock from the bridge down toward the toe of the landslide and the riverbed.

In terms of scenic quality, landscape character integrity would remain high as the excavated material and excavation areas would not appear as inconsistent elements and would be subordinate to the surrounding landscape features. Vividness would continue to be strong and the dominant colors and forms of the landscape (valley bottom, mountains) would remain intact. Visual harmony would also

remain high with the material placement, excavation areas, retaining walls, and bridge as natural appearing colors that blend with the surrounding environment, and the scale of the bridge subordinate to other features within the view frame.

Nearly all transit and tour buses stop at this viewpoint during the summer. Bicyclists may also stop at this viewpoint. View duration would vary based on the length of time busses or cyclists are stop at the viewpoint.

5.2.2 Viewpoint 2—West Bridge Abutment

As shown the illustrations provided in Attachment A, the Pretty Rocks Bridge would be in the center middleground of the view from Viewpoint 2. The bridge would introduce a bold horizontal and straight line that appeared smooth in texture. Collectively, these attributes would contrast with the existing diagonal lines and course texture of the landscape. However, if the bridge were a neutral color like brown, rust, or grey, the bridge would have a low level of contrast with the surrounding Pretty Rocks Landslide.

The excavated material placement would appear similar to the existing condition of the landslide in color. Therefore, the excavated material would likely appear as more tan/red/brown colored rock below the roadway within the view from Viewpoint 2 (purple shaded area on the illustration provided in Attachment A). The excavation at both ends of the bridge would be visible from Viewpoint 2, including removal of the rock knob located at the east abutment, the excavation area uphill of the east abutment, and west abutment excavation area and potential bench cut partway up the rockwall (orange shaded areas on illustration provided in Attachment A). Excavation would be intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops. Because the existing view consists mainly of exposed rock and cliff, excavation that exposes additional rock and placement of additional rock within the view would not introduce contrast. Road-level rockfall ditches would not introduce an additional inconsistent element because these ditches are a common characteristic of the roadway. The retaining wall at the east end of the bridge on the uphill side of the road would add another line to the view at the far edge of the middleground of the view. However, if the retaining wall were made of natural materials, the wall would be more likely to blend in with the natural surroundings at the east end of the bridge, thus reducing contrast. The bench cut along the west abutment excavation area would add a bold, smooth diagonal line in the opposite direction (uphill) compared to the existing diagonal lines within the view along the mountainside that trend downhill. The bench cut would not appear natural due to its line form and smoother texture and would add contrast to the view.

Work at the Perlite Landslide would likely not be noticeable as the Perlite Landslide is near the edge of the middleground area of the view and thus work at this site along the roadway would not be noticeable from that distance. Removal of individual rocks or placement of small rock bolts at rockfall areas would also not be noticeable from this viewpoint due to the small scale of this work. Modifications to geohazard sites in Phase II would not be visible from Viewpoint 2 as they would be located outside of the view, around the east side of the mountain (beyond the east bridge abutment).

In terms of scenic quality, the inconsistency of the roadway would change slightly with introduction of the bridge, though inconsistency of the existing roadway segment and its black gravel would continue to be more dominant. Over time, the black graveled roadway segment that the bridge would replace would likely be overtaken by the landslide as the roadway segment would not be maintained. Therefore, the contrast and inconsistency from the black gravel along the roadway would decrease over time. Inconsistency would also be introduced from the bench cut along the west abutment excavation area and from the retaining wall at the east end of the bridge. Existing landscape elements would still be present; the excavation and material placement areas would appear as exposed rock, which is currently pervasive in the existing view. Vividness would continue to include similar forms

and lines, with the roadway line being slightly more prominent and straight due to the bridge. New lines would be introduced to the view from the retaining wall at the east end of the bridge and the bench cut along the west abutment excavation area. Visual harmony would not change dramatically though there would be more focus on the bridge due to it being a human-made feature and potentially some focus on the bench cut along the west abutment excavation area. Colors within the view would remain vivid and neutral in palate. Some darker areas may be exposed due to excavation and material placement.

This viewpoint would be seen by bicyclists and riders on buses headed east, primarily riders in the middle to right side of the bus. View duration would generally be limited to approaching and crossing the bridge.

5.2.3 Viewpoint 3—East Bridge Abutment

The Pretty Rocks bridge would be on the far right of the view from Viewpoint 3 as shown in the illustrations provided in Attachment A. The bridge would be an inconsistent human-made element within the view. Similar to Viewpoint 2, if the bridge were a neutral color like brown, rust, or grey, there would be less contrast between the bridge and the surrounding landslide.

Similar to Viewpoint 2, material placement would likely appear as more tan/brown/red colored rock below the roadway similar to the existing condition of the landslide as viewed from Viewpoint 3 (purple shaded area on the illustration provided in Attachment A). The excavation at the east end of the bridge would not be visible from Viewpoint 3. Removal of the rock knob adjacent to this viewpoint would not be visible because this excavation area would be just behind the viewer at this viewpoint. The excavation area uphill of the east end of the bridge and the retaining wall here would not be visible from this viewpoint as these areas would be about 90 degrees to the right of the view. But the west abutment excavation area and bench cut would be visible from Viewpoint 3 (orange shaded area on illustration provided in Attachment A). Excavation would be intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops. Because the view from Viewpoint 3 consists mainly of exposed rock and cliff within and above/below the landslide in the foreground and middleground, excavation and placement of additional rock within the view would introduce contrast in shape and form, but not color. However, the bench cut along the west abutment excavation area would add a bold, smooth diagonal line that would not appear natural due to its line form and smoother texture and would also add contrast to the view.

Work at the Perlite Landslide would not be visible within the view of Viewpoint 3 because the site is behind the view. Rock scaling and rock bolting would likely not be noticeable as the mountainside is very rocky and removal of some rocks or placement of 1-inch bolts would likely not be noticeable. Modifications to geohazard sites in Phase II would not be visible from Viewpoint 3 because they would be behind this viewpoint, around the east side of the mountain.

In terms of scenic quality, the inconsistency of the roadway would increase with introduction of the bridge; however, the existing roadway section to be abandoned may decrease in contrast and inconsistency over time as it would not be maintained and would become overrun by the landslide. Inconsistency would also be introduced from the bench cut along the west abutment excavation area. Existing landscape elements would still be present; the excavation and material placement areas would appear as exposed rock, which is currently dominant in the foreground and middleground of the existing view. Vividness would continue to include similar forms and lines, with the roadway line being more prominent and straight due to the bridge. New lines would be introduced to the view from the bench cut along the west abutment excavation area, and if the viewer were facing the mountain, the retaining wall at the east end of the bridge. Visual harmony would not change dramatically though there may be slightly more focus on the bridge due to it being a human-made feature and the bridge framing the right side of the view and potentially some focus on the bench cut

along the west abutment excavation area due to its line and texture. A wide range of colors within the view would continue to be present. Some darker areas may be exposed due to excavation and material placement. The straight line of the bridge and smoother line of the bench cut would introduce some contrast with the other lines within the view that trend downward from right to left and are less straight and rougher in texture.

This viewpoint would be seen by bicyclists and some bus passengers (i.e., those on the left side of buses headed west). This view would be difficult to see from the middle or right side of buses headed west. View duration would generally be limited to approaching and crossing the bridge.

5.2.4 Viewpoint 4—Riverbed

The Pretty Rocks bridge would be within the upper center of the view from Viewpoint 4 as shown in illustrations provided in Attachment A. The bridge would be fairly prominent within this view due to its size and framing by the mountain in the backdrop. The straight line of the bridge would direct viewers at Viewpoint 4 to focus on the bridge. If the bridge were a neutral color like brown, rust, or grey, there would be less contrast between the bridge and the surrounding landslide.

Material placement would be most noticeable from this viewpoint as the entire material placement area would be visible and would reduce vegetation and color variety in the center of this view (purple shaded area on illustration provided in Attachment A). However, the material would likely appear as more tan/brown/red colored rock in the center of the view similar to the existing condition of the landslide above the roadway. The excavation at both ends of the bridge would be visible from Viewpoint 4, including removal of the rock knob by the east abutment, excavation area uphill of the east abutment, and west abutment excavation area (see orange shaded areas on illustration in Attachment A). Excavation would be intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops. Because the area in which the excavation would occur consists mainly of exposed rock and cliff within and above/below the roadway in the middleground of the view from Viewpoint 4, excavation and placement of additional rock within the view would not introduce contrast. The bench cut along the west abutment excavation area would add a smooth diagonal line that would not appear natural due to its line form and smoother texture and would add contrast to the view. The retaining wall at the east end of the bridge may be visible from this view and may introduce contrast. However, if the wall were made of natural materials, it would be more likely to blend into the natural surroundings of the east end of the bridge.

Rock scaling and rock bolting at rockfall areas would likely not be noticeable from this viewpoint as the removal of individual rocks or placement of small bolts would not be noticeable due to the distance from the viewer. Modifications to geohazard sites in Phase II would not be visible from Viewpoint 4 because they would be outside of the view, around the east side of the mountain. Work along the roadway at the Perlite Landslide would also likely not be visible due to the site's location at the mountainside crest and distance from the viewer.

In terms of scenic quality, the inconsistency of the roadway would increase with introduction of the bridge. The bridge would appear dominant within the view. Inconsistency would also be introduced from the bench cut along the west abutment excavation area. Existing landscape elements would still be present; the excavation and material placement areas would appear as exposed rock, which is prominent in the middleground and background of the existing view. Vividness would continue to include similar forms and lines, with the roadway line being more prominent and straight due to the bridge appearing as a bold horizontal line rather than a much less noticeable contoured line along the mountainside. The bridge would add another strong focal point (in addition to the mountaintop). A new line would also be introduced to the view from the bench cut along the west abutment excavation area and from the retaining wall at the east end of the bridge. Visual harmony would change due to the inconsistency of the bridge as a human-made feature and unnatural bench

cut in the west abutment excavation area in an otherwise natural-appearing view. The scale of the view would be altered to focus more on the bridge. A range of colors within the view would continue to be present, though some green vegetation in the middleground would be replaced by tan/brown/red rock. Some darker areas may be exposed due to excavation and material placement.

This viewpoint would most likely be seen by hikers and backpackers. View duration would depend on whether visitors hike through or remain in the area.

6 AVOIDANCE, MINIMIZATION, AND MITIGATION MEASURES

The Polychrome Area Improvements (proposed project) are being designed to blend in with the existing mountainside as much as possible. The following measures are recommended to minimize the contrast created by the project:

- Bridge color should be nonreflective and a neutral color to blend in with the existing colors of the landslide to the extent feasible. The final appearance would be approved by NPS in consultation with the Bureau of Land Management standard environmental color chart.
- If possible, the retaining wall at the east end of the bridge and at the Perlite Landslide should resemble natural materials and blend into the landscape, to reduce visibility.
- To the extent feasible, the width of the bench cut along the west abutment excavation area should be minimized and have a rough texture (i.e., not smooth surface) to reduce contrast.
- Any disturbed previously vegetated areas should be revegetated with native species.
- The NPS should require shielding on construction lighting to eliminate light trespass. Fully shielded lights should illuminate the work area without allowing light to shine upward, sideways, or backward outside the work zone.

7 REFERENCES

NPS (National Park Service). 2018. Visual Resource Inventory, Denali National Park and Preserve. Viewpoint: Polychrome Overlook.

Sullivan, R. and M. Meyer. 2016. Documenting America's Scenic Treasures: The National Park Service Visual Resource Inventory.

ATTACHMENT A

Viewpoint 1 (VP1)—Polychrome Overlook

Existing Conditions

Illustration of post-construction conditions

Orange shaded areas indicate excavation areas. Purple shaded area indicates material placement area. Additional features such as retaining walls are not shown, but would be placed in the excavation area shown to the right of the bridge.

This illustration is conceptual in nature and does not represent the actual final conditions. Bridge design and material excavation/deposition locations, shape, and extent are subject to change based on the final engineering design.

Viewpoint 2 (VP2)—West Bridge Abutment

Existing Conditions

Illustration of post-construction conditions

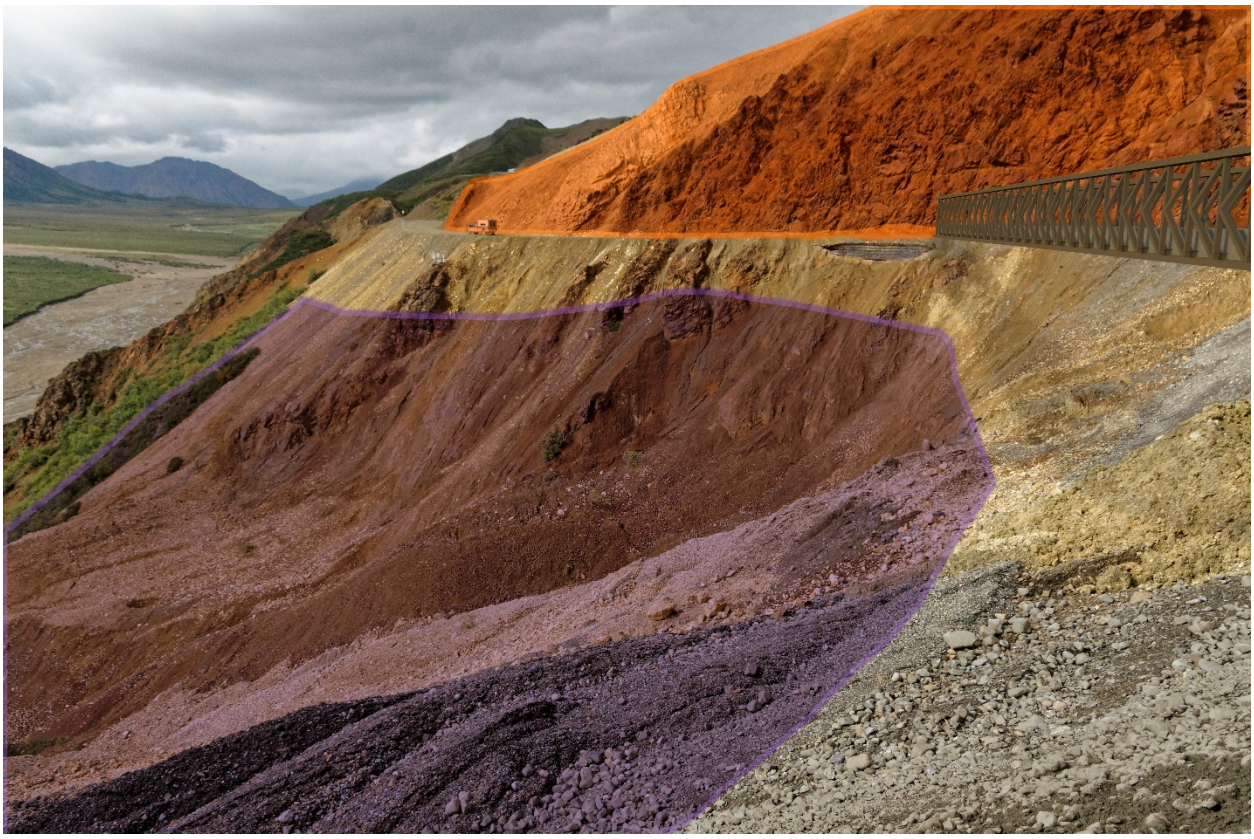
Orange shaded areas indicate excavation areas. Purple shaded area indicates material placement area. Additional features such as retaining walls are not shown, but would be placed in the excavation area shown to the right of the bridge.

This illustration is conceptual in nature and does not represent the actual final conditions. Bridge design and material excavation/deposition locations, shape, and extent are subject to change based on the final engineering design.

Viewpoint 3 (VP3)—East Bridge Abutment

Existing Conditions

Illustration of post-construction conditions



Orange shaded area indicates excavation area. Purple shaded area indicates material placement area.

This illustration is conceptual in nature and does not represent the actual final conditions. Bridge design and material excavation/deposition locations, shape, and extent are subject to change based on the final engineering design.

Viewpoint 4 (VP4)—Riverbed

Existing Conditions

Illustration of post-construction conditions

Orange shaded areas indicate excavation areas. Purple shaded area indicates material placement area. Additional features such as retaining walls are not shown, but would be placed in the excavation area shown to the right of the bridge.

This illustration is conceptual in nature and does not represent the actual final conditions. Bridge design and material excavation/deposition locations, shape, and extent are subject to change based on the final engineering design.

APPENDIX E—WILDERNESS ACT MINIMUM REQUIREMENTS ANALYSIS

ARTHUR CARHART NATIONAL WILDERNESS TRAINING CENTER

MINIMUM REQUIREMENTS DECISION GUIDE WORKBOOK

"…except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act…"

-- The Wilderness Act of 1964

Project Title: Polychrome Area Improvements

MRDG Step 1: Determination

*Determine if Administrative Action is **Necessary***

Description of the Situation
What is the situation that may prompt administrative action?

The Pretty Rocks Landslide and other geohazards from Mile 44 through Mile 46 are threatening the integrity, safety, and continued viability of the Park Road. Landslide movement at Pretty Rocks has been observed for decades but has accelerated in recent years. Prior to 2014, when landslide movement noticeably increased, downslope movement was 1 inch or less per month. Monitoring equipment used by Denali National Park and Preserve (DENA) staff indicated that by September 2021 movement was measured at 15.5 inches per day and further acceleration is likely in the near future. The increasing movement of the landslide results in an increased risk of rockfall hazard as the loose material holding large rocks in place erodes away and the slope above the road becomes steeper. The current conditions require enhanced safety protocols, including the need for additional staff to serve as rockfall spotters during most maintenance activities in the area.

The increased rate of movement has required extraordinary maintenance efforts from the NPS in order to safely maintain access across the landslide; current maintenance efforts are no longer sustainable in the face of accelerating movement. For example, over a 5-month period from fall 2020 to spring 2021, the Pretty Rocks Landslide section of the road slumped approximately 18 feet below the surrounding road grade, which required an emergency repair, the addition of about 6,000 cubic yards of material, and a delayed spring road opening. The slump required an additional 10,000 cubic yards of material and daily maintenance throughout the summer 2021 season. Due to accelerated landslide movement, the NPS was no longer able to maintain the area around Pretty Rocks Landslide after September 2, 2021 and closed the road at the East Fork Bridge for the remainder of the season, 20 days earlier than scheduled. Since September 2021, the landslide has continued to displace the road more than 30 feet below the surrounding road grade; that section of road is scheduled to remain closed in 2022. Without long-term improvements, the risk of rockfall and catastrophic road failure would continue to increase.

The Park Road—including the section through the Pretty Rocks Landslide and the Bear Cave Landslide—is the primary means by which most visitors experience Denali National Park and Preserve (DENA). The Park Road is the main access for visitors venturing into the designated Denali Wilderness as well as eligible wilderness areas near Kantishna. This makes it unique among wilderness areas in Alaska that are remote and generally require aircraft to access, as well as among wilderness areas in the lower 48 that are more accessible but comparably small. The majority of park visitors use the Park Road, and most of those road users traverse the Pretty Rocks Landslide area. If left unaddressed, the Pretty Rocks Landslide and the Bear Cave Landslide would continue displacing the road, eliminating vehicular access to the western half of the Park Road and popular visitor destinations and NPS facilities including the Toklat Road Camp, Eielson Visitor Center, Wonder Lake, Kantishna, and the most iconic views of the Alaska Range and the Denali massif as well as the unique, easy wilderness access this section of road provides.

Options Outside of Wilderness
Can action be taken outside of wilderness that adequately addresses the situation?

☐ YES **STOP – DO NOT TAKE ACTION IN WILDERNESS**

☒ NO **EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**

Explain:

In order to provide continued access, some level of activity would have to occur within the Denali Wilderness. The wilderness boundary in the Pretty Rocks Landslide area begins 150 feet from the centerline of the original road alignment and the scale of the repairs and mitigations required to continue providing road access is not feasible to accomplish solely within this limited corridor. Other options to address Park Road issues would have further impact on wilderness and are not analyzed here.

Criteria for Determining Necessity
Is action necessary to meet any of the criteria below?

A. Valid Existing Rights or Special Provisions of Wilderness Legislation

*Is action necessary to satisfy valid existing rights or a special provision in wilderness legislation (the Wilderness Act of 1964 or subsequent wilderness laws) that **requires** action? Cite law and section.*

☐ YES ☒ NO

Explain:

Neither the Wilderness Act, the Alaska National Interest Lands Conservation Act (ANILCA, the enabling legislation for the Denali Wilderness,) nor any valid existing rights require that action related to this project take place in wilderness.

B. Requirements of Other Legislation

*Is action necessary to meet the requirements of **other federal laws**? Cite law and section.*

☐ YES ☒ NO

Explain:

Other federal laws do not require that action related to this project take place in wilderness.

C. Wilderness Character

Is action necessary to preserve one or more of the five qualities of wilderness character?

UNTRAMMELED

☐ YES ☒ NO

Explain:

Actions under the proposed project are not necessary to preserve the untrammeled quality of wilderness character.

UNDEVELOPED

☐ YES ☒ NO

Explain:

Actions under the proposed project are not necessary to preserve the undeveloped quality of wilderness character.

NATURAL

☐ YES ☒ NO

Explain:

Actions under the proposed project are not necessary to preserve the natural quality of wilderness character.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

☒ YES ☒ NO

Explain:

Maintaining the Park Road is the best way for the NPS to continue to offer access to primitive and unconfined recreation in the Denali Wilderness. Most backcountry users access the wilderness via the Park Road, and DENA is special in part because of the unique wilderness access it provides in contrast to many other wilderness areas in Alaska. Taking action under the project would provide access to primitive and unconfined recreation in the western portion of the park in the long term, but at the same time, without taking action DENA would still provide outstanding opportunities for primitive and unconfined recreation.

OTHER FEATURES OF VALUE

☐ YES ☒ NO

Explain:

There are no other features of value that would be preserved by taking action.

Step 1 Determination
*Is administrative action **necessary** in wilderness?*

Criteria for Determining Necessity

A. Existing Rights or Special Provisions	☐ YES	☒ NO
B. Requirements of Other Legislation	☐ YES	☒ NO
C. Wilderness Character		
Untrammeled	☐ YES	☒ NO

Undeveloped	☐ YES	☒ NO
Natural	☐ YES	☒ NO
Solitude/Primitive/Unconfined	☒ YES	☒ NO
Other Features of Value	☐ YES	☒ NO

Is administrative action **necessary** in wilderness?

☒ YES	**EXPLAIN AND COMPLETE STEP 1 OF THE MRDG**
☐ NO	**STOP – DO NOT TAKE ACTION IN WILDERNESS**

Explain:

Administrative action is necessary in wilderness in order to provide safe access along the only overland route within DENA and allow visitors to continue experiencing and enjoying the entirety of the Park Road and the access it affords to other areas of the park, including access to wilderness. The project would greatly benefit access to primitive and unconfined recreation in the western portion of DENA; without the Park Road, many people would not be able to access the western portion of the park for wilderness recreation opportunities. Most backcountry users access the wilderness via the Park Road, and therefore maintaining the Park Road is the best way for DENA to continue to offer access to primitive and unconfined recreation in the Denali Wilderness.

Additionally, the Denali Park Road is listed in the National Register of Historic Places; it is both a Historic District (HD) and a Cultural Landscape (CL). The road is historically significant for its association with the period of scenic road development in NPS in the 1920s and 1930s, for its shuttle bus system, and for its association with the Mission 66 park development program in the 1950s and 1960s. The road is also a rustic example of landscape engineering combining NPS aesthetic road design principles with the Alaska Road Commission's experience constructing roads in northern environments. Preservation of the Denali Park Road, including its historic use as access to recreation and wilderness opportunities, will require action in wilderness because the wilderness boundary begins 150 feet from the centerline of the original road alignment and adequate repairs and mitigations to continue providing road access are not feasible within this limited corridor.

MRDG Step 2

*Determine the **Minimum** Activity*

Other Direction

*Is there "special provisions" language in legislation (or other Congressional direction) that explicitly **allows** consideration of a use otherwise prohibited by Section 4(c)?*

AND/OR

Has the issue been addressed in agency policy, management plans, species recovery plans, or agreements with other agencies or partners?

☐ YES **DESCRIBE OTHER DIRECTION**

☒ NO **SKIP AHEAD TO TIME CONSTRAINTS BELOW**

Describe Other Direction:

Time Constraints

What, if any, are the time constraints that may affect the action?

Weather conditions (particularly temperature and presence of snow/ice), species restrictions (golden eagle nesting), and lack of daylight, limit the construction season.

For safety, weather, and access purposes, work would need to occur over the summer season. Blasting and rock scaling or rock bolt installation cannot happen during periods of darkness for safety reasons. Also, these activities cannot occur if snow is obscuring the slopes being worked on. Construction activities outside of typical bus operating hours would reduce impacts to visitors passing the site on the roadway during Phase II. To reduce impacts to overnight visitors, construction activities would need to occur during daylight hours, which would avoid the use of artificial lighting and creating noise during nighttime hours. To reduce impacts to wildlife, construction activities would need to be limited to certain times of the year to address specific species restrictions.

Components of the Action

What are the discrete components or phases of the action?

Component X:	*Example: Transportation of personnel to the project site*
Component 1:	Excavation of material
Component 2:	Placement of material
Component 3:	Construction of bridge

Component 4:	Construction of retaining walls
Component 5:	Rock scaling and bolting
Component 6:	
Component 7:	
Component 8:	

Proceed to the alternatives.

Refer to the **MRDG Instructions** regarding alternatives and the effects to each of the comparison criteria.

MRDG Step 2: Alternatives

Alternative 1: No Action Alternative, No Section 4(c) prohibited uses

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Under Alternative 1, the Park Road at the Pretty Rocks Landslide would not be repaired and no bridge would be constructed; the Bear Cave Landslide, Perlite Landslide, and rockfall areas would not be addressed. The NPS would not improve the Polychrome section of road and there would be no vehicle access through the Polychrome area to the 47 miles of road west of the landslide (Mile 45.4). Access to the Kantishna inholdings would be primarily via air, and visitor transportation would continue to be limited to Mile 43 of the Park Road, indefinitely. If no action is taken to restore road access to the west district of the park, further planning would be needed to determine if NPS roads and facilities west of Polychrome would be maintained, abandoned, or restored to a natural state.

Component Activities
How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Excavation of material	No excavation of material at the site would be conducted.
2	Placement of material	No placement of material would occur as the roadway would no longer be maintained.
3	Construction of bridge	The bridge and temporary platform would not be constructed.
4	Construction of retaining walls	Retaining walls would not be constructed.
5	Rock scaling and bolting	Rock scaling and bolting would not be conducted.

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No excavation of material at the site would be conducted.	☐	☐	☒
2	No placement of material would occur as the roadway would no longer be maintained.	☒	☐	☐
3	The bridge and temporary platform would not be constructed.	☐	☐	☒
4	Retaining walls would not be constructed.	☐	☐	☒
5	Rock scaling and bolting would not be conducted.	☐	☐	☒
Total Number of Effects		1	0	NE

Untrammeled Total Rating	1

Explain:

The untrammeled quality of wilderness character refers to wilderness that is essentially free from the intentional actions of modern human control or manipulation. The Polychrome section of road would be closed to all traffic indefinitely. Geologic processes and movements would continue to occur within the wilderness, including the free movement of the Pretty Rocks and Bear Cave landsides.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No excavation of material at the site would be conducted.	☐	☐	☒
2	No placement of material would occur as the roadway would no longer be maintained.	☐	☐	☒
3	The bridge and temporary platform would not be constructed.	☐	☐	☒
4	Retaining walls would not be constructed.	☐	☐	☒

5	Rock scaling and bolting would not be conducted.	☐	☐	☒
	Total Number of Effects	0	0	NE
	Undeveloped Total Rating		0	

Explain:

The Polychrome section of road would be closed to all traffic indefinitely. Landslide activity would continue, and eventually additional rock and soil may be deposited on the Pretty Rocks roadway section. There would be no use of motorized equipment or additional installations in wilderness.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No excavation of material at the site would be conducted.	☒	☒	☐
2	No placement of material would occur as the roadway would no longer be maintained.	☒	☒	☐
3	The bridge and temporary platform would not be constructed.	☒	☒	☐
4	Retaining walls would not be constructed.	☒	☒	☐
5	Rock scaling and bolting would not be conducted.	☒	☒	☐
	Total Number of Effects	5	-5	NE
	Natural Total Rating		0	

Explain:

The Polychrome section of road would be closed to all traffic. Landslide activity would continue and would likely result in additional rock and soil depositing downhill into the wilderness. The road closure would likely lead to additional use/concentration of use within the wilderness east of the landslide, which would result in additional impacts to the natural quality of wilderness. However, with the road closure, there would be reduced visitor use west of the landslide and thereby reduced impacts to the natural quality of wilderness in that portion of the park. Road closure would also result in reduced access for scientific research and thus studies may need to use alternative, and potentially more invasive, access methods (i.e., aircraft).

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No excavation of material at the site would be conducted.	☒	☒	☐
2	No placement of material would occur as the roadway would no longer be maintained.	☒	☒	☐
3	The bridge and temporary platform would not be constructed.	☒	☒	☐
4	Retaining walls would not be constructed.	☒	☒	☐
5	Rock scaling and bolting would not be conducted.	☒	☒	☐
Total Number of Effects		5	-5	NE
Solitude or Primitive & Unconfined Rec. Total Rating		0		

Explain:

The Polychrome section of road would be closed to all traffic indefinitely. There would be no road access to points west of Pretty Rocks Landslide (Mile 45.4) on the remaining 47 miles of the Park Road. This would substantially reduce access to primitive and unconfined recreation opportunities in the wilderness area west of the landslide. However, with the road closure, there would be reduced use west of the landslide and thereby increased opportunities for solitude for visitors that can access the wilderness in that portion of the park. Conversely, the road closure would likely lead to additional use/concentration of use within the wilderness east of the landslide, which would result in reduced opportunities for solitude in this portion of the wilderness.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	No excavation of material at the site would be conducted.	☐	☐	☒
2	No placement of material would occur as the roadway would no longer be maintained.	☐	☐	☒
3	The bridge and temporary platform would not be constructed.	☐	☐	☒

4	Retaining walls would not be constructed.	☐	☐	☒
5	Rock scaling and bolting would not be conducted.	☐	☐	☒
	Total Number of Effects	0	0	NE

Other Features of Value Total Rating	0

Explain:

There are no other features of value that would be negatively impacted by this alternative.

Summary Ratings for Alternative 1

Wilderness Character	Rating Summary
Untrammeled	1
Undeveloped	0
Natural	0
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	1

MRDG Step 2: Alternatives

Alternative 2: Pretty Rocks Bridge and Polychrome Area Improvements

Description of the Alternative
What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

Phase I would restore access through the Polychrome area by constructing a bridge over the Pretty Rocks Landslide (approximately Mile 45.4) and undertaking risk reduction measures for hazards near the east abutment of the proposed bridge and the nearby Perlite Landslide and rockfall (approximately Mile 45.3). Phase II would address several additional geologic hazards in the Polychrome area, including constructing a retaining wall at Bear Cave Landslide and undertaking risk reduction measures in rockfall areas. The Park Road would be used to transport materials and workforce to the work sites for both phases.

Phase I would include the construction of a steel bridge spanning the Pretty Rocks Landslide. Abutments would be concrete and steel pilings with ground anchors drilled into the bedrock. The bridge would be a one-lane bridge with space at each end for vehicle passing. A temporary platform would be constructed near the east abutment for use as a bridge assembly location. The bridge, bridge abutments/piles, and temporary platform would be outside of the wilderness.

Approximately 125,000 to 150,000 cubic yards of material would be excavated using heavy machinery and some blasting, a portion of which may occur within the wilderness. Excavation would occur at both ends of the bridge. A retaining wall near the east abutment of the Pretty Rocks Bridge would be installed on the slope above the road to reduce the risk of rockfall from the excavated slope. A portion of the excavation area (less than an acre) above the roadway at the west abutment would occur within the wilderness. Excavation may also require temporary (approximately 5 months) use of motorized equipment on the west side of the slope in designated wilderness. The excavation area by the west abutment could include a bench cut into the rock partway down the rock wall to serve as a rockfall catchment area. A portion of this bench cut would be within the wilderness. Measures would be implemented to protect the vegetation from damage by heavy machinery and vehicles. Excavation areas would be intended to produce rough irregular rock faces that resemble the surrounding natural rock outcrops while maintaining the integrity of the finished rock cut face to minimize rockfall and rock instability. Periodic (yearly) maintenance of the bench area using heavy machinery would be needed, a small portion of which would occur in the wilderness. Material removed from the bench during yearly maintenance would be hauled off-site and not placed in the wilderness.

Excavated material would need to be disposed of during construction. Much of the material would be of insufficient quality for use as aggregate or roadbed material; however, if appropriate, a portion of the material would be trucked off site and stored in DENA for use on future projects or to fill the slump in the existing road while maintaining limited access during construction. Storage would occur in existing nonwilderness storage locations.

Excavated material would primarily be placed below the road. The majority of the material deposition area (approximately 10 acres) below the roadway would occur within the wilderness. Motorized equipment would be used temporarily (approximately 5 months) in wilderness to move material off the roadway and into the material placement area. Motorized equipment use in wilderness would be the minimum extent necessary to safely place the material. Some vegetation towards the toe of the landslide would be covered by excavated material. Excavated material would be rock and soil similar to what exists at the site and would be expected to look similar to existing rock/soil at the landslide. The placement of the material at a fairly consistent depth would create a quasi-contoured surface and additional contouring or future maintenance would not be needed.

Rockfall areas above the road to the east and west of Pretty Rocks Landslide would be addressed using a combination of rock scaling (i.e., the removal of loose or potentially unstable rocks), installation of rock bolts or dowels, and/or the creation of rockfall ditches. Rock scaling would be designed to match existing surroundings and would be conducted by workers on ropes and performed by hand using prybars; no blasting would be necessary. Installation of rock bolts would include 1-inch diameter bolts or dowels drilled into the surface and subsurface rock of the cliff face to secure hazardous rocks and would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them. Rock scaling and installation of rock bolts would occur in wilderness and would be repeated every 5 to 10 years, or as needed to reduce additional rockfall hazards. One rockfall area on the east side of the Pretty Rocks Landslide is a separate debris slide that creates a hazard along 45 feet of the Park Road.

In Phase II, there would be excavation of materials and the construction of a buried retaining wall at the Bear Cave Landslide. The retaining wall at Bear Cave would be on the downhill side of the slope to stabilize the road edge. All work related to the Bear Cave retaining wall would be outside of the wilderness. Rockfall areas above the road to the east and west of Bear Cave Landslide would be addressed during Phase II using a combination of rock scaling (i.e., the removal of loose or potentially unstable rocks), installation of rock bolts or dowels, and/or the creation of rockfall ditches. Rock scaling would be designed to match existing surroundings and would be conducted by workers on ropes and performed by hand using prybars; no blasting would be necessary. Installation of rock bolts would include 1-inch diameter bolts or dowels drilled into the surface and subsurface rock of the cliff face to secure hazardous rocks and would be designed to match surroundings by either staining the bolts or cutting them flush with the rock and grouting over them. Rock scaling and installation of rock bolts would occur in wilderness and would be repeated every 5 to 10 years, or as needed to reduce additional rockfall hazard. No motorized equipment would be needed for maintenance of the rock bolts.

In summary, activities/elements occurring in the wilderness would include:

- Excavation and use of motorized equipment (either heavy equipment or for blasting) for excavation above the roadway at the west abutment
- Use of heavy equipment on the west side of the slope for excavation at the west abutment
- A small portion of the bench cut into the rock partway down the excavation area by the west abutment
- Periodic maintenance of the bench area using heavy machinery
- Material placement below the roadway
- Use of motorized equipment to place material below the roadway
- Rock scaling and rock bolting at rockfall areas
- Use of motorized equipment to drill and install the rock bolts

Component Activities
How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*
1	Excavation of material	A portion of excavation would occur within the wilderness using heavy equipment or blasting. Both methods would require the use of motorized vehicles in wilderness. A small portion of the potential bench cut into the rock partway down the excavation area by the west abutment would be in wilderness. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome of excavation. Excavation would require use of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. Periodic maintenance (once a year) of the bench cut area would require using heavy machinery, a small portion of which would occur in the wilderness.
2	Placement of material	Material placement would occur within the wilderness below the Park Road and would cover some vegetation within the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.
3	Construction of the bridge	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.
4	Construction of retaining walls	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.
5	Rock scaling and bolting	Some rock scaling may occur within the wilderness area at rockfall areas. Rock bolting at the rockfall areas may be in the wilderness and would require motorized equipment to drill and install the rock bolts. No motorized equipment would be needed for maintenance of the rock bolts.

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation would occur within the wilderness using heavy equipment or blasting. A small portion of the potential bench cut into the rock partway down the excavation area by the west abutment would be in wilderness. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome of excavation.	☐	☒	☐
2	Material placement would occur within the wilderness below the Park Road and would cover some vegetation within the wilderness area.	☐	☐	☒
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness.	☒	☐	☐
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☐	☒	☐
5	Some rock scaling may occur within the wilderness area at rockfall areas. Rock bolting at the rockfall areas may be in the wilderness and would require motorized equipment to drill and install the rock bolts. No motorized equipment would be needed for maintenance of the rock bolts.	☐	☒	☐
	Total Number of Effects	1	-3	NE
Untrammeled Total Rating		-2		

Explain:

The untrammeled quality is degraded by actions that intentionally manipulate or control ecological systems (Burrows et al. 2016). Construction of the bridge would allow the Pretty Rocks Landslide to occur naturally. Excavation (including the bench cut) within the wilderness would degrade the untrammeled quality by altering the ecological processes of rock weathering/movement, soil deposition/creation, and vegetation growth within the wilderness. The intention of the retaining walls is to alter landslide movement and therefore the walls could alter geologic processes surrounding the walls in the wilderness area. Rock scaling and bolting would be very localized and small in size and likely not result in substantial or noticeable change; however, these actions would affect the natural processes of rock weathering and erosion.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation would occur within the wilderness using heavy equipment or blasting. Both methods would require the use of motorized vehicles in wilderness. A small portion of the potential bench cut into the rock partway down the excavation area by the west abutment would be in wilderness. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome of excavation. Excavation would require use of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. Periodic maintenance (once a year) of the bench cut area would require using heavy machinery, a small portion of which would occur in the wilderness.	☐	☒	☐
2	Material placement would occur within the wilderness below the Park Road and would cover some vegetation within the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☐	☒	☐
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness.	☐	☐	☒
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness,	☐	☐	☒

	but construction would be visible and audible within the wilderness.			
5	Some rock scaling may occur in the wilderness area at rockfall areas. Rock bolting at the rockfall areas may be in the wilderness and would require motorized equipment to drill and install the rock bolts. No motorized equipment would be needed for maintenance of the rock bolts.	☐	☒	☐
	Total Number of Effects	0	-3	NE
Undeveloped Total Rating		-3		

Explain:

The undeveloped quality is affected by nonrecreational structures, installations, and by the use of motor vehicles, motorized equipment, or mechanical transport. Excavation and material placement within the wilderness, along with the use of heavy equipment through the wilderness, would result in the temporary use of motorized equipment within the wilderness. In addition, motorized equipment would be necessary for drilling the rock bolts. The rock bolts would be an installation in the wilderness though they would be very small (1-inch diameter).

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation would occur in the wilderness using heavy equipment or blasting. Both methods would require the use of motorized vehicles in wilderness. A small portion of the potential bench cut into the rock partway down the excavation area by the west abutment would be in wilderness. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome of excavation. Excavation would require use of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. Periodic maintenance (once a year) of the bench cut area would require using heavy machinery, a small portion of which would occur in the wilderness.	☐	☒	☐
2	Material placement would occur in the wilderness below the Park Road and would	☐	☒	☐

	cover some vegetation within the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.			
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.	☐	☒	☐
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☐	☒	☐
5	Some rock scaling may occur in the wilderness area at rockfall areas. Rock bolting at the rockfall areas may in the wilderness and would require motorized equipment to drill and install the rock bolts. No motorized equipment would be needed for maintenance of the rock bolts.	☐	☒	☐
	Total Number of Effects	0	-5	NE
Natural Total Rating		-5		

Explain:

This quality is affected by changes to the ecological systems inside the wilderness. Excavation (including the bench cut) would alter the ecological processes of rock weathering/movement, soil deposition/creation, and vegetation growth within the wilderness. Excavation, rock scaling, and rock bolting within the wilderness, as well as bridge and retaining wall activities outside the wilderness, would affect ecological systems as they would affect habitat and behavior for many species that use these cliff habitats including collared pikas, hoary marmot, Dall's sheep, and grizzly bears, as well as nonanimal species like lichens. Rock movement would still occur, and drainage would not be substantially altered due to the retaining walls. However, the retaining walls would alter geologic processes surrounding the walls in the wilderness area. Material placement would slightly alter ecological systems by covering some vegetation toward the toe of the landslide. However, this vegetation is common and found extensively adjacent to the project site. Heavy vehicle use in the wilderness for excavation and periodic bench cut maintenance would affect vegetation.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation would occur in the wilderness using heavy equipment or blasting. Both methods would require the use of motorized vehicles in wilderness. A small portion of the potential bench cut into the rock partway down the excavation area by the west abutment would be in wilderness. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome of excavation. Excavation would require use of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. Periodic maintenance (once a year) of the bench cut area would require using heavy machinery, a small portion of which would occur in the wilderness.	☒	☒	☐
2	Material placement would occur in the wilderness below the Park Road and would cover some vegetation within the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☒	☒	☐
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.	☒	☒	☐
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☒	☒	☐
5	Some rock scaling may occur in the wilderness area at rockfall areas. Rock bolting at the rockfall areas may be in the wilderness and would require motorized equipment to drill and install the rock bolts. No motorized equipment would be needed for maintenance of the rock bolts.	☒	☒	☐

Total Number of Effects	5	-5	NE
Solitude or Primitive & Unconfined Rec. Total Rating	0		

Explain:

This quality is affected by impacts to the sights and sounds of people, include impacts to the soundscape and viewshed. All project activities, whether within the wilderness or not, would be visible and/or audible from the wilderness due to the proximity of the project sites to the wilderness boundary during construction. Impacts to the soundscape from construction would be temporary, while impacts to the viewshed from the bridge, excavation (particularly the bench cut), and material placement would be permanent. Project activities (including periodic maintenance activities) would use machinery and would increase the number of people present within the immediate area. Therefore, opportunities for solitude would decrease. However, the completed project would allow access to the full extent of the Park Road, including access to opportunities for solitude or primitive and unconfined recreation. Providing this access would facilitate spreading recreational use over a greater extent of the Denali Wilderness, therefore decreasing the concentration of use and increasing opportunities for solitude.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation would occur in the wilderness using heavy equipment or blasting. Both methods would require the use of motorized vehicles in wilderness. A small portion of the potential bench cut into the rock partway down the excavation area by the west abutment would be in wilderness. Rough irregular rock faces that resemble the surrounding natural rock outcrops would be the intended outcome of excavation. Excavation would require use of heavy equipment on the west side of the slope, a portion of which would be through designated wilderness. Periodic maintenance (once a year) of the bench cut area would require using heavy machinery, a small portion of which would occur in the wilderness.	☐	☐	☒
2	Material placement would occur in the wilderness below the Park Road and would cover some vegetation within the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☐	☐	☒

3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.	☐	☐	☒
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☐	☐	☒
5	Some rock scaling may occur in the wilderness area at rockfall areas. Rock bolting at the rockfall areas may be in the wilderness and would require motorized equipment to drill and install the rock bolts. No motorized equipment would be needed for maintenance of the rock bolts.	☐	☐	☒
	Total Number of Effects	0	0	NE
Other Features of Value Total Rating		0		

Explain:

Wilderness preserves other features that are of scientific, educational, scenic, or historical value. The Pretty Rocks Landslide area was surveyed by cultural resource specialists in 2018 and 2021. Survey work in 2021 revealed that very few portions of the survey area displayed even moderate archaeological potential, and that large portions of the survey area consist of steeply sloped and unstable terrain. The likelihood that intact archaeological or historic resources are present within these areas is very low. Furthermore, the location of a majority of the survey area high above the surrounding terrain and situated on the face of Polychrome Mountain would not have been conducive to intensive use by ancestral populations. Therefore, it is unlikely that project activities would result in impacts to cultural resources. No other features of value (paleontological resources, particularly important educational or scientific resources) are known to exist in the area.

Summary Ratings for Alternative 2

Wilderness Character	Rating Summary
Untrammeled	-2
Undeveloped	-3
Natural	-5
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	-10

MRDG Step 2: Alternatives

Alternative 3: Variations on the Pretty Rocks Bridge and Polychrome Area Improvements Alternative

Description of the Alternative

What are the details of this alternative? When, where, and how will the action occur? What mitigation measures will be taken?

This alternative includes variations on some activities in Alternative 2 that would potentially result in lesser impacts to wilderness, including options related to excavation, vehicular use within the wilderness for excavation, rock scaling, and rock bolting.

Alternative 3 would include excavation with no bench cut in the west abutment excavation area. This option would result in a larger excavation area within the wilderness and more material that would need to be placed in the wilderness than a design that incorporates a bench cut. However, the elimination of the bench cut would eliminate the need for yearly maintenance with the use of motorized equipment in wilderness. Annual maintenance for the west abutment excavation would be limited to cleaning of the rockfall ditch along the roadway outside of wilderness.

There are multiple methods for excavation that, if feasible, would reduce wilderness impacts compared to Alternative 2. These methods include: 1) If the rock is entirely 'rippable,' equipment may be staged on the road to pull material down and equipment would not need to travel across tundra through wilderness to excavate from above; 2) Excavation could start at the west end excavation area and move upwards as opposed to excavation from above in order to use vehicles only in the area intended for excavation, eliminating the need for vehicle access over unexcavated ground in wilderness; or 3) If equipment is needed above the area to be excavated, it could be delivered via helicopter slingload, thereby reducing the amount of natural tundra in wilderness that would be impacted by equipment delivery and use. Any of these methods or a combination of these methods would reduce wilderness impacts compared to delivering equipment for excavation by driving it across tundra and through wilderness.

Rock bolting would not be employed at the rockfall areas if practicable; only rock scaling and rockfall ditches would be used to address geohazards at these sites.

Other elements of Alternative 2 would remain the same under Alternative 3, such as the bridge, east bridge abutment excavation and retaining wall, material placement, Bear Cave Landslide retaining wall, work at the Perlite Landslide, and rock scaling at the rockfall areas.

Component Activities

How will each of the components of the action be performed under this alternative?

Comp #	Component of the Action	Activity for this Alternative
X	*Example: Transportation of personnel to the project site*	*Example: Personnel will travel by horseback*

1	Excavation of material	A portion of excavation (greater than if bench cut used) would occur within the wilderness using heavy equipment or blasting. Vehicular use within the wilderness for excavation would be reduced.
2	Placement of material	Material placement would occur in the wilderness below the Park Road and would cover some vegetation in the wilderness area. Use of motorized equipment to place material below the roadway would be necessary in wilderness.
3	Construction of the bridge	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.
4	Construction of retaining walls	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.
5	Rock scaling and bolting	Some rock scaling may occur in the wilderness area at the rockfall areas. No rock bolting would occur.

Wilderness Character
What is the effect of each component activity on the qualities of wilderness character? What mitigation measures will be taken?

UNTRAMMELED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation (greater than if bench cut used) would occur in the wilderness using heavy equipment or blasting. Vehicular use within the wilderness for excavation would be reduced.	☐	☒	☐

2	Material placement would occur in the wilderness below the Park Road and would cover some vegetation in the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☐	☐	☒
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness.	☒	☐	☐
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☐	☒	☐
5	Some rock scaling may occur in the wilderness area at the rockfall areas. No rock bolting would occur.	☐	☒	☐
	Total Number of Effects	1	-3	NE
	Untrammeled Total Rating		-2	

Explain:

As described under Alternative 2, construction of the bridge would allow the Pretty Rocks Landslide to occur naturally. Similar to Alternative 2, excavation within the wilderness would degrade the untrammeled quality by altering the ecological processes of rock weathering/movement, soil deposition/creation, and vegetation growth within the wilderness. However, under Alternative 3, there would be additional impact from excavation on the untrammeled quality due to a larger excavation area. The intention of the retaining walls is to alter landslide movement and therefore the walls could alter geologic processes surrounding the walls in the wilderness area. Similar to Alternative 2, rock scaling would be very localized and small in size and likely not result in substantial or noticeable change to ecological processes; however, this action would affect the natural processes of rock weathering and erosion. There would be slightly reduced impacts on the untrammeled quality under Alternative 3 compared to Alternative 2 due to the lack of rock bolting under this alternative.

UNDEVELOPED

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation (greater than if bench cut used) would occur in the wilderness using heavy equipment or blasting. Vehicular use in	☐	☒	☐

	the wilderness for excavation would be reduced.			
2	Material placement would occur within the wilderness below the Park Road and would cover some vegetation in the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☐	☒	☐
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness.	☐	☐	☒
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible in the wilderness.	☐	☐	☒
5	Some rock scaling may occur within the wilderness area at the rockfall areas. No rock bolting would occur.	☐	☐	☒
	Total Number of Effects	0	-2	NE
Undeveloped Total Rating		-2		

Explain:

Similar to Alternative 2, excavation and material placement within the wilderness under Alternative 3 would result in the temporary use of motorized equipment within the wilderness. However, under Alternative 3, temporary motorized equipment use for excavation would be reduced. In addition, Alternative 3 would not include periodic maintenance-related motorized equipment use in wilderness for the bench cut, thereby reducing long-term motorized vehicle use in the wilderness in comparison to Alternative 2. The elimination of rock bolting under Alternative 3 would also reduce temporary motorized equipment use in the wilderness and eliminate permanent installations within wilderness from the bolts compared to Alternative 2.

NATURAL

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation (greater than if bench cut used) would occur in the wilderness using heavy equipment or blasting. Vehicular use in	☐	☒	☐

	the wilderness for excavation would be reduced.			
2	Material placement would occur within the wilderness below the Park Road and would cover some vegetation in the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☐	☒	☐
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.	☐	☒	☐
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☐	☒	☐
5	Some rock scaling may occur in the wilderness area at the rockfall areas. No rock bolting would occur.	☐	☒	☐
	Total Number of Effects	0	-5	NE

Natural Total Rating	-5

Explain:

Similar to Alternative 2, excavation under Alternative 3 would alter the ecological processes of rock weathering/movement, soil deposition/creation, and vegetation growth within the wilderness. Excavation and rock scaling within the wilderness, as well as bridge and retaining wall activities outside the wilderness, would affect ecological systems as they would affect habitat and behavior for many species that use these cliff habitats including collared pikas, hoary marmots, Dall's sheep, and grizzly bears, as well as nonanimal species like lichens. However, under Alternative 3, there would be additional impact from excavation on the natural quality due to a larger excavation area. Rock movement would still occur, and drainage would not be substantially altered due to the retaining walls, but the retaining walls would alter geologic processes surrounding the walls in the wilderness area. Similar to Alternative 2, material placement under Alternative 3 would slightly alter ecological systems by covering some vegetation toward the toe of the landslide. Similar to Alternative 2, heavy vehicle use in the wilderness for excavation would affect vegetation, but under Alternative 3 motorized equipment use within the wilderness would be reduced and impacts to tundra would be reduced. Alternative 3 would also reduce periodic impacts to the natural quality from maintenance of the bench cut as there would be no bench cut under Alternative 3.

SOLITUDE OR PRIMITIVE & UNCONFINED RECREATION

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation (greater than if bench cut used) would occur in the wilderness using heavy equipment or blasting. Vehicular use in the wilderness for excavation would be reduced.	☒	☒	☒
2	Material placement would occur in the wilderness below the Park Road and would cover some vegetation within the wilderness area. Use of motorized equipment to place material below the roadway would be necessary within wilderness.	☒	☒	☐
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness. Pile driving would be required for the temporary platform and bridge.	☒	☒	☐
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible within the wilderness.	☒	☒	☐
5	Some rock scaling may occur in the wilderness area at the rockfall areas. No rock bolting would occur.	☒	☒	☐
	Total Number of Effects	5	-5	NE
Solitude or Primitive & Unconfined Rec. Total Rating		0		

Explain:

As described under Alternative 2, all project activities, whether within the wilderness or not, would be visible and/or audible from the wilderness due to the proximity of the project sites to the wilderness boundary during construction. Impacts to the soundscape from construction would be temporary, while impacts to the viewshed from the bridge, excavation, and material placement would be permanent. Project activities would use machinery and would increase the number of people present in the immediate area. Therefore, opportunities for solitude would decrease. However, the completed project will allow access to the full extent of the Park Road, including access to opportunities for solitude or primitive and unconfined recreation. Providing this access would facilitate spreading recreational use over a greater extent of the Denali Wilderness, thus decreasing the concentration of use and increasing opportunities for solitude. Under Alternative 3, there would be reduced impacts to solitude due to a lack of rock bolting and from periodic maintenance as there would be no bench cut to maintain.

OTHER FEATURES OF VALUE

Activity #	Component Activity for this Alternative	Positive	Negative	No Effect
X	*Example: Personnel will travel by horseback*	☐	☐	☒
1	A portion of excavation (greater than if bench cut used) would occur in the wilderness using heavy equipment or blasting. Vehicular use in the wilderness for excavation would be reduced.	☐	☐	☒
2	Material placement would occur in the wilderness below the Park Road and would cover some vegetation in the wilderness area. Use of motorized equipment to place material below the roadway would be necessary in wilderness.	☐	☐	☒
3	Construction of the bridge and temporary platform would occur outside of the wilderness, but construction activities would be visible and audible from the wilderness.	☐	☐	☒
4	The retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide would be constructed outside the wilderness, but construction would be visible and audible in the wilderness.	☐	☐	☒
5	Some rock scaling may occur in the wilderness area at the rockfall areas. No rock bolting would occur.	☐	☐	☒
	Total Number of Effects	0	0	NE

Other Features of Value Total Rating	0

Explain:

Wilderness preserves other features that are of scientific, educational, scenic, or historical value. The Pretty Rocks Landslide area was surveyed by cultural resource specialists in 2018 and 2021. Survey work in 2021 revealed that very few portions of the survey area displayed even moderate archaeological potential, and that large portions of the survey area consist of steeply sloped and unstable terrain. The likelihood that intact archaeological or historic resources are present within these areas is very low. Furthermore, the location of a majority of the survey area high above the surrounding terrain and situated on the face of Polychrome Mountain would not have been conducive to intensive use by ancestral populations. Therefore, similar to Alternative 2, it is unlikely that project activities under Alternative 3 would result in impacts to cultural resources. No other features of value (paleontological resources, particularly important educational or scientific resources) are known to exist in the area.

Summary Ratings for Alternative 3

Wilderness Character	Rating Summary
Untrammeled	-2
Undeveloped	-2
Natural	-5
Solitude or Primitive & Unconfined Recreation	0
Other Features of Value	0
Wilderness Character Summary Rating	-9

MRDG Step 2: Alternatives Not Analyzed

Alternatives Not Analyzed
What alternatives were considered but not analyzed? Why were they not analyzed?

The NPS considered the construction of a new road to bypass the Pretty Rocks Landslide. Three routes were considered: a northern route, and two southern routes. Creating a new road to avoid the Pretty Rocks Landslide would lead to new impacts to the wilderness as the road would likely be in the wilderness due to the narrow band of nonwilderness around the existing roadway. Each of the reroute alternatives would have resulted in the construction of several miles of permanent road in wilderness, as well as many years of construction activity, including motorized equipment and motorized vehicle use in wilderness. By developing an Expert-Base Risk Assessment and a Value Analysis, park leadership, along with support from the Alaska Region of the National Park Service, the Federal Highways Administration, and consultants as subject matter experts, determined that impacts from these alignments would be greater to socioeconomics, wilderness, and additional gravel needs, than the Polychrome Area Improvements Project. The iconic viewpoints, historical character, lower cyclic maintenance costs, and known geotechnical challenges of the existing alignment were considered when determining the preferred alternative.

Repositioning of the bridge span to reduce excavation within the wilderness is not feasible because the bridge location already spans the longest distance possible for the bridge type with a single clear span. The single clear span allows the landslide to continue naturally without impacting access on the roadway. If the bridge was lengthened, bridge piers would be required that are not structurally advisable within the slump itself; the bridge location already uses the longest distance with competent material for the foundation.

Placement of all excavated material in existing nonwilderness gravel pits is not feasible due to capacity constraints at the pits. Trucking the excavated material out would unacceptably impact traffic along the portion of the Park Road still open due to the large number of trucks required to haul out the material. Trucking the material out would also greatly increase vehicular noise and needed road maintenance to support the additional heavy loads. The increase in noise and traffic would have an adverse impact on visitors, including users of wilderness areas adjacent to the road. The proposed project already includes trucking out any usable material and storage in existing storage locations; however, much of the material would be of insufficient quality for use as aggregate or roadbed material.

The NPS considered removing the upper landslide material at the Pretty Rocks Landslide from above the road and shifting the roadway into the hillside. This alternative would require the excavation of a substantial portion of the mountain (1.1 million cubic yards), mostly within wilderness. This larger volume of excavated material would need to be deposited on site below the road. The material would be placed on the toe of the landslide and immediately to the east of the landslide, in wilderness. Due to the geology of the project area, it was determined that this alternative would only provide a temporary solution, as excavation to reach competent bedrock is unachievable to reestablish a road. Therefore, given the unreasonable operational and safety challenges, increased impacts to wilderness, and the insufficiency of this alternative to fulfill the purpose of restoring reliable access, the NPS dismissed removing the upper landslide from further consideration.

Alternatives to rock scaling and bolting could include spraying shotcrete over the rockfall surface or installing a wire mesh net over the slope. Both of these options would result in additional wilderness impacts because they would be within wilderness, would include larger permanent installations, and would adversely affect wildlife. Therefore, these options were not evaluated as they would not reduce impacts to wilderness.

MRDG Step 2: Alternative Comparison

Alternative 1:	No Action Alternative, No Section 4(c) prohibited uses
Alternative 2:	Pretty Rocks Bridge and Polychrome Area Improvements
Alternative 3:	Variations on the Pretty Rocks Bridge and Polychrome Area Improvements Alternative

	Alternative 1	Alternative 1	Alternative 2	Alternative 2	Alternative 3	Alternative 3
Wilderness Character	+	-	+	-		
Untrammeled	1	0	1	-3	1	-3
Undeveloped	0	0	0	-3	0	-2
Natural	5	-5	0	-5	0	-5
Solitude/Primitive/Unconfined	5	-5	5	-5	5	-5
Other Features of Value	0	0	0	0	0	0
Total Number of Effects	11	-10	6	-16	6	-15
Wilderness Character Rating	1		-10		-9	

MRDG Step 2: Determination

Refer to the **MRDG Instructions** before identifying the selected alternative and explaining the rationale for the selection.

Selected Alternative	
☐ Alternative 1:	No Action Alternative, No Section 4(c) prohibited uses
☐ Alternative 2:	Pretty Rocks Bridge and Polychrome Area Improvements
☒ Alternative 3:	Variations on the Pretty Rocks Bridge and Polychrome Area Improvements Alternative
☐ Alternative 4:	
☐ Alternative 5:	
☐ Alternative 6:	
☐ Alternative 7:	
☐ Alternative 8:	

Explain Rationale for Selection:

The Denali Wilderness is vast and of very high quality. Unique among Alaskan wilderness areas, it is also extremely accessible, providing trailless wilderness experiences that would otherwise be unavailable to many. Accessibility to this wilderness is in large part provided by the Park Road and therefore maintaining access via the Park Road fulfills the unique place of the Denali Wilderness within the greater National Wilderness Preservation System. While the No Action Alternative would best preserve wilderness character near the closed portion of the Park Road it would also prevent vehicular access to 47 miles of road and countless wilderness opportunities provided along the remainder of the roadway and potentially degrade wilderness quality in the first 43 miles of the Park Road. Because the Park Road is no longer maintainable at the Pretty Rocks Landslide, the Polychrome Area Improvements project is necessary to maintain the park and wilderness access traditionally provided by the Park Road.

The Polychrome Area Improvements Project (Alternative 2 in this MRA) includes efforts to minimize impacts to wilderness. However, a few additional variations, if feasible, could be selected to further minimize impacts to wilderness and are presented in Alternative 3. Therefore, Alternative 3 is the Selected Alternative. Impacts to wilderness from Alternative 3 would be both temporary and permanent, with permanent impacts to the wilderness minimized by reducing the need for long-term maintenance activities within the wilderness, a reduction in the amount of tundra disturbed by equipment operation in wilderness, and elimination of installations within the wilderness (rock bolts) compared to Alternative 2. Mitigation measures have been included to address impacts to wildlife, natural processes, solitude and unconfined recreation, and the viewshed. Therefore, Alternative 3 would result in temporary impacts to wilderness character during construction and minimal permanent impacts while ensuring safe access along the only overland route within DENA and allowing visitors to continue experiencing and enjoying the entirety of the Park Road and the access it affords to other areas of the park, including the Denali Wilderness.

If, as engineering design progresses, it is found and documented in writing that a component of Alternative 3 is not feasible due to engineering feasibility or safety concerns, then the corresponding component in Alternative 2 becomes the preferred action.

Describe Monitoring & Reporting Requirements:

1. Consultation and coordination with the National Historic Preservation Act Section 106 coordinator and Backcountry Information Center to ensure cultural resources protection and backcountry user safety.
2. Recontour and/or revegetate all excavation and construction areas.
3. Design the retaining walls near the east abutment, Perlite Landslide and Bear Cave Landslide to be as visually unintrusive as possible (e.g., use natural materials, bury walls if possible).
4. Revegetate any areas impacted by construction with native species/tundra mats.
5. Implement biological mitigation measures stated in the Environmental Assessment (monitoring, construction timing, invasive species equipment checks) to reduce impacts to the natural quality.
6. Limit blasting and any other loud activities to occur between 8 a.m. and 8 p.m. to limit disruptions to overnight wilderness recreationists.
7. Require shielding on construction lighting to eliminate light trespass. Fully shielded lights should illuminate the work area without allowing light to shine upward, sideways, or backward outside the work zone.
8. Bridge color should be nonreflective and a neutral color to blend in with the existing colors of the landslide to the extent feasible. The final appearance would be approved by NPS in consultation with the Bureau of Land Management standard environmental color chart.
9. Conduct bridge assembly outside of the wilderness area.
10. Design all elements of the project to be as unobtrusive as possible.
11. Implement measures to protect the vegetation from damage by heavy machinery and vehicles.
12. Store or use as much excavated material as possible outside of wilderness areas.

Approvals

Which of the prohibited uses found in Section 4(c) of the Wilderness Act are approved in the selected alternative and for what quantity?

Approved?	Prohibited Use	Quantity
☐	Mechanical Transport:	
☒	Motorized Equipment:	Excavation/placement of materials (approximately 5 months during construction of Phase 1)
☒	Motor Vehicles:	Excavation/placement of materials (approximately 5 months during construction of Phase 1)
☐	Motorboats:	
☒	Landing of Aircraft:	Placement of equipment for excavation
☐	Temporary Roads:	

☐	Structures:	
☐	Installations:	

Record and report any authorizations of Wilderness Act Section 4(c) prohibited uses according to agency policies or guidance.

Refer to agency policies for the following signature authorities:

Prepared:

Name _____ Position _____

Signature _____ Date _____

Recommended:

Name _____ Position _____

Signature _____ Date _____

Recommended:

Name _____ Position _____

Signature _____ Date _____

Approved:

Name _____ Position _____

Signature _____ Date _____