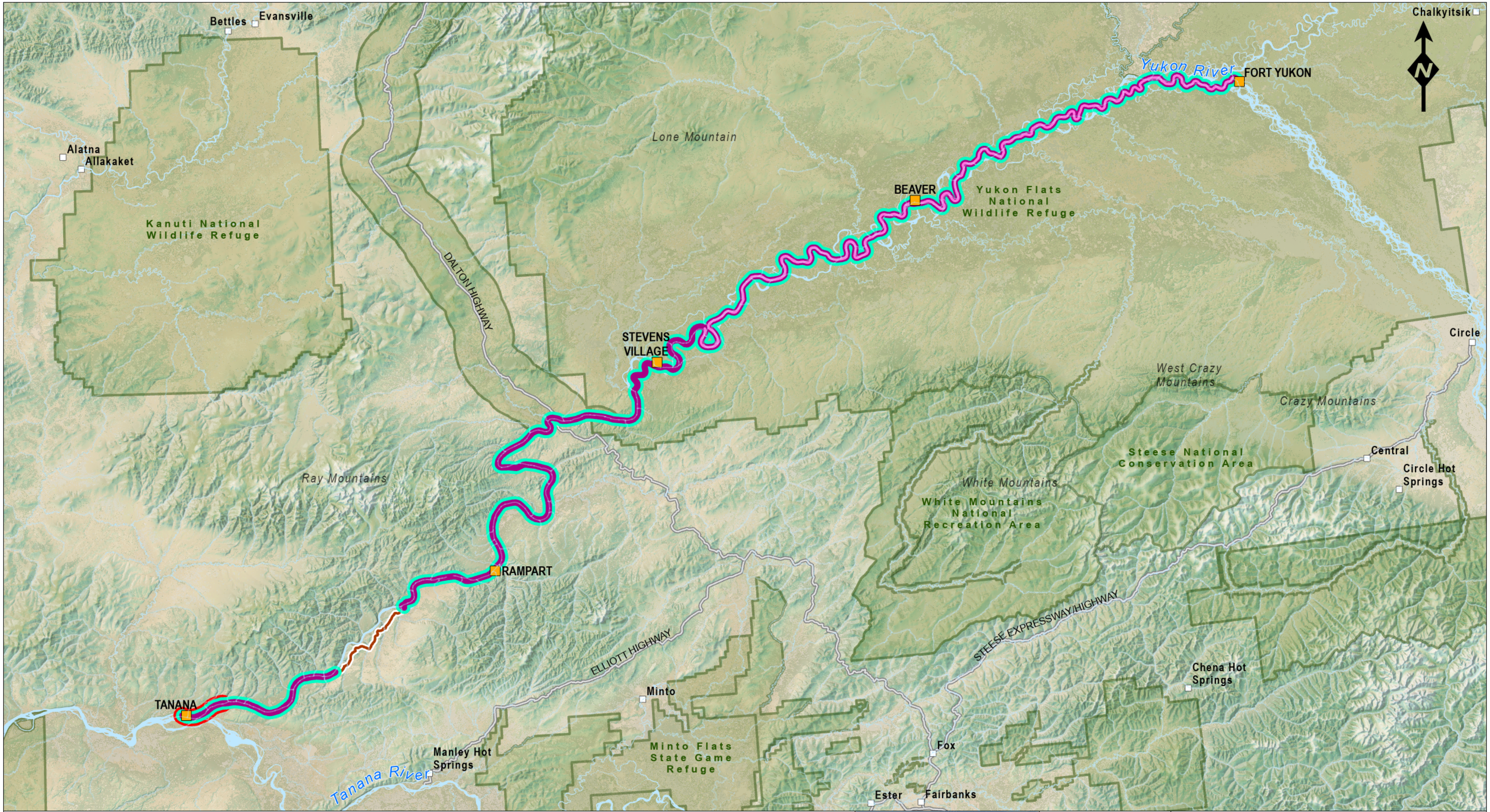
Appendix H – EFH Consultation

Contents

- Essential Fish Habitat Mapset
- National Marine Fisheries Service (NMFS) Concurrence (March 14, 2024)
- Conservation Recommendations Modification Letter to NMFS (March 12, 2024)
- National Marine Fisheries Service Conservation Recommendations (February 14, 2024)
- Essential Fish Habitat Update Memo (January 5, 2024)
- Essential Fish Habitat Assessment (November 2023)



Community	
Connected Community	
Parks, Preserves and Refuges	
Highway	
Alignment (Install Type)	
Canyon Bypass (Terrestrial)	

Essential Fish Habitat (Use,Species)

- Spawning,Bering cisco, Broad whitefish
- Migratory,Inconnu, Bering cisco, Broad whitefish
- Migratory,Chinook, Coho, Chum
- Migratory,Sockeye

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ALASKA FIBEROPTIC PROJECT FORT YUKON TO TANANA (IN RIVER) ESSENTIAL FISH HABITAT

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

SHEET: A

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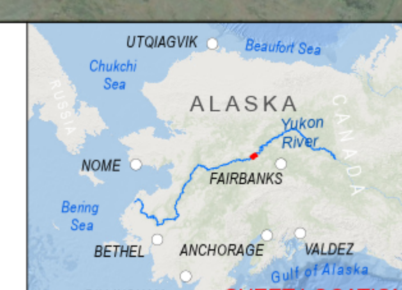
Alignment (Install Type)
- Scratch Plow
- Proposed BMH and HDD Location
- Proposed HDD Bore Alignment

Overland Bypass (Install Type)
- HDD Bore
- Summer Trench
- Surface Lay

Essential Fish Habitat (Species, Life Stage)
- humpback whitefish,present
- humpback whitefish,rearing
- inconnu,present
- chum salmon,present
- Chinook salmon,present
- Chinook salmon,rearing



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ALASKA FIBEROPTIC PROJECT
CANYON BYPASS (TERRESTRIAL)
ESSENTIAL FISH HABITAT

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

SHEET:
B

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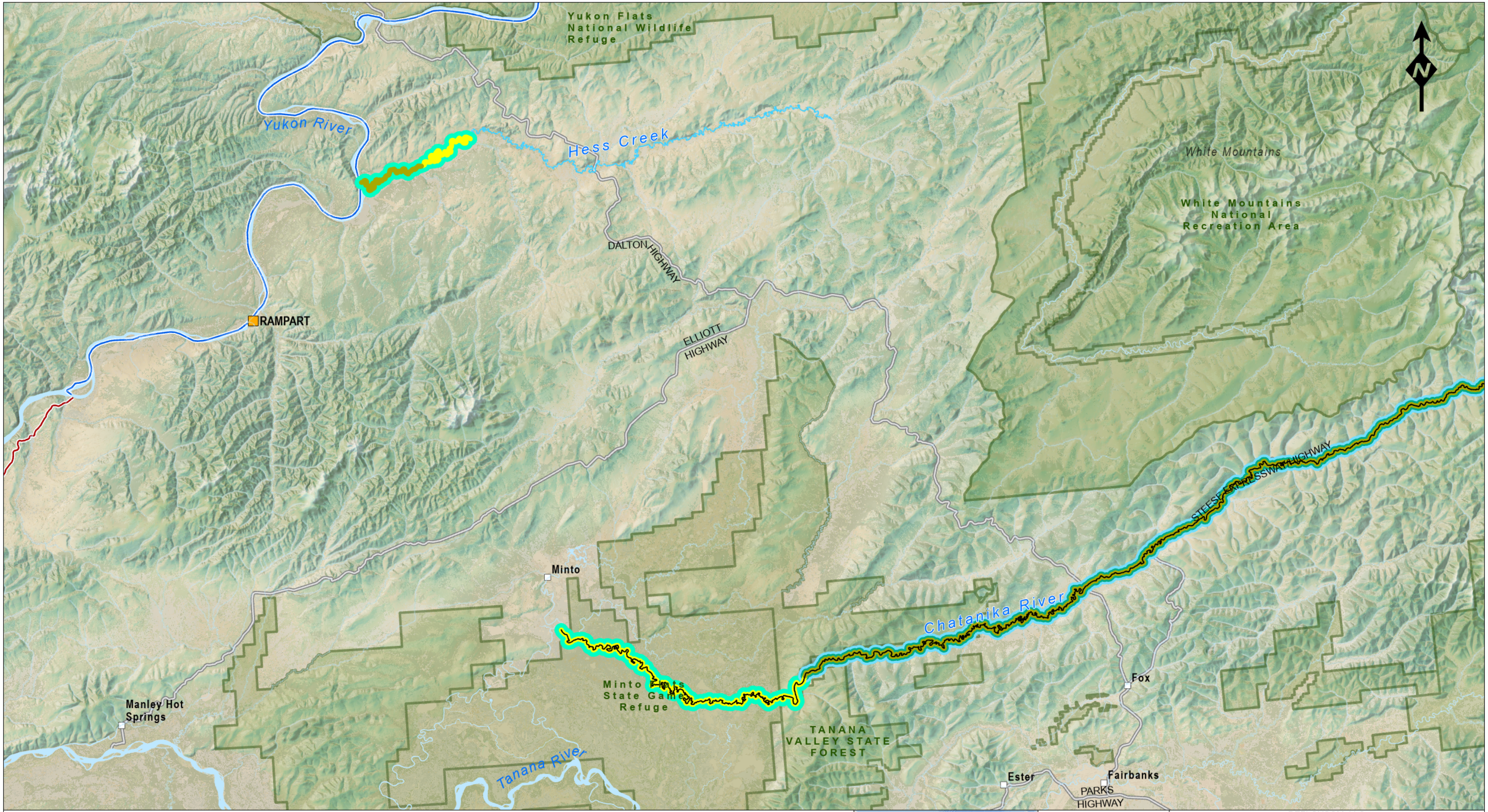


□ Community
Segment 1 Connected Community
Parks, Preserves and Refuges
Highway

Alignment (Install Type)
Scratch Plow
Canyon Bypass (Terrestrial)

Essential Fish Habitat (Species, Life Stage)
coho salmon,present
chum salmon,spawning
chum salmon,present
Chinook salmon,spawning
Chinook salmon,rearing
Chinook salmon,present

DeployCom

DEPLOYCOM, LLC

ALASKA FIBEROPTIC PROJECT
FAIRBANKS TO YUKON RIVER (TERRESTRIAL)
ESSENTIAL FISH HABITAT

SCALE: 0 4 8 16 Miles; 0 5 10 20 Kilometers

SHEET: C

DEPLOYCOM_0077.aprx, 3/9/2024 1:16 PM, R01

From: Pereira, Amanda
To: Brooke Therrien; Allen Todd; Doug Hudson; Andrew Bielakowski; Paul Cartier; Glenn Ruckhaus
Cc: Joshua Standing Horse; Fitzpatrick, Joshua
Subject: FW: Alaska Fiber Optic Network (Doyon, Ltd.) EFH Conservation Measures response
Date: Friday, March 15, 2024 3:37:35 AM

[External]

Good morning all –

Please see the response from NMFS, below. Our EFH process is concluded, they accept the proposed modifications to the conservation measures. Thanks and please let me know if you have any questions,

Sincerely,

Amanda

Amanda Pereira (she/her)
Environmental Program Officer
National Telecommunications and Information Administration
Office of Internet Connectivity and Growth

Email: apereira@ntia.gov
Phone: 202.834.4016

From: Lucas Byker - NOAA Federal <lucas.byker@noaa.gov>
Sent: Thursday, March 14, 2024 2:52 PM
To: Pereira, Amanda <apereira@ntia.gov>
Subject: Re: Alaska Fiber Optic Network (Doyon, Ltd.) EFH Conservation Measures response

Amanda,

Thank you for your response. We have no objections to the modifications to the conservation recommendations.

Thanks again,

Luke

On Tue, Mar 12, 2024 at 3:06 PM Pereira, Amanda <apereira@ntia.gov> wrote:

> Good evening all –
>
> Attached please find our response to the Conservation Measures articulated by NMFS

in your letter, dated February 14, 2024. There were five (5) conservation measures identified by NMFS to further avoid, minimize, mitigate, or otherwise offset effects. We are proposing modifications to the first two conservation measures and accept the remaining three conservation measures without modification, as detailed in the attached response. The response has been prepared by Owl Ridge Consultants on behalf of Doyon, Ltd. and NTIA. I have also attached the Materials Safety Data Sheet for Bentonite to support our response. We look forward to your reply,

Sincerely,

Amanda

Amanda Pereira (she/her)
Environmental Program Officer
National Telecommunications and Information Administration
Office of Internet Connectivity and Growth

Email: apereira@ntia.gov
Phone: 202.834.4016

MEMORANDUM

To:	Amanda Pereira
Company:	National Telecommunication and Information Administration
From:	William Morris
Company:	Owl Ridge Natural Resource Consultants, Inc.
Date:	March 8, 2024
Subject	Alaska FiberOptic Project National Marine Fisheries Service Essential Fish Habitat Recommended Conservation Measures
Attachments:	Bentonite Material Safety Data Sheet

The National Telecommunication and Information Administration (NTIA), in coordination with Doyon, Limited ("Doyon"), has reviewed the National Marine Fisheries Service (NMFS) letter of February 14, 2024, providing NMFS concurrence with the conclusions contained in the Essential Fish Habitat Assessment (EFHA) for the Alaska FiberOptic Project for the Fairbanks to Yukon River/Fort Yukon to Tanana fiber optic cable (FOC) installation. The letter also contained five Essential Fish Habitat (EFH) Conservation Recommendations. We appreciate NMFS' review and timely response. Your letter requires a written response to the conservation measures within 30 days of receipt, or by March 14, 2024. This memorandum constitutes NTIA's response.

Under the description of EFH in the letter, Stevens Creek is correctly listed as an anadromous waterbody, however, the Anadromous Waters Catalog (AWC) does not currently show Stevens Creek as listed for Pacific salmon habitat, rather humpback whitefish, least cisco, and sheefish have been documented using the lower reaches of the creek.

Following are NMFS conservation recommendations to further avoid, minimize, mitigate, or otherwise offset effects along with responses from Doyon and its contractors:

1. **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 (Gelinas and Mathy 2012).**

   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.

   For the Yukon River tie ins, where drilling into the thalweg is required, inert bentonite will be used for lubrication and would pose no threat to fish. The Material Safety Data Sheet for bentonite is attached.

2. **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.**

The timing of break-up along the Yukon River varies with a median break-up date of May 11 at Fort Yukon and May 8 at Tanana, during some years, breakup occurs on or later than May 20. The lower

Yukon River experiences a later break-up with a median breakup date of May 20 at Emmonak, but as late as early June.

High water events and runoff from snowmelt in the project area can remain high until mid-June. Local tug operators advise towing the cable lay barge (CLB) through the canyon, between the communities of Tanana and Rampart, and into the upper project areas after June to ensure safe travel on the river. Installation of the FOC requires low water velocities so that commercial divers can work safely in the river while feeding cable into conduits and loading/unloading cable from subsea equipment.

The CLB is designed to handle currents below 4 knots, although it can operate at speeds slightly above 4 knots for a limited time, doing so will require more thrust and reduce safety margins. During high water events, the river typically runs above 4 knots, gradually reducing to between 2 and 4 knots as summer progresses and melt waters subside.

Upon entering the river post-ice breakup, the installation barge will transition from an ocean-going tug to a shallow draft river tug, set up its multibeam sonar, and then be towed upstream to the project site. The transition, multibeam setup, and tow from the mouth of the river to the project site are estimated to take approximately 3 weeks. Subsequent installation activities, once mobilized at the upper end of the project area and working downstream with the current (from Beaver to Tanana), are estimated to require 48-60 days.

Below is a general list of activities and a general timeline associated with FOC installation within the Yukon River. The actual start date is highly dependent on spring break up, the movement of ice, and safe access to the river.

Activity	General Dates	Approximate length of days
CLB enters the Yukon River.	Early June	--
Barge transitions from ocean going barge to shallow draft barge.	Mid-June	7 days
Barge and support vessels travel upriver to project site	End of June	14 days
FOC Installation	Early July – End of August*	60 days
Barge and support vessels travel downstream and prepares for ocean travel.	Early September	14 days
Barge and support vessels depart Yukon River.	Mid-September	--

*May extend into September depending on start date and progression of FOC installation.

Even under optimal conditions, with an early break-up, where the CLB enters the river, navigates through high-water events during the melt-off, and conducts in-water operations safely, meeting a July 1st finish date is unfeasible. Additionally, this timeline does not account for horizontal directional drilling (HDD) operations which will precede FOC installation, and also necessitate diver involvement for conduit installation.

While installation operations on the Yukon River may create localized noise disturbance that may be avoided by adult migrating Pacific Salmon, the Yukon River is wide enough that operations will be easily avoided by Pacific salmon and no impact to fish passage will occur. The FOC will be installed overland through the canyon reach of the Yukon River, thereby avoiding potential disturbance to Pacific salmon in the narrowest stretch where avoidance could be most difficult. Furthermore, there is no documented main channel spawning habitat for Pacific salmon between Fort Yukon and Tanana so eggs, larvae, and alevins will not be in the gravels. The FOC will primarily be installed within or proximate to the thalweg of the river, which would not be anticipated to provide spawning habitat for Pacific salmon, should some main channel spawning occur. For safety and project success, the in-river installation window needs to be flexible and include most of the open-water season. Impacts to EFH species is not anticipated

3. **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.

4. **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.

5. **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. For the Canyon Bypass reach, equipment crossing locations vegetated by grasses and sedges have been located. Mats will be laid on the riparian vegetation and stream banks to facilitate the equipment crossing and maintain bank integrity. No brushing or tree removal will be required.

We appreciate NMFS review of the project and EFHA. We are committed to following the recommendations provided as modified above, and we seek your concurrence that the outlined measures will mitigate impacts to EFH and EFH species.

Attachments

Safety Data Sheet

Star-Gel Premium

SDS Revision Date: 09/01/2015

1. Identification

1.1. Product identifier

Product Identity Star-Gel Premium

Alternate Names None

1.2. Identified uses of the substance or mixture and application method

Intended use Additive

Application Method See Technical Data Sheet.

1.3. Details of the supplier of the safety data sheet

Company Name NorthStar Fluid Solutions
P.O. Box 271036
Louisville, Colorado 80027, USA

Emergency

CHEMTREC (USA) (800) 424-9300

24 hour Emergency Telephone No. International +1-703-527-3887

Customer Service: NorthStar Fluid Solutions (303) 495-3130

2. Hazard(s) identification

2.1 Classification in accordance with paragraph (d) of §1910.1200

Carcinogenicity	Category 1A - H350
Specific Target Organ Toxicity - (Repeated Exposure)	Category 1 - H372

2.2. Label Elements

Hazard Pictograms

Signal Word Danger

Hazard Statements H350- May cause cancer by inhalation
H372- Causes damage to organs through prolonged or repeated exposure if inhaled.

Precautionary Statements

[Prevention]
P201- Obtain special instructions before use.
P202- Do not handle until all safety precautions have been read and understood.
P260- Do not breathe dust/fume/gas/mist/vapors/spray
P264- Wash face, hands and any exposed skin thoroughly after handling.
P270- Do not eat, drink or smoke when using this product.
P280- Wear protective gloves/ eye protection/ face protection

[Response]
P308 + P313- IF exposed or concerned: Get medical advice/attention
P314- Get medical attention/advice if you feel unwell.

[Storage]
P405- Store locked up.

[Disposal]
P501- Dispose of contents/container in accordance with local/regional/national/international regulations.

Contains

Substances	**CAS Number**
Bentonite	1302-78-9
Crystalline silica, quartz	14808-60-7
Crystalline silica, cristobalite	14464-46-1
Crystalline silica, tridymite	15468-32-3

2.3 Hazards not otherwise classified
Not known

3. Composition/information on ingredients

Substances	CAS Number	PERCENT (w/w)	GHS Classification - US
Bentonite	1302-78-9	60 - 100%	Not classified
Crystalline silica, quartz	14808-60-7	1 - 5%	Carc. 1A (H350) STOT RE 1
Crystalline silica, cristobalite	14464-46-1	0.1 - 1%	Carc. 1A (H350) STOT RE 1
Crystalline silica, tridymite	15468-32-3	0.1 - 1%	Carc. 1A (H350) STOT RE 1

In accordance with paragraph (i) of §1910.1200, the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret.
[1] Substance classified with a health or environmental hazard.
[2] Substance with a workplace exposure limit.
[3] PBT-substance or vPvB-substance.
*The full texts of the phrases are shown in Section 16.

4. First aid measures

4.1. Description of first aid measures

Inhalation	If inhaled, remove from area to fresh air. Get medical attention if respiratory irritation develops or if breathing becomes difficult.
Eyes	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes and get medical attention if irritation persists.
Skin	Wash with soap and water. Get medical attention if irritation persists.
Ingestion	Under normal conditions, first aid procedures are not required.

4.2. Most important symptoms and effects, both acute and delayed

Breathing crystalline silica can cause lung disease, including silicosis and lung cancer. Crystalline silica has also been associated with scleroderma and kidney disease.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. Fire-fighting measures

5.1. Extinguishing media

All standard fire fighting media.

5.2. Special hazards arising from the substance or mixture

Decomposition in fire may produce toxic oases.

5.3. Advice for fire-fighters

Full protective equipment. Avoid creating and breathing dust.

6. Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

Use appropriate protective equipment. Avoid creating and breathing dust. See section 8 for additional information.

6.2. Environmental precautions

Prevent from entering sewers, waterways or low areas.

6.3. Methods and material for containment and cleaning up

Collect using dustless method and hold for appropriate disposal. Consider possible toxic or fire hazards associated with contaminating substances and use appropriate methods for collection, storage and disposal.

7. Handling and storage

7.1. Precautions for safe handling

This product contains quartz, cristobalite, and/or tridymite which may become airborne without a visible cloud. Avoid breathing dust. Avoid creating dusty conditions. Use only with adequate ventilation to keep exposure below recommended exposure limits. Wear a NIOSH certified, European Standard En. 149, or equivalent respirator when using this product. Material is slippery when wet.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice.

7.2. Conditions for safe storage, including any incompatibilities

Use good housekeeping in storage and work areas to prevent accumulation of dust. Close container when not in use. Do not reuse empty container.

8. Exposure controls and personal protection

8.1. Control parameters

Substances	CAS Number	OSHA PEL-TWA	ACGIH TLV-TWA
Bentonite	1302-78-9	Not applicable	TWA: 1 mg/m³
Crystalline silica, quartz	14808-60-7	$\frac{10\ mg/m^3}{\%SiO2 + 2}$	TWA: 0.025 mg/m³
Crystalline silica, cristobalite	14464-46-1	1/2 x $\frac{10\ mg/m^3}{\%SiO2 + 2}$	TWA: 0.025 mg/m³
Crystalline silica, tridymite	15468-32-3	1/2 x $\frac{10\ mg/m^3}{\%SiO2 + 2}$	0.05 mg/m³

8.2. Exposure controls

Respiratory	Not normally needed. But if significant exposures are possible then the following respirator is recommended: Dust/mist respirator. (N95, P2/P3)
Eyes	Wear safety glasses or goggles to protect against exposure.
Skin	Normal work gloves. Wear clothing appropriate for the work environment. Dusty clothing should be laundered before reuse. Use precautionary measures to avoid creating dust when removing or laundering clothing.
Engineering Controls	Use approved industrial ventilation and local exhaust as required to maintain exposures below applicable exposure limits.
Other Work Practices	None known.

See section 2 for further details. - [Prevention]:

9. Physical and chemical properties

Appearance	Solid, various colors.
Odor	Odorless
Odor threshold	No information available
pH	8-10
Melting point / freezing point	No information available
Initial boiling point and boiling range	No data available
Flash Point	No data available
Evaporation rate (Ether = 1)	No data available
Flammability (solid, gas)	No data available
Upper/lower flammability or explosive limits	No data available
Vapor pressure (Pa)	No data available
Vapor Density	No data available
Specific Gravity	2.65
Solubility in Water	Insoluble
Partition coefficient n-octanol/water (Log Kow)	No data available
Auto-ignition temperature	No data available
Decomposition temperature	No data available
Viscosity (cSt)	No data available
Density (lbs/gal)	No data available

9.2. Other information

No data available

10. Stability and reactivity

10.1. Reactivity

Not expected to be reactive

10.2. Chemical stability

Stable

10.3. Possibility of hazardous reactions

Will not occur

10.4. Conditions to avoid

None anticipated

10.5. Incompatible materials

Hydrofluoric acid

10.6. Hazardous decomposition products

Amorphous silica may transform at elevated temperatures to tridymite (870 C) or cristobalite (1470 C).

11. Toxicological information

11.1 Information on likely routes of exposure

Principle Route of Exposure Eye or skin contact, inhalation.

11.2 Symptoms related to the physical, chemical and toxicological characteristics

Acute Toxicity

Inhalation

Inhaled crystalline silica in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (IARC, Group 1). There is sufficient evidence in experimental animals for the carcinogenicity of tridymite (IARC, Group 2A).

Breathing silica dust may cause irritation of the nose, throat, and respiratory passages. Breathing silica dust may not cause noticeable injury or illness even though permanent lung damage may be occurring. Inhalation of dust may also have serious chronic health effects (See "Chronic Effects/Carcinogenicity" subsection below).

Eye Contact May cause mechanical irritation to eye.

Skin Contact May cause mechanical skin irritation.

Ingestion None known

Chronis Effects/Carcinogenicity

Silicosis: Excessive inhalation of respirable crystalline silica dust may cause a progressive, disabling, and sometimes-fatal lung disease called silicosis. Symptoms include cough, shortness of breath, wheezing, non-specific chest illness, and reduced pulmonary function. This disease is exacerbated by smoking. Individuals with silicosis are predisposed to develop tuberculosis.

Cancer Status: The International Agency for Research on Cancer (IARC) has determined that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources can cause lung cancer in humans (Group 1 - carcinogenic to humans) and has determined that there is sufficient evidence in experimental animals for the carcinogenicity of tridymite (Group 2A - possible carcinogen to humans). Refer to IARC Monograph 68, Silica, Some Silicates and Organic Fibres (June 1997) in conjunction with the use of these minerals. The National Toxicology Program classifies respirable crystalline silica as "Known to be a human carcinogen". Refer to the 9th Report on Carcinogens (2000). The American Conference of Governmental Industrial Hygienists (ACGIH) classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

There is some evidence that breathing respirable crystalline silica or the disease silicosis is associated with an increased incidence of significant disease endpoints such as scleroderma (an immune system disorder manifested by scarring of the lungs, skin, and other internal organs) and kidney disease.

11.3 Toxicity data

Toxicology data for the components

Substances	CAS Number	LD50 Oral	LD50 Dermal	LC50 Inhalation
Bentonite	1302-78-9	> 5000 mg/kg (Rat) > 2000 mg/kg (Rat)	No data available	> 5.27 mg/L (Rat)
Crystalline silica, quartz	14808-60-7	500 mg/kg (Rat) >15,000 mg/kg (Human)	No data available	No data available
Crystalline silica, cristobalite	14464-46-1	500 mg/kg (Rat)	No data available	No data available
Crystalline silica, tridymite	15468-32-3	500 mg/kg (Rat)	No data available	No data available

Substances	CAS Number	Skin corrosion/irritation
Bentonite	1302-78-9	Non-irritating to the skin (Rabbit)
Crystalline silica, quartz	14808-60-7	Non-irritating to the skin
Crystalline silica, cristobalite	14464-46-1	Non-irritating to the skin
Crystalline silica, tridymite	15468-32-3	Non-irritating to the skin

Substances	CAS Number	Eye damage/irritation
Bentonite	1302-78-9	Non-irritating to the eye (Rabbit)
Crystalline silica, quartz	14808-60-7	Mechanical irritation of the eyes is possible.
Crystalline silica, cristobalite	14464-46-1	Mechanical irritation of the eyes is possible.
Crystalline silica, tridymite	15468-32-3	Mechanical irritation of the eyes is possible.

Substances	CAS Number	Skin Sensitization
Bentonite	1302-78-9	Did not cause sensitization on laboratory animals (mouse)
Crystalline silica, quartz	14808-60-7	Not regarded as a sensitizer.
Crystalline silica, cristobalite	14464-46-1	Not regarded as a sensitizer.
Crystalline silica, tridymite	15468-32-3	Not regarded as a sensitizer.

Substances	CAS Number	Respiratory Sensitization
Bentonite	1302-78-9	No information available
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

Substances	CAS Number	Mutagenic Effects
Bentonite	1302-78-9	In vitro tests did not show mutagenic effects
Crystalline silica, quartz	14808-60-7	Not regarded as mutagenic.
Crystalline silica, cristobalite	14464-46-1	Not regarded as mutagenic.
Crystalline silica, tridymite	15468-32-3	Not regarded as mutagenic.

Substances	CAS Number	Carcinogenic Effects
Bentonite	1302-78-9	Did not show carcinogenic effects in animal experiments (similar substances)
Crystalline silica, quartz	14808-60-7	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.

Substances	CAS Number	Carcinogenic Effects
Crystalline silica, cristobalite	14464-46-1	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.
Crystalline silica, tridymite	15468-32-3	Contains crystalline silica which may cause silicosis, a delayed and progressive lung disease. The IARC and NTP have determined there is sufficient evidence in humans of the carcinogenicity of crystalline silica with repeated respiratory exposure. Based on available scientific evidence, this substance is a threshold carcinogen with a mode of action involving indirect genotoxicity secondary to lung injury.

Substances	CAS Number	Reproductive toxicity
Bentonite	1302-78-9	Did not show teratogenic effects in animal experiments.
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

Substances	CAS Number	STOT - single exposure
Bentonite	1302-78-9	None under normal use conditions
Crystalline silica, quartz	14808-60-7	No significant toxicity observed in animal studies at concentration requiring classification.
Crystalline silica, cristobalite	14464-46-1	No significant toxicity observed in animal studies at concentration requiring classification.
Crystalline silica, tridymite	15468-32-3	No significant toxicity observed in animal studies at concentration requiring classification.

Substances	CAS Number	STOT - repeated exposure
Bentonite	1302-78-9	None under normal use conditions
Crystalline silica, quartz	14808-60-7	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)
Crystalline silica, cristobalite	14464-46-1	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)
Crystalline silica, tridymite	15468-32-3	Causes damage to organs through prolonged or repeated exposure if inhaled: (Lungs)

Substances	CAS Number	Aspiration hazard
Bentonite	1302-78-9	Not applicable
Crystalline silica, quartz	14808-60-7	Not applicable
Crystalline silica, cristobalite	14464-46-1	Not applicable
Crystalline silica, tridymite	15468-32-3	Not applicable

12. Ecological information

12.1. Toxicity

Aquatic Ecotoxicity

Substances	CAS Number	Toxicity to Algae	Toxicity to Fish	Toxicity to Microorganisms	Toxicity to Invertebrates
Bentonite	1302-78-9	EC50(72h): > 100 mg/L (freshwater algae)	TLM96 10,000 ppm (Oncorhynchus mykiss) LC50 (96h) 16,000 - 19,000 mg/L (Oncorhynchus mykiss) /& K ± mg/L (black bass, warmouth bass, blue gill and sunfish)	No information available	EC50 (96h) 81.6 mg/L (Metacarcinus magister) EC50 (96h) 24.8 mg/L (Pandalus danae) EC50 (48h) > 100 mg/L (Daphnia magna)
Crystalline silica, quartz	14808-60-7	No information available	LL50 (96h) 10,000 mg/L (Danio rerio) (similar substance)	No information available	LL50 (24h) > 10,000 mg/L (Daphnia magna) (similar substance)
Crystalline silica, cristobalite	14464-46-1	No information available	LL0 (96h) 10,000 mg/L (Danio rerio) (similar substance)	No information available	LL50 (24h) > 10,000 mg/L (Daphnia magna) (similar substance)
Crystalline silica, tridymite	15468-32-3	No information available	LL0 (96h) 10,000 mg/L(Danio rerio) (similar substance)	No information available	LL50 (24h) > 10,000 mg/L (Daphnia magna) (similar substance)

12.2. Persistence and degradability

Substances	CAS Number	Persistence and Degradability
Bentonite	1302-78-9	The methods for determining biodegradability are not applicable to inorganic substances.
Crystalline silica, quartz	14808-60-7	The methods for determining biodegradability are not applicable to inorganic substances.
Crystalline silica, cristobalite	14464-46-1	The methods for determining biodegradability are not applicable to inorganic substances.
Crystalline silica, tridymite	15468-32-3	The methods for determining biodegradability are not applicable to inorganic substances.

12.3. Bioaccumulative potential

Substances	CAS Number	Log Pow
Bentonite	1302-78-9	No information available
Crystalline silica, quartz	14808-60-7	No information available
Crystalline silica, cristobalite	14464-46-1	No information available
Crystalline silica, tridymite	15468-32-3	No information available

12.4. Mobility in soil

No information available

12.5. Results of PBT and vPvB assessment

No information available

13. Disposal considerations

13.1. Waste treatment methods

Disposal Method	Bury in a licensed landfill according to federal, state, and local regulations.
Contaminated Packaging	Follow all applicable national or local regulations.

14. Transport information

	DOT (Domestic Surface Transportation)	IMO / IMDG (Ocean Transportation)	ICAO/IATA
14.1. UN number	Not restricted	Not restricted	Not restricted
14.2. UN proper shipping name	Not restricted	Not restricted	Not restricted
14.3. Transport hazard class(es)	**DOT Hazard Class:** Not applicable	**IMDG:** Not applicable **Sub Class:** Not applicable	**Air Class:** Not applicable
14.4. Packing group	Not applicable	Not applicable	Not applicable

14.5. Environmental hazards

IMDG Not applicable

14.6. Special precautions for user

Not applicable

15. Regulatory information

US Regulations

US TSCA Inventory	All components listed on inventory or are exempt.
EPA SARA Title III Extremely Hazardous Substances	Not applicable
EPA SARA (311,312) Hazard Class	
EPA SARA (313) Chemicals	This product does not contain a toxic chemical for routine annual "Toxic Chemical Release Reporting" under Section 313 (40 CFR 372).
EPA CERCLA/Superfund Reportable Spill Quantity	Not applicable
EPA RCRA Hazardous Waste Classification	If product becomes a waste, it does NOT meet the criteria of a hazardous waste as defined by the US EPA.
California Proposition 65	The California Proposition 65 regulations apply to this product.

MA Right-to-Know Law	One or more components listed.
NJ Right-to-Know Law	One or more components listed.
PA Right-to-Know Law	One or more components listed.

Canadian Regulations

Canadian DSL Inventory	All components listed on inventory or are exempt.

16. Other information

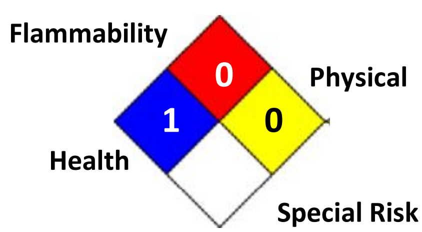
This is the first version in the GHS SDS format. Listings of changes from previous versions in other formats are not applicable.

The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. Buyer assumes all risk of use, storage and handling of the product in compliance with applicable Federal, State and local law and regulations. NorthStar Fluid Solutions makes no warranty of any kind, express or implied, concerning the accuracy of completeness of the information and data herein. The implied warranties of merchantability and fitness for a particular purpose are specifically excluded. NorthStar Fluid Solutions will not be liable for claims relating to any use of this product. Bara-Kade® is a registered trademark of Halliburton.

Emergency Overview:

Risk Classification System:

HEALTH	**1**
FLAMMABILITY	**0**
PHYSICAL	**0**
PPE	**E**



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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, AK 99802-1668

February 14, 2024

Amanda Pereira
Environmental Program Officer
Office of Internet Connectivity and Growth (OICG)
National Telecommunications and Information Administration
U.S. Department of Commerce Room 4874
1401 Constitution Avenue, NW Washington, DC 20230

Re: Alaska FiberOptic Project; AKRO-2023-00308

Dear Ms. Pereira:

The National Marine Fisheries Service has reviewed the essential fish habitat (EFH) assessment provided November 16, 2023, regarding the above referenced project. The purpose of this project is to install fiber optic cable along the Dalton Highway and the Yukon River connecting five communities to a high-speed broadband network. The proposed scope of work includes a terrestrial route of installation from Fairbanks to the E.L. Patton Yukon River Bridge, and an in-water route which would connect communities upstream and downstream of the bridge. A second terrestrial route would parallel the Yukon River. At each community, "punch-outs" will occur to transition the fiber optic cable from the thalweg of the Yukon River to land.

Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act require Federal agencies to consult with us on all actions that may adversely affect EFH and other aquatic resources. The EFH consultation process is guided by the regulation at 50 CFR 600 Subpart K, which mandates the preparation of EFH assessments and outlines each agency's obligations. In support of this consultation process, you provided a notice of the proposed action and your agency's conclusion regarding impacts on EFH. We offer the following comments and recommendations on this project pursuant to the above referenced regulatory process.

Essential Fish Habitat

The North Pacific Fishery Management Council designated EFH for all life stages of Pacific salmon, including freshwater habitat (NPFMC 2021). The in-water portion of the project footprint would be within freshwater habitat that the Alaska Department of Fish and Game's Anadromous Waters Catalog (AWC) identifies as anadromous (Giefer and Graziano 2023). The Yukon River (AWC-334-40-11000) supports Chinook, coho, pink, chum and sockeye salmon. The terrestrial portion of the project will cross three anadromous streams: the Chatanika River (AWC-334-40-11000-2490-3151-4020), Garnet Creek (AWC- 334-40-11000-2538), and Stevens Creek (AWC- 334-40-11000-2530) (Giefer and Graziano 2023).

Assessment of Effects to EFH

Your agency has concluded that the proposed project activity may adversely affect EFH in the project area. You also concluded those effects would be minimal and temporary in nature. Federal regulations define an adverse effect as "any impact which reduces the quality and/or quantity of EFH" (50 CFR 600.810(a)). Based on our review of the project plans and the information provided, we agree with your conclusion. The potential adverse effects to EFH can be mitigated if your identified conservation recommendations and best management practices, as well as the conservation recommendations below, are implemented.

EFH Conservation Recommendations

Implementing the appropriate mitigation measures can avoid or minimize direct and indirect project related impacts associated with the installation of fiber optic cable. In accordance with Section 305(b)(4)(A) of the MSA, we offer the following conservation recommendations to further avoid, minimize, mitigate, or otherwise offset effects:

1. 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 (Gelinas and Mathy 2012).
2. 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.
3. 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.
4. 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.
5. 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.

Additional information related to these recommendations can be found in Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska (Limpinsel et al. 2023) and our Regional website, where you can find FAQs.

A written response to our conservation recommendations is required within 30 days pursuant to Section 305(b)(4)(B) of the MSA. If your response is inconsistent with our recommendations, please explain the reasons for not following our recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects (50 CFR 600.920(k)). If you will not make a decision within 30 days, please provide a letter to that effect and indicate when a full response will be provided. Significant changes to the project may require reinitiating consultation. Lucas Byker, lucas.byker@noaa.gov, is available to answer questions or discuss further actions.

Sincerely,

Catherine Coon
Assistant Regional Administrator
Habitat Conservation Division

cc: Dale Youngkin, dale.youngkin@noaa.gov
Charlene Felkley, charlene.felkley@noaa.gov

References

Gelinas, M. and D. Mathy. 2012. Designing and Interpreting Geotechnical Investigations for Horizontal Directional Drilling. Retrieved January 1, 2024.

Giefer, J., and S. Graziano. 2023. Catalog of waters important for spawning, rearing, or migration of anadromous fishes – Interior Region, effective June 15, 2023, Alaska Department of Fish and Game, Special Publication No. 23-02, Anchorage.

Limpinsel, D., S. McDermott, C. Felkley, E. Ammann, S. Coxe, G.A. Harrington, S. Kelly, J.L. Pirtle, L. Shaw, and M. Zaleski. 2023. Impacts to Essential Fish Habitat from Non-Fishing Activities in Alaska: EFH 5-year review from 2018-2023. National Marine Fisheries Service, Alaska Region, Juneau, Alaska. U.S. Dep. Commerce, NOAA Tech. Memo. NMFS-F/AKR-30. doi: 10.25923/9z4h-n860.

North Pacific Fishery Management Council (NPFMC). 2021. Fishery Management Plan for the Salmon Fisheries in the EEZ off Alaska. Appendix A. Anchorage, Alaska, North Pacific Fishery Management Council.

OWL RIDGE
NATURAL RESOURCE CONSULTANTS

MEMORANDUM

To:	Amanda Pereira
Company:	National Telecommunication and Information Administration
From:	William Morris
Company:	Owl Ridge Natural Resource Consultants, Inc.
Date:	January 5, 2024
Subject	Alaska FiberOptic Project, Segment 1 Description of Changes to Installation Methodology in the Yukon River and Associated Changes to Essential Fish Habitat Assessment
Attachments:	Tables and Figures

The National Telecommunication and Information Administration (NTIA), in coordination with Doyon, Limited ("Doyon"), proposes to install fiber optic cable (FOC) from Fairbanks, Alaska to the Yukon River communities of Fort Yukon, Beaver, Stevens Village, Rampart, and Tanana in the summer of 2024 and 2025 as part of the Alaska FiberOptic Project (Project). A total of 314 miles of cable will be laid in the active channel of the Yukon River.

The purpose of this memorandum is to identify changes to the proposed methodology used to install the FOC within the Yukon River between Beaver and Tanana and to update the temporary disturbance to EFH accordingly. The original Essential Fish Habitat Assessment (EFHA) submitted on October 31, 2023, proposed the use of direct burial during the summer of 2024 between Beaver and Tanana. Additional testing of the FOC indicates that river velocities may be high enough to lift the cable from the bottom resulting in an increased likelihood of cable exposure. To minimize the risk of damage to the cable, marine installers are recommending that the FOC be "scratched" into the riverbed using a scratch plow.

Included in this memorandum are updated EFH map figures (Figure 1 (Amended), Figure 2 (Amended), Figure 3 (Amended), and Figure 4 (Amended)) that include the change in Yukon River FOC installation between Beaver and Tanana. Similarly, EFH tables impacted have been updated to include the change in installation methodology (Table 1 (Amended), Table 2 (Amended)). None of the changes described and outlined below change the conclusions or prior effects discussions within the original assessment. Post Project conditions are anticipated to remain suitable to support FMP-managed fish species that rely on the intersected habitats, in this case for migration. No long-term or significant short-term effects to EFH or FMP-managed fish species are anticipated to result from installation and operation of Segment 1 of the Alaska FiberOptic Project.

Scratch Plow Fiber Installation and Skid Plow Disturbance to EFH

As indicated above, a specifically designed scratch plow will be used to install the cable in the bed of the Yukon River between Beaver and Tanana. The scratch plow is 6.5 feet wide by 13 feet long. The blade of the scratch plow will create a 4- to 6-inch-wide trench and insert the FOC approximately 1 foot deep into the riverbed. Figure 5 illustrates the approximate design of the scratch plow being built for use. Like the jet plow, which will be used between Fort Yukon and Beaver during summer 2025, the apparatus rides on a paired skid and is towed along the river bottom. Each skid will be 18" to no greater than 24" wide. The disturbance associated with the scratch plow is the only change in methodology and will increase the temporary disturbance to the riverbed as provided in Table 2 (Amended). Temporary disturbance to the riverbed from skid contact as the jet and scratch plows transit the alignment are also included in Table 2 (Amended) assuming maximum skid width of 24 inches.

Updated Conclusion

Total project impacts to EFH include temporary disturbance from scratch and jet plow cable burial of around 21 acres and up to 76 acres from skid contact with the bed of the river. Essential Fish Habitats disturbed are all migratory habitat for Pacific salmon. While not a change from the original EFHA, the only potential permanent displacement of EFH is approximately one (1) square foot of migratory EFH associated with conduit punch-outs for the FOC transitions should they protrude above the bed of the Yukon River. Post Project conditions are anticipated to remain suitable to support FMP-managed fish species that rely on these habitats. No long-term or significant short-term effects to EFH or FMP-managed fish species are anticipated to result from installation and operation of Segment 1 of the Alaska FiberOptic Project.

Tables

Table 1 (Amended). EFH by species, waterbody, and life stage with distance from nearest EFH and mode of FOC installation.

Species	River/Creek	AWC No.	Present	Spawning	Rearing	Distance from Crossing to EFH	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

Table 2 (Amended). Yukon River FOC installation related temporary disturbance to Essential Fish Habitat.

NOTE: Total disturbance calculations do not include sockeye salmon metrics as their distribution overlaps other Pacific salmon and therefore the disturbance is already included.

Managed Species	EFH Type/Use	Mode of Installation	Length of FOC Installation (miles)	Burial Temporary Disturbance (acres)	Bed Surface Temporary Disturbance from Skid Contact (acres)
Chinook, Coho, Chum Salmon	Migratory	Scratch Plow	225.9	13.70	54.75
		Jet Plow	87.6	7.08	21.23
Sockeye Salmon	Migratory	Scratch Plow	7.6	0.46	1.84
		Total	313.5	20.78	75.98

Figures

- Community
- Segment 1 Connected Community
- Parks, Preserves and Refuges
- Highway

Segment 1 Alignment (Install Type)

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

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SEGMENT 1 FIBER OPTIC CABLE PROJECT LOCATION

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

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

FIGURE: 1 Amended

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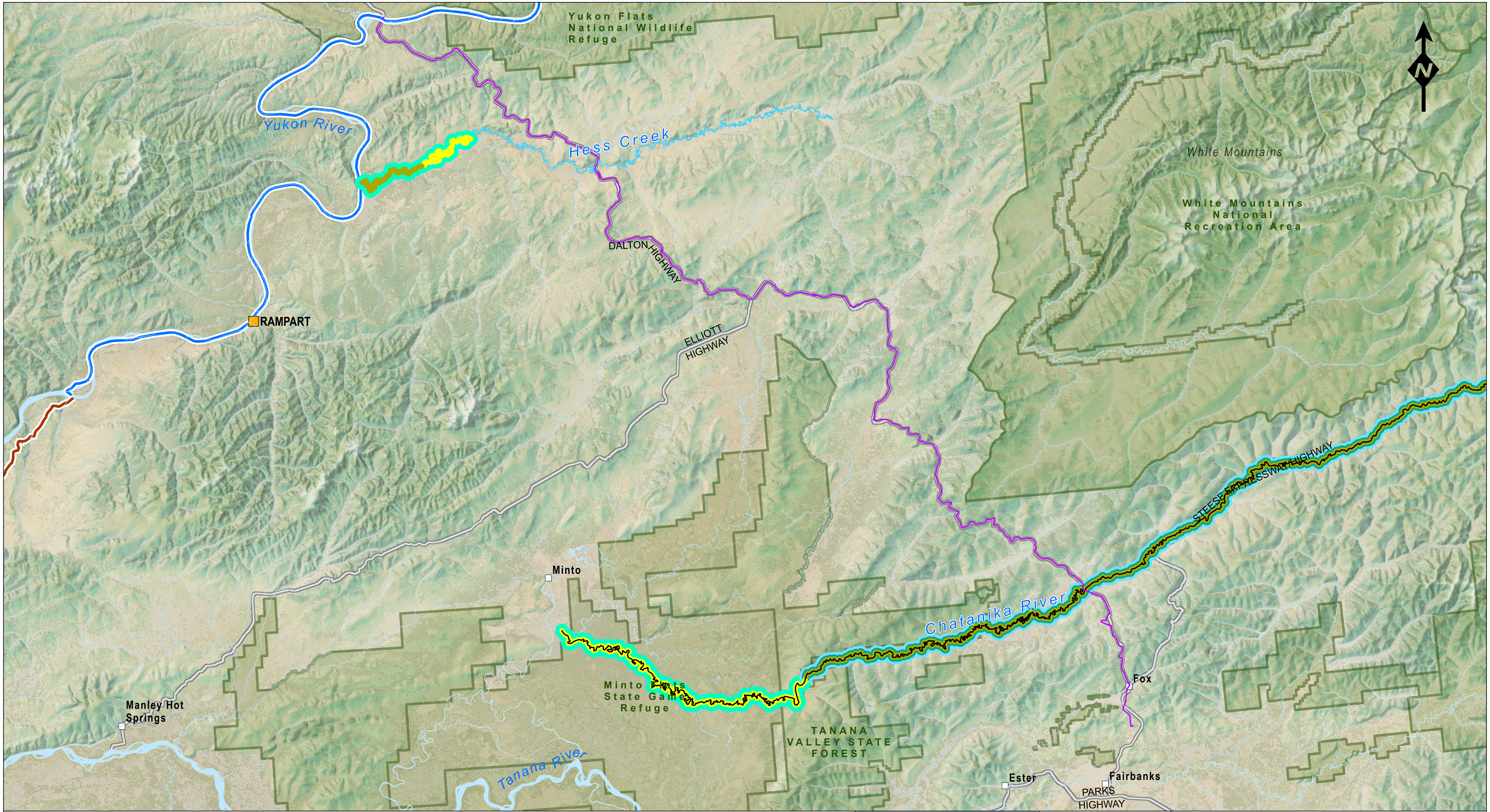

Community
Segment 1 Connected Community
Parks, Preserves and Refuges
Highway
Segment 1 Alignment (Install Type)
Scratch Plow
Canyon Bypass (Terrestrial)
Terrestrial

Essential Fish Habitat (Species, Life Stage)
coho salmon,present
chum salmon,spawning
chum salmon,present
Chinook salmon,spawning
Chinook salmon,rearing
Chinook salmon,present

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SEGMENT 1 FIBER OPTIC CABLE
FAIRBANKS TO YUKON RIVER (TERRESTRIAL)
ESSENTIAL FISH HABITAT

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

SCALE: 0 4 8 16 Miles; 0 5 10 20 Kilometers

FIGURE: 2 Amended

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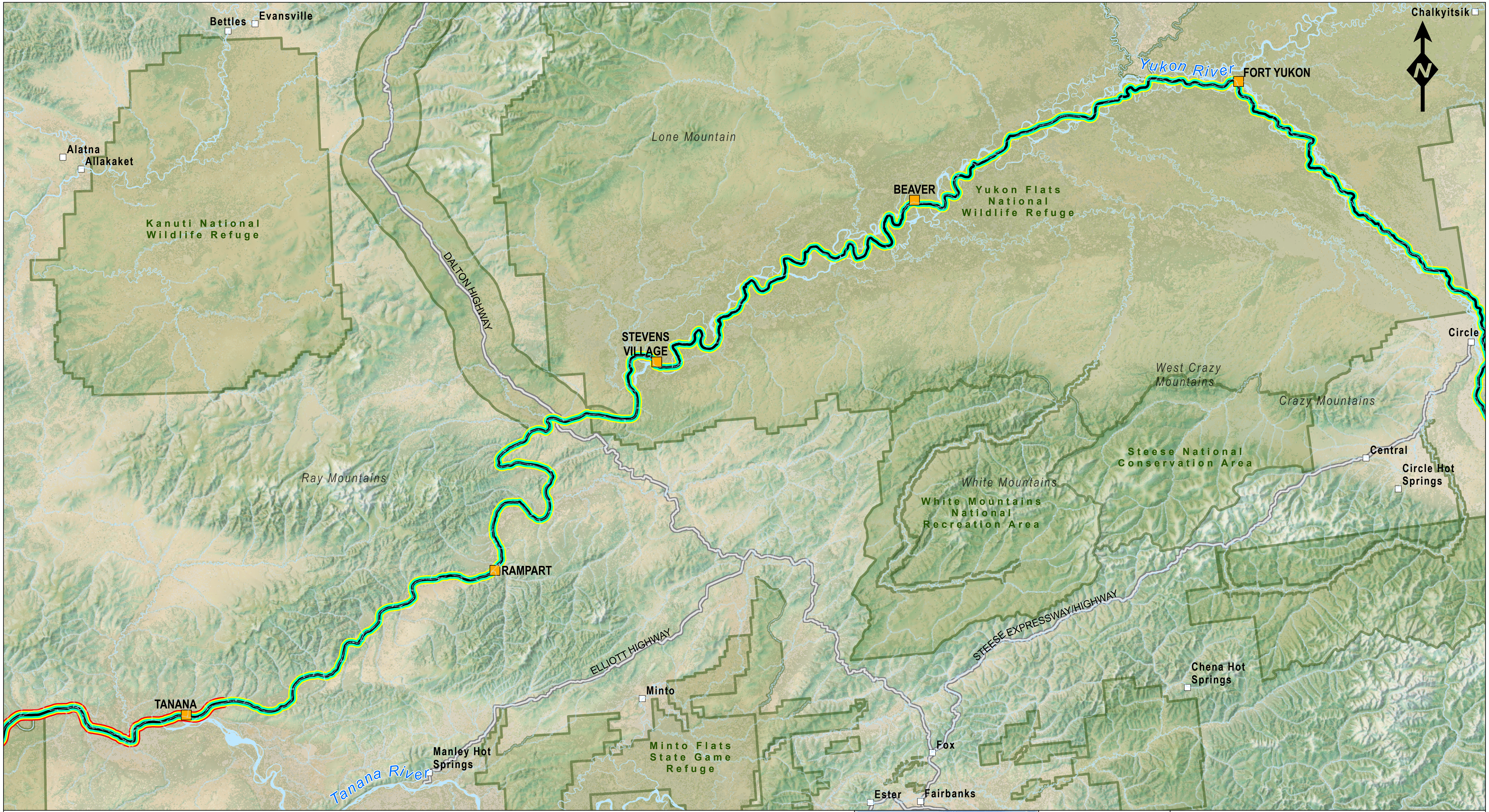

- Community
- Segment 1 Connected Community
- Parks, Preserves and Refuges
- Highway

Essential Fish Habitat (Species, Life Stage)

- coho salmon, present
- Chinook salmon, present
- chum salmon,present
- sockeye salmon, present

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SEGMENT 1 FIBER OPTIC CABLE FORT YUKON TO TANANA (IN RIVER) ESSENTIAL FISH HABITAT

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

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

FIGURE: 3 Amended

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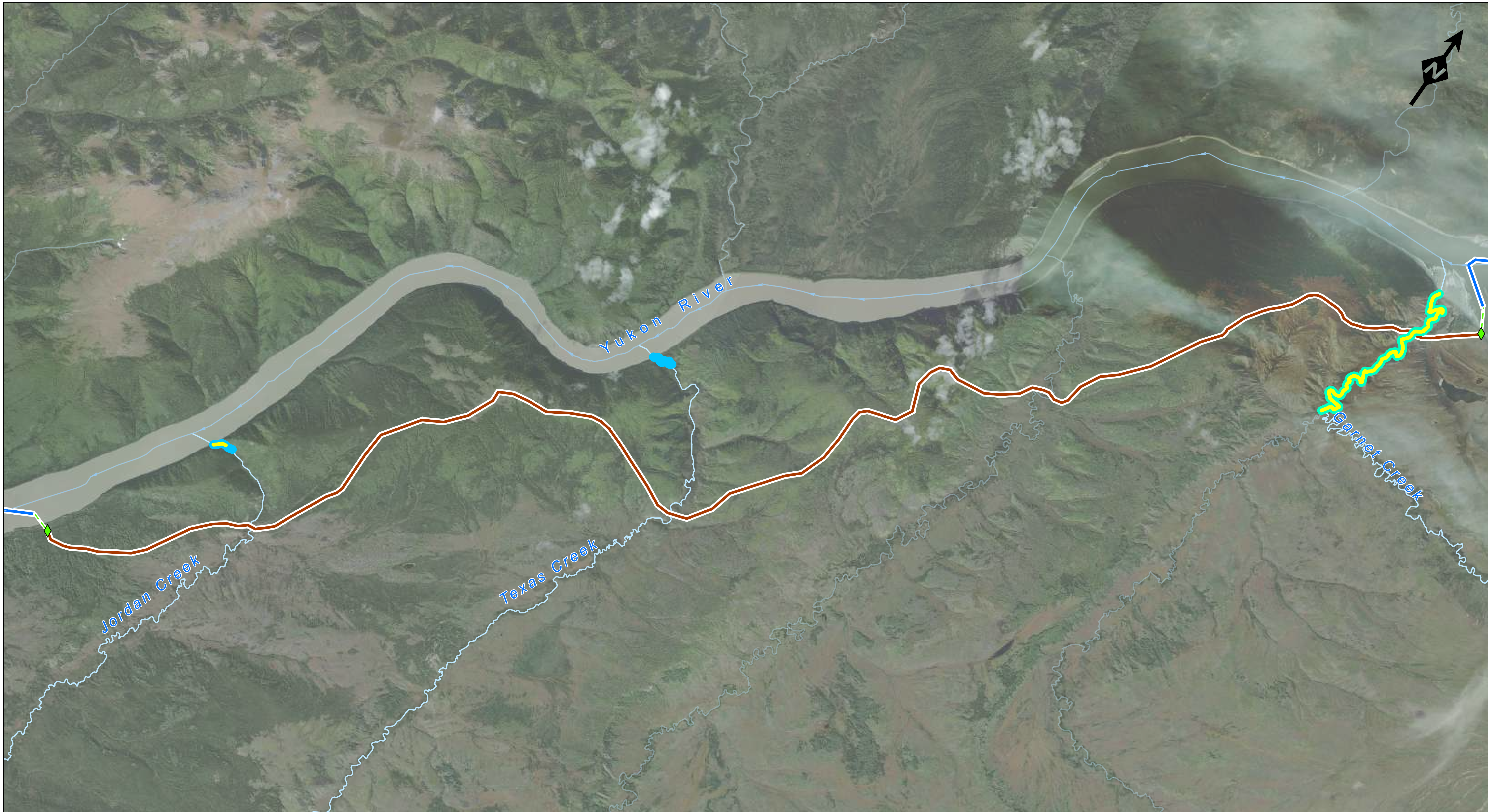
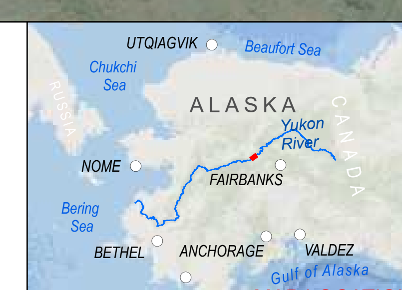


Segment 1 Alignment (Install Type)
- Scratch Plow
- Canyon Bypass (Terrestrial)

- Proposed BMH and HDD Location
- Proposed HDD Bore Alignment

Essential Fish Habitat (Species, Life Stage)
- chum salmon,present
- Chinook salmon,present
- Chinook salmon,rearing



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SEGMENT 1 FIBER OPTIC CABLE CANYON BYPASS (TERRESTRIAL) ESSENTIAL FISH HABITAT

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

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

FIGURE: 4Amended

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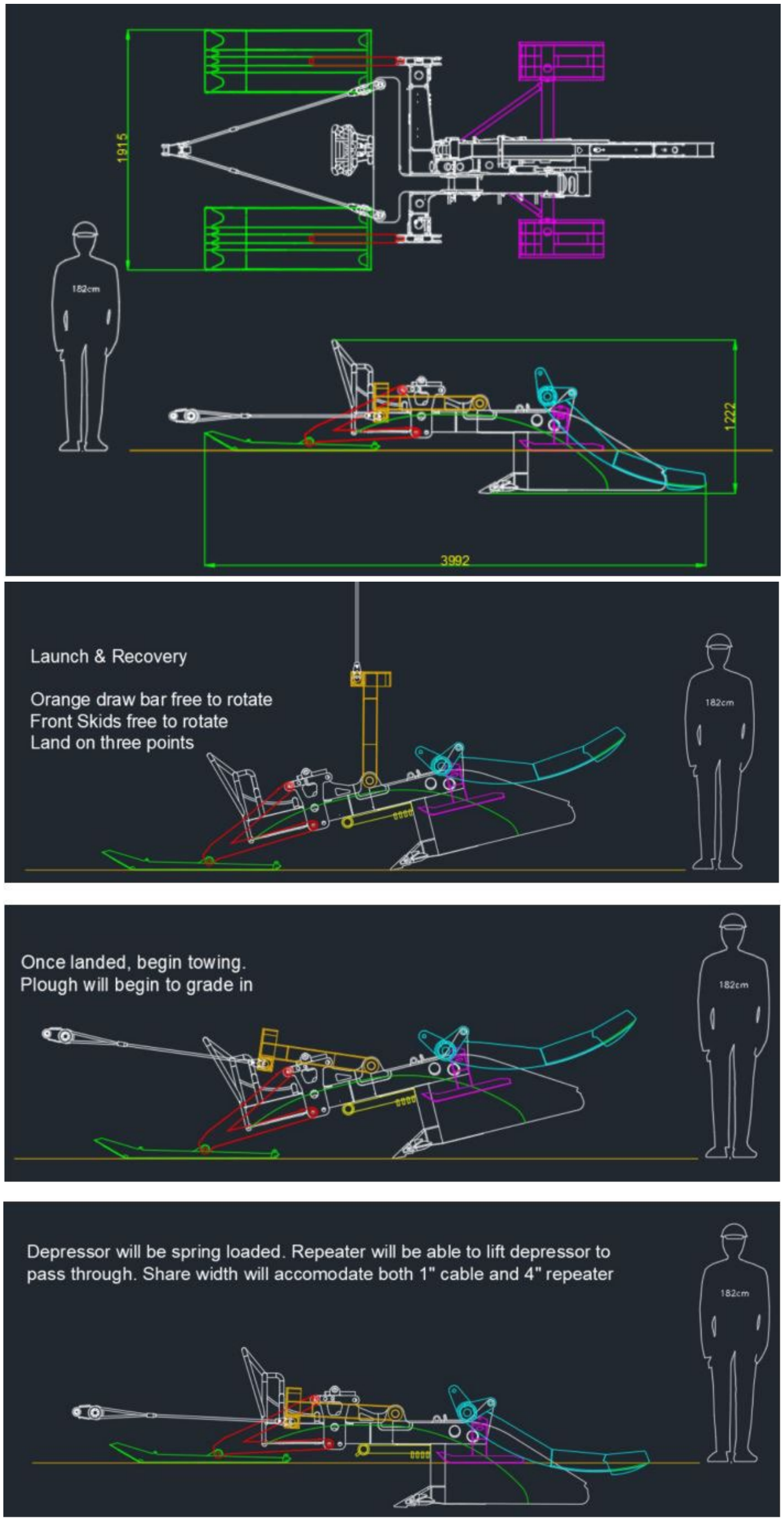

FIGURE 5. SCRATCH PLOW CONCEPT AND FUNCTIONAL DIAGRAMS.

Essential Fish Habitat Assessment

Segment 1 Alaska FiberOptic Project

November 2023

Prepared for:
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Document Number: DEP004-23-006F0

TABLE OF CONTENTS

List of Tables

List of Figures

Appendices

ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
DNR	Alaska Department of Natural Resources
AWC	Anadromous Waters Catalog
BMH	Beach manhole
BMP	Best management practices
CLB	cable lay barge
CFR	Code of Federal Regulations
DOC	Dissolved organic carbon
DOT&PF	Alaska Department of Transportation and Public Facilities
DMLW	DNR Division of Mining, Land, and Water
EEF	Electronics equipment connex
EEZ	Exclusive Economic Zones
EFH	Essential Fish Habitat
FMC	Fisheries Management Council
FMP	Fisheries Management Plan
FOC	Fiber optic cable
gpm	Gallons per minute
HAPC	Habitat Area of Particular Concern
HDD	Horizontal directional drilling
L	Liter
LCRSRA	Lower Chatanika River State Recreation Area
mg	Milligrams
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MP	Milepost
NMFS	National Marine Fisheries Service
NTU	Nephelometric turbidity units
NPFMC	North Pacific Fishery Management Council
NTIA	National Telecommunication and Information Administration
NOAA	National Oceanographic and Atmospheric Administration
OHW	Ordinary high water
ROW	Right-of-way
SAV	submerged aquatic vegetation
SWPPP	Stormwater Pollution Prevention Plan
TSS	Total suspended solids
U.S.	United States

INTRODUCTION

Doyon, Limited ("Doyon"), in coordination with the National Telecommunication and Information Administration (NTIA), proposes to install fiber optic cable (FOC) from Fairbanks, Alaska to the Yukon River communities of Fort Yukon, Beaver, Stevens Village, Rampart, and Tanana in the summer of 2024 and 2025 as a part of the Alaska FiberOptic Project (Project).

The Project will comprise two parts: a terrestrial corridor and a river corridor. The terrestrial corridor will involve burying the cable along existing highways or hanging it on existing and new utility pole lines. The river corridor will involve installing cable in the Yukon River between Fort Yukon to the Village of Tanana. Beach manhole (BMH) landings will be installed in the communities of Fort Yukon, Beaver, Stevens Village, Rampart, and Tanana. Installing FOC to these communities will require in-water work below the ordinary high water (OHW) elevations and, therefore, some Project components have the potential to affect federally managed fish species and essential fish habitat (EFH).

Some freshwater habitats support fish species that are managed under federal fishery management plans (FMPs) and are designated as EFH for some of these species. Habitats identified as supporting Pacific salmon by the Anadromous Waters Catalog (AWC), which specifies which waterbodies are important to anadromous fish species and therefore afforded protection under the State of Alaska Anadromous Fish Act, are considered EFH for the Pacific salmon species listed as indicated by the FMP.

Essential fish habitat guidelines outline procedures that federal agencies must follow to satisfy Magnuson-Stevens Fishery Conservation and Management Act (MSA) consultation requirements. In compliance with the MSA, this abbreviated EFH assessment describes proposed Project components that may affect designated EFH and/or managed fish species, components of the Project that may affect managed fish species and/or designated EFH, and species and the life stages the EFH is designated for. Further, it presents an analysis of potential effects on managed fish species and EFH, recommends measures to minimize potential effects, and summarizes the Agency's determination of effects.

1. PROPOSED ACTION

Doyon Limited, in coordination with the National Telecommunication and Information Administration (NTIA), proposes to construct and operate Segment 1 of the Alaska FiberOptic Project (Project). The Project will utilize funding provided by a grant from the Tribal Broadband Connectivity Program, and only this NTIA-provided funding, to provide broadband access to a portion of the area within its Alaska Native Regional Corporation Boundary that is unserved by broadband internet. The Project would install approximately 445 miles of fiber optic cable (FOC) from a connection with an existing fiber optic cable near Fairbanks, Alaska to the central interior region of the Yukon River (Figure 1). This will connect five underserved, predominantly Native Alaskan communities along the Yukon River to a reliable, affordable, scalable high-speed broadband network, bridging the digital divide for the foreseeable future in one of the most remote, isolated, high-cost, and difficult to serve areas of the United States.

The five communities, Tanana, Rampart, Stevens Village, Beaver, and Fort Yukon, are currently in need of high-speed internet service to continue to exist into the future. Young people growing up in these communities are moving to urban areas at excessive rates because of the communities' remote nature. The lack of consistent, high-speed internet connections, and the local opportunities associated with those connections, are a primary force driving young people to leave. As young people exit the communities and elders pass on, there is a continual loss of language and culture. Consequently, these remote Native communities need high-speed internet service if they are to continue to exist.

1.1. Description of the Action

This assessment is organized by the two distinct parts of installation, the primarily terrestrial corridor that extends from Fairbanks to, and includes, the E.L. Patton Bridge and crosses the Yukon River, and the installation of the FOC in the Yukon River. The Yukon River corridor includes all proposed activities within the Yukon River, initiating at the point the FOC enters the Yukon River, and extending upstream to Fort Yukon and downstream to Tanana, plus an overland section, the Canyon Bypass, that avoids the Rampart Rapids (Figure 1). The Project includes installation of a 48-fiber count cable, 0.55 inches in diameter, that parallels or is within the existing highway right-of-way (ROW) and then transitions to the Yukon River. Six distinct techniques will be used to install the FOC:

- Traditional trenching along the terrestrial corridor
- Tracked vibratory plowing along the Canyon Bypass and wherever feasible along the terrestrial corridor
- Horizontal directional drilling (HDD) at various locations to cross waterbodies, roadways, or to transition into/out of the Yukon River
- Direct lay (self-burial) in the active channel of the Yukon River
- Jet plowing the cable into the river bottom between Fort Yukon and Beaver
- Aerially on new and existing poles

A detailed project description, including detailed river construction and installation methodologies, is included as Appendix A.

Community

Segment 1 Connected Community

Parks, Preserves and Refuges

Highway

Segment 1 Alignment (Install Type)

Direct Lay

Canyon Bypass (Terrestrial)

Jet Plow

Terrestrial

DRAFT

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SEGMENT 1 FIBER OPTIC CABLE PROJECT LOCATION

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

SCALE:

0 5 10 20 Miles

0 10 20 40 Kilometers

FIGURE:

1

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1.1.1. Fairbanks to Yukon River – Terrestrial Route

The terrestrial component of the Project and FOC installation corridor (Figure 2) will be constructed primarily during the thawed season in 2024 with some potential installation activities occurring in winter 2024/25, and includes the following:

- The FOC originates at 321 Hagelbarger Avenue in Fairbanks.
- Approximately One-hundred and twelve (112) miles of buried cable, primarily located in the Alaska Department of Transportation and Public Facilities (DOT&PF) ROW along the Old Steese, Elliott, and Dalton highways to the E.L. Patton Bridge over the Yukon River.
- Approximately twenty (20) miles of above-ground line strung from existing poles. The FOC will extend between the origination point at Hagelbarger Avenue, through Fox, and transition to the ground approximately 2.5 miles north of the Lower Chatanika River State Recreation Area (LCRSRA), near Milepost (MP) 14 of Elliot Highway.
- HDD will be used as necessary at creek and roadway crossings.
- Installation of new utility poles is proposed at four isolated locations near MPs 31.5 and 52 where trenching is not feasible. The FOC will transition from the ground and be hung aerially at these locations.
- The FOC terminates north of the E.L. Patton Bridge. HDD will be used to transition the FOC to the Yukon River.

1.1.2. Yukon River – In-River Route and Canyon Bypass

The river corridor initiates when the FOC enters the Yukon River and extends upstream to Fort Yukon and downstream to Tanana (Figure 3). The river corridor includes all proposed activities within the river as well as an overland Canyon Bypass that avoids the Rampart Rapids. Installation of the FOC will occur in two phases during the summers of 2024 and 2025. BMHs and an electronics equipment connex (EEC) will be installed in each community as the Project is constructed. The FOC will be installed between each BMH and the in-river FOC via HDD installed conduit. The river component of the Project includes the following:

- Approximately three-hundred and fourteen (314) miles of cable laid in the active channel of the Yukon River.
    - In 2024, Phase 1 will install the FOC starting in Beaver and extend downriver to the communities of Stevens Village, Rampart, and Tanana.
    - In 2025, Phase 2 will install the FOC between Fort Yukon and Beaver.
    - Detailed river construction and installation methodologies are discussed in Appendix A.
- At each community.
    - HDD will occur at designated locations on existing gravel pads.
    - A BMH and an electronics equipment connex (EEC) will be installed at each HDD site. The connection between the main FOC and the BMH will be via a conduit that runs from a punch-out on the FOC within the river to the BMH on land.

    - The FOC will be hung on existing poles aboveground with minimal ground disturbance anticipated.

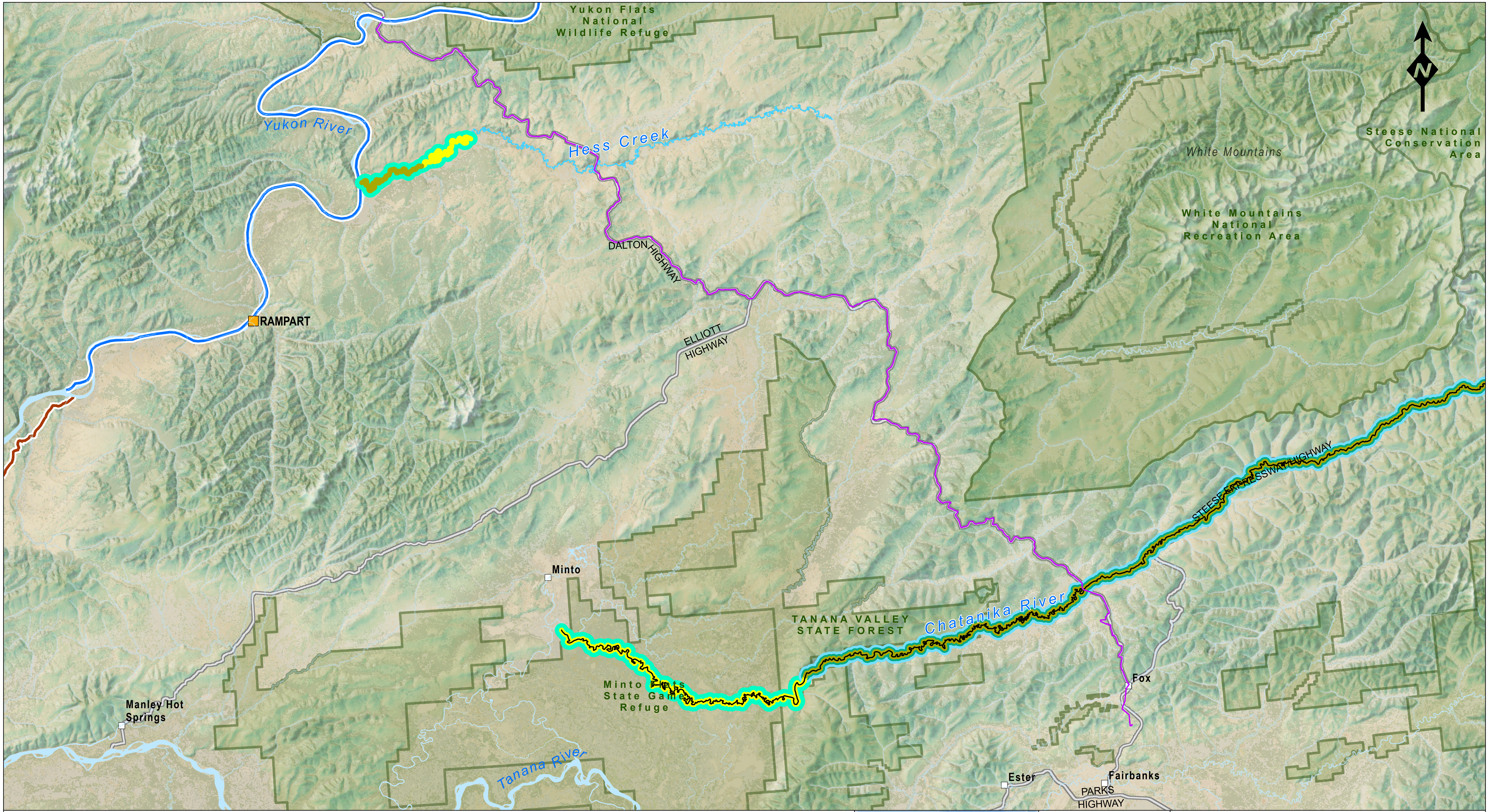
- An approximate 20-mile Canyon Bypass route is proposed between the communities of Rampart and Tanana to bypass the Rampart Rapids (Figure 4). This bypass is required to avoid high velocity river flow (~10 knots) and unsuitable river substrate in which to lay the FOC.
    - One BMH will be placed at either end of the Canyon Bypass where the FOC transitions out of and back into the Yukon River.
    - HDD will be used to install the FOC under any streams along the Canyon Bypass route.
- Detailed Canyon Bypass construction and installation methodologies are discussed below.

1.2. Construction Schedule

The project will be completed in two phases during the Summer of 2024 and 2025. The majority of the FOC will be installed in 2024 and includes the river corridor between Beaver and Tanana, and the Canyon Bypass corridor. A portion of the river corridor, between Fort Yukon and Beaver, will be installed during the summer of 2025.

The Yukon River transitions gradually from a broad braided plain with multiple channels upstream from Fort Yukon and to a single channel downstream of Stevens Village. Based on discussions with local mariners and the results of the field reconnaissance in September 2023, it was determined that:

- A smaller, shallow draft barge is required to safely navigate upstream beyond Beaver.
- An alternative FOC installation method is required between Fort Yukon and Beaver.
    - Although the river, between Beaver and Stevens Village, continues to be braided, the river is deep enough to allow for direct lay of the FOC. However, the reach between Beaver and Fort Yukon is too shallow to safely lay the FOC directly on the river bottom due to potential hazards to navigation caused by environmental factors such as ice and/or human factors such as boat propellers. As a result, an installation method known as jet plowing is required to safely install the FOC throughout this portion of the river.



Community
Segment 1 Connected Community
Parks, Preserves and Refuges
Highway

Segment 1 Alignment (Install Type)
Direct Lay
Canyon Bypass (Terrestrial)
Terrestrial

Essential Fish Habitat (Species, Life Stage)
coho salmon,present
chum salmon,spawning
chum salmon,present
Chinook salmon,spawning
Chinook salmon,rearing
Chinook salmon,present

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SEGMENT 1 FIBER OPTIC CABLE
FAIRBANKS TO YUKON RIVER (TERRESTRIAL)
ESSENTIAL FISH HABITAT

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

SCALE: 0 4 8 16 Miles; 0 5 10 20 Kilometers

FIGURE: 2

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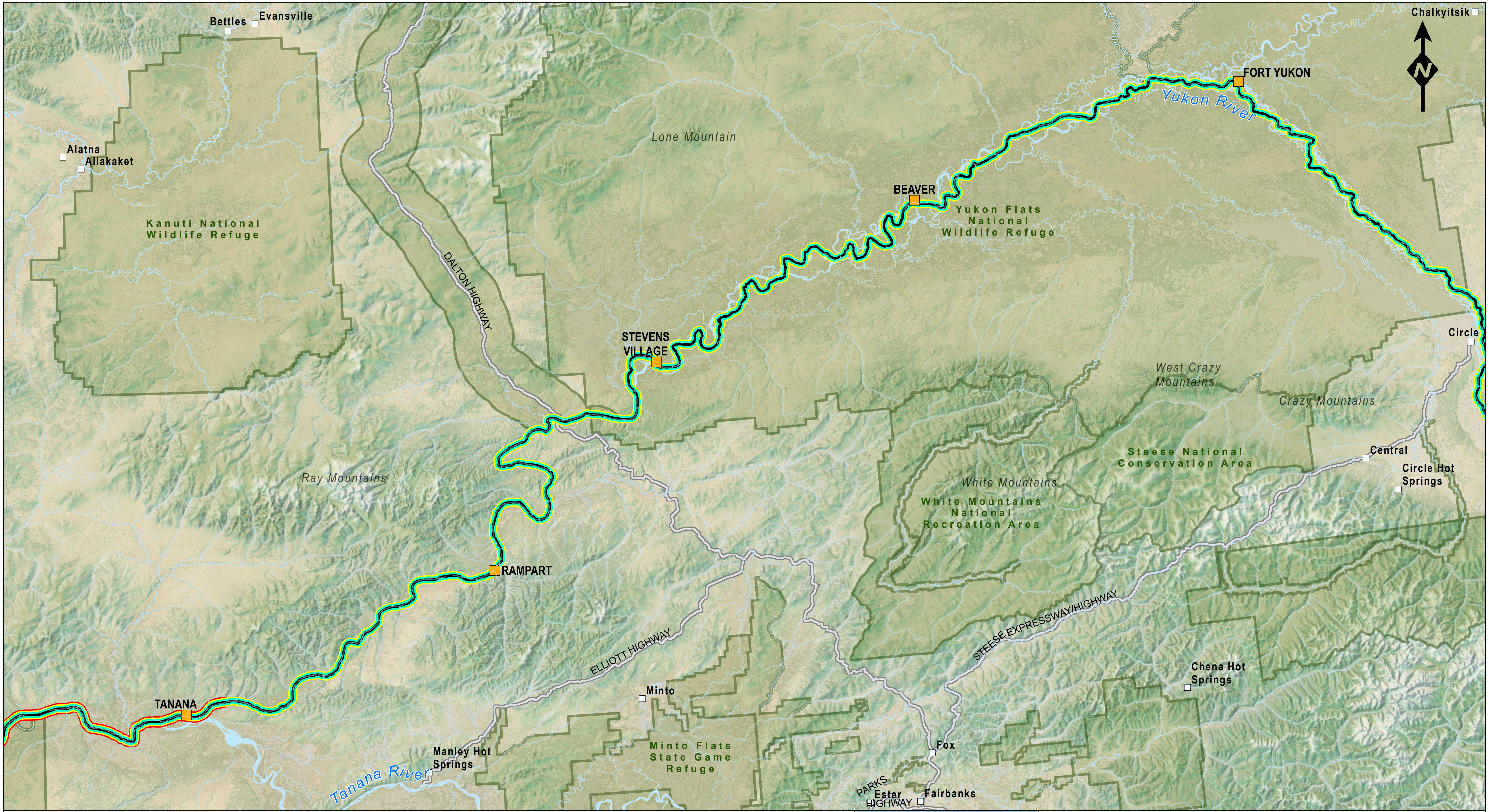

□	Community
■	Segment 1 Connected Community
	Parks, Preserves and Refuges
	Highway

Essential Fish Habitat (Species, Life Stage)

- coho salmon, present
- Chinook salmon, present
- chum salmon,present
- sockeye salmon, present

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SEGMENT 1 FIBER OPTIC CABLE FORT YUKON TO TANANA (IN RIVER) ESSENTIAL FISH HABITAT

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

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

FIGURE: 3

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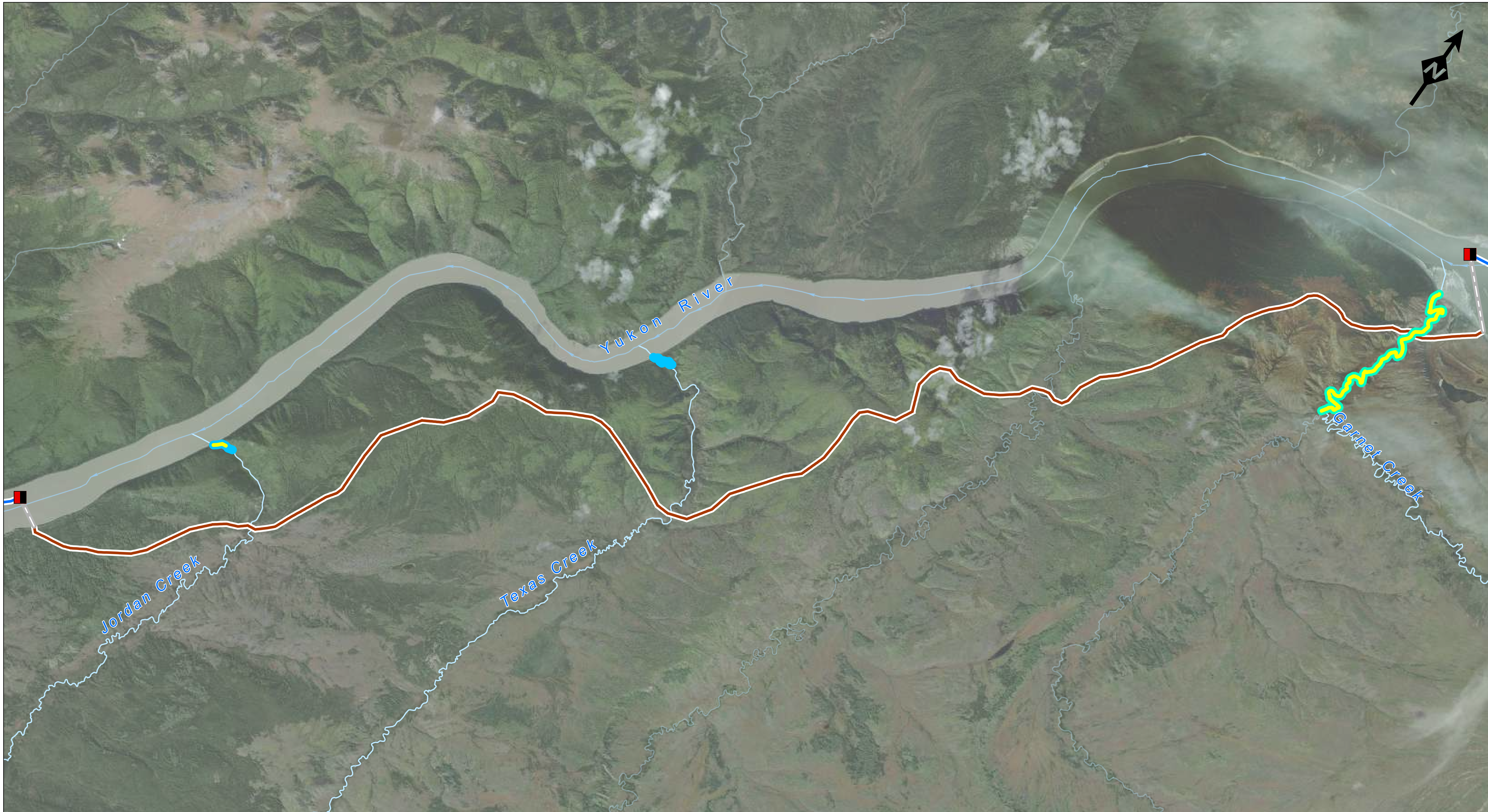
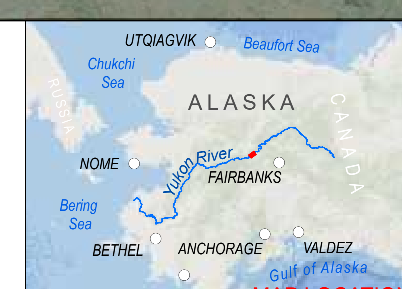


Segment 1 Alignment (Install Type)
- Direct Lay
- Canyon Bypass (Terrestrial)

- Approximate HDD Tie-In Location
- Approximate Fiber Optic HDD Bore Alignment

Essential Fish Habitat (Species, Life Stage)
- chum salmon,present
- Chinook salmon,present
- Chinook salmon,rearing



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SEGMENT 1 FIBER OPTIC CABLE CANYON BYPASS (TERRESTRIAL) ESSENTIAL FISH HABITAT

ALASKA FIBEROPTIC PROJECT - ESSENTIAL FISH HABITAT

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

FIGURE: 4

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2. ESSENTIAL FISH HABITAT

The Essential Fish Habitat (EFH) Guidelines are contained under 50 Code of Federal Regulations (CFR) 600.05 – 600.930, and outline procedures that federal agencies must follow to satisfy Magnuson-Stevens Fishery Conservation and Management Act (MSA) consultation requirements (50 CFR 600.920). Federal agencies must consult the National Marine Fisheries Service (NMFS) regarding federal actions that may adversely affect EFH:

- "Federal action means any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken by a Federal agency" (50 CFR 600.910).
- "Adverse effect means any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR 600.910).
- Additional definitions are included in the MSA, 50 CFR 600.10, and 50 CFR 600.910.

For any federal action that may adversely affect EFH, federal agencies must provide NMFS with a written assessment of the effects of that action on EFH (50 CFR 600.920 (e)(1)). The EFH assessment must contain the following: 1) A description of the action, 2) An analysis of the potential adverse effects of the action on EFH and the managed species, 3) The federal agency's conclusions regarding the effects of the action on EFH, and 4) Proposed mitigation, if applicable (50 CFR 600.920(e)). The level of detail in an EFH Assessment should be commensurate with the complexity and magnitude of the potential adverse effects of the action (50 CFR 600.920 (e)(2)).

EFH is defined as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802(10)). For the purposes of interpreting this definition:

- "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate (50 CFR 600.10).
- "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities (50 CFR 600.10).
- "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem (50 CFR 600.10).
- "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR Part 600.10).

Species identified in a FMP are generally referred to in this EFH assessment as "managed species." The proposed Project would be within the jurisdiction of the FMP for the Salmon Fisheries in the Exclusive Economic Zone (EEZ) fisheries off Alaska (NPFMC et al. 2012), which lists five species of Pacific salmon that could occur within the Project Area: Chinook salmon (*Oncorhynchus tshawytscha*), coho salmon (*O. kisutch*), chum salmon (*O. keta*), sockeye salmon (*O. nerka*), and pink salmon (*O. gorbuscha*).

This Project will be constructed entirely within the freshwaters of the Yukon River drainage and does not encounter any marine EFH or Habitat Areas of Particular Concern (HAPC). As a result, marine EFH and HAPCs are not considered in this evaluation.

2.1. Managed Fish Species and Essential Fish Habitat

Pacific salmon EFH in Alaska is designated based on the NMFS-Alaska Region's Environmental Impact Statement for EFH description Level 1, information based on distribution (NMFS 2005). The Pacific salmon FMP identifies EFH for each species' life stage and, in most cases, is based on either the general distribution of the life stage in marine waters of the EEZ of Alaska, or the general distribution of the life stage in freshwaters as identified by the Alaska Department of Fish & Game (ADF&G) Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes (AWC) (Geifer and Graziano 2023). The primary EFH intersected by Project activities 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 (Table 1; Figure 2, Figure 3, Figure 4). Table 1 lists Project intersections with EFH by managed species, anadromous waterbody crossed or encountered, lifestage documented, and FOC installation method. Table 1 also lists anadromous waterbodies crossed by the project upstream of documented EFH, with the associated distance. All stream crossings within designated EFH are proposed to be completed by HDD, while installation within designated EFH (Yukon River) will be by direct lay on the streambed or by jet plowing (Yukon River from Beaver to Fort Yukon).

Table 1. EFH by species, waterbody, and life stage with distance from nearest EFH and mode of FOC installation.

Species	River/Creek	AWC No.	Present	Spawning	Rearing	Distance from Crossing to EFH	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	Direct/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

Species	River/Creek	AWC No.	Present	Spawning	Rearing	Distance from Crossing to EFH	Mode of Installation
	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	Direct/Jet Plow
Coho Salmon	Chatanika River	334-40-11000-2490-3151-4020	X			Collocated	HDD
	Yukon River	334-40-11000	X			Collocated	Direct/Jet Plow
Sockeye Salmon	Yukon River	334-40-11000	X			Collocated for 7.6 mi	Direct/Jet Plow

2.2. Pacific Salmon

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. Ice thickness increases throughout the winter until April when melting begins. Ice break-up typically occurs in early May. During the summer, the river is characterized by deep water and laminar flow with swift and sometimes swirling currents. The river narrows gradually from a broad braided plain with multiple sloughs near Fort Yukon to a primarily single main channel downstream of Stevens Village. Bathymetry and channel geometry are constantly changing, and the only known records are from the river barges that operate annually and track their routes. Based on data collected from river barges, upstream between Fort Yukon and Beaver, the river depth is on average less than 10 feet deep. As the river becomes more centralized downstream of Beaver, the depth increases.

More than 75 percent (%) of the annual runoff in the Yukon River occurs during a five-month period, May through September. More than 95% of all sediment transported during an average year also occurs during this period. During the other seven months, streamflow, concentrations of sediment and other water quality constituents are low, and little or no sediment transport occurs in the Yukon River and its tributaries. At Fort Yukon, dissolved organic carbon (DOC) concentrations are less than 2.0 milligrams per liter (mg/L) during the winter and higher DOC concentrations (28 mg/L) were measured during peak discharge from spring snowmelt (USGS 2016) while open-water season DOC between Kaltag and Fort Yukon ranged from 4.6 to 6.0 mg/L with an average concentration of 5.2 mg/L (Lomax et al. 2009). Measured suspended-sediment concentrations have been about 200 mg/L during spring snowmelt (USGS 2016) while reach-wide total suspended solids (TSS) between Kaltag and Fort Yukon ranged from 65 to 380 mg/L, with an average load of 191 mg/L and overall highest values measured downstream from the confluence with the Tanana River (Lomax et al. 2009). 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 as low as 1.1 nephelometric turbidity units (NTU) and as high as 1,619.6 NTU, 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 TSS loads, and sufficient nutrients to support aquatic life.

The Yukon River supports all five species of Pacific salmon found in North America: Chinook salmon, coho salmon, chum salmon, sockeye salmon, and pink salmon. Pacific salmon in these drainages are targeted by commercial, subsistence, and sport fisheries. Pacific salmon EFH in Alaska is designated based on Level 1 (i.e., information based on distribution) (NPFMC 2021). The Salmon FMP identifies EFH for each species' life stage based on either the general distribution of the life stage or the general distribution of the life stage in waters identified in the AWC (Geifer and Graziano 2023) which shows where spawning adults, rearing juveniles, and/or where presence level observations have been made.

EFH for Pacific salmon is present within freshwater waterbodies in all Project component areas and could potentially be affected by Project activities. Life stages expected to be exposed to proposed Project activities include freshwater juveniles and adults (Figure 2, Figure 3, Figure 4).

2.2.1. Chinook Salmon

Chinook salmon spawn in rivers and streams throughout Interior Alaska. Migration and spawning within the Project area occurs from mid-June into early September. Chinook salmon in the Yukon River are managed through international treaty as adults destined for spawning rivers in Canada must first pass through the Alaska portion of the Yukon River where they are susceptible to commercial and subsistence harvest. Females typically deposit 2,000 to 5,000 eggs, although sometimes more than 17,000, in gravel beds where they develop throughout the winter (Healey 1991). Fry typically emerge between May and June the following year. Juvenile Chinook salmon in Alaska remain in freshwater until at least the following spring when they move toward marine habitats with many rearing for an additional season prior to smolting. Rearing juvenile Chinook salmon are present year-round in the Yukon drainage and out-migrating smolts leave the system from as early as mid-April extending through October. Chinook salmon smolts feed on plankton and aquatic invertebrates in fresh water prior to migrating to the ocean.

Chinook salmon adults migrate through the Yukon River to reach spawning areas while juveniles may move between clearwater tributaries for rearing and, as smolts, to reach nearshore and ocean habitats. The Yukon River, Chatanika River, Garnet Creek, Jordan Creek, Hess Creek, and Texas Creek all have documented Chinook salmon habitat, with the Chatanika River and Jordan and Texas creeks having documented rearing habitat. However, the HDD crossings of Jordan and Texas creeks will be located just over one mile upstream from documented anadromy. Only the Chatanika has documented spawning and rearing Chinook salmon habitat at the HDD FOC crossing (Table 1). Hess Creek, one of the larger Yukon River tributaries crossed by the terrestrial part of the alignment from Fairbanks to the Yukon River, also has EFH for Chinook salmon, but in excess of 20 miles downstream from the HDD crossing. HDD will be used to install the FOC under all tributaries with Chinook salmon spawning and rearing habitat.

2.2.2. Coho Salmon

Adult coho salmon migration and spawning typically begins in late July and can run through early December. Females can deposit 2,000 to 4,500 eggs and fry emerge the following year between May and August. Juvenile coho salmon usually rear from one to three winters in freshwater. Juvenile coho salmon can establish winter territories in freshwater pools and lakes. In spring, juveniles may move between brackish estuarine water and move into freshwater feeding habitats during the summer and fall (ADF&G 2007). Juvenile out-migration is typically from mid-April through October.

Coho salmon EFH is documented within the Yukon River portion of the project as well as in the Chatanika River. No spawning or rearing habitat has been documented at the Chatanika HDD crossing or along the mainstem of the Yukon River. Only presence has been documented for adults in the Chatanika River at the crossing, though juvenile rearing is likely throughout much of the drainage, as well as spawning upstream from the FOC crossing. Hess Creek also has EFH for coho salmon, but in excess of 20 miles downstream of the HDD crossing within the DOT&PF ROW (Geifer and Graziano 2023).

2.2.3. Chum Salmon

Chum salmon in the Yukon River drainage are characterized by two distinct runs, summer and fall. Summer chum salmon typically spawn from late June into September while fall chum salmon spawn from September until as late as early December. Females typically deposit up to 4,000 eggs. Chum salmon fry emerge from May through late June the following year and immediately begin moving downstream to the sea, usually shortly after ice breaks up from their natal rivers. The duration of this migration depends on the total distance traveled and water velocities encountered. Little or no feeding occurs in streams during the downstream migration, and feeding may not occur until smolts reach estuarine or saltwater habitats at river mouths. Once in the estuary, juveniles form schools and normally remain close to shorelines for several months to feed and grow prior to moving out into the high seas. Salo (1991) describes chum salmon juveniles as depending on a detritus-based food web in the estuarine habitat. By late summer, juvenile chum salmon move to offshore waters. By their first winter, chum salmon have moved into the Gulf of Alaska and spend three to four years in the ocean before returning to natal streams (NPFMC 2012).

Chum salmon freshwater EFH has been documented in the Chatanika and Yukon rivers as well as in Garnet, Hess, and Jordan creeks (Table 1) Chum salmon spawning habitat has been designated in Hess Creek and the Chatanika River. However, the Hess Creek HDD crossing is located 25.8 miles upstream from documented presence of chum salmon and 38.85 miles upstream from the nearest documented chum salmon spawning habitat. Documented chum salmon habitat is greater than one mile downstream from the HDD crossing of Jordan Creek. No mainstem Yukon River spawning habitat has been documented for chum salmon (Table 1; Figure 2, Figure 3, Figure 4) (Geifer and Graziano 2023).

2.2.4. Sockeye Salmon

Sockeye salmon EFH in the Project area is limited to a portion of the Yukon River between the Village of Tanana and the Tanana/Yukon River confluence. It is likely that the observation of sockeye salmon at this point, upstream from the Tanana River, were fish destined for spawning grounds in tributaries of the Tanana River. Periodicity for Interior Alaska sockeye salmon is not well documented, but it is likely that adults spawn any time from July into September with smolts out-migrating to the sea from April or May into July.

2.2.5. Pink Salmon

Pink salmon are found downriver from the Project area (below Tanana) and, therefore, are not included in this EFH assessment.

3. EVALUATION OF POTENTIAL EFFECTS ON EFH

This section considers the potential effects the proposed action may have on EFH and associated FMP-managed fish species. The *Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska* (Limpinsel et al. 2023) identifies potential impacts associated with utility lines, cables, and pipelines, as well as recommended conservation measures.

3.1. Direct and Indirect Effects

The Project proposes to install the FOC adjacent to and predominantly within the existing DOT&PF ROW along the Elliot and Dalton highways and within about 314 miles of riverbed in the Yukon River. Approximately 20 miles of the river will be bypassed with an overland installation referred to as the Canyon Bypass. The FOC will be installed using a variety of techniques: traditional trenching, a tracked vibratory plow, direct lay (self-burial), jet plowing, and HDD. 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

The following subsections describe potential impacts on fish and EFH for proposed project activities.

3.2. Freshwater Ecosystems Effects Evaluation

This assessment considers the potential effects of the Project's proposed action on the quantity and quality of EFH for all life stages of Pacific salmon species present in the Project area designated as EFH from the Fort Yukon transition initiation site to Tanana landfall site, including 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 could result in temporary habitat removal or disturbance, water quality degradation, wetland and riparian buffer removal, streamflow changes, and stream sedimentation.

3.2.1. Fairbanks to Yukon River

Consistent with NMFS conservation measures for the installation of cables, the FOC route from Fairbanks to the Yukon River Bridge lies primarily within the existing DOT&PF ROW along the Old Steese, Elliott, and Dalton highways which generally are comprised of previously and/or continually disturbed lands. The majority of the proposed terrestrial corridor FOC installation will occur during the summer of 2024 with the remainder of the FOC installed once the ground freezes in early winter 2024/25. Winter installation will focus on areas of more extensive wetlands to mitigate potential impacts to those sensitive habitats from construction during the thawed season. Installation will begin at the Alaska Communications (ACS) switching station at 321 Hagelbarger Avenue in Fairbanks, Alaska and extend to the north end of the E. L. Patton Yukon River Bridge. The FOC will be hung using existing poles between the ACS switching station and the Lower Chatanika River State Recreation Area (LCRSRA). Approximately 2.5 miles north of the LCRSRA, near MP14 of Elliot Highway, the FOC will transition to below ground. All crossings of EFH along the terrestrial route between Fairbanks and the Yukon River will be installed using HDD, limiting potential impacts to EFH and managed species to water withdrawal activities and clearing of vegetation along the alignment. Details of the terrestrial component of the Project and FOC installation corridor are provided in Section 1.1.1 and the Project description (Appendix A).

Vegetation Clearing

Installation will begin with a survey of existing utilities and the planned FOC installation route, followed by vegetation clearing at a width of 10-15 feet to allow access for trenching and equipment installation. No surface alteration or grading will be conducted. A feller/buncher or hand cutting will be used to clear heavy timber. The felled trees will be removed and disposed of in a manner that does not create a fire hazard. To minimize disturbance of the surface soils, low ground-pressure equipment will be used. A mulcher will cut vegetation just above the ground surface and place the mulch in the same general area where the vegetation was removed. This will provide a smooth travel surface, protect the soil horizon, and provide a binding material for revegetation. Potential effects to water quality are also expected to be temporary and be mitigated by following Storm Water Pollution Prevention Plan (SWPPP) requirements and Best Management Practices (BMPs).

Excavation and Backfill

The underground FOC will be installed with the appropriate depth criteria for the various soil and installation types encountered on the route. Within frost susceptible soils and ice rich soils, burial will 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's road prism or ditch, burial will be 48 inches below the surface, and outside the road prism burial will be 36 inches below ground surface, unless otherwise specified. All trenches will be backfilled and compacted in 6-inch lifts. Water bars will be included to prevent subterranean movement of water that infiltrates into the backfilled trench.

Water Withdrawal

Water to support HDD installation will be pumped from the streams at each crossing location using low flow pumps with pump rates under 25 gallons per minute (gpm). ADF&G Fish Habitat Title 16 Permits and Alaska Department of Natural Resource (DNR) Division of Mining, Land, and Water (DMLW) Temporary Water Use Authorizations will be obtained. Intakes will be screened to avoid the impingement, entrapment, and entrainment of fish per ADF&G requirements. All water withdrawal will be consistent with any temporary water use authorizations issued by the DNR-DMLW and any fish habitat permits issued by ADF&G. No effects on EFH or Pacific salmon are expected from water withdrawal activities.

Stream Crossings

All stream crossings of FOC will be completed with the use of existing casings, bridges, or with new HDD casings that are installed 8-10 feet below the bottom of the streambed with no impact to the water course. HDD equipment is not anticipated to enter the streams and will travel along existing roadways wherever feasible. At the Yukon River, the FOC will be suspended from the E.L. Patton Yukon River Bridge through a permit with DOT&PF. No effects on EFH or FMP managed species are anticipated from FOC stream crossings.

Material Staging Locations and Access

All material, construction equipment and personnel for the terrestrial corridor installation will use existing road infrastructure to access the project site. Staging areas will occur at DOT&PF-approved locations along the highway corridor. No effects on EFH or FMP managed species are anticipated from material staging or access activities.

Summary of Effects

Given the overland route modes of construction (Section 1.1 and Appendix A) consisting of burial of the FOC in the existing DOT&PF ROW, hanging it on existing or new poles, clearing, trenching, and stabilization methods, and HDD methods for FOC stream crossings, no loss of EFH 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 could 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. The FOC installation and associated activities along the alignment between Fairbanks and the Yukon River bridge are unlikely to have adverse effects on EFH. Any effects from installation methods, should they be detectable, will be short term and isolated to the immediate area of construction at any given stream crossing. Fish passage would not be affected.

3.2.2. Yukon River – Fort Yukon to Tanana

The entirety of the FOC installation within the Yukon River will occur in migratory habitat for Chinook, coho, and chum salmon adult and juvenile life stages. As described above, adult Pacific salmon use the reach for migration between the ocean and spawning habitats located in tributaries of the Yukon River, and juveniles for migration from spawning and rearing areas to the ocean. Differing hydro-geomorphologies are encountered along the Yukon River between Fort Yukon and Tanana necessitating four separate modes of FOC installation, each with different potential impacts to EFH (Table 2).

Table 2. Yukon River corridor project component summary.

FOC Installation Method	Sections	Distance (miles)	Timing	Notes
Direct lay and self-burial (barge)	Beaver to Canyon Bypass (river exit) Rapids bypass to Tanana (river re-entry)	225.9	Summer 2024	
Jet plowing (smaller barge or diver operated jet nozzles)	Fort Yukon to Beaver	87.6	Summer 2025	And as needed during direct cable lay or at punch-out locations
Vibratory Plowing	Canyon Bypass (overland)	19.18	Summer 2024-25	

FOC Installation Method	Sections	Distance (miles)	Timing	Notes
(includes alignment clearing, HDD at stream crossings including all EFH)				
HDD (conduit installed from BMHs/transitions to thalweg FOC)	Village connections (Fort Yukon, Beaver, Stevens Village, E.L. Patton Bridge-Yukon Bridge, Canyon Bypass, Rampart)			BMH and the EEC

The primary effects on EFH include the disturbance of the bed of the Yukon River for the direct lay portion of the install between Beaver and Tanana, excluding the Canyon Bypass. Impacts will be temporary, short term, and limited to the immediate vicinity of the cable. Jet plowing will result in a slightly larger disturbance footprint compared to direct lay of the FOC in the riverbed between Beaver and Fort Yukon. However, impacts resulting from jet plowing will also be short term, temporary and overall, will have a low footprint (Table 3). The 3 to 4-inch diameter HDD-installed conduit will convey the FOC from the BMH to the thalweg of the river at all FOC punch-out points and will create localized disturbance at the site of the install and potentially permanent displacement if the conduit remains above the riverbed. A total of 8.33 to 29.61 acres of EFH will be temporarily disturbed over the course of the in-river FOC installation. Installation of the punch-out conduits may temporarily disturb up to 33 square feet of substrate and permanently displace approximately one square foot of habitat in total. Table 3 provides the total temporary disturbance of EFH in the Yukon River by Pacific salmon species, EFH type, and mode of FOC installation. Punch-outs will occur at each transition between land and the thalweg of the Yukon River with one entry and one exit conduit at Beaver, Stevens Village, Rampart, and the Canyon Bypass and a single conduit line installed at Fort Yukon, the E.L. Paton Bridge, and Tanana (Table 4).

Table 3. Yukon River EFH temporary disturbance by Pacific salmon species and mode of cable installation.

Managed Species	EFH Type/Use	Mode of Installation	Length of FOC Installation (miles)	Temporary Disturbance (acres)
Chinook, Coho, Chum Salmon	Migratory	Direct Lay	225.9	1.25–13.69
		Jet Plow	87.6	7.08–15.92
Sockeye Salmon	Migratory	Direct Lay	7.4	0.04–0.45
		Total	**313.5**	**8.33–29.61**

Table 4. Yukon River HDD conduit punch-out location, number of punch-outs, with estimated temporary disturbance and permanent displacement of EFH.

Location of Punch-Out	Migratory EFH Species	# of Punch-Outs	EFH Disturbance (square feet)	EFH Displacement (square feet)
Fort Yukon	Chinook, Coho, Chum Salmon	1	3	0.09
Beaver	Chinook, Coho, Chum Salmon	2	6	0.17
Stevens Village	Chinook, Coho, Chum Salmon	2	6	0.17

Location of Punch-Out	Migratory EFH Species	# of Punch-Outs	EFH Disturbance (square feet)	EFH Displacement (square feet)
E.L. Patton Bridge	Chinook, Coho, Chum Salmon	1	3	0.09
Rampart	Chinook, Coho, Chum Salmon	2	6	0.17
Canyon Bypass	Chinook, Coho, Chum Salmon	2	6	0.17
Tanana	Chinook, Coho, Chum, Sockeye Salmon	1	3	0.09
	Total	**11**	**33**	**0.96**

Yukon River In-River Route and Canyon Bypass

The FOC will be installed in the thalweg of the Yukon River. The entirety of the river bottom is submerged land owned by the State of Alaska and managed by the DMLW. A public easement application will be submitted to DNR-DMLW for placement of the FOC in the thalweg of the Yukon River from Fort Yukon to Tanana as well as along a portion of the Canyon Bypass.

A preliminary route hazard analysis was conducted in 2022 to evaluate the risks resulting from ice jams, boulder fields, and high current areas that may cause a hazard to the installation or to mariners. Additional surveys to assess river alignments were also conducted in May and September 2023. The analysis conducted was a combination of online data research, field reconnaissance, and discussions with local mariners who have traditional/local knowledge of the river.

Risks from ice damage to the cable are avoided by installing the FOC in the deepest part of the river channel. During break-up, water levels rise and can float large chunks of ice up onto the shoreline, potentially creating a hazard to the buried HDD conduit. The conduit will be buried at a depth to minimize the risk of damage from break-up river ice. The risk analysis also identified a canyon that lies between the villages of Rampart and Tanana with high water velocity where FOC installation is not feasible, therefore, a Canyon Bypass corridor was developed.

<u>Pre-Installation Activities and Installation Technologies</u>

Prior to the start of the FOC installation, a multibeam survey will be completed to identify and avoid any anomalies that may be detected as the barge travels up the Yukon River in 2024. Due to the variability of the river from year to year and the large accumulation of sediment, collecting multibeam data weeks prior to installation will result in the best assessment of bathymetric data.

<u>Cable Burial Between Beaver and Tanana</u>

The Yukon River flows with a high level of turbidity and suspended solids during the open water season. This flow condition combined with the bottom composition and vortex-induced vibration placed on the FOC from the current and cable tension as it touches down on the riverbed installation, will cause the cable to self-bury in typical river sediments and gravels. For analysis, it is assumed that disturbance to the riverbed from this action will range from the width of the FOC to six inches. Experience from other installations with similar conditions to the Yukon River and verification by divers validates the burial process.

If during inspection the cable has not sufficiently self-buried, supplemental diver jetting may be implemented to verify cable anchoring. This is a remedial process that is not expected to be needed between Beaver and Tanana, but the equipment will be available on the cable lay barge (CLB).

Total direct disturbance to EFH will be approximately 1.25 to 13.69 acres along the 226 mile river installation corridor and would last for less than the open water season of the installation. While TSS and turbidity may increase somewhat as the cable self-buries, increases in turbidity and TSS would not be in excess of the naturally high turbidity and TSS characteristics of the river.

Cable Lay Process Between Fort Yukon and Beaver (2025)

Jet plowing is the fluidization of the riverbed using water delivered via pressurized nozzle as shown in Appendix A. The source of the water is the same as the receiving waterbody, the Yukon River. Jet plowing would be conducted using a jet plow specially designed for use in the Yukon River (Appendix A, Section 5.3). The plow is approximately 14 feet long, 10 feet wide, and 5 feet high. The plow utilizes 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 three feet. The jet plow would be fed by a 6-inch pump with an output of 2,290 gpm.

Riverbed substrate will determine the ultimate width of the temporary disturbance; however, for analysis we have assumed the disturbance will range from 8 to 18 inches in width. The total acreage of riverbed disturbance over the 88 miles of FOC between Beaver and Fort Yukon will range from 7.08 to 15.92 acres.

Water withdrawal intakes operated to feed the jet nozzle would be screened or placed to avoid the intake, impingement, and entrapment of fish during pumping activities. Design and operation will comply with ADF&G Title 16 permit requirements, including riverbed jetting, cable installation, and water intake for jetting activities. The permits will specify the intake criteria required to provide the proper protection of fish; at a minimum, maximum instantaneous water velocity across any intake screen would have to be below 0.5 feet per second with a maximum screen size of 0.25 inches (depending on timing, more restrictive criteria may be required).

Canyon Bypass Alignment

Land along the Canyon Bypass corridor is predominantly owned by the State of Alaska and managed by DNR-DMLW. A small portion of the corridor crosses lands managed by Doyon. The Canyon Bypass alignment is approximately 20 miles of undisturbed boreal forest, tundra, and wetland habitats. Much of the area is identified as upland habitat and has been impacted by wildfires in the last 20 years. The FOC installation at the Canyon Bypass river exit/re-entry locations will be via HDD and will include BMHs (two total) in upland locations above the 50-year floodplain. Additional details are provided in Appendix A.

The proposed bypass route will 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 (Table 1).

Installation methods and potential effects on EFH and managed species would be the same as those described above in Section 3.2.1. In addition, 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.

Adverse impacts to EFH would be primarily limited to the FOC conduit punch-outs as previously described in Section 3.2.1. No long term or measurable effects to EFH are anticipated.

Horizontal Directional Drilling – Shore to River

A BMH will be installed at each community, the Yukon River Bridge, and at the up- and downstream ends of the Canyon Bypass to provide for transitioning the FOC from land to the riverbed. The FOC will be routed from each BMH to the bed of the river using HDD installed in 3 to 4 inch diameter conduit (one entrance conduit and one exit conduit at intermediate locations along the river and a single entrance at Fort Yukon and the E.L. Patton Bridge, and one exit conduit at Tanana). It is anticipated that the thalweg end of each conduit will ultimately be below the riverbed substrate, however, there is potential for localized scour as conduits may protrude above the bed. Divers using jet nozzles will fluidize the bed to expose the conduit for installation of the FOC and it is assumed this activity could temporarily disturb up to 3 square feet of substrate around each punch-out location for a total temporary and short term disturbance of up to 33 square feet (Table 4). If conduits remain above the bed at punch-outs, they could represent about 0.09 square feet each of permanent EFH displacement for a total displacement of about 1.0 square foot (Table 4).

Water withdrawal for conduit HDD installation will be the same as described in Section 3.2.1 relying on low volume pumps to supply water for drilling muds. Water withdrawal to supply the diver operated jet nozzles to expose the punch-out locations will rely on 530 gpm pumps. All pumping activities will be conducted consistent with the conditions of temporary water use authorizations issued by DNR-DMLW and Title 16 fish habitat permits issued by ADF&G to ensure the proper protection of fish and EFH.

Drill cuttings will not be disposed of in the river. The HDD entry site will be above the ordinary high water and stabilized with earthen berms and straw bales to prevent any offsite runoff from drilling operations. The work area will be surrounded by a silt fence.

Drilling fluids used for the HDD operations are water-based materials with no hazardous components as defined by the Resource Conservation and Recovery Act. Safety Data Sheet information will be available for each HDD drill site and will be kept on-site for the duration of the drilling work.

Fuel Storage

Fuel requirements along the terrestrial portion will be sourced from existing fuel suppliers based in Fairbanks. Fuel will be staged at various locations near the active operations using 8,000-gallon tankers that are temporarily staged at the site and then moved as the project advances. All stationary fuel tankers and fuel transfers will use best management practices (BMPs) and secondary containment of 110 percent of the volume of the largest vessel.

Within the river portion, the CLB will mobilize with sufficient fuel to perform FOC installation activities. Field construction equipment and support vessels used for the FOC installation will utilize built-in fuel systems. The CLB will transport two diesel tanks and a gasoline tank. These tanks will 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 will be supplied by contracted support services and transferred to the lay barge for storage. Table 5 identifies the type of fuel, quantity, tank features, and storage location of the fuel.

All HDD machinery will be transported along the river using a landing craft type vessel. This vessel will support the movements of HDD related equipment to each community and carry a maximum 500-gallon tank of gasoline (Table 5).

All tanks will have their own secondary spill containment and will be checked on a regular basis.

Table 5. Fuel storage for Yukon River vessels.

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

In-River Installation Camp

Contractors associated with the FOC installation along the river portion will either have two accommodation vessels approximately 70 feet in length, or a portable 20-person camp will be transported on the cable lay barge and offloaded in each community while the cable is being laid in the vicinity. The camps will utilize community water, electricity, and will purchase fuel from each community to run camp generators if available. Camp supplies will be provided on a bi-weekly or weekly basis from Nenana or Fairbanks on contracted support barges or scheduled airline service. Local labor will be recruited to support these camps wherever feasible. The project contractor will use small support transport vessels to transport crew between the camps and the CLB vessel and to the other support vessels. During the 2024 FOC installation, there will be one 30-foot survey support vessel, two 20-foot cable skiffs to support operations, and an assist tug. During the 2025 installation effort, instead of a single assist tug, two 25-foot truckable tugs will be brought in to support the FOC installation. No impacts to EFH or managed species are anticipated.

Material Staging Locations and Access

The primary mode of access for equipment for the river installation will be via barge. Once all FOC is spliced and shipping conditions are ice free, it will be mobilized directly from Vancouver, British Columbia to the project site via ocean vessels. The barge will stop-over in Seward, Alaska 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 will be towed to Beaver (2024) and Fort Yukon (2025) to begin installation. No impacts to EFH or managed species are anticipated.

Summary of Effects

EFH encountered by the Yukon River portion for the FOC project is migratory habitat for Chinook, chum, coho, and to much lesser extent, sockeye salmon. The primary impacts to EFH and managed species will 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 punch-outs. Localized short term increases in turbidity and TSS along the in-river alignment and at conduit punch-out locations could also occur but would remain within typical ranges seen in the river. Potential impacts of water withdrawal on EFH will be immeasurable in terms of volume withdrawn and adherence to screened intake specifications that will be contained in fish habitat permits will reduce the potential for individual fish mortality.

3.3. Cumulative Effects

Cumulative effects are impacts on the environment that result from the incremental impacts of an action when added to other past, present, and reasonably foreseeable future actions (40 Code of Federal Regulations § 1508.7). A cumulative effects analysis is intended to examine actions occurring within a watershed or ecosystem that adversely affect the ecological structure or function of EFH. Project effects will be limited to temporary and localized affects and not affect managed fish populations or substantially modify EFH. The ecological structure and function of EFH will be maintained; cumulative effects are not anticipated.

4. MITIGATIVE MEASURES

Mitigative measures specific to Project activities and potential effects on EFH described above will be employed to reduce the potential for impacts on EFH and FMP managed species including:

- Use existing rights-of-way whenever possible to lessen overall encroachment and disturbance of wetlands.
    - Fairbanks to Yukon River route is nearly entirely within an existing disturbed ROW.
- Use HDD where cables or pipelines would cross anadromous fish streams.
    - All FOC installation crossings of EFH are proposed to use HDD and all Yukon River transitions from BMHs to the thalweg will be installed with HDD.
- Store and contain excavated material on uplands. If storage in wetlands or waters cannot be avoided, use alternating stockpiles to allow the continuation of sheet flow. Store stockpiled materials on construction cloth rather than bare marsh surfaces, eelgrass, macroalgae, or other submerged aquatic vegetation (SAV).
    - All HDD cuttings will be hauled away and disposed of on uplands, or other approved locations outside of wetlands.
- Limit equipment access to the immediate project area. Tracked vehicles are preferred over wheeled vehicles. Consider using mats and boards to protect sensitive areas.
    - Low ground pressure and tracked equipment is proposed for use in wetlands and stream crossings.
- Caution equipment operators to avoid sensitive areas. Clearly mark sensitive areas to ensure that equipment operators do not traverse them.
- Limit construction equipment to the minimum size necessary to complete the work. Use shallow-draft equipment to minimize grounding effects and to eliminate the necessity for temporary access channels. Use the push-ditch method in which the trench is immediately backfilled to minimize the impact duration when possible.
    - Specially designed shallower draft barges will be used in the Beaver to Fort Yukon shallow section of the installation. A specially designed jet plow will be used to prepare the bed and the cable will be pushed into the resultant fluidized trench.
- Conduct construction during the time of year when it will have the least impact on sensitive habitats and species.
- Align crossings along the least damaging route. Avoid known fished and sensitive areas such as SAV, emergent marshes, and anadromous fish bearing streams.
- Apply compensatory mitigation to mitigate the permanent loss of habitat (Hanson et al.2003).

- Bury pipelines and submerged cables where possible. Unburied pipelines or pipelines buried in areas where scouring or wave activity eventually exposes them run a much greater risk of damage leading to leaks or spills.
    - Cables will either be directly buried or rapidly self-bury in the Yukon River while perpendicular crossings of anadromous streams will be crossed using HDD.
- Comply with U.S. Coast Guard and Environmental Protection Agency's regulations for ballast water and biofouling. Check on the status of these regulations as they are in phases of development at the time of this review.
- Visually inspect and clean vessel surfaces (e.g., propellers, hulls, anchors, fenders) brought from other areas over land via trailer that may harbor non-native plant or animal species. Empty bilges and clean thoroughly using hot water or a mild bleach solution. Perform these activities in an upland area to prevent the introduction of non-native species during the cleaning process. Use native plants to stabilize construction areas along roads and other developments. Avoid spreading invasive species in these areas when mowing or otherwise performing weed and brush control.
- Contaminant release potential will be managed through fuel handling plans, containment, and limiting equipment access to the immediate project area. Tracked vehicles will be used whenever appropriate and possible, and construction equipment used will be the minimum size necessary for the work. Equipment operators will be cautioned to avoid sensitive areas which will be clearly marked for non-entry.

5. CONCLUSION

No loss of EFH is expected with the overland installation modes of construction: FOC burial along existing ROW, FOC suspension from existing bridges and suspension on existing or new utility poles, and installation of the FOC with HDD at all crossings of EFH will preclude loss of EFH. Installation and operation of the FOC within the Yukon River will temporarily affect EFH designated as migratory habitat during cable self-burial and jet plowing portions. The HDD-installed conduit punch-out locations where the FOC transitions from land to the thalweg of the Yukon River could permanently displace less than one (1) square foot of benthic EFH used as migratory habitat for Pacific salmon and result in limited localized scour.

HDD equipment will be thoroughly washed prior to mobilization to prevent transmission of invasive plant species, in compliance with Executive Order 13112 - Invasive Species. The Yukon River transition process and HDD installations along overland routes pose possible temporary effects to water flow related to water withdrawal which will be regulated by ADF&G Fish Habitat Title 16 Permits and DNR-DMLW Temporary Water Use Authorizations. In compliance with these permits, required fish exclusion screening will be employed to prevent the impingement, entrainment, and entrapment of fish and total water volumes authorized will be protective of fish and EFH. Potential effects to water quality from surface activities are also expected to be temporary and mitigated by following SWPPP requirements and BMPs. To prevent potential runoff from HDD operations, the HDD entry site will be stabilized with earthen berms and straw bales, and the work area will be surrounded by a silt fence.

Excavation/trenching that occurs below the waterline will cause a temporary and localized increase in turbidity, which could affect fish occupying the temporarily affected habitat. Increased turbidity could temporarily decrease habitat quality and modify habitat function; under some circumstances, this may harm fish and/or temporarily alter behavior. Elevated turbidity from suspended solids could temporarily diminish habitat quality, and, if persistent, may decrease primary production and affect feeding behavior within the area affected (Limpinsel et al. 2023). However, no streams with designated EFH are proposed for trenched FOC installation. Researchers have determined that large sediment plumes have the potential to damage gills and impair organ function (Limpinsel et al. 2023). However, activities proposed by the Project will not generate large sediment plumes and turbidity and TSS are expected to remain within the natural variability observed within the Yukon River in the project reach. Increased turbidity resulting from the one-time burial of the FOC will be limited. Such impacts will not affect fish populations or have long-term impacts on EFH. Most fish would likely move away from active trenching or jetting activities. Small or juvenile benthic species or life stages (e.g., larval or egg) may be vulnerable to injury or potential burial if unable to move away from the active trenching activities, however, embryonic and larval Pacific salmon are not expected to be present in the gravels during in-river activities.

Disturbing the riverbed may affect the benthic community, which could, in turn, affect food supply within a relatively small area. The disturbance effects will be localized and primarily short-term.

Once installed, the FOC is not anticipated to adversely affect FMP-managed fish species or the habitats' ability to support managed species. While altering the physical habitat may briefly affect some habitat function, the Project will not block juvenile or adult fish migration during or after the completion of cable laying or plowing activities. Total project impacts to EFH include temporary disturbance of less than 35 acres of habitat in the Yukon River associated with cable and conduit punch-out cable connections and the possible permanent displacement of around one (1) square foot of migratory EFH associated with conduit punch-outs for the FOC transitions should they protrude above the bed of the Yukon River. Post-Project conditions are anticipated to remain suitable to support FMP-managed fish species that rely on these habitats. No long-term or significant short-term effects to EFH or FMP managed fish species are anticipated to result from installation and operation of the Alaska FiberOptic Project.

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APPENDICES

Appendix A. Project Description

Alaska FiberOptic Project

Segment 1

Supplemental Project Description

November 2023

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TABLE OF CONTENTS

List of Figures

1. PROJECT DESCRIPTION

Doyon, Limited (Doyon), in coordination with the National Telecommunication and Information Administration (NTIA), proposes to construct and operate Segment 1 of the Alaska FiberOptic Project (Project). The Project will utilize funding provided by a grant from the Tribal Broadband Connectivity Program, and only this NTIA-provided funding, to provide broadband access to a portion of the area within its Alaska Native Regional Corporation boundary that is unserved by broadband internet. Doyon proposes to provide broadband internet service to five currently unserved communities along the Yukon River; the five communities are Fort Yukon, Beaver, Stevens Village, Rampart, and Tanana.

The proposed project is divided into two corridors: a terrestrial corridor which extends from Fairbanks to and includes the E.L. Patton Bridge crossing over the Yukon River; and a river corridor that initiates at the point the fiber optic cable (FOC) enters the Yukon River and extends upstream to Fort Yukon and downstream to Tanana. The river corridor includes all proposed activities within the river as well as an overland Canyon Bypass that avoids the Rampart Rapids. The FOC will be installed in two phases during the summer of 2024 and 2025.

2. SCHEDULE

The project will be completed in two phases during the Summer of 2024 and 2025. The majority of the FOC will be installed in 2024 and includes the river corridor between Beaver and Tanana, and the Canyon Bypass corridor. A portion of the river corridor, between Fort Yukon and Beaver, will be installed during the summer of 2025.

2.1. Rationale for Phased Construction in the Yukon River

The Yukon River transitions gradually from a broad braided plain with multiple channels upstream from Fort Yukon and to a single channel downstream of Stevens Village. Based on discussions with local mariners and the results of the field reconnaissance in September 2023, it was determined that:

- A smaller, shallow draft barge is required to safely navigate upstream beyond Beaver.
- An alternative FOC installation method is required between Fort Yukon and Beaver.

Although the river between Beaver and Stevens Village continues to be braided, the river is deep enough to allow for direct lay of the FOC. However, the reach between Beaver and Fort Yukon is too shallow to safely lay the FOC directly on the river bottom due to potential hazards to navigation caused by environmental factors such as ice and/or human factors such as boat propellers. As a result, an installation method, known as water jetting , is required to safely install the FOC throughout this portion of the river.

3. FIBER OPTIC CABLE INSTALLATION

The project includes installation of a 48-fiber count cable, 0.55-inches in diameter, FOC (Figure 1). Six distinct techniques will be used to install the FOC and include:

1. Traditional trenching (summer and winter).
2. Vibratory plowing along the Canyon Bypass and wherever feasible along the terrestrial corridor.
3. Direct lay (self-burial) in the active channel of the Yukon River.
4. Jet plowing the cable into the river bottom between Fort Yukon and Beaver.
5. HDD at various locations to cross waterbodies, roadways, or to transition into/out of the Yukon River.
6. Aerially on new and existing poles.

Details of the routing and installation are provided in the following sections.

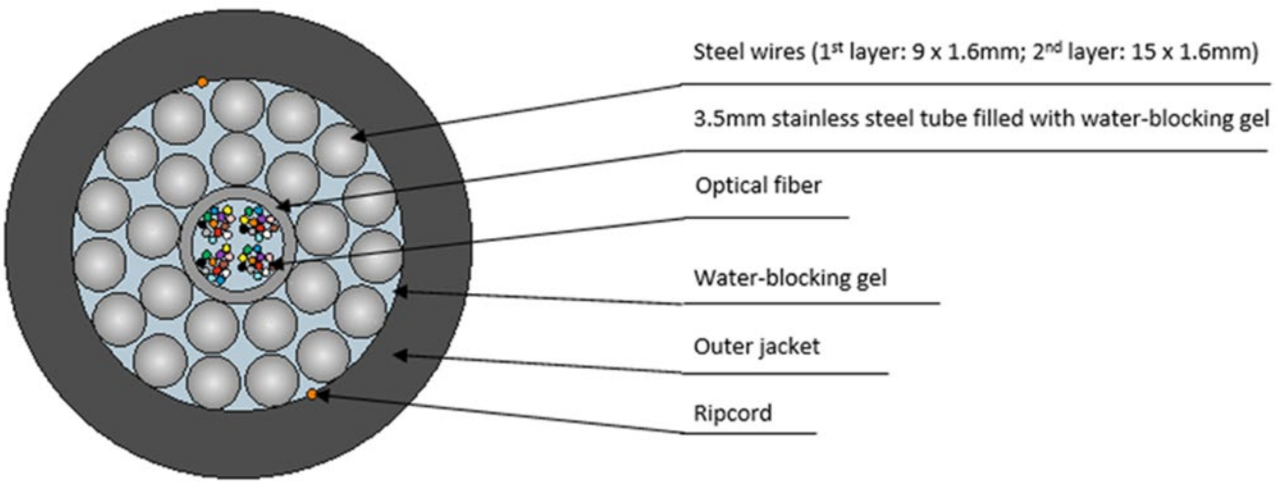

Figure 1. Cross-section of the FOC.

4. TERRESTRIAL FOC INSTALLATION AND BURIAL

4.1. Vegetation Clearing

After surveying existing utilities and the planned fiber optic installation route. This will be followed by vegetation clearing to allow access for trenching and equipment installation. The vegetation clearing width will be approximately 10-15 feet. Heavy timber will be cleared using a feller/buncher or by hand cutting. Felled trees will be moved to the edge of the right-of-way or removed and disposed of in a manner that does not create a fire hazard. No surface alteration or grading will 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 will 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.

Figure 2. Typical mulchers.

4.2. Excavation and Backfill

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

- Within frost susceptible soils and ice rich soils, burial will 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's road prism or ditch, burial will be 48-inches below the surface unless specified otherwise by DOT&PF.
- Outside the road prism, burial will be 36 inches below ground surface unless specified otherwise by DOT&PF.

All trenches will be backfilled and compacted in 6-inch lifts and water bars will be included to prevent subterranean movement of water that infiltrates into the backfilled trench. Wherever feasible a tracked vibratory plow may also be used to insert to FOC.

4.3. Stream Crossings

The FOC will cross all streams within the terrestrial corridor with the use of existing casings, bridges, or with new HDD casings that are installed 8-10 feet below the bottom of the streambed with no impact to the water course. HDD equipment is not anticipated to enter the streams and will travel along existing roadways wherever feasible. At the Yukon River, the FOC will be suspended from the E.L. Patton Yukon River Bridge through a permit with DOT&PF.

5. YUKON RIVER CONSTRUCTION AND INSTALLATION METHODOLOGY

The FOC will be installed in the thalweg of the Yukon River with minor modifications based on multibeam data collected as the barge travels upstream just prior to installation. Three distinct techniques will be used to install the FOC within the Yukon River including:

1. Direct lay (self-burial) in the active channel of the Yukon River.

2. Jet plowing the cable into the river bottom between Fort Yukon and Beaver.
3. HDD at each community landing and at either end of the Canyon Bypass to connect to punch-outs along the main cable.

5.1. Installation Technologies

Installation of the FOC is uniquely engineered for the Yukon River based on existing track logs, known riverbed profiles, riverbed composition, depth, and cable specifications. The command center for the installation is situated on the cable lay barge (CLB) and is supported by smaller support skiffs (Figure 3). Installation will begin in Beaver in 2024 and work downstream to the termination point at Tanana. In 2025 installation will begin in Fort Yukon and work downstream to the termination at Beaver.

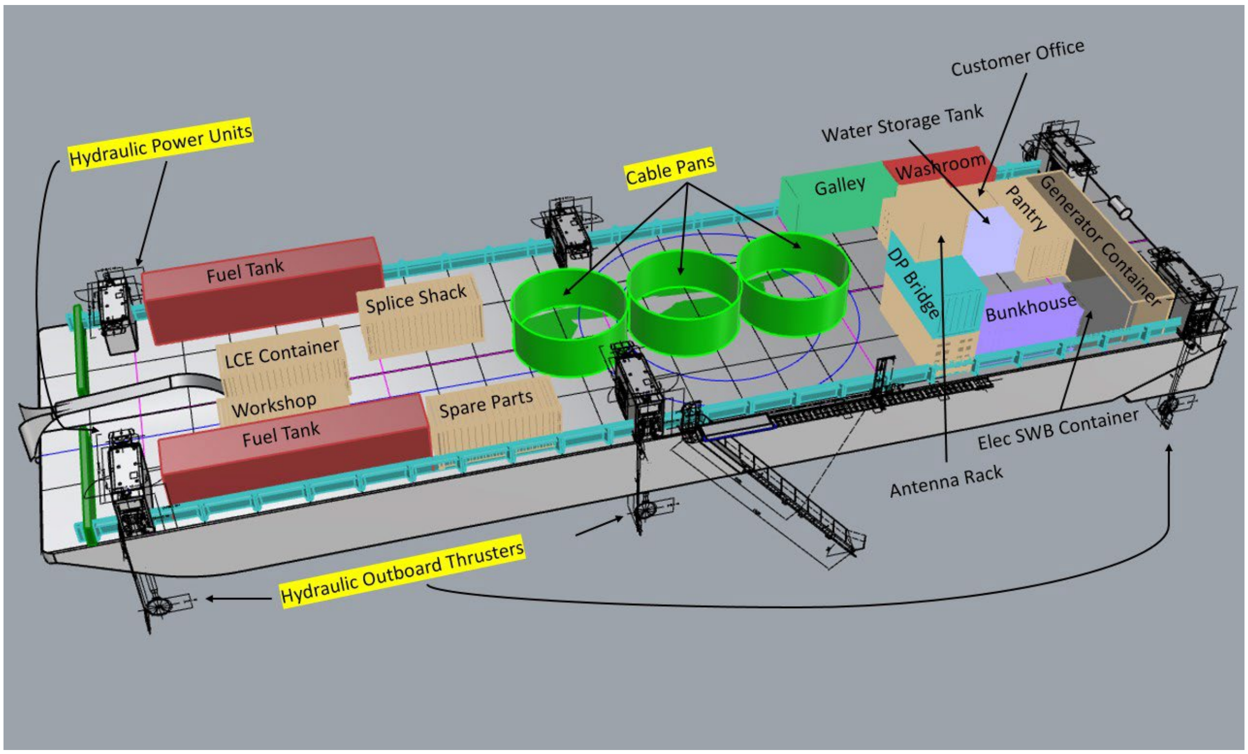

Figure 3. Cable lay barge typical.

Based on the comparison of field data, collected in the summer of 2023, and the results of the multibeam surveys, which will be collected as the CLB travels upstream (summer 2024 and 2025), the final calculated engineered values will be input into the system for real time data of cable payout, lay tension, cable angle, residual tension, minimum bend restrictions, cable set back and achieved burial depth. This data coupled with calculated corrective actions (difference between calculated values and real time measured values) are displayed for the operators on specially designed touch screens in real time during all cable operations—this is the most advanced FOC laying system available in the industry. The FOC Cable Superintendent can see all information simultaneously and can make adjustments to the angle, tension, set back and payout, which are then broadcast automatically to displays around the vessel to show the crew running the lay management system (LMS).

During the installation, the payout of cable will be controlled by means of a Linear Cable Engine (LCE). The LCE must be capable of holding the weight of the cable(s) in the water column as well as compensating for other forces on the cable. The cable holdback analysis will be conducted considering cable diameter, cable weight in water, water depth, FOC catenary length, projected area of FOC catenary, current through water column, friction coefficient of cable area in water column, density of water, residual tension, and minimum bending radius at touchdown.

The CLB movement is 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 will be deployed during the entire operation to provide the capability for accurate measurements of the current and adjustments should they be required to compensate for the current. The DP system will be sized to maintain control and position with anticipated current of up to 4 knots in any relative direction to the CLB.

5.2. Cable Lay Process from Beaver to Tanana (2024)

The Yukon River flows with a high level of turbidity and suspended solids. This flow condition combined with the bottom composition and vibration placed on the FOC during installation from the current and cable tension as it touches down on the riverbed installation, will cause the cable to self-bury in typical river sediments and gravels. Experience from other installations with similar conditions to the Yukon River and verification by divers validates the burial process. Multibeam sonar will be used sporadically over the course of the entire route to ensure the cable placement on the river bend is stable and self-burying accordingly. The CLB that will be used throughout this portion of the river is 200 feet long with a 56-foot beam and an 8-foot draft.

5.3. Cable Lay Process from Fort Yukon and Beaver (2025)

A specially designed jet plow is being built for the shallow waters of the Yukon River between Fort Yukon and Beaver (Figure 4). The plow is approximately 14 feet in length, 10 feet wide, and 5 feet in height. The plow utilizes surface fed water pumps to pump high pressure water to the leading edge of the jet plow which temporary 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 rapidly fills in the fluidized trench and safely buries the cable. Due to the shallow depth of the river a smaller barge, which is 180 feet long with a 50-foot beam and 4-foot draft, will pull the plow and carry the FOC cable.

Furthermore, due to the restricted narrow channels of the river coupled with the high current, the plow is designed to be able to be steerable and launched and 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.

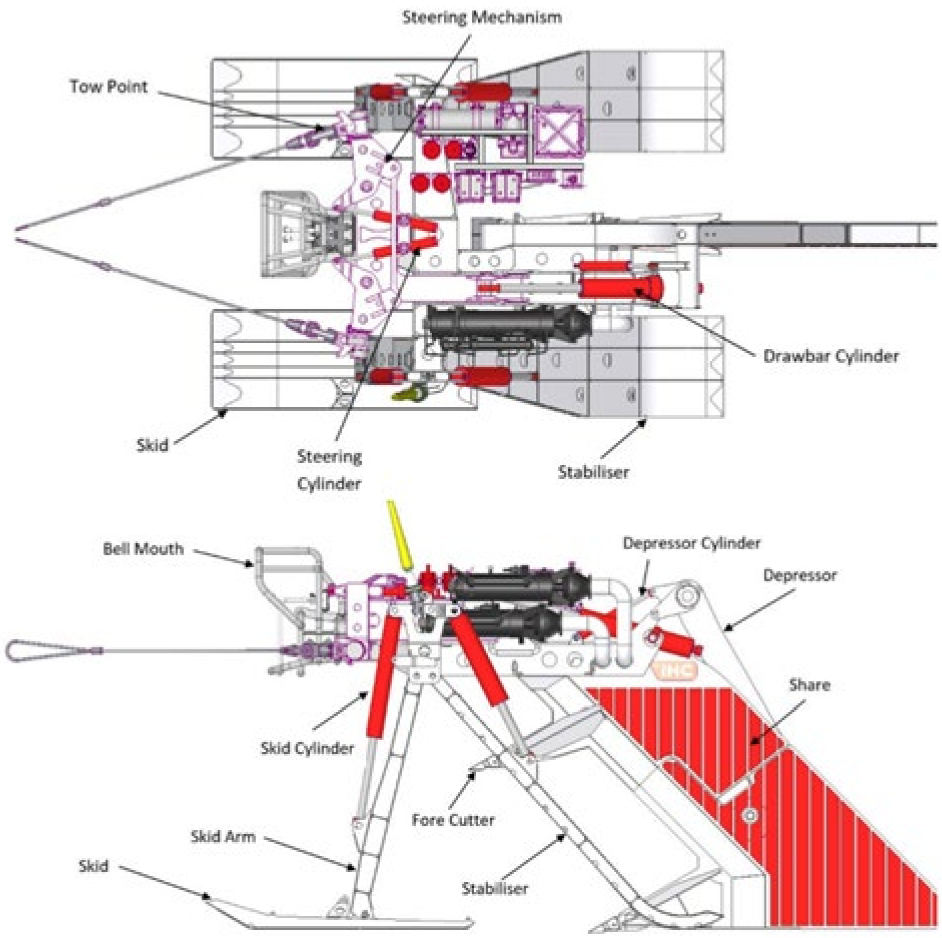

Figure 4. Jet plow diagram.

6. YUKON RIVER TRANSITIONS

A total of eight BMHs will be constructed within the river corridor and will occur at the following locations:

- Communities: Five (5) BMHs
- Canyon Bypass: Two (2) BMHs (located at the exit and re-entry points)
- E.L. Patton Bridge (Yukon River): One (1) BMH.

The BMHs are a pre-cast 4-ft by 4-ft concrete cellar that will house the FOC once it exits the river and will remain in place for the life of the project. (Figure 5). A small backhoe will be used to excavate the BMH location and once installed, the surrounding area will be backfilled and graded to match existing ground. Wherever feasible, BMH's will be located on previously disturbed ground. In communities, the FOC will be hung on existing poles once it transitions out of the BMH.

Figure 5. Typical beach manhole.

The final location of the BMHs are currently being determined. A map set identifying the preferred BMH/HDD locations will be developed once they are finalized. The finalized sites are anticipated to be less than a half mile away from the river punch-out location.

Diver jetting will be used at the conduit punch-out locations to bury cable as needed in select locations. Diver jetting is when a diver uses a handheld pressurized jet nozzle which fluidizes the riverbed using water delivered from a surface fed water pump as shown below (Figure 6). The riverbed will be temporarily liquified at the punch-out locations to allow for deeper placement of the cable. The source of the water is the same as the receiving water body, the Yukon River.

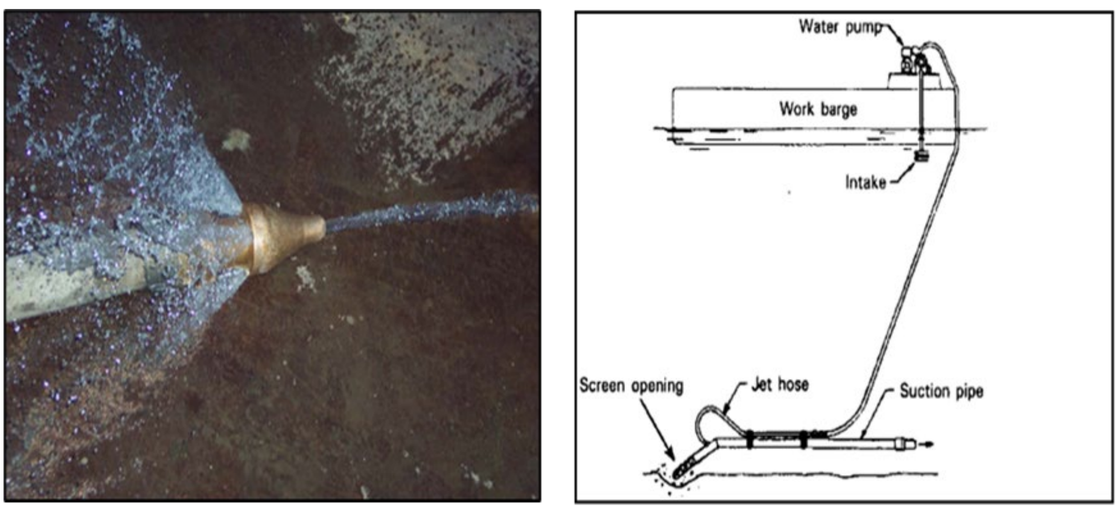

Figure 6. Graphic diver jetting example.

7. CANYON BYPASS CONSTRUCTION AND INSTALLATION METHODOLOGY

Land along the Canyon Bypass corridor is predominantly owned by the State of Alaska and managed by the Alaska Department of Natural Resources (DNR) Division of Mining, Land and Water (DMLW). A small portion of the corridor crosses lands managed by Doyon. The Canyon Bypass alignment is approximately 20 miles of undisturbed boreal forest, tundra, and wetland habitats. Much of the area is identified as upland habitat and has been impacted by wildfires in the last 20 years.

The proposed bypass route will utilize HDD to install the FOC under Garnet, Stevens, Texas, and Jordan creeks. Garnet Creek is a catalogued anadromous stream for chum salmon (*Oncorhynchus keta*) and King salmon (*O. tshawytscha*) and contains humpback whitefish (*Coregonus pidschian*). A fish habitat permit under Alaska Statue 16.05.841-871 will be required from the Alaska Department of Fish and Game.

The FOC installation at the Canyon Bypass exit/re-entry locations will be via HDD and will install BMHs (two total) in upland positions above the 50-year floodplain. Vegetation along the approximately 20-mile route between the BMHs will be cleared where necessary using a low-pressure mulcher. We estimate a 10-15 foot wide clearing. The FOC will be inserted into the ground using a tracked vibratory plow. The plow will bury the FOC approximately 10-16 inches deep by creating a 1-inch-wide slice into the existing ground (Figure 7). Once the FOC is installed the space will be compacted using a tracked hoe and/or hoepack. Tracked support equipment may also be present. All work would be conducted in summer during snow free conditions and supported by access from the Yukon River via barge. Water used to support HDD will be pulled from the streams and a Temporary Water Use Authorization from DNR-DMLW will be obtained.

Figure 7. Example of equipment used for FOC installation along the Canyon Bypass.

8. PROJECT SUPPORT ACTIVITIES

8.1. Camp

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

The project contractor will use small support transport vessels to transport crew between the camps and the CLB vessel and to the other support vessels.

8.2. Support Vessels

During the 2024 FOC installation, there will be one 30-foot survey support vessel, two 20-foot cable skiffs to support operations, and an assist tug. For the 2025 FOC installation effort, the single assist tug will be replaced by two 25-foot truckable tugs.

8.3. Material Staging Locations & Access

The primary mode of access for equipment for the river installation will be via barge. Once all FOC is spliced and shipping conditions are ice free, it will be mobilized directly from Vancouver, British Columbia to the project site via ocean vessels. The barge will stop-over in Seward, Alaska 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 will be towed to Beaver (2024) and Fort Yukon (2025) to begin installation.

Staging along the terrestrial corridor will be at designated locations, on existing gravel pads. The CLB will house all the material and equipment needed to install the FOC in the Yukon River. All HDD activities will be in designated staging areas along the terrestrial corridor on in designated areas within each community.