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Draft Environmental Assessment

Alaska FiberOptic Project –

Upper Yukon River

Fairbanks North Star Borough; Yukon-Koyukuk Census Area; Doyon Corporation Region

Approximately 468 miles of proposed fiber optic cable installation to serve rural, underserved communities in a portion of the Yukon River drainage

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Acronyms and Abbreviations

AADT	annual average daily traffic
ACS	Alaska Communications System
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
APDES	Alaska Pollutant Discharge Elimination System
ADNR	Alaska Department of Natural Resources
AHRS	Alaska Heritage Resource Survey
AKEPIC	Alaska Exotic Plants Information Clearinghouse
ANCSA	Alaska Native Claims Settlement Act
APE	Area of Potential Effect
AS	Alaska Statute
AWC	Anadromous Waters Catalog
BGAPA	Bald and Golden Eagle Protection
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMH	Beach manhole
BMP	best management practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGP	Construction General Permit
CLB	cable lay barge
dBA	decibels
DCRA	Alaska Division of Community and Regional Affairs
DGGS	Alaska Division of Geological and Geophysical Surveys
DMLW	Alaska Division of Mining, Land, and Water
DOE	Determination of Eligibility
DP	dynamic positioning
DOT&PF	Alaska Department of Transportation and Public Facilities
DTM	digital terrain model
EA	Environmental assessment
EFH	Essential fish habitat
EFHA	Essential fish habitat assessment
EHS	extra high strength
FIRMS	Flood Insurance Rate Maps

EJ	Environmental Justice
EO	Executive Order
EPA	U.S. Environmental Protection Agency
FMP	Fishery management plan
FOC	fiber optic cable
FR	Federal Register
GHG	greenhouse gases
GIS	geographic information system
HDD	horizontal directional drilling
LCE	linear cable engine
LCRSRA	Lower Chatanika River State Recreation Area
LDN	day/night noise level
LEQ	Equivalent Continuous Sound Pressure Level
MBS	multibeam sonar
MBTA	Migratory Bird Treaty Act
mg/L	milligrams per liter
MP	Milepost
NAAQS	national ambient air quality standards
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOTMAR	Notice to Mariners
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
OHA	Office of History and Archaeology
PIP	Priority Invasive Plants
PM	particulate matter
RCRA	Resource Conservation and Recovery Act
ROW	right-of-way
SDS	safety data sheet
SIP	State Implementation Plan
SWPPP	stormwater pollution prevention plan
TBCP	Tribal Broadband Connectivity Program
TCP	Traditional Cultural Properties
TSS	total suspended solids
U.S.	United States

U.S.C.	U.S. Code
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WOTUS	Waters of the U.S.

Executive Summary

Doyon, Limited (Doyon) proposes to construct and operate the Alaska FiberOptic Project. Funding for the Alaska FiberOptic Project is provided by a grant from the National Telecommunications and Information Administration's (NTIA) Tribal Broadband Connectivity Program, to provide hard-wired broadband access to approximately 600 households in five underserved, predominantly Alaska Native communities within Doyon's Alaska Native Regional Corporation boundary. The five communities are Fort Yukon, Beaver, Stevens Village, Rampart, and Tanana.

The network to be installed under the Alaska FiberOptic Project would bridge the digital divide in one of the most remote, isolated, high-cost, and difficult to serve areas of the United States. The Alaska FiberOptic Project would:

- Create permanent jobs for Alaska Native and rural residents;
- Bring new opportunities for distance education, telemedicine, public health and safety, and rural economic development;
- Provide an essential tool for cultural survival acting as a hub for language preservation; and
- Connect youth and adults with Alaska Native Elders, mentors, and networking resources.

During development of the Alaska FiberOptic Project, one route option and several configuration/ technology options were evaluated. The Proposed Action was selected for analysis and final design because it is technically feasible, meets the purpose and need (including cost-related constraints), presents a lesser potential impact than the options, and would fulfill the requirements of the grant.

The Proposed Action consists of installing approximately 468 miles of fiber optic cable (FOC): 132 miles would be installed underground and overhead within previously-disturbed rights-of-way along existing roadways between Fairbanks and the Yukon River, 316 miles would be laid underwater in the deepest active channel of the Yukon River, and 20 miles would be installed underground and on the surface of a remote, undisturbed, Canyon Bypass; FOC would also be installed within each of the five communities. Underground installation would be accomplished primarily using vibratory plowing and horizontal directional drilling (HDD); aerially-installed cable would be placed primarily on existing poles. Installation along the Yukon River would utilize underwater plows and HDD.

Because the Alaska FiberOptic Project would utilize federal funds, NTIA must fulfill obligations under the National Environmental Policy Act (NEPA) and other applicable local, state, and federal regulations. In compliance with these regulations, the following environmental assessment (EA) has been prepared. The implementation of NEPA requires a systematic, interdisciplinary approach to project planning and implementation, and emphasizes that the environmental impacts of federally funded projects be given serious consideration in the decision-making process. The EA evaluates the potential social, economic, and environmental effects from the Proposed Action, and was prepared with input from stakeholder agencies.

The results of the EA indicate that, through compliance with applicable federal and state laws and regulations, and with implementation of typical construction best practices, the Proposed Action would not result in any significant adverse effects to the natural, cultural, or human environment. The findings of the EA are summarized in Table ES-1 below:

Table ES-1. Effect comparison of alternatives.

Resource Area	Proposed Action	No Action Alternative
Noise	Short term impacts during construction, and during emergency maintenance activities, would be temporary and minor. No impacts would be realized during regular operations. No Significant Impacts.	No Impacts.
Air Quality	Short term impacts during construction, and during emergency maintenance activities, including construction equipment emissions and fugitive dust emissions would be temporary and minor. No impacts would be realized during regular operations. No Significant Impacts.	No Impacts.
Geology and Soils	Impacts to soils and permafrost during construction from underground installation of FOC and installation of new utility poles, and during emergency maintenance activities, would be minimized through implementation of measures in stormwater pollution prevention plan and construction best practices (watering for dust suppression). No Significant Impacts.	No Impacts.
Water Resources	Impacts to water quality, wetlands, surface waters, groundwater, and floodplains would be avoided where possible or permits would be obtained where impacts are unavoidable. No Significant Impacts.	No Impacts.
Biological Resources	The avoidance of disturbance to upland habitats by routing fiber in existing rights-of-way, using HDD, or mounting on existing structures would result in no significant impact to biological resources. Installation of FOC in the Yukon River would not result in significant impacts to Essential Fish Habitat. No Significant Impacts.	No Impacts.
Historic and Cultural Resources	Historic and cultural resources are known to exist in the project area, installation methods—including avoidance of resources—would result in no significant impacts to these resources. Provisions of a Programmatic Agreement and Cultural Resources Management Plan would be implemented during construction and work would be stopped if archeological materials or human remains are discovered. No Adverse Effects.	No Effects.
Aesthetic and Visual Resources	Construction impacts would be temporary and minor. No alterations would occur to the landscape that would result in any adverse impacts to the visual landscape or aesthetic quality of the region. No Significant Impacts.	No Impacts.
Land Use	Construction impacts would be temporary and minor. During long-term operations, the presence of the FOC and appurtenances would not alter or impact the	No Impacts.

Resource Area	Proposed Action	No Action Alternative
	existing or future use of lands crossed by the Proposed Action. No Impacts.	
Recreation/Travel and Transportation	Short duration closures or lane restrictions would occur within the Terrestrial Corridor to install aerial lines and buried cable adjacent to, across, and under driveways, roadways, and highways. Access to both developed and disbursed recreation areas, businesses and residences would be maintained during construction, though some delays may be realized. Installation of the FOC within the River Corridor would not impede travel along the Yukon River nor any shore-based travel. Recreational activities along the immediate shoreline could be disturbed by noise if they overlap in time and location with cable-laying activities. No significant impacts.	No impacts.
Subsistence	Subsistence activities occur throughout the project area. Impacts to subsistence resources and uses is not anticipated. No significant Impacts.	No Impacts.
Infrastructure	Installation in the Yukon River and along the Canyon Bypass would not impact any existing infrastructure due to the lack of existing infrastructure. Along the Terrestrial Corridor and in each of the communities, existing infrastructure (utility poles) may be used for aerial installation; no impacts would result. Other existing infrastructure would be identified (through 811/Alaska Digline and other standard construction practices) and avoided. Installation and operation of the FOC represents a positive contribution to the regional infrastructure. The Proposed Action would result in no significant direct or indirect adverse impacts to existing infrastructure; installation and operation of the broadband infrastructure represents a positive addition to the infrastructure in the region.	No Impacts.
Socioeconomic Resources	Potential effects of the Proposed Action on the existing economic and social environment would derive from changes to employment, income, population, housing, infrastructure and utility use, access, social factors, and lifestyle. There would be short-term effects during construction; however, once the FOC has been placed, there would be negligible longer-term effects except for the positive effects from the availability of hard-wired broadband internet access. No significant impacts; considerable sociocultural benefits.	Environmental Justice (EJ) communities would continue to lack access to hard-wired broadband internet access. Significant Impacts.

Resource Area	Proposed Action	No Action Alternative
Human Health and Safety	There are no anticipated conflicts with, or impacts to, human health and/or safety as a result of construction, operation, or maintenance of the components of the Proposed Action. The Proposed Action alignment is generally located in remote areas where there is a very low probability of encountering contaminated soil or water, or other materials, the release of which to the environment may pose a safety hazard for workers or a health risk to the public. No Significant Impacts. The Proposed Action may, in some instances, generate a beneficial effect by reducing potential impacts to human health and safety.	No Impacts.

1 Introduction

The Consolidated Appropriations Act of 2021 directed the Department of Commerce's National Telecommunication and Information Administration (NTIA) to implement a series of programs to facilitate the deployment of broadband. These programs include the Tribal Broadband Connectivity Program (TBCP), which directs funding to tribal governments to be used for broadband service deployment on tribal lands, as well as for telehealth, distance learning, broadband affordability, and digital inclusion. On November 15, 2021, President Biden signed the Infrastructure Investment and Jobs Act into law, which includes an additional $65 billion to help ensure that all Americans have access to reliable, high-speed, and affordable broadband service.

In 2021, Doyon, Limited (Doyon) applied for funding under the TBCP, proposing to construct and operate the Alaska FiberOptic Project. The Alaska FiberOptic Project would utilize funding provided by a grant from the TBCP, to provide broadband access to a portion of the area within its Alaska Native Regional Corporation Boundary that is underserved by hard-wired broadband internet. Doyon proposed to provide hard-wired broadband internet service to five currently underserved communities along the Yukon River; the five communities are Fort Yukon, Beaver, Stevens Village, Rampart, and Tanana.

NTIA's review of the application suggested the Alaska FiberOptic Project would have the potential to benefit residents, students, Alaska Native Elders, mentors, anchor institutions, health care providers, public health and safety entities, and small businesses. Subsequently, on August 26, 2022, the NTIA provided Doyon Federal Award No. NT22TBC0290063, in the amount of $50,651,548.43, to fund installation of the Alaska FiberOptic Project. NTIA's implementation of the award would meet the intent of the various federal laws to ensure access to reliable, high-speed, and affordable broadband service in one of the most remote and isolated areas of the United States.

The Alaska FiberOptic Project would consist of installing approximately 468 miles of fiber optic cable (FOC) from a connection with an existing FOC near Fairbanks, Alaska to the central interior region of the Yukon River. The installation would include 132 miles of primarily buried FOC from Fairbanks to the E.L Patton Bridge crossing over the Yukon River; this portion of the FOC would be installed in the Alaska Department of Transportation and Public Facility (DOT&PF) rights-of-way (ROWs) along the Steese, Elliott, and Dalton highways. From the E.L Patton Bridge, a total of 316 miles of FOC would be laid in the deepest active channel of the Yukon River. Between the communities of Rampart and Tanana, a 20-mile Canyon Bypass would install FOC on undisturbed ground surface and underground. The upstream termination would be at Fort Yukon, and downstream termination would be at Tanana (Figure 1). The Alaska FiberOptic Project would be installed on/over private lands, state lands, and Bureau of Land Management (BLM) administered lands managed according to the White Mountains Resource Management Plan (BLM 2016), the Central Yukon Resource Management Plan (BLM 2020), and the Utility Corridor Resource Management Plan.

2 Purpose and Need

The purpose of the Alaska FiberOptic Project (hereafter referred to as the Proposed Action) is to connect approximately 600 households in five underserved, predominantly Alaska Native communities along the Yukon River to a reliable and affordable hard-wired high-speed broadband network. This network would bridge the digital divide in one of the most remote, isolated, high-cost, and difficult to serve areas of the United States.

The Proposed Action would:

- Create permanent jobs for Alaska Native and rural residents;
- Bring new opportunities for distance education, telemedicine, public health and safety, and rural economic development;
- Provide an essential tool for cultural survival acting as a hub for language preservation; and
- Connect youth and adults with Alaska Native Elders, mentors, and networking resources.

3 Description of Proposed Action and Alternatives

This Chapter includes a description of the Proposed Action as well as the justification for selection of the Proposed Action. The Proposed Action includes the installation of FOC and appurtenances. The Proposed Action would include installation of FOC that would be installed underground, on the ground surface, aerially on existing and new utility poles, and in the deep channels of the Yukon River. The Proposed Action is divided into two corridors—the Terrestrial Corridor and the River Corridor—each corresponding to a geographical portion of the Proposed Action. The River Corridor contains an overland route, the Canyon Bypass, which avoids the Rampart Rapids. The corridors are addressed separately in the sections below.

3.1 Terrestrial Corridor

The Terrestrial Corridor originates at the Alaska Communications System (ACS) switching station at 321 Hagelbarger Avenue in Fairbanks, Alaska and extends to the north end of the E.L. Patton Yukon River Bridge (Appendix A). In the 132 mile-long Terrestrial Corridor, new FOC would be installed aerially on existing poles between the ACS switching station and within the vicinity of the Lower Chatanika River State Recreation Area (LCRSRA). The FOC would be installed generally underground in existing utility ROW along the Steese Highway, Elliott Highway, and Dalton Highway. Construction in the Terrestrial Corridor would use existing infrastructure with no new access roads. A FOC regeneration site would be placed at a mid-point along the Terrestrial Corridor (in the vicinity of Livengood) to boost the signal; the specific location and additional details are discussed in the following subsections. Table 3-1 below summarizes proposed installation techniques along the corridor. Additional details of the installation techniques are further defined in the following subsections.

Table 3-1. Summary of Terrestrial Corridor installation techniques.

Installation Technique	Location	Distance	Area of Impact	Seasonal Timing
Aerial	Project Start to MP X on the Elliott Highway	20 miles	n/a	Summer/Fall
Vegetation Clearing	To support all underground installation	92 miles	168 acres	Spring/Fall*
Subsurface Installation**	Starting at MP 14 continuing until the E.L. Patton Bridge at the Yukon River	112 miles	160 acres	Summer/Fall/ Winter
HDD	All waterbody and roadway crossings	0.78 miles	0.09 acres	Summer/Fall/ Winter
Vaults	Vaults would be located no greater than every 20,000 feet	n/a	0.03 acres	Summer/Fall/ Winter

***** Vegetation clearing would follow the USFWS Timing Recommendations to Avoid Land Disturbance and Vegetation Clearing guidelines (USFWS 2017).
**Includes vibratory plowing, traditional trenching, frost trenching, benching.

3.1.1 Aerial Installation

The FOC would be installed aerially on existing and new utility poles in the Terrestrial Corridor as follows (Appendix A):

- Approximately twenty (20) miles of above-ground FOC would be attached to existing utility poles. The FOC would extend between the origination point at 321 Hagelbarger Avenue in

Fairbanks, through Fox, and transition to a buried configuration at a point approximately 2.5 miles north of the LCRSRA, near Milepost (MP) 14 of the Elliott Highway.

- Installation of new utility poles is proposed at four isolated locations along the Elliott Highway near MP 31.5 and MP 52.0 where terrain reduces the feasibility of traditional plow/trench installation methods; this is discussed further below. The FOC would transition from below ground and be installed aerially on new utility poles in these locations.
- The aerially-installed FOC would be a 96-fiber count cable, with a diameter between 0.50-and 0.85-inches. The aerially-installed FOC would be lashed to a 0.25-inch extra high strength (EHS) messenger cable.
- Aerial splice points would nominally be placed at approximately 19,000-foot intervals.
- 100 feet of aerial slack would be staged on poles at approximately 2,000-foot intervals.

The construction methodology is addressed below.

3.1.1.1 ROW Clearing

The existing utility poles are located in an existing utility ROW that is subject to periodic vegetation management activities including trees and shrubs. However, surface vegetation may need to be removed or trimmed to facilitate the safe movement of construction vehicles and to permit efficient installation of the FOC.

Installation would begin with a land survey and seasonal pre-construction nesting bird survey of the planned FOC installation alignment, followed by vegetation clearing in a corridor approximately 10 to 15 feet wide. Vegetation clearing would follow the U.S. Fish and Wildlife Service (USFWS) *Timing Recommendations to Avoid Land Disturbance and Vegetation Clearing* (USFWS 2017) within the Interior Region of Alaska and discussed further in Section 5.5.6.1.

The corridor would provide access for a low-pressure mulcher and other installation equipment. Heavy timber would be cleared using a feller/buncher or by hand cutting. Felled trees would be moved to the edge of the ROW or removed and disposed of in a manner that does not create a fire hazard. No surface alteration or grading associated with vegetation clearing would be conducted. Clearing and mulching is performed by cutting the vegetation just above the ground surface and placing the mulch in the same general area of where the vegetation is removed. Low ground-pressure mulching equipment would be used to minimize disturbance of the surface soils. Figure 2 provides examples of typical mulching equipment. The mulch provides a smooth travel surface, protects the soil horizon, and provides a binding material for revegetation.

3.1.1.2 New Utility Pole Installation

New utility poles would be installed using a direct-buried approach: a hole would be excavated using either an auger or excavated with a backhoe; the hole would be excavated to a depth of 10 percent of the above-ground height of the pole plus 2 feet. The utility pole would then be installed in the hole, typically by a truck with an attached boom. Depending on the terrain and available equipment and access, the utility pole may also be installed by helicopter dependent upon field conditions at the time of construction. After the pole is placed in the hole, the interstitial space would be backfilled with excavated soils or imported fill. A riser would be attached to the pole in which the FOC would be placed to transition the cable from an underground configuration to an aerial configuration.

3.1.1.3 Fiber Optic Cable Installation

Aerial installation of FOC on existing and new utility poles would be performed utilizing bucket trucks or similar boom-equipped vehicles. The FOC would be installed directly to a utility pole or an existing crossarm if present, at a location below the electrical conductors. The FOC would be lashed to the pole or crossarm. In sensitive environmental areas or areas that are difficult to access by overland vehicles, installation personnel would walk to a pole and physically climb the poles instead of using bucket trucks or the like. Equipment required for the installation includes the applicable trucks, spools of fiber, and small tools utilized to perform the framing and lashing of wire/cables.

3.1.2 Underground Installation

Approximately 112 miles of FOC would be installed underground in the Terrestrial Corridor between the LCRSRA and the E.L. Patton Yukon River Bridge. Two parallel FOC conduits would be installed; the FOC in each run would be a 96-fiber count cable with a diameter of approximately 0.61 inches, and each FOC would be installed in 1.25 inch-diameter high density polyethylene (HDPE) conduit to protect the FOC.

The FOC installed underground would be primarily located in the DOT&PF ROW along the Steese, Elliott, and Dalton highways to the E.L. Patton Bridge over the Yukon River. The following activities/construction methodologies would be employed along the Terrestrial Corridor to install the FOC and conduit underground:

- ROW clearing
- Tracked vibratory plowing
- Traditional trenching
- Frost trenching
- Benching (where terrain is too steep or uneven to safely operate heavy equipment)
- HDD at various locations to cross waterbodies, roadways, rough terrain, or to transition into/out of the Yukon River.

The underground FOC would be installed with the following depth criteria for the various soil and installation types that would be encountered on the route.

- Where approved, plowed or trenched burial would primarily be to the base of the active layer or top of the permafrost, but not less than 12 inches below the surface.
- Within the DOT&PF road prism or ditch, burial would be 48 inches below the surface unless specified or approved otherwise by DOT&PF.
- Where additional FOC protection is necessary within DOT&PF ROW, burial would be 36 inches below ground surface unless specified or approved otherwise by DOT&PF.

The construction equipment that may be used during underground installation of the FOC is addressed in the sections below.

Vaults would be placed along the Terrestrial Corridor to facilitate fiber splicing and FOC slack storage to be installed. Fiber splice locations would be approximately every 20,000 feet of FOC distance. Fiber slack locations would be placed on each side of highway road crossings, at transitions between aerial and buried installation, as well as regular intervals between 4,000 to 5,000 feet for extra FOC storage in consideration of future use or needs during construction.

Cable markers would be placed along the Terrestrial Corridor to identify underground FOC location and depict owners' information. Markers would be placed approximately every 500 feet along the route, at every vault location, and at each side of a road crossing. Markers would be driven into the ground and/or permanently affixed to vaults utilizing two 3/8-in stainless steel bolts to ensure straightness and longevity.

3.1.2.1 Right of Way Clearing

The first step in the underground installation process would be the surveying of existing utilities and a land survey of the planned FOC installation alignment. This would be followed by vegetation clearing to allow access for trenching and equipment installation. A corridor approximately 10- to 15-feet wide would be cleared of vegetation. Heavy timber would be cleared using a feller/buncher or by hand cutting. Felled trees would be moved to the edge of the ROW or removed and disposed of in a manner that does not create a fire hazard. No surface alteration or grading associated with vegetation clearing would be conducted. Clearing and mulching would be performed as described above for aerial installation of the FOC.

Vegetation clearing would, to the extent possible, be performed in accordance with USFWS vegetation clearance timing guidance for the area (USFWS 2017).

3.1.2.2 Vibratory Plowing

The primary underground placement method would be vibratory plowing; this method would be used in all locations along the Terrestrial Corridor that are accessible by plow equipment and where the terrain and permitting would allow the use of this method. Using vibratory plowing, the two conduits would be installed to a minimum depth of 12 inches. Plowing is achieved by running the conduit(s) through a plow chute, attached to a 5-in-wide steel plow shank, and lowering the conduit into the ground at the desired depth and driving forward; vibratory plowing equipment is shown in Figure 3. A hoe pack would also be used to compact the disturbed area. Plowing is the preferred installation method due to its lower impact to the ground and reduction in disturbance of soils, thus minimizing erosion potential. An estimated 60 percent of the Terrestrial Corridor would be installed via plowing methods, 40 percent of which is estimated to be done in the summer, with the remaining work to be done during the winter months.

3.1.2.3 Traditional Trenching

Traditional trenching would be utilized where vibratory plowing is not possible due to terrain or permitting restrictions, and in the following instances:

- Transitions to and from deep trenches
- At the entrance and exit points for HDD
- Where the FOC transitions from an underground to an aerial configuration
- Where vaults are installed
- Where solid or large rocks are present

Trenching would consist of utilizing rubber and/or steel tracked excavators of a size suitable for the location and for the work to be completed. Trenching would consist of digging a 12- to 24-inch-wide trench to allow for placement of the conduit or direct buried cable as needed. All areas trenched would typically utilize the excavated native soils as backfill and would require adequate compaction to reduce erosion potential. All trenches would be backfilled and compacted in 6-inch lifts and water bars would be included to prevent subterranean movement of water that infiltrates into the backfilled trench. An estimated 10 percent of the terrestrial corridor would be installed via trenching.

3.1.2.4 Frost Trenching

Permitting requirements or environmental concerns may require “frost trenching” in certain locations, including in delineated wetland areas. Frost trenching involves construction during the winter months when the ground is adequately frozen to support the weight of construction equipment. Frost trenching is completed by removing all snow cover from the trench path to minimize backfill containing snow and ice. The clearing width would be adequate to minimize snow mixing with spoils removed from the trench. Typically, a chain trencher or rock wheel is utilized to cut a 6-inch-wide slot to the desired depth. Once the desired depth is achieved, a cable plow would follow to plow the FOC into the saw cut trench to ensure that the cable is placed flat and at the lowest depth possible to provide adequate depth of cover. Mechanical equipment, such as a tracked excavator, would follow along and backfill the trench utilizing native materials. Mounding and track packing the trenchline would be performed to minimize settling that might occur during the summer months. An estimated 20 percent of the Terrestrial Corridor would be installed via frost trenching.

3.1.2.5 Benching

Where terrain along the Terrestrial Corridor is too steep or uneven and thus does not allow the safe use of heavy equipment, benching would be performed to create a safer and more-level pathway for the equipment to operate. In these instances, approximately 36 to 48 inches of material would be dug from a slope using a standard excavator and the conduits would be placed at the backside edge of the "benched" area, and then native material would be returned, and the slopes rebuilt to maintain natural drainages and ensure sufficient cover over the FOC conduits. Slopes will be rebuilt to match the original shape and grade using native material excavated from benching process. It is not anticipated additional materials will be required. All benching activities would occur in succession with backfill, compaction, and revegetation activities occurring immediately after FOC installation. Benched areas and rebuilding of the slopes would occur in a 24-hour period. An estimated two percent of the Terrestrial Corridor would be installed utilizing benching methods.

The open-cut/trenching construction methodology would utilize an excavator, backhoe, or specialized trenching machine to excavate a trench that is approximately 12 to 24 inches wide. The trench would be dug to an appropriate depth given the soil and installation types that is encountered:

- Within frost-susceptible soils and ice rich soils, burial would be to the base of the active layer or top of the permafrost, but not less than 12 inches below the surface.
- Within the DOT&PF road prism or ditch, burial would be 48 inches below the surface unless specified otherwise by DOT&PF.
- Outside the DOT&PF road prism or ditch, burial would be 36 inches below ground surface unless specified otherwise by a relevant land management agency.

All open-cut trenches would be backfilled and compacted in 6-inch lifts and water bars would be included to prevent subterranean movement of water that infiltrates into the backfilled trench. Water bars will be constructed using natural impermeable material spanning the width of the trench and are estimated to be 12-24 inches wide. Water bars will be placed as needed in specific areas that are more susceptible to water related erosion.

3.1.2.6 HDD Installation

All stream crossings would be completed with the use of existing casings, bridges, or with new HDD casings that are installed 8 to 10 feet below the bottom of the streambed with no impact to the watercourse. HDD equipment is not anticipated to enter the streams and would travel along existing roadways wherever feasible. The HDD construction methodology is described in Section 3.1.2.6 below. An estimated 13 percent of the Terrestrial Corridor would be installed via HDD.

At the Yukon River, the FOC would be attached to the utility corridor/catwalk beneath the E.L. Patton Yukon River Bridge through a Major Utility Permit with DOT&PF.

3.1.2.7 Vault Installation

At discrete locations along the Terrestrial Corridor, approximately 123 vaults would be installed; these vaults would be used as locations to splice the FOC and as locations to store additional FOC. Vaults used for the splicing of the FOC would be located no further than every 20,000 feet, as this is the length of FOC contained on a spool. Vaults used to store additional FOC (as well as perhaps for the splicing of the FOC) would be placed on each side of highway road crossings, at transitions between aerial and buried installation, and at regular 4,000-to-5,000-foot intervals; FOC would be stored in consideration of future use or needs during construction. Vaults would be 48 inches long by 30 inches wide by 36 inches tall. The vaults would be strategically placed in dry (upland) areas to the extent possible to avoid flooding and freezing within the vault. All vaults would be placed 30 inches below the surface and the remaining 6 inches of vault above ground would be backfilled with minimal grading. The grading would begin at the top edge of the vault and slope at a minimum of a 2:1 slope away from the vault to allow water to shed away from the vault and minimize water ingress into the vault.

3.1.2.8 Regeneration Site

Given the length of the Terrestrial Corridor, regeneration equipment is necessary to boost the strength of the signal in the FOC. This regeneration equipment would be placed at a mid-point along the Terrestrial Corridor, somewhere between MP 65 and 75 of the Elliott Highway. The regeneration equipment would be placed in an existing gravel pad. A communication shelter, housing network regeneration equipment and electric generators would be placed at the site. Installation of a fuel tank would be required to store fuel for the generators. Siting criteria of this locations includes:

- Proximity to main FOC line
- Availability and proximity to commercial power
- Land Ownership
- Minimize potential impacts to environmental resources such as wetlands and cultural sites.

Access to the regeneration site would be from existing access roads or driveways connected to the highway. The FOC would be connected to the regeneration site and installed subsurface using a vibratory plow and HDD.

3.1.2.9 Terrestrial Testing and Commissioning

Following completion of the conduit installation along the Terrestrial Corridor, the conduits would be “proofed” to verify their integrity and to ensure the conduit is clear from any obstructions, debris, or damage as a critical step before installing the FOC. If necessary, corrective actions would be taken to repair conduit prior to FOC installation.

Once the conduits have been proofed, the FOC would be “blown” in the conduits. This is done using a machine powered by compressed air, which is set up at one end of the conduit. The cable is propelled through the conduit utilizing a combination of air pressure and rubberized tracks.

Once the FOC is fully installed, fusion splicing is performed to join the FOC cables together, resulting in a seamless connection that minimizes signal loss and ensures optimal performance. Once the fiber is spliced together, it is end-to-end tested utilizing an optical time domain reflectometer and light loss tester device to ensure it meets design specifications.

3.1.3 Construction Support

3.1.3.1 Material Staging Locations and Access

All material, construction equipment and personnel for work in the Terrestrial Corridor would use existing road infrastructure to access work locations. Primary material and equipment staging areas would be located on either end of the Terrestrial Corridor in Fairbanks and in the vicinity of the Yukon River Camp (located on BLM land). Additional minor staging areas may be established along the Terrestrial Corridor at pre-determined locations as needed.

3.1.3.2 Fuel Storage

All fuel for work along the Terrestrial Corridor would be purchased from existing fuel supply sources based in Fairbanks. A small 200-gallon tank in the back of a service truck will be used to keep equipment topped up daily. Best management practices (BMPs) for refueling would be employed.

3.1.3.3 Crew Accommodation

Survey and construction crews working along the Terrestrial Corridor would utilize existing infrastructure for crew accommodations. All crew would utilize lodging located on either end of the project and commute to the project site each day. There is available lodging in Fairbanks and when working on the northern end of the project the crew would utilize accommodations at the Yukon River Camp.

3.2 River Corridor

The River Corridor originates at the north end of the E.L. Patton Yukon River Bridge and extends east up the Yukon River to Fort Yukon and west down the Yukon River to the eastern terminus of the Canyon Bypass, and from the western terminus of the Canyon Bypass downriver to Tanana (Appendix B). Approximately 316 miles of FOC would be installed in the River Corridor; the new FOC would be laid in the thalweg of the Yukon River, and would be installed under the riverbed from the thalweg to a point onshore within each of the five communities and adjacent to the western and eastern termini of the Canyon Bypass.[1] In simple terms, the infrastructure installed in the River Corridor consists of the middle-of-river FOC, river-to-shore FOC, a beach manhole (BMH), a communications shelter, and then the FOC in the communities.

Construction methodology and equipment that may be used during installation of the FOC in the River Corridor is addressed in the sections below. Table 3-2 below summarizes proposed installation techniques along the corridor. Additional details of the installation techniques are further defined in the following subsections.

[1] The thalweg is the line of lowest elevation within a valley or watercourse, often taken to be the middle of the primary navigable channel of a waterway.

Table 3-2. Summary of River Corridor installation techniques.

Installation Technique	Location	Distance	Area of Impact	Seasonal Timing
Jet Plow	Fort Yukon to Beaver	88 miles	10.7 acres	Summer/Fall
Scratch Plow	Beaver to Tanana	228 miles	27.7 acres	Summer/Fall
HDD	Tie locations at each of the five communities, one at the Yukon River Bridge, and two for exit and reentry at the Canyon Bypass.	n/a	<0.001 (35 square feet)	Summer/Fall

3.2.1 Middle-of-River Fiber Optic Cable

Installation of the FOC in the Yukon River thalweg would start at Fort Yukon and work downstream to Tanana.

3.2.1.1 Equipment and Crew

The installation of FOC in the Yukon River between Beaver and Tanana would involve the following vessels: one cable lay barge (CLB), one 30-foot survey support vessel, two 20-foot skiffs, and an assist tug. For construction between Fort Yukon and Beaver, a smaller barge and two 25-foot truckable tugs would replace the single assist tug used between Beaver and Tanana. In addition, two accommodation vessels may be employed. A landing craft type vessel would be used to support all HDD and terrestrial FOC installations along the River Corridor.

The FOC installation would require a 14-person crew; the accommodation vessels would require an approximately 4-person staff. Local labor and contractors would be utilized to the greatest extent possible.

3.2.1.2 Cable Lay Barge

The FOC would be installed from the CLB, with support provided by skiffs and other boats. The command center for the installation would be located on the CLB. The movement of the CLB would be controlled by a dynamic positioning (DP) system that maintains a consistent position and speed allowing for appropriate tension and burial. An acoustic Doppler current profiler would be deployed during the entire operation to provide the capability for accurate measurements and adjustments should they be required to compensate for the current. The DP system would be sized to maintain control and position with anticipated current of up to 12 knots (Figure 4).[2]

3.2.1.3 Cable Installation Management System

The installation of the FOC would be controlled by a state-of-the-art management system that would incorporate data on the alignment bathymetry, current riverbed profiles, riverbed composition, depth, and FOC specifications.

A multibeam survey would be completed as the CLB travels upstream to conduct work in the respective portion of the Yukon River. Due to the variability of the river from year to year and the large accumulation of sediment, collecting multibeam data just prior to installation would result in the best assessment of bathymetric data.

Multibeam sonar is commonly utilized to map out a riverbed in order to plan a cable lay route and to

[2] Adjacent to each of the locations where FOC would be installed to the shore, one or more anchors may be deployed from the CLB as the barge would need to hold position for an extended period of time.

locate hazards such as boulders and other objects on the riverbed potentially harmful to the cable. Comparison between the current year and previous years' track logs and the multibeam survey would be completed in real time to determine any variations in the thalweg and address any pre-deployment adjustments.

Based on the comparison of two multibeam surveys, the final calculated engineered values would be input into the system for real-time data of FOC payout, lay tension, and achieved burial depth. This data coupled with calculated corrective actions (such as areas requiring slack) are displayed for the operators on specially designed touch screens in real time during all FOC operations. The operators can see all information simultaneously and can adjust the angle, tension, and payout, which are then broadcast automatically to displays around the vessel to show the crew running the cable lay management system.

The FOC payout would be controlled by means of a Linear Cable Engine (LCE). The LCE is designed to be capable of holding the weight of the cable in the water column as well as compensating for other forces on the cable. A cable holdback analysis would be conducted considering cable diameter, cable weight in water, water depth, catenary length, projected area of catenary, current through water column, friction coefficient of cable area in water column, density of water, residual tension, and minimum bending radius at touchdown; this analysis would provide the data used during the laying of the FOC.

3.2.2 Fiber Optic Cable Installation

Installation of the FOC in the thalweg of the Yukon River would utilize different equipment according to location; these are described in the sections below.

3.2.2.1 Beaver to Tanana

Between the communities of Beaver and Tanana, the FOC would be installed in the riverbed using a scratch plow deployed from the CLB (Figure 5). The CLB is approximately 200 feet long with a 56-foot beam and an 8-foot draft. The scratch plow proposed for the installation is approximately 6.5 feet wide by 13 feet long and would be towed along the riverbed on four skids (one at each corner); each skid would be no wider than 24 inches. The blade of the scratch plow would create a 6- to 12-inch-wide, 1-foot-deep trench in the riverbed; the FOC feeds through the plow and is laid into the trench as it moves forward.

The plow utilizes screened surface fed water pumps to pump high pressure water to the leading edge of the plow which temporarily fluidizes the riverbed to allow the plow share to pass with relative ease and low tensions through the riverbed to a maximum depth of 1 foot. The plow share has a hollow internal space through which the FOC is lowered and a depressor aft that ensures the cable is safely placed at the bottom of the fluidized trench. Once the plow share has passed, the riverbed immediately and rapidly fills in the fluidized trench and safely buries the FOC.

Due to the restricted narrow channels of the river coupled with the high current, the plow design includes the ability to launch, steer, and be recovered with FOC loaded in the plow. In emergencies, the FOC can be remotely released from the plow while on the riverbed without the intervention of divers.

3.2.2.2 Fort Yukon to Beaver

Between the communities of Fort Yukon and Beaver, the FOC would be installed in the riverbed using a jet plow deployed from the CLB (Figure 6). The jet plow is specially designed for FOC installation in the shallow waters of the Yukon River between Fort Yukon and Beaver. The plow is approximately 14 feet long, 10 feet wide, and 5 feet high. Due to the shallow depth of the river, a smaller barge (180 feet long with a 50-foot beam and 4-foot draft), would pull the plow and carry the FOC. All technologies used to place the FOC downstream would be transferred to the smaller barge but would operate the same way.

The operation of the jet plow is very similar to the scratch plow described above. The plow utilizes screened surface fed water pumps to pump high pressure water to the leading edge of the jet plow which temporarily fluidizes the riverbed to allow the plow share to pass with relative ease and low tensions through the riverbed to a maximum depth of 3 feet. The plow share has a hollow internal space through which the cable is lowered and a depressor aft that ensures the cable is safely placed at the bottom of the fluidized trench. Once the plow share has passed, the riverbed immediately and rapidly fills in the fluidized trench and safely buries the cable.

Due to the restricted narrow channels of the river coupled with the high current, the plow design includes the ability to launch, steer, and be recovered with cable loaded in the plow. In emergencies, the cable can be remotely released from the plow while on the riverbed without the intervention of divers.

3.2.2.3 Jetting-Enhanced Installation

If the post-installation inspection reveals that the FOC has not sufficiently buried, supplemental handheld diver jetting may be implemented to further bury the FOC. This is a remedial process that is not expected to be needed, but the equipment would be available on the CLB. Diver jetting is the fluidization of the riverbed using water delivered via pressurized nozzle; the water intake would be located on the CLB. A graphic of the process is provided in Figure 7.

3.2.2.4 River-to-Shore Fiber Optic Cable

As shown in Appendix B, at each of the five communities, at the western and eastern termini of the Canyon Bypass, and at the E.L. Patton Yukon River Bridge, the FOC would be installed in conduit between the thalweg of the river and the shore utilizing an HDD construction methodology. A 5-person crew would complete the HDD work at each community and at the E.L. Patton Yukon River Bridge. The HDD work would be performed prior to or simultaneously with the middle-of-river FOC installation.

HDD would be employed to install conduit originating at each BMH and terminating in the Yukon River (Figure 8, Figure 9). The HDD activity would be based onshore. The HDD rig would install a 3- to 4-inch conduit to house the FOC. At the communities of Beaver, Stevens Village, and Rampart, and at the E.L. Patton Yukon River Bridge, two conduits would be installed: one FOC from the upstream direction, and one FOC going the downstream direction. At Fort Yukon and Tanana, and at the western and eastern termini of the Canyon Bypass, only one conduit would be installed and would transition the FOC in or out of the Yukon River.

After the HDD conduit installation is complete the conduit would be plugged with a small low profile conical float to prevent sand and sediment from entering the conduit. The float would be held in place by a messenger line in the conduit tied off in the BMH. When the CLB (CLB) arrives, the float messenger line would be released in the BMH allowing the float to come to surface.

Prior to commencement of any activity in a shipping fairway in a navigable waterway, a request for a local Notice to Mariners (NOTMAR) would be issued to the U.S. Coast Guard (USCG) District Office. This would be accomplished by submitting a narrative description along with a drawing of intended vessel/barge layout, together with details of the work including but not limited to work hours, a safety lighting plan, and an anchor plan. The buoys would be located with submeter accuracy and provided to the USCG as a NOTMAR.

When the CLB reaches the in-river conduit termination point, it would hold position proximate to the previously installed buoy. The tab line would be disconnected from the buoy and attached to the middle-of-river FOC. The tab line and attached middle-of-river FOC would then be pulled through the conduit using a mechanical puller. The FOC from the river would either be terminated within the BMH or the electronics building depending on the distance.

Given the longer distances to be bored from each location on shore to the middle-of-river FOC, a larger HDD rig may be used for work in the River Corridor than would be used in Terrestrial Corridor. Standard operating procedures would be implemented during the HDD activities along both the Terrestrial and River corridors. Prior to deployment, the drilling rig would be thoroughly washed to prevent transmission of invasive plants; the bore pit would be stabilized with earthen berms and straw bales to prevent any offsite runoff from drilling operations; and the work area would be surrounded by a silt fence.[3] HDD cuttings and drilling fluids used during the HDD activity are water-based materials with no hazardous components as defined by the Resource Conservation and Recovery Act (RCRA). No additional additives will be used during HDD. Minimal drilling fluid will be dispersed into the environment at locations where the FOC connects to terrestrial (onshore) infrastructure. Cuttings and drilling mud, which are comprised of bentonite and native material will be disposed at a designated site. The HDD bores are estimated to be small (~4inches in diameter) and short (~300-500 feet). Safety Data Sheet (SDS) information would be available for each HDD drill site and would be kept on-site for the duration of the drilling work.

3.2.2.5 Beach Manhole Installation

A BMH would be installed at the E.L. Patton Yukon River Bridge, at a point onshore adjacent to each of the five communities to be served, and at the western and eastern termini of the Canyon Bypass. At the E.L. Patton Yukon River Bridge, the FOC would transition from underground installation to underwater installation; at the western and eastern termini of the Canyon Bypass the FOC would transition from underwater installation to overland surface installation, and at the BMH adjacent to each community, the BMH represents the point where the “last-mile” FOC would connect to the mainline FOC.

Beach manholes serve as the transition point from underwater to overland installation, as locations where the FOC may be spliced, and as locations to store spare FOC. Although a BMH and a vault are similar in purpose, BMHs are typically larger, made of concrete, and have built-in ability to anchor the FOC to minimize the risk of the cable getting pulled out due to water current or outside sources.

The BMH is a pre-cast concrete cellar that would house the FOC once it exits the river and would remain in place for the life of the project. A small backhoe would be used to excavate the BMH location and once installed, the surrounding area would be backfilled, and minor grading may occur. Wherever feasible, BMHs would be located on previously disturbed ground. A photo of a typical BMH is provided in Figure 10.

3.2.2.6 Communications Shelter

In each of the five communities, a communications shelter would be installed (Figure 11). The communications shelter would include a 30-ampere electrical service to power the equipment necessary to serve the community. The FOC is an unpowered system; the electrical service is only to power the land-based equipment. The communications shelter would have a floor size of 10 feet by 10 feet, with the total footprint of each permanent onshore facility of approximately 25 feet by 25 feet, including a fence surrounding the shelter. The communications shelter would be located on skids and would be movable if necessary. Wherever feasible, the communication shelter would be placed in proximity to the BMH. In some communities this may not be feasible and the FOC may have to be strung on existing poles between the BMH and the communications shelter.

<u>Testing/Commissioning</u>

Prior to shore landing operations, divers and shore crews would fit conduit ends with bell mouths and

[3] Where bore pits are located on BLM-administered lands, the straw bales would be either certified weed-free or would use Alaska-grown straw.

conduct field tests, using a mandrel/soft conduit pig, to confirm the HDD conduit is operational.

For this operation, the divers, along with a support vessel, would be positioned near the conduit end. Careful precautions would be taken to ensure the anchors are well clear of the installed cable. Divers would pull a tag line through the conduit until the shore pull line is at the offshore end of the conduit. Then a soft conduit proving pig specified to the inner diameter of the conduit would be attached and the shore crew would pull the pig back through conduit to prove the conduit is free from obstructions prior to cable operation.

3.2.3 Last-Mile Installation

At or in the vicinity of the communication shelter in each community, the FOC would transition to an aerial configuration via an existing utility pole or a new utility pole (referred to as a transition pole). The FOC would be installed from the BMH to the transition pole underground utilizing one of the previously addressed methods. From the transition pole, FOC would be installed on existing utility poles utilizing the previously addressed method, and from existing utility poles to individual structures to be served. All work would occur within the existing utility easement or on lands with existing access agreements in place.

3.2.3.1 Construction Support

3.2.3.2 Material Staging Locations and Access

Access to the entire river corridor during construction would be via the Yukon River, using the CLB with support vessels. Once all FOC is spliced and shipping routes are ice free, the barge would be mobilized directly from Vancouver, British Columbia to the Yukon River via ocean vessels. The barge would stop over in Seward to change tugs and prepare for the next leg of travel. Once the transfer is complete, the CLB, support tug, and all small support vessels would be towed to Beaver or to Fort Yukon to begin installation from those respective locations. Small quantities of materials may be stored ashore in the communities to support work being performed in the vicinity.

3.2.3.3 Fuel Storage

Within the River Corridor, the CLB would mobilize with sufficient fuel to perform FOC installation activities. Field construction equipment and support vessels used for the FOC installation would utilize built-in fuel systems. The CLB would transport two diesel tanks and a gasoline tank (Table 3-3). These tanks would be used to refuel support vessels and necessary equipment associated with the FOC installation. Fuel for camp heaters and support vessels may also be purchased in the local communities if needed or would be supplied by contracted support services and transferred to the CLB for storage.

All HDD machinery would be transported along the river using a landing craft type vessel. This vessel would support the movements of HDD related equipment to each community and would carry a maximum 500-gallon tank of gasoline (Table 3-3). All tanks would have their own secondary spill containment and would be checked on a regular basis.

Table 3-3. Yukon River fuel storage.

Fuel Type	Tank Size (Gallons)	Tanks Features	Storage Location
Diesel	17,171 (x2) ~34,300 (total)	Double Walled/Pressure Tested, 110% Containment	CLB
Gasoline	6,600	Double Walled/Pressure Tested, 110% Containment	CLB
Gasoline	500 gallons	Double Walled/Vacuum Pressure Gauge, 110% Containment	Landing craft

3.2.3.4 Crew Accommodation

Contractors associated with the FOC installation along the River Corridor would either have a portable 20-man camp or two accommodation vessels, each of which would be approximately 70 feet long. Although there is preference to utilize accommodation vessels, if needed, a man camp would be transported on the CLB and would be offloaded in each community while the cable is being laid in the vicinity. The camps would utilize community water and electricity and would purchase fuel (if available) from each community to run camp generators. Camp supplies would be provided on a bi-weekly or weekly basis from Nenana or Fairbanks on contracted support barges or scheduled airline service. Local labor would be recruited to support these camps wherever feasible. Skiffs would be used to transport crews between the accommodation vessels/camp to the CLB.

3.2.4 Canyon Bypass

Downstream of Rampart and upstream of Tanana, a section of the Yukon River has been identified as unsuitable for the laying of FOC in the river due to the velocity of currents in this area. To avoid this stretch of the river, an overland alignment—termed the Canyon Bypass—was identified to transit around this area (Figure 12).

Two additional river-to-shore sections of FOC would be laid, and two additional BMH installed, one at the upstream end of the bypass and one at the downstream end of the bypass. Along the approximately 20-mile-long bypass, the majority of the FOC would be installed using the vibratory plowing methodology; the FOC would be laid bare (e.g., not in conduit) and would be laid at a shallow burial depth due to the remote nature of the area. The FOC would also be installed under some waterways utilizing HDD; wetlands are identified adjacent to these waterbodies as well as at the upstream end of the bypass. To avoid and minimize impacts to wetlands an approximate 1-mile section at the eastern end of the bypass would be laid directly on the ground surface. A Section 404 Nationwide Permit Authorization from the USACE is anticipated and further discussed in Section 4.5.8. Table 3-4 below summarizes proposed installation techniques along the bypass.

3.2.4.1 Construction Support

Work along the Bypass would be supported as described for the River Corridor.

Table 3-4. Summary of Canyon Bypass installation techniques.

Installation Technique	Location	Distance	Area of Impact	Seasonal Timing
ROW Clearing		18 miles	32 acres	Summer/Fall
Surface Lay	North end of the bypass. BMH to Garnet Creek	1 mile	n/a	Summer/Fall
Subsurface Installation (Vibratory Plow)	Garnet Creek to river re-entry point	19 miles	1 acres	Summer/Fall
HDD	Under Garnet Creek, Stevens Creeks, Texas Creek, and Jordan Creek, river exit, river re-entry	0.3 miles	<0.001 (33 square feet)	Summer/Fall

3.2.5 Universal Construction-Related Activities

A number of construction-related activities would be undertaken to ensure compliance with applicable state and federal laws. These activities, described below, would be employed along the Terrestrial Corridor, the River Corridor, and along the Canyon Bypass.

In addition to the activities described below, the Proposed Action would implement, on BLM-administered lands, as applicable, Standard Operating Procedures contained in the Eastern Interior White Mountains Record of Decision and Approved Resource Management Plan and Stipulations as contained in the Utility Corridor Resource Management Plan (see Appendix C).

3.2.5.1 Pre-Construction Nesting Bird Survey

If vegetation clearance or construction activities are scheduled to occur during the nesting season(s) identified in *Timing Recommendations for Land Disturbance & Vegetation Clearing* (USFS 2017) the project proponent would have a qualified biologist survey any area where vegetation would be damaged by the project or associated activities no longer than 48 hours prior to vegetation disturbance. If an active nest is located, an appropriate avoidance area (as determined by the qualified biologist) would be marked and avoided during all operations. Results of the survey(s), including findings, sufficient coordinates to describe a boundary around the survey area, site photographs, and photographs of any marked avoidance areas, would be provided to the NTIA and, for work on BLM-administered lands the BLM, within 7 business days of the survey.

3.2.5.2 Revegetation and Stabilization

Following construction in a given area on lands administered by the BLM, disturbed areas—including areas that have been trenched, benched, or otherwise disturbed—would to the extent possible be returned to the pre-disturbance condition through the implementation of applicable SOPs. This would meet the requirements of BLM White Mountains RMP Decision Soil-1.

On non-BLM-administered lands, disturbed areas would be re-vegetated per the stormwater pollution prevention plan developed for the project (including implementing Best Management Practices 52.00 and 53.00, Permanent Seeding and Soil Amendments). The primary re-vegetation methodology would be reseeding of disturbed areas; the seed mixes to be used during re-vegetation activities would be those as recommended for the region in *A Revegetation Manual for Alaska* (Wright 2008).

3.2.5.3 Storm Water Management

A stormwater pollution prevention plan (SWPPP) would be developed in accordance with the Alaska Pollutant Discharge Elimination System Construction General Permit (APDES CGP) for this project in order to minimize the discharge of storm water pollutants from construction activities to Waters of the U.S. (WOTUS). This would meet the requirements of BLM White Mountains RMP Decision Soil-2.

Best management practices such as the following would be utilized during onshore construction:

- Clearing Limits: Project clearing limits would be clearly marked.
- Preserve Existing Vegetation: Natural vegetation would be preserved by minimizing clearing to provide buffer zones and stabilized areas which help control erosion, protect water quality, and enhance aesthetic benefits.
- Vegetation Buffer: A vegetation buffer strip consists of areas of undisturbed vegetation no less than 25 feet wide.
- Fiber Roll: Fiber rolls consist of straw, flax, or other similar materials bound into a tight tubular roll and may be used to protect slopes, slow sheet flow, and as a perimeter control to prevent sediment from traveling offsite. Where installed on BLM-administered lands, fiber rolls would be either certified weed-free or, if containing straw, would use certified weed-free or (if unavailable and approved by an Authorized Officer), Alaska-grown straw.
- Straw Mat: Straw mat would be utilized as necessary to prevent erosion and to provide stability to any steeply sloped areas disturbed during installation while vegetation regrows. Where installed on BLM-administered lands, straw mats would be either certified weed-free or would use Alaska-grown straw.
- Brush Barrier: Brush barriers are perimeter sediment control structures using material such as small tree branches, root mats, stone, or other non-erodible debris left over from site clearing.

3.2.5.4 Fuel Management

A Spill Prevention, Control, and Countermeasure Plan (40 CFR 112) would be prepared and maintained for the construction- and operation-related fuel storage for this project and would be provided to agencies prior to construction.

3.2.5.5 Invasive Species Control

The introduction, or spread, of noxious weeds and invasive plants would be controlled or minimized through implementation of the measures presented in the sections below.

3.2.5.5.1 Lands not Administered by the Bureau of Land Management

A host of measures would be employed during construction to control the spread of invasive species, including:

- Prior to deployment and first use along the Terrestrial Corridor, River Corridor, or Canyon Bypass, construction equipment would be thoroughly power- or pressure-washed to remove mud, dirt and plant parts and prevent transmission of invasive plants.
- Certified weed free fill and gravel would be utilized where feasible and available.
- Minimizing soil disturbance and reseeding where appropriate to reduce the likelihood of weed establishment.
- Revegetating disturbed areas per *A Revegetation Manual for Alaska* (Wright 2008).

- Using "weed-free" seed in all revegetation activities, where such seed is available, and its use is feasible.
- Using weed-free straw in all projects where straw is used.

3.2.5.5.2 Bureau of Land Management Stipulations for Invasive Plant Species Management on Lands Administered by the Bureau

Stipulations per BLM Alaska Instruction Memorandum No. 2022-008 Invasive Plant Prevention and Management, as shown in Appendix D, would be implemented on BLM-administered lands. Certified weed-free or (if unavailable and approved by an Authorized Officer), Alaska-grown straw, and other certified weed-free material fill (e.g., fill and gravel), would be utilized where feasible and available.

3.2.6 Operations and Maintenance

Operation of the installed FOC network would be passive; during routine operations, the system would not require regular human management or intervention, or scheduled maintenance. Fiber optic networks are robust and generally offer greater than 99.9 percent uptime.

While they are not typically subject to weather-related or other interference, FOC failure attributable to natural or anthropogenic causes can occur. The type of repair operation would depend on the location and nature of the failure and the time of year when the failure occurs.

During the operations phase, the installed FOC may fail due to natural or anthropogenic causes. The type of repair operation would depend on the location of the failure and the time of year when the failure occurs.

3.2.6.1 Terrestrial Corridor

Failures of the line along the underground portions of the Terrestrial Corridor would be repaired in-place; if the failure occurs between a splice or slack vaults, the FOC would be unearthed as described above in Section 3.1.2.3, Traditional Trenching. The cable would be respliced or a replacement section inserted to repair the failure, and then the cable would be reburied. If a failure occurs within a splice or slack vault, the cable would be respliced or repaired in the splice or slack vault.

Failures along the aboveground portions of the Terrestrial Corridor would be repaired in-place. If the cause of the FOC failure is the failure of a utility pole, the utility pole would be replaced using the methodologies described in Section 3.1.1.2, New Utility Pole Installation. If the FOC fails due to another cause, repairs would be made in-place using the methodologies described in Section 3.1.1.3.

3.2.6.2 River Corridor

Failures of the line along the River Corridor present seasonal access challenges: failures of the in-river FOC would only be repairable during the open-water and full ice conditions. During the late fall when ice is thin and weak, and late spring during break-up, there is no opportunity to repair the cable. Repair of failures of the in-river FOC would use similar equipment to that described in Section 3.2.2 for open water repairs. During winter conditions when the ice is thick enough, large excavation equipment can be mobilized to the failure site to remove ice and access the riverbed. This equipment is readily available on the North Slope as well as in Fairbanks depending of the type of equipment needed. When the point of failure is identified, the two ends of the FOC would be raised to a supporting vessel or equipment where the FOC could be respliced or a replacement section inserted to repair the failure; the cable would then be reburied in the riverbed or repulled through conduit (if the failure is found in a river-to-shore section).

Failures along the shore-based portions of the River Corridor (i.e., landward of the BMH installed at each village) would be repaired as described for the Terrestrial Corridor. Because these components can be accessed overland, repairs can be made year-round.

3.2.6.3 Canyon Bypass

Failures along the Canyon Bypass would generally be repaired in-place; when the point of failure is identified, the FOC would be unearthed by hand or as described above in Section 3.1.2.3, Traditional Trenching. The cable would be respliced or a replacement section inserted to repair the failure, and then the cable would be reburied. If the failure occurs in a section that has been installed underneath a waterbody, the cable would be severed on both ends, the failed cable would be removed, and the new cable installed and spliced at both sides of the waterbody.

3.3 Alternatives

3.3.1 No Action Alternative

Under the No Action alternative, the Proposed Action would not be constructed, and the five villages would remain underserved by wired high-speed internet service. Antiquated (in modern terms) internet access would continue to be available utilizing the existing microwave-based communication system in the region; newer satellite-based internet service would also continue to be available. The *de minimis* benefits of not constructing and operating the Proposed Action are outweighed in breadth and depth by the needs for, and benefits promised by, the construction and operation of the Proposed Action.

3.3.2 Options Considered, Evaluated, and Dismissed

3.3.2.1 Alignment Options

During the development of the Proposed Action, another alignment option was considered, evaluated, and dismissed.

3.3.2.1.1 Hess Creek / Doyon Land Routing

During the evolution of the Proposed Action's design, an option was reviewed as a means to increase the portion of the Project that would be installed on land (rather than in the Yukon River) and to maximize the use of Doyon-owned lands, while still providing the necessary connection to the Yukon River. This alignment option (termed the Hess Creek/Doyon Land Routing) includes:

- From the Hess Creek Bridge located at approximately MP 24 of the Dalton Highway, FOC would be laid overland in a northwesterly direction to the point where Hess Creek flows into the Yukon River upstream from the community of Rampart. The FOC would then be installed downstream in the thalweg of the Yukon River as described for the Proposed Action.
- The FOC would be laid directly on the surface, mostly in upland muskeg type habitat; the FOC would self-bury over time due to the natural freeze-thaw processes in the area. Where Hess Creek flows into the Yukon River, a BMH would be installed and the FOC would transition to installation in the thalweg as described for the Proposed Action.
- From a point along the Dalton Highway north of the Hess Creek Bridge and south of the E.L. Patton Yukon River Bridge, FOC would be laid overland in a northeasterly direction across Doyon and State of Alaska land to a point on the south side of the Yukon River across from the community of Stevens Village. The FOC would then be installed upstream in the thalweg of the Yukon River as described for the Proposed Action.

- The FOC would be laid directly on the surface, mostly in upland habitat; the FOC would self-bury overtime due to the natural freeze-thaw processes in the area. FOC would also be installed under some waterways utilizing HDD. At the Yukon River, a BMH would be constructed on the south bank of the river, casing would be installed under the Yukon River utilizing HDD, and another BMH would be constructed adjacent to the community. FOC would then be installed in conduit within the casing to connect the two BMHs. Upstream of Stevens Village the work under this option would be as described for the Proposed Action.

This option, while meeting the purpose and need, was not selected for inclusion in the Proposed Action. The Hess Creek portion uses the active floodplain of a highly sinuous river. The direct laying of the FOC would expose the network to unnecessary points of failure given the variable soil conditions of the floodplain and associated erosion and debris. The northeast extension to Stevens Village is variable, and often steep, forested terrain that would require multiple river crossings. This option would require construction activities that are more complex—and that would result in greater surface disturbance—than installation along the highway and in the Yukon River. The highly variable terrain and dynamic environments along the route would result in the potential for greater environmental impacts both from construction and operational maintenance.

3.3.2.2 Configuration/Technology Options

3.3.2.2.1 Aerial Installation of Fiber Optic Cable

In many parts of the United States, aerial installation of FOC on existing utility poles, or utility poles newly-installed to support the FOC, is the preferred installation method due to the lessened environmental impacts in most environments, lower cost, and faster installation schedule compared with underground installation. However, aerial installation of FOC, except within established communities or along existing ROWs and on existing utility poles maintained by others, is infeasible in the Project area, due in large part to the widespread prevalence of permafrost: timber poles or other directly-embedded poles installed in permafrost are subject to failure as a result of the freeze-thaw cycles of permafrost, resulting in reliability issues. The average burial depth of a utility pole is 12-15 feet at minimum. Permafrost throughout the Terrestrial Corridor is predominately discontinuous and discussed further in Sections 4.3.3 and 5.3.1. Additionally, this configuration option presents greater potential environmental impacts when compared to the Proposed Action—air emissions, for instance, would be increased if extensive helicopter-supported construction were employed to minimize surface disturbances; if such helicopter-supported construction were not utilized, greater impacts to terrestrial resources (including flora, fauna, and cultural and paleontological resources, if present) would be realized.

3.3.2.2.2 Wireless Provision of High-Speed Internet Service

Broadband internet service can be provided wirelessly using radio signals or low earth orbit (LEO) satellite systems. The use of microwave-provided wireless high-speed internet service is infeasible in the Project area due to the lack of established infrastructure. The range of a wireless broadband signal is approximately 30 miles; this would require the installation of approximately 10 tall radio towers along the Yukon River (including in the Yukon Flats National Wildlife Refuge). Further, this would require the installation of a dedicated power service for each of the towers, which would likely be diesel-fueled generators due to their reliability and ubiquity in rural Alaska; the use of diesel generators would entail frequent refueling and increased operations and maintenance requirements.

The use of microwave-provided wireless internet service would not meet the purpose and need because it would not provide a hard-wired high-speed internet connection. Further, this option presents increased potential environmental effects from operation of diesel generators (including new generators in each of the villages, and the concomitant potential environmental and human health effects); the avoidable impacts to avian species associated with tall, guyed structures like the necessary radio towers; the increased greater operations and maintenance costs; and the lowered service speeds associated with wireless technologies.

LEO satellite systems require a large array or “satellite constellation” to provide wireless broadband service to ground based receivers. Each user is required to have their own receiver to access the LEO broadband. Starlink is currently the largest provider of LEO wireless systems and as of July 2023 there are 5,011 Starlink satellites in orbit; 4,982 of which are operational (McDowell 2023). In December 2022, Starlink began offering service to the northern latitude populations of Alaska, Canada, and Scandinavia. Many residents in Alaska communities have purchased the receiving systems and now receive wireless broadband internet with much higher speeds and lower latency than offered by the legacy microwave systems. There are other providers of LEO broadband internet available to Alaska communities. LEO systems depend upon clear unobstructed line of site connection with the satellites and are not designed to work in extreme cold temperatures that exist in interior Alaska. The LEO broadband systems are viable backup systems, but do not compare in the reliability and speed of a hard-wired fiber optic system for long term dependable internet service. LEO satellite system-provided wireless internet service would not meet the purpose and need for the Project because it would not provide a hard-wired high-speed internet connection.

4 Description of the Affected Environment

The sections below describe the affected environment along the Terrestrial Corridor, the River Corridor, and the Canyon Bypass.

4.1 Noise

4.1.1 Ambient Noise

Ambient noise across the Proposed Action area varies by location. In the Terrestrial Corridor, anthropogenic noise (primarily sourced from on-road vehicle traffic) is common and is the primary source of ambient noise. Anthropogenic noise (noise from on- and off-road vehicles and boats) is the primary source of noise along the majority of the River Corridor in areas adjacent to each of the five communities and adjacent to the E.L Patton Bridge. Away from the communities and the E.L. Patton Bridge, and along the Canyon Bypass, the ambient noise environment is characterized primarily by natural phenomena (e.g., the movement of water, wind), with passing boats or aircraft as the primary sources of anthropogenic noise.

4.1.2 Sensitive Receptors

Noise sensitive receptors are, for the purposes of this analysis, defined as those populations that are more susceptible to the effects of noise than the population at large and those located in proximity to localized sources of noise. Sensitive receptors can include long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, childcare centers, parks and recreations centers, and athletic facilities.

Along the Terrestrial Corridor, there are no long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, schools, playgrounds, childcare centers, parks and recreations centers, or athletic facilities proximate to where work would occur. The Whitefish Campground and Boat Launch and the Lower Chatanika State Recreational Area, which includes campgrounds, is immediately adjacent to the Project alignment; the nearest developed campground is approximately 1 mile from the alignment. Residences are found along the Terrestrial Corridor in the community of Fox and further south between the community of Fox and the southern terminus of the Terrestrial Corridor in unincorporated Fairbanks-North Star Borough. North of the community of Fox, scattered rural residences are located along the Steese Highway.

Along the River Corridor, the whole of each of the five communities (i.e., residences, schools, community center, cemetery) is considered a noise sensitive receptor; similarly, any rural residence along the Canyon Bypass would be considered a noise sensitive receptor.

4.2 Air Quality

The Clean Air Act (CAA) and its implementing regulations (42 U.S.C. 7401 et seq., as amended in 1977 and 1990) are the basic federal statutes and regulations governing air pollution in the United States.

Air quality in the Project area is regulated by the Alaska Department of Environmental Conservation (ADEC), which administers federal and state air quality standards. The U.S. Environmental Protection Agency (EPA) has set national ambient air quality standards (NAAQS) for six of the following criteria pollutants (US EPA, 2022): ozone (O3), particulate matter (PM 2.5 and 10), nitrogen dioxide (NO 2), carbon monoxide (CO), sulfur dioxide (SO2), and lead (Pb). Under these standards, a geographic location with pollutant levels below air quality standards is said to be in "attainment," while higher levels are in "non-attainment." With the exception of the southernmost 350 feet of the Terrestrial Corridor, which is located within the Fairbanks PM2.5 Nonattainment Area, all Project facilities would be in areas classified as attainment for all criteria pollutant standards (NAAQS and Alaska ambient air quality standards [AAAQS]).4

Projects located in "non-attainment" or "maintenance" areas, as determined by the EPA, may need to be modified or mitigation measures developed and implemented to conform to the State Implementation Plan (SIP). The CAA (42 U.S.C. 7401 et seq.) prohibits federal assistance to projects that are not in conformance with the SIP.

In accordance with Executive Order (EO) 13990, this EA also takes into consideration the potential emission of greenhouse gases (GHG) associated with the Project. EO 13990 directs that the Council on Environmental Quality shall review, revise, and update its final guidance entitled, ''Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews,'' 81 FR 51866 (August 5, 2016). The Council released in 2023 the guidance entitled "National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change" which required that, when conducting climate change analyses in NEPA reviews, agencies should consider: (1) the potential effects of a Proposed Action on climate change, including by assessing both GHG emissions and reductions from the Proposed Action; and (2) the effects of climate change on a Proposed Action and its environmental impacts.

Alaska is at the forefront of climate change. Because of its northern latitude and seasonal changes in sea ice, the state is warming at two to three times the rate of the global average. Rising temperatures can be tied to most of the effects of climate change in Alaska. Reduced ice coverage, including shrinking glaciers, retreating sea ice, and thawing permafrost, are all serious impacts of rapid warming. Meanwhile, much of Alaska has seen increases in precipitation, with more of that precipitation falling as rain than snow. These changes to temperature, precipitation, and ice have a diverse range of effects, including extreme droughts, reduced snowpack, changes in sea level, ocean warming and acidification, large wildfires, and more impactful heatwaves (USDA Undated).

4.3 Geology and Soils

4.3.1 Farmlands

The Farmland Protection Policy Act (7 USC 4201 and 7 CFR Ch. VI Part 658) discourages federal activities that would convert farmland to nonagricultural purposes. Prime and important farmland includes all land that is defined as prime, unique, or farmlands of statewide or local importance. No prime or important farmlands are found along the project alignment.

4.3.2 Physiography and Geology

Alaska is comprised of four physiographic regions that are primarily defined based on topography. From north to south, these divisions are the Arctic Coastal Plain, Rocky Mountain System, Intermontane Plateaus, and Pacific Mountain System. These four regions are further divided into physiographic provinces based on similar topographic characteristics and geologic processes, and each province into physiographic sections based on characteristic landforms and geomorphic history. The Proposed Action is located within the following physiographic sections: Tanana-Kuskokwim Lowland, Yukon-Tanana Uplands, Yukon Flats, Rampart Trough, and Kokrine-Hodzana Highlands (Wahrhaftig 1965). The following descriptions of these divisions are taken from Wahrhaftig.

[4] Areas where air quality data are not available (which includes all five communities, and the linear portions outside of the Fairbanks PM2.5 Nonattainment Area) are considered to be unclassifiable and are treated as attainment areas.

4.3.2.1 Tanana-Kuskokwim Lowland

The Tanana-Kuskokwim Lowland is a broad depression bordering the Alaska Range on the north; its surfaces are of diversified origin. Coalescing outwash fans from the Alaska Range slope 20-50 feet per mile northward to floodplains along the axial streams of the lowland. Rivers from the range flow for a few miles at the heads of the fans in broad terraced valleys 50–200 feet deep. Semi-circular belts of morainal topography lie on the upper ends of some fans. The floodplains of the Kuskokwim and Kantishna rivers and of the Tanana River west of Tolovana are incised 50–200 feet below the level of the lowland. Several nearly level projections of the lowland extend into uplands on the north. Large fields of stabilized dunes cover the northern part of the lowland and lower slopes of adjacent hills between Nenana and McGrath. The outwash fans grade from coarse gravel near the Alaska Range to sand and silt along the axial streams. Areas north of the axial streams are underlain by thick deposits of "muck," a mixture of frozen organic matter and silt. Parts of the southwestern part of the lowland have thick loess cover, but the central and eastern parts are free of loess south of the Tanana River. Scattered low hills of granite, ultramafic rocks, and Precambrian(?) schist rise above the outwash. Tertiary conglomerate in the foothills of the Alaska Range plunges beneath the lowland in a monocline, and the heads of the outwash fans may rest on a pediment cut across this conglomerate. The base of the alluvial fill near Fairbanks is at or below sea level. The entire section is an area of permafrost. Porous gravel at the heads of the outwash fans, however, has a deep-water table and dry permafrost (ground perennially at temperatures below freezing but having no ice).

4.3.2.2 Yukon-Tanana Uplands

The Yukon-Tanana Upland is the Alaskan equivalent of the Klondike Plateau in Yukon Territory. Rounded even-topped ridges with gentle side slopes characterize this section of broad undulating divides and flat-topped spurs. In the western part these rounded ridges trend northeast to east; they have ridge crest altitudes of 1,500–3,000 feet and rise 500–1,500 feet above adjacent valley floors. The ridges are surmounted by compact rugged mountains 4,000–5,000 feet in altitude. Ridges in the eastern part have no preferred direction, are 3,000–5,000 feet in altitude but have some domes as high as 6,800 feet and rise 1,500–3,000 feet above adjacent valleys. In the extreme northeast the ridges rival the Ogilvie Mountains in ruggedness. Valleys in the western part are generally flat, alluvium floored, and 0.25 to 0.5 miles wide to within a few miles of headwaters. Streams in the eastern part that drain to the Yukon flow in narrow V-shaped terraced canyons, but the headwaters of the Fortymile and Ladue rivers are broad alluvium-floored basins.

A belt of highly deformed Paleozoic sedimentary and volcanic rocks containing conspicuous limestone units, overthrust and overturned to the north, extends along the north side of the upland. The rest of the upland is chiefly Precambrian (?) schist and gneiss but has scattered small elliptical granitic intrusions in the northwestern part; large irregular batholiths make up much of the southeastern part. In the western part a thick mantle of windborne silt lies on the lower slopes of hills, and thick accumulations of muck overlie deep stream gravels in the valleys. Alluvial deposits of gold and other metals abound throughout the upland. Pingos are common in valleys and on lower hill slopes. The entire section is underlain by discontinuous permafrost.

4.3.2.3 Yukon Flats

The central part of the Yukon Flats section consists of marshy lake-dotted flats rising from 300 feet in altitude on the west to 600–900 feet on the north and east. The northern part of the flats is made up of gently sloping outwash fans of the Chandalar, Christian, and Sheenjek rivers; the southeastern part of the flats is the broad gentle outwash fan of the Yukon River. Other areas are nearly flat floodplains. Rolling silt- and gravel-covered marginal terraces having sharp escarpments 150–600 feet high rise above the flats and slope gradually upward to altitudes of about 1,500 feet at the base of surrounding uplands and mountains. Their boundaries with surrounding uplands and mountains are gradational.

Escarpments bounding the Yukon Flats expose well-consolidated or crystalline rocks of Paleozoic and possibly Mesozoic age. The marginal terraces are capped with gravel on which rests a layer of wind-borne silt. A well drilled at Fort Yukon in 1954 disclosed 48 feet of aeolian sand of late Pleistocene or Recent age, underlain by 100 feet of sandy gravel of Pleistocene age, underlain in turn by at least 292 feet of fine lake sediments of late Pliocene or early Pleistocene age. On the basis of this well it is thought that the Yukon Flats are the site of a late-Tertiary lake that occupied a down-warped basin. Permafrost probably underlies most of the section except rivers, recently abandoned meander belts, and large thaw lakes.

4.3.2.4 Rampart Trough

The Rampart Trough is a structurally controlled depression having gently rolling topography 500–1,500 feet in altitude; it is incised 500–2,500 feet below highlands on either side. Terraces on tributaries of the Yukon River near Rampart are 20 feet, 100 feet, 150 feet, 250 feet, and 500 feet above stream level. The Rampart Trough was eroded along a tightly folded belt of soft continental coal-bearing rocks of Tertiary age. Hard rock hills and the surrounding uplands are partly metamorphosed sedimentary and volcanic rocks of Mississippian age that strike about N 60" E and are cut by granitic intrusions. Permafrost underlies all the lowland except the Yukon River floodplain.

4.3.2.5 Kokrine-Hodzana Highlands

The Kokrine-Hodzana Highlands consist of even-topped rounded ridges rising to 2,000–4,000 feet in altitude surmounted by isolated areas of more rugged mountains. A rugged compact highland in the northeastern part has many peaks between 4,500 and 5,700 feet in altitude. The Ray Mountains, rising to 5,500 feet, have cirques and glaciated valleys and craggy, cliffed tors that rise abruptly from broad granite ridgetops. Valleys have alluviated floors to within a few miles of their heads.

The highlands are underlain chiefly by Paleozoic and Precambrian (?) schist and gneiss having a northeast-trending structural grain, cut by several granitic intrusions, the largest of which is the granite batholith that upholds the Ray Mountains. Small placer deposits of tin and gold occur in the southern part of the highlands. Discontinuous permafrost underlies those portions of the Kokrine-Hodzana Highlands overlain by the Project alignment.

4.3.3 Soils

Information regarding the soil types found along the Project alignment are taken from the U.S. Department of Agriculture’s (USDA) STATSGO soils database and University of Alaska Fairbanks (UAF) Institute of Northern Engineering Permafrost Characteristics of Alaska Map (2008); Appendix E illustrates the location of these soil types.

Permafrost is a condition in which the subsurface material is frozen for a minimum of twenty-four consecutive months (Ritter 2011) and in Alaska is known to extend downward to depths greater than 1,000 feet. The upper surface of the permafrost is overlain by a layer that does not remain permanently frozen, termed the active layer; whereby the material temperatures change with the seasonal influences from ambient temperature and solar radiation. The mechanics of the active layer are similar to typical seasonal freeze/thaw cycles in the soil horizon, with the exception that the waters released by melting are prevented from percolating downward by the permanently frozen permafrost.

Permafrost in Alaska is characterized by four (four) primary categories based on the percent of permafrost present across all landforms, soil types, and slope aspects: continuous (>90%), discontinuous (50-90%), sporadic (10-50%) and isolated (>0-10%) (UAF 2008).

4.3.3.1 Terrestrial Corridor

The following soil types found along the Terrestrial Corridor:

- Interior Alaska Highlands-Boreal Upland-Rounded Mountains, Acid
- Interior Alaska Highlands-Boreal Lowland-Flood Plains and Terraces
- Interior Alaska Highlands-Boreal Upland and Lowland-Mountain Valleys
- Interior Alaska Highlands-Boreal Upland-Hills and Plains, Acid
- Interior Alaska Highlands-Boreal Upland-Hills and Plains
- Interior Alaska Highlands-Boreal Upland and Subalpine-Rounded Mountains
- Interior Alaska Highlands-Boreal Upland and Alpine-Rugged Mountains
- Interior Alaska Highlands-Boreal Lowland-Flood Plains and Terraces
- Yukon Flats-Boreal Upland-Hills and Plains

The Terrestrial Corridor between Fairbanks and the Yukon River is mapped as approximately 90 percent discontinuous and 10 percent continuous permafrost. Continuous permafrost areas are found at the northern end of the Corridor (UAF 2008). There are numerous soil types defined along the proposed FOC installation near the existing highway from Fairbanks to the Yukon River. The available drilling data from various highway projects and design has allowed this variable and complex morphology to be accurately mapped. The depth of the active layer varies from 7 inches in the low lying organic rich soils with high content of clay or other very fine material, to greater than 80 inches in the well drained dune and loam soil complexes.

4.3.3.2 River Corridor

The following soil types found in each of the five communities per the USDA's STATSGO soils database are listed below.

- Tanana
  - Interior Alaska Lowlands-Boreal Lowland-Floodplains and Terraces, High Elevation
  - Interior Alaska Lowlands-Boreal Lowland-Flood Plains and Terraces
- Rampart
  - Interior Alaska Highlands-Boreal Upland and Subalpine-Rounded Mountains
  - Interior Alaska Highlands-Boreal Upland-Hills and Plains
- Stevens Village
  - Yukon Flats-Boreal Lowland-Floodplains and Terraces
- Beaver
  - Yukon Flats-Boreal Lowland-Floodplains and Terraces
- Fort Yukon
  - Yukon Flats-Boreal Lowland-Floodplains and Terraces

Along the River Corridor, discontinuous permafrost is mapped at all five communities (UAF 2008).

4.3.3.3 Canyon Bypass

The following soil types are found along the Canyon Bypass alignment which are distinct in the slopes of their location.

- Interior Alaska Highlands-Boreal Upland-Hills and Plains (E31PH) on slopes of 0-25 percent (2024b, 2024)
- Interior Alaska Highlands-Boreal Upland-Rounded Mountains, Acid (E31M4) on slopes of 12-45 percent (2024a, USDA).
- Interior Alaska Highlands-Boreal Upland and Subalpine-Rounded Mountains

The Canyon Bypass Alignment between Rampart and Tanana is mapped as approximately 50 percent discontinuous and 50 percent isolated permafrost (UAF 2008). The flatter low lying areas make up the areas of discontinuous permafrost and would occur in the E31PH soils. The steeper slopes and rocky ridges that form the upland portions of the route constitute the areas of isolated permafrost predominantly in the E31M4 soil.

4.4 Water Resources

4.4.1 Surface Water

Surface waters (i.e., lakes and rivers) occurring along the Proposed Action alignment are discussed below and presented in Appendices A and B. Review of multiple databases identified surface waters within the project corridor and more specifically identified those that are listed as impaired waterbodies based by ADEC or as navigable by the USACE.

The ADEC's Division of Water Monitoring and Assessment section oversees ambient water quality monitoring programs to support the stewardship of Alaska's freshwater and marine resources. The section also evaluates and analyzes water quality data to produce Alaska's Integrated Water Quality Monitoring and Assessment Report (Integrated Report) on a biennial basis. Both the integrated report and ADEC water quality map identified a single stream (Goldstream Creek) within the terrestrial corridor (ADEC 2024) as impaired.

Navigable waters are determined and defined differently by various federal and state agencies. Navigable waters of the U.S. (WOTUS), as defined under title 33 CFR 329, are those waters that are subject to the ebb and flow of the tides and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce while the waterway is in its ordinary condition. Consultation with the USACE under Section 10 of the Rivers and Harbors Act is required for any construction in, on, or over a navigable water (USACE 2024).

4.4.1.1 Terrestrial Corridor

The Terrestrial Corridor crosses numerous named and unnamed surface waters. The named waters, from south to north, include Little Blanche Creek, Glenn Creek, Gilmore Creek/Goldstream Creek, Gold Run, Fox Creek, Dome Creek, Chatanika River, Willow Creek, Washington Creek, Cushman Creek, Aggie Creek, Globe Creek, Tatalina River, Bridge Creek, Tolovana River, Cleary Creek, Ester Creek, Oliver Creek, Livengood Creek, Ready Bullion Creek, Rosebud Creek, Lost Creek, Hess Creek, Isom Creek, and the Yukon River; these are shown in Appendix A.

Goldstream Creek (AK_R_8030907_014_001) is listed as an impaired waterbody under the Clean Water Act Section 303(d) for not meeting the TMDL for turbidity. Goldstream Creek is classified as a Category 4a impaired water (ADEC 2024) and has an EPA-approved TMDL plan (ADEC 2015).

Review of the USACE navigable waters within the terrestrial corridor listed identified the first 139 miles of the Chatanika River as navigable (Figure 13) (USACE 2024).

4.4.1.2 River Corridor

The components in the River Corridor would, in large part, be installed in the Yukon River. The U.S. Geological Survey (USGS) collects flow data along the Yukon River at Stevens Village. Peak mean flow typically occurs in the month of June, at a rate of 323,000 cubic feet per second (cfs); mean flow in other open-water months (May to October) ranges from 108,000 to 225,000 cfs. The Yukon River is extremely turbid, with suspended sediment concentrations measured at the E.L. Patton Yukon River Bridge ranging from approximately 150 mg/L to approximately 900 mg/L (equivalent to approximately 450 to 2,700 nephelometric turbidity units [NTU, the common unit of measurement[5]] (Chikita et al. 2002).

The Yukon River is not listed as an impaired waterbody (ADEC 2024) however review of the USACE navigable water list identified the entire length of the Yukon River as a navigable waterbody (USACE 2024).

4.4.1.3 Canyon Bypass

The Canyon Bypass crosses numerous named and unnamed surface waters. The named waters include Garnet Creek, Stevens Creeks, Texas Creek, and Jordan Creek; these are shown in Appendix B. There are no contaminated or navigable waterbodies that cross the bypass alignment.

4.4.2 Groundwater

Groundwater resources are present along the Proposed Action alignment. Each of the five communities utilize groundwater resources to supply drinking water to the community. Drinking water wells are identified along the Proposed Action alignment. There is no known contamination of groundwater resources along the Proposed Action alignment.

4.4.3 Coastal Zone, Estuary, and Inter-tidal Areas

The Proposed Action is not located within the coastal zone. There are no estuaries or inter-tidal areas along the Proposed Action alignment.

4.4.4 Floodplains

Executive Order 11988, Floodplain Management, directs federal agencies to avoid actions located in or adversely affecting floodplains unless there is no practicable alternative and to take action to mitigate losses if avoidance is not practicable.

A review of the Federal Emergency Management Agency (FEMA) online flood maps indicate that portions of the project are located within mapped areas and unmapped areas. These areas are further defined within the Terrestrial and River corridors and shown in Appendix F.

[5] For comparison, a clear mountain stream might have a turbidity of around 1 NTU, whereas a large river like the Mississippi might have a dry-weather turbidity of around 10 NTUs. (EPA, undated)

4.4.4.1 Terrestrial Corridor

Review of the FEMA National Flood Hazard Layer Mapper indicates mapped floodplains are located along the Terrestrial Corridor. Mapped floodplains are shown within the vicinity of Fairbanks until MP 31 of the Elliott Highway and are identified on the following Flood Insurance Rate Maps (FIRMS) (FEMA 2023):

- 02090C3440J
- 02090C3420J
- 0250090075F

Within these mapped areas, the FOC alignment is predominately located within Zone X, defined as a non-special flood hazard area with moderate to low flood risk. The FOC passes through three mapped Zone A river crossings, defined as a special flood hazard area with a high flood risk (FEMA 2023). These areas include:

- Fox Creek (MP 0)
- Chatanika Creek (MP 11)
- Washington Creek (MP18.5)

4.4.4.2 River Corridor

Within the river corridor, there are no mapped floodplains except those in the community of Fort Yukon, which is mapped entirely as Zone AE on the following FIRMS:

- 0200450008A
- 0200450009A

Zone AE is defined as a special flood hazard area with a high flood risk (FEMA 2023). Potential impacts to existing drainage patterns would be minimized during project design; accordingly, no adverse impacts to floodplains are anticipated.

4.4.5 Wild and Scenic Rivers

The Proposed Action alignment is not located on, and does not cross, any waterway designated as a Wild and Scenic River.

4.5 Biological Resources

The Proposed Action alignment is located in the Ray Mountains, Yukon-Tanana Uplands, Yukon-Old Crow Basin, and Yukon River Lowlands ecoregions (Nowacki et al. 2001; see Figure 14). The wildlife and vegetation found in these areas are abstracted from Nowacki et al. and presented in the sections below.

4.5.1 Wildlife

The wildlife found along the Proposed Action alignment is typical of the wider area; there are no unique or unusual wildlife known along the alignment. Some species are ubiquitous across the Proposed Action alignment.

- Ray Mountains. Several small caribou herds inhabit these mountains. Canada lynx and American marten are typical in the boreal forest, and moose, brown bears, gray wolves, and red fox are also found here. Landbirds found in this ecoregion include olive-sided flycatchers, blackpoll warblers, boreal owls, great gray owls, and rusty blackbirds. The mountain streams provide an important habitat for Arctic grayling and also support Dolly Varden and Chinook, chum, and coho salmon (Nowacki et al. 2001).

- Yukon-Old Crow Basin. Rich aquatic habitats attract waterfowl and provide prime habitat for moose, river otter, North American beaver, and muskrat. Species breeding here include scaup (greater and lesser), northern pintail, scoter (surf and white-winged), American widgeon, sandhill crane, loons (Arctic, red-throated, and common), and grebes (horned and red-necked). Most of the canvasback ducks that nest in Alaska do so in this ecoregion. Snowshoe hare and Canada lynx occur. The rivers support Chinook, coho, and chum salmon. Resident fish include northern pike, sheefish, burbot, whitefish, and Arctic grayling (Nowacki et al. 2001).
- Yukon-Tanana Uplands. The open, mixed deciduous-conifer forests support a large variety of birds, including Smith's longspurs, gray jays, boreal chickadees, northern flickers, red-tailed hawks, and boreal owls. Peregrine falcons favor cliffs in the area. Dall sheep and hoary marmots inhabit the high mountainous areas. Top-level predators include black and brown bears, wolverines, and gray wolves, and smaller predators are marten, mink, short-tailed and least weasels, and Canada lynx. Small mammals include yellow-cheeked voles and northern flying squirrels. Caribou and moose are also found in this ecoregion. The clear headwater streams in this ecoregion are important spawning areas for Chinook, chum, and coho salmon. Northern pike, whitefish, and burbot are common in the larger lakes and rivers, and Arctic grayling tend to be found in smaller streams (Nowacki et al. 2001).
- Yukon River Lowlands. The wet habitats of these lowlands support many birds, mammals, and fish. Common loons, horned and red-necked grebes, trumpeter swans, and common goldeneyes breed near the lakes and wetlands. The forests along the river valleys attract ruffed grouse, belted kingfishers, alder flycatchers, and Hammond's flycatchers. Landbirds inhabiting this ecoregion include olive-sided flycatchers, blackpoll warblers, boreal owls, great gray owls, and rusty blackbirds. This ecoregion also provides prime habitat for mink, marten, muskrat, moose, and river otter. Smaller mammals include red squirrels, northern bog lemmings, yellow-cheeked voles, and the tiny shrew. Several caribou herds range throughout the broad expanse of these lowlands, as do populations of black bear. The river and streams commonly contain coho, chum, and king salmon. Northern pike and whitefish are common in lowland drainages, and Arctic lamprey migrate up the Yukon River (Nowacki et al. 2001).

4.5.2 Vegetation

The vegetation found along the Proposed Action alignment is typical of the wider area; there are no unique or unusual vegetation assemblages known along the alignment.

- Ray Mountains. Black spruce bogs occur in lowlands near the Yukon River. Stands of white spruce, birch, and aspen occur on warm, south-facing slopes with good drainage and along floodplains with alders and willows. Shrub birch and Dryas-lichen tundra characterize the alpine areas.
- Yukon-Old Crow Basin. Vegetation varies with soil drainage. Wet grass marshes and low shrub swamps occur in the flats among the streams, rivers, and lakes. Open black spruce stands also grow at lower elevations, with white spruce growing on better drained sites. Paper birch, balsam poplar, and aspen are most likely found in early successional stands following fires. Extensive thickets of birch, willow, and some alder occur in openings and under trees from lower elevations to above tree line. Sedge and cottongrass tussocks are found through the ecoregion.

- Yukon-Tanana Uplands. Black spruce favors north-facing slopes underlain with permafrost; spruce also occurs with sedge tussocks and scrub bogs in valley bottoms. White spruce, birch, and aspen dominate south-facing slopes. White spruce, balsam poplar, alder, and willows occur in floodplains on better-drained sites. Low birch-ericaceous shrubs and Dryas-lichen tundra are the primary vegetation above tree line.
- Yukon River Lowlands. The Yukon River Lowlands encompass the lower stretches of the Yukon and Koyukuk rivers in west-central Alaska. A mosaic of black spruce stands, birch-ericaceous shrubs, and sedge-tussock bogs occur. Many of these areas contain a dense concentration of lakes and ponds. Along the major rivers, highly productive stands of white spruce and balsam poplar prevail. Where the meandering streams have left oxbows or cut-off sloughs, wet sedge meadows and aquatic vegetation occur. Tall alders and willows dominate active floodplains and river bars.

4.5.3 Threatened and Endangered Species

A search of the USFWS Information for Planning and Consultation (IPaC) system indicates that there are no federal- or state-listed threatened or endangered species found along the Proposed Action alignment (Appendix G).

4.5.4 Bureau of Land Management Special Status Species

No mammalian or fish species identified as BLM Special Status Species are found on lands administered by the BLM that are crossed by the Project alignment. Some avian species [olive-sided flycatcher (*Centopus cooperi*), rusty blackbird (*Euphagus carolinus*), red-throated loon (*Gavia stellata*), whimbrel (*Numenius phaeopus rufiventris*), and gray-headed chickadee (*Poecile cinctus lathami*)] and some invertebrate species may occur on lands administered by the BLM that are crossed by the Project alignment.

A desktop inspection of the Proposed Action area shows no rare or sensitive plant species occurring directly within the Proposed Action area. However, many areas are unsurveyed and undocumented populations could exist. Table 4-1 notes the BLM-identified sensitive species that may occur along the Proposed Action alignment.

Table 4-1. BLM-identified sensitive plant species.

Scientific Name	Common Name	Family
Arnica lonchophylla (A. lonchophylla) ssp. *lonchophylla*	Longleaf arnica	Asteraceae
Carex parryana	Parry sedge	Cyperaceae
Douglasia arctica (Androsace americana)	Mackenzie's River Douglasia	Primulaceae
Juncus articulatus	Jointed rush	Juncaceae
Micranthes nelsoniana ssp. *insularis*	no common name	Saxifragaceae
Micranthes porsildiana (M. nelson ana var. porsildiana)	Porsild's saxifrage	Saxifragaceae
Orobanche uniflora	Naked broom-rape	Orobanchaceae
Oxytropis kokrinensis	Kokrines locoweed	Fabaceae
Poa porsildii	Porsild's bluegrass	Poaceae
Ranunculus turneri ssp. turneri	no common name	Ranunculaceae

4.5.5 Critical or Threatened / Endangered Habitat

No portion of the Proposed Action would be located in or adjacent to designated critical habitat. The Yukon River, along which the River Corridor is located, is designated as Essential Fish Habitat under the Magnuson-Stevens Act. The Alaska Department of Fish and Game (ADF&G) documents the presence of Chinook, coho, chum, and sockeye salmon in that portion of the Yukon River that constitutes the Proposed Action's River Corridor.

4.5.6 Migratory Birds and Eagles

Federal protections for eagles and migratory birds include the Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). The MBTA protects migratory birds by prohibiting intentional take, sale, or other activity that would harm migratory birds, their eggs, or nests, unless authorized by permit. The BGEPA provides additional and similar protections to bald and golden eagles.

A variety of shorebirds, landbirds, eagles and raptors, waterfowl, and loons and grebes may be found seasonally along the Terrestrial Corridor, River Corridor, and Canyon Bypass.

The Project Area falls in Bird Conservation Region (BCR) 4 (Northwestern Interior Forest) of North America (USFWS 2021). Migratory birds listed by the USFWS as Birds of Conservation Concern that are likely to occur in the study area include the American golden plover, bristle-thighed curlew, Hudsonian godwit, rock sandpiper (Pribilof), short-billed dowitcher, solitary sandpiper (Western), wandering tattler, lesser yellowlegs, marbled murrelet (Alaska), Aleutian tern, short-eared owl, olive-sided flycatcher, and gray-headed chickadee (Alaska).

4.5.7 Fish / Essential Fish Habitat

The Yukon River and its tributaries support a variety of resident and anadromous fish species typical to Interior Alaska, including all five species of Pacific salmon found in North America. Many fish species in the Yukon River are targeted by commercial, subsistence, and sport fisheries with Pacific salmon and whitefishes of significance for commercial and subsistence harvest from mainstem Yukon River fisheries. The Yukon River supports resident fish species such as Arctic grayling, burbot, northern pike, longnose sucker, lake chub, slimy sculpin, and round whitefish as well as anadromous species such as all five Pacific salmon, Dolly Varden, Bering cisco, least cisco, broad whitefish, humpback whitefish, and inconnu (sheefish). Some species such as Dolly Varden and some whitefishes exhibit both resident and anadromous populations within the drainage. The ADF&G Anadromous Waters Catalog (AWC) specifies which waterbodies are important to anadromous fish species by lifestage and therefore are afforded additional protection under the State of Alaska Anadromous Fish Act. The AWC is not a complete listing as not all waterbodies have been surveyed; however, it serves as one of the most comprehensive and effective tools to help identify potentially sensitive fish habitats across the project. In addition, freshwaters specified as important for Pacific salmon in the AWC form the basis for all non-marine essential fish habitat designated in Alaska per the Salmon Fishery Management Plan (FMP) and a separate essential fish habitat assessment (EFHA) has been developed for the project (EFH 2023).

Fish habitat intersected by the Proposed Action activities includes migratory, rearing, and spawning habitat. EFH intersected is migratory habitat for adult Pacific salmon returning to their natal rivers to spawn, and juvenile Pacific salmon out-migrating to the sea or moving between streams for rearing. Between Fort Yukon and just upstream from Stevens Village, Bering cisco spawning is documented in the AWC. In addition, though not documented in the AWC, Carter (2010) documented spawning by broad whitefish in this same general reach. It is likely that humpback and least cisco also use this reach for spawning, while inconnu (the largest of the Yukon River whitefish) spawn primarily upstream from Fort Yukon in the more braided higher velocity reaches (Brown et al. 2012). Whitefish spawning is in late

September to early October with fish moving off spawning grounds by late October into November, or within a couple of weeks of spawning (ADF&G Species Profile). Eggs and larvae develop over winter and emerge sometime before break-up under ice cover. Table 4-2 lists the Proposed Action's intersections with EFH and whitefish species by anadromous waterbody crossed or encountered, life stage documented, and FOC installation method (see Appendix H).

The Yukon River is located within a dynamic arctic environment with large variations in air temperatures. The river is frozen approximately half of the year with freeze-up generally occurring by November and ice break-up typically in early May. During the summer, the river is characterized by deep water and laminar flow with swift and sometimes swirling currents. More than 75 percent of the annual runoff in the Yukon River occurs during a five-month period, May through September. More than 95 percent of all sediment transported during an average year also occurs during this period. Turbidity is exceptionally variable over the year depending on glacial input (ice vs. open water season) and flood events. Lomax et al. (2009) measured turbidity values averaging 199.6 NTU across their sample reach and season. Based on their study of water quality, physical habitats, fish, and aquatic invertebrates, they ultimately concluded that the Yukon River consists of high-quality water with inherently unstable substrates, high total suspended solids (TSS) loads, and sufficient nutrients to support aquatic life.

Table 4-2. Anadromous fish habitat by species, waterbody, and life stage with distance from nearest FOC crossing.

Species	River/Creek	AWC No.	Present	Spawning	Rearing	Distance from Crossing to Anadromous Fish Habitat	Mode of Installation
Chinook salmon	Chatanika River	334-40-11000-2490-3151-4020	X	X	X	Collocated	HDD
	Garnet Creek	334-40-11000-2538	X			Collocated	HDD
	Hess Creek	334-40-11000-2650	X			25.8 mi	HDD
	Texas Creek	334-40-11000-2520			X	2.45 mi	HDD
	Jordan Creek	334-40-11000-2508			X	1.07 mi	HDD
	Yukon River	334-40-11000	X			Collocated	Scratch/Jet Plow
Chum salmon	Chatanika River	334-40-11000-2490-3151-4020	X	X		Collocated	HDD
	Garnet Creek	334-40-11000-2538	X			Collocated	HDD
	Hess Creek	334-40-11000-2650	X	X		25.8/38.85 mi	HDD
	Jordan Creek	334-40-11000-2520	X			1.16 mi	HDD
	Yukon River	334-40-11000	X			Collocated	Scratch/Jet Plow
Coho salmon	Chatanika River	334-40-11000-2490-3151-4020	X			Collocated	HDD
	Yukon River	334-40-11000	X			Collocated	Scratch/Jet Plow
Sockeye salmon	Yukon River	334-40-11000	X			Collocated for 7.6 mi	Scratch/Jet Plow
Whitefish[1]	Yukon River	334-40-11000	X			Collocated	Scratch/Jet Plow
Humpback whitefish	Stevens Creek	334-40-11000-2530	X		X	2.5/2.62 mi	HDD
Least cisco	Stevens Creek	334-40-11000-2530			X	2.39 mi	HDD
Inconnu	Stevens Creek	334-40-11000-2530	X			2.75 mi	HDD
Humpback whitefish	Garnet Creek	334-40-11000-2538	X			0.89 mi	HDD
Bering cisco, Broad whitefish[2]	Yukon River	334-40-11000		X		Collocated	Scratch/Jet Plow

NOTES
[1] Undifferentiated whitefish included in the AWC; includes least cisco, Bering cisco, broad whitefish, humpback whitefish, and Inconnu
[2] Only Bering cisco are documented in the AWC as spawning in the reach between Fort Yukon and near Stevens Village, however, Carter (2010), identified broad whitefish in the same reach

4.5.8 Wetland Habitats

Section 404 of the Clean Water Act (CWA) regulates discharges of dredged or fill material into wetlands and waterbodies meeting the definition of WOTUS. Further, Executive Order 11990, Protection of Wetlands, directs federal agencies to avoid, to the extent possible, adverse impacts associated with the destruction or modification of wetlands, and to avoid supporting new construction in wetlands whenever there is a practicable alternative.

The Proposed Action alignment would cross wetlands and waterbodies characterized in the USFWS National Wetlands Inventory (NWI) as Freshwater Emergent Wetland, Freshwater Forested/Shrub Wetland, Freshwater Pond, Lakes, Riverine, and Other. The length of each corridor of the Proposed Action located in each type of wetland is presented in Table 4-3 below; wetlands are illustrated in Appendix I.

Table 4-3. Wetland habitats intersected by Proposed Action alignment.

Corridor	Freshwater Emergent Wetland (Miles)	Freshwater Forested/ Shrub Wetland (Miles)	Freshwater Pond (Miles)	Lakes (Miles)	Riverine (Miles)
Terrestrial Corridor	0.10	29.36	0.25	0.00	0.89
River Corridor	0.00	0.00	0.00	0.00	316.15
Canyon Bypass	0.00	1.30	0.00	0.00	2.81

Preliminary desktop wetland delineations are being completed throughout the project corridors and are included in Appendix I.

4.5.9 Invasive Species

Review of the University of Alaska Exotic Plants Information Clearinghouse Invasive Plants (AKEPIC) Mapper indicated there are numerous non-native species infestations along the Terrestrial Corridor and within each of the five communities; these are listed in Appendix D (AKEPIC 2023).

4.6 Historical and Cultural Resources

The Project is subject to a review of cultural resources under Section 106 of the National Historic Preservation Act (NHPA). Two desktop cultural resources investigations were completed by DOWL, Inc. and Alaska Cultural Resource Consultants, LLC for the Terrestrial and River corridors, respectively. The River Corridor includes all five impacted communities along the Yukon River and the Canyon Bypass.

For both reviews, published and available unpublished literature about cultural resources including archaeology excavations and surveys, the prehistory and history of the area, ethnography, Native and non-Native placenames, paleontology resources, and subsistence uses was reviewed. Furthermore, aerial imagery and topographic maps, review of publicly available terrain data, and integrated publicly available Alaska Native placenames data were also reviewed. A summary of the desktop literature reviews within each of the corridors is outlined below.

4.6.1 Terrestrial Corridor

4.6.1.1 Previous Survey Findings

The Study Area for the desktop literature review consisted of a 200–foot-wide corridor along the

Terrestrial Corridor. Approximately 87 percent (or 113 miles) of the Terrestrial Corridor was previously surveyed for cultural resource impacts in 2012 for another fiber optic project that generally follows a similar routing; numerous other surveys have been performed within and near the Terrestrial Corridor Study Area. The findings of these previous surveys, as reported in the desktop report completed for the Proposed Action (*Cultural Resources Literature Review and Recommendations: New Horizons Telecom, Inc. Fairbanks – Yukon Fiber Route* [DOWL 2023]) are presented in the following paragraph.

Review of the Alaska Heritage Resource Survey (AHRS) database identified 14 known cultural resources that have been determined eligible for or listed on the NRHP within the study area.

4.6.2 River Corridor

The Study Area for the desktop literature review consisted of a 1.5-mile buffer on either side of mid-channel of the Yukon River, to include the entirety of each of the five communities. The discussions below are organized geographically by each of the five communities. That portion of the River Corridor located outside the five communities is addressed separately below.

Each of the five communities has been surveyed for cultural resources over multiple years for various federally funded projects spread throughout the communities. Review of the Alaska Heritage Resource Survey (AHRS) database identified a total of 90 sites within River Corridor, including the five communities. This includes 3 sites that were determined eligible for listing in the National Register of Historic Places (NRHP), 3 sites to be treated as eligible, 18 sites listed as a contributing property to an eligible historic district, and 66 sites that are listed but do not contain a determination of eligibility or their consultation is pending. Although there are AHRS listed sites within the Study Area some no longer have any physical remains due to being demolished and further discussed below.

The findings of these previous surveys, as reported in the desktop report completed for the Proposed Action (*The Alaska FiberOptic Project, Fort Yukon to Tanana: Cultural Resources Literature Review* [Alaska Cultural Resource Consultants 2023]) are presented in the following sections.

4.6.2.1 Tanana

In total, 26 sites were identified in the Project Study Area within, and in the vicinity of Tanana. 18 of those sites were listed as contributing property within an eligible district, however most of these sites have been documented and destroyed. There is one site listed on the NRHP, one site has been determined eligible, and six sites that are listed within the AHRS database but do not contain a determination of eligibility.

4.6.2.2 Rampart

In total, four sites were identified in the Project Study Area within, and in the vicinity of Rampart. There is one site that has been determined eligible. This site is identified as a “Historic District” but has not been researched or studied in detail. The remaining three sites are listed within the AHRS database but do not contain a determination of eligibility. Two of these sites are located on the opposite side of the river.

4.6.2.3 Stevens Village

In total, four sites were identified in the Project Study Area within, and in the vicinity of Stevens Village. All four sites are listed within the AHRS database but do not contain a determination of eligibility. No resources have been determined eligible, contributing within eligible district, treated as eligible, or eligible pending.

4.6.2.4 Beaver

In total, four sites were identified in the Project Study Area within, and in the vicinity of Beaver. All four sites are listed within the AHRS database but do not contain a determination of eligibility. Two of the sites have been identified as “likely eligible.” Both sites are historic structures consisting of cabins. It is noted that very little cultural resource survey work has been done in the vicinity of Beaver.

4.6.2.5 Fort Yukon

In total, 52 sites were identified in the Project Study Area within, and in the vicinity of Fort Yukon. Two NRHP eligible sites, which have since been destroyed, are listed as historic structures with no other attributes nominated. There is one site that has been determined eligible, and the remaining 49 sites are listed within the AHRS database but does not contain a determination of eligibility.

4.6.2.6 Yukon River

Archaeological and architectural resources are known to exist within the Yukon River itself (shipwrecks) and along the banks of the river. Previous research, including that performed by Rainey and Hadleigh-West, concluded that “...the only ancient sites in the region were to be found on the major tributaries and not on the Yukon proper.” There are no Traditional Cultural Properties listed in the AHRS in the Study Area.

There are five NRHP identified cultural resources sites along the Yukon River not listed in the community profiles above. All sites are structures, including the E.L. Patton Bridge, and have been determined to be eligible for listing.

Known archaeological and/or architectural resources in the Yukon River (i.e., below mean high water) consist exclusively of sunken vessels. Records identify seven known sunken vessels between 1899 and 1991. Published information related to the location of sunken vessels is vague and incomplete, therefore it is possible that other sunken vessels exist beneath the high-water mark of the Yukon River. Other resources, such as fishing locales, fish weirs, or other places of traditional cultural significance may also exist within the river but have not yet been documented.

4.6.3 Canyon Bypass

The Study Area for the desktop literature review consisted of a 1.5-mile buffer on either side of the alignment along the Canyon Bypass. The findings of the review are presented in *The Alaska FiberOptic Project, Fort Yukon to Tanana: Cultural Resources Literature Review* (Alaska Cultural Resource Consultants 2023). Review of the AHRS database did not identify any known cultural resources within the bypass nor have any studies been completed in the vicinity.

4.6.3.1 Probability Analysis

A GIS-based probability analysis was performed for a 100-meter-wide alignment along the Canyon Bypass; this is documented in *The Alaska FiberOptic Project, Fort Yukon to Tanana: Cultural Resources Literature Review* (Alaska Cultural Resource Consultants 2023). The goal of the probability analysis was to identify areas of potential existence of historic or prehistoric cultural resources by evaluating environmental variables that influence the presence or absence of cultural resources. Table 4-4 presents the variables/GIS layers that were used in the evaluation.

Table 4-4. Variables used for GIS layers.

Variable	Parameter/Scale	Derived Map Product	Source
Aspect	Flat, NE, SE, SW, NW	Viewshed	Interferometric Synthetic Aperture Radar (IFSAR), Digital Elevation Model (DEM)
Geology	Geologic Units	Rock types	Geologic Map of Alaska (SIM-3340)
Geology	Geologic Lines	Faults	Geologic Map of Alaska (SIM-3340)
Hydrology and Wetlands	Wetlands Streams	Lakes, ponds, riverine, other	National Wetlands Inventory (NWI) National Hydrography Dataset (NHD)
Slope, Contours	Percent slope	<20%; 20.01-30%; > 30%	IFSAR, DEM

Surface model inputs generally consisted of topographical parameters to drive the probability model. A five-meter resolution digital terrain model (DTM) for the project was used, parameters from the DTM included:

- Elevation – evaluated at approximately 165-foot (50 meter) increments.
- Aspect – created using GIS, calculated in degrees, and grouped into five classes (flat, NW, NE, SW, SE)
- Slope – created using GIS, calculated as a percentage, grouped 0-20, 20-30 and greater than 30 degrees.

When topological driven parameters were satisfied, additional inputs into the model surface included NWI Wetlands and the USGS National Hydrography Dataset (NHD); increments were designated as less than 330 feet (<100 meters) from the stream body.

The independent variables suspected to influence probable site location were assembled from various public data sources. The data were processed and standardized to create GIS map outputs. Once the variables were entered, an examination of the overlap of the layers along the alignment was performed. It is reasoned that if the variables had any effect on site location, the intersection of the largest number of variables at any point along the alignment would be an area of medium/high probability, and the lower number of intersecting variables would be an area of lower probability.

This approach has its basis in findings from field investigations over time—settlements with evidence of permanent or semi-permanent housing tend to be found along the margins of rivers, lakes, and streams. Esdale's (2008) synthesis of Northern Archaic tradition (6,000–1,500 years before present) notched point assemblages noted that sites "are found in a wide variety of environmental zones but occur most frequently in mountainous and intermontane regions" (Esdale 2008:8). She added "visible areas such as ridges were the most frequent places to find sites, followed by lake shores and river terraces. Less visible forested areas were next, followed by glacial deposits, beaches, ice patches, and dunes." The Canyon Bypass follows a ridge south of the Yukon River that matches the "ridge" environmental variable for possible Northern Archaic site locations.

A total of 4.9 linear miles of the 19.2-mile Canyon Bypass were evaluated as low probability. These include areas of wetlands, steep slopes, and stream flood zones. A total of 14.3 linear miles are considered to be medium/high probability. These include areas of bare ground, gradual slopes, good viewsheds from ridgelines, and open forest. The medium/high probability areas also include the transitions from the Yukon River onto shore. The probability areas are presented in Figure 15.

4.7 Aesthetic and Visual Resources

This section summarizes the existing aesthetic condition and visual resources found along portions of the Proposed Action alignment and identifies the potential viewer types and their sensitivity to visual change. The large majority of the infrastructure installed under the Proposed Action in the Terrestrial Corridor and the River Corridor would be installed underground or underwater; because these components would not be visible, they would not have any potential aesthetic or visual resources-related impact, and thus the existing aesthetic condition and visual resources along these sections are not addressed here.

4.7.1 Terrestrial Corridor

Approximately 20 miles of the FOC in the southern portion of the Terrestrial Corridor would be installed aerially, generally on existing utility poles. The visual environment along this portion of the Terrestrial Corridor is that of a mature boreal forest containing rural subdivisions with overhead utilities; paved and unpaved local roadways; paved highway infrastructure; and commercial, industrial, and mining-related infrastructure and developments in and near the community of Fox.

In three discrete locations (near MP 52) along the Elliott Highway, approximately 230 feet of FOC would be installed aerially on new utility poles. The visual environment in these locations is that of a mature boreal forest containing paved highway infrastructure.

These areas are characterized by rounded hilly terrain, dense evergreen and deciduous forest stands and grassland vegetation, and wetland complexes. The area is characterized by a mixed color and texture palette, with rough, light and dark green trees, black evergreen trunks and white birch trunks, and smooth, green grasses that include yellow and red during the autumn. Foreground vegetation provides vertical elements, while the background consists of either flat horizon or distant, low, rounded hills. The scenic quality of the area adjacent to the Project alignment is typical of the wider region.

Viewer sensitivity ranges from high (for residents with potentially long viewing times) to low (motorists on local roadways and highways with short viewing times). Viewing distances at ground level are generally short due to the heavily-wooded nature of much of the area; longer-distance views are afforded to motorists on some parts of the Steese Highway, particularly along those portions that are located in wide (up to 150+ foot) cleared ROWs and along portions of the roadway that are located on hillsides with breaks in vegetation.

The visual resource varies along the Terrestrial Corridor. Built environment features are present along the length of the Terrestrial Corridor but are found in a much higher density and are prevalent in the visual environment from the southern terminus of the Terrestrial Corridor north to the vicinity of the community of Fox. The visual environment along this portion of the Terrestrial Corridor is that of a mature boreal forest containing rural subdivisions with overhead utilities; paved and unpaved local roadways; paved highway infrastructure; and commercial, industrial, and mining-related infrastructure and developments in and near the community of Fox.

From the community of Fox to the northern terminus of Terrestrial Corridor, built environment features are found in a much lower density, are geographically widespread, and are generally not prevalent in the environment. The visual environment along this portion of the Terrestrial Corridor is that of a mature boreal forest containing paved highway infrastructure and widely scattered residential, commercial, and industrial, land uses and developments.

The Dalton Highway north of the community of Livengood is designated by DOT&PF as a Scenic Byway; this is considered a special visual resource area. The southern portion of the Terrestrial Corridor is not covered by any visual resources-related management plan except for lands managed by the BLM.

Lands managed by the BLM, Eastern Interior Field Office from approximately MP 16.5 Elliott Highway to approximately MP 24 Elliott Highway are managed as Visual Resource Management (VRM) Class II (BLM 2016). The objective of VRM Class II is to retain the existing character of the landscape. Activities or modifications of the environment should not be evident or attract the attention of the casual observer. Changes should repeat the basic elements of form, line, color and texture found in the predominant natural features of the characteristic landscape.

Lands managed by the BLM, Eastern Interior Field Office from approximately MP 24 Elliott Highway to approximately MP 31 Elliott Highway, and managed by the BLM, Central Interior Field Office at MP 56 Dalton Highway, are managed as VRM Class IV (BLM 2016). The objective of VRM Class IV is to provide for management activities which require major modification of the existing character of the landscape. Changes may attract attention and be dominant landscape features but should reflect the basic elements of the existing landscape. Class IV rating is generally reserved for areas where the visual intrusions dominate the view shed but are in character with the landscape.

4.7.2 River Corridor

The River Corridor is located in portions of a number of physiographic regions; these are described below.

- Yukon Flats Section. The central part of the Yukon Flats section consists of marshy lake-dotted flats. The Proposed Action alignment passes through is a broad gentle outwash fan of the Yukon River.
- Rampart Trough. The Rampart Trough has a gently rolling topography. Terraces on tributaries of the Yukon River near Rampart rise up to 500 feet above stream level.
- Nowitna Lowland. The Nowitna Lowland is a rolling silt-covered tableland into which the flat floodplains of the major rivers, with valleys 1.5 to 10 miles wide, have been incised up to 300 feet.
- Kokrine-Hodzana Highlands. The Kokrine-Hodzana Highlands consist of even-topped rounded ridges interspersed with valleys.

Outside of the five communities and the location where the Terrestrial Corridor and the River Corridor meet at the E.L Patton Bridge, scenic integrity is high and the landscape appears natural and intact with dense and continuous vegetation; evidence of cultural modification is limited, with built environment features (remote residences and subsistence camps) widely scattered. Each of the five communities is a distinct area of development with structures of various sizes, ages, and composition along the shoreline and in upland areas and boats lining the shoreline during the open-water season. Utility poles supporting electrical cable and telecommunications cable are found throughout each community.

4.7.3 Canyon Bypass

The Canyon Bypass is located in portions of two physiographic regions; these are described below:

- Rampart Trough. The Rampart Trough has a gently rolling topography. Terraces on tributaries of the Yukon River near Rampart rise up to 500 feet above stream level.
- Yukon-Tanana Uplands. Rounded even-topped ridges with gentle side slopes characterize this section of broad undulating divides and flat-topped spurs. In the western part these rounded ridges have ridge crest altitudes of 1,500–3,000 feet and rise 500–1,500 feet above adjacent valley floors. Valleys are generally flat, alluvium floored, and 0.25 to 0.5 miles wide to within a few miles of headwaters.

The majority of the 20-mile FOC alignment along the Canyon Bypass would be installed subsurface and beneath waterways. A small portion (less than 1 mile) would be laid on the ground surface, where it would self-bury over time.

4.8 Land Use

Land ownership throughout the corridor includes a variety of stakeholders including federal, state, municipal, private, and native lands. Consultation and coordination with stakeholders is ongoing. Land ownership was determined by using publicly available information while land use within the project corridors was determined using the following documents:

- White Mountains National Recreation Area Travel Management Area (BLM 2022)
- White Mountains Travel Management Area (BLM 2022)
- Yukon Tanana Area Plan (ADNR 2014)
- Alaska 2036 Long Range Transportation Policy (2016)
- Interior Alaska Transportation Plan (2010)

4.8.1 Terrestrial Corridor

The Terrestrial Corridor is primarily located within an existing transportation and utility corridor that includes the Steese, Elliott, and Dalton highways. Highway transportation is the primary use of the terrestrial corridor. This corridor is the only overland link between Fairbanks and Prudhoe Bay.

Land ownership within the Terrestrial Corridor is owned and/or managed by public and private entities. Land ownership and management includes State of Alaska lands (84%), federal lands managed by the BLM (9%), private non-native land (5%), Fairbanks North Star Borough (FNSB) (1%) and Native Allotments (1%).

Existing land use with the corridor is transportation based however various other land uses such as other utility corridors, material sites, recreation, and hunting and subsistence activities occur on adjacent lands and are accessed via the existing highway corridor. Several active material sites along the Elliott Highway are managed by BLM. BLM also manages the land north of the Yukon River Bridge where there is an existing land lease for the Yukon River Camp. This facility provides year-round retail services, fuel service, and accommodations. A public use boat launch is located here and is a primary access point to the Yukon River. Boat access is used year-round with peak activity during the summer months (Yukon River Camp undated). The FOC alignment crosses a portion of the White Mountains Recreation Area and some of its access roads and trails.

Land use on public land (State of Alaska, BLM, and FNSB) along the Terrestrial Corridor may be authorized through the adjudication of leases, permits, rights-of-way, and easements by the respective regulatory agencies. Consultation with BLM to obtain a right-of-way grant, Alaska Department of Natural Resources (ADNR) to obtain easement authorizations, DOT&PF to obtain a Major Utility Permit, and FNSB for local authorization is anticipated. Additionally, letters of non-objection from leaseholders and private landowners is also anticipated.

4.8.2 River Corridor

The River Corridor consists primarily of submerged lands owned by the State of Alaska and managed by ADNR. These submerged lands currently have no other use other than the river bottom supporting an important regional river transportation corridor for the Upper Yukon River and associated communities.

Connections from the FOC installed in the river to the communities would occur on terrestrial public lands owned either by the DOT&PF or the respective village corporation's lands. All lands used for the terrestrial transition are developed with existing civil infrastructure supporting local transportation or logistical storage. No change in land use is required for any land connection to the river installed FOC.

4.8.3 Canyon Bypass

The majority of land in the Canyon Bypass alignment is owned by the State of Alaska and managed by ADNR. A small portion of the western end of the alignment and the HDD is located lands owned by Doyon (Appendix J, Sheet AD), the applicant for the Proposed Action. The land is an unimproved boreal forest with undulating topography. There is no current use of the land other than as an area for occasional subsistence hunting and harvesting of berries by residents that also maintain fishing camps near the bypass corridor. This area of the project is susceptible to forest fires and portions of this alignment have recently been burned.

4.9 Recreation/Travel and Transportation

4.9.1 Terrestrial Corridor

The very large majority of the length of the Terrestrial Corridor is located immediately adjacent to existing roads and highways, including the Old Steese Highway, Elliott Highway, and Dalton Highway. Traffic counts along these roadways vary, with the highest traffic counts found at the southern end of the Terrestrial Corridor with annual average daily traffic (AADT) counts of up to 1,200. Traffic counts decline as the distance from Fairbanks increases, with a count of less than 200 at the E.L. Patton Yukon River Bridge.

The roads and highways along which the Terrestrial Corridor is located provide access for dispersed and concentrated recreational activities. One formal campground—the state-owned Lower Chatanika River State Recreation Area—and two BLM trailheads—Wickersham Dome Trailhead and Colorado Creek Trailhead—are accessed from the Elliott Highway, along which the Terrestrial Corridor is located. A portion of the Terrestrial Corridor is located along the southwestern portion of the White Mountains National Recreation Area. The federal and state public lands located along the Terrestrial Corridor provide year-round dispersed recreation opportunities. A public boat launch/barge landing complex is located on BLM-administered lands at the northern terminus of the Terrestrial Corridor.

4.9.2 River Corridor

The Yukon River is the primary surface travel corridor in the region. RS2477 trails are found on the bank of the Yukon River along much of the length of the River Corridor and are found in the vicinity of each of the five communities. Small networks of largely gravel roads are present in and around each of the five communities.

Recreational use of the Yukon River itself is limited. Few individuals float the river or portions of the river. Recreational fishing in the main stem of the Yukon River is negligible. The river is used for transportation by hunters accessing lands along the river. There are no designated campgrounds along the River Corridor.

4.9.3 Canyon Bypass

Given the remoteness of the area along the Canyon Bypass, recreational use of the area is taken to be de minimis. There are no designated campgrounds along the Canyon Bypass. There are no identified RS2477 trails or other overland travel routes in the area.

4.10 Subsistence

State and federal law define subsistence differently and have different responsibilities in subsistence resource and use management. Although the State of Alaska generally manages subsistence harvests on state lands and certain private lands, the federal government is responsible for managing subsistence uses on federal lands and waters and across all lands for certain species. Subsistence uses and associated resources are commonly identified as the "customary and traditional uses" of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. Subsistence hunting and fishing are important sources of employment and nutrition in almost all rural communities, and the opportunity for a subsistence lifestyle is guaranteed for all rural residents by ANILCA. However, subsistence also defines important cultural values in terms of the harvest, processing, distribution, and consumption in a traditional way that cannot be separated from other aspects of the Alaska Native culture. Subsistence use occurs throughout the project study area. Subsistence data is primarily collected by the BLM through their land management processes and by the USFWS, Subsistence Management Division on the federal level, and by the ADF&G on the Alaska state level. ADF&G uses its Community Subsistence Information System to provide information about subsistence within Alaska (ADF& 2024).

An ANILCA Section 810 Evaluation of the Proposed Action was completed and is included in Appendix K.

4.10.1 Terrestrial Corridor

Subsistence users may include residents in and around the five villages that would receive the proposed high speed fiber optic internet. Other residents outside these communities might also be affected by the project in terms of subsistence resources and uses. Other nearby communities include Livengood, Minto, and Manley Hot Springs. These communities are all east of the Yukon River and are Census Designated Places within the Yukon-Koyukuk Census Area. Livengood, with a population of less than 20 people, is where the Dalton Highway starts. From Livengood, the Dalton Highway goes directly to the E.L. Patton Bridge over the Yukon River, and then proceeds northward to the North Slope. Livengood is a community that is about 50 percent Native Alaskans and 50 percent White. Minto is a community with a population that has ranged from 120-150 persons in recent years; the population is almost exclusively Native Alaskans. Manley Hot Springs has an estimated population of less than 100 persons including about 40 percent Alaska Natives.

Subsistence use throughout the Terrestrial Corridor includes hunting and gathering of berries, roots, and plants. Although much of the access to subsistence resources and uses is via land or boat, the terrestrial corridor includes the primary transportation system for north-central Alaska providing access to staging areas to mobilize away from the road system. Opportunistic sightings of game may result in the occasional harvest of large mammals, but the vast majority of subsistence hunting occurs away from the road system and outside the terrestrial corridor and associated ROW.

Different from hunting, berry picking and other forms of gathering are localized along the highway system and could occur in or near the proposed FOC alignment. Many of the species of berries develop in the disturbed soils near the road where their roots can easily take hold and develop. The primary users of these highway-focused systems for harvesting are non-rural residents and the scattered rural residents along the highway system.

4.10.2 River Corridor

Subsistence harvesting of salmon and non-salmon species is prevalent along the River Corridor.

Regulation and management of the Yukon River drainage for subsistence salmon follows the Yukon River Drainage Subsistence Salmon Fishery Management Protocol, which provides a framework for co-management of subsistence fisheries by ADF&G via the Board of Fish and the USFWS via the Federal Subsistence Board. Pacific salmon management in the Yukon is also guided by the Pacific Salmon Treaty which requires harvest in Alaska provide for adequate escapement into Canada.

4.10.3 Canyon Bypass

The Canyon Bypass is on undeveloped and remote land. Subsistence hunting and harvesting of berries by residents is possible. Fish camps are located along the river near the FOC exit and re-entry points on both sides of the river.

4.11 Infrastructure

The types and extent of public infrastructure differs across the Terrestrial Corridor, River Corridor, and Canyon Overland Bypass, and thus are discussed separately below.

4.11.1 Terrestrial Corridor

There is no public water or sewer infrastructure along the Terrestrial Corridor; private wells and septic systems are ubiquitous. Electric service along the southern portion of the Terrestrial Corridor is provided by Golden Valley Electric Association, Inc.; there is no public electric service along the remainder of the Terrestrial Corridor. Wired telecommunications services along the southern portion of the Terrestrial Corridor is provided by Alaska Communications; cellular telecommunication services are available along the southern half of the Terrestrial Corridor.

At the Yukon River, the FOC will be attached to the utility corridor/catwalk beneath the E.L. Patton Yukon River Bridge through a Major Utility Permit with DOT&PF. The Yukon River Camp—a commercial entity providing lodging, fuel, and other services—is located at the northern terminus of the Terrestrial Corridor. From the bridge, the FOC would be installed through the parking and access roads leading to the Yukon River boat launch and the north portion of the Yukon River Camp lease. HDD will be used to install the FOC and transition it to a communication shelter within the BLM leased area and eventually into the Yukon River. See Appendix A, Sheet AD for a proposed site layout.

Vehicle traffic on the roadways in the Terrestrial Corridor varies. On the Steese Highway and Dalton Highway, higher traffic volumes are found at the southern end of the Terrestrial Corridor in the vicinity of Fairbanks and Fox (2,850 to 4,750 annual average daily traffic [AADT]), and lower traffic volumes at the E.L Patton Bridge (140 to 170 AADT). Traffic on non-highway roadways at the southern terminus of the Terrestrial Corridor ranges from 560 to 1,040 AADT (DOT&PF 2023).

4.11.2 River Corridor

4.11.2.1 City of Tanana

The City of Tanana has a water and sewer utility that provides piped water and sewer services to a portion of the community. The local electric grid is powered by diesel generators. A wired local telecommunication system operates within the community; communications to points outside the community are provided using radio and microwave equipment. Cellular telecommunication services are available within the community. Tanana is not connected to Alaska's highway network. (Tanana Chiefs Conference Undated; State of Alaska, Division of Community and Regional Affairs [DCRA] Undated(a); DCRA Undated(b))

4.11.2.2 Community of Rampart

Rampart does not have community-wide piped water or sewer infrastructure; the Rampart Village Council operates a water plant and provides water to the washeteria and a single water point. A local electric grid is powered by diesel generators. A wired local telecommunication system operates within the community; communications to points outside the community are provided using radio and microwave equipment. Cellular telecommunication services are not available. The community is not connected to Alaska's highway network (Tanana Chiefs Conference Undated; State of Alaska DCRA Undated(a); DCRA Undated (c)).

4.11.2.3 Community of Stevens Village

Stevens Village has piped water and sewer infrastructure at the school building, clinic and tribal council office, and washeteria/water point. A local electric grid is powered by diesel generators. A wired local telecommunication system operates within the community; communications to points outside the community are provided using satellite equipment. Cellular telecommunication services are not available. The community is not connected to Alaska's highway network (State of Alaska DCRA Undated(a); State of Alaska DCRA Undated(d)).

4.11.2.4 Community of Beaver

Beaver has piped water and sewer infrastructure at the school building and washeteria/water point. A local electric grid is powered by diesel generators. A wired local telecommunication system operates within the community; communications to points outside the community are provided using satellite equipment. Cellular telecommunication services are not available. The community is not connected to Alaska's highway network (State of Alaska DCRA Undated(a); State of Alaska DCRA Undated(e).

4.11.2.5 City of Fort Yukon

The City of Fort Yukon has a water and sewer utility that provides piped water and sewer services to a portion of the community. A combination of piped water, water delivery, and individual wells serve households. A flush/haul system, septic tanks, honey buckets, and outhouses are used for sewage disposal. The city operates a solid waste landfill. A local electric grid is powered primarily by diesel generators. A wired local telecommunication system operates within the community. The FOC was installed via a buried cable to the city; however high-speed internet is only available in specific buildings, the health clinic, schools and some residential homes. Broadband internet connectivity is not currently available community wide. Cellular telecommunication services are available. The city is not connected to Alaska's highway network (Tanana Chiefs Conference Undated; (State of Alaska DCRA Undated(a); State of Alaska DCRA Undated(f).

4.11.2.6 Canyon Bypass

There is no public infrastructure located along or intersecting with the route of the Canyon Bypass.

4.12 Socioeconomic Resources Including Environmental Justice

This section of the EA discusses the existing socioeconomic environment and potential effects on that environment from the Proposed Action. Factors considered in the analysis include employment and income, population and demographics, housing and infrastructure, and the social setting. In addition, Environmental Justice (EJ) is evaluated. Executive Order 12898 requires the consideration of EJ issues during a federal agency's environmental review process to evaluate potential disproportionate effects on minority and low-income populations. EJ guidance requires the fair treatment and meaningful involvement of all people of all races, color, origin, or income with respect to development, implementation, and enforcement of environmental laws.

4.12.1 Terrestrial Corridor

Fox is about 10 miles from the City of Fairbanks and is within the Fairbanks North Star Borough. It is also part of the Fairbanks Alaska Metropolitan Statistical Area. A Metropolitan Statistical Area is an integrated economic and social unit having a large population nucleus such as Fairbanks, the second largest city in Alaska behind Anchorage. Fox was established as a mining camp in the early 1900s, and is now a suburb of Fairbanks with many residents working in Fairbanks or at the nearby Fort Knox Gold Mine. U.S. Census data shows the population is about 400 persons as of 2020. The population is about 85 percent white with relatively high incomes because of the economic links to the Fairbanks area and the gold mine.

The Terrestrial Corridor of the Proposed Action follows existing ROWs from Fox to the E. L. Patton Bridge. The bridge is a transportation artery for both the Dalton Highway and the Alaska Pipeline, connecting Fairbanks north to Deadhorse and the Prudhoe Bay Oil Field. This bridge is the only bridge crossing of the Yukon River in Alaska. There are no communities at or near the bridge.

4.12.2 River Corridor/Canyon Bypass

The Proposed Action would provide the communities (Fort Yukon, Beaver, Rampart, Stevens Village, and Tanana; Appendix B, Sheets Q, R, S, T, U) with new FOC and internet access. These communities are designated Alaska Native Villages on lands owned by Doyon, Limited. The communities are located along the Yukon River, with the river serving as the major transportation mode within the area. The Study Area is vast and rural with small populations within each village. The population of the Study Area is mainly composed of Alaska Natives, primarily Athabascan. The area has no major urban areas and is not within a designated Alaskan borough. While there is no common government among the communities, all of the villages within the Study Area have local government jobs (e.g., schools, utilities) which provide an important part of local income. It is common for younger residents of the area to leave for educational and economic opportunities elsewhere. Infrastructure in the Study Area is described in Section 4.11 of this EA. Subsistence lifestyle has been a traditional way of life for many residents, and subsistence remains an important factor in the local culture today.

Economic opportunities in the River Corridor villages are relatively limited, and the area has historically had higher unemployment rates relative to other areas. There is limited detailed data describing the area, although each community is within the Yukon-Koyukuk Census Area and basic census data is collected for the Census Area as a whole and for each community either as a city or as a Census Designated Place. A Census Designated Place is a concentration of population definition by the U.S. Census Bureau for statistical purposes. The Census Bureau has designated Fort Yukon and Tanana as cities, with Beaver, Rampart, and Stevens Village classified as Census Designated Places. Based on available data, the five Study Area communities are estimated to have a total population of around 1,000 residents who would potentially benefit from the proposed high-speed internet lines. The U.S. Census reported that about 73 percent of the Yukon-Koyukuk Census Area residents have access to a computer, with about 46 percent of residents having a broadband internet subscription.

The social setting of the River Corridor Study Area focuses on rural, small community, and subsistence lifestyles. Life can often be hard with harsh winters and limited transportation. The Study Area communities are closely associated with social factors and values such as subsistence, family, cultural traditions, connections to the water, wildlife and fish in the area, stories from elders, and a sense of shared history among the residents. The subsistence lifestyle in the area arises from both traditional and practical factors. The traditions of hunting and fishing off the land and water go back hundreds of years, and food obtained from subsistence activities help to increase access to lower-cost food in an area that has high food costs. The availability of salmon in the Yukon River has decreased in recent years, and this has adversely affected subsistence fishing in the Study Area. Regulation and management of the Yukon River drainage for subsistence salmon follows the Yukon River Drainage Subsistence Salmon Fishery Management Protocol, which provides a framework for coordinated subsistence fisheries management between ADF&G and the federal subsistence management programs in the drainage. Each community in the Study Area coordinates with the Yukon River Inter-Tribal Fish Commission on subsistence issues.

Each of the five communities is identified as an Environmental Justice population because the communities consist largely of minority and low-income populations based on data from the U.S. Census Bureau and from the Environmental Protection Agency's EJ Screening and Mapping Tool.

Brief summaries of the River Corridor Study Area communities follow below.

Tanana. Tanana is located at the confluence of the Yukon River with its tributary Tanana River, about 130 miles west of Fairbanks. The area was a traditional meeting and trading place used by members of several Indigenous groups. In the 1930s a regional hospital was built in Tanana, and the Native Village of Tanana was officially chartered by the BIA in 1939. The population has declined from a high of over 400 in 1970 to less than 250 in 2020. About 80 percent of the population of Tanana are Native Alaskan with 18 percent white.

Rampart. Rampart lies on the southern bank of the Yukon River about 60 miles east-northeast of Tanana. Rampart first appeared in the 1880 U.S. Census as an unincorporated Tinneh village. The population was reported to be over 200 residents in 1900, but population declines have been steady since that high. Population was estimated by the U.S. Census to range from 24 to 57 persons over the 2000–2020 period. The population is about 90 percent Native Alaskan. There are about 20 households in the village.

Stevens Village. Stevens Village is on the north bank of the Yukon River about seven miles upstream from the mouth of the Dall River. The village is named for its first chief, Skidedlestalk "Old Steven" Stevens. After undergoing several name changes, it became a Census Designated Place in 1980. Population estimates for the village in recent years include 87 persons in 2000 dropping to 37 in 2020.

Beaver. Beaver lies on the northern bank of the Yukon River about 17 miles northeast of the mouth of Beaver Creek and about 60 miles southwest of Fort Yukon in the Yukon Flats. The village of Beaver was originally established in the early 1900s as a Yukon River landing. The village first appeared in the 1930 U.S. Census as an unincorporated village. Beaver became a census-designated place in 1980. There were about 80 persons in Beaver with 30 households in 2010. About 85 percent of the population is Native Alaskan with about 5 percent white.

Fort Yukon. Historically, residents of the area including Fort Yukon were Indigenous people. Today's Fort Yukon developed from a trading post located on the north bank of the Yukon River at its confluence with the Porcupine River. The village is about 145 miles northeast of Fairbanks. Fort Yukon first appeared on the 1880 U.S. Census as an unincorporated village of 109 residents. During the 1950s, a military base and radar station were established at Fort Yukon; the town was officially incorporated in 1959. Population estimates show that Fort Yukon reached a high of about 700 persons in 1960 but fell to about 450 persons by 2020. There were about 300 housing units in recent years, housing a population of about 85 percent Native Alaskan with about 10 percent white.

Other relevant information from the U.S. Census Office (2017–2021 data) characterizing demographic, economic, and social conditions in the Yukon-Koyukuk Census Area as a whole include:

- Population declined 3 percent from April 1, 2020 to July 1, 2022
- About 75 percent of housing is owner-occupied

- New building permits for private units was at or near 0 units in recent years
- About 87 percent of adult residents had education of high school graduates or higher
- About 65 percent of residents aged 16 years or older were in the civilian labor force
- Retail sales per capita was about $5,200 (compared to about $14,000 for Alaska as a whole)
- Per capita income was about $26,000 (compared to about $39,000 for Alaska as a whole)
- About 24 percent of residents were identified as in poverty

Based on available socioeconomic data, the Study Area for the River Corridor has experienced little growth and development, and the area could greatly benefit from potential economic stimuli such as high-speed internet access.

4.13 Human Health and Safety

No portion of the Proposed Action is located on a potentially hazardous materials or waste site, including any sites that are on the National Priorities List, or on a site subject to actions under the RCRA or the Toxic Substances Control Act (TSCA). Contaminated groundwater and soils are known to be present along the Proposed Action; the ADEC Alaska Regulated Contaminated Sites dataset identifies the following sites proximate to the Proposed Action alignment (Table 4-5). Contaminated soils or groundwater are not expected to be present along the Terrestrial Corridor, the River Corridor, or the Canyon Bypass outside of areas that are currently populated.

Table 4-5. Contaminated sites in the vicinity of the Proposed Action (ADEC 2023b).

Terrestrial Corridor
In Fox, two leaking underground storage tanks; the cleanups are listed as complete.
At Elliott Highway MP 5.5, a leaking underground storage tank; cleanup is complete.
River Corridor
Tanana
BLM Alaska Fire Service Tanana Station. Hydrocarbon-contaminated soils; site is active.
DOT&PF Tanana Maintenance Shop. Hydrocarbon-contaminated soils; site is active.
IHS Tanana Health Center. Contaminated soils; site is active.
FAA Tanana FABLM/AK Fire Service F.S. Contaminated soils; site is active.
BLM AK Fire Service Housing Complex Tanana. Hydrocarbon-contaminated soils; site is active.
FAA Tanana Station. Hydrocarbon-contaminated soils; site is active
FAA Tanana Station – FSS. Petroleum-contaminated soil and groundwater; site is active.
IHS Tanana Building 303. Hydrocarbon-contaminated soils; site is active.
Tanana Community Hall. Hydrocarbon-contaminated soils; site is active.
City of Tanana Former Tanana Power Company Landfarm. Contaminated soils in landfill; site is active.
FAA Tanana Station – VORTAC. Hydrocarbon-contaminated soils; cleanup complete.
Tanana School. Contaminated soils in landfill; cleanup complete.
FAA - Tanana VORTAC. Contaminated soils; cleanup complete.
Tanana Gas Company. Hydrocarbon-contaminated soils; cleanup complete.
Bear Creek RRS Yukon River POL Site SS008. Hydrocarbon-contaminated soils; cleanup complete.
BLM Tanana Lot 3 Former Tank Farm. Contaminated soils; cleanup complete.
Tanana Power Company. Contaminated soils; cleanup complete.
Rampart
DOT&PF SREB. Contaminated soil; cleanup complete.
Rampart School. Contaminated soils; site is active.
Airport Road. Contaminated soil from tanker spill; site is active.
Stevens Village
Petroleum contaminated soils at Steven Village old school building; cleanup complete.
Petroleum contaminated soils at Stevens Village tank farm and washateria; site is active.
Beaver
Beaver School Tank Farm. Petroleum contaminated soils; site is active.
Beaver Generator Building and tank farm. Petroleum contaminated soils; site is active.
Beaver Joint Utilities tank farm. Petroleum contaminated soils; site is active.
DOT&PF SREB. Contaminated soil; cleanup complete.

Fort Yukon
Fort Yukon School. Contaminated soil at school tank farm; site is active.
FAA Fort Yukon Quarters Facility Building 300. Contaminated soil; site is active.
FAA Fort Yukon Quarters Facility Building 601. Contaminated soil; site is active.
FAA Fort Yukon Quarters Facility Buildings 100 and 102. Contaminated soil and groundwater; site is active.
FAA Fort Yukon Quarters Facility Building 101. Contaminated soil; site is active.
Crowley Tank Farm. Petroleum-contaminated soil; site is active.
Fort Yukon LRRS. PFAS-contaminated groundwater; site is active.
Addie Shewfelt Building. Petroleum-contaminated soil; site is active.
Fort Yukon LRRS. LUST; cleanup complete.
Fort Yukon LRRS-Road Oiling. Waste oil, fuel, chlorinated solvents, PCBs, and pesticides (DDT)-contaminated road surfaces; no further action.
BLM Fire Service Heliport. LUST; cleanup complete.
FAA Fort Yukon VORTAC. LUST, petroleum-contaminated soil; cleanup complete.
FAA Fort Yukon RCAG. LUST, petroleum-contaminated soil; cleanup complete.
Fort Yukon LRRS LUST. LUST; cleanup complete.
FAA Fort Yukon H Marker Facility. Carcinogenic PAHs contaminated soil; cleanup complete.
Fort Yukon LRRS-White Alice Waste oil, fuel, chlorinated solvents, PCBs, and pesticides (DDT)-contaminated road surfaces; no further action.
Fort Yukon LRRS-Landfill #1. Lead-contaminated soil and groundwater; site closed.
Fort Yukon-Old Warehouse. Contaminated soil; cleanup complete.
Fort Yukon LRRS-Waste Accumulation. POL contaminated soils; cleanup complete.
ADF&G Fort Yukon. LUST; cleanup complete.
Fort Yukon LRRS-Power Plant. POL-contaminated soil and groundwater; cleanup complete.
FAA Fort Yukon Quarters Facility Incinerator. LUST and dioxin-contaminated soils; cleanup complete.
AKARNG Fort Yukon FSA. Petroleum-contaminated soils; cleanup complete.
FAA Fort Yukon Quarters Facility Building 300. LUSTs and contaminated soil; cleanup complete.
FAA Fort Yukon Quarters Facility Building 601. LUSTs and contaminated soil; cleanup complete.
FAA Fort Yukon Quarters Facility Building 103. LUST and contaminated soil; cleanup complete.
BLM Alaska Fire Service Fort Yukon Station. Cyanide-contaminated soil; cleanup complete.
Yukon Flats Rural Center Heating Oil Tank. LUST and contaminated soil; cleanup complete.
Alaska Commercial Company-Marina. Contaminated soil; cleanup complete.

NOTES: ADF&G – Alaska Department of Fish & Game; AKARNG - Alaska Army National Guard; BLM-AK – Bureau of Land Management; DOT&PF-Alaska Department of Transportation & Public Facilities; FAA – Federal Aviation Administration; FSS – Flight Service Station; IHS – Indian Health Service; LRRS – Long Range Radar Station; LUST – Leaky Underground Storage Tank; PAH – poly aromatic hydrocarbons; PFAS – per-and polyfluoroalkyl substances; POL - petroleum oil lubricants; RCAG – Remote Center Air/Ground; SREB – Snow Removal Equipment Building

5 Analysis of Environmental Impacts

This section describes the environmental consequences, beneficial or adverse, of the Proposed Action (see Sections 3.1 and 3.2) and No Action Alternative (see Section 3.3.1) on resources described in Section 4. The categories of impacts have been defined as significant, less than significant with mitigation incorporated, less than significant, or no impact. NEPA requires agencies to assess the potential direct and indirect impacts of each alternative on the existing environment (as characterized earlier in this section). Direct impacts are those impacts that are caused by the Proposed Action and occur at the same time and place, such as soil disturbance. Indirect impacts are those impacts related to the Proposed Action but result from an intermediate step or process, such as changes in surface water quality because of soil erosion. For each resource, the potential impact is assessed in terms of context of the action and the intensity of the potential impact, per Council on Environmental Quality (CEQ) regulations (40 CFR §1508.27). Context refers to the timing, duration, and where the impact could potentially occur (i.e., local vs. national; pristine vs. disturbed; common species vs. protected species). In terms of duration of potential impact, context is described as short or long term. Intensity refers to the magnitude or severity of the effect as either beneficial or adverse.

The discussions in the following sections are focused on the potential environmental consequences presented by construction of the Proposed Action. Regular operation of the installed FOC network would be passive (and thus would have no potential environmental consequences); however, the installed FOC may fail due to natural or anthropogenic causes. Repair operations, as described in Section 3.2.6, would be identical to construction activities, albeit at a reduced temporal and geographical scale. Therefore, the discussions of potential environmental consequences presented for construction of the Proposed Action serve as a proxy for discussions of potential environmental consequences that may be realized by repair operations during the operations phase of the Proposed Action.

5.1 Noise

5.1.1 Construction

There are no state or local regulations related to noise that are applicable to the Proposed Action. In 1974, the U.S. EPA published *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. This document provides information for state and local agencies to use in developing ambient noise standards. In it, EPA identified outdoor and indoor noise levels to protect public health and welfare. An Equivalent Continuous Sound Pressure Level (LEQ(24)) of 70 decibels (dBA) was identified as the level of environmental noise that would not result in any measurable hearing loss over a lifetime. A day/night sound level (Ldn) of 55 dBA outdoors and an Ldn of 45 dBA indoors were identified as noise thresholds that would prevent activity interference or annoyance. These levels are not "peak" levels but are 24-hour averages. Occasional high levels of noise may occur. An Ldn of 55 dBA is equivalent to a continuous noise level of 48.6 dBA. Examples of typical noise levels are provided in Table 5-1. Table 5-2 summarizes the equipment noise emissions database used by the Central Artery/Tunnel (CA/T) "Big Dig" Project.

Table 5-1. Typical equipment/activity noise emissions.

Equipment / Activity	Typical Noise Level (dBA)
Quiet room	28–33
Computer	37–45
Refrigerator	40–43
Microwave	55–59

Equipment / Activity	Typical Noise Level (dBA)
Highway traffic	70—80 (at 50 feet)
Outboard boat motor	85–90 (at 50 feet)
All-terrain vehicle	85–96 (at 50 feet)

Table 5-2. Roadway Construction Noise Model (RCNM) default emission reference levels and usage factors.

Equipment Description	Impact Device?	Acoustical Usage Factor (%)	Spec. 721.560 L $_{max}$ @ 50 feet (dBA, slow)[1]	Actual Measured L $_{max}$ @ 50 feet (dBA slow) (samples averaged)[2]	Number of Actual Data Samples[3]
All Other Equipment > 5 HP	No	50	85	N/A	0
Auger drill rig	No	20	85	84	36
Backhoe	No	40	80	78	372
Chainsaw	No	20	85	84	46
Compactor (ground)	No	20	80	83	57
Compressor (air)	No	40	80	78	18
Crane	No	16	85	81	405
Drill rig truck	No	20	84	79	22
Excavator	No	40	85	81	170
Flatbed truck	No	40	84	74	4
Front end loader	No	40	80	79	96
Generator	No	50	82	81	19
Horizontal boring hydraulic jack	No	25	80	82	6
Pickup truck	No	40	55	75	1
Pneumatic tools	No	50	85	85	90
Pumps	No	50	77	81	3
Tractor	No	40	84	N/A	0
Vibratory pile driver	No	20	95	101	44
Welder/torch	No	40	73	74	5

Source: Construction Noise Handbook, Construction Equipment Noise Levels and Ranges – Federal Highway Administration (FHWA). 1/14/2018. Equipment and operation noise levels are based on measurements made in conjunction with the Central Artery/Tunnel (CA/T) "Big Dig" Project. The values represent the "default" values for use in the Roadway Construction Noise Model (RCNM).

NOTES

[1] The specification "Spec" limit for each piece of equipment expressed as an L_{max} level in dBA "slow" at a reference distance of 50 foot from the loudest side of the equipment.

[2] The measured "Actual" emission level at 50 feet for each piece of equipment based on hundreds of emission measurements performed on CA/T work sites.

[3] The number of samples that were averaged together to compute the "Actual" emission level.

The following relationships occur with regard to increases in noise measured on the A-weighted decibel scale (EPA 1974):

- A change of 1 dBA cannot be perceived by humans, except in carefully controlled laboratory environments;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference by humans;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness and can cause an adverse response.

Noise decreases at a rate of approximately 6 dBA with each doubling of distance.

Construction of the Proposed Action would not result in any permanent increase in ambient noise levels. There are no established noise level standards applicable to construction of the Proposed Action, and thus construction would not result in the generation of noise levels in excess of established standards. The Proposed Action is a linear infrastructure project, and construction work would move along the linear length of the Proposed Action alignment. Therefore, noise generated by construction activities would be transient and short-term, lasting only as long as construction in a given area or at a given location. Further, the noise generated would be typical of that present in the environment, including noise generated by boats and diesel engines. Given the transient and short-term nature of noise generation during construction, and the few numbers and low density of sensitive receptors, no significant noise-related impacts would be realized.

5.1.2 Operation

Routine operation of the components would not generate noise, and therefore there would be no noise-related impacts during routine operation. Routine and emergency maintenance activities would generate noise similar to that generated during construction; this noise generated would be of a short duration and would occur on an intermittent and/or ad hoc basis. Because the noise generated would not be constant, and would be of a short duration, no impacts would be realized.

5.1.3 No Action Alternative

No noise-related impacts would be realized under the No Action Alternative.

5.2 Air Quality

5.2.1 Construction

Emissions during construction would include criteria air pollutants. Construction-related emissions would be temporally distributed across the construction period and geographically distributed along the Terrestrial Corridor, River Corridor, and Canyon Bypass. The emissions associated with the small construction activity scope would represent a bare fraction of the regional emissions inventory, and no pollutants would be emitted at levels that would result in a change in the air quality classification for any geographic location. In compliance with state requirements, ultra-low sulfur diesel fuel (ULSD) would be used for all diesel powered highway/on-road vehicles (automobiles and trucks) and non-road/off-road equipment (e.g., graders, bulldozers, backhoes).

In that southernmost 350-foot-long portion of the Terrestrial Corridor that is located within the Fairbanks PM2.5 Nonattainment Area, the very small construction scope in this area would not exacerbate the degree of non-attainment, and would not hinder attainment of the national ambient air quality standards in the area, thus ensuring general conformity.

Sensitive receptors in the vicinity of the Proposed Action alignment can be exposed to increases in pollutants as a result of fugitive dust released during excavation activities and vehicle travel on unpaved roads and as a result of the use of internal combustion engines on construction equipment. Pollutant emissions would be distributed over the construction period and across the alignment, and thus would not be concentrated in any one area. Further, activities at any given construction work area would last a matter of days, and thus air quality-related emissions during construction would not be significant.

5.2.2 Operation

Routine operation of the components would not generate emissions, and therefore there would be no air quality-related impacts during routine operation. Routine and emergency maintenance activities would generate air emissions at a rate similar to that generated during construction; these emissions would be of a short duration, and would occur on an intermittent and/or ad hoc basis. Because the emissions generated would not be constant, and would be of a short duration, no impacts would be realized.

5.2.3 No Action Alternative

No air quality-related impacts would be realized under the No Action Alternative.

5.3 Geology and Soils

5.3.1 Construction

Underground installation of the FOC (either by vibratory plowing, trenching, benching, or boring), the installation of new utility poles, and the installation of BMHs or vaults would disturb surficial and shallow soils and geologic formations. Seasonally, construction would occur during both the summer and winter. Winter trenching would occur during frozen ground conditions, in wetland areas, in order to reduce impacts to hydric soils. No impacts to geologic formations would be realized given the small dimensions of the plowing, trenches, and borings necessary to install the FOC and the small size of each excavation required for each new pole.

The installation of new utility poles and the underground installation of the FOC would involve surface disturbance. Soil erosion and sedimentation would be avoided or minimized through implementation of BMPs as described in Sections 3.2.5.2 and 3.2.5.3 and compliance with National Pollutant Discharge Elimination System (NPDES) permit requirements. As necessary, site watering would serve to suppress fugitive dust during construction, and the seeding and stabilization of disturbed soils in compliance with permit requirements would avoid or minimize post-construction impacts to soils.

Degradation of permafrost and the potential for thermal erosion have two root causes during construction and installation of subsurface utilities like FOC. Disturbing the vegetative mat creates a break in the thermal insulation qualities and increases the amount of heat penetrating the substrate, potentially creating a corridor for melted water to flow and provide a continuous source of “heat” to the system. Water released from the thawing active layer combined with meteoric water and normal surface drainage, if not otherwise mitigated, would allow water to be collected and transported along the plowed corridor for the FOC. In areas with a thick active layer, waters entering the disturbed area would be capable of dispersing as they percolate downward reducing the likelihood of impacting the permafrost.

5.3.1.1 Terrestrial Corridor

Review of the available data for the Terrestrial Corridor of the FOC installation (USDA 2024b) shows that approximately 82 percent of the route is located in areas with an active layer depth greater than 12 inches. The construction technique described in Sections 3.1.2.2 and 3.1.2.3 with compaction and creation of water bars with impermeable material, prevent melted and meteoric waters from entering and traveling along the disturbed area. This technique prevents transmission of water along the disturbed area and allows the permafrost to retain continuity and prevent thermal degradation.

5.3.1.2 River Corridor

Sediments in the active channel of the Yukon River would be temporarily displaced to allow installation of the FOC. The disturbed alignment of the FOC would create a small localized depositional environment that would quickly backfill the disturbed area and return the riverbed to the original bed form.

Each of the five villages would have disturbed geology and soils from the HDD and would result in displacement of the boring material to allow installation of conduit for the FOC. HDD would be used to transition the FOC from the river to the BMH. In the villages of Tanana, Rampart, Beaver, Fort Yukon, and at the Yukon River Bridge the BMH's would be installed on existing gravel pads creating little to no impact to the surrounding subsurface. BMH's in Stevens Village and at either end of the Canyon Bypass would be constructed in previously undisturbed ground resulting in the displacement of unconsolidated fluvial material as typically conducted with other village construction projects. From the HDD in all villages the FOC would be placed on existing utility poles. Temporary disturbance to traffic and localized access restrictions may be put in place during installation of the FOC on the utility poles.

5.3.1.3 Canyon Bypass

Review of the available data for this section of the FOC installation (USDA 2024a) provide that the only portions of the route with an active layer less than 12 inches are located near the transition from the uplands to the BMHs. The construction technique described in Section 3.1.2 prevents melted and meteoric waters from entering and traveling along the disturbed area. This technique prevents transmission of waters along the disturbed area and allows the permafrost to retain continuity and prevent thermal degradation.

Underground installation of the FOC by plowing, trenching, or benching, and the installation of new utility poles, would be unlikely to impact permafrost (where permafrost is present). Boring may exceed the depth of the active layer; however, the installed infrastructure is of small diameter, would operate at ambient temperatures, and significant impacts to permafrost would not be realized. Impacts to soils (specifically permafrost) resulting from construction of the Proposed Action would not be significant.

5.3.2 Operation

Routine operation of the components would not result in impacts to geology or soils. Routine and emergency maintenance activities along those portions of the alignment that are installed underground would require the re-disturbance of surficial and shallow soils and geologic formations. Measures described above and in Section 3.2.6.3 would be employed during routine and emergency maintenance activities and thus impacts to soils resulting from such activities would not be significant.

5.3.3 No Action Alternative

No geology or soil-related impacts would be realized under the No Action Alternative.

5.4 Water Resources

5.4.1 Surface Water

5.4.1.1 Construction

5.4.1.1.1 Terrestrial Corridor

The Proposed Action alignment crosses numerous surface waters (i.e., lakes and rivers) along the Terrestrial Corridor. In areas where the FOC would be installed on existing utility poles, surface waters would be spanned aerially, with installation equipment sited on adjacent upland areas. No new poles would be installed within or adjacent to a surface water.

In areas where FOC would be installed underground, and where surface waters are present (i.e., are not culverted), HDD would install the FOC underground beneath the surface water feature. As with aerial construction, equipment would be staged on upland areas set back from the surface waters.

Vegetation removal would be required for both overhead and underground FOC installation. To protect surface water quality, in areas where surface waters are present, vegetation removal would be limited to the extent feasible and buffered from the edge of the features. Necessary permit(s) and certifications—including one or more permits and certifications issued under Sections 404 and 401 of the Clean Water Act and Section 10 of the River and Harbors Act—would be obtained for work in or adjacent to wetlands and navigable waters, and the proponent would ensure compliance with the terms and conditions of those permit(s). Implementation of BMPs contained in the SWPPP(s) developed for the Proposed Action—including BMPs regarding sediment and stormwater controls, fueling, materials handling and storage, and spill response—would minimize potential impacts to surface water quality during construction regardless of the installation methodology. Water use, required to support HDD, would be acquired from nearby surface waters along the corridor. Temporary Water Use Authorization(s) from the ADNR would be obtained prior to construction.

Where the Proposed Action crosses Goldstream Creek, FOC would be installed aerially on existing poles. Given the limited surface disturbance associated with this installation methodology, construction in this area would not result in additional total dissolved solid load (increased turbidity) to the waterbody and would not inhibit the recovery of water quality. Minimal to no impacts to surface waters are anticipated during construction.

Impacts to navigable waters within the Terrestrial Corridor are not anticipated. HDD would be used to install the FOC under the Chatanika River.

5.4.1.1.2 River Corridor

The FOC would be installed in the thalweg of the Yukon River using a jet or scratch plow. Once the FOC has been installed, the resulting trench beings to fill in immediately. Connections to each community would be via HDD. A single tie-in location would occur in the river and connect to onshore facilities. Short-term degradation of water quality from disturbance to bottom sediments in the immediate vicinity of the FOC installation from the jet and scratch plow activity and from HDD and diver jetting at tie-in locations would occur. Given the naturally high level of turbidity and suspended solids present in the Yukon River, this degradation would be de minimis with the river returning to preconstruction conditions. Long term erosion and shifts in riverbed stability are not anticipated.

Water quality studies on two similar projects using larger jet plow installation methodologies determined that jet plow activities produced no observable plume or a narrow range of slightly elevated total suspended solids (TSS). The intent of the TSS sampling during the trials was to monitor sediment plumes from the jet plow operations for potential exceedance of TSS standards set forth in the Section

401 Water Quality Certificate (WQC).

Results of the jet plow trial showed low to slightly elevated levels of TSS, but none approached exceeding ambient concentrations by 200 mg/L as per the condition described in the WQC and all but two samples showed increases in TSS less than 10 mg/L (Normandeau Associates 2023). The Yukon River typically has an ambient mean TSS of 191 mg/L (Lomax et al. 2012). As such, a measurable change or increase in TSS and impacts to water quality is not anticipated as the plow equipment to be used for this project is less powerful, and thereby less able to produce measurable increases than the trial reporting minimal TSS increases.

Installation of FOC between the shore and thalweg would use shore-based HDD equipment. The equipment would be set back from the shoreline and would employ appropriate BMPs to minimize the discharge of materials to the river. At the mid-river terminus, the riverbed would be disturbed where the installed conduit terminates. As described above for installation of the FOC, the naturally high level of turbidity and suspended solids present in the Yukon River would result in a de minimis degradation of water quality that would be realized at a single point of time at each community.

Surface water pumps would be used to momentarily fluidize while the FOC is being inserted into the riverbed. A Temporary Water Use Authorization(s) from the ADNR would be obtained prior to installation of the FOC in the Yukon River.

The entire length of the Yukon River is listed as navigable. Installation of the FOC within the thalweg of the river would impact approximately 40 acres (316 miles) of navigable waters.

5.4.1.1.3 Canyon Bypass

The Canyon Bypass crosses numerous surface waters, these waters would be crossed utilizing HDD to install the FOC beneath the surface water feature, with no impacts to the bank or bed of the surface water. In these areas, the HDD equipment would be set back from the surface waters. Along the Canyon Bypass, vegetation removal would be required as part of the underground installation of FOC. To protect surface water quality, in areas where surface waters are present, vegetation removal would be limited to the extent feasible and would be buffered from the edge of the features. Necessary permit(s) and certifications as described above would be obtained for work in or adjacent to surface waters, and the proponent would ensure compliance with the terms and conditions of those permit(s). Implementation of BMPs contained in the SWPPP(s) developed for the Proposed Action—including BMPs regarding sediment and stormwater controls, fueling, materials handling and storage, and spill response—would minimize potential impacts to surface water quality during construction regardless of the installation methodology. Therefore, only less than significant impacts to surface waters are anticipated during construction.

5.4.1.2 Operation

Routine operation of the components would not result in any impacts to surface water resources, as operation of the components is passive. Routine and emergency maintenance activities would also not result in any significant impact to surface water resources—such activities would be similar to those executed during construction, but of a smaller geographic and temporal scope; impacts would be confined to those areas and times where routine or emergency maintenance activities occur. Equivalent resource protection measures to those employed during construction would also be employed during maintenance activities, and thus no significant impacts to surface water resources would occur during operation.

5.4.2 Groundwater

5.4.2.1 Construction

No significant impacts to groundwater quality or quantity would result from construction. Water required for dust control and other purposes would be obtained from existing sources that may draw on groundwater. The depth to groundwater varies across the Proposed Action alignment; in areas with shallow groundwater, burial of the FOC, installation of new poles, or installation of BMHs may encounter groundwater. If encountered, groundwater would be discharged to the surface. Implementation of BMPs would ensure no significant impacts to groundwater quality would result during construction. The very small cross-sections of infrastructure to be installed underground would have no effect on groundwater flow at any meaningful scale.

5.4.2.2 Operation

Routine operation of the FOC system components would not result in impacts to groundwater resources. Operation of the components is passive, and routine and emergency maintenance activities with small water volume demands (if water is utilized at all), would not result in any significant impact to groundwater resources. Fueling and materials handling and storage measures similar to those employed during construction would be employed during maintenance activities. No significant impacts to groundwater resources would occur during operations.

5.4.3 Coastal Zone, Estuary and Inter-tidal Areas

The Proposed Action is not located within the coastal zone, and there are no estuaries or inter-tidal areas along the Proposed Action alignment. Therefore, no impacts to these environments would be realized during construction or operation.

5.4.4 Floodplains

5.4.4.1 Construction and Operations

Review of the FEMA National Flood Hazard Layer Mapper Viewer indicates mapped floodplains occur in both the Terrestrial and River corridors as presented in Section 4.4.4. Given that all aboveground components (including the communications shelters in the communities, new utility poles, and the regeneration site) are small in scale, that no changes to the morphology or drainage patterns of surface waters would be realized as surface waters would be either spanned aerially or HDD would be used to install FOC below surface waters, and that the small cross-section of underground installation of FOC would not alter surface flow patterns, no adverse impacts to floodplains are anticipated.

All communities in the River Corridor are on the State of Alaska 1982 Flood Threat List and Erosion Flood List, with threat levels ranging from low (Tanana) to high/average or high. Fort Yukon is the only community participating in the National Flood Insurance Program; however, in Alaska many communities are not eligible to participate in this program. The severity and frequency of flooding events has increased since the threat levels were assigned in 1982 and all communities in the River Corridor are vulnerable to flooding, particularly at break-up. The location of onshore infrastructure (BMH and communications shelter) would not adversely affect the floodplain.

The infrastructure installed in each of the communities (communications shelter and BMH), the BMHs installed outside of the five communities, and buried FOC along the Terrestrial Corridor that is installed in a mapped floodplain are all potentially at risk from flooding. While fiber optic networks are not immune to the effects of flooding, the system is hardened (splices are made in concrete vaults or BMHs; the FOC is placed in conduit and buried; the FOC itself is waterproof) to protect against the physical effects of floodwaters, and thus impacts to the system as a result of being placed in floodplains or areas subject to flooding would be low.

5.4.5 Wild and Scenic Rivers

The Proposed Action alignment is not located on, nor crosses, any wild and scenic river. Therefore, no impacts to any wild and scenic river would be realized during construction or operation.

5.4.6 No Action Alternative

No water resources-related impacts would be realized under the No Action Alternative.

5.5 Biological Resources

5.5.1 Wildlife

5.5.1.1 Construction

As number of terrestrial and avian species may be found along the Proposed Action alignment or may transit the alignment. Along the Terrestrial Corridor, construction would not be anticipated to cause any significant or long-term disturbance to these species as work would occur along existing roadways and highways that are existing sources of anthropogenic noise, light, and odor, and thus individuals found in these areas are taken to be acclimated to human disturbance. In the short-term, terrestrial species individuals or groups proximate to a construction area may alter their behavior as a result of construction activities or the individuals or groups may disperse to adjacent unaffected areas to minimize or avoid being further impacted; these impacts would not be significant.

Potential direct impacts to nesting avian species would be minimized. Vegetation clearing would, to the extent possible, be performed in accordance with USFWS vegetation clearance timing guidance for the area. If vegetation clearing is performed during the time period during which the USFWS recommends avoiding vegetation clearing, pre-construction nesting bird surveys would be performed by the project proponent as described in Sections 3.1.1.1 and 3.2.5.1 to identify active nests for avoidance (USFWS 2017). Indirect impacts would be reduced by minimizing vegetation removal and trimming to the extent feasible, and by re-vegetation activities following construction. Non-nesting avian species would be expected to disperse to non-affected adjoining areas during construction; given the largely undeveloped nature of the vast majority of the Proposed Action alignment, and the narrow linear area of disturbance presented by the proposed action, sufficient areas exist to which avian species can disperse. Therefore, the impact would be low. Similarly, along the River Corridor, construction would not be anticipated to cause significant disturbance to any terrestrial or avian species. Work associated with the laying of FOC would occur generally mid-river, and thus at a considerable distance from terrestrial habitats. Small boat traffic associated with the movement of crews and equipment from a shore-based construction camp to the CLB would occur nearer to upland habitats; however, small boat traffic is common on the river, and like non-project traffic would be focused in the area near communities. Terrestrial and avian species found in the vicinity of the communities are acclimated to the noise and other disturbances associated with small boat operations; the additional traffic associated with the Proposed Action is not anticipated to impact any terrestrial or avian species.

Along the Canyon Bypass, construction would also not be anticipated to cause significant disturbance to any terrestrial or avian species. While work associated with the installation of FOC would occur in upland habitats, there is ample space into which individuals can disperse.

5.5.1.2 Operation

Potential impacts to wildlife during operations would be the same as assessed for construction, albeit at smaller geographic and temporal scales.

5.5.2 Vegetation

5.5.2.1 Construction

Vegetation disturbance or removal, as described in Section 3, would be required along the Terrestrial Corridor and along the Canyon Bypass to facilitate the overhead and underground installation of FOC. It is estimated that vegetation disturbance or removal—either mowing, clearing of brush, or felling of trees—would occur on approximately 200 acres along the Terrestrial Corridor and approximately 32.3 acres along the Canyon Bypass. As described in Sections 3.1.1.1 and 3.1.2.1, natural vegetation would be preserved by minimizing clearing of vegetation to the extent feasible. As described in Section 3.2.5.5.1, following construction, all areas disturbed during construction of the project would be re-vegetated using seed mixes as recommended for the region by ADNR's *A Revegetation Manual for Alaska* (Wright 2008). Therefore, impacts to vegetation would be minimized during construction, and less than significant impacts would be realized to vegetation communities as well as to the wildlife species for which these vegetation communities serve as habitat.

5.5.2.2 Operation

If vegetation removal or trimming is necessary in support of activities during operations, then potential impacts to vegetation would be the same as assessed for construction, albeit realized at smaller geographic and temporal scales.

5.5.3 Threatened and Endangered Species

As presented in Section 4.5.3, no federal- or state-listed threatened or endangered species are found along the Proposed Action alignment, and therefore no impacts to such species would occur.

5.5.4 Bureau of Land Management Special Status Species

As presented in Section 4.5.4, no mammalian or fish species identified as BLM Special Status Species are found on lands administered by the BLM that are crossed by the Project alignment; therefore, no impacts to these species would be realized. Potential direct and indirect impacts to avian species would be minimized through the implementation of measures identified above. Potential direct and indirect impacts to invertebrate species would be reduced by minimizing vegetation removal and trimming to the extent feasible, and by re-vegetation activities following construction; these would reduce impacts to suitable habitat for these species. Potential direct and indirect impacts to plant species would be reduced by minimizing vegetation removal to the extent feasible, and by re-vegetation activities following construction; these would reduce impacts to suitable habitat for these species.

5.5.5 Critical or Threatened / Endangered Habitat

No portion of the Proposed Action would be located in or adjacent to designated critical habitat, and therefore no impacts to designated critical habitat would occur.

5.5.6 Migratory Birds and Eagles

5.5.6.1 Construction

As presented in Section 4.5.6, a variety of bird species may be found along the Proposed Action alignment either year-round or seasonally. Work would be conducted pursuant to the MBTA and the

BGEPA. Vegetation clearing would, to the extent possible, be performed in accordance with USFWS vegetation clearance timing guidance for the area as follows:

- Forest or Woodland / Shrub or Open: May 1–July 15[a, b, c]
- Seabird Colonies (including cliff and burrow colonies): May 10–September 15[d]
- Eagles: March 1–August 31

[a] Raptors may nest two or more months earlier than other birds
[b] Canada geese and swans begin nesting April 20
[c] Black scoter are known to nest through August 10
[d] Eagles and their nests have additional protection under the Eagle Act and a permit may be required to conduct activities near an eagle nest.

If vegetation clearance is performed during the time period during which the USFWS recommends avoiding vegetation clearance, pre-construction nesting bird surveys would be performed in these areas to identify active nests for avoidance (USFWS 2017). Non-nesting avian species would be expected to disperse to non-affected adjoining areas during construction; given the largely undeveloped nature of the Proposed Action alignment, sufficient areas exist to which avian species can disperse. Therefore, the impact would be low.

5.5.6.2 Operation

Potential impacts to migratory birds during operations would be the same as assessed for construction, albeit realized at smaller geographic and temporal scales.

5.5.7 Fish / Essential Fish Habitat

5.5.7.1 Construction

5.5.7.1.1 Terrestrial Corridor

Given the construction methodologies described for the Proposed Action, no direct impacts to fish would be realized and no loss of EFH or other fish habitat is anticipated. The small scale of the alignment and trench width, and the clearing and trenching practices proposed are not expected to result in increases in turbidity and sedimentation within drainages containing EFH and are not likely to be detectable but can be short term and limited to the immediate vicinity of the alignment. Post construction inspection would identify any specific locations within floodplains that require additional stabilization, further limiting potential for effects to fish habitat and EFH.

Any effects from installation methods, should they be detectable, would be short term and isolated to the immediate area of construction at any given stream crossing. Fish passage would not be affected. Potential effects to water quality are expected to be temporary and be mitigated by following SWPPP requirements and BMPs. ADF&G Fish Habitat Title 16 Permits and ADNR Division of Mining, Land, and Water (DMLW) Temporary Water Use Authorizations would be obtained with respect to water withdrawal. All water withdrawal would be consistent with any temporary water use authorizations issued by the ADNR-DMLW and any fish habitat permits issued by ADF&G. The FOC installation and associated activities along the alignment between Fairbanks and the Yukon River bridge are unlikely to have adverse effects on fish and fish habitat.

5.5.7.1.2 River Corridor

As presented in Section 4.5.7, Pacific salmon migration and rearing habitat as well as whitefish spawning and migration habitat are identified for the Yukon River in the River Corridor and some tributaries.

Construction-related impacts to the bed of the Yukon River would be temporary and would not overlap with whitefish spawning or development of larvae. Table 5-3 summarizes temporary disturbances to the riverbed of the Yukon River by anadromous fish species use for Pacific salmon and whitefishes. All other tributaries with known fish populations would be crossed by HDD and would not impact fish or fish habitat.

Pacific salmon and other aquatic species do not generally travel, hold, or feed mid-stream, particularly in turbid waters such as the Yukon, and thus the cable laying activity would not affect the activities of aquatic species that are present. Ambient and background sound pressure level (SPL) data are not readily available for the Yukon River, however, Amoser and Ladich (2010) found that flowing reaches of European rivers ranged in ambient SPLs from 111.2 – 133.4 decibels relative to 1 micropascal (dB rms). Given the high turbidity of the Yukon River, it is anticipated that ambient SPL would be higher or similar to the higher of the European streams. Sound pressure levels generated by the jet and scratch plow are anticipated to be lower or near those generated by screeding equipment evaluated for use in the Beaufort Sea which ranged from 164 – 179 dB rms (USDOI 2023). Screeding is a process which recontours sediment on the marine floor but does not remove sediment from the water. The activity often entails dragging a metal plate such as a screed bar across the sediment, thereby smoothing the high spots and filling the relatively lower areas. The SPLs produced by screeding are within the range that could cause behavioral avoidance by fish but would not cause injury or mortality (Buehler et al. 2015). The noise generated would be closer to the ambient SPLS in the Yukon, lower than screeding equipment, and the area of disturbance would be proximate to the equipment and easily avoidable and bypassed by migrating fish. Small boat traffic associated with support of the CLB would travel nearer to shore and would also land onshore in the communities. Small boat traffic is common on the river and concentrated near the communities. Small boat traffic is not known to directly (through impacts) or indirectly (through generation of noise and movement) impact aquatic species individuals, and thus only less than significant impacts are anticipated to be realized by aquatic species during construction.

Table 5-3. Yukon River FOC installation-related temporary disturbance to anadromous fish habitat.

Anadromous Species	EFH Type/Use	Mode of Installation	Length of FOC Installation (miles)
Chinook, coho, and chum salmon	Migratory	Scratch Plow	225.9
		Jet Plow	87.6
Sockeye salmon	Migratory	Scratch Plow	7.4
Inconnu, Bering cisco, broad whitefish, humpback whitefish, least cisco	Migratory	Scratch Plow	225.9
		Jet Plow	87.6
Bering cisco, broad whitefish, humpback whitefish (only Bering cisco shown in AWC)	Spawning	Scratch Plow	73.2
		Jet Plow	87.6

The Proposed Action's potential effects on the quantity and quality of EFH for all life stages of Pacific salmon species present in the Proposed Action area designated as EFH from the Fort Yukon transition initiation site to Tanana landfall site, may stem from vegetation clearing, traditional trenching, HDD, water withdrawal, direct lay in the active channel of the Yukon River, and jet plowing the cable into the river bottom between Fort Yukon and Beaver. These actions can result in temporary habitat removal or disturbance, water quality degradation, wetland and riparian buffer removal, streamflow changes, and stream sedimentation.

Potential impacts to EFH- and FMP-managed species are outlined by Limpinsel et al. 2023 and include:

- Fish injury or mortality (particularly benthic species or life stages)
- Temporary disruption to fish behavior/movement
- Physical alteration or destruction of habitat
- Temporary reduction in habitat quality and/or modification of habitat function
- Temporary increased turbidity and decreased habitat quality
- Re-suspension and distribution of contaminants if present

EFH encountered along the River Corridor is migratory habitat for Chinook, chum, coho, and to a much lesser extent, sockeye salmon. The primary impacts to EFH and managed species would be the temporary disturbance of between 8.33 and 29.61 acres of Yukon River streambed for the cable lay and 33 square feet for conduit tie ins. Localized short term increases in turbidity and TSS along the in-river alignment and at conduit tie-in locations can also occur but would remain within typical ranges seen in the river. Potential impacts of water withdrawal on EFH would be immeasurable in terms of volume withdrawn and adherence to screened intake specifications that would be contained in fish habitat permits would reduce the potential for individual fish mortality. Therefore, less than significant impacts to fish and effect to EFH would be realized.

An EFHA was prepared and submitted to the National Marine Fisheries Service (NMFS). The EFHA determined that project activities may adversely affect EFH in the project area, however those impacts would be minimal and temporary in nature. On February 14, 2024, the NMFS concurred with this determination based on the adherence to conservation recommendations proposed in the EFHA and best management practices. NMFS also provided five additional conservation recommendations outlined in Table 5-4.

On March 12, 2024, NITA, on behalf of Doyon and its contractors, provided the following response to NMFS' additional five conversation recommendations. On March 14, 2024, NMFS accepted the proposed modifications to conservation recommendations.

Table 5-4. NMFS EHF assessment conservation recommendations and NTIA response.

NMFS Conservation Recommendation	Response
Complete geotechnical survey at each horizontal directional drilling site under anadromous streams to ensure the drilling is completed at an appropriate depth to prevent an inadvertent release of drilling fluids into surface waters.	Geotechnical surveys are not envisioned for the HDD crossings, rather the cable will be installed a minimum of 5 to 10 feet below the bed of streams crossed. Inert drilling muds such as bentonite will be used for lubrication during use of the low volume low pressure drills. Downstream visual monitoring will be employed to ensure detection of any mud loss.
All in-water cable installation in the Yukon River should occur prior to July 1st to avoid disturbing eggs in the gravel or disturbing returning adult salmon.	Installation of the FOC is estimated to take approximately 60 days. Typical spring break occurs in May. Based on the typical river breakup and length of time needed to safely install the FOC completion of all in-water by July 1 is not feasible. See Appendix H for additional information.
Water pump intakes for operation of the jet plow should be screened with ¼ inch or smaller screen to prevent the impingement or entrainment of fish during water withdrawal.	Water pump intakes will be screened with ¼ inch or smaller screens to prevent impingement or entrainment of fish.
During horizontal directional drilling operations under anadromous streams, equipment required to clean up an inadvertent release should be available and ready to deploy at the site, and the area downstream of the drilling profile should be continuously monitored during drilling for signs of inadvertent release.	Downstream visual monitoring for inadvertent releases will be conducted and hydrovac equipment will be on site to remove any drilling muds should an inadvertent spill or loss to the stream bed occur.
At horizontal directional drilling sites, a vegetated riparian buffer should be maintained between the drill entry and exit sites and disturbance to existing vegetation should be minimized.	A vegetative buffer of at least 50 feet will be maintained within the riparian zones at all HDD crossings of EFH streams. Mats will be laid on the riparian vegetation and stream banks to facilitate the equipment crossing and maintain bank integrity.

In addition, the ADF&G Habitat Section would develop Fish Habitat Permits as required by AS 16.05.841 and AS 16.05.871. Permits would be conditioned to ensure the maintenance of fish passage and the proper protection of anadromous fish and anadromous fish habitat.

5.5.7.1.3 Canyon Bypass

The proposed bypass route would utilize HDD to install the FOC under Garnet, Stevens, Texas, and Jordan creeks. Only Garnet Creek is crossed within the reach catalogued as anadromous for Pacific salmon. Installation methods and potential effects on EFH and managed species would be the same as those for the Terrestrial Corridor. Because the Canyon Bypass is remote, streams would be crossed by the tracked low ground pressure equipment being used for mulching, trenching and HDD installations. River crossings would be conducted as close to perpendicular to the channel as possible and from point bar to point bar to minimize impacts to the streambed. Modifications to the banks of AWC listed streams would be avoided to the maximum extent possible and any bank modifications for stream crossings would be stabilized as required by any fish habitat permits authorizing the crossings. Permanent displacement of EFH would be limited to the FOC conduit tie ins as previously described for the River Corridor in Section 5.5.7.1.2. No long term or measurable effects to EFH are anticipated. The Proposed Action's effects would be limited to temporary and localized affects and not affect managed fish populations or substantially modify EFH. The ecological structure and function of EFH would be maintained.

5.5.7.2 Operation

Potential impacts to fish and effects to EFH during operations would be the same as assessed for construction, albeit realized at smaller geographic and temporal scales.

5.5.8 Wetland Habitats

5.5.8.1 Construction

Construction along portions of the Terrestrial Corridor, River Corridor, and Canyon Bypass would occur in wetland habitats. Impacts to wetland habitats cannot be avoided; best management practices—including limiting clearing areas and preserving existing vegetation, described in Sections 3.1.1.1 and 3.1.2.1 would be employed to minimize impacts. Permanent and temporary wetland impacts would be permitted under Nationwide Permit (NWP) 57 (Electric Utility Line and Telecommunications Activities). Correspondence with USACE and the Pre-Construction Notification application provided to the USACE are included in Appendix I.

5.5.8.1.1 Permanent Impacts

Permanent impacts in wetland include the installation of 55 vaults along the Terrestrial corridor and 1 BMH at the start (northern end) of the Canyon Bypass. The BMH and vault are similar in size and would be approximately 3 feet wide by 4 feet long by 4 feet high (with an approximate 30-square-foot footprint for construction). No permanent impacts to WOTUS are anticipated. No additional fill is required, however excavation to install a BMH/vault is required. The total area of permanent wetland impacts is 0.05 acres and is summarized below in Table 5-5. Approximately 112 cubic yards of existing material would be excavated and then backfilled around the vaults/BMH in wetland areas. Any excess material would be removed from the site and properly disposed of. No additional fill would be placed.

5.5.8.1.2 Temporary Impacts

Temporary wetland impacts along the Terrestrial Corridor and Canyon bypass would occur where the FOC would be installed using vibratory plowing and frost trenching. Temporary impacts to WOTUS include installation of the FOC in the Yukon River using a jet or scratch plow. The total area of temporary impacts to wetland and WOTUS is 43.61 acres and is summarized below in Table 5-6. Vibratory plowing creates a 6-inch-wide trench in the ground using a blade which inserts the FOC into the ground. Minimal ground disturbance would occur and there is no excavation or backfilling associated with this installation methodology. Similarly, the jet/scratch plow would create a 6-12” trench in the bed of the Yukon River. The riverbed would be temporarily fluidized to allow for the FOC to be installed. Immediately after the FOC has been installed in the riverbed the trench begins to fill in.

Approximately 200 acres of vegetation clearing is required along the Terrestrial Corridor and Canyon Bypass so that machinery needed to install the FOC can pass through. Approximately 65 acres of that would be in wetlands.

Table 5-5. Permanent wetland impacts summary.

Cowardin/NWI Classification		
Subsystem or Class	**Code**	**Number of Vaults**
Wetlands – Palustrine		
Emergent / Scrub Shrub	PEM1/SS1B	3
Emergent / Scrub Shrub	PEM1E	1
Scrub-Shrub	PSS1/4B	9
Scrub-Shrub	PSS1B	7
Scrub-Shrub	PSS1C	8
Scrub-Shrub	PSS4B	14
Forested	PFO4B	9
Wetlands - Riverine		
Riverine	Rp1FO7WS	1 (BMH)
Summary		
Total number of Vaults/BMH being placed in Jurisdictional Wetlands		52
Total Permanent Impact to Jurisdictional Wetlands:		0.05 acres
	Total Excavation: (and backfilled material)	**110 cubic yards**

Table 5-6. Temporary wetland impacts summary.

Cowardin/NWI Classification			
Subsystem or Class	**Code**	**Acres**	**Miles**
Terrestrial Corridor			
Emergent	PEM1C	0.07	1.10
	PEM1E	0.03	0.52
Emergent / Scrub Shrub	PEM1/SS1B	0.09	1.54
Scrub-Shrub	PSS1/4B	0.33	5.37
Scrub-Shrub	PSS1//4E	0.02	0.29
Scrub-Shrub	PSS1B	0.31	5.15
Scrub-Shrub	PSS1C	0.26	4.34
Scrub-Shrub	PSS1E	0.02	0.26
Scrub-Shrub	PSS4B	0.51	8.39
Forested	PFO4B	0.55	9.06
Flooded	PUBH	0.02	0.39
	Terrestrial Corridor Total	2.21 acres	36.41 miles
River Corridor/ Canyon Bypass			
Wetlands – Palustrine			
Scrub-Shrub / Emergent	PSS1/EM1D	0.06	0.03
Scrub-Shrub	PSS4/1D	0.81	0.44
Scrub-Shrub	PSS1C	0.03	0.02
Forested	PFO1C	0.18	0.09
Waterbodies – Riverine			
Riverine	R2UBH	40.00	316
Riverine	Rp1FO7WS	0.28	0.15
River Corridor/Canyon Bypass Total		41.40 acres	316.73 miles
Summary			
Total Temporary Impact to Jurisdictional Wetlands and WOTUS		43.61 acres	353.14 miles

During construction different mitigation measures would be used to minimize impacts to wetlands. Along the Terrestrial Corridor winter installation can be employed where needed or required, potentially reducing temporary impacts to wetlands. Along the Canyon Bypass rig matting would be used in wetland areas to minimize ground disturbance from tracked equipment. Brushing and clearing along with Canyon Bypass would occur as necessary and would be required for heavy machinery.

5.5.8.2 Operation

Potential impacts to wetland habitats during operations would be the same as assessed for construction, albeit realized at smaller geographic and temporal scales.

5.5.9 Invasive Species

5.5.9.1 Construction

The Proposed Action involves vegetation clearing and grubbing and ground disturbance. During the construction phase, the methods detailed in Section 3.2.5.5 would be employed to prevent transmission of invasive plants in compliance with Executive Order 13112 (Invasive Species) and BLM Instruction Memorandum No. 2022-008 (Appendix D). Additionally, contractors would ensure that ground disturbing activities are minimized, and disturbed areas are re-vegetated with seed recommended for the region by ADNR's *A Revegetation Manual for Alaska* (Wright 2008). The approved ROW would be subject to the stipulations presented in Section 3.2.5.5.2 on BLM-managed lands as the grantee is responsible for invasive species control within the limits of the approved ROW. Therefore, the spread of invasive species would be minimized, and less than significant impacts would be realized.

5.5.9.2 Operation

Potential invasive species-related impacts during operations would be the same as assessed for construction, albeit at smaller geographic and temporal scales.

5.5.10 No Action Alternative

No biological resources-related impacts would be realized under the No Action Alternative.

5.6 Historic and Cultural Resources

To comply with the requirements of Section 106 for the project, a Programmatic Agreement (PA) is in the process of being developed by NTIA, in consultation with the Alaska State Historic Preservation Office and other stakeholders, to allow for a phased process to identify, evaluate, assess, and avoid, and/or mitigate project effects on historic properties. All Section 106 related correspondence and the PA are in Appendix L. The PA contains the following key agreements which, if applicable, must be completed prior to construction:

- Pedestrian field survey(s) would be completed prior to construction in areas of medium to high probability to contain previously unrecorded cultural resources.
- A Cultural Resource Management Plan (CRMP) that clearly identifies the procedures to follow should cultural resources be discovered. The CRMP also clearly defines steps taken should human remains be identified.

Prior to the initiation for the Section 106 process and development of the PA, public outreach and general project updates have been communicated by Doyon to numerous stakeholders within the region by newsletters. Once Doyon received the grant and project design had been initiated, Doyon completed two trips, in May and August 2023, to each of the five communities where hardwired broadband service would be provided. The goal of these trips was to update the communities on the project status and answer any questions. Additional information related to public consultation is included in Section 7.

On February 7, 2024, letters were sent to stakeholders initiating consultation under Section 106 of the National Historic Preservation Act. The purpose of the letter was to notify stakeholders that a project specific PA was being developed, provide a detailed project description, and formally invite them to participate. Follow-up phone calls were also made, and emails were sent requesting entities confirm receipt of the information. A distribution list was also included with this outreach.

On April 18, 2024, a draft of the PA was sent to all stakeholders for their review and input. Following publication of the draft PA, a webinar was held for Doyon stakeholders. This meeting provided an update on project status, and key aspects of the PA will be presented. Individual follow up phone calls were also made to state and federal agencies.

Signatories, invited signatories, and consulting parties involved in the PA are listed in Table 5-7. The signed PA is included as Appendix L.

Table 5-7. Programmatic agreement signatories.

Entity	Programmatic Agreement Role
National Telecommunications and Information Administration (NTIA) Doyon, Limited (Doyon) Alaska State Historic Preservation Officer (SHPO) Bureau of Land Management (BLM) U.S. Army Corps of Engineers (USACE)	Signatory
DeployCom Alaska Department of Transportation and Public Facilities (DOT&PF) Alaska Department of Natural Resources (ADNR) Alaska Department of Fish and Game (ADF&G)	Invited Signatory
[List of entities to be added once confirmed]	Concurring Party

5.6.1 Area of Potential Effect

The Area of Potential Effect (APE) for the entire corridor is divided into land-based and in-river activities. The APE for all land-based activities is centered on the FOC installation alignment centerline with a 30-foot buffer either side of the alignment, 60 feet wide in total. The APE for the all in-river activities is centered on the FOC burial in the bed of the Yukon River, with a 100-foot buffer either side of the centerline, 200 feet wide in total. The Alaska Heritage Resources Survey (AHRS) database[6] listed 40 cultural resources located within the APE; of these cultural resources, 14 have been determined eligible for, or listed on, the National Register of Historic Places (NRHP); 22 have been determined not eligible; and 4 (four) properties are listed on the AHRS database but do not contain a Determination of Eligibility (DOE).

[6] The AHRS database is a list maintained by the Alaska Office of History and Archaeology, and includes buildings, objects, structures, archaeological and historic sites, districts, travel ways, traditional cultural properties, landscapes and other places of cultural importance. Listing on the AHRS is not the same as listing on the NRHP.

5.6.2 Construction

5.6.2.1 Terrestrial Corridor

The majority of known AHRS sites within the APE are located within the Terrestrial Corridor. Of the 14 known cultural resources that have been determined eligible for, or listed on the NRHP, 13 are located with the APE along the Terrestrial Corridor. The potential effects to each of the resources addressed are presented below in Table 5-8.

During the desktop study two areas along the proposed alignment were identified to extend beyond previously surveyed areas. These areas were noted to either be in the vicinity of other known cultural sites or have a high potential due to existing landforms within the surveyed area. Pedestrian surveys of these areas would be completed prior to construction as outlined in the PA.

Table 5-8. Terrestrial Corridor resources: potential impact analysis.

AHRS NO	Site Name	NRHP Status	Assessment of Effect
FAI-00230 LIV-00122	Tanana Valley Railroad	Determined Eligible	**Recommend No Adverse Effects Finding.** Portions of the TVRR (LIV-00122) located within Fox at the southern origin of the Proposed Action have been disturbed by road construction. Three segments of the Proposed Action are in proximity to LIV-00122 in areas not previously surveyed between Elliott Highway MP 3.5–8; however, the current design is for the FOC to be installed aerially on existing utility poles in these locations. As such, no adverse effects are anticipated to LIV-00122 as the Proposed Action would not be introducing any new intrusive visual elements, and no ground disturbance would occur which may affect the physical remains of LIV-00122. The Proposed Action would not adversely affect the integrity of any properties which make these sites NRHP-eligible. After installation of the FOC, these sites would retain their integrity of location, design, setting, feeling, and association.
FAI-00344 LIV-00073	Davidson Ditch	Determined Eligible	**Recommend No Adverse Effects Finding.** Where the Proposed Action intersects the resource, the FOC is proposed to be installed aerially on existing utility poles. As such, no adverse effects are anticipated to FAI-00344/LIV-00073. The Proposed Action would not be introducing any new intrusive visual elements, and no ground disturbance would occur which may affect the physical remains of FAI-00344/LIV-00073. The Proposed Action would not adversely affect the integrity of any properties which make these sites NRHP-eligible. After installation of the FOC, these sites would retain their integrity of location, design, setting, feeling, and association.
LIV-00764 LIV-00769	Elliott Highway Segment B, Bypass Segment B11 Elliott Highway Segment B, Bypass Segments B16	Determined Eligible Determined Eligible	**Recommend No Adverse Effects Finding.** The Proposed Action design anticipates installing the FOC within the clearing limits of the Elliott Highway ROW along the toe of the current road prism, when possible, and within the abandoned roadbeds of these two resources. These resources would receive temporary disturbance but would not permanently affect the resource. After installation of the FOC, the highway segments would continue to retain their integrity in alignment, embankment, and travel lanes, and appear as they did during the segments' period of significance, 1938-1959. The Proposed Action would not adversely affect the integrity of any properties which make these Segments of the Elliott Highway NRHP-eligible. After installation of the FOC, these Elliott Highway Segments would retain their integrity of location, design, setting, feeling, and association.
LIV-00503	Livengood Mining Historic District	Determined Eligible	**Recommend No Adverse Effects Finding**. The Proposed Action design includes winter trenching within the Livengood Mining Historic District (LIV-00503). Much of the route lies within previously surveyed areas; the unsurveyed portion is located within the maintained ROW of the Elliott Highway and is unlikely to contain any previously undocumented or recorded historic features or components. The Proposed Action would not adversely affect

AHRS NO	Site Name	NRHP Status	Assessment of Effect
			the integrity of any properties within the Historic Mining District which makes it NRHP-eligible. After installation of the FOC, the Historic Mining District would retain its integrity of location, design, setting, feeling, and association.
LIV-00515	Olive to Cleary Creek Ditch	Contributing within Eligible District	**Recommend No Adverse Effects Finding.** The Proposed Action includes the use of HDD where the alignment crosses the resource. Through the use of this installation method, no impacts to the physical integrity of the resource would be realized. The Proposed Action would not adversely affect the integrity of any properties which make the site NRHP-eligible. After installation of the FOC, the site would retain its integrity of location, design, setting, feeling, and association.
LIV-00392	Livengood Tram Road	Treated as Eligible or Eligible Pending	**Recommend No Adverse Effects Finding.** Where the Proposed Action intersects the resource, the current design calls for an HDD bore under Livengood Creek, which coincides closely with the reported location of LIV-00392. A previous survey in this area revealed no evidence of this resource at this location. Therefore, no adverse effects are anticipated to the resource as a result of the Proposed Action.
LIV-00556	Dunbar-Brooks Terminal Trail	Determined Eligible	**Recommend No Adverse Effects Finding.** The Proposed Action crosses the Dunbar-Brooks Trail (LIV-00556) in the vicinity of Livengood Creek and Livengood Tram Road (LIV-00392). Summer trenching is proposed to install the FOC. A previous survey in this area did not identify any evidence of this trail. The proposed installation of the FOC at this location is within the clearing limits of the Elliott Highway ROW along the toe of the current road prism. It is unlikely that evidence of LIV-00556 remains at this location and the installation of the FOC is unlikely to adversely affect LIV-00556. Therefore, no adverse effects are anticipated to the resource as a result of the Proposed Action.
LIV-00284	Rosebud Knob Archaeological District	Determined Eligible	**Recommend No Adverse Effects Finding.** Rosebud Knob Archaeological District is a prehistoric district with numerous archaeological sites on bedrock knolls and outcrops. The Proposed Action alignment crosses the resource. Since the FOC would be installed within an existing established utility corridor within the clearing limits of the Dalton Highway and no high-potential landforms (e.g., bedrock knolls, elevated landforms, bedrock outcrops) are located along this portion of the Proposed Action alignment no adverse effects are anticipated. Furthermore, the Proposed Action would not adversely affect the integrity of any properties which make these sites NRHP-eligible. After installation of the FOC, these sites would retain their integrity of location, design, setting, feeling, and association.
LIV-00501	Dalton Highway	Determined Eligible	**Recommend No Adverse Effects Finding.** The Proposed Action alignment crosses the Dalton Highway (LIV-00501) multiple times along the length of the alignment; however, these crossings are proposed to either consist of FOC installed aerially on existing utility poles, or via HDD bores underneath the drivable surface of the highway. Therefore, the

AHRS NO	Site Name	NRHP Status	Assessment of Effect
			Proposed Action would not adversely affect the integrity of any properties which make the bridge NRHP-eligible. After installation of the FOC, the Dalton Highway would retain its integrity of location, design, setting, feeling, and association.
LIV-0045	E.L Patton Yukon River Bridge	Determined Eligible	**Recommend No Adverse Effects Finding.** Placement of the FOC on the bridge would not adversely affect the integrity of any properties which make the bridge NRHP-eligible. After installation of the FOC, the bridge would retain its integrity of location, design, setting, feeling, and association. Its essential physical features would remain intact. Placement of the FOC on the bridge would not alter its continuous orthotropic beam, twin box girder design, nor its instream piers, or its decking.

5.6.2.2 River Corridor

5.6.2.2.1 Yukon River Corridor

During the laying of the FOC in the riverbed, multibeam sonar (MBS) scans would be performed to maintain a course over the thalweg of the Yukon River. Obstacles revealed by the MBS imagery as riverbed anomalies would be avoided—such obstacles may include boulders, submerged logs and natural debris, and possibly cultural materials (e.g., skiff sized boats, larger shipwrecks, fuel drums). Avoidance assures that if any of the anomalies are submerged cultural resources, the Proposed Action would not impact them; therefore, no adverse effects are anticipated to any cultural resources.

5.6.2.2.2 Communities

Each of the five communities has been surveyed for archaeological and historical resources. The ground-disturbing activities to be performed within and in the vicinity of each of the communities—including HDD and excavation for placement of BMHs—and the location of these activities indicates there is a low probability of these ground-disturbing construction activities impacting unknown cultural resources. BMHs would be placed within existing utility easements or on previously disturbed ground. The installation of FOC on existing utility poles would not introduce any new intrusive visual elements, and no ground disturbance would occur, and thus these activities within the communities would not result in any impacts to cultural resources.

One NRHP eligible site, the Rampart Historic District (TAN-00008), was identified in Rampart and has not been recorded in detail. Landfall and the placement of BMHs and aerial installation of the FOC are not expected to have an adverse effect on any contributing elements to the Rampart Historic District. Known cultural resources within the communities would be avoided, and thus no adverse effects are anticipated to any cultural resources.

5.6.2.2.3 Canyon Bypass

The GIS-based probability analysis performed for the Proposed Action indicated that approximately three-fourths of the nominal length of the bypass present a medium to high probability for the presence of archaeological sites. These include areas of bare ground, gradual slopes, good viewsheds from ridgelines, and open forest. The medium to high probability areas also include the transitions from the Yukon River onto shore. Prior to construction, the proposed Canyon Bypass alignment would be subject to a pedestrian archaeological survey as outlined in the PA; identified resources would be avoided through minor re-routing. Therefore, no adverse effects are anticipated to any cultural resources.

5.6.3 Operations

During the operations phase, activities may be necessary to repair the FOC. The potential effects on historic and cultural resources would be identical to those identified for the construction phase as these operations-phase activities would occur in the same locations where construction would occur.

5.6.4 No Action Alternative

No cultural resources-related impacts would be realized under the No Action Alternative.

5.7 Aesthetic and Visual Resources

5.7.1 Construction

Construction-related visual impacts resulting from the temporary presence of equipment, materials, and work crews along the Proposed Action alignment would not substantially degrade the existing aesthetic or visual character or quality of the site and its surroundings. During construction, visual impacts would include the temporary presence of workers, construction equipment, the construction camp, on- and off-road vehicles, and the CLB and support vessels.

5.7.1.1 Terrestrial Corridor

Installation of the FOC underground would not present any aesthetic or visual resource-related impacts. Along the contiguous approximately 20-mile-long section of the Terrestrial Corridor where FOC and appurtenances would be installed on existing poles, the installation of a single new FOC and appurtenances would not be readily apparent and would not result in any aesthetic- or visual resources-related impacts. The visual environment along this portion of the Terrestrial Corridor is that of a mature boreal forest containing rural subdivisions with overhead utilities; paved and unpaved local roadways; paved highway infrastructure; and commercial, industrial, and mining-related infrastructure and developments in and near the community of Fox. The new FOC would represent an incremental addition to the visual environment—one more cable on poles that already support numerous cables or wires including electrical conductor and/or telecommunications cables. Further, in most portions of this section, the visibility of the existing pole line is largely obscured by topography and vegetation; in general, it is at road crossings where the existing pole line is not obscured. In these locations, the viewing time is short and viewer sensitivity is generally low.

In two discrete locations along the Terrestrial Corridor, where the FOC would otherwise be installed underground, new utility poles would be installed and the FOC would transition to an overhead configuration. In one location (approximately 1.1 miles long) three poles would be installed and in the other location (approximately 0.2 miles long) 10 poles would be installed. In these areas, while the utility poles and aerial cable would represent new features in the immediate visual environment, they would not result in a significant impact.

A portion of the Dalton Highway in the Terrestrial Corridor is designated as a Scenic Byway; all components of the Proposed Action would be installed underground along this portion of the highway and would not compromise the scenic integrity or value of this area. Therefore, installation of FOC would not result in a significant aesthetics-or visual resources-related impact.

The Proposed Action would be installed on lands designated as VRM Class II and Class IV. In these areas, the FOC would be installed underground within the existing utility alignment with minimal clearing of brush and trees. The proposed action is not expected to change the visual character of the landscape within BLM managed lands, and thus would be consistent with the objectives of both VRM Class II and Class IV.

5.7.1.2 River Corridor

Construction activities and equipment would be visible to residents of the five communities, those traveling the Yukon River, and occupants of scattered rural residences and subsistence camps. Work within the River Corridor would take place primarily on the river. The CLB and movements of support vessels would be visible from a given location for only a period of days on stretches of water where barge and boat traffic are common. A temporary construction camp would be visible within or adjacent to each community for an extended duration (perhaps up to a period of 4 to 6 weeks); each camp would be comprised of temporary structures not unlike existing structures in the communities.

The FOC laid in the thalweg of the Yukon River would not be visible, and thus would not present any aesthetics-or visual resources-related impacts. Within the River Corridor, some components of the Proposed Action would be visible within or adjacent to each of the communities; these include a new portable steel structure (communications shelter) and the “last mile” components (including new utility poles and new FOC and appurtenances installed on new or existing utility poles). Utility poles and aerially installed cables are ubiquitous in the visual environment of each of the communities, as are portable steel structures (such as connex boxes and similar structures), and therefore the Proposed Action would result in only an incremental, less-than-significant impact on the existing visual condition.

Given the commonness of barge and boat traffic, the similarity of construction camp structures and form to existing structures, and the relatively short duration over which the construction activities would be visible from any given point, temporary construction-related visual effects would be less than significant.

5.7.1.3 Canyon Bypass

The area along and around the Canyon Bypass is largely unpopulated, thus work would not be visible to any permanent residents. The area along and around the Canyon Bypass may be used by people engaged in subsistence harvesting of resources; the visibility of construction activities would depend on the location of viewers and duration of views but would be less than significant given the small scale of construction activities compared to the vast scale of the visual environment in the area.

5.7.2 Operation

5.7.2.1 Terrestrial Corridor

Operation and maintenance activities and equipment would be visible to motorists along the entirety of the Terrestrial Corridor, and to residents primarily along the southern portion. Utility ROW maintenance (e.g., vegetation clearing, line inspections) is commonplace in Alaska to protect infrastructure and enhance safety and, while vegetation removal or trimming may be evident to viewers, the visual effects of vegetation removal would be minor and temporary. As a result, given the commonness of equipment and activities along the Terrestrial Corridor and the limited number of affected viewers, temporary construction-related visual effects would be less than significant.

5.7.2.2 River Corridor

Regular operation and maintenance activities associated with onshore infrastructure would not result in any aesthetic or visual resources-related impact. In the event the FOC requires inspection or repair, equipment and activities similar to that which took place during installation would be visible and would be less than significant.

5.7.2.3 Canyon Bypass

Along the Canyon Bypass, FOC would be buried and thus would not be visible and would not result in any aesthetic or visual resource related impacts.

5.7.3 No Action Alternative

No aesthetic or visual resources-related impacts would be realized under the No Action Alternative.

5.8 Land Use

5.8.1 Construction

Temporary impacts to the use of lands would be realized within the Terrestrial Corridor, River Corridor, and Canyon Bypass. These impacts would result from the physical presence of construction equipment and crews, and construction activities, in the environment; these impacts would be short-term. Construction would comply with all permit and land use requirements of the respective landowners, management entities, regulatory agencies, and the public.

5.8.2 Operation

Impacts during operations would be similar to construction, but on a much more limited basis. Any physical disturbance to the ground or FOC would be related to damage of the FOC requiring repair. Any impacts would be localized to the area of impact and would not affect other portions of the FOC system. The presence of the FOC would not prevent or inhibit the continuation of existing land uses.

5.8.3 No Action Alternative

No land use-related impacts would be realized under the No Action Alternative.

5.9 Recreation/Travel and Transportation

5.9.1 Terrestrial Corridor

5.9.1.1 Construction

During construction in those areas where FOC would be installed aerially across a roadway or driveway, travel in both directions along the roadway or driveway would be stopped to ensure the safe installation of the FOC. Each closure would be of a short duration and would generally be timed for the early morning hours when vehicle traffic along the roadway is low. In some locations along the Terrestrial Corridor, construction equipment may need to be operated from the roadway. In these locations, a single lane would be closed, and traffic control would be employed. All lane or road closures would be appropriately permitted by and coordinated with DOT&PF and the Alaska Department of Public Safety, as necessary.

Numerous roads and driveways intersect with the roadways and highways along which the FOC would be installed. In most instances, the FOC is identified to be installed across these roads and driveways utilizing an open trenching methodology. A private driveway may be fully closed during FOC installation; such a closure would last less than one day and would be coordinated with the appropriate landowner(s). Where an intersecting public road or public driveway is crossed, only a single lane would be closed at a time and traffic control would be employed. All lane or road closures would be appropriately permitted by and coordinated with DOT&PF and the Alaska Department of Public Safety, as well as public land managers, as necessary.

Given the low vehicle traffic along the majority of the roadways and highways, appropriate permitting of lane closures, and coordination with public land managers, impacts to travel and transportation during construction would be low.

The roads and highways along which the Terrestrial Corridor is located provide access for dispersed and concentrated recreational activities. Access to developed recreational areas would be maintained during construction. Access to dispersed recreation on public lands would also be maintained, although some lane closure-related delays may be realized. Therefore, impacts in terms of access to restriction would be low. Roadside recreational activities may be disturbed during construction; however, vast unimpacted lands are available along the Terrestrial Corridor, and thus impacts would be low.

The Project Proponent would coordinate with the BLM and the operator of Yukon River Camp prior to construction to minimize disruptions to the use of the boat ramp and to avoid access disruptions to the Yukon River Camp; the Yukon River Camp and the boat ramp area is largely disturbed, thus providing flexibility to install the FOC in locations that would minimize disruptions.

5.9.1.2 Operations

Impacts to recreation, travel, and transportation along the Terrestrial Corridor would be similar to those realized during construction, albeit on smaller geographic and temporal scopes.

5.9.2 River Corridor

5.9.2.1 Construction

Installation of the FOC along the River Corridor would not impact use of the Yukon River for transportation; as described in the Project Description, the laying of the FOC by the CLB would be coordinated with the USCG District Office to ensure the safe use of the navigable waterway by all users. Work along the River Corridor would not impede any shore-based mode of travel.

Given the limited recreational use of the Yukon River, and that construction activities would be coordinated with and communicated by the USCG and would not impact transportation, recreational activities on the Yukon River would not be impacted during construction. Recreational activities on the immediate shoreline including camping and hunting could be impacted by the noise and activity of the CLB and support vessels if such recreational activities and construction activities overlap in both time and space. Given the length of the River Corridor along which recreation could occur, and the short timeframe during which construction would occur along any given stretch of the River Corridor, impacts to recreation would be low.

5.9.2.2 Operations

Impacts to recreation, travel, and transportation along the River Corridor would be similar to those realized during construction, albeit on smaller geographic and temporal scopes.

5.9.3 Canyon Bypass

5.9.3.1 Construction and Operations

Given the presumed de minimis recreational use of the area, lack of designated campgrounds, and lack of trails or other overland travel routes in the area, no impacts to recreation or travel along the Canyon Bypass would be realized during either the construction or operations phases of the Proposed Action.

5.9.4 No Action Alternative

No recreation, travel, or transportation-related impacts would be realized under the No Action Alternative.

5.10 Subsistence

5.10.1 Construction

Subsistence hunters may use these highways to reach staging points where they leave the respective highway to hunt for game, but it is illegal to shoot on, from, or across the driving surface of any constructed road or highway. There would be temporary inconvenience from traffic delays or use of staging points by construction equipment. The most congested staging area is the boat ramp at the E.L. Patton bridge during September. Staging of construction equipment during September would be avoided. Harvesting of berries along the highway corridor would be temporarily impacted from the movement and staging of equipment or from clearing vegetation. Road pullouts and parking may be limited during construction and some brush would be removed or inaccessible during construction of the terrestrial portion of the FOC.

Impacts to subsistence from the river installation of the FOC would be minor and temporary. The equipment would be moving very slowly in the deep-water channel of the river. The position and slow movement of the equipment would not impact the migration of salmon that use the shallower slower water of the Yukon River for their upstream migration. Subsistence fishing and fishwheels are conducted in the near shore waters where there would not be any construction equipment except the specific locations of the HDD transitions to the river FOC. Subsistence users would have to avoid the construction equipment as it moves downstream but would not restrict access to the shoreline to conduct subsistence activities.

5.10.2 Operation

Once the FOC is installed there would be very little impact to subsistence. The aerial portion of the FOC would be placed on existing poles and any removal or trimming of vegetation would naturally regenerate. The buried FOC in both the terrestrial and river installations would not pose any impact to subsistence activities, except for the rare, isolated needs to excavate and repair the FOC. If this occurs, the impacts would be similar to those described in Section 5.9.1, but over a shorter period of time and localized area.

5.10.3 No Action Alternative

No subsistence-related impacts would be realized under the No Action Alternative.

5.11 Infrastructure

5.11.1 Construction and Operation

The Proposed Action involves the installation of FOC on existing utility poles, on new utility poles, underground, and within waterways. The terrestrial installation of underground cable and associated facilities would occur within utility and road ROWs. The Project Proponent would coordinate with the owner(s) of existing utility poles to ensure the installation of the FOC does not adversely affect the loading or stability of the poles.

To avoid impacts to existing buried utilities or infrastructure, the Project Proponent would utilize 811/Alaska Digline to identify buried utilities in the ROWs prior to any construction activities. A major Utility Permit from the DOT&PF is also required. Where construction would occur adjacent to or within any road, traffic control measures would be utilized to ensure the safety of the construction crew and public. The Project Proponent would coordinate with the BLM and the operator of Yukon River Camp prior to construction to minimize disruptions to the use of the boat ramp and to avoid access disruptions to Yukon River Camp; the Yukon River Camp and the boat ramp area is largely disturbed, thus providing flexibility to install the FOC in locations that would minimize disruptions. The Proposed Action would result in no significant adverse direct or indirect impacts to existing infrastructure. Installation and operation of the broadband infrastructure represents a significant positive impact to the infrastructure in the region, including improved access to telehealth and emergency services access infrastructure.

5.11.2 No Action Alternative

The No Action Alternative would not allow the high-speed fiber optic cable to be constructed and operated in the study area. This would not provide the affected communities with opportunities for improvements in economic opportunities and increases in quality of life. Improvements in emergency response services would not occur if the opportunities associated with the new fiber optic cable did not occur.

5.12 Socioeconomic Resources Including Environmental Justice

5.12.1 Construction and Operation

Potential effects of the Proposed Action on the existing economic and social environment would derive from any substantial changes to education, employment, income, population, housing, infrastructure and utility use, access, social factors, and lifestyle. There would be short-term beneficial effects from construction. During the time that the system is operational, beneficial effects would be realized from the availability of the hard-wired broadband internet connectivity in the Proposed Action area, including creating new permanent employment; providing new opportunities for distance education, telemedicine, public health and safety, and rural economic development; providing an essential tool for cultural survival acting as a hub for language preservation; and connecting youth and adults with Alaska Native Elders, mentors, and networking resources.

5.12.1.1 Terrestrial Corridor

Direct employment effects from Terrestrial Corridor activities would be short-term and minor. Aerial and underground installation of the FOC along the Terrestrial Corridor can occur simultaneously using multiple construction crews; it is anticipated that construction along the Terrestrial Corridor would occur over a 5-month period and would utilize fewer than 20 workers. Survey and construction crews working along the Terrestrial Corridor would utilize existing infrastructure for crew accommodations. All crew would utilize lodging located on either end of the Terrestrial Corridor and commute to their work site each day. There is available lodging in Fairbanks and when working on the northern end of the Terrestrial Corridor the crew would utilize accommodations at the Yukon River Camp. Indirect effects from the minor and short-term Terrestrial Corridor employment would also be minor, as there are no identifiable effects on population, housing, and lifestyle.

5.12.1.2 River Corridor/Canyon Bypass

Direct employment effects from construction activities along the River Corridor and the Canyon Bypass, and in affected communities, would generally be minor and short term. Installation of the FOC in the River Corridor would require a 14-person crew, and the camp barge would require an approximately 4-person staff. The Project Proponent's contractor would use two to three small support transport vessels to transport crew between the camps and the CLB vessel and to other support vessels. Additionally, a 5-person crew would complete the HDD work at each community and at the E.L. Patton Yukon River Bridge. The HDD work would be performed prior to or simultaneously with the middle-of-river FOC installation. Income effects from this workforce would be minor and generally be temporary in nature. In all cases, local labor would be recruited to fill open positions to the greatest extent possible, which would be a benefit to a small number of residents.

The limited construction activity for the River Corridor and associated employment would have negligible effects on population, housing, infrastructure, and lifestyle. Employment is unlikely to result in additional population, and no new housing or infrastructure would be needed due to the Proposed Action. The crew camps—if deployed on-shore—would utilize community water and electricity and would purchase fuel (if available) from each community to run camp generators. Camp supplies would be provided on a weekly basis from Nenana or Fairbanks on contracted support barges or air services. The Proposed Action would not result in displacement of businesses and residences.

Use of the Yukon River for placement of the FOC and for vessels transporting crew and equipment would not result in foreseeable direct impacts to the River Corridor access. The relationship of the Study Area communities with the river would not be affected in terms of transportation and access to lands and water used for subsistence.

The Proposed Action would provide residents of the five communities with new access to high-speed internet, which can lead to substantial improvements to economic opportunities and quality of life. New internet access can also help to reduce the trend of people leaving the area to pursue educational, economic, or other opportunities outside the area.

The Proposed Action would not result in disproportionate impacts to the EJ populations in the socioeconomic Study Area. Access to and the significant positive benefits associated with the new high-speed broadband network would be available to all residents including the EJ populations within the affected communities.

5.12.2 No Action Alternative

Reliable and affordable internet access is a staple of modern life in the United States. Implementation of the No Action alternative would not result in construction of the new high-speed broadband network associated with the Proposed Action. Internet access within the socioeconomic Study Area would continue to be slow and expensive compared to what would be achieved with the Proposed Action. With the lack of a high-speed broadband network within the Study Area, new economic and educational opportunities would continue to be delayed. The socioeconomic character of the Study Area would remain as is, but opportunities for improved quality of life would not occur. Overall, if the proposed fiber optic cable is not constructed and operated, there would be a significant adverse impact to the study area because of the lost opportunities the new cable would provide to residents and communities.

5.13 Human Health and Safety

5.13.1 Construction and Operation

Prior to commencement of any activity in a shipping fairway in a navigable waterway, a request for a local Notice to Mariners (NOTMAR) would be issued to the USCG District Office. This would be accomplished by submitting a narrative description along with a drawing of intended vessel/barge layout, together with details of the work including but not limited to work hours, a safety lighting plan, and an anchor plan. The conduit end in the river would be located with submeter accuracy and provided to the USCG as a NOTMAR. Similarly, the terrestrial construction requires submittal of a highway safety plan to DOT&PF describing signage, lane closures and any traffic restrictions and safety modifications. Flaggers and safety supervisors would be on site during all operations to verify procedures are followed for the safety of vehicles on the road system and boaters on the Yukon River.

The river channel and geometry of the Yukon River are constantly changing and there is the potential that the cable is exposed by river erosion. If the FOC is exposed due to erosion or natural forces such as ice movement, there is the potential for hazards to navigation. Small craft would be especially vulnerable to FOC in the river channel. Any hazards would be short term. Any disruption of service would be immediately known, and the system can pinpoint the location. The repair and mitigation of any hazard to navigation would be completed as described in Section 3.2.6.2.

There are no anticipated conflicts with, or impacts to, human health and/or safety as a result of construction, operation, or maintenance of the components of the Proposed Action. The Proposed Action alignment is generally located in remote areas where there is a very low probability of encountering contaminated soil or water, or other materials, the release of which to the environment can pose a safety hazard for workers or a health risk to the public. A low potential exists for contaminated soil to be encountered during excavation or other ground-disturbing activities in discrete areas (e.g., the five communities, other inhabited areas, areas subject to past mining actions). If encountered, contaminated soil would be segregated, sampled, and tested to determine appropriate treatment and disposal options. Further, work would be performed in accordance with relevant OSHA standards, and fugitive dust measures would be implemented; these activities, as required by law or in regulation, would be protective of workers and public health.

Similarly, there is a low potential for encountering contaminated groundwater during excavation or other ground-disturbing activities. If potentially contaminated groundwater is encountered, groundwater samples would be collected and tested to determine appropriate treatment and disposal. Hazardous materials would be transported, used, and disposed of in accordance with applicable rules and regulations that are protective of human health and safety.

No acutely hazardous materials would be used or stored on-location during construction of the Proposed Action. Construction would require the use of gasoline, diesel fuel, oil, solvents, and lubricants associated with vehicles and construction activities. The most likely incidents involving these hazardous materials are associated with minor spills or drips. An inadvertent release can also occur from the use of hazardous materials during construction within temporary storage sites, while transporting hazardous materials, or during refueling and servicing of equipment. Hazardous materials management would include compliance with the SWPPP(s) developed for the project and implementation of BMPs related to fueling and the handling, use and storage of hazardous materials. All transport of hazardous materials would comply with applicable laws, rules, and regulations, and would use applicable BMPs, including the acquisition of required shipping papers, package marking, labeling, transport vehicle placarding, training, and registrations. The construction contractor would implement proper hazardous materials management activities, which would include preparation and implementation of plan(s) such as a Hazardous Materials and Waste Management Plan, before field construction activities begin that would outline the proper procedures for the handling, use, storage, and disposal of hazardous materials.

The Proposed Action may, in some instances, reduce potential impacts to human health and safety. Reliable hard-wired broadband access would facilitate access to telemedicine services and distance education opportunities, for instance; improved access to medical professionals and increased rates of education are both key to improved overall health and wellbeing. Access to telemedicine services for acute conditions or emergency situations may improve survivability in these remote communities. Further, broadband access may improve cross-generational and cross-community interactions, improving the communication of traditional knowledge and promoting increased individual and community-level wellbeing.

5.13.2 No Action Alternative

No human health and safety-related impacts beyond those currently present would be realized under the No Action Alternative.

5.14 Cumulative Impacts

5.14.1 Terrestrial Corridor

Review of the BLM's ePlanning system did not identify any projects that would result in construction activities that overlap the Terrestrial Corridor; a single BLM-proposed activity was identified by BLM staff. Review of the DOT&PF Northern Region website identified the potentially cumulative projects presented in Table 5-8. It should be noted that projects not subject to federal, state, or local permitting, and not performed by or under contract to a federal or state agency, may occur on private lands along the Terrestrial Corridor. Given the transient nature of work along the Terrestrial Corridor, no cumulative impacts would be expected to be realized from these projects and the Proposed Action.

The DOT&PF projects listed in Table 5-9 would be constructed, in part, in 2024 and 2025, and thus would temporally overlap the Proposed Action. No cumulative impacts are anticipated from the Dalton

Highway MP 0-9 Reconstruction project: this project would result in a new section of the Dalton Highway being constructed, while the Proposed Action would be installed in the existing section of the Dalton Highway, and thus no spatial overlap of work would result in this area. Work under the Dalton Highway MP 0-9 Reconstruction project and the Proposed Action would overlap for a distance of approximately 2.5 miles; in this section, the Dalton Highway MP 0-9 Reconstruction project would widen the road and install culverts and improve drainage features as needed. In this section, the FOC under the Proposed Action would be installed before construction on the Dalton Highway MP 0-9 Reconstruction project begins, and thus there would be no cumulative impacts generated.

The Proposed Action and Dalton Highway MP 18-37 Reconstruction project overlap spatially and temporally; during the 2024–2025 construction period anticipated for the Proposed Action, work associated with the Dalton Highway MP 18–37 Reconstruction project is scheduled to include construction of a new bridge, removal of a temporary detour bridge, culvert installation, and embankment construction. Construction of the Proposed Action in this area would be coordinated with DOT&PF to avoid temporal impacts where possible; through compliance by both parties with applicable federal and state laws intended to be protective of the environment and human health, no cumulative resource impacts are anticipated.

The Proposed Action and the BLM's work to realign and shift the entrance driveway to the Wickersham Dome Trailhead would overlap spatially and may overlap temporally. The BLM's work would include construction of a new access road driveway, removal of the existing access road driveway, and expansion of a parking area. Construction of the Proposed Action in this area would be coordinated with BLM to avoid temporal impacts where possible; through compliance by both parties with applicable federal and state laws intended to be protective of the environment and human health, no cumulative resource impacts are anticipated.

Table 5-9. Planned projects along the Terrestrial Corridor.

Project Name	Description	Overlaps
Dalton Highway MP 0-9 Reconstruction	To improve safety and efficiency for commercial vehicles, relocate the road to more level terrain below the ridge lines it currently follows.	Terrestrial Corridor
Dalton Highway MP 18-37 Reconstruction	To enhance safety, performance, and reduce DOT&PF's maintenance costs, reconstruct the Dalton Highway including drainage improvements, widening, and replacement of Hess Creek Bridge.	Terrestrial Corridor
Elliott Highway MP 28	Realign/shift access road driveway leading to Wickersham Dome Trailhead and enlarge the parking area.	Terrestrial Corridor

5.14.2 River Corridor

5.14.2.1 Communities

Review of the BLM's ePlanning system identified several potentially cumulative projects as presented in Table 5-10. It should be noted that projects not subject to federal or state permitting, and not performed by or under contract to federal or state agencies, are likely to occur in each community during the construction of the Proposed Action. Most of those projects, like those presented in Table 5-10, are small in scope. Given the small scope of Proposed Action-related work in each community, the generally small scope of other projects performed in each community, and compliance with applicable federal and state laws intended to be protective of the environment and human health, no cumulative impacts are anticipated.

Table 5-10. Planned projects along the River Corridor.

Project Name	Description	Overlaps
Fort Yukon Fire Station Sewer Connection	Connect the Fort Yukon Fire Station sewer system, for the management of grey water, to the City of Fort Yukon's public sewer system.	River Corridor
Fort Yukon AFS Installation of Lifewater Sewage Treatment Plant	Installation of Lifewater sewage treatment plant at BLM – Alaska Fire Service Fire Guard Station	River Corridor
Rampart Hazardous Fuels Reduction	Hazardous fuels reduction in and near the Village of Rampart.	River Corridor

5.14.2.2 Yukon River

No other in-river projects have been identified that overlap the Proposed Action spatially or temporally, and therefore the Proposed Action would not contribute to any cumulative impacts.

5.14.3 Canyon Bypass

Given the remote nature of the Canyon Bypass, it is anticipated that no other projects would occur along the bypass route in a timeframe when cumulative impacts may be realized and, therefore, the Proposed Action would not contribute to any cumulative impacts.

6 Applicable Environmental Permits and Regulatory Requirements

A listing of the primary applicable environment permitting, and regulatory requirements is presented in Table 6-1.

Table 6-1. Potential applicable statutory, regulatory, and other requirements.

Potentially Applicable Requirement	Relevant Project Information
All Resources	
National Environmental Policy Act (NEPA) of 1969 42 U.S.C. § 4321 et seq.	NEPA EA and associated public involvement procedures are underway.
Vegetation, Wildlife, and Fish	
Endangered Species Act of 1973 16 U.S.C. § 1531 et seq.	No populations or individuals of Endangered, Threatened, or Candidate species would be impacted by the Proposed Action, and thus the Proposed Action would be compliant with the Act.
Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) of 1976 16 U.S.C. 1801 et seq.	No long term or measurable effects to EFH are anticipated, and thus the Proposed Action would be compliant with the Act. Conservation Recommendations and correspondence with the NMFS is included in Appendix H.
Bald Eagle and Golden Eagle Protection Act (Eagle Act) of 1940 16 U.S.C. § 668-668d	The project as currently proposed would have no effect on Bald or Golden Eagle populations and may have low effects on individuals. Eagle and eagle nest surveys would be completed prior to construction and ground disturbance.
Migratory Bird Treaty Act (MBTA) of 1918 16 U.S.C. § 703-712 Responsibilities to Federal Agencies to Protect Migratory Birds Executive Order 13186	The project as currently proposed would have no effect on migratory bird populations and may have low effects on migratory bird individuals. Adherence to the USFWS Timing Recommendations for Land Disturbance and Vegetation Clearing.
Fishway Act AS16.05.841	ADF&G would review project plans and issue Fish Habitat Permits as required that would ensure the maintenance of fish passage in any fish bearing waters.
Anadromous Fish Act AS16.05.871	ADF&G would review project plans and issue Fish Habitat Permits for all activities in anadromous waterbodies. Permits would be conditioned to ensure the proper protection of anadromous fish and their habitats.
Fish and Wildlife Conservation Act 16 U.S.C. § 2901 et seq. Fish and Wildlife Coordination Act 16 U.S.C. § 661 et seq.	The project as currently proposed would have no effect on wildlife populations and may have low effects on wildlife species individuals.
Waters, Wetlands, and Floodplain Protection	
Clean Water Act 33 U.S.C. § 1251 et seq.	The Project Proponent would obtain all necessary permits for temporary and permanent impacts to wetlands. Correspondence with the USACE is included in Appendix I.

Potentially Applicable Requirement	Relevant Project Information
Floodplain/Wetlands Environmental Review Requirements 10 CFR 1022.12	The Project Proponent would obtain all necessary permits for temporary and permanent impacts to wetlands.
Floodplain Management Executive Order 11988	The Proposed Action would not constitute an incompatible development in a floodplain, would not result in an adverse effect to a floodplain, and would not be impacted by being located in a floodplain. The only practicable routing requires siting in a floodplain. Therefore, the Proposed Action would not be inconsistent with the Order.
Protection of Wetlands Executive Order 11990	The Project Proponent would obtain all necessary permits for temporary and permanent impacts to wetlands.
Coastal Zone Management Act (CZMA) 16 U.S.C. § 1451 et seq.	The CZMA is not applicable to the Proposed Action.
Air Quality	
The Clean Air Act, as revised in 1990 42 U.S.C. § 4701	Work under the Proposed Action that is located within the Fairbanks PM2.5 Nonattainment Area would not inhibit activities addressing non-attainment, and thus the Proposed Action would be compliant with the Act.
Final Mandatory Reporting of Greenhouse Gases Rule 40 CFR 98	The Proposed Action is not subject to the Rule per the reporting requirements in 40 CFR 98 Subpart A.
Cultural and Historic Resources	
Antiquities Act of 1906 16 U.S.C. § 431-433 Historic Sites Act of 1935 16 U.S.C. § 461-467 National Historic Preservation Act (NHPA), as amended, inclusive of Section 106 54 U.S.C. § 306108 et seq. Archaeological Data Preservation Act of 1974 (16 U.S.C. § 469 – 469-1) Archaeological Resources Protection Act of 1979, as amended 16 U.S.C. § 469 a-c Native American Graves Protection and Repatriation Act 25 U.S.C. § 3001 et seq. Indian Sacred Sites Executive Order 13007	Impacts to cultural resources are not anticipated. A PA is being drafted. The Project Proponent would utilize an unanticipated discovery plan which is outlined in the CRMP. In the low likelihood an unanticipated discovery occurs, construction and stop and proper predetermined protocols will execute a project specific PA and CRMP are included in Appendix L.

Potentially Applicable Requirement	Relevant Project Information
American Indian Religious Freedom Act of 1978 (42 U.S.C. § 1996)	
Noise, Public Health, and Safety	
Noise Control Act of 1972 42 U.S.C. § 4901 et seq.	The Proposed Action would utilize equipment that is compliant with the Act.
Spill Prevention Control and Countermeasures Rule 40 CFR 112.	The Proposed Action proponent would develop, and implement, a Spill Prevention Control and Countermeasures Plan as is determined necessary.
Environmental Justice	
Environmental Justice	No additional requirements apply to the project for Environmental Justice. Impacts are anticipated to benefit Environmental Justice communities.
Land Management	
Alaska National Interest Lands Conservation Act (ANILCA) of 1980; Title 8	The Proposed Action would not impact subsistence uses.
Bureau of Land Management, Eastern Interior White Mountains Record of Decision and Approved Resource Management Plan	The Proposed Action would conform with the Plan through implementation of applicable Standard Operating Procedures contained in the Plan and/or terms and conditions included in the ROW grant.
Bureau of Land Management, Utility Corridor Resource Management Plan	The Proposed Action would conform with the Plan through implementation of applicable Stipulations contained in the Plan and/or terms and conditions included in the ROW grant.

7 Consultations

7.1 Agency Scoping

A list of the agencies and individuals that were contacted in the process of developing the Alaska FiberOptic Project and the EA is provided below in Table 7-1. Formal documentation with other agencies would be updated as the permitting and consultation process is completed. Documentation relating to public and agency consultation completed to date is in Appendix M.

Table 7-1. List of agencies contacted.

Agency and Name	Consultation	Status
Pre-Application Meeting, Multiple Agencies	NEPA	Completed April 6, 2023
Federal		
NMFS Luke Byker	Essential Fish Habitat	Completed. Concurrence received March 14, 2024
BLM Sheri Wilson	Easement Authorization (Standard Form (SF) 299)	In Progress
OHA SHPO McKenzie Herring	Section 106 National Historic Preservation Consultation	In Progress
USACE Carolyn Farmer	Section 404 Wetland and Water of the U.S. & Section 10 Rivers and Harbors Act	In Progress, Permit Submitted to USACE April 10, 2024
State		
DNR, Division of Land Robert Sackinger	Land Easement Authorization	In Progress
DOT&PF Garrett Carter	Easement Utility Permit	Preparing Application(s) for Submittal
ADF&G Audra Brase	Title 16 Fish Habitat	Preparing Application(s) for Submittal
DNR, Division of Water Lesli Schick	Temporary Water Use Authorization	Preparing Application(s) for Submittal

7.2 Public Scoping

Initially, as part of Doyon's grant application submitted in 2021, letters of resolution and support were obtained from communities in the project area, the Tribal entities, and the native corporations as well as other entities such as the Tanana Chiefs Conference, Interior Regional Housing Authority, Senator Click Bishop, Yukon Flats School District, and Yukon-Koyukuk School District. These letters provided general support for the project and stakeholders who would most likely be impacted by the proposed action. Since receiving the grant, Doyon has maintained regular communication with their stakeholders through the publication of mailers. Copies of the letters and general project communication are attached.

After the grant was received and project design initiated, Doyon completed two trips to each of the five communities where hardwired broadband service would be provided. The goal of these trips was to update the communities on the project status and answer any questions. The first community visit and meetings occurred in May 2023 and the second meeting occurred in August 2023. Copies of the public notices, PowerPoint presentation slides, sign-in sheets and meeting notes is in Appendix M.

8 List of Preparers

The following contributed to the preparation of this document.

Table 8-1. List of Preparers.

Name	Affiliation	Role
Bill Morris	Owl Ridge	Environmental Analysis, EA Review
Brooke Therrien	Owl Ridge	Project Manager, EA Review
Conrad Mulligan	Arcadis	Environmental Analysis, Primary Author
Glenn Ruckhaus	Owl Ridge	Environmental Analysis, EA Review
Kalin Seaton	Owl Ridge	GIS and Figures
Mike Stanwood	Owl Ridge	Socioeconomic Analysis
Paul Cartier	Owl Ridge	Data Manager & GIS
Susan Walker	Owl Ridge	Technical Editor

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Figures

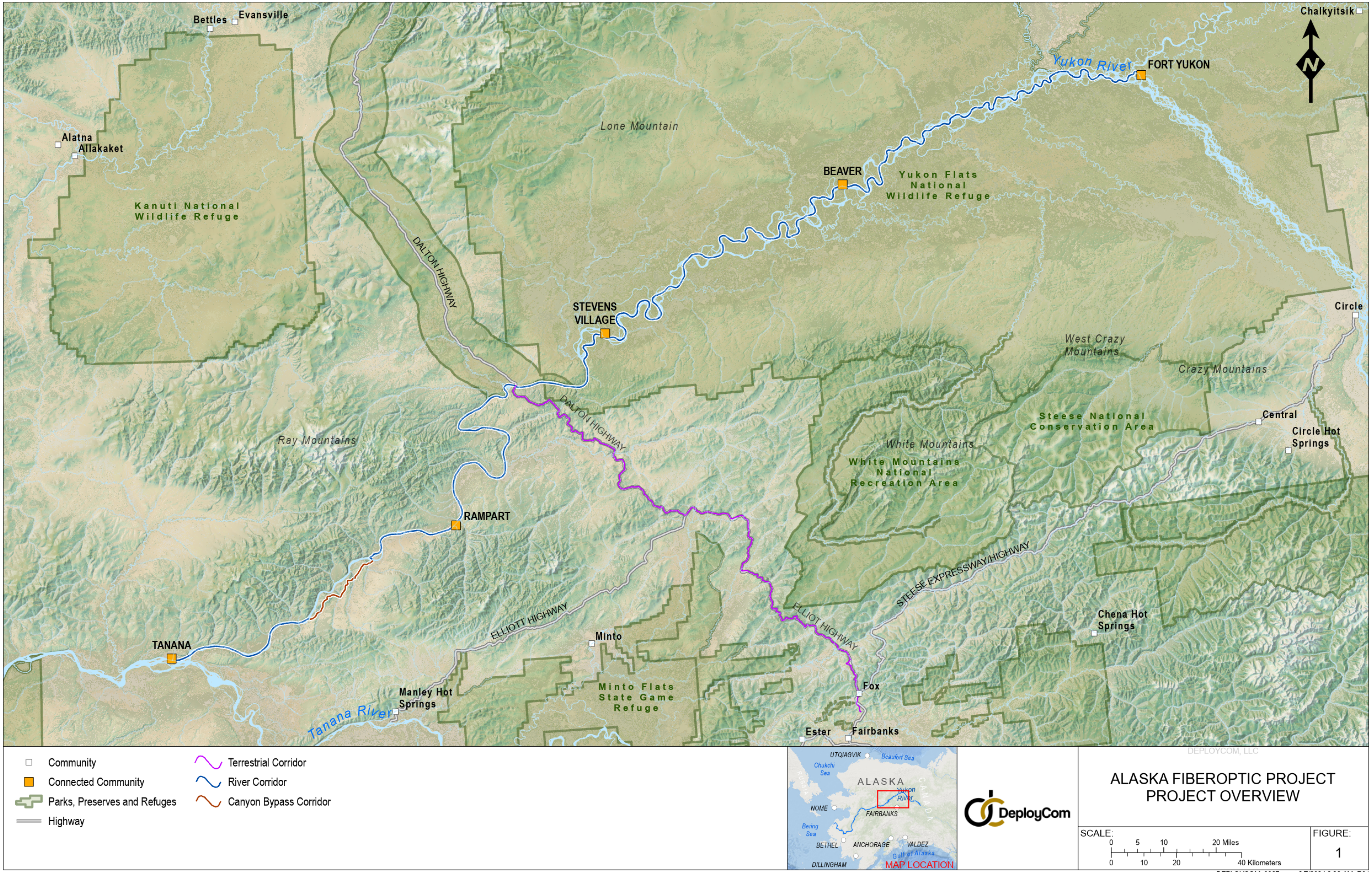
Bettles
Evansville
Chalkyitsik
Yukon River
FORT YUKON
Alatna
Allakaket
Lone Mountain
Kanuti National Wildlife Refuge
BEAVER
Yukon Flats National Wildlife Refuge
DALTON HIGHWAY
STEVENS VILLAGE
Circle
West Crazy Mountains
Crazy Mountains
Ray Mountains
Central
Circle Hot Springs
Steese National Conservation Area
White Mountains
White Mountains National Recreation Area
RAMPART
STEESE EXPRESSWAY/HIGHWAY
ELLIOTT HIGHWAY
Chena Hot Springs
Minto
TANANA
Fox
Manley Hot Springs
Minto Flats State Game Refuge
Tanana River
Ester
Fairbanks
Community
Connected Community
Parks, Preserves and Refuges
Highway
Terrestrial Corridor
River Corridor
Canyon Bypass Corridor
UTQIAGVIK
Beaufort Sea
Chukchi Sea
ALASKA
CANADA
Yukon River
NOME
FAIRBANKS
Bering Sea
BETHEL
ANCHORAGE
VALDEZ
Gulf of Alaska
DILLINGHAM
MAP LOCATION
DeployCom
DEPLOYCOM, LLC
ALASKA FIBEROPTIC PROJECT
PROJECT OVERVIEW
SCALE:
0 5 10 20 Miles
0 10 20 40 Kilometers
FIGURE:
1
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Figure 2. Typical mulching equipment.

Figure 3. Typical vibratory plow.

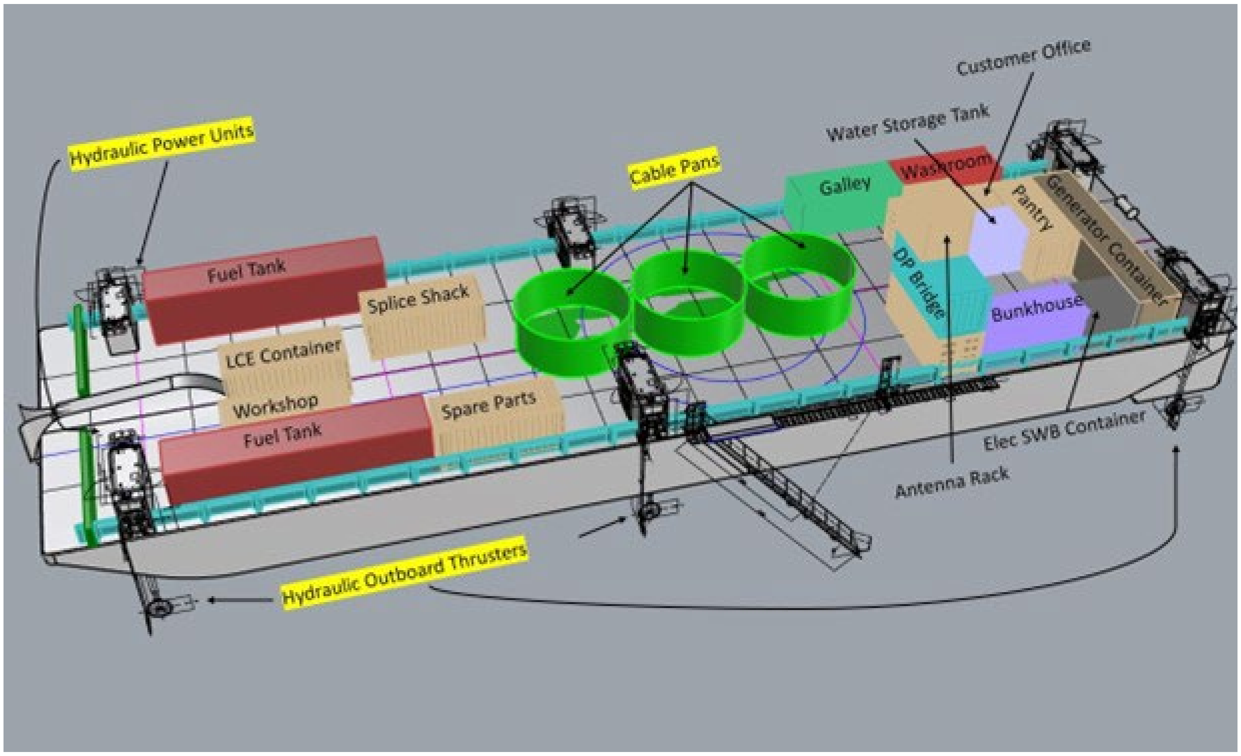


Figure 4. Graphic of the cable lay barge (CLB).

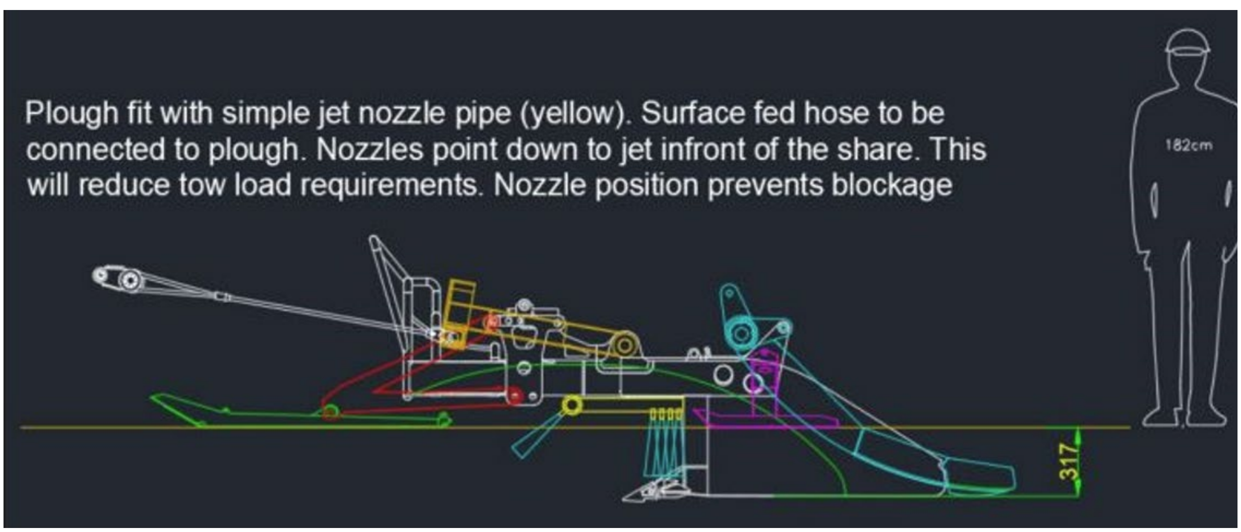


Figure 5. Graphic of the scratch plow.

Figure 6. Graphic of the jet plow.

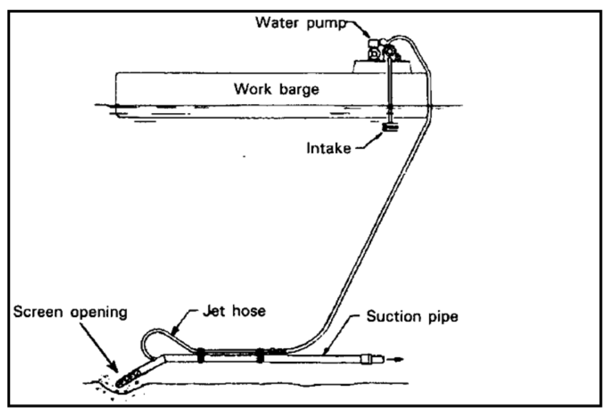


Figure 7. Photo and graphic examples of diver jetting.

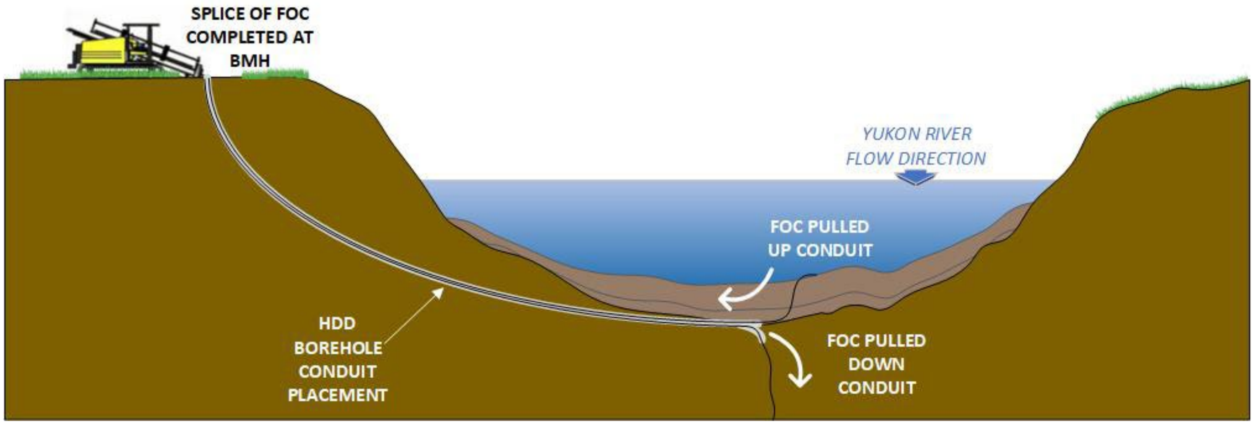
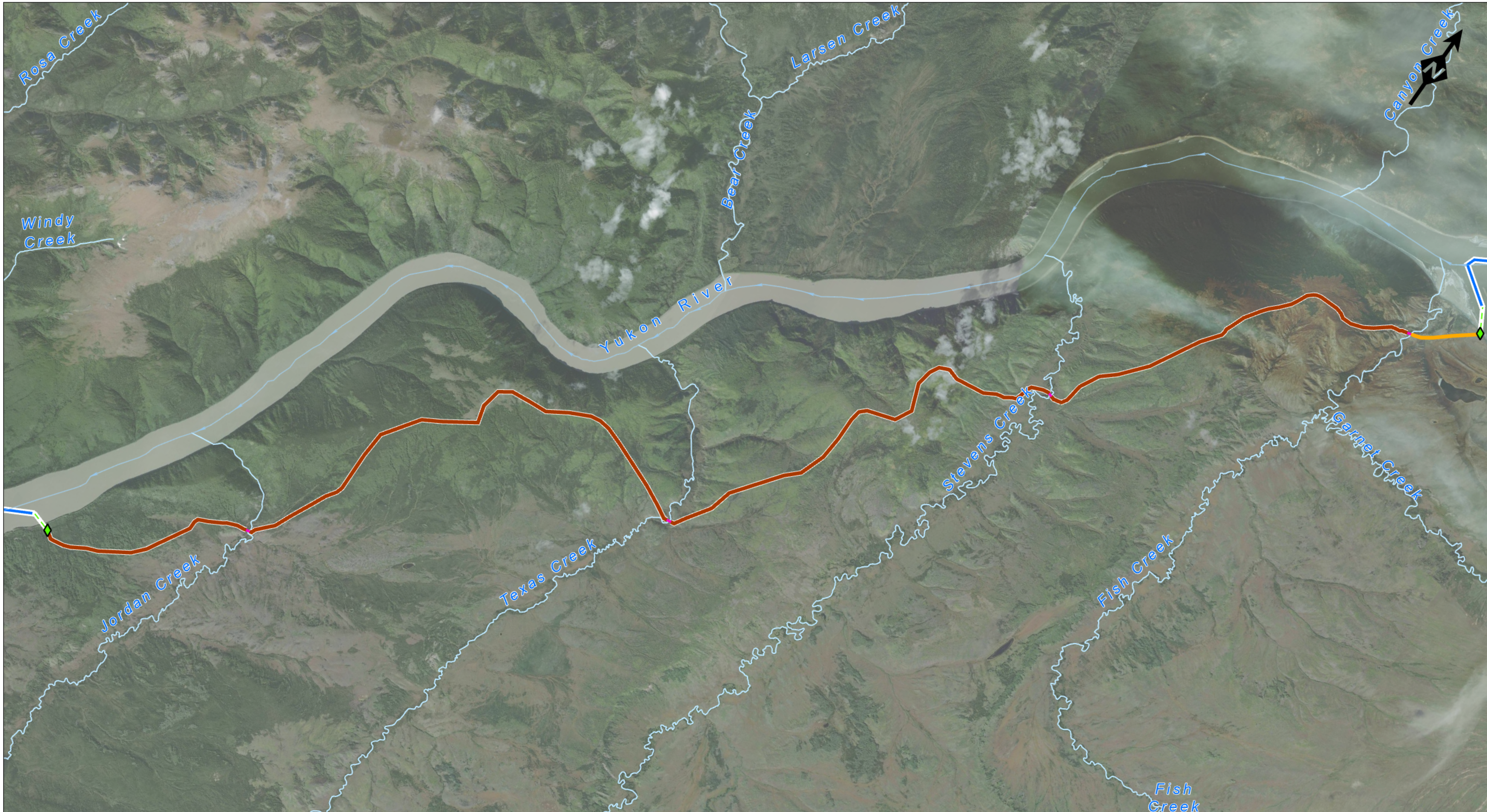


Figure 8. Graphic of horizontal directional drilling.

Figure 9. Typical all terrain Ditch Witch.

Figure 10. Photo of a typical beach manhole (BMH).

Figure 11. Photo of a typical communications shelter.

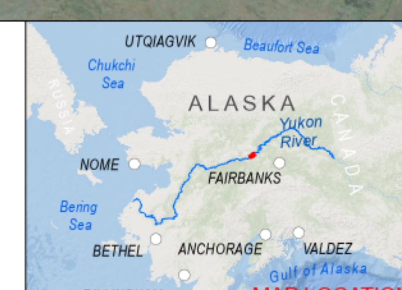


Alignment (Install Type)

- Scratch Plow
- Approximate Fiber Optic HDD Bore Alignment
- Proposed BMH and HDD Location

Overland Bypass (Install Type)

- HDD Bore
- Summer Trench
- Surface Lay



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ALASKA FIBEROPTIC PROJECT
CANYON BYPASS
(TERRESTRIAL)

SCALE: 0 0.5 1 2 Miles; 0 0.75 1.5 3 Kilometers

FIGURE: 12

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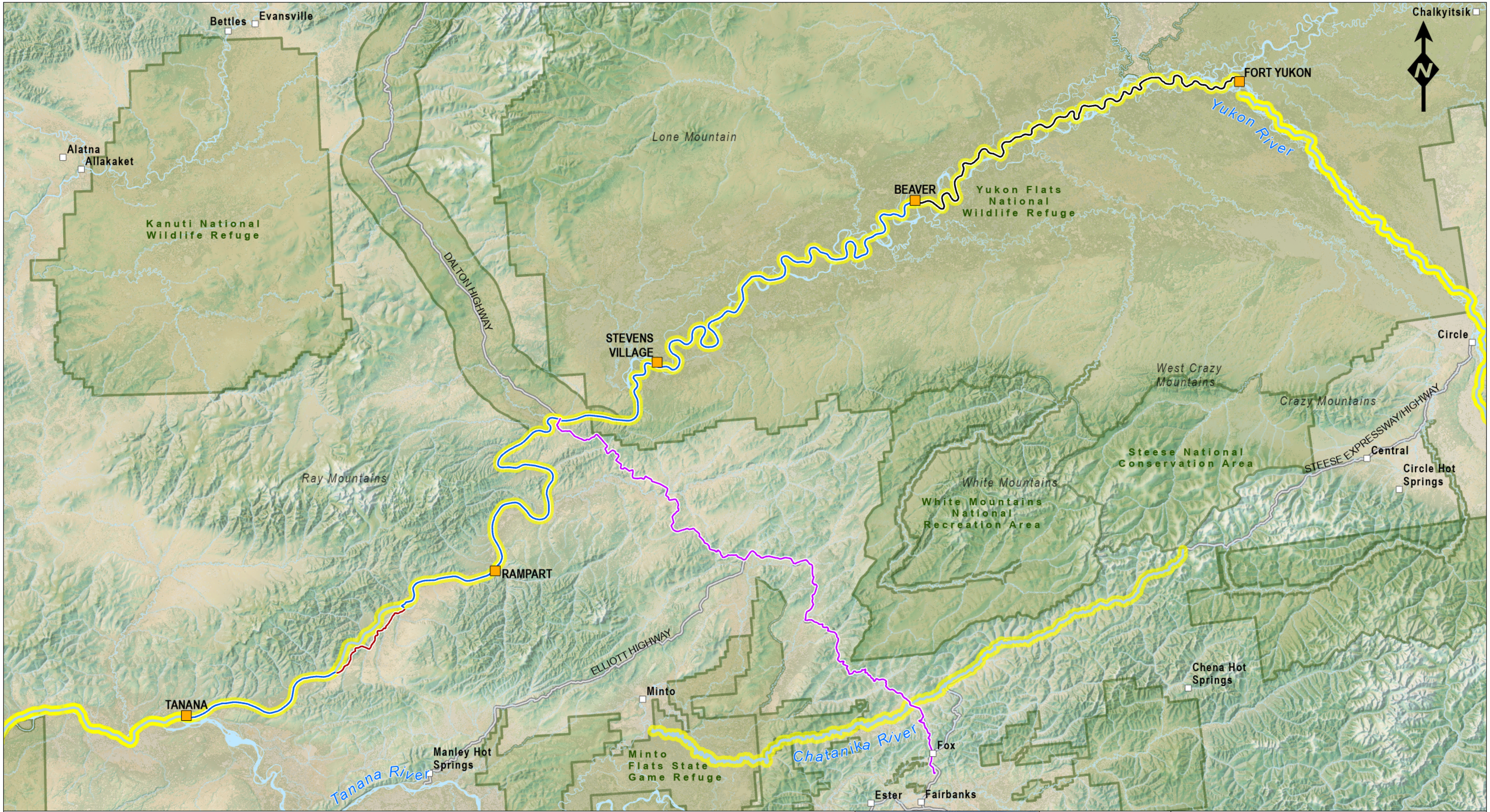

Alignment (Install Type)

- Scratch Plow
- Canyon Bypass (Terrestrial)
- Jet Plow
- Terrestrial
- Navigable Portions of Yukon and Chatanika Rivers
- Community
- Connected Community
- Parks, Preserves and Refuges
- Highway

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ALASKA FIBEROPTIC PROJECT
FORT YUKON TO TANANA (IN RIVER)
NAVIGABLE WATERS

SCALE: 0 5 10 20 Miles; 0 10 20 40 Kilometers

FIGURE: 13

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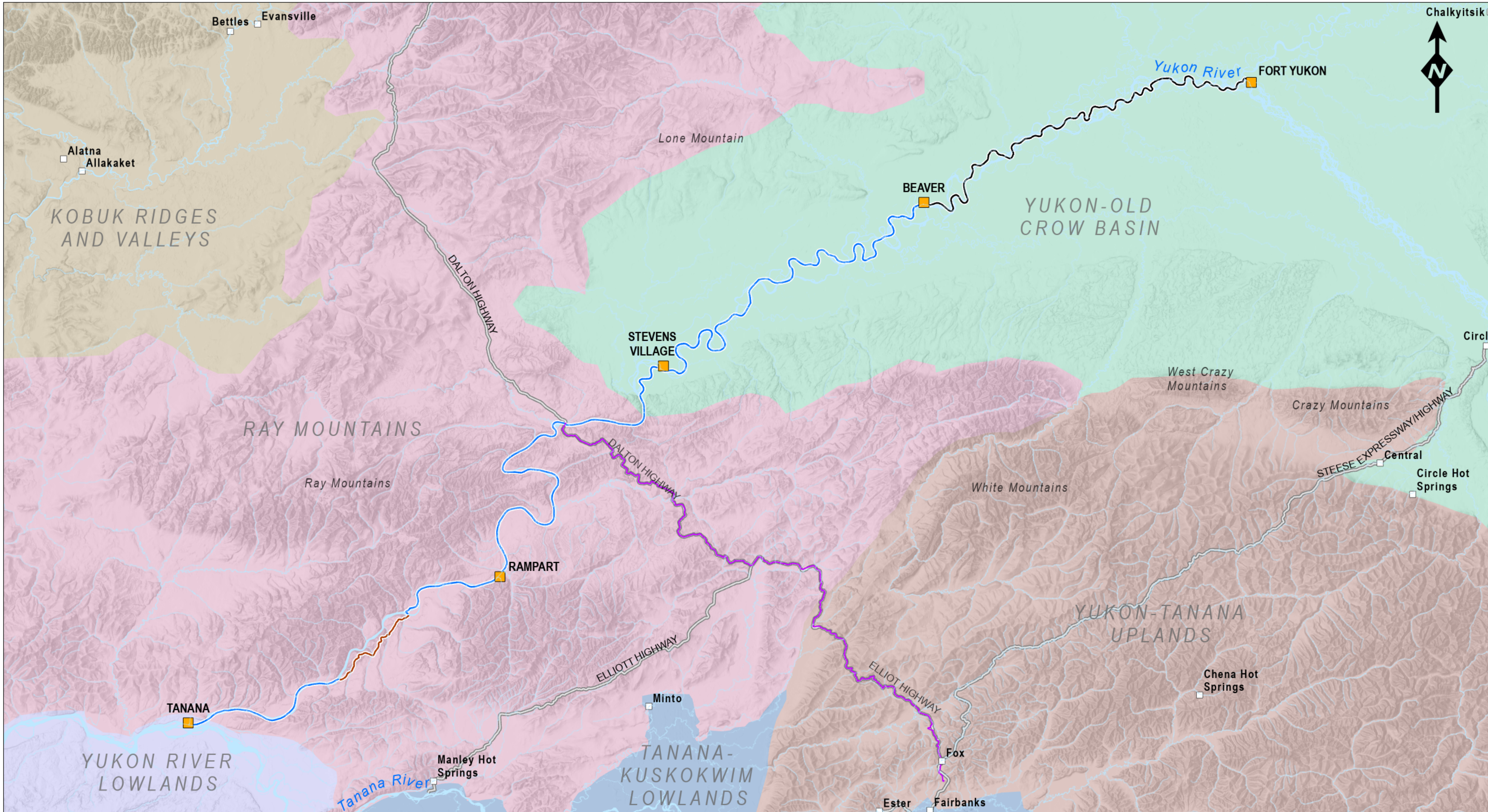

□	Community
■	Connected Community
═	Highway

Alignment (Install Type)

- Scratch Plow
- Canyon Bypass (Terrestrial)
- Jet Plow
- Terrestrial

Ecoregion Name

- Kobuk Ridges and Valleys
- Ray Mountains
- Tanana-Kuskokwim Lowlands
- Yukon River Lowlands
- Yukon-Old Crow Basin
- Yukon-Tanana Uplands

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ALASKA FIBEROPTIC PROJECT ECOREGIONS

SCALE: 0 5 10 20 Miles; 0 10 20 40 Kilometers

FIGURE: 14

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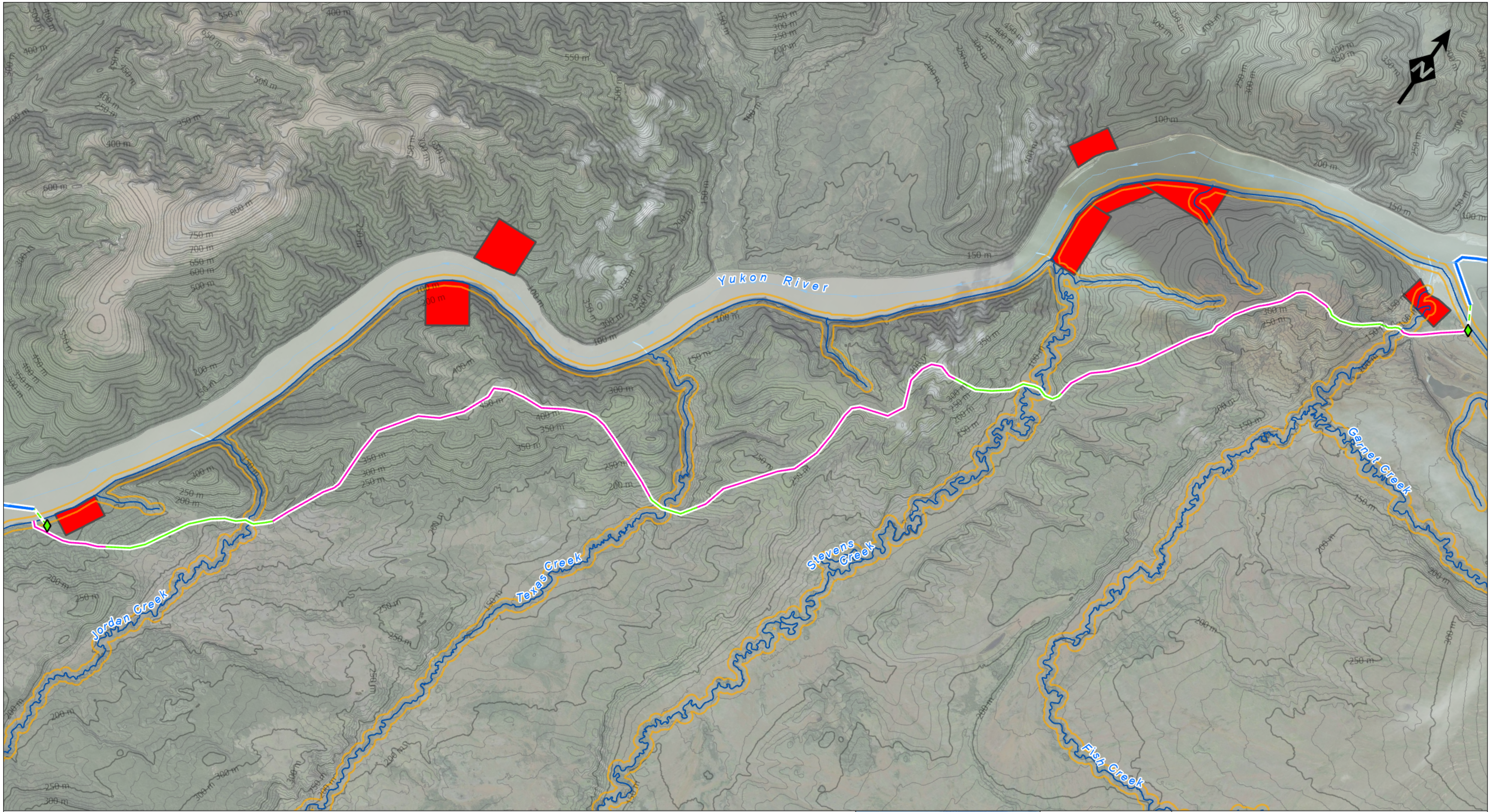

IFSAR Contour (50 m)
NHD Stream/River
Native Allotment
NHD Stream/River 100 meter buffer

Cultural Probability
Low
Moderate/High

Alignment (Install Type)
Scratch Plow
Proposed HDD Bore Alignment
Proposed BMH and HDD Location

DeployCom

ALASKA FIBEROPTIC PROJECT
CANYON BYPASS (TERRESTRIAL)
CULTURAL RESOURCE
PROBABILITY AREAS

SCALE: 0 0.5 1 2 Miles
0 0.75 1.5 3 Kilometers

FIGURE: 15

DEPLOYCOM_0073.aprx, 3/7/2024 9:20 AM, R02

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