Department of the Army Permit Application

CD8 Development

North Slope, Alaska

April 2025

COVER LETTER

Hannah Griego
Senior Environmental Coordinator
Environmental Permitting & Compliance
ConocoPhillips Alaska, Inc.
P.O. Box 100360, 700 G Street
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April 10, 2025

Mr. Tyler Marye
Alaska District Regulatory Division, North Section
United States Army Corps of Engineers
2204 3rd Street, P.O. Box 6898
JBER, AK 99506

Electronic Submittal
Tyler.J.Marye@usace.army.mil
regpagemaster@usace.army.mil

RE: Department of the Army Permit Application
CD8 Development
North Slope, Alaska

Dear Mr. Marye:

ConocoPhillips Alaska, Inc. (CPAI) respectfully submits to the Department of the Army (DA) the attached documentation to commence the process of seeking authorization from the United States Army Corps of Engineers (USACE) to construct the CD8 Development (Project). CPAI recognizes that this process will be subject to an environmental impact statement and looks forward to working cooperatively with the USACE and affected stakeholders through the process. The proposed Project consists of a gravel drillsite, pipelines, a gravel pipeline tie-in pad, gravel access road, a tundra access road turnout for subsistence activities, and power and fiber optic cables to support development of hydrocarbon resources from CPAI's oil and gas leases within the Colville River Unit. The proposed work would involve the placement of clean fill material and temporary discharge to Waters of the United States.

In this regard, enclosed please find:

- A completed DA application with:
  - Attachment A: Project Description
  - Attachment B: Sheets
  - Attachment C: Applicant's Proposed Mitigation Statements
  - Attachment D: Avoidance and Minimization Measures Table
  - Attachment E: Wetland Delineation Report

If you have any questions or require additional information, please do not hesitate to contact me.

Sincerely,

Hannah Griego
Senior Environmental Advisor

Enclosures:

- DA Application with Attachments

cc:

Jonathon Hegna, USACE
Janet Post, USACE
Sara Longan, USACE
Kyle Hampton, CPAI
Chris Wrobel, CPAI
Nichole Gifford, CPAI

APPLICATION FORM

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

For use of this form, see 33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 08-31-2023

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Hannah Middle – R. Last - Griego	First - Middle - Last -
Company – ConocoPhillips Alaska, Inc.	Company -
E-mail Address – hannah.griego@conocophillips.com	E-mail Address -
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address - P.O. Box 100360	Address -
City - Anchorage State - AK Zip - 99510 Country - USA	City - State - Zip - Country -
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business 907-265-6163 c. Fax	a. Residence b. Business c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize,_____to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

_____ _____

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)

CD8 Development

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
Colville River	Address
15. LOCATION OF PROJECT	City - State - Zip-
Latitude: 70.23308° N Longitude: 150.90090° W	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID See Project Description Municipality

Section - Township - Range -

17. DIRECTIONS TO THE SITE

The CD8 Development (Project) is located on the North Slope of Alaska in the Colville River Unit (CRU) between the between the East Channel and Niġliq Channel of the Colville River. The CD8 drillsite will be located approximately 7.5 miles south and slightly east of existing Colville Delta 1 (CD1)/Alpine Central Facility (ACF), 4.5 miles southeast of existing Colville Delta 4 (CD4), and 2.1 miles east-northeast of Nuiqsut.

18. Nature of Activity (Description of project, include all features)

ConocoPhillips Alaska, Inc. (CPAI) proposes the placement of fill material into 67.3 acres, 65.9 acres of which are Waters of the United States (WOTUS), including wetlands, to construct a gravel drillsite, pipelines, a gravel pipeline tie-in pad, gravel access road, a subsistence tundra access road turnout, and power and fiber optic cables. Temporary discharges to <0.1 acre are proposed for trenching power and fiber optic cables. See the attached Project Description and permit drawings for specific fill requirements and acreage for project components.

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

The purpose of the CD8 Project is to construct the infrastructure necessary for the safe and economic (i) production of commercial quantities of oil and gas resources from lands leased by CPAI for oil and gas development in the southeastern portion of the Colville River Unit (CRU) and (ii) transportation of those resources to market, via ACF, consistent with applicable laws and legal obligations. To serve this purpose, CPAI needs permit approval to construct one or more drill sites, access roads, pipelines, and ancillary infrastructure.

Development and production of oil and gas from the CD8 Project is necessary to access subsurface resources that cannot be reached from existing and currently permitted drill sites. The Project will extend CRU field life and provide new benefits to local, state, and national economies through tax revenues; royalties and overriding royalties to State of Alaska, Arctic Slope Regional Corporation (ASRC), and Kuukpik Corporation as surface and subsurface landowners; creating jobs during construction (including local hires), and developing new resources to help meet U.S. domestic energy demand and support the balance of trade.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Discharge of gravel fill and riprap is necessary for the construction of the gravel drillsite, gravel pipeline tie-in pad, gravel access road, and subsistence tundra access road turnout. Clean gravel fill will primarily be purchased from the existing ASRC Mine Site. Additional material may be obtained from an existing and permitted site in Kuparuk (Mine Site C). Stone riprap will be sourced from a permitted mine in the Brooks Range near Galbraith Lake. Sand slurry fill is necessary for the construction of vertical support members to support pipelines and power and fiber optic cables.

Temporary discharge of trenched materials is required for cable trenching. Please see the attached Project Description for further information.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
Gravel: 746,100 cy	Riprap: 12,580 cy	Sand Slurry: 1,400 cy

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres: 65.9 acres filled; <0.1 acre impacted by temporary discharges

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

Please see the attached Applicant Proposed Mitigation Statements.

24. Is Any Portion of the Work Already Complete? [ ] Yes [X] No IF YES, DESCRIBE THE COMPLETED WORK

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address - Kuukpik Corporation, PO Box 89197

City - Nuiqsut State - AK Zip - 99789

b. Address – Arctic Slope Regional Corporation, PO Box 129

City - Utqiaġvik State - AK Zip - 99723

c. Address - State of Alaska Department of Natural Resources, Division of Mining, Land and Water, 3700 Airport Way

City - Fairbanks State - AK Zip - 99709

d. Address – Oil Search (Alaska), LLC, PO Box 240927

City - Anchorage State - AK Zip - 99524

e. Address – Native Allotment Under Care of Inupiat Community of the Arctic Slope, PO Box 934

City – Utqiaġvik State - AK Zip - 99723

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
See Project Description					

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Hanna R. Long — April 10, 2025

SIGNATURE OF APPLICANT | DATE | SIGNATURE OF AGENT | DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

ATTACHMENT A

PROJECT DESCRIPTION

CD8 DEVELOPMENT

PROJECT DESCRIPTION

ConocoPhillips Alaska, Inc.
700 G Street
Anchorage, AK 99501

April 2025

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Contents

Figures

Tables

Acronyms and Abbreviations

Abbreviation	Definition
AAC	Alaska Administrative Code
ACF	Alpine Central Processing Facility
ACP	Alaska Coastal Plain
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
AOGCC	Alaska Oil and Gas Conservation Commission
APDES	Alaska Pollutant Discharge Elimination System
API	American Petroleum Institute
ASRC	Arctic Slope Regional Corporation
BLM	Bureau of Land Management
BTU	British Thermal Unit
CAA	Clean Air Act
CD1	Colville Delta 1
CD4	Colville River Delta 4
CD4N	Colville River Delta 4 North
CFR	Code of Federal Regulations
CPAI	ConocoPhillips Alaska, Inc.
CPF2	Central Processing Facility 2
CRD	Colville River Delta
CRU	Colville River Unit
CWA	Clean Water Act
cy	cubic yard(s)
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FGDC	Federal Geographic Data Committee
FR	Federal Register
ft^2	square foot/feet
GI	gas injection
GIS	Geographic Information System
GMT1/MT6	Greater Mooses Tooth 1/Mooses Tooth 6
GMT2/MT7	Greater Mooses Tooth 2/Mooses Tooth 7
GMTU	Greater Mooses Tooth Unit
H	horizontal
HDD	horizontal directional drilling
HSM	horizontal support member
KRU	Kuparuk River Unit
LOA	Letter of Authorization

Abbreviation	Definition
MG	million gallons
MI	miscible injectant
MI/GI	miscible injectant/ gas injection
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPR-A	National Petroleum Reserve-Alaska
NSB	North Slope Borough
NSSRT	North Slope Spill Response Team
NWI	National Wetlands Inventory
ODPCP	Oil Discharge Prevention and Contingency Plan
OHW	ordinary high water
OPA	Oil Pollution Act of 1990
Project	CD8 Development
Q1	first quarter
Q2	second quarter
Q3	third quarter
Q4	fourth quarter
RCRA	Resource Conservation and Recovery Act
REIM	remote electrical and instrumentation module
RP	Recommended Practice
SPCC	Spill Prevention, Control, and Countermeasure
SWPPP	Stormwater Pollution Prevention Plan
TAPS	Trans-Alaska Pipeline System
UIC	underground injection control
USACE	United States Army Corps of Engineers
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
V	vertical
VSM	vertical support member
WNS	Western North Slope
WOTUS	Waters of the United States

1.0 INTRODUCTION

This project description is provided to the United States Army Corps of Engineers (USACE) to support ConocoPhillips Alaska, Inc.'s (CPAI) Department of the Army application for the Colville Delta 8 (CD8) Development (Project) on the North Slope of Alaska. This project description is also intended to support USACE's anticipated analysis under the National Environmental Policy Act (NEPA).

2.0 PROJECT LOCATION AND SITE DESCRIPTION

2.1 Location

The Project is located on the North Slope of Alaska in the Colville River Unit (CRU) between the East Channel and Niġliq Channel of the Colville River (see attached maps and Sheets in Attachment B). The CD8 drillsite will be located approximately 7.5 miles south of existing Colville Delta 1 (CD1)/Alpine Central Facility (ACF), 4.5 miles southeast of existing Colville Delta 4 (CD4), and 2.1 miles east-northeast of Nuiqsut. The drillsite will be part of CPAI's Western North Slope (WNS) operating and development area; the drillsite, pipeline tie-in pad and most of the pipeline, power and fiber optic cables, and gravel road will be within the CRU. However, the pipeline, cables, and gravel road will each cross a portion of the Pikka Unit, which is leased to Oil Search Alaska, LLC.

Table 2-1. Project Components Locations

Project Component	Township	Range	Section(s)[a]	Latitude[b]	Longitude[b]
CD8 Drillsite	10N	5E	8, 9	70.23308° N	150.90090° W
Pipeline Tie-In Pad	11N	4E	13	70.30610° N	150.99788° W
Pipelines	10N	5E	3, 4, 9	—	—
	11N	4E	13	—	—
	11N	5E	18, 19, 29, 30, 32, 33	—	—
Roads	10N	5E	4, 9	—	—
	11N	5E	19, 29, 30, 32, 33	—	—
L9324 Bridge	11N	5E	30	70.28120° N	150.95396° W
Subsistence Access Turnout and Ramps	11N	5E	33	70.26158° N	150.88383° W
Power & Fiber Optic Cables	10N	5E	3, 4, 9	—	—
	11N	4E	12, 13	—	—
	11N	5E	5, 6, 7, 18, 19, 29, 30, 32, 33	—	—

[a] All sections are within the Umiat Meridian.
[b] Latitude and longitude coordinates for linear Project features are not provided because of the multiple locations these features traverse. Approximate linear feature coordinates are available on request.
Notes: CD8: Colville Delta 8; N: North; E: East; W: West.

2.2 Adjoining Property Owners and Lessees

The Project is in the CRU, which is governed by the CRU Agreement, and jointly managed between the Alaska Department of Natural Resources (ADNR), Arctic Slope Regional Corporation (ASRC), and Bureau of Land Management (BLM). The Project is also located within the North Slope Borough (NSB). The drillsite, pipeline tie-in pad, gravel access road from CD4, and most of the pipelines and power and fiber optic cables will be on surface lands owned by the Kuukpik Corporation, an Alaska Native Village Corporation, established pursuant to the Alaska Native Claims Settlement Act. Segments of the pipeline and the power and fiber optic cable routes will cross land whose surface rights are owned by the State of Alaska and managed by ADNR. Additionally, segments of the pipeline and the power and fiber optic cable routes, and gravel will cross a portion of the Pikka Unit. The subsurface mineral rights of the Project are jointly owned by ADNR and ASRC. None of the Project facilities will be located on or within 500 feet of Native allotments. The closest allotment (AKFF 011723) is approximately 1,670 feet south on the far side of the Nuiqsut Fuel Gas Pipeline. Most of the proposed pipeline routes follow existing pipeline corridors.

2.3 Site Description

The Project is within the Colville River Delta (CRD) on the Arctic Coastal Plain (ACP) physiographic region on the North Slope of Alaska. The ACP landscape comprises gently rolling hills, many shallow lakes and ponds, and wetlands resulting from poorly drained soils. The CRD is characterized by low-lying palustrine tundra surrounded by tidal rivers and streams, coastal barrens on tidal influenced river bars, and vegetated and unvegetated dunes. As is typical on the North Slope, the Project is located on permafrost where the subsurface is perennially frozen.

Nearby infrastructure and activities within and adjacent to the CRD include the community of Nuiqsut with an airport operated by the NSB and winter ice road connectivity to the gravel road system at Kuparuk. Oil and gas industry infrastructure include drillsites and processing facilities for CPAI's Alpine Development and Santos's Pikka Project, support facilities on gravel including camps and the Alpine airstrip, pipelines including existing Horizontal Directional Drilling (HDD) crossings of the Colville River, and the ASRC Mine Site. Additional activities in the area include the annually constructed Alpine/WNS Multiyear Ice Road which includes the Colville River Ice Bridge.

3.0 PROJECT OVERVIEW

CPAI, as operator and 100 percent working interest owner in the producing intervals of the CRU, plans to develop hydrocarbon resources from CPAI's oil and gas leases in the CRU. The Project consists of a drillsite, pipelines, a pipeline tie-in pad, gravel access road, ice roads and pads, a

tundra access road turnout for subsistence activities, and power and fiber optic cables. Project components and details are described in Section 5.0, Project Components; other Project infrastructure and utility needs are described in Section 8.0, Other Infrastructure and Utilities. The construction and operation of these facilities require authorizations from USACE as well as other federal, state, and local permits. A summary of these permits and authorizations is provided in Section 18.0, Other Permits and Regulatory Authorizations.

4.0 PROJECT PURPOSE

4.1 Proposed Purpose and Need

The purpose of the CD8 Project is to construct the infrastructure necessary for the safe and economic (i) production of commercial quantities of oil and gas resources from lands leased by CPAI for oil and gas development in the southeastern portion of the CRU and (ii) transportation of those resources to market via ACF, consistent with applicable laws and legal obligations. To serve this purpose, CPAI needs permit approval to construct one or more drillsites, access roads, pipelines, and ancillary infrastructure.

Development and production of oil and gas from the Project is necessary to access subsurface resources that cannot be reached from existing and currently permitted drill sites. The Project will extend CRU field life and provide new benefits to local, state, and national economies through tax revenues; royalties and overriding royalties to State of Alaska, ASRC, and Kuukpik Corporation as subsurface and surface landowners; creating jobs during construction (including local hires); and developing new resources to help meet U.S. domestic energy demand and support the balance of trade.

4.2 Proposed Basic Project Purpose and Water Dependency

The proposed basic Project purpose is to construct the infrastructure necessary to safely and economically drill for, produce, and transport commercial quantities of oil and gas resources to market for sale. The basic Project purpose is not water-dependent, so it does not require access or proximity to, or siting within, a special aquatic site to fulfill its basic purpose. However, virtually all land on the ACP physiographic region on the North Slope of Alaska and 98 percent of the project area is wetland, including the Project site. Thus, there are no alternatives to the Project that meet the project purpose and need that do not impact wetlands.

5.0 PROJECT COMPONENTS

The Project consists of a drillsite with roads and pipelines connecting back to existing facilities in the CRU. Support facilities include a pipeline tie-in pad, and power and fiber optic cables between CD8 and ACF. Table 5-1 summarizes the major Project components.

Table 5-1. Major Project Components

Component		Description
Gravel Pads	Drillsite	15.3-acre CD8 drillsite pad
	Pipeline Tie-in Pad	0.5-acre pipeline pigging and tie-in pad near CD4N
Pipelines	Infield Lines	7.6-mile-long Produced Oil pipeline connecting CD8 to Pipeline Tie-In Pad 6.8-mile-long Injection Water pipeline connecting CD8 to CD4 7.1-mile-long MI/GI pipeline connecting CD8 to Alpine MI/GI Pad area
Access	Gravel Road	6.1-mile-long road connecting drillsite to CD4 access road
	Waterbody Crossings	Bridge at Lake L9324; Four culvert swale crossings
	Ice Roads	Approximately 30.9 miles (total) over two construction seasons; Shortened Alpine/WNS Multiyear Ice Road for the life of the Project
	Ice Pads	Approximately 176.9 acres (total) during two construction seasons
	Marine Transport	Barge delivery to Oliktok Dock
Subsistence Access Turnout		Subsistence tundra access road turnout with ramps
Power & Fiber Optic Cables		10.8-mile-long from ACF to CD8
Material Source(s)		Use of one-or more materials sources in project area (ASRC or KRU Site)

Notes: ASRC: Arctic Slope Regional Corporation; ACF Alpine Central Processing Facility; CD1: Colville Delta 1; CD4: Colville Delta 4; CD4N: Colville Delta 4 North; KRU: Kuparuk River Unit; MI/GI miscible injectant/gas injection.

Access to the Project will occur via ground transportation on seasonal ice roads and existing and proposed gravel roads; fixed wing aircraft to the existing Alpine airstrip at CD1/ACF; helicopter; and barge to the existing Oliktok Dock.

Hydrology criteria for the Project are described in Table 5-2 below. Analysis of water surface elevations consider snow and ice impacts as well as open water flood levels based on a regional open water and ice affected modeling update completed in 2020 (MBI 2020). Design analysis will be based on site-specific conditions including observations and measurements and modeled conditions (e.g., ice or snow affects).

Table 5-2. CD8 Hydrology Design Criteria

Project Component	Design Criteria
Gravel Pads and Pipelines	Greater of the following: • Q200 open water + 3 feet or • Q50 ice affected water surface elevation +1 foot
Gravel Roads	Greater of the following: • Q200 open water • Q50 ice affected water surface elevation
Bridges	• Q200 open water + 5 feet or • Q50 ice affected water surface elevation + 3 feet
Culverts	• Swale Crossing: Q50 open water with headwater diameter ratio of 1 or less • Cross drainage: as required to maintain natural drainage patterns
Erosion Protection	Q50 open water + 1 foot: • Where velocity is > 2 feet per second, or • Design wave height > 0.7 feet, or • Combined velocity >1.0 fps AND 0.4-foot wave height.

Notes: CD8: Colville Delta 8; Q50: 50-year flood event; Q200: 200-year flood event; fps: feet per second.

5.1 Gravel Pads

Design thickness for the gravel pads is based on the more stringent of the North Slope industry practice of 5 feet minimum pad thickness to maintain a stable thermal regime or the Project hydrologic basis of design (see Table 5-2). Embankment side slopes will have a horizontal (H) to vertical (V) ratio of approximately 2H:1V. Based on preliminary evaluation for the potential for erosion, riprap has been included in locations along gravel pads and the gravel road.

5.1.1 CD8 Drillsite

The CD8 drillsite is a gravel pad designed to accommodate drilling and operations facilities to support resource development. The drillsite is located on moderately high, level terrain approximately 5,500 feet west of the East Channel of the Colville River.

Drillsite facilities will include wellhead shelters and drilling material storage and well work equipment. The drillsite is sized to accommodate up to 40 wells with typical 20-foot wellhead spacing. These include production wells to extract hydrocarbons from the reservoir and injector wells to inject water and/or gas/miscible injectant (gas and natural gas liquids) to maintain reservoir pressure and support enhanced oil recovery. The injection water will consist of treated seawater and/or produced water processed at ACF. Well stimulation will be conducted in all wells to increase fluid flow through the reservoir and enhance oil recovery. This technique uses a specially blended fluid that is pumped into a well under pressure, causing cracks to form in the reservoir rocks. Wells will be equipped with appropriate well safety valve systems in accordance with 20 Alaska Administrative Code (AAC) 25.265. Manifold and/or pipe rack piping will combine

individual wellhead piping into a common gathering line through which all produced fluids will be transported to ACF.

Additional drillsite facilities are expected to include, but are not limited to, the following equipment, packaged in truckable and/or barged modules with some of the equipment in enclosed modules:

- Emergency shutdown equipment
- Fuel gas pressure let-down and conditioning equipment
- Well test and associated metering facilities
- Electrical and instrumentation control equipment
- Pig launchers/receivers
- Chemical injection facilities (including tanks and small pumps within modules, containment, and exterior tank fill connections)
- Exterior Storage Tanks and Containment (Chemicals and Freeze Protection Fluid)
- Equipment and tanks to support drilling and well work operations
- Production heater and associated equipment (approximately 30 million British thermal units [BTU] per hour)
- Tank Truck Loading/Unloading Area (TTLA)
- Transformer (oil-insulated) and platform
- Low-pressure and high-pressure pipe rack and/or manifold piping/valves
- Communications infrastructure, including a tower up to 80 feet high
- High-mast lights

In addition to the facilities listed above, at various times throughout the Project's producing lifetime, temporary modules and tanks, equipment, spill response equipment containers, and other structures may be used at the CD8 drillsite to address short-term needs.

5.1.2 Pipeline Tie-in Pad

The CD8 produced oil pipeline will tie into existing pipeline infrastructure at a new pipeline tie-in pad located near CD4N. One or more modules will be installed on this pad for pigging.

5.1.3 New Facilities on Existing Pads

The Project may include installation of modules and equipment on the existing ACF at CD1 and CD4 gravel pads. New equipment to be installed on the existing ACF pad includes tie-ins for power and fiber optic and routing of cables. Modules and equipment to be installed at CD4 includes pigging equipment to ensure pipeline integrity. Expansion of existing pads is not planned to support the project.

5.2 Pipelines

The Project will include infield pipelines to carry a variety of products between ACF and the CD8 drillsite (Table 5-3). Pipelines to/from CD8 will leverage tie-ins with existing pipelines and/or facilities to avoid parallel pipelines to the extent practicable. Pipelines will rest on common

horizontal support members (HSMs) atop vertical support members (VSMs) and will use existing slots on Willow pipeline HSMs from the Willow HDD Pad to Alpine MI/GI Pad area to avoid the need to install new VSMs/HSMs for most of the CD8 pipelines length. Pipelines (including suspended cables) on new VSMs will be a minimum of 7 feet above ground except where pipelines meet gravel pads and at road crossings. New pipelines that share existing VSMs/HSMs will match the existing HSM heights. New VSMs/HSMs will also be sized with sufficient room to allow for additional future pipeline installation (e.g., a potential gas injection pipeline to support Project needs). In total, the project includes approximately 2.5 miles of pipelines on approximately 350 new VSMs. No VSMs are proposed for placement below ordinary high water (OHW). The hydrologic basis of design for pipelines is described in Table 5-2 above.

Table 5-3. CD8 Pipelines

Pipeline(s)	Start/End Points	Length (miles)	Notes
Produced oil	CD8 to CD8 Pipeline Tie-In Pad	7.6	Transport produced crude oil, gas, and water from CD8 for processing at ACF. Requires new VSMs from CD8 to Willow HDD Pad and from MI/GI Pad area to Pipeline Tie-In Pad (2.1 miles).
Injection Water	CD4 to CD8	6.8	Transport seawater or produced water to CD8 to maintain reservoir pressure and support enhanced oil recovery. Shares new VSMs with CD8 Produced Oil pipeline from CD8 to Willow HDD. Requires new VSMs from CD4 Junction to CD4 (0.4 mile)
MI/GI	MI/GI Pad area to CD8	7.1	Transports MI and/or lean gas to CD8 for artificial lift to support enhanced oil recovery, reservoir pressure support, and fuel gas. Shares new VSMs with CD8 Produced Oil pipeline from CD8 to Willow HDD.

Notes: CD4: Colville Delta 4; CD8: Colville Delta 8; HDD: horizontal directional drilling; MI: miscible injectant; MI/GI: miscible injectant/gas injection; OHW: ordinary high water; VSM: vertical support member.

Where located on new VSMs/HSMs, the CD8 pipelines will typically have supports with a single VSM, except where anchor supports are used and in expansion loops, where two VSMs per pipeline support will be used. New VSMs will typically be placed about 55 feet apart and have a typical diameter of 12 to 30 inches and a disturbance footprint diameter of 18 to 40 inches. VSMs will be installed using a sand slurry fill or may be driven into an undersized hole using a vibratory hammer based on engineering design. The pipelines will be strung, welded, tested, and then installed in pipe saddles on top of the HSMs. Where Project pipelines parallel existing pipelines on new VSMs, the new VSMs will be aligned with the existing VSMs and constructed as close to the existing pipelines as practicable. A typical distance between HSMs of adjacent pipelines is 5 feet to allow adequate space for maintenance and safety.

Pipeline design will conform to American Society of Mechanical Engineers Codes B31.4 and B31.8 as appropriate, applicable federal and state standards, and CPAI internal specifications. Typical pipeline construction will consist of carbon steel pipe as dictated by service, pipeline size,

and code, externally coated with fusion-bonded epoxy to prevent external corrosion, and covered with rigid polyurethane insulation and metal jacketing, as necessary. External metal jacketing will be non-reflective or will be buffed in the field. All pipelines will be hydrostatically tested prior to startup as required by the appropriate design code (e.g., B31.4 and B31.8). Pigging facilities will be installed for the produced oil and injection water pipelines to allow pipeline inspection and maintenance.

5.3 Power and Fiber Optic Cables

Fiber-optic and power cables will be suspended via messenger cable attached to the new and existing HSMs. Power and fiber optic cables will connect to existing facilities at ACF (approximately 10.8 miles). At pipeline crossings of gravel roads, fiber-optic and power cables may be installed in the tundra by trench. Trenches will be dug in winter and trenched materials will be temporarily sidecast onto plywood, plastic sheeting, or an ice pad adjacent to the trench. Excavated materials will be backfilled into the excavation once trenching is complete.

5.4 Access to the Project

Access to the Project from Alpine CD1/ACF and other WNS pads will occur via ground transportation on seasonal ice roads and existing and proposed gravel roads (Table 5-4). Ground transport from Kuparuk and/or Deadhorse to CD8 will occur seasonally via the annually constructed Alpine/WNS Multiyear Ice Road. Helicopters may be used to access the project area but will be limited to emergency response to the CD8 pad, ice road cleanup during construction years, and required monitoring studies. Helicopters will depart from the helicopter base of operations (likely at CD5 or Willow) and land directly on the tundra.

Access for personnel, equipment, and supplies to and from the North Slope will primarily occur by ground on existing roads, by fixed-wing aircraft to the airstrip at Alpine CD1/ACF, and by barge to the existing Oliktok Dock. CPAI estimates that air traffic at the CD1/ACF airstrip will increase slightly relative to existing traffic during construction but will not increase during drilling and operations.

Table 5-4. CD8 Development: Total Traffic Volumes (number of trips)

Year	Ground[a]	Fixed Wing to ACF/CD1[b]	Helicopter[c]	Barge to Oliktok[d]	Tugboat to Oliktok[e]	Support Vessels to Oliktok[f]
Year 0	13,388	14	16	—	—	—
Year 1	88,303	66	120	1	1	8
Year 2	101,554	64	115	—	—	—
Year 3	32,268	—	15	—	—	—
Year 4	32,263	—	15	—	—	—
Year 5	32,268	—	15	—	—	—
Year 6	32,268	—	15	—	—	—
Year 7	9,507	—	15	—	—	—
Year 8 – Life of Project[g] Annual / Cumulative	1,920 / 44,160	—	15 / 345	—	—	—
Total	**385,984**	**144**	**671**	**1**	**1**	**8**

[a] Includes buses, light commercial trucks, short-haul trucks, passenger trucks, gravel hauling operations (i.e., B70/maxi dump trucks, and other miscellaneous vehicles.
[b] Only includes flights to support Project. Fixed-wing aircraft includes C-130, DC-6, Twin Otter/CASA, Q400, Cessna, or similar.
[c] Includes support for ice road construction, pre-staged boom deployment, environmental monitoring, and agency inspection during all phases of the Project. Helicopter flights in Year 0 will support the start of project construction in the fourth quarter of Year 0/first quarter of Year 1.
[d] Includes barge arrival from a location outside the North Slope to Oliktok Dock.
[e] Includes a tugboat accompanying a barge from a location outside the North Slope to Oliktok Dock.
[f] Includes shallow draft tugs, crew boats, and other support vessels arrival to Oliktok Dock.
[g] For the purposes of analysis, the life of the project is estimated to be 30 years.
Notes: Ground trips are defined as one way, and a single fixed-wing or helicopter flight is defined as a landing and subsequent take-off; a vessel trip is defined as arrival and subsequent departure from Oliktok Dock. Y: Year; —: value equals zero.

5.4.1 Ice Roads and Pads

During construction, ice roads will be constructed for the Project pipeline, pad, and gravel road construction; lake access; and gravel source access during winter construction. During drilling and operations, planned ice road use is limited to drilling rig mobilization/demobilization (Table 5-5). Because of heavy equipment size and frequency of construction traffic, safety considerations dictate using separate ice roads for hauling gravel and general traffic.

Table 5-5. Estimated Ice Road and Pads

Year	Ice Road Length (miles)	Ice Road Footprint (acres)	Ice Pad Footprint (acres)
Year 0/1 (winter)	16.8	88.8	115.2
Year 1/2 (winter)	14.1	133.2	61.7
Year 2/3 – Year 6/7 (winter) Annual / Cumulative[a]	—	—	5.0 / 25.0
Year 7/8 – Life of Project (winter) Annual / Cumulative[b]	—	—	—
Total[b]	**30.9**	**222.0**	**201.9**

[a] This row indicates the totals from Year 2/3 through Year 7/8 (winter).
[b] For the purposes of analysis, the life of the project is estimated to be 30 years. This row indicates the totals from Year 7/8 through Year 29/30 (winter).
[c] Values may not sum to totals due to rounding.
Notes: All mileages are approximate. —: value equals zero

During drilling and operations, seasonal ground access from Deadhorse and Kuparuk to CD8 will be provided via the currently permitted and annually constructed Alpine/WNS Multiyear Ice Road. The Alpine/WNS Multiyear Ice Road will be able to connect to the CD8 gravel road once it is complete, thus shortening the total length of the annual ice road by 6.9 miles (a minimum of 29.3 acres) in most years for a total savings of approximately 193.2 miles of ice road (820.4 acres) over the analyzed life of the project.

Single-season ice pads (ice pads built and used for a single winter construction season) will be used during construction to stage construction equipment and support construction activities (Table 5-5). For example, ice pads will be used at the material source (approximately 75 acres), to support bridge construction (approximately 7.5 acres per bridge), to support Pipeline Tie-in Pad construction, to support module mobilization along the Alpine /WNS Multiyear Ice Road, and at other locations as needed near infrastructure within the Project vicinity. During drilling, an approximately 5-acre single season ice pad may also be constructed annually adjacent to the drillsite.

Ice road and pad construction is dependent on ground temperature and precipitation (i.e., sufficient snow for prepacking of routes) and typically begins annually in November or December. Vehicle access via ice road depends on dates of opening and closing of the ice road by ADNR and the distance from existing infrastructure. The usable ice road season for travel to the Project area is expected to be similar to Alpine operations because of the logistical synergies within the Colville River Unit. The ice road use season for the Project is expected to be 90 days, from approximately January 25 through April 25. A typical ice road will be at least 6 inches thick. Ice road widths vary based on purpose: a 35-foot-wide surface for general access; 50-foot-wide-surface for hauling gravel; and an 80 to 120-foot-wide surface for pipeline, power, and fiber optic cable installation.

5.4.2 Gravel Roads

A new 6.1-mile-long gravel road will provide year-round access to the CD8 drillsite from CD4. The gravel road is designed to maintain the existing thermal regime, is based on the project-specific hydrologic basis of design (Table 5-2) and will be a minimum of 5 feet thick and have 2H:1V side slopes. The road will be 32 feet wide (crown width) with an average toe-to-toe width of approximately 65 feet where erosion protection is not located and 75 feet where erosion protection is located. Additional mitigation measures for wildlife, including caribou, that give wildlife the right-of-way near roads are described in CPAI's Wildlife Avoidance and Interaction Plan.

While the road and pipeline routes are constrained by existing infrastructure and topography, where possible, roads and pipelines will be spaced to minimize potential caribou disturbance, prevent excessive snow accumulation from snowdrifts, and facilitate snow removal. However, pipelines will typically be constructed within 1,000 feet of roads to allow for visual inspection from the road. Note that the gravel road includes a 40-foot pipeline "bridged" crossing constructed over the CD4 Pipelines just east of CD4 to provide access south towards CD8.

5.4.3 Waterbody Crossings

The gravel road system includes construction of one bridged waterbody crossing, four culvert crossings of swales, and cross-drainage culverts.

5.4.3.1 Bridges

The multi-span L9324 bridge will be constructed on steel pile pier groups made up of sets of four pilings positioned approximately 50 to 80 feet apart with sheet pile abutments located above OHW at each end of the bridge (Table 5-6). The bridge deck will have a removable guardrail and will be designed to support a drill rig. The bridge is designed based on the project-specific hydrologic basis of design (Table 5-2)

Table 5-6. Bridge Crossings

Waterbody	Bridge Length (feet +/-)[a]	Number of Piers below OHW	Number of Piles below OHW	Pile/Surface Casing Diameter (in)	Pile Area below OHW (ft^2)
Lake L9324	400	5	20	48 / 66	475

[a] Bridge length is approximations based on aerial imagery and are subject to change.
Notes: ft^2: square feet; in: inches; OHW: ordinary high water.

5.4.3.2 Culverts

The Project anticipates a need for four culvert or culvert battery crossings at swales. Culverts will be placed perpendicular to the road, where feasible. The size, layout, and quantity of culverts

crossing swales will be based on project-specific hydrologic basis of design (Table 5-2) and site-specific conditions. Typical culverts will be steel pipe pile. Culverts will extend approximately 2 feet past the toe of the slope and have a minimum of 3 feet of cover (dependent on pipe material, wall size, and loading) or slightly less in insulated sections. Neighboring culverts will be spaced a minimum of 3 feet between outer walls to provide for proper gravel compaction and vehicular load distribution.

Where fish passage is required (as designated by the Alaska Department of Fish and Game [ADF&G]), culverts will be designed with at least one of the culverts in the battery having the invert embedded 20 percent below grade, situated in the deepest part of the stream channel. Fish passage culverts will be backfilled to match existing grade (20 percent of culvert diameter) to provide conditions similar to a stream bed within the culvert. Fish passage culverts will either be corrugated steel plate or steel pipe pile. Baffles may be added on a site-specific basis and in consultation with permitting agencies.

Cross-drainage culverts will also be placed in the road to maintain natural surface drainage patterns. Preliminary culvert locations for crossflow will be selected based on aerial photography. CPAI (or its contractor) will walk the road alignment prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and review the data with regulatory agencies for concurrence. Thus, the final design for the size, number, and locations of the culverts will be completed after the field survey. The estimated spacing of culverts is every 1,000 feet; however, some culverts may be spaced closer or farther than 1,000 feet, as is common on roads associated with oil and gas development on the North Slope. The culverts will be installed with the gravel road prior to spring breakup; additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.

5.4.4 Barging to Oliktok Dock

One or more barges may be used to deliver bulk materials, such as VSMs, HSMs, pipeline pipe, and drillsite module(s) to the North Slope at Oliktok Dock during project construction. To accommodate barge delivery and offload, CPAI may conduct screeding (i.e., redistributing and contouring the existing marine sediments) in front of the dock face. Screeding in front of Oliktok Dock is a routine activity that is currently permitted (POA-2020-00066) and expected to be permitted at the time of CD8 construction. Oliktok Dock is routinely used for North Slope project access.

From Oliktok, project materials and module(s) offloaded from the barge will be staged at or near Oliktok Dock on an existing gravel pad until winter. The materials and module(s) will be transported first on existing gravel roads, then on the annual Alpine/WNS Multiyear Ice Road, and finally on an ice road connecting the Alpine/WNS Multiyear Ice Road to the CD8 drillsite.

5.5 Subsistence Access Infrastructure

The gravel roads will include a tundra access road turnout for subsistence activities with ramps located according to community input and vegetation type. These turnouts will allow local residents to access the area for subsistence use. Tundra access road turnouts will be designed to take into consideration community comments and lessons learned from GMT1/MT6 and Greater Mooses Tooth 2/Mooses Tooth 7 (GMT2/MT7).

6.0 TEMPORARY AND PERMANENT IMPACTS TO WOTUS

The Project will result in unavoidable temporary and permanent impacts to jurisdictional Waters of the U.S. (WOTUS), including wetlands. Table 6-1 lists the footprint, footprint in WOTUS, and an estimated quantity of permanent fill material that will be used for each Project component.

Table 6-1. Footprint of Project Components and Fill Requirements in WOTUS

Component	Footprint (acres)[a]	WOTUS Footprint (acres)[a]	Fill quantities (cy)			Notes/Assumptions
			Gravel	Riprap	Sand Slurry	
Drillsite	15.3	15.3	218,000	1,000	—	Average thickness of 9 to 10 feet with 2H:1V side slopes.
Pipeline Tie-In Pad	0.5	0.5	7,100	280	—	Average thickness of 12 to 13 feet with 2H:1V side slopes.
Gravel Road	51.1	49.7	517,000	11,300	—	6.1-mile road, 32-ft surface width, 8 to 9-foot average thickness, and 2H:1V side slopes. Includes intersection upgrades at CD4.
Subsistence Tundra Access Turnout	0.4	0.4	4,000	—	—	Average thickness of 7 feet.
Pipeline VSMs[b]	<0.1	<0.1	—	—	1,400	Approximately 350 total VSMs.
Totals[c]	**67.3**	**65.9**	**746,100**	**12,580**	**1,400**	

[a] Values are approximate and subject to change.
[b] VSM estimates based on assumed spacing of 55 feet (shorter spacing near expansion loops) with 80 percent of VSMs being singular and 20 percent being paired. VSMs will have a typical diameter of 12 to 30 inches and a disturbance footprint diameter of 18 to 40 inches. Footprint based on assumption that 75 percent of VSMs are 14-inch diameter and 25 percent are 24-inch diameter. Larger VSMs will be required in special locations like floodplains.
[c] Values may not sum to totals because of rounding.
Notes: cy: cubic yards; H: horizontal; KRU: Kuparuk River Unit; OHW: ordinary high water; V: vertical; VSM: vertical support member; WOTUS: Waters of the United States.

In addition to the footprints listed, the Project includes placement of structures (pipe piles) below OHW to construct a road bridge (Section 5.4.3, Waterbody Crossings). The acreage of fill for bridge abutments is included in the total acreage of gravel roads in Table 6-1. Pile footprints are described in Table 5-6 in Section 5.4.3, Waterbody Crossings, above.

Table 6-2 lists the WOTUS, by National Wetlands Inventory (NWI) code, that will be impacted by the placement of fill.

Table 6-2. Footprint in WOTUS by NWI Code

NWI Code[a]	Description	Fill Footprint (acres)[b]
PEM1/SS1B	Palustrine seasonally saturated persistent emergent/broad-leaved deciduous shrub meadow	23.3
PEM1/SS1D	Palustrine continuously saturated persistent emergent/broad-leaved deciduous shrub meadow	14.1
PEM1F	Palustrine semi-permanently flooded persistent emergent meadow	15.3
PSS1B	Palustrine seasonally saturated broad-leaved deciduous shrub scrub	12.5
PUBH	Palustrine permanently flooded unconsolidated bottom pond	0.3
L2EM2H	Lacustrine permanently flooded littoral lake with nonpersistent emergent vegetation	0.4
Unidentified[c]		<0.1
Total[d]		**65.9**

[a] Source: FGDC 2013.
[b] Values are approximate and subject to change.
[c] Footprint by NWI code not known. Includes approximately 350 VSMs (<0.1 acre) in the Project area.
[d] Values may not sum to totals because of rounding.
Note: NWI: National Wetlands Inventory; VSM: vertical support members.

Table 6-3 lists temporary discharges to jurisdictional WOTUS. Trenching will be used to bury power and communications cables at pipeline road crossings and in other locations on the project as needed (Section 5.3, Power and Fiber Optic Cables). Side cast material used to backfill the trench is accounted for as a temporary discharge in Table 6-3. The temporary sidecast of materials is not included as a temporary discharge as trenched materials will be side cast onto plywood, plastic sheeting, or an ice pad adjacent to the trench to avoid a discharge of fill material into WOTUS as a result of placement of side cast materials; side casting materials will not change the bottom elevation of WOTUS, convert a WOTUS to upland, or result in the loss of wetland function.

Table 6-3. Temporary Discharges in WOTUS

Component	Footprint (acres)[a]	WOTUS Footprint (acres)[a]	Notes/Assumptions
Cable trenching	<0.1	<0.1	Backfill of approximately 600 linear feet of trench.
Total area of temporary impact[b]	**<0.1**	**<0.1**	

[a] Values are approximate and subject to change.
[b] Values may not sum to totals because of rounding.
Note: WOTUS: Waters of the United States.

7.0 AVOIDANCE AND MINIMIZATION

Project development will be subject to existing standard protective measures and best management practices. Sources of these measures include:

- ADNR Division of Oil and Gas North Slope lease mitigation measures (ADNR 2018), subject to any exceptions granted. These measures were developed to mitigate the potential adverse social and environmental effects of specific oil and gas lease-related activities.
- NSB Standard Permit Stipulations (NSB 2014). These standard measures were developed by the NSB for industrial development and use permits. They include onshore, ice, tundra travel, and wildlife stipulations designed to promote responsible development of oil and gas resources while protecting a subsistence way of life.
- CPAI's design measures and Best Management Practices (BMPs). These measures include project design features and BMPs that will avoid or minimize environmental impacts and are not already included in the ADNR and NSB measures. Examples include the erosion control measures described in Section 9.0 and the spill prevention and response measures described in Section 10.0.

Because of the abundance of wetlands on the North Slope and in the Project vicinity, avoiding all fill discharges into wetlands is not practicable. Avoidance and minimization measures for the Project are found in the Applicant Proposed Avoidance and Minimization Statement (Attachment C) and CPAI's Avoidance and Minimization Statement Measures Table (Attachment D).

8.0 OTHER INFRASTRUCTURE AND UTILITIES

8.1 Material Requirements and Sources

Approximately 746,100 cy of gravel fill, 12,580 cy of riprap, and 1,400cy of sand slurry is needed for the project (Table 6-1). CPAI expects that gravel for the Project will primarily be purchased from the existing ASRC Mine Site but material may be obtained from an existing and permitted site in Kuparuk. Gravel is anticipated to be collected, hauled, and placed in a single winter season.

The ASRC Mine Site is located about 1 mile east of, and across the East Channel of the Colville River from the proposed CD8 drillsite and will be accessed via ice road. The ASRC site is an existing commercial gravel source that was originally permitted in 1997 (POA-1996-869, Colville River). Material for the Project will be obtained from the Phase 3 expansion area of the ASRC site which was permitted by ASRC in 2012. As part of the Phase 3 expansion, ASRC anticipated mining up to 15 million cubic yards of sand and gravel from 430 acres for public and private

project use over 10 years (USACE 2017). A description of the ASRC Mine Site and past mining activities is provided in the GMT2 Supplemental EIS (BLM 2018).

In addition to gravel, stone riprap (Class I and Class II) will be needed in some locations to protect gravel infrastructure from erosion. The riprap will be sourced from a permitted mine in the Brooks Range near Galbraith Lake.

8.2 Camps and Workforce

The estimated construction workforce is presented in Table 8-1. Construction workers will be housed at the main camp located at CD1, a camp located at the Kuukpik Pad (K-Pad)(near the intersection of the Nuiqsut Spur Road and Colville Delta [CD] 5) road, a temporary construction camp located at the material source or elsewhere in the project area, or a combination of the three depending on availability. Housing of construction workers at existing camps in Nuiqsut is also possible; in the event construction workers are housed within Nuiqsut, commuting will be limited to only light duty vehicles.

Table 8-1. Estimated Workforce

Year	Construction	Drilling[d]
Year 1 (winter/summer)[a]	525 / 50	—
Year 2 (winter/summer)[b]	400 / 280	75 / 120
Year 3 - 6 (annual)	—	120
Year 7 (winter/summer)	—	120 / —
Year 8 – Life of Project (annual)[c]	—	—
Camps	• ACF at CD1 • Camp at K-Pad[d] • Temporary Camps	• Drill Rig Camp at CD4, CD8, ACF at CD1, or K-Pad

[a] Year 1 activities include ice road, gravel infrastructure, and bridge construction.
[b] Year 2 activities include ice road and pipeline construction and facility installation.
[c] For the purposes of analysis, the life of the project is estimated to be 30 years.
[d] Drilling is expected to occur in two phases, an initial 2.5-year phase followed by a subsequent phase. For the purposes of analysis, the drilling phase is assumed to be 5 years.
[e] During construction, bed space may be used at the existing camps in Nuiqsut in lieu of bed spaces identified at or near CD8.
Notes: ACF: Alpine Central Processing Facility; CD1: Colville Delta 1

During drilling, workers will be housed year-round in a mobile drill rig camp at CD4 or CD8, and/or at the CD1 main camp or a camp located on Kuukpik Pad (K-Pad). Operations will be carried out by personnel housed at the CD1 main camp. CPAI estimates that up to two additional operator positions (day and night shifts working a rotational work schedule) may be required to support CD8 operations.

8.3 Power and Communication Facilities

Electrical power for the project will be generated by the existing gas-fired-turbine power plant at ACF and delivered using a power cable. The power cable and a communications cable will be suspended from pipeline VSMs via messenger cable attached to the HSMs from CD8 to ACF (Section 5.3, Power and Fiber Optic Cables). Once installed, the power cable will also be used to power drill rigs, except during facility maintenance.

During construction, prior to completion of the permanent power supply connection, portable generators fueled by ultra-low-sulfur diesel will provide temporary power at the drillsite. Portable diesel-fired generators will also be available to provide emergency backup power after completion of the permanent power supply connection.

An 80-foot-tall, self-supporting lattice communication tower will be included at the drillsite. The communication tower will be equipped with lights to meet applicable Federal Aviation Administration (FAA) and Federal Communications Commission (FCC) requirements. The lattice tower will avoid use of guywires. Additional temporary towers may be located at the drillsite and will be pile-supported and may require guy wire supports. Guy wires will include devices to mitigate bird strikes, such as bird diverters. As practicable given the equipment layout and potential for snow/ice loading and associated concerns, bird diversion tactics may be installed.

8.4 Water Sources and Uses

During construction, freshwater will be needed for domestic use at construction camps, construction and maintenance of ice roads and pads, hydrostatic testing, and dust suppression. Estimated freshwater use for project construction is detailed in Table 8-2.

Table 8-2. Total Freshwater Use by Project Phase and Year (millions of gallons)

Year (Season)	Construction[a]	Drilling[b]	Operations[c]	Total[d]
Year 0/1 (winter)	59.3	—	—	59.3
Year 1 (summer)	1.0	—	—	1.0
Year 1/2 (winter)	54.1	2.1	—	56.2
Year 2 (summer)	6.0	3.9	0.9	10.8
Year 2/3 (winter)	—	5.5	—	5.5
Year 3 (summer)	—	4.2	0.9	5.1
Year 3/4 (winter)	—	5.5	—	5.5
Year 4 (summer)	—	4.2	0.9	5.1
Year 4/5 (winter)	—	5.5	—	5.5
Year 5 (summer)	—	4.2	0.9	5.1
Year 5/6 (winter)	—	5.5	—	5.5
Year 6 (summer)	—	4.2	0.9	5.1
Year 6/7 (winter)	—	5.0	—	5.0
Year 7 (summer)	—	—	0.9	0.9
Year 7/8 – Life of Project Annual / Cumulative[d]	—	—	—	—
Year 8 – Life of Project Annual / Cumulative[d]	—	—	0.9 / 20.7	0.9 / 20.7
Total[d]	**120.4**	**49.8**	**26.1**	**196.3**

[a] Construction phase includes ice road construction (1.0 MG per mile for 35-foot-wide road equivalent); ice pad construction (0.25 MG per acre); hydrostatic testing (volume based on pipeline diameter and length); and camp supply (100 gallons per person per day).
[b] Drilling phase includes drilling water (approximately 0.5 MG per well), ice pad construction (0.25 MG per acre) and camp supply (100 gallons per person per day). Drilling is expected to occur in two phases, an initial 2.5-year phase followed by a subsequent phase. For the purposes of analysis, the drilling phase is assumed to be 5 years.
[c] Operations phase includes miscellaneous operational purposes (i.e., dust suppression). For the purposes of analysis, the life of the project is estimated to be 30 years.
[d] Values may not sum to totals due to rounding.

During drilling, freshwater will be needed for domestic use at the drilling camp and for drilling activities (i.e. mud). During operations, about 0.9 million gallons of freshwater will be used on an annual basis (primarily in the summer) for miscellaneous operational purposes (i.e., dust suppression, hydrostatic testing, and other oil and gas activities). This annual freshwater use will be more than offset by the volume of water that is saved (6.9 million gallons annually and over 190 million gallons over the analyzed life of the project) because a segment of the annual Alpine/WNS Multiyear Ice Road will be replaced by the CD8 gravel road.

Freshwater will be supplied from nearby lakes, already permitted for existing operations, to support water withdrawal and will make use of existing permanent infrastructure or a temporary triplex pump and truck connection if required and as allowed by temporary water use authorizations and fish habitat permits, where necessary.

Seawater piped from ACF will be used during drilling and operations. Seawater will be used for well stimulation during the drilling phase. If the seawater pipeline is not available, trucks will be used to transport the seawater for well stimulation. Ground traffic is described in Table 5-4.

During full operations, seawater will also be injected into the Narwhal reservoir to enhance oil recovery.

8.5 Fuel and Chemical Storage

The CD8 drillsite will have temporary tanks to support drilling operations, including brine tanks, cuttings and mud tanks, and drill rig diesel fuel tanks for emergency back-up power built in as part of the drill rig structure. Production operations storage tanks at the drillsite will include chemical storage tanks that may contain any of the following, depending on operational needs: corrosion inhibitor, methanol, scale inhibitor, emulsion breaker, anti-foam, weathered crude, or diesel. Portable oil storage tanks to support well and pad operational activities and maintenance (i.e., well work and well testing) may be present on an as-needed basis.

CPAI will comply with local, state, and federal oil pollution prevention requirements including applicable USACE, state, and NSB mitigation measures and BMPs related to storage and use of fuels, hazardous substances, and waste. These include compliance with the WNS (Alpine) Oil Discharge Prevention and Contingency Plan (ODPCP) and Alpine Spill Prevention, Control, and Countermeasure (SPCC) Plan. Secondary containment for fuel and oil storage tanks will be sized as appropriate to container type and according to governing regulatory requirements in 18 AAC 75 and 40 CFR 112.

8.6 Waste Handling and Disposal

During construction, waste will be hauled offsite and disposed of in accordance with applicable regulations. Sanitary wastes generated from construction and drilling camps will be hauled to an existing wastewater treatment facility. The treated wastewater will be disposed of at an approved disposal site or reused as practical. Burnable waste will be incinerated at an approved facility (likely ACF or Willow), and non-burnable waste will be recycled or transported to the NSB landfill at Deadhorse. Hazardous and other solid waste associated with the project will be managed under Alaska Department of Environmental Conservation and United States Environmental Protection Agency (EPA) regulations.

Freshwater used for hydrostatic testing of the new CD8 pipelines will be discharged to the tundra following filtration and sampling to ensure compliance with water quality standards. Alternatively, the hydrostatic test water may be disposed of at an approved disposal well or beneficially reused for enhanced oil recovery.

Drilling wastes (i.e., muds and cuttings) will be disposed of on-site through annular disposal (i.e., pumped down the well through the space between two casing strings) and/or transported to an approved disposal well such as an ACF Class I disposal well. Reserve pits will not be required or

constructed. A temporary storage cell may be constructed for staging muds and cuttings prior to disposal.

During operations, produced water will be processed at ACF and re-injected to the subsurface through injection wells to maintain pressure in the reservoir and enhance oil recovery. Well-work waste materials will be managed according to the Alaska Waste Disposal and Reuse Guide.

9.0 EROSION CONTROL AND SNOW REMOVAL

The Project will follow the existing Alpine Storm Water Pollution Prevention Plan (SWPPP) and Alpine Facilities Erosion Control Plan, which will be updated to encompass the CD8 facilities as needed. The SWPPP describes management of surface water drainage for the drill pad. The Alpine Facilities Erosion Control Plan contains procedures for operation, monitoring, and maintenance of various erosion control methods. The plan also contains snow removal and dust control measures. Snow removal plans include the use of snow-blowing equipment to minimize gravel carryover to the tundra and the placement of cleared snow in designated areas. CPAI selects snow push areas annually based on avoiding areas of thermokarst, proximity to waterbodies, and evaluating the area based on previous years' activities. Gravel roads will be watered to minimize dust impacts on the tundra and maintain the integrity of the roads.

10.0 SPILL PREVENTION AND RESPONSE

Dedicated emergency response resources available at WNS facilities to serve the CD8 Project include spill response personnel, facilities, and equipment. CPAI will follow the WNS ODPCP and Alpine SPCC Plan and will amend the plans to include CD8 as applicable based on state and federal regulatory requirements. Emergency response plans include a community communication plan to key individuals in Nuiqsut and NSB.

Proposed facilities are designed to minimize the potential for spills with spill prevention measures and spill response capabilities to mitigate the impacts of spills that occur. CPAI's design of production facilities includes provisions for secondary containment for oil and hazardous substances, as required by local, state, and federal regulatory requirements. If a spill occurs on a pad outside facilities, the fluid would remain on the pad, unless the spill is near the pad edge or exceeds the retention capacity of the gravel pad. Fuel transfers near pad edges will be limited to the extent practicable in order to mitigate this risk.

CPAI designs and constructs pipelines to comply with applicable state, federal, and local regulations. The pipelines will be constructed of high-strength steel and will have wall thicknesses in compliance with design code requirements. Welds will be validated using non-destructive examination (i.e., radiography and/or ultrasonic) during pipeline construction to ensure their integrity, and the pipelines will be hydrostatically tested prior to operation. In

addition, CPAI will implement its existing pipeline maintenance and inspection program and employee spill prevention training program to further reduce the likelihood of spills occurring. The production fluids and injection water pipelines will be capable of accommodating pigs for maintenance and inspection operations. CPAI will maintain a corrosion control program and an inspection program that includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared technology. The inspection programs are API Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.

CPAI will follow requirements for routine pipeline visual inspection in accordance with the WNS ODPCP and Alpine SPCC Plan. Consistent with these plans and as required by 40 CFR 112.9(d)(4)(ii), CPAI plans to conduct visual inspection of pipelines on a periodic and regular schedule, weather and safety permitting. Visual inspection may be ground-based occurring from the gravel road or from the air by fixed wing aircraft. Aerial visual inspection can be aided by infrared technology as appropriate. Infrared technology, employed either aerially using aircraft or from the ground using handheld systems, is a leak detection method using the temperature "signature" that results when warm fluid leaks. Infrared technology can detect warm spots in low-light conditions or when other circumstances such as light fog or drifted snow limit visibility. Infrared technology also can identify trouble spots along the pipeline, such as damaged insulation, before a problem occurs.

In the event of a spill, CPAI will implement the ODPCP and SPCC Plan. As described by the WNS ODPCP, spill response equipment will be pre-staged at strategic locations to facilitate the rapid deployment of equipment by personnel. During summer, a seasonally pre-staged or pre-deployed containment boom will be placed at strategic locations using boats and/or helicopters to facilitate a rapid response. Use of this pre-staging concept will considerably reduce the effective response time and will expedite equipment deployment to contain and recover spilled oil to minimize the affected area. The threat to rivers and streams from a possible pipeline spill will be minimized by quickly intercepting, containing, and recovering spilled oil near the waterway-pipeline crossing points. Spill response actions could also include use of watercraft (airboats and/or jetboats) to access potentially affected areas. The access road will be used for access and staging for spill response. A state-registered Primary Response Action Contractor and U.S. Coast Guard classified Oil Spill Removal Organization would provide trained personnel to manage all stages of a spill response, from containment and recovery to cleanup.

CPAI provides regular training for its employees and contractors on the importance of preventing spills of oil or hazardous substances. CPAI provides new-employee orientation, annual environmental training seminars, and appropriate certification classes for specific issues, covering spill prevention. CPAI employees and contractors participate in frequent safety meetings, which address spill prevention, as appropriate. The CPAI Incident Management Team

participates in regularly scheduled training programs and conducts spill response exercises in coordination with federal, state, and local agencies. Employees are encouraged to participate in the North Slope Spill Response Team (NSSRT). NSSRT members receive regularly scheduled spill response training to ensure immediate availability of skilled spill responders on the North Slope.

11.0 ABANDONMENT AND RECLAMATION

The abandonment and reclamation of Project facilities will be determined at or before the time of site closure and will be subject to input from several federal, state, and local authorities as well as private landowners. Other stakeholders will also provide comment on the abandonment and reclamation plan. Controlling factors may include:

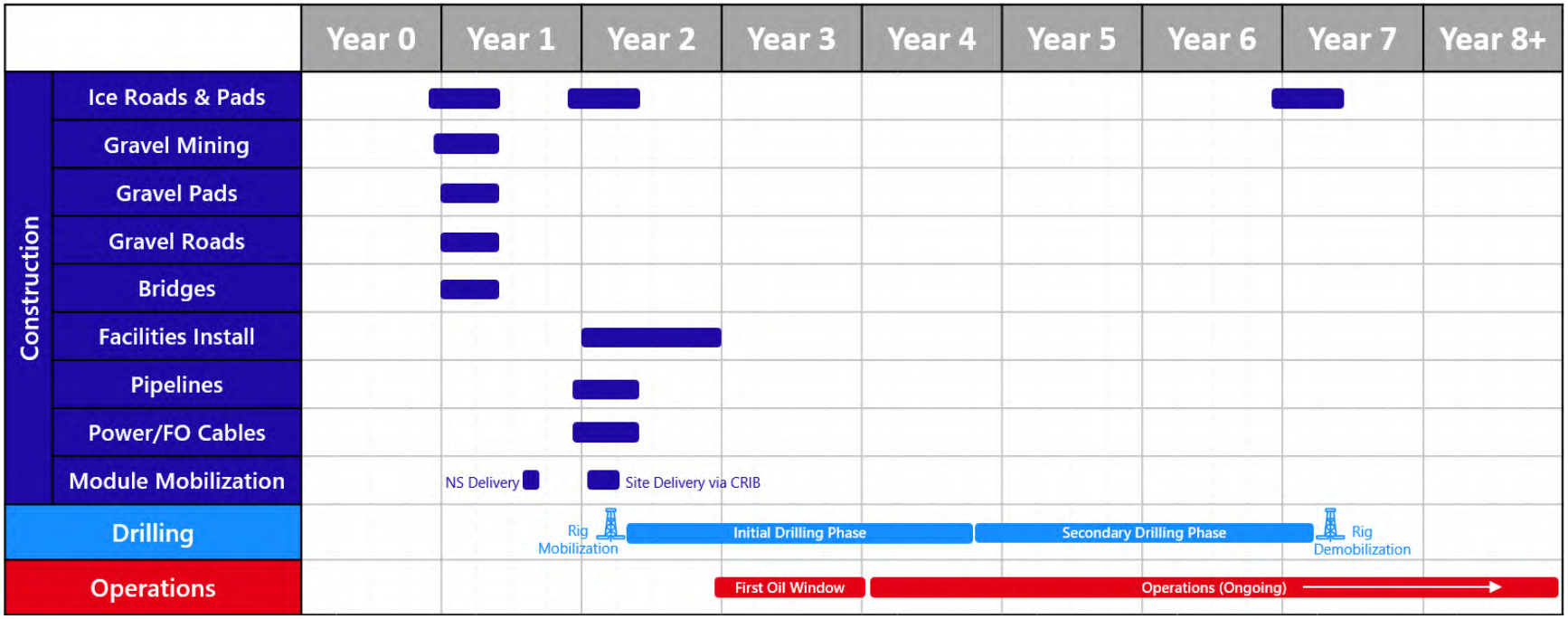
- USACE Section 404/10 Permit
- State of Alaska easement
- Alaska Oil and Gas Conservation Commission (AOGCC) requirements for plugging and abandonment of wells
- NSB Title 19
- Private agreements addressing private lands

Closure of project facilities may involve removing gravel infrastructure or alternatively leaving these in place for alternative purposes. Revegetation of abandoned facilities could be accomplished by seeding with native vegetation or by allowing natural colonization. Depending on the types of abandonment and reclamation that occur, road and air traffic levels may increase but would likely occur at lower intensity levels and for shorter durations than levels observed during construction. If the gravel is removed as part of the reclamation process, it could be used for other development projects.

12.0 SCHEDULE AND LOGISTICS

Project timing is based on several factors, including permitting and other regulatory approvals, Project sanctioning, and purchase and fabrication of long-lead-time facilities. The schedule presented in this Project description is an estimated schedule that is dependent on subsequent detailed Project planning and a variety of contingencies. Subject to those qualifications, Project construction will occur over approximately 2 years. First oil will likely occur between Q4 of Year 2 of construction or Q4 of Year 3. Operations will run to the end of the Project's field life so long as ACF continues operating. For the purposes of analysis, the life of the project is estimated to be 30 years. Figure 12-1 provides a general schedule for key construction, drilling, and operations milestones. The schedule presented in Figure 12-1 may be modified as detailed design progresses and as circumstances require.

Figure 12-1. Project Schedule



Notes: Y: Year; CRIB: Colville River Ice Bridge; CRU: Colville River Unit; FO: Fiber Optic; Mob: Mobilization; NS: North Slope. For analysis purposes, operations is assumed to continue through Year 30.

12.1 Construction Phase

Gravel mining and placement will be conducted almost exclusively during winter. A typical construction season begins with prepacking of snow in November, or as soon as conditions allow, with ice road construction occurring primarily in December and January to allow for use by February 1. The schedule anticipates typical weather conditions and is subject to change based on annual field conditions.

Gravel facilities will be built by constructing an ice road followed by laying gravel. Culverts will be installed per the final design during the first construction season prior to spring breakup. Additional culverts may be placed after spring breakup as site-specific needs are further assessed. Bridges will be constructed during winter from ice roads and ice pads. Erosion protection (riprap) will be installed during the winter season, prior to break-up. Gravel conditioning and compaction occurs during summer (typically July to October) to expose, thaw, and dewater the deeper layers and re-compact the gravel.

Once gravel pads are completed, on-pad facilities will be constructed. The drillsite modules will be delivered by barge as early as summer of Year 1. During the summer open-water season before barge arrival, screeding of the area in front of the Oliktok dock will occur around mid-July once the risk of ice encroachment has passed. Once offloaded, modules will be transported to CD8 via a combination of gravel roads and ice roads during the following winter.

Pipelines will be installed during winter from ice roads. First, VSM locations will be surveyed and drilled. In locations where new VSMs are required, a VSM and HSM will be assembled and installed using a sand slurry fill. Engineering design will determine which method will be used for any given new VSM. The pipelines will be strung, welded, tested, and then installed in pipe saddles on top of the HSMs.

12.2 Drilling Phase

Drilling will begin following drill rig mobilization to the drillsite. Drilling will be conducted year-round and will progress at a rate of about 25 to 50 days per well. The initial phase of drilling is expected to take approximately 2.5 years with subsequent drilling occurring over up to 2.5 additional years based on reservoir performance and executional efficiency. For the purposes of analysis, the drilling phase includes both phases of drilling for a drilling period of approximately 5 years. It is assumed that the CD8 wells will be drilled consecutively, however, CPAI will determine the timing of drilling based on drilling results, economics, rig availability, and any other relevant factors that arise during the drilling program.

Drilling will include the use of well stimulation techniques. Well stimulation will use seawater as the base fluid and will occur only in the initial stage of drilling to stimulate flow at the

production and injection wells. All well stimulation activities will comply with applicable AOGCC regulations.

12.3 Operations Phase

Once sustained production to ACF has been achieved, typical operations will consist of well operations, production operations, and transportation of produced hydrocarbons. Sustained production is expected to begin between Q4 of Year 2 and Q4 of Year 3. Well maintenance operations and routine drilling activities will occur intermittently throughout the life of the Project. Standard CPAI operations and maintenance practices will be implemented.

13.0 AIR EMISSIONS

Emissions sources for construction, drilling, and production phases of the Project consist of equipment typically used at drillsites and production facilities on the North Slope. Air quality impacts from new sources will be minimized by compliance with applicable legal requirements in regulatory authorizations, applicant committed measures, use of ultra-low sulfur diesel in all diesel-fueled vehicles and engines, and a fugitive dust control plan.

14.0 WILDLIFE AVOIDANCE

CPAI has developed a Wildlife Avoidance and Interaction Plan in consultation with state and federal agency representatives to provide guidance to CPAI employees and contractors and assist them in implementing appropriate, standardized procedures when wildlife is encountered. The Wildlife Avoidance and Interaction Plan is applicable to all of CPAI's North Slope locations and is available for agency review on request. CPAI will follow this plan and will update or modify the plan as necessary and in consultation with regulatory agencies and local residents.

The Project has limited overlap within polar bear critical habitat; specifically, the only aspects of the project that overlap critical habitat is barging activities and power and fiber optic cable installation on existing pipe racks using ice roads. CPAI has a more detailed Polar Bear Avoidance and Interaction Plan for polar bear and Pacific walrus interaction and avoidance during North Slope activities. It includes guidance on the identification of wildlife and potential dens, waste and attractant management, and training and reporting requirements. CPAI also develops lighting plans for its North Slope facilities to minimize potential impacts on wildlife, especially birds, from facility lighting, and minimizes off-pad travel during the bird-nesting season.

15.0 CULTURAL RESOURCES

Various cultural resource surveys of the Project area have been conducted. Current archaeological site location and condition information indicate that there are no historic properties eligible for listing on the National Register of Historic Places in the direct or indirect effects footprint for the Project. The current analysis anticipates a Section 106 National Historic Preservation Act (NHPA) determination of "No Historic Properties Affected" for the Project area. CPAI anticipates formal coordination and consultation between USACE, the State Historic Preservation Office through the Alaska Department of Natural Resources Office of History and Archaeology, and NSB Iñupiat History, Language, and Culture and Planning Department.

Ice roads will be routed to avoid cultural resources. The NSB, State of Alaska, and local entities will be notified immediately according to each agency's respective regulations if prehistoric, historic, or archaeological objects are discovered during construction or operations.

16.0 LOCAL HIRE AND WORKFORCE DEVELOPMENT PROGRAM

CPAI and a number of contractors assist with career training, and internship opportunities to expand local workforce capabilities and to prepare Alaskans for employment in the oil and gas industry. Programs offering hands on learning and workforce readiness prepare participants for employment when opportunities are available.

CPAI has active local workforce development efforts committed to hiring Kuukpik Corporation shareholders, their descendants and Nuiqsut residents. Local hire programs in Nuiqsut are coordinated with the Kuukpik Corporation. Kuukpik Corporation helps identify qualified shareholders, shareholder descendants, and spouses interested in working on CPAI projects. CPAI emails out job opportunities every Wednesday and hosts job fairs in the community with our contractors and other operators. In addition, CPAI has partnered with Arctic Slope Energy Services on the Nutaaq program which offers employment and training opportunities in CPAI's north slope facilities to shareholders of ASRC in Nuiqsut and across Alaska.

In support of workforce readiness, CPAI, Nanuq, Inc. and Nuiqsut Trapper School host the Career Quest program, providing opportunities to youth (ages 14-18) in Nuiqsut for summer employment opportunities and to explore careers in the oil and gas industry. It is CPAI's intent that Nuiqsut youth will gain employment experience and identify their desired career pathway. Since its 2004 inception, Career Quest has yielded several full-time regular employees at CPAI's Alpine development. CPAI also supports

17.0 TRAINING

CPAI provides new-employee orientation on health, safety, and environmental issues; annual environmental training seminars; and appropriate certification classes for specific activities,

including spill prevention and response, as noted above. All North Slope employees and contractors are required to complete an 8-hour unescorted training program. Project-specific training is provided for all personnel. Training provides personnel with an overview of local, state, and federal requirements within their project area. A key objective of training is to ensure oilfield personnel know and understand the environmental, social, and cultural regulatory requirements within the project area where they will be working. Moreover, training emphasizes protection of cultural and archaeological resources, wildlife awareness and interaction, avoiding conflicts with subsistence activities, health and safety measures, and Project mitigation commitments.

18.0 OTHER PERMITS AND REGULATORY AUTHORIZATIONS

Table 18-1 lists key permits, approvals, and other potential requirements for the Project.

Table 18-1. Key Permits, Approvals, and Other Potential Requirements for Project

Agency	Permits, Approvals, and Other Requirements
Federal Agencies	
U.S. Army Corps of Engineers and Cooperating Agencies	• NEPA review and ROD
United States Army Corps of Engineers	• CWA Section 404 Permit • Consultation with USFWS and NMFS under Section 7 of the ESA • Consultation with NMFS under the Magnuson-Stevens Fishery Conservation and Management Act for EFH • Compliance with Section 106 of the NHPA
United States Environmental Protection Agency	• Reviews during the USACE Section 404 permitting process • OPA90 SPCC Plan • OPA90 Facility Response Plan Amendment
United States Fish and Wildlife Service	• MMPA LOA for Incidental Take of Polar Bears and Walrus • MMPA LOA for Intentional (Deterrence) Take of Polar Bears • Consultation under Section 7 of the ESA/Issuance of Biological Opinion for ESA-listed Species
National Marine Fisheries Service	• Consultation under Section 7 of the ESA/Issuance of Biological Opinion for ESA-listed Species • Consultation under the Magnuson-Stevens Fishery Conservation and Management Act for EFH
State Agencies	
Alaska Department of Natural Resources State Historic Preservation Officer	• Consultation with USACE under NHPA Section 106
Alaska Department of Natural Resources Division of Mining, Land and Water	• Temporary Water Use Authorizations

Table 18-1. Key Permits, Approvals, and Other Potential Requirements for Project

Agency	Permits, Approvals, and Other Requirements
Alaska Department of Natural Resources Division of Oil and Gas	• Unit Plan of Operations Amendment Approval • Easements • Land Use Permits
Alaska Department of Fish and Game	• Title 16 Fish Habitat Permits • Public Safety Permit
Alaska Department of Environmental Conservation	• CAA Air Quality Permit • CWA Section 401 Water Quality Certification • CWA Section 402 APDES permit • ODPCP • Certificate of Proof of Financial Responsibility • Temporary Storage of Drilling Waste • Temporary Camp Permit
Alaska Oil and Gas Conservation Commission	• Permit to Drill • Approval for Annular Disposal of Drilling Wastes • Area Injection Order (Class II Disposal) • Conservation Order (Pool Rules) • Well Sundries
Alaska Department of Public Safety, Division of Fire and Life Safety	• Fire and Life Safety Plan Review • Fire Marshal Approval
Local Entities	
North Slope Borough	• Resource Development District: Master Plan Update • Iñupiat History, Language, and Culture Division: Traditional Land Use Inventory Clearance • Development Permits and/or Administrative Approvals
Kuukpik Corporation	• Land Use Authorization for facilities constructed on Kuukpik land
Native Village of Nuiqsut	• Executive Order 13175 Tribal Consultation

Notes:

APDES: Alaska Pollutant Discharge Elimination System
CAA: Clean Air Act
CWA: Clean Water Act
EFH: Essential Fish Habitat
EIS: Environmental Impact Statement
EPA: United States Environmental Protection Agency
ESA: Endangered Species Act
LOA: Letter of Authorization
MMPA: Marine Mammal Protection Act
NEPA: National Environmental Policy Act
NHPA: National Historic Preservation Act
NMFS: National Marine Fisheries Service
ODPCP: Oil Discharge Prevention and Contingency Plan
OPA: Oil Pollution Act of 1990
RCRA: Resource Conservation and Recovery Act
ROD: Record of Decision
SPCC: Spill Prevention, Control, and Countermeasure
UIC: underground injection control
USACE: United States Army Corps of Engineers
USFWS: United States Fish and Wildlife Service

19.0 REFERENCES

Alaska Department of Natural Resources (ADNR) Division of Oil and Gas (DOG). 2018. Mitigation Measures, North Slope Area Wide, Effective April 18, 2018.

Bureau of Land Management (BLM). 2018. Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth 2 Development Project Final Supplemental Environmental Impact Statement, Volume 1, Section 2.4.6, Gravel Supply Options.

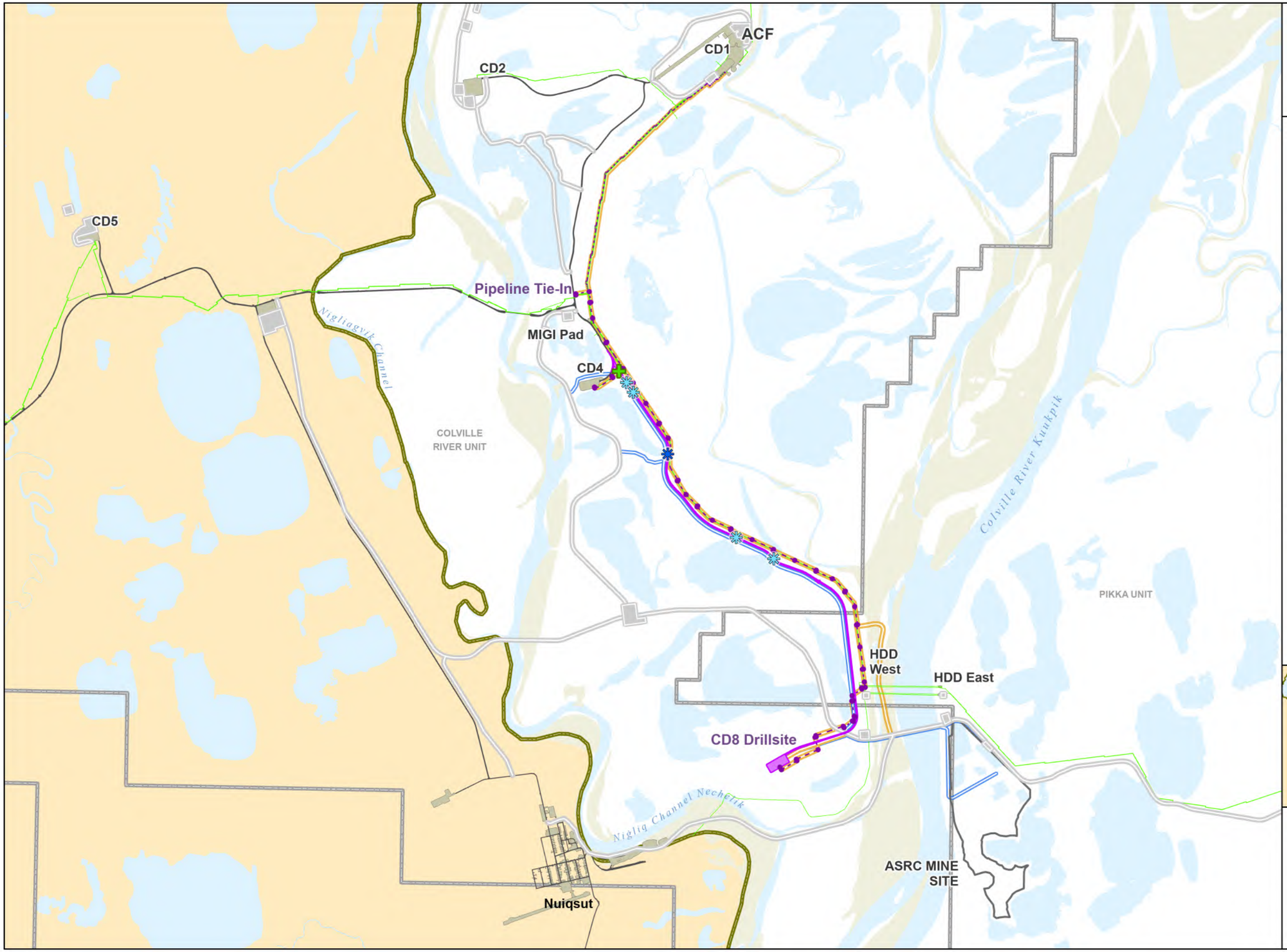
Federal Geographic Data Committee (FGDC). 2013. Classification of wetlands and deepwater habitats of the United States. FGDC-STD-004-2013. Second Edition. Wetlands Subcommittee, Federal Geographic Data Committee and United States Fish and Wildlife Service, Washington, D.C.

Michael Baker International (MBI). 2020. 2020 Colville River Delta 2D Surface Water Model Update 177261-MBI-HH-RPT-001. Prepared for ConocoPhillips Alaska, Inc. by Michael Baker International. Anchorage, Alaska.

North Slope Borough (NSB). 2014. Oil and Gas Technical Report: Planning for Oil & Gas Activities in the National Petroleum Reserve – Alaska, Appendix G: North Slope Borough Standard Permit Stipulations.

US Army Corps of Engineers (USACE). 2017. Public Notice of Application for Permit. Reference number 1996-869-M11. Anchorage, Alaska.

CD8 Proposed Development



Proposed Project
- Culvert Crossing
- Bridge Crossing
- Pipeline Crossing
- Power and Fiber Optic
- Pipeline Corridor
- Gravel Footprint

Ice Road
- Year 1
- Year 2

2024-2029 Permitted Ice
- Ice Pad
- Ice Road

Infrastructure
- Pipeline
- Road
- Pad

Boundaries
- Oil and Gas Unit
- NPR-A (BLM)

N

0 0.5 1 Miles

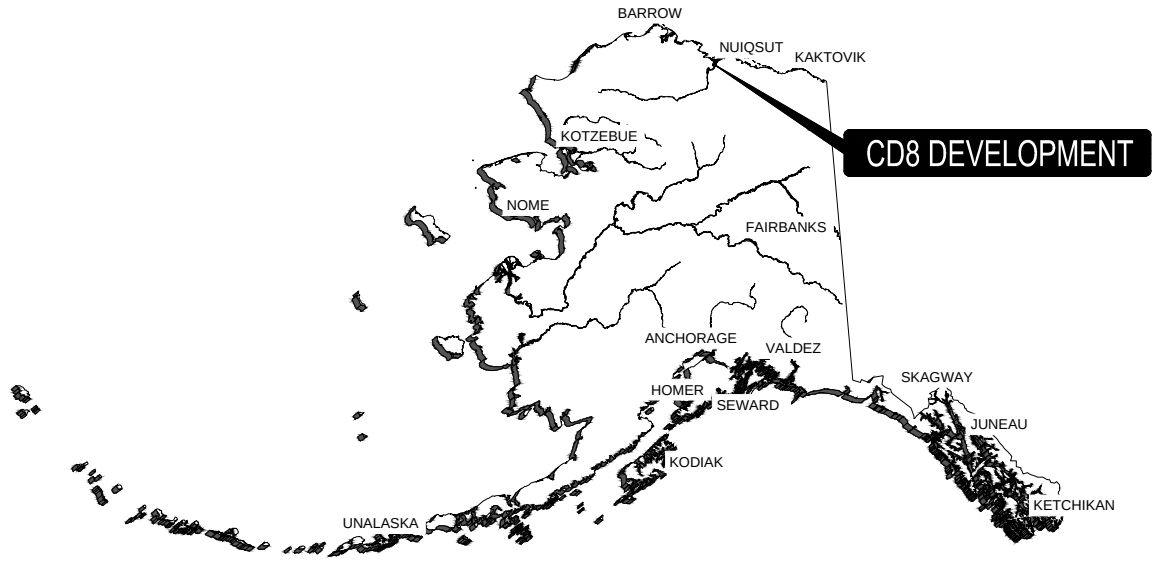
ConocoPhillips Alaska

April 7, 2025

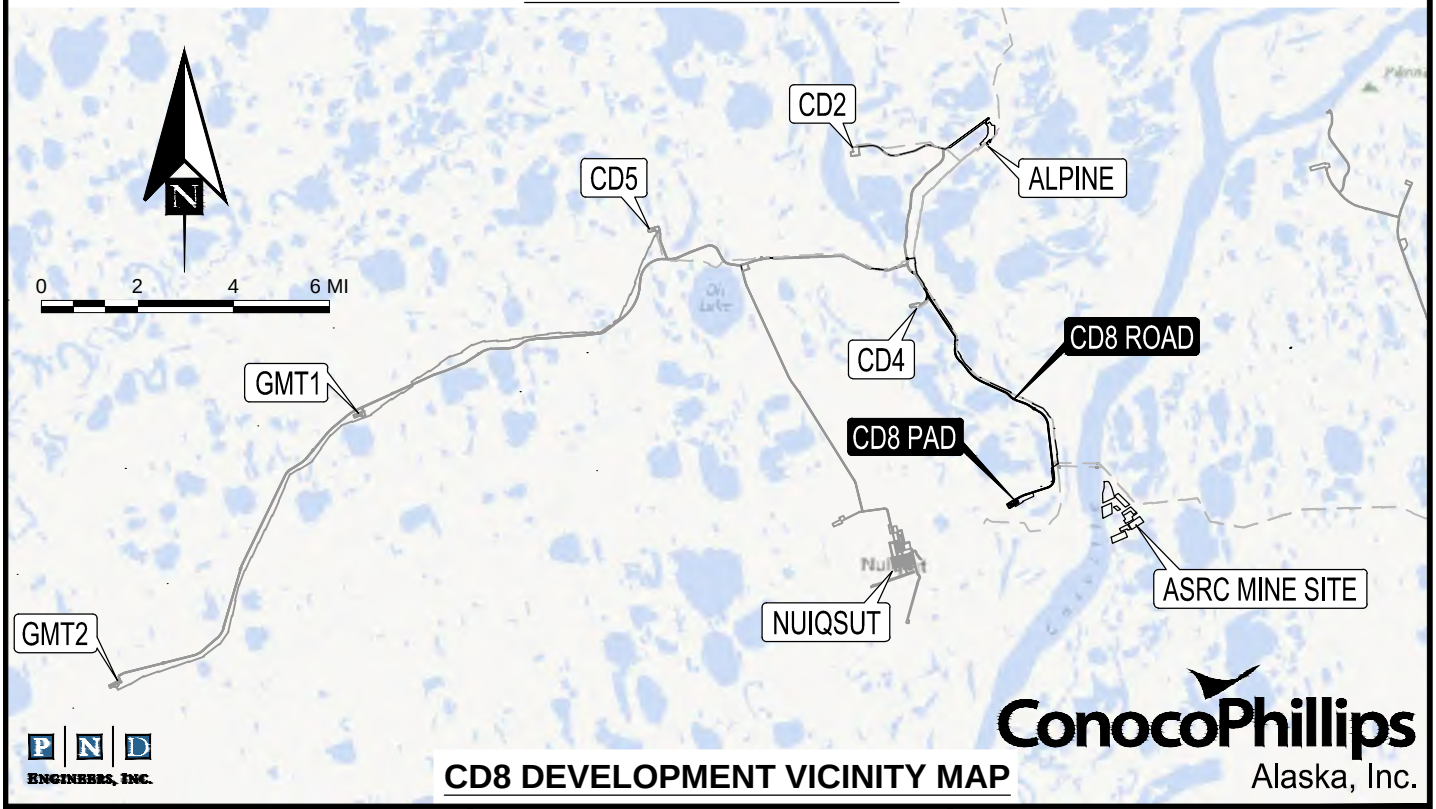
Layout: Proposed_CD8_Alternative_A3_Overview
Project: CD8_Alternatives_Overviews_BW.aprx

ATTACHMENT B

SHEETS



ALASKA VICINITY MAP



P N D ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

CD8 DEVELOPMENT VICINITY MAP

PURPOSE:
CONSTRUCT ROAD, PAD, AND BRIDGE INFRASTRUCTURE FOR OILFIELD DEVELOPMENT

DATUM: BPMSL, NAD83 ASP ZONE 4

REFERENCE: POA-XXXX-XXXXXX COLVILLE RIVER

APPLICANT: CONOCOPHILLIPS ALASKA, INC (CPAI)

LOCATION:

T10N R5E, T11N R4E, T11N R5E UMIAT MERIDIAN

PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION

IN: COLVILLE RIVER UNIT

COUNTY: NORTH SLOPE BOROUGH

STATE: ALASKA

SHEET INDEX

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA-XXXX-XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA

KUUKPIK CORPORATION
P.O. BOX 89187
NUIQSUT, AK 99789
(907) 480-6220
ATTN: GEORGE SIELAK

STATE OF ALASKA DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINING, LAND & WATER
3700 AIRPORT WAY
FAIRBANKS, AK 99709
ATTN: JEANNE PROULX

ARCTIC SLOPE REGIONAL CORPORATION
P.O. BOX 129
BARROW, AK 99723
ATTN: DAVID KNUTSON

NATIVE ALLOTMENT UNDER CARE OF INUPIAT COMMUNITY
OF THE ARCTIC SLOPE
P.O. BOX 934
UTQIAGVIK, AK 99723
ATTN: REALTY DEPARTMENT

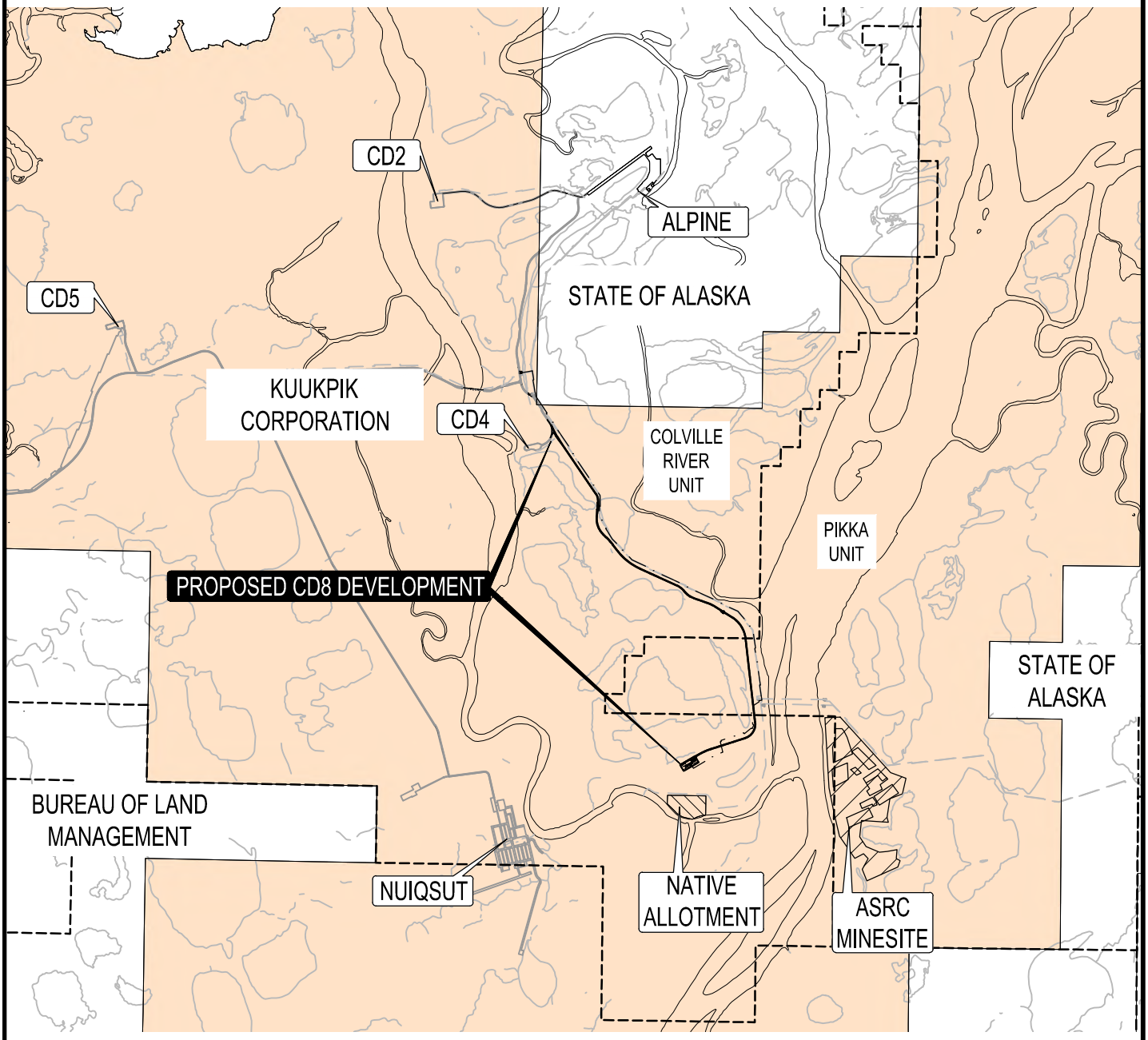
OIL SEARCH (ALASKA), LLC
P.O. BOX 240927
ANCHORAGE, AK 99524
ATTN: LAND MANAGER

ADJACENT LAND OWNERS

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	3 of 33 4/7/2025



N

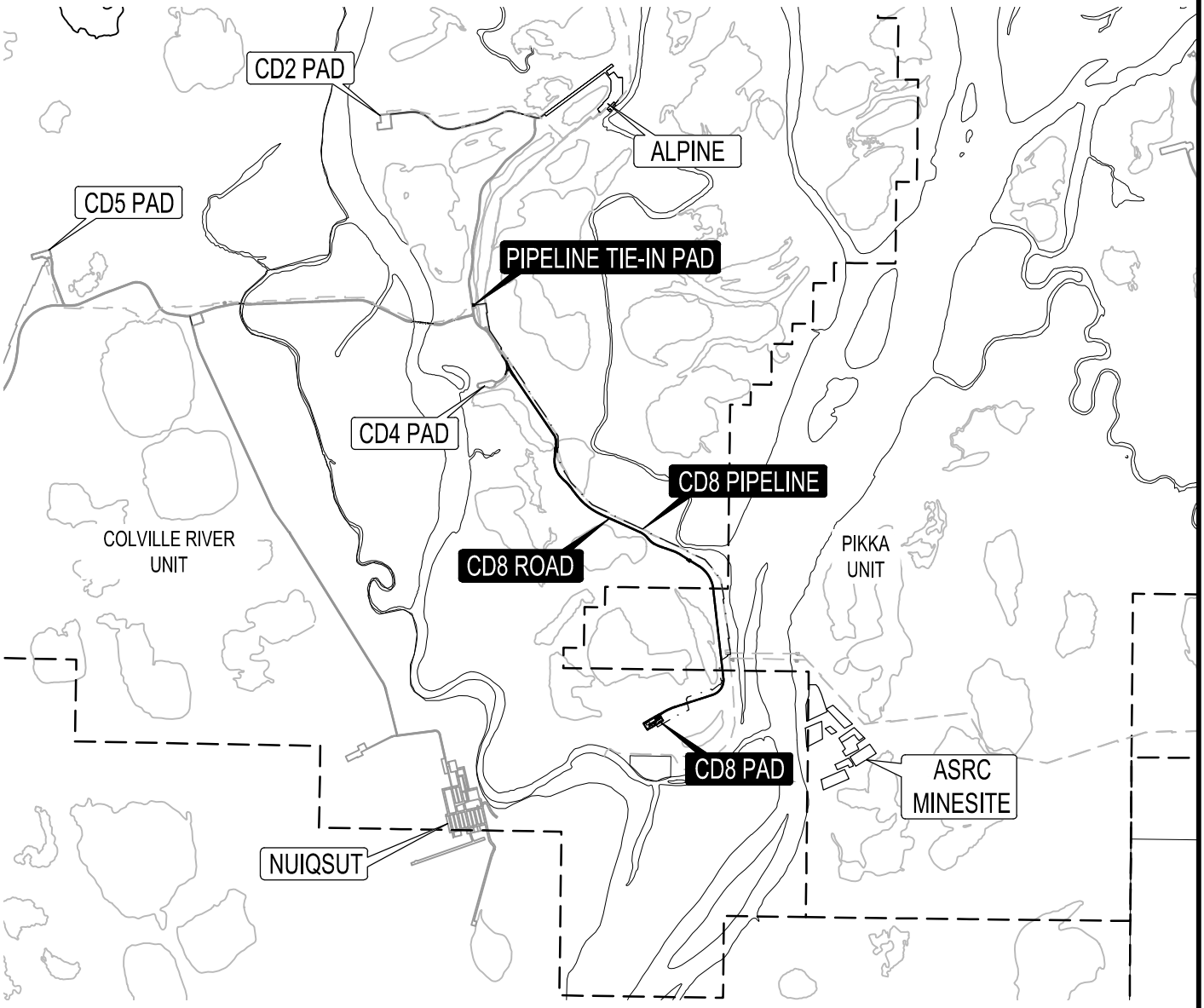
0 1 2 3 MI

ADJACENT LAND OWNERSHIP MAP

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	4 of 33
	4/7/2025



0 1 2 3 MI

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **5** of **33** 4/7/2025

CD8 DEVELOPMENT OVERVIEW

COMPONENT	FOOTPRINT (AC)	GRAVEL VOLUME (CY)	RIPRAP VOLUME (CY)	LENGTH (mi)
CD8 PAD	15.3	218,000	1,000	---
PIPELINE TIE-IN PAD	0.5	7,100	280	---
CD8 ROAD	51.1	517,000	11,300	6.1
VEHICLE PULLOUT/SUBSISTENCE ACCESS PAD	0.4	4,000	---	---

BRIDGE CROSSING	# OF PIERS BELOW OHW	# PILES PER PIER	PILE DIAMETER * (in)	PILE AREA BELOW OHW (ft^2)	APPROX. CLEAR OPENING (FT)
LAKE L9324 BRIDGE	5	4	66	475	400

**Pile diameter includes surface casings (pile diameter + 18") used for pile installation.*

PIPELINES	TOTAL VSM's	FOOTPRINT (AC)	SLURRY VOLUME (CY)
CD8 PIPELINES	350	< 0.1	1,400

TRENCHING	LENGTH (FT)	WIDTH (FT)	TOTAL FOOTPRINT (AC)
TRENCHING	600	1	< 0.1

TOTAL CD8 DEVELOPMENT INFRASTRUCTURE	FOOTPRINT (AC)	TOTAL GRAVEL VOLUME (CY)	TOTAL RIPRAP VOLUME (CY)	TOTAL SLURRY VOLUME (CY)
PADS	15.8	225,100	1,280	---
ROADS	51.1	517,000	11,300	---
SUBSISTENCE ACCESS	0.4	4,000	---	---
PIPELINES AND TRENCHING	< 0.1	---	---	1400
TOTAL	**67.3**	**746,100**	**12,580**	**1,400**

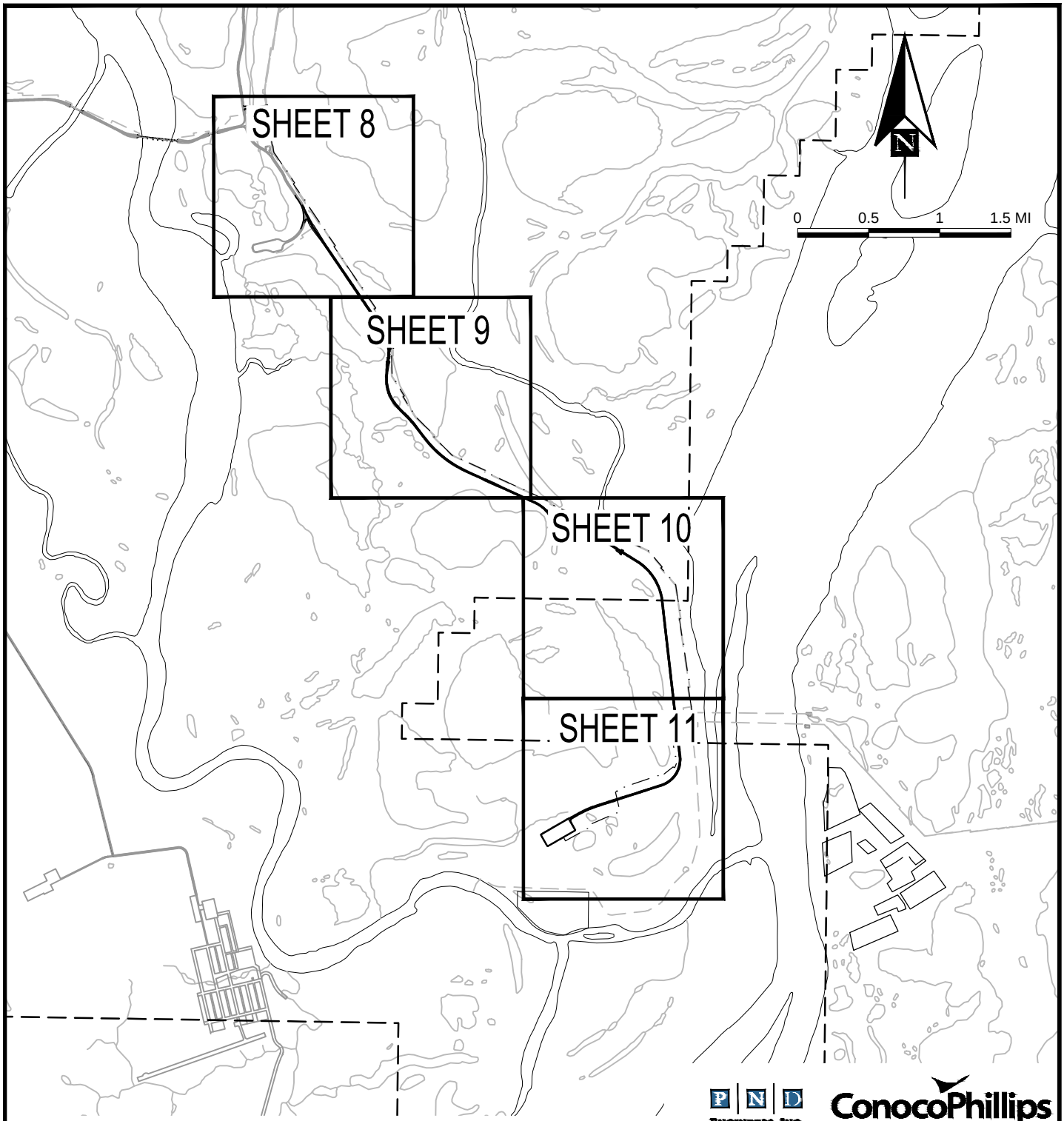
NOTES:
1. ACREAGE AND VOLUME QUANTITIES REPORTED ABOVE ARE PROJECT TOTALS, INCLUDING FILL IN UPLANDS AS WELL AS WATERS OF THE U.S.

CD8 DEVELOPMENT QUANTITIES

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA

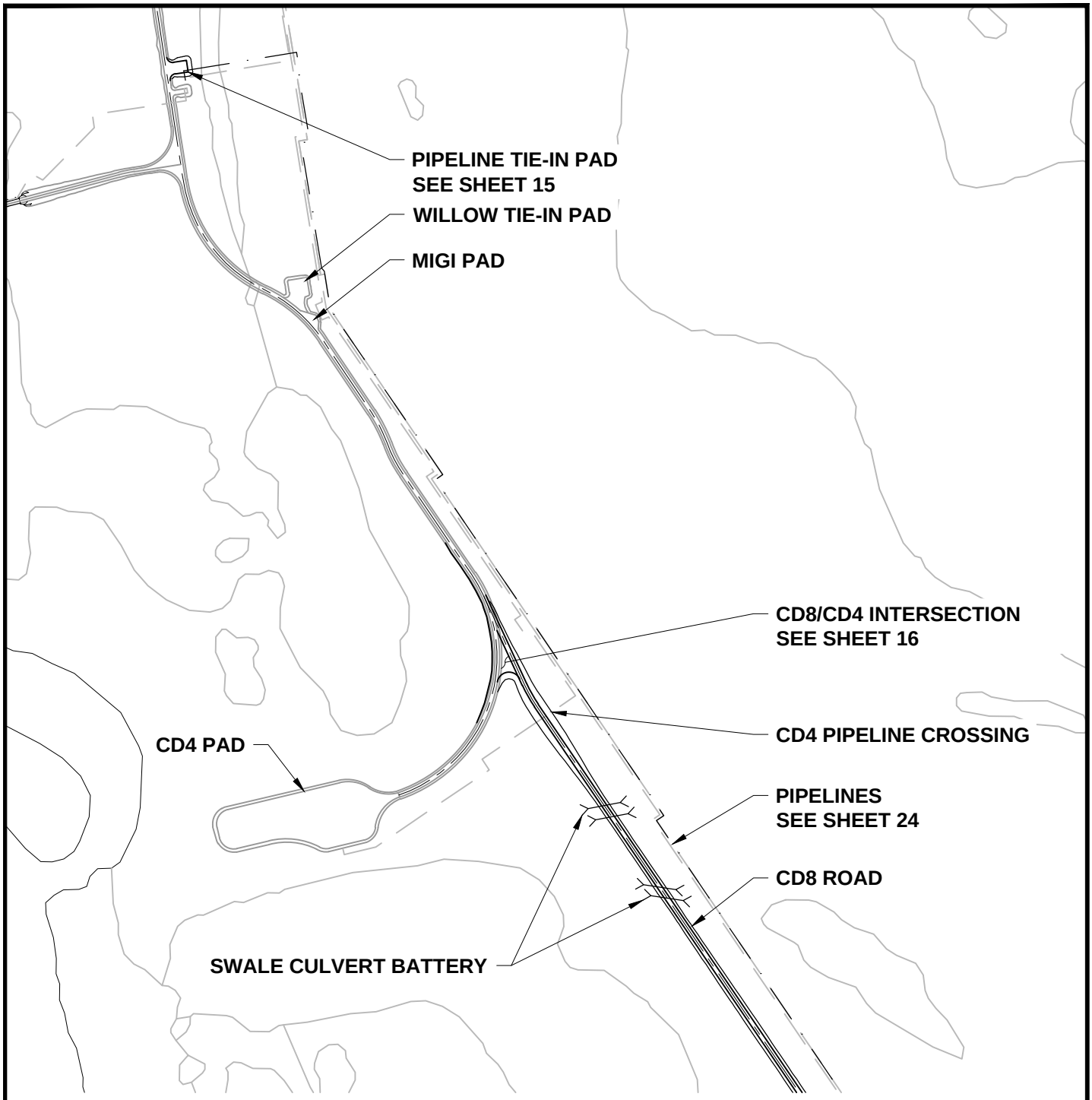


PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **7** of **33** 4/7/2025

CD8 ROAD KEY MAP



NOTES:
1. CROSS DRAINAGE CULVERTS AS REQUIRED, SEE SHEET 19.

N

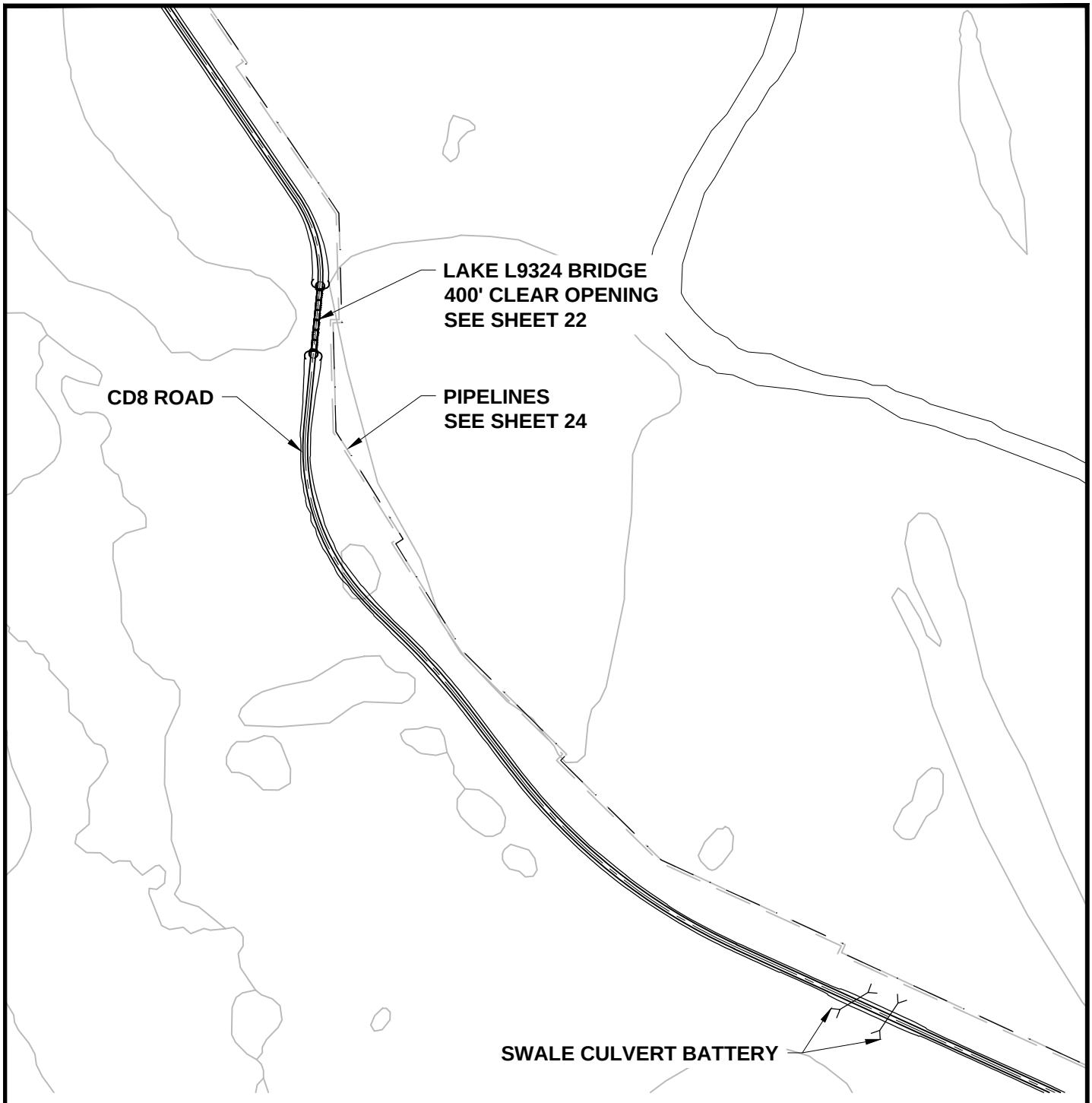
0 500 1000 1500 FT

CD8 ROAD
SHEET 1 OF 4

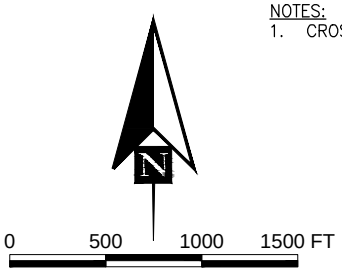
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	**8** of **33** 4/7/2025



NOTES:
1. CROSS DRAINAGE CULVERTS AS REQUIRED, SEE SHEET 19.

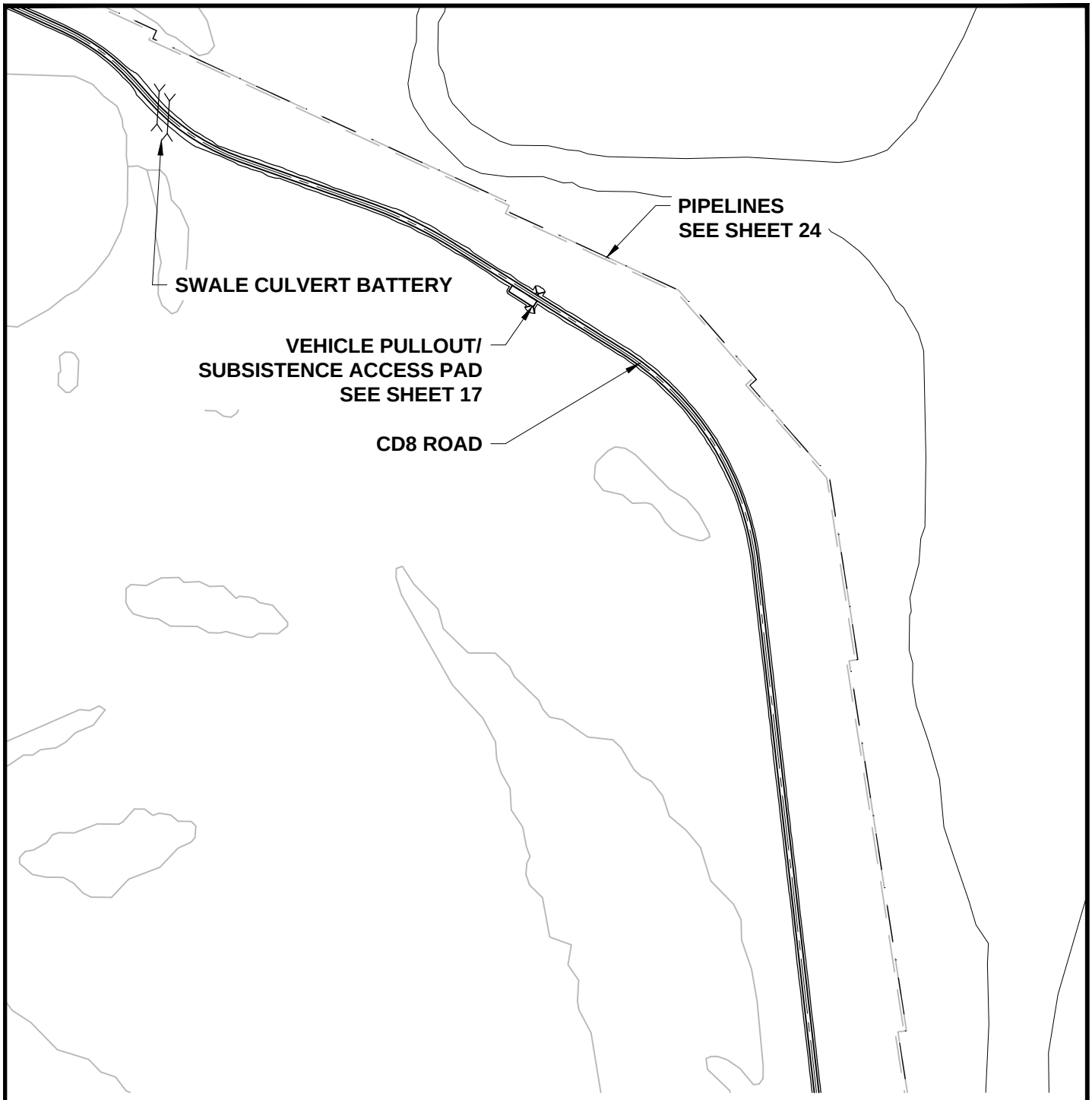


CD8 ROAD
SHEET 2 OF 4

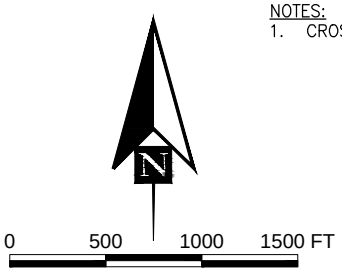
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	9 of 33
	4/7/2025



NOTES:
1. CROSS DRAINAGE CULVERTS AS REQUIRED, SEE SHEET 19.

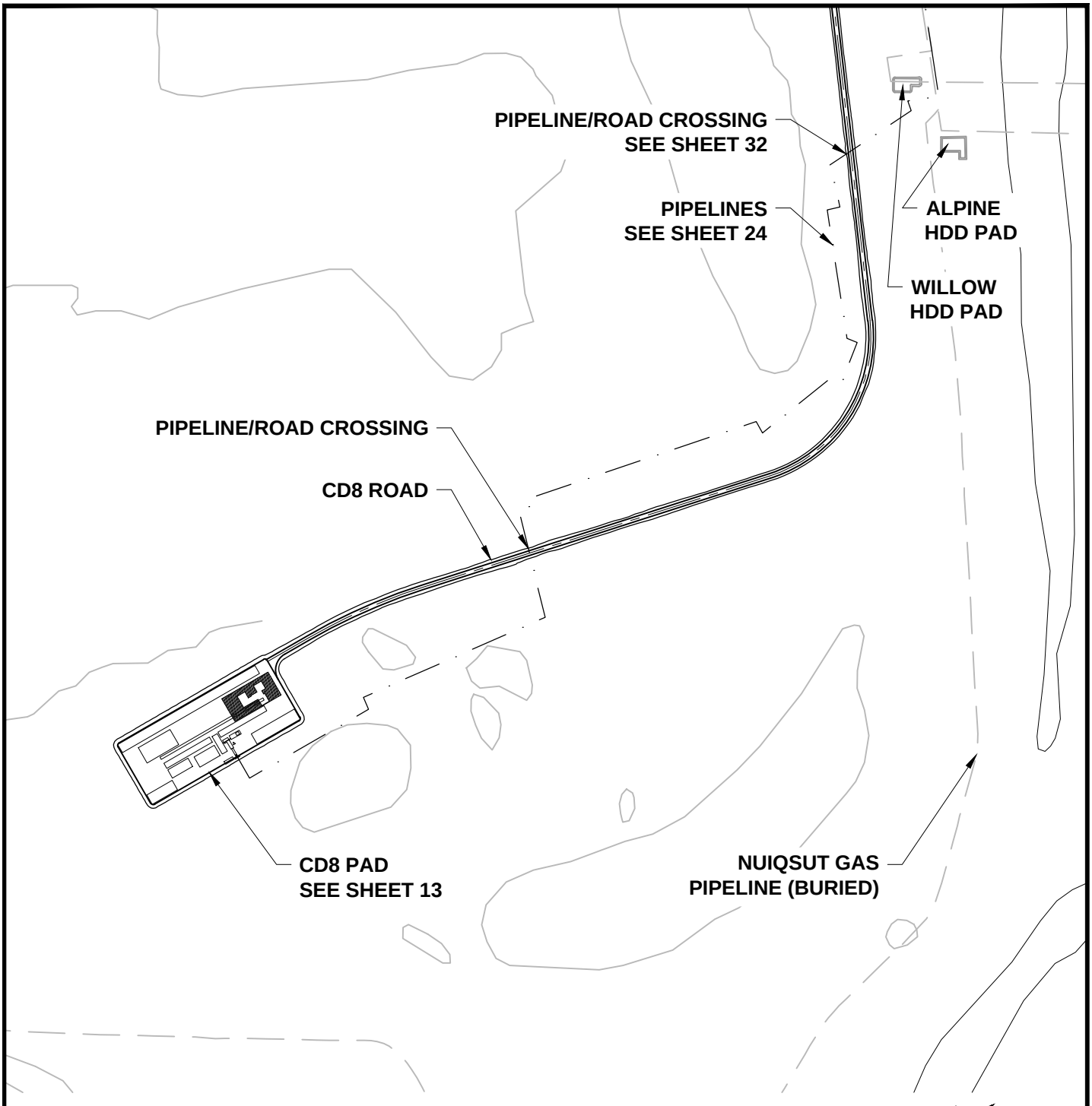


CD8 ROAD
SHEET 3 OF 4

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	**10** of **33** 4/7/2025



NOTES:
1. CROSS DRAINAGE CULVERTS AS REQUIRED, SEE SHEET 19.

N

0 500 1000 1500 FT

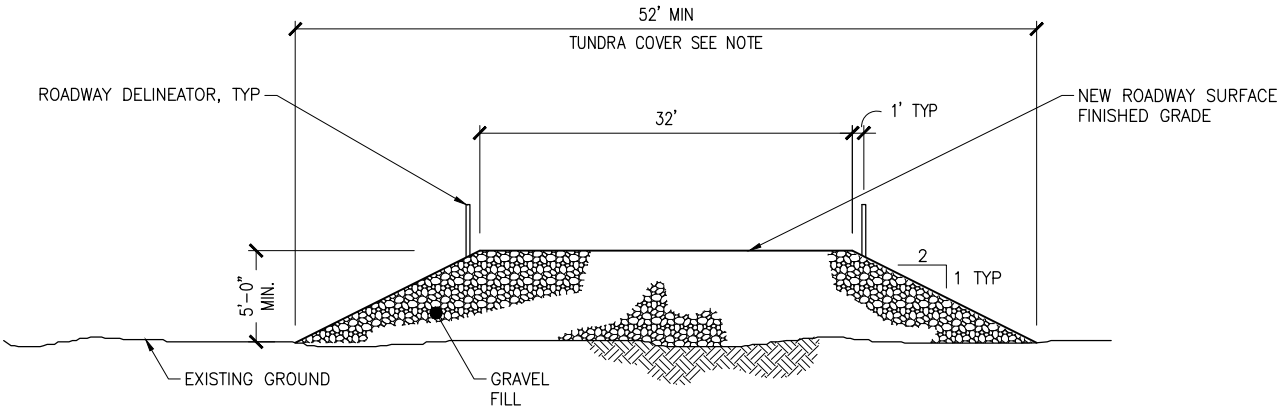
CD8 ROAD
SHEET 4 OF 4

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA

SHEET **11** of **33** 4/7/2025



32 FT WIDE ROAD TYPICAL SECTION

NTS

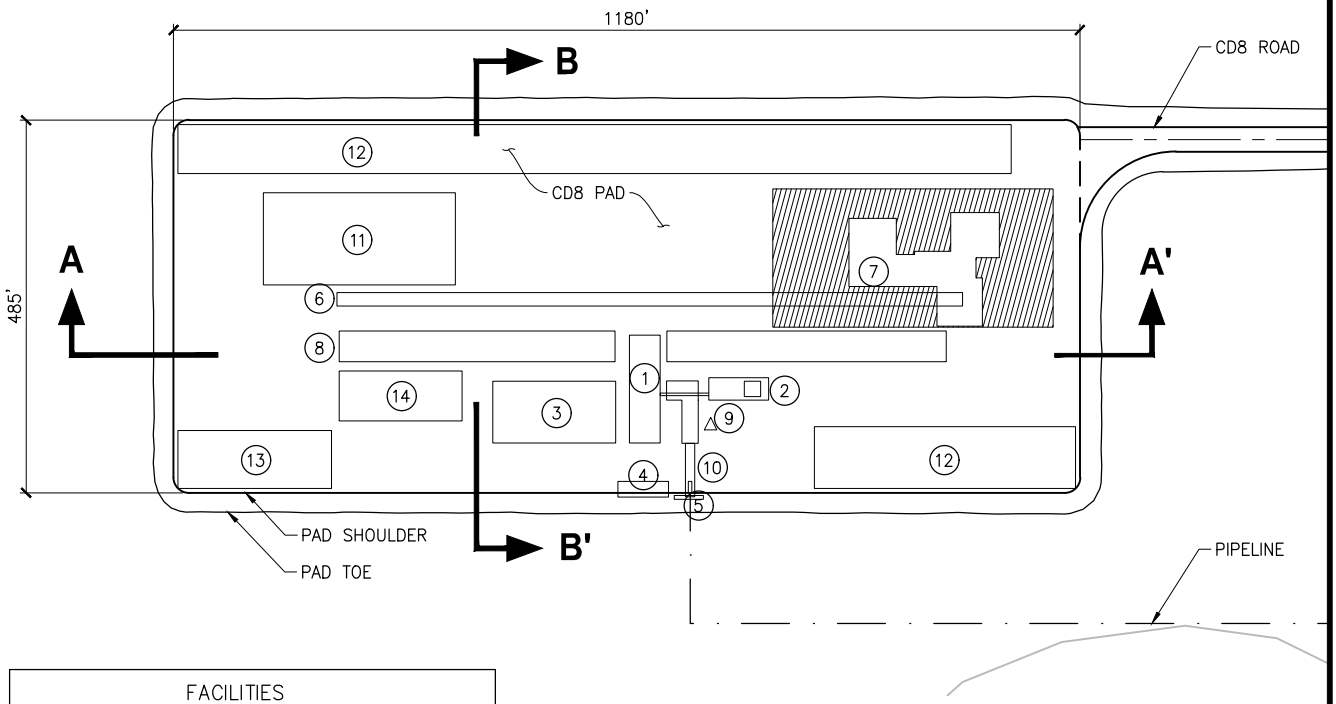
NOTES:
1. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD ELEVATION.
2. RIPRAP EROSION PROTECTION WILL BE INCLUDED ON ONE OR BOTH SIDES OF THE ROAD BASED ON HYDRAULIC MODELING AND DESIGN CRITERIA.

TYPICAL ROAD SECTION

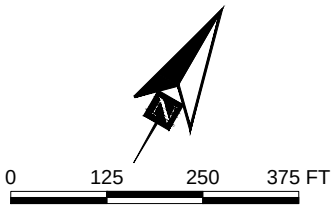
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



FACILITIES	
1	SINGLE PROCESS MODULE
2	PRODUCTION HEATER SKID W/ BURNER HOUSE
3	CHEMICAL TANKS AND CONTAINMENT
4	SWITCHGEAR PLATFORM
5	PAD EDGE VALVES PLATFORM
6	WELL HOUSES
7	DRILL RIG
8	PIPE RACKS
9	COMMUNICATION TOWER
10	PIPE BRIDGE
11	WELL STIMULATION EQUIPMENT
12	DRILLING EQUIPMENT/TUBULARS
13	RIG CAMP
14	TEMP TANKS CONTAINMENT



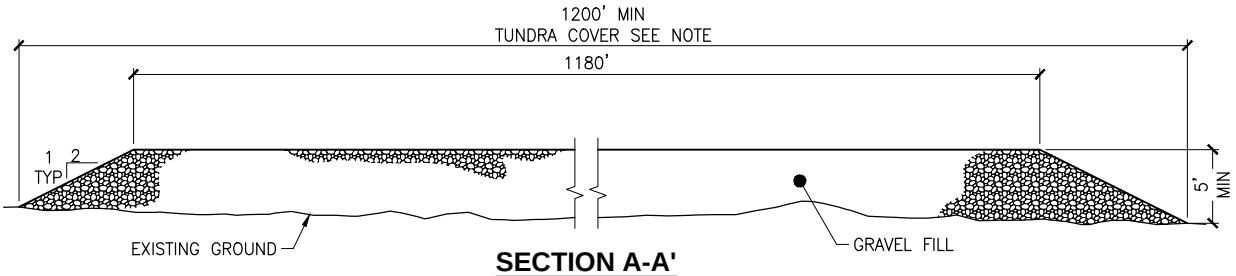
NOTES:
1. WELL SPACING DETAILS PROVIDED IN THE PROJECT DESCRIPTION.
2. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
3. SEE SHEET 14 FOR CD8 PAD SECTIONS.

PND ENGINEERS, INC.

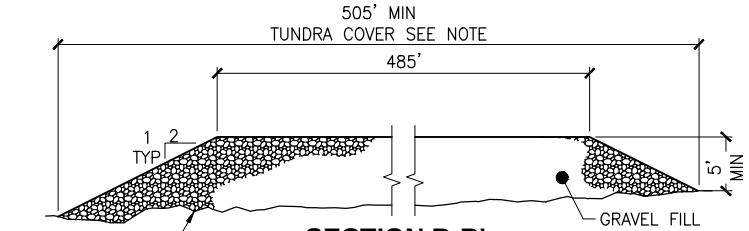
ConocoPhillips Alaska, Inc.

CD8 PAD PLAN

REFERENCE: POA-XXXX-XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **13** of **33** 4/7/2025



SECTION A-A'
CD8 PAD LONGITUDINAL SECTION
NTS



SECTION B-B'
CD8 PAD TRANSVERSE SECTION
NTS

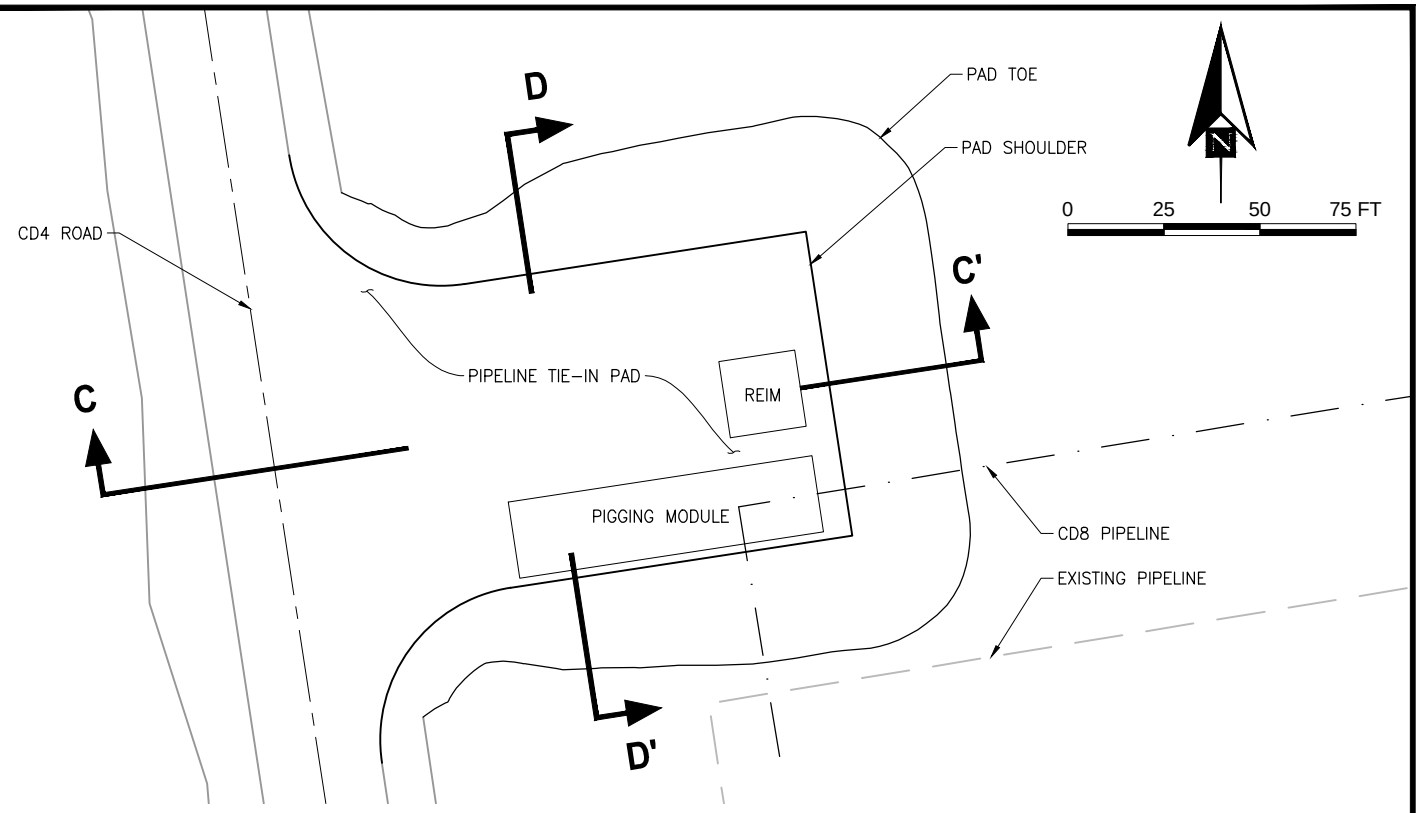
NOTES:
1. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD/PAD ELEVATION.
2. RIPRAP EROSION PROTECTION WILL BE INCLUDED ON ONE OR BOTH SIDES OF THE PAD BASED ON HYDRAULIC MODELING AND DESIGN CRITERIA.

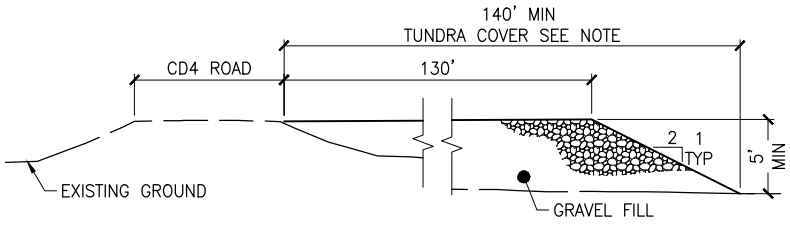
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

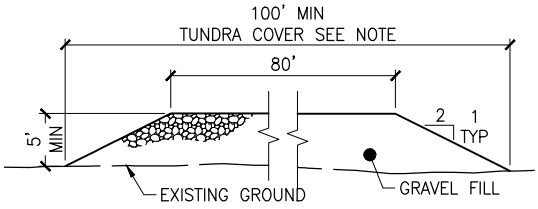
REFERENCE: POA-XXXX-XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **14** of **33** 4/7/2025

CD8 PAD SECTIONS





SECTION C-C'
PIPELINE TIE-IN PAD
NTS



SECTION D-D'
PIPELINE TIE-IN PAD
NTS

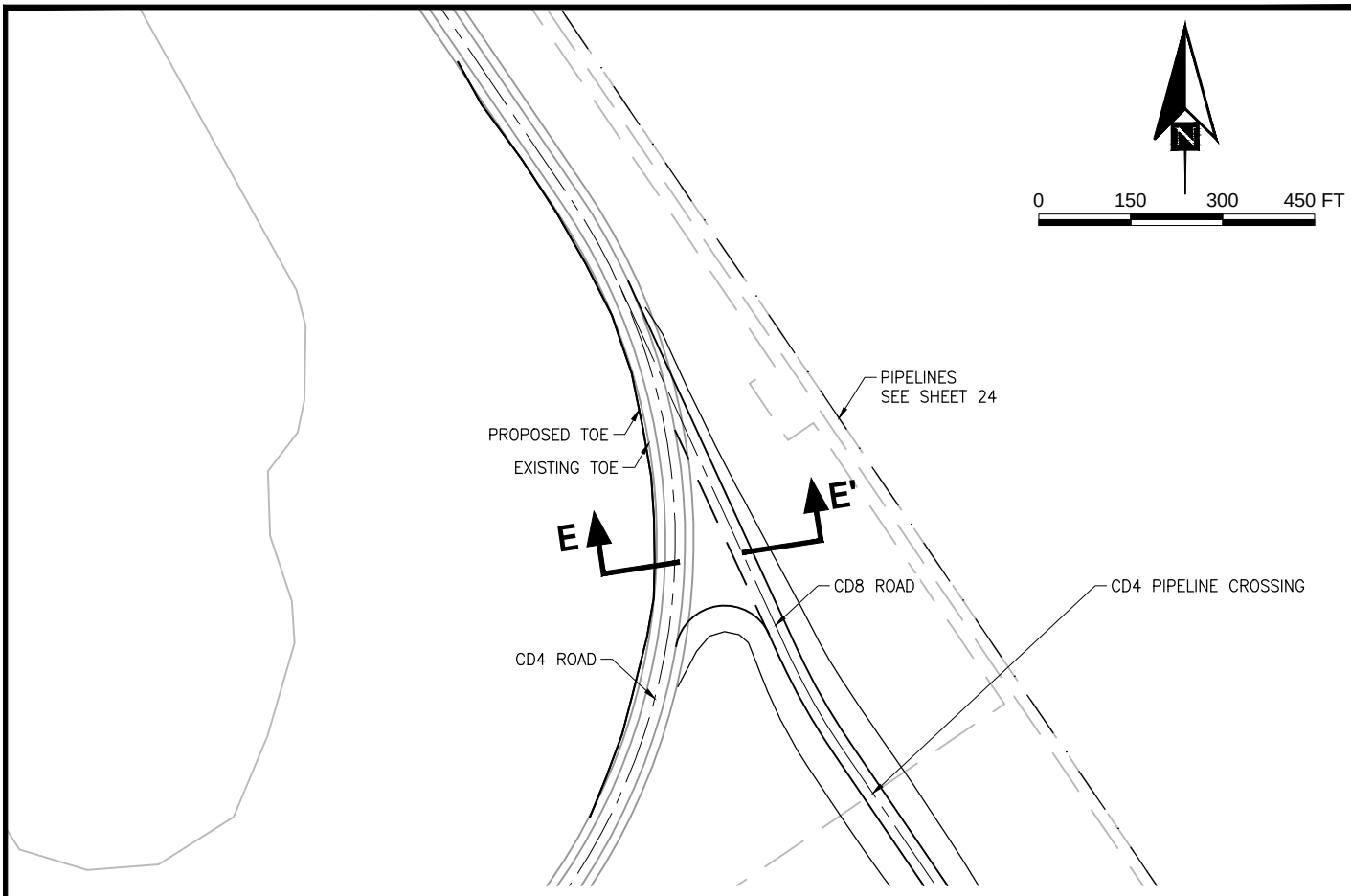
NOTES:
1. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD/PAD ELEVATION.
2. RIPRAP EROSION PROTECTION WILL BE INCLUDED ON ONE OR BOTH SIDES OF THE PAD BASED ON HYDRAULIC MODELING AND DESIGN CRITERIA.

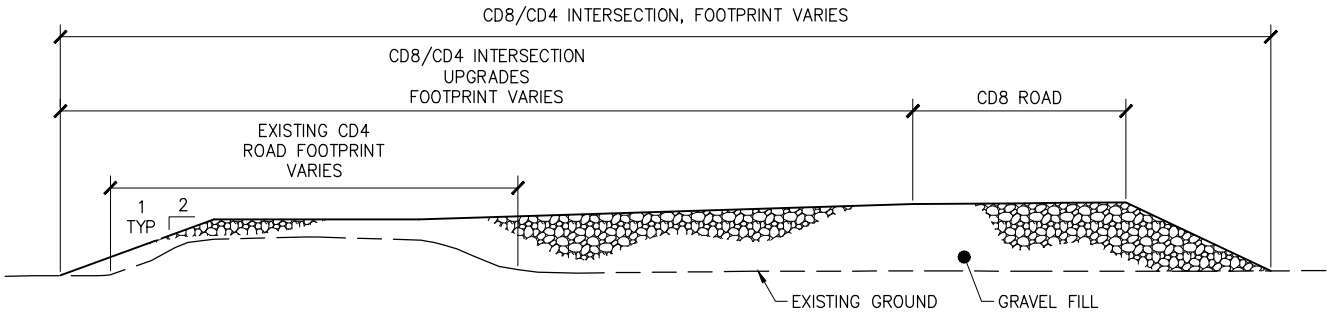
PIPEPLINE TIE-IN PAD PLAN AND SECTIONS

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA





SECTION E-E'
CD8/CD4 INTERSECTION
NTS

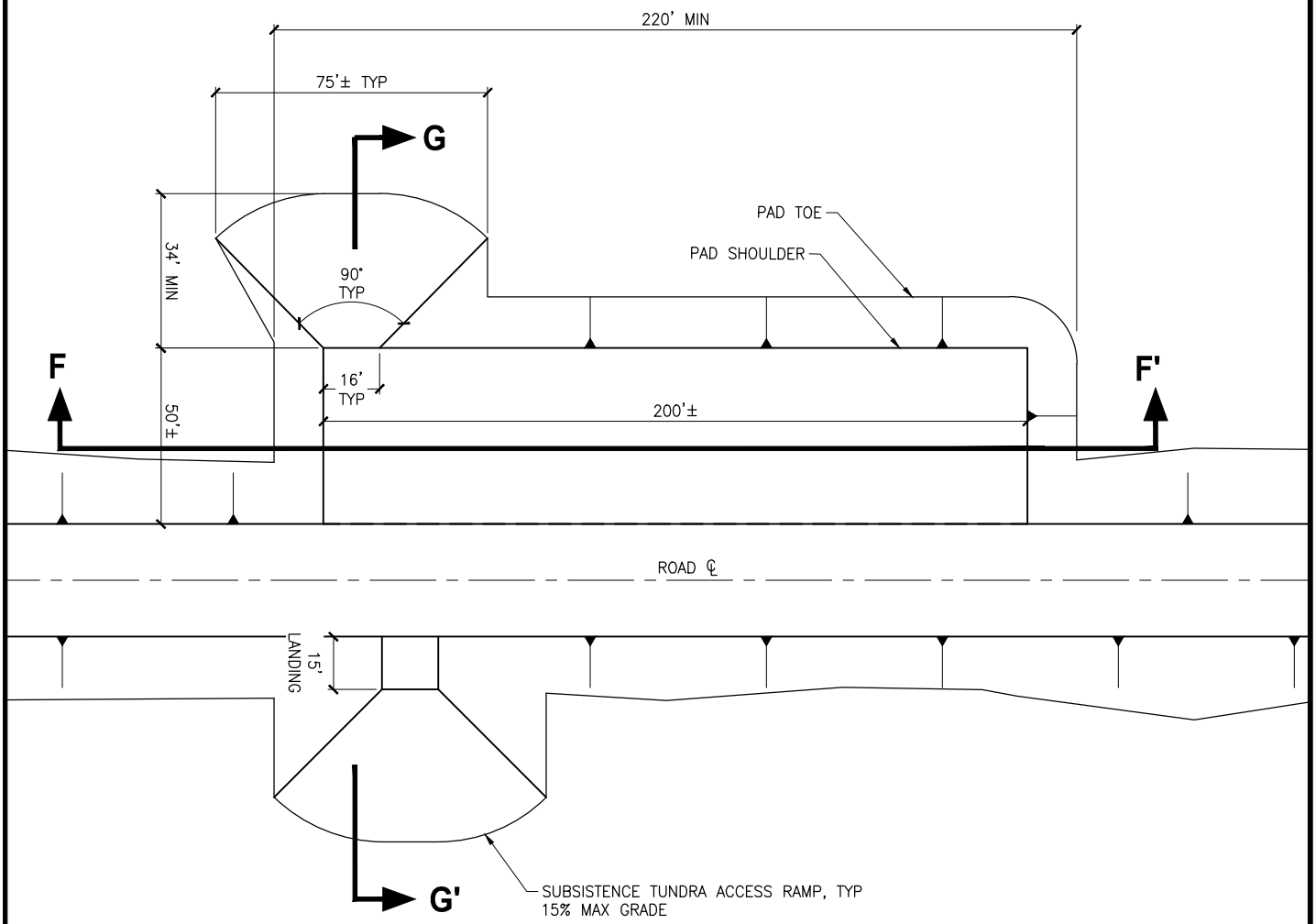
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

NOTES:
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. RIPRAP EROSION PROTECTION WILL BE INCLUDED ON ONE OR BOTH SIDES OF THE PAD BASED ON HYDRAULIC MODELING AND DESIGN CRITERIA.

CD8/CD4 INTERSECTION PLAN AND SECTION

REFERENCE: POA-XXXX-XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA



0 25 50 75 FT

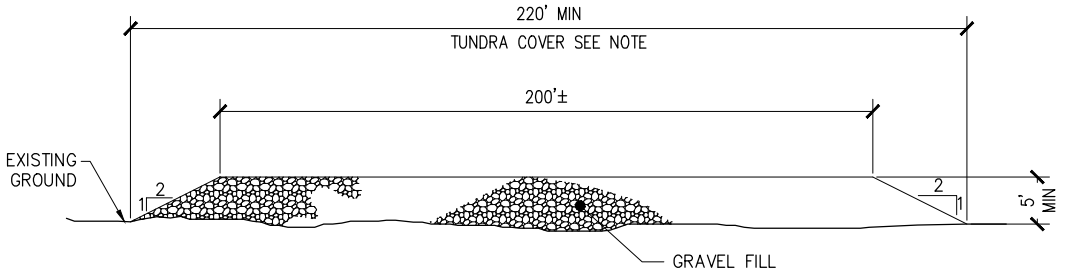
NOTES:
1. MINIMUM GRAVEL DEPTH 5.0' WITH 2:1 FILL SLOPES.
2. SEE SHEET 18 FOR SUBSISTENCE ACCESS/VEHICLE PULLOUT PAD TYPICAL SECTIONS.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

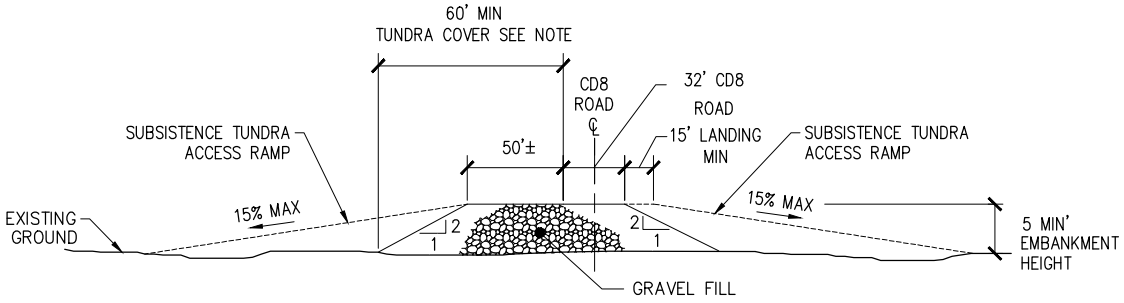
TYPICAL VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



SECTION F-F'
VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD
TYPICAL LONGITUDINAL SECTION

NTS



SECTION G-G'
VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD
TYPICAL TRANSVERSE SECTION

NTS

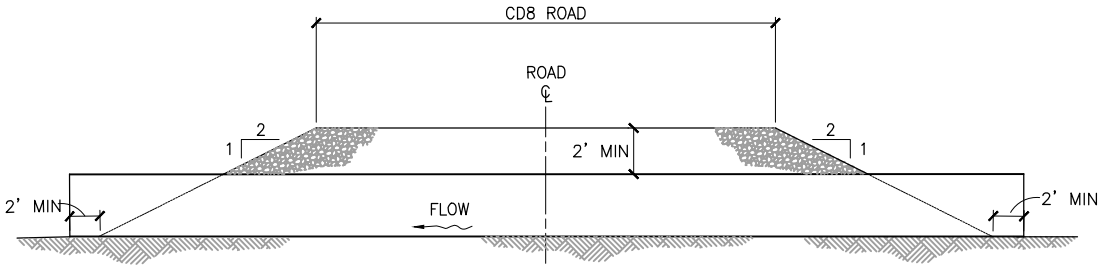
NOTES:
1. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD/PAD ELEVATION.

PND ENGINEERS, INC.

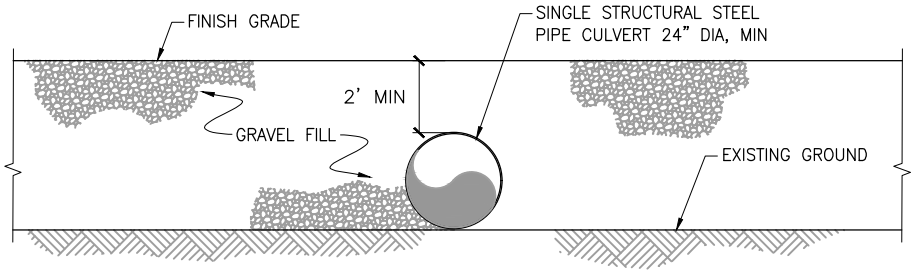
ConocoPhillips Alaska, Inc.

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **18** of **33** 4/7/2025

VEHICLE PULLOUT / SUBSISTENCE ACCESS PAD
TYPICAL SECTIONS



TYPICAL CROSS DRAINAGE CULVERT SECTION



TYPICAL CROSS DRAINAGE CULVERT ELEVATION

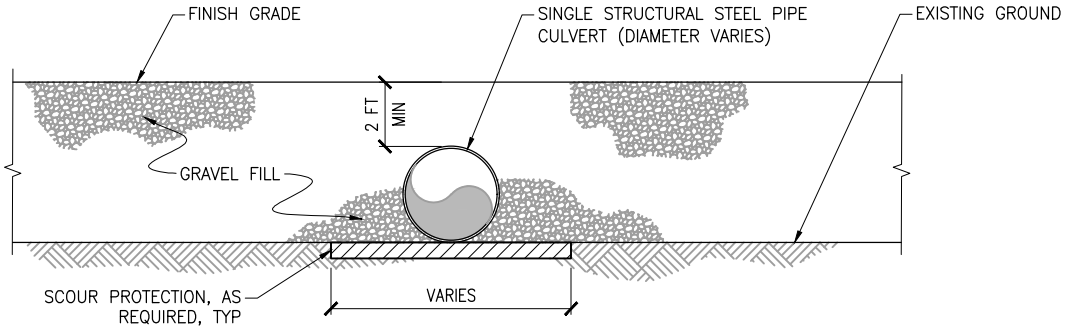
NOTES:
1. AS A GENERAL GUIDELINE, CROSS-DRAINAGE CULVERTS WILL BE SITED APPROXIMATELY EVERY 1,000 FEET OR AS NEEDED ALONG THE ALIGNMENT DURING INITIAL DESIGN EFFORTS. EXACT PLACEMENT OF CULVERTS WILL DEPEND ON ACTUAL IN-FIELD LOCAL DRAINAGE PATTERNS, AND MAY BE SPACED CLOSER OR FARTHER THAN 1,000 FEET.

CROSS DRAINAGE CULVERT SECTIONS AND ELEVATION

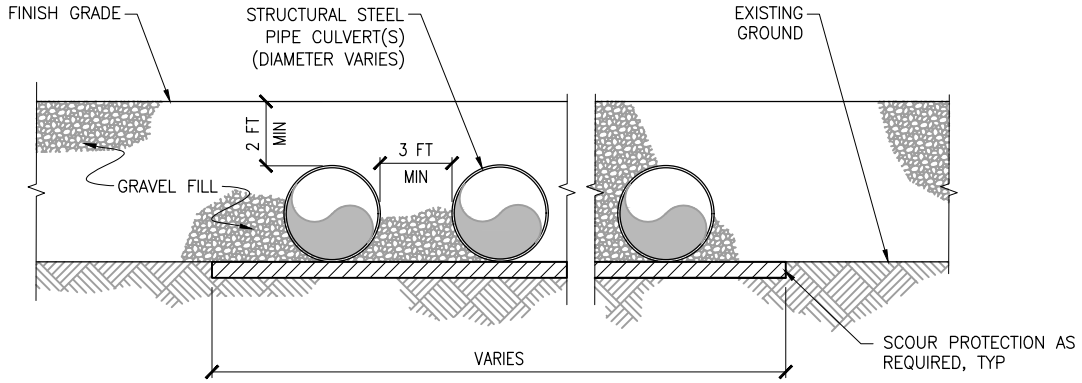
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

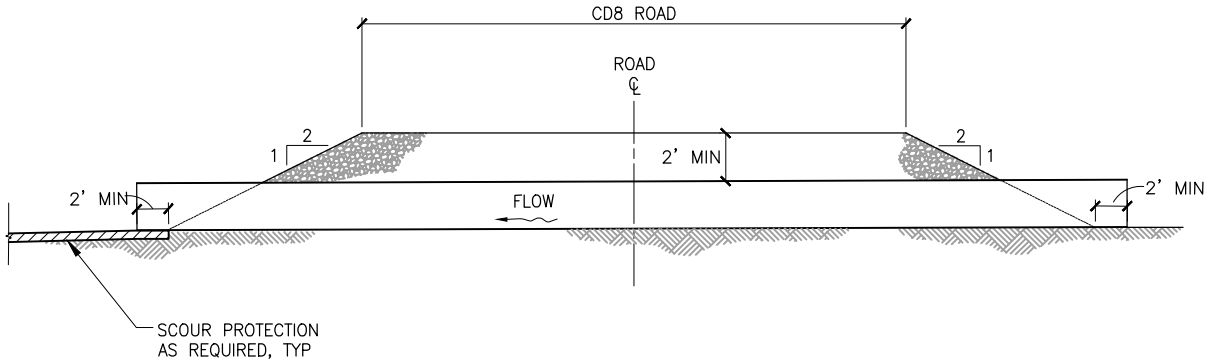
REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



TYPICAL SINGLE CULVERT ELEVATION



TYPICAL CULVERT BATTERY ELEVATION



TYPICAL SINGLE/MULTIPLE CULVERT SECTION

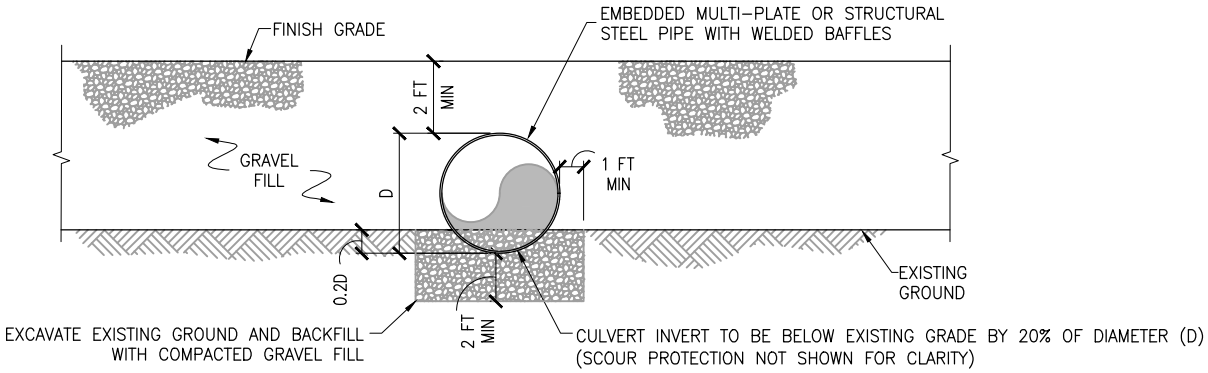
NOTES:
1. SCOUR PROTECTION MATERIALS, THICKNESS, AND DIMENSIONS TO BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

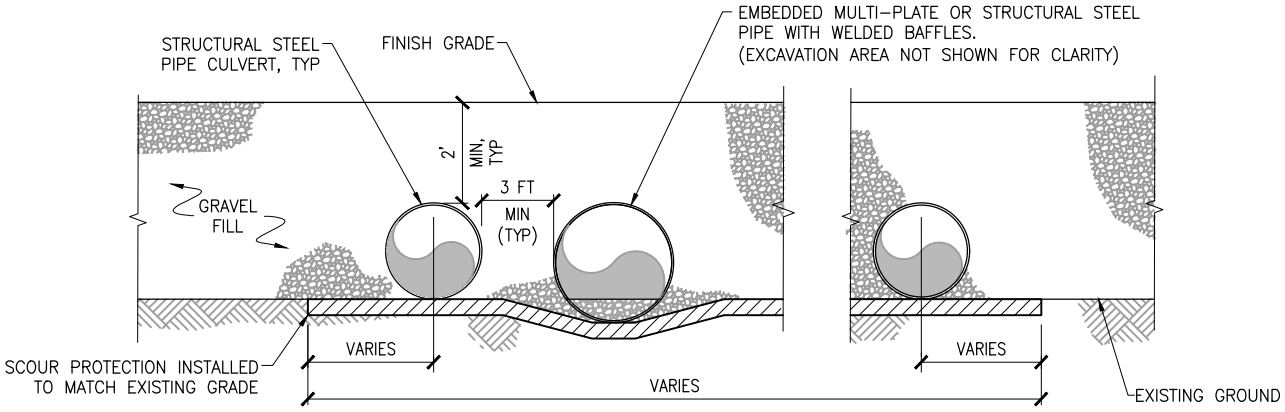
REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	**20** of **33** 4/7/2025

CULVERT BATTERY SECTIONS AND ELEVATIONS



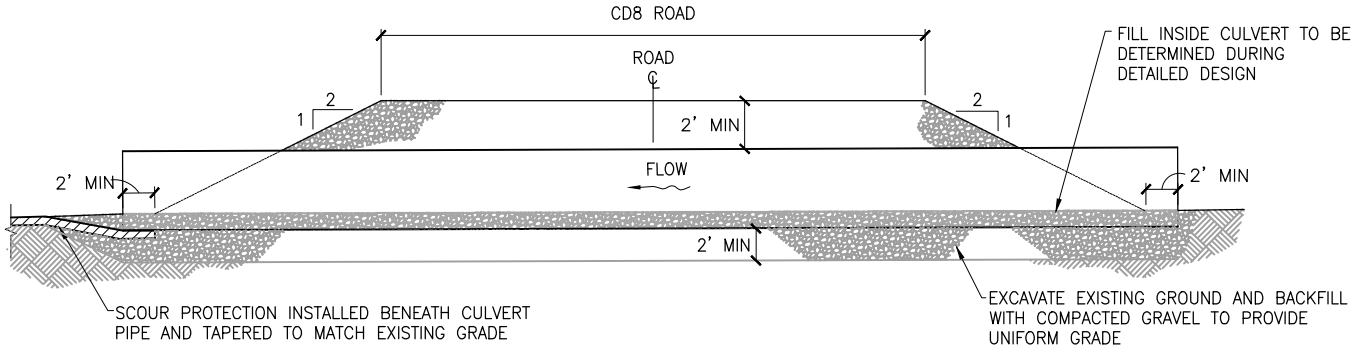
TYPICAL FISH PASSAGE CULVERT DETAIL

NTS



TYPICAL FISH PASSAGE CULVERT BATTERY ELEVATION

NTS



TYPICAL FISH PASSAGE CULVERT SECTION

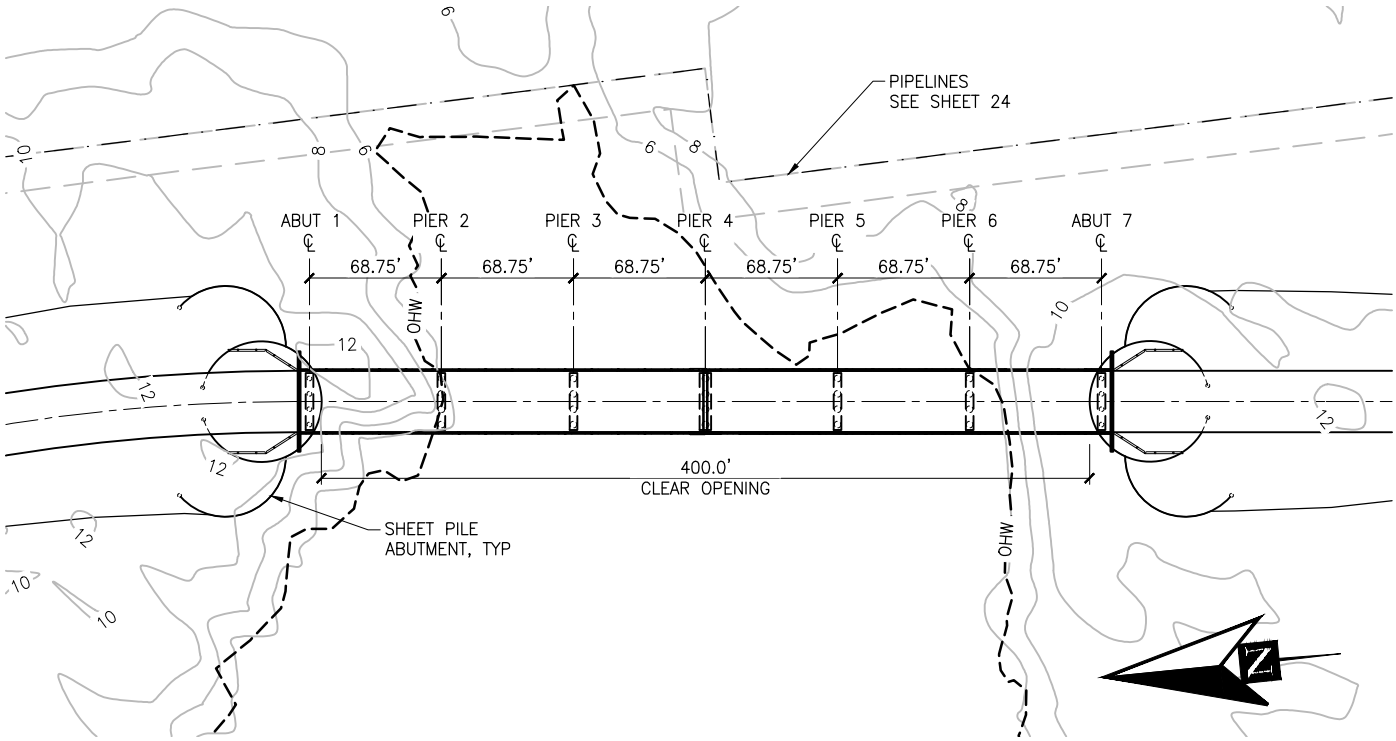
NTS

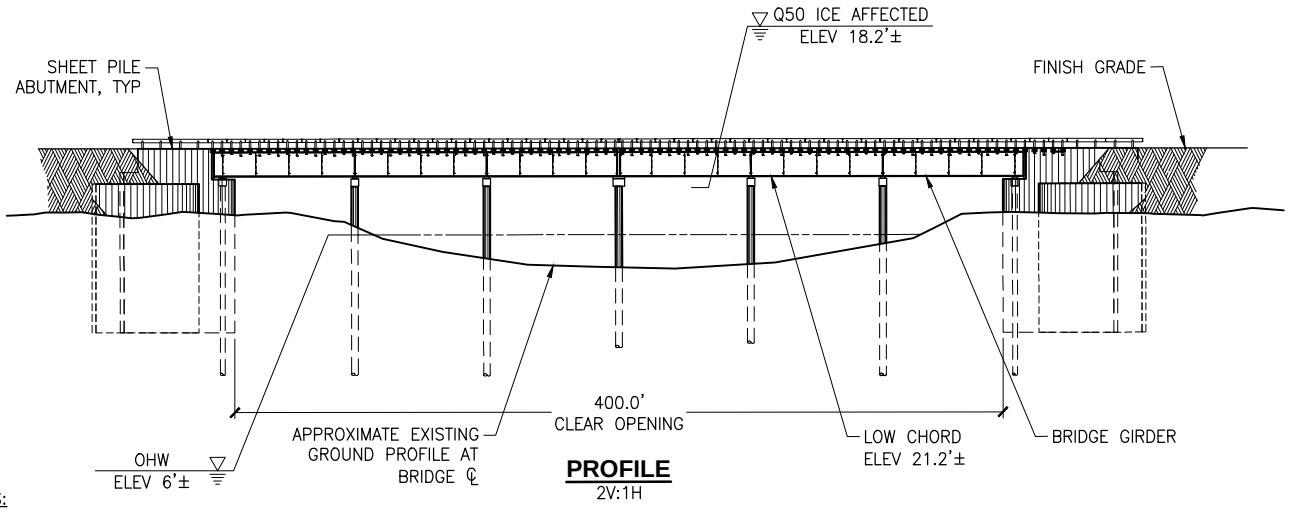
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **21** of **33** 4/7/2025

FISH PASSAGE CULVERT SECTIONS AND ELEVATIONS





PROFILE
2V:1H

NOTES:

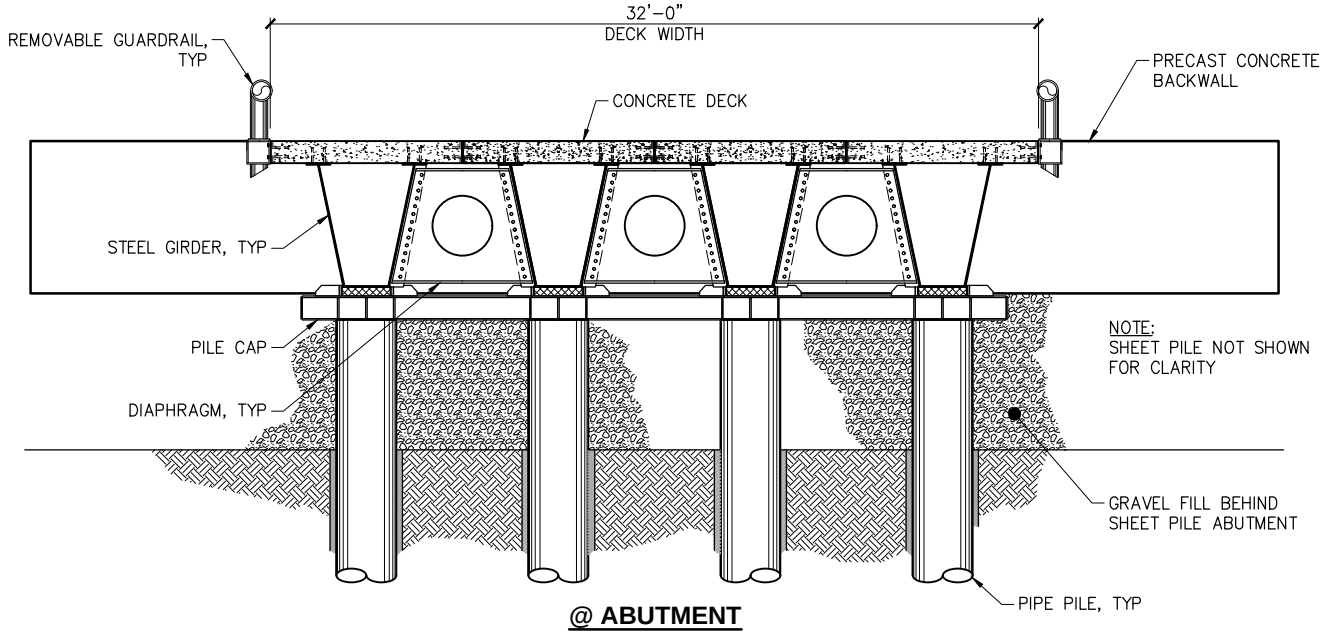
1. VERTICAL SCALE 2X HORIZONTAL SCALE.
2. BRIDGE CROSSING PROFILES ARE BASED ON LiDAR DATA. BATHYMETRY IS ASSUMED AND HAS NOT YET BEEN COLLECTED. VERTICAL DATUM IS NAVD88.
3. BRIDGE LOW CHORD ELEVATION WILL BE A MINIMUM OF THREE (3) FEET ABOVE THE FIFTY (50) YEAR ICE AFFECTED FLOOD ELEVATION OR FIVE (5) FEET ABOVE THE 200-YEAR OPEN WATER FLOOD ELEVATION, WHICHEVER IS HIGHER.
4. ORDINARY HIGH WATER (OHW) ELEVATIONS ARE APPROXIMATED BASED ON VEGETATION LIMITS VISIBLE IN AERIAL IMAGERY.
5. FLOOD ELEVATIONS SHOWN ARE BASED ON PRELIMINARY SURVEY AND HYDROLOGIC DATA.

LAKE L9324 BRIDGE PLAN AND PROFILE

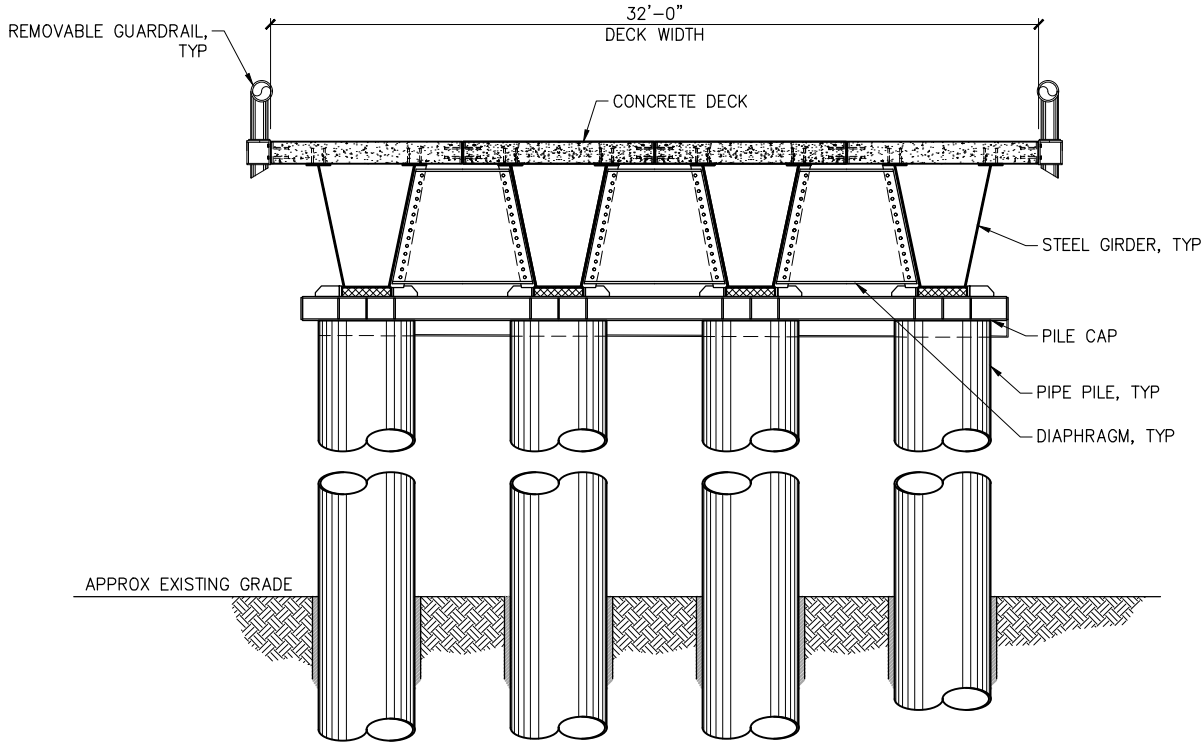
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE: POA-XXXX-XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA



@ ABUTMENT



@ PIER

TYPICAL SECTIONS

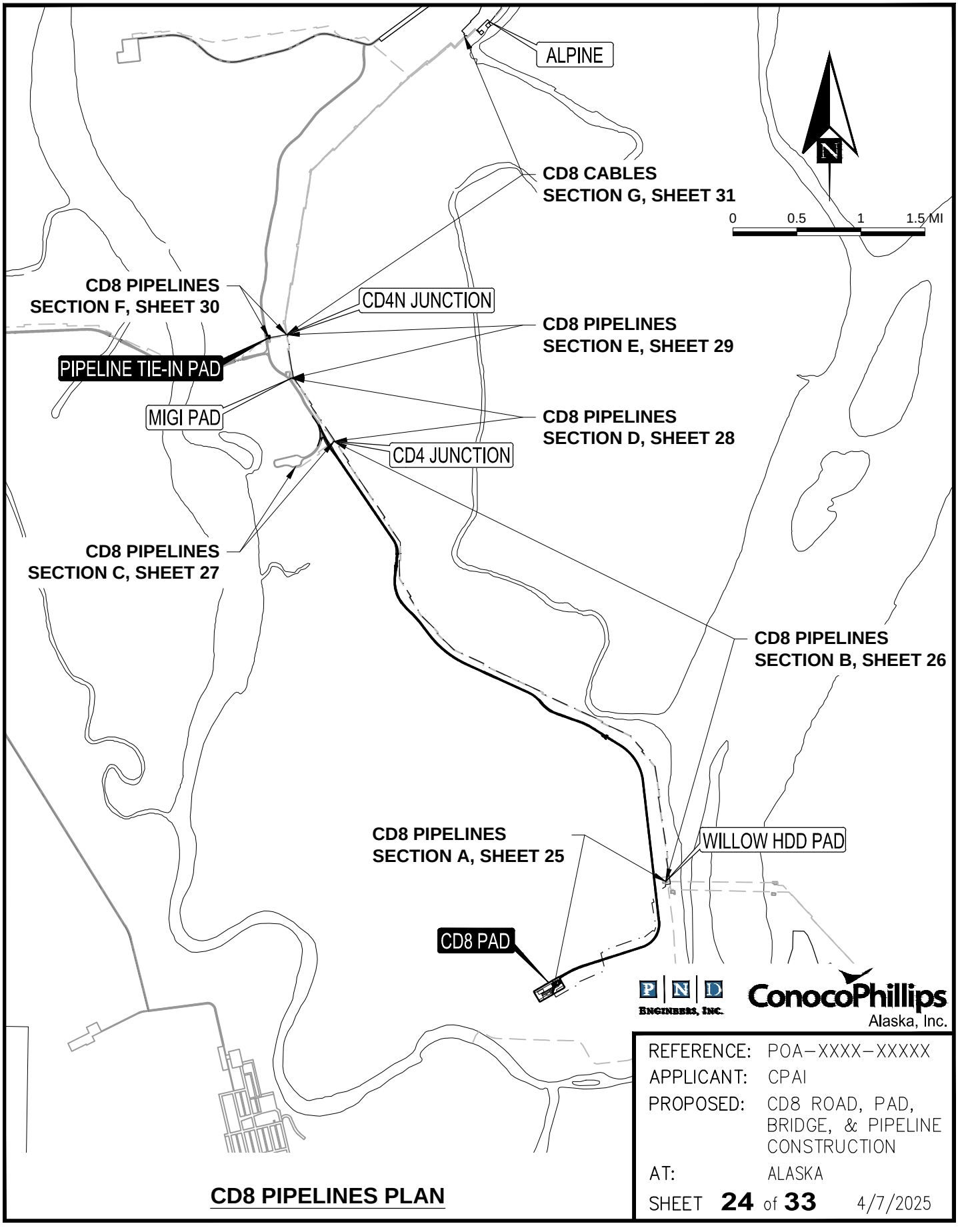
P N D ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

LAKE L9324 BRIDGE SECTIONS

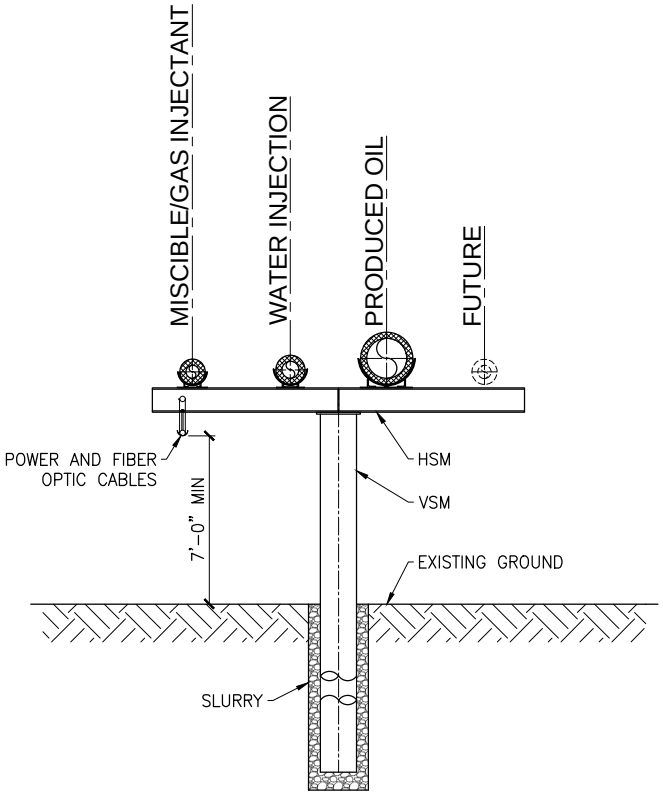
REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA

SHEET **23** of **33** 4/7/2025



CD8 PIPELINES PLAN

REFERENCE: POA–XXXX–XXXXX
APPLICANT: CPAI
PROPOSED: CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT: ALASKA
SHEET **24** of **33** 4/7/2025



(CD8 TO HDD)

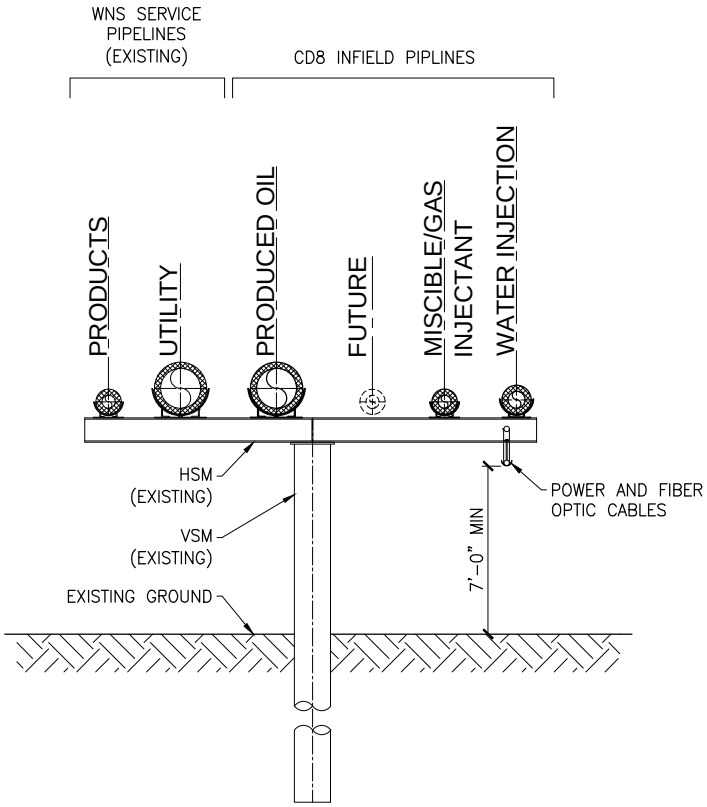
CD8 PIPELINES
SECTION A

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



(HDD TO CD4 JUNCTION)

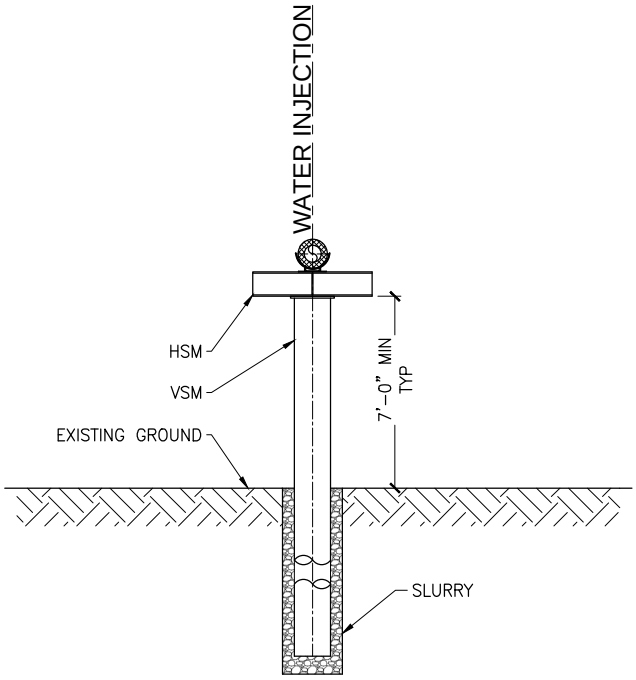
WNS PIPELINE SECTION B

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



(CD4 JUNCTION TO CD4)

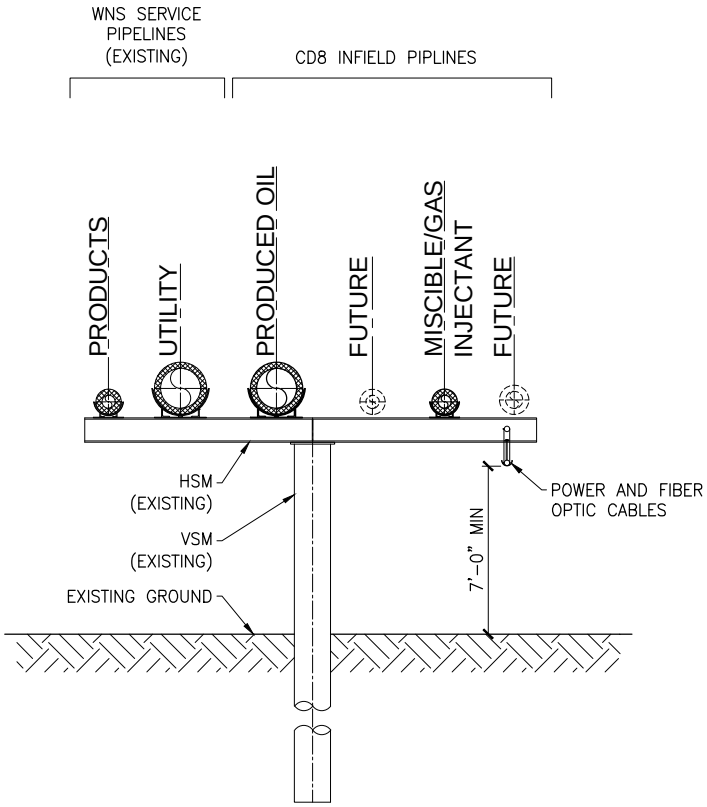
CD8 PIPELINES
SECTION C

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



(CD4 JUNCTION TO MIGI)

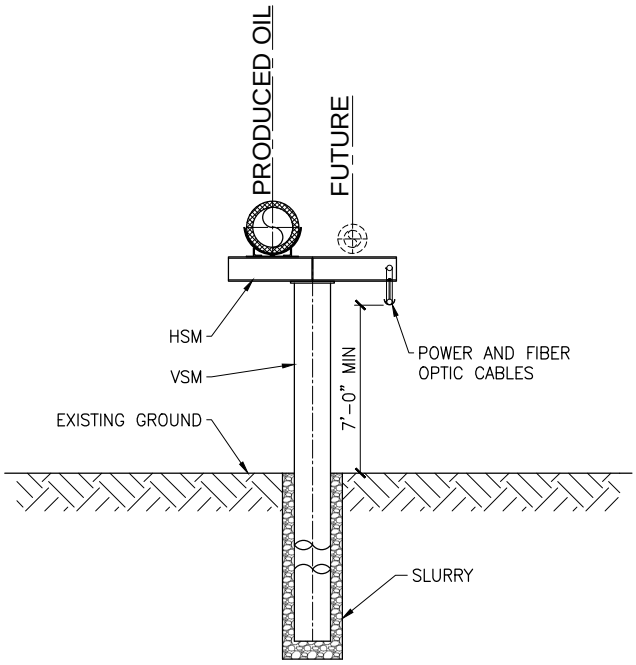
WNS PIPELINE SECTION D

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



(MIGI TO CD4N JUNCTION)

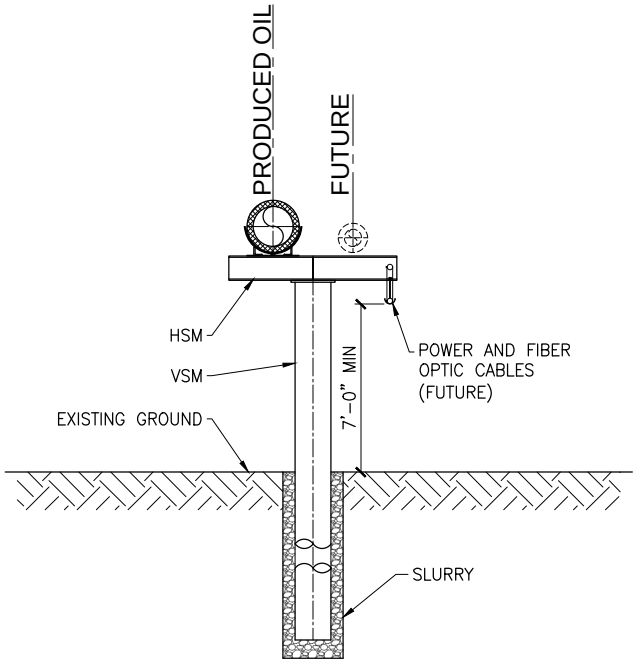
CD8 PIPELINES
SECTION E

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



(CD4N JUNCTION TO PIPELINE TIE-IN PAD)

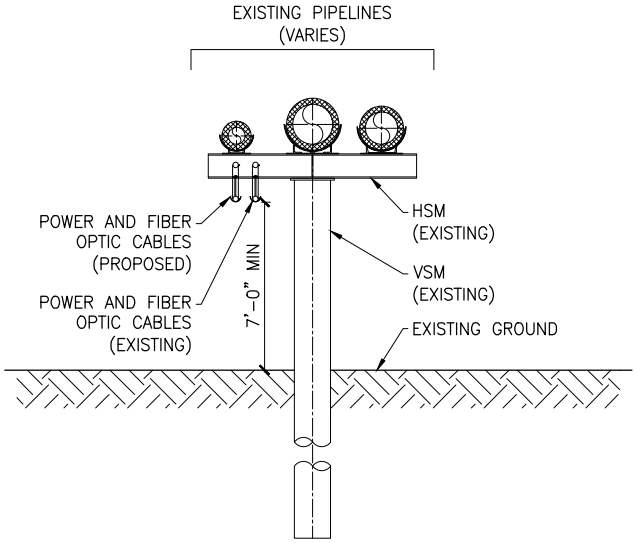
CD8 PIPELINES
SECTION F

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



(CD4N JUNCTION TO ALPINE)

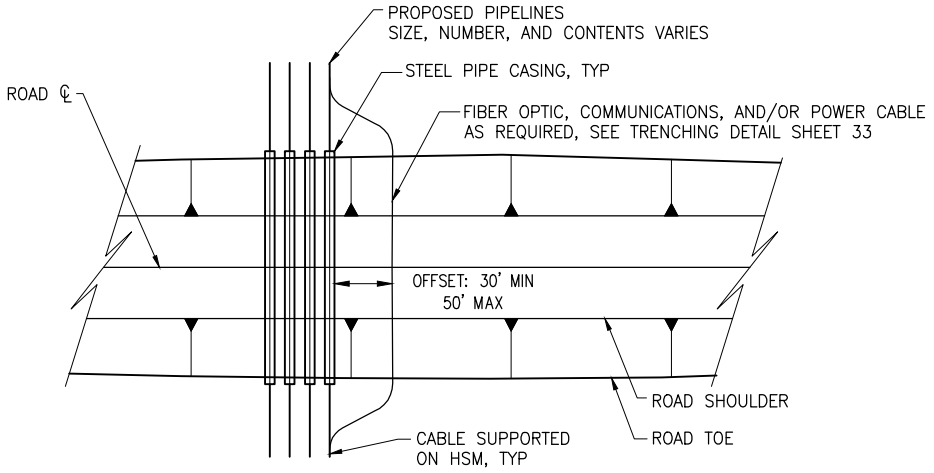
GMT1 PIPELINE SECTION G

NOTES:
1. PIPELINE LAYOUTS ARE SCHEMATIC, FOR INFORMATION ONLY. FINAL PIPELINE LAYOUTS WILL BE DETERMINED DURING DETAILED DESIGN.

PND ENGINEERS, INC.

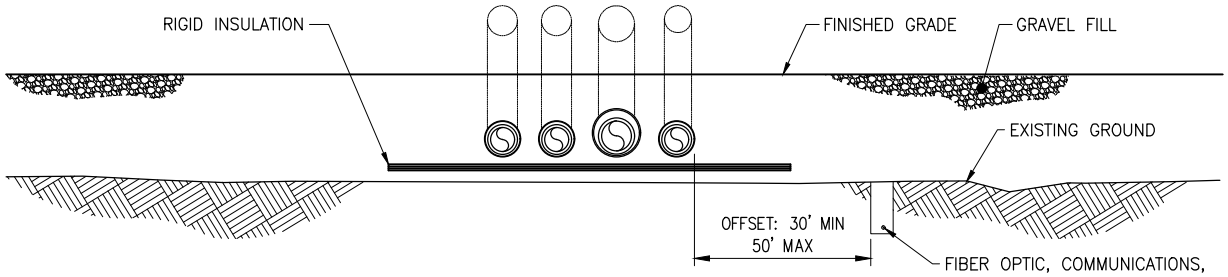
ConocoPhillips Alaska, Inc.

REFERENCE:	POA-XXXX-XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA



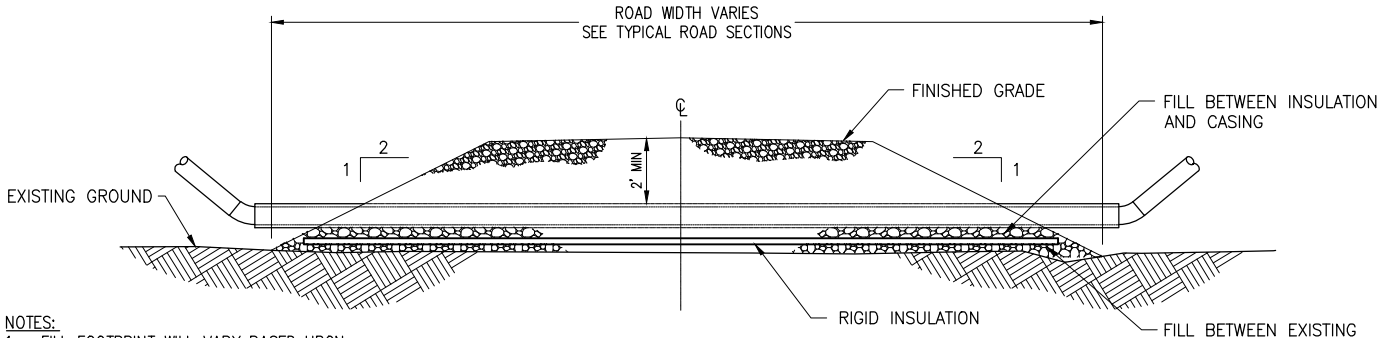
PIPELINE CROSSING ROAD PLAN

NTS



PIPELINE CROSSING ROAD PROFILE

NTS



NOTES:

1. FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD ELEVATION.

PIPELINE CROSSING ROAD SECTION

NTS

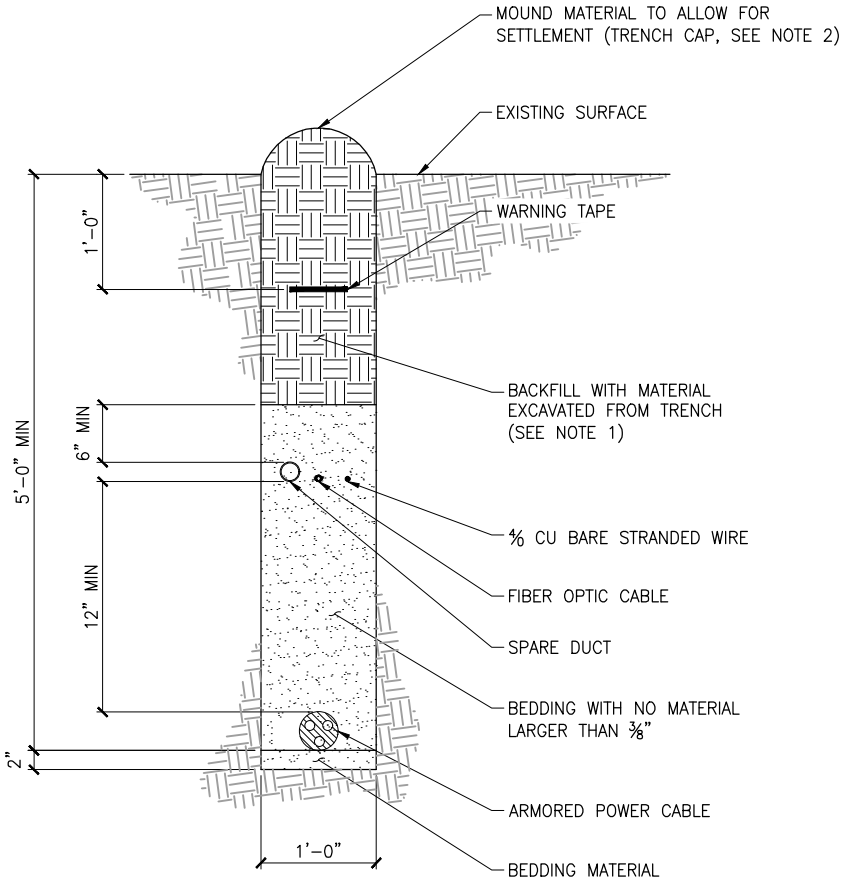
PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA

SHEET **32** of **33** 4/7/2025

PROPOSED PIPELINE ROAD CROSSING



TRENCH DETAIL

NTS

NOTES:

1. REMOVE ALL ICE AND SNOW DOWN TO TUNDRA SURFACE PRIOR TO TRENCHING.
2. THE TRENCH CAP SHOULD BE 35% – 40% OF THE TRENCH DEPTH (1.75' TO 2' FOR A 5' DEEP TRENCH), TO ALLOW FOR SETTLING AND ICE THAW.

PND ENGINEERS, INC.

ConocoPhillips Alaska, Inc.

REFERENCE:	POA–XXXX–XXXXX
APPLICANT:	CPAI
PROPOSED:	CD8 ROAD, PAD, BRIDGE, & PIPELINE CONSTRUCTION
AT:	ALASKA
SHEET	**33** of **33** 4/7/2025

TYPICAL TRENCH DETAIL

ATTACHMENT C

APPLICANT PROPOSED MITIGATION STATEMENTS

ConocoPhillips Alaska, Inc.
Department of the Army Permit Application
CD8 Development
North Slope, Alaska

Applicant's Proposed Mitigation Statements

Applicant's Proposed Mitigation

1. **Avoidance of impacts to waters of the U.S., including wetlands:**

Please describe how, in your project planning process, you avoided impacts to waters of the U.S., including wetlands, to the maximum extent practicable. Examples of avoidance measures include site selection, routes, design configurations, etc.

The CD8 Development (Project) has been located where economically recoverable oil and gas resources are found and was specifically sited in a location that optimizes not only resource recovery, but also avoidance and minimization of adverse impacts to wetlands and other resources. Because the Project drillsite must be built in the vicinity of the mineral resource to be extracted, total avoidance of impacts to Waters of the United States (WOTUS) is not practicable. However, ConocoPhillips Alaska, Inc. (CPAI), has taken measures to avoid impacts to WOTUS to the maximum extent practicable through Project siting and design. Proposed mitigation measures specific to avoidance of impacts to WOTUS are described below. Additional proposed mitigation measures pertaining to all physical, biological, and social environmental resources are described in the Project Avoidance and Minimization Measures Table (Attachment D).

Facility Siting and Design

CPAI has designed the Project with the pad size necessary to produce the discovered oil, within the economic and technological constraints of North Slope oil development. This includes use of directional drilling to reduce the overall pad footprint and avoid the need for additional drillsite pads and associated roads and pipelines. The drillsite footprint has been further minimized by using 20-foot (instead of 30-foot) wellhead spacing to reduce the overall gravel footprint for drillsite pads. Furthermore, CPAI sited the drillsite to further avoid impacts to aquatic resources. Screening criteria include:

- Avoiding placement of the drillsite within a ½ mile of the banks of the Colville River
- Avoiding placement of facilities within 500 feet of fish-bearing waterbodies except where avoidance will have other more substantial impacts
- Locating the drillsite on higher, drier, and level ground to minimize the gravel fill placement footprint and volume in WOTUS
- Avoiding location of pads or other structures in active stream channels

- Avoiding location of facilities in ponds (PUB), wetlands with vegetation subclass 2 (EM2) indicating the presence of *Arctophila*, or permanently inundated or semi-permanently inundated wetlands (H and F class water regimes)
- Avoiding locations having unique habitat or other value to the extent practicable, including preferred habitat of threatened or endangered species, historical brown-bear dens, historical polar bear dens, and modeled potential polar bear denning habitat
- Conducting cultural/archeological resource surveys prior to site selection and avoiding placement of facilities within 500 feet of identified cultural resource sites, native allotments, and cabins

The pad location ultimately selected was chosen based on access to subsurface resources, while balancing surface concerns. The pad location was shifted west to move further from the Colville River and move further from areas of modeled higher-velocity water based during hydraulic design criteria flood events (see Table 5-2 in the Project Description). The pad was also located in an area of slightly higher elevation, to reduce the gravel footprint and gravel volume and riprap needed relative to areas slightly north.

Road Design and Routing

Gravel roads will be built to the minimum width necessary for adequate operations and safety. The Project will avoid the need for additional gravel fill by minimizing the road footprint through use of a 32-foot surface width and a horizontal (H) to vertical (V) ratio of approximately 2H:1V. The 32-foot surface allows the road to accommodate winter drill rig moves, allowing tie-in of the annually constructed Alpine/WNS Multiyear Ice Road from Kuparuk and heavy haul ice route from areas west of the Colville River Delta. Ice road tie-in to the CD8 road will shorten the total length of the annual ice roads in the Colville River Delta by 6.9 miles in most years. The Project estimates a net reduction in ice road mileage by approximately 162 miles and 176 million gallons of water over the analyzed life of the project (see Sections 5.4.1, Ice Roads and Pads and Section 8.4, Water Sources and Uses in the Project Description), reducing activities near and withdrawals from freshwater lakes in the Colville River Delta.

CPAI's route selection further avoids impacts. For example, criteria used in road routing includes:

- Routing the road in proximity to the existing pipeline corridor to aggregate project impacts in areas of existing development and avoiding impacts to less developed areas
- Use of natural "ridge-like" terrain and upland features to the extent practicable to avoid fill placement in wetlands and decrease the total roadway footprint as these areas are located at higher elevations than surrounding wetlands

The selected road route provides the most direct and shortest route from existing infrastructure at CD4 while following existing infrastructure and higher-elevation terrain to minimize fill footprints and volumes.

Maintenance of Natural Water Current Patterns, Circulation, and Fluctuation

CPAI has designed the Project infrastructure to avoid the creation of standing water and minimize impacts to natural hydrology. This includes selecting a route that follows higher topographic features to the extent practicable and pad, road, bridge and culvert design that follows robust hydrological design criteria based on best available data while minimizing overall footprint to the extent practicable. Previous hydraulic modeling software was updated to the Sedimentation and River Hydraulics – Two Dimension (SRH-2D) modeling software. This included a rebuild of the model mesh representing existing terrain and bathymetry. Mesh was updated using a mosaic of LiDAR and IFSAR digital elevation models. Open water conditions, historically the basis for design criteria, were modeled against updated flood frequency and discharges. With the added benefit of the updated mesh and SRH-2D model, the hydraulic influence of ice jam scenarios, commonly observed in the CRD, were also able to be modeled and considered for design criteria. See Table 5-2 in the Project Description for details on specific criteria for each project element.

Strategic placements of bridges and/or culverts will further minimize the chance of creating standing water. Culverts and bridge structures will be designed to sustain both low- and high-water flows, accommodate fluctuating water levels, and maintain circulation, including during flood periods. CPAI proposes construction of one bridged waterbody-crossing at Lake L9324 and four culvert crossings of swale features. Bridge and culvert placement and design will incorporate the findings of fish surveys and hydrologic modeling including both open-water and ice-affected conditions (See Table 5-2 in the Project Description). The Lake L9324 Bridge crossing has been located at a narrow lake section to the extent practicable, to avoid placement of gravel fill and to minimize the number of piers/pilings below the ordinary high water (OHW) mark of the waterbody crossed. The L9324 Bridge will include intermediate steel pile pier groups positioned approximately 50 to 80 feet apart.

Culverts will be installed at defined channels to maintain hydrologic flow and as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is every 1,000 feet. However, CPAI (or its contractor) will walk the road alignment prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and will review the data with regulatory agencies for concurrence. The culverts will be installed per the final design prior to breakup of the first construction season. Exact placement will be adjusted based on a field survey of local, in-field drainage patterns, and additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.

Use of Existing Infrastructure

CPAI proposes the use of existing infrastructure to the maximum extent practicable, thereby eliminating the need to place fill for larger gravel pads and additional pipelines to support Project construction and operations. These uses include:

- Use of existing camp space at Alpine, at the Kuukpik Pad (K-Pad), and in Kuparuk to support Project construction and operations, avoiding the need for a larger CD8 pad to accommodate the footprint of additional housing.
- Use of the existing Alpine CD1/ACF airstrip for transporting equipment and personnel to the area. No airstrip is proposed for this project. No increase in fixed-wing aircraft flights to Alpine are anticipated to support the project during drilling and operations.
- Use of existing CRU infrastructure, including processing facility, power generation, warehouse space, a valve shop, a fleet shop, tanks, and emergency response equipment at ACF/CD1 and the existing drilling support infrastructure at K-Pad/ACF.
- Use of existing pipelines and/or facilities to avoid parallel pipelines to the extent practicable, including tie-in of the produced fluids pipeline to existing pipelines at the CD8 Pipeline Tie-In Pad, tie-in of the injection water pipeline at CD4, and tie-in MI/GI pipeline at the existing MI/GI Pad. Tie-ins avoid construction of approximately 3.2 miles of pipeline with new VSMs/HSMs.
- Use of space on permitted or existing pipeline vertical support members (VSMs) and horizontal support members (HSMs) from the Willow HDD Pad to the existing miscible injectant/ gas injection (MI/GI) Pad area (approximately 5.4 miles or approximately 70 percent of the project pipeline length) to support Project pipelines. Use of existing pipelines VSMs/HSMs also avoids the need to place new pipeline VSMs below OHW.
- Use of space on existing VSMs/HSMs between the CD8 Pipeline Tie-In Pad and the ACF/CD1 to support Project power and fiber-optic cables (approximately 3.2 miles).
- Use of the existing Oliktok Dock to accommodate module and bulk material transport to the Project area
- Purchase of gravel from the ASRC Mine Site, an existing commercial gravel source, and/or another existing source in Kuparuk eliminating the need to develop a new gravel source within the project vicinity while minimizing vehicle traffic to support gravel hauling.

Avoid Use of Power Poles

CPAI has designed the Project so that all power lines and fiber-optic cables will be hung underneath the HSMs using messenger cables to avoid the need to install power poles, thereby

eliminating the potential impact on vegetation and wetlands as well as reducing the potential for bird strikes and avoiding the creation of perches for predators.

Winter Construction

CPAI will conduct gravel hauling activities in winter to avoid the need to construct a gravel access road to the selected material source. Conducting gravel hauling activities in winter also allows short-term stockpile of gravel, if needed, as well as gravel haul support facilities (camps, etc.) on ice pads to avoid the need for constructing a gravel pad, which will require placement of fill in WOTUS.

Gravel placement for road and pad construction and development activities will occur in the winter months when wetlands are frozen and covered by snow and ice to minimize impacts to flow processes and wildlife, although alternative schedules may be considered through consultation with applicable regulatory agencies. Construction will not occur during times when migratory fish are moving to and from freshwater habitats.

Construction activities such as VSM installation for pipelines will be conducted from ice roads to minimize ground disturbance and associated water resources. VSM drill cuttings will be temporarily stored on ice and removed prior to spring breakup. Power and messenger cable trenches will be dug in winter to avoid collecting water from adjacent wetlands, and trenched materials will be temporarily sidecast onto plywood, plastic sheeting, or an ice pad adjacent to the trench. This will avoid a discharge of fill material into WOTUS associated with sidecasting of trenched materials, as sidecasting will not change the bottom elevation of WOTUS, convert WOTUS to upland, or result in the loss of wetland function.

Use of Ice Roads and Pads

CPAI proposes the use of single-season ice roads to support winter construction of the gravel road, pad, and pipelines to avoid the need for additional gravel roads for construction. This includes avoiding construction of gravel road access to the material source at ASRC and/or Kuparuk. Ice roads will be built only after the ground surface is frozen sufficiently to support the weight of heavy equipment without damaging the underlying tundra. The ice roads will be constructed of at least 6 inches of ice/compacted snow prior to use to protect the underlying vegetation and terrain. Ice roads will be routed to avoid shrub areas and large areas of tussock tundra to the extent practicable.

CPAI proposes the use of single-season ice pads to support Project construction and avoid the need for permanent fill to support temporary activities. These include use of ice pads to stage construction equipment; to provide short-term stockpiling of gravel during construction activities; and to support construction activities at bridge crossings, along the pipeline alignment, and at other locations as needed near the proposed infrastructure. Like ice roads, ice

pads will be built to avoid shrub areas and large areas of tussock tundra to the extent practicable and to protect the underlying vegetation and terrain.

All required permits will be obtained for ice road/pad construction and operation.

Avoidance Summary

The total amount of avoided fill, in acres, is presented in Table 1.

Table 1. Acreage of Quantifiable Avoidance Measures

Measure	Acres Avoided[a]
Facility design including use of directional drilling	26
Use of 20-foot well spacing avoids additional gravel fill	7
Use of 2H:1V side slopes avoids additional gravel fill	14
Use of shared facilities (e.g., processing facility, power generation, camps, airstrip, tanks, warehouses, maintenance shops, drilling support infrastructure) reduces overall Project gravel footprint	58
Use of ice roads and pads for winter construction and staging including mine site access avoids the need for additional gravel roads and pads	230
Use of existing VSMs/HSMs to support new CD8 pipelines avoids needs for new VSMs	<0.1
Tie-in to existing in-field lines near CD4N (PO lines at CD4N) avoids fill for VSMs to transport material to/from CD1/ACF	<0.1
Suspend fiber-optic and power cables via messenger cable attached to HSMs to avoid additional fill associated with utility poles, reduce the potential for bird strikes, and avoid providing perches for predators.	<0.1
Total avoidance	**334**

a Values are approximate and subject to change.
Notes: ACF: Alpine Central Facility; CD1: Colville Delta 1; CD4: Colville Delta 4; CD8: Colville Delta 8; CD4N: Colville Delta 4 North; cy: cubic yards; H: horizontal; HSM: horizontal support member; V: vertical; VSM: vertical support member.

2. Minimization of unavoidable impacts to WOTUS, including wetlands:

Please describe how your project design incorporates measures that minimize the unavoidable impacts to waters of the U.S., including wetlands, by limiting fill discharges to the minimum amount/size necessary to achieve the project purpose.

Road Alignment Optimization

CPAI selected the proposed road route to minimize the overall gravel fill footprint and avoid impacts to natural hydrology patterns. Throughout project development, CPAI has evaluated several potential road alignments. Screening was conducted based on several factors including road mileage and acreage in WOTUS; a preference to avoid higher-value wetlands including

preferred habitats for threatened and endangered species; hydrology studies including minimization of the number of waterbody crossings and potential waterbody crossing impacts; erosion considerations; wildlife, avian, fish and cultural resource studies; pipeline crossings, and tie-in with the Alpine/WNS Multiyear Ice Road. CPAI's proposed alignment minimizes wetland impacts, and hydrology and erosion considerations while balancing other environmental tradeoffs. Specific minimization criteria included:

- Maintaining a 500-foot setback from fish-bearing waterbodies to the extent practicable except where routing around setbacks would substantially increase the road footprint
- Minimizing road length in swale and relic channel features and in areas of higher potential for flooding, erosion, and scour based on the hydraulic design criteria (including the Nigliq and Sakoonang channels) to minimize need for larger road embankments and additional erosion protection
- Minimizing impacts in wetlands and ponds that are permanently inundated (H class water regime) to the extent practicable
- Minimize the number of existing pipeline crossings, which require a larger fill footprint due to the grade change and embankment height needed to reach the pipeline "bridge" elevation

The selected route provides the shortest road alignment, minimizes bridge length, locates the bridge in an area of lower erosion potential, and minimizes road footprint through optimized use of topography to locate the road on generally higher, drier ground.

Pipeline Routing and Design

Pipelines will be designed to minimize redundant parallel pipelines to the extent practicable as described in Use of Existing Infrastructure, above. These measures minimize the number of parallel pipe racks and VSMs needed throughout the field and minimize the number of pipelines on each pipe rack.

New pipeline VSMs for sections parallel to existing pipelines will be aligned to match existing VSMs where possible. While the road and pipeline routes are constrained by existing infrastructure and topography, where possible, roads will be spaced from pipelines to minimize caribou disturbance, prevent excessive snow accumulation from snowdrifts, and facilitate snow removal. The pipeline will be elevated a minimum of 7 feet above the ground to ensure free caribou movement. CPAI assessed one pipeline that was constructed in accordance with the 7-foot minimum height requirement and found that as-built heights ranged from 7 feet to 18 feet, minimizing impacts to caribou movement and allowing for easier travel by humans and other wildlife.

Equipment

The Project has been designed to reduce impacts from equipment by using machinery and techniques to minimize wetland impacts and to use ice roads to avoid impact of machinery on the tundra. The construction of the Project will conform to standard North Slope project industry practices and will be subject to numerous other permitting and regulatory requirements including, but not limited to, oil spill prevention and contingency plans and appropriate tundra travel restrictions. Specialized equipment will be used to construct and maintain ice roads so that construction can occur during the winter months to avoid associated impacts. CPAI will use approved tundra travel vehicles during winter to support construction and operations activities when access is required off-pad. Off-road vehicle operators will be trained to avoid tight turns on frozen tundra, minimizing the risk of tearing or otherwise disturbing tundra.

Thermal Protection

Gravel roads and pads will have a minimum thickness of 5 feet. This thickness will maintain a stable thermal regime by insulating the underlying tundra and offsetting the loss of insulating effect caused by compression of the vegetated tundra below the gravel. CPAI will also elevate heated buildings or structures on pilings to the extent practicable to prevent or reduce heat transfer to underlying soils and preserve the thermal integrity of the permafrost. Finally, well conductor piles and passive cooling devices (thermosyphons) will be installed around wells to remove unavoidable heat transfer from wellbore fluids.

Erosion Control

CPAI will include CD8 in the existing Alpine Facilities Erosion Control Plan (Erosion Control Plan). The Erosion Control Plan details the ways in which CPAI will prevent and mitigate erosion that could impact terrestrial and aquatic environments. The plan includes CPAI's operations, monitoring, and maintenance procedures that detail the actions CPAI will undertake to monitor; maintain; and, if needed, remediate gravel fill impacting the surrounding tundra and wetlands.

The Erosion Control Plan discusses snow removal and gravel deposition removal. This includes the use of snow-blowing equipment to minimize gravel carryover to the tundra and the placement of cleared snow in designated areas. CPAI selects snow push areas annually, based on avoiding areas of thermokarst, proximity to waterbodies, and evaluating areas used during the previous year.

During breakup or periods of heavy precipitation, excess water may threaten the integrity of existing roads and pads, increase the risk of gravel washouts, and impede safe operations. CPAI has designed Project facilities using robust hydrological design criteria based on best available data (see above) including the use of riprap where warranted to avoid the likelihood of gravel erosion and washouts. Temporary sumps and diversion structures may also be constructed to

collect stormwater on the pad. The stormwater will be inspected for petroleum sheen prior to discharge to the tundra, and CPAI will implement the following procedures:

- If petroleum sheen or other contaminants are observed, the water will not be discharged to the tundra, but instead will be evaluated for hydrocarbon recovery, beneficial reuse, or underground injection.
- If discharged to the tundra, a filter sock or other adequate filtration/settling device will be used to collect fines and prevent sedimentation onto the tundra or into streams.
- Dispersing boards may be placed at the discharge end of the hose to ensure that the tundra and vegetation are not damaged during the discharge.
- The discharge point will be inspected regularly and moved if needed to prevent erosion.
- Pump(s) will be placed within a drip pan to catch any oil/fuel leaks.
- Temporary sumps, well points, or similar devices will be installed when needed to collect stormwater runoff on the pad.

The Erosion Control Plan also contains dust control measures. During Project construction and operation, gravel roads will be watered to minimize dust and maintain integrity of the roads. CPAI will also implement the following related procedures:

- Conduct annual training for dust control regarding permit stipulations, application procedures and techniques, identification of dust control areas, and location of permitted water sources.
- Reduce dust control activities when precipitation (e.g., rain, snow, frost, dew, fog) provides adequate coverage.
- Apply the proper amount of water at appropriate rates to avoid the creation of localized erosion due to surface water runoff.
- Collect water for dust control activities from permitted raw water sources.
- Apply proper dust control at a frequency appropriate to individual facilities.

Wastewater Disposal

CPAI will minimize surface discharge of wastewater through use of existing disposal wells, including zero discharge of produced water and drilling wastes to prevent soil surface erosion, changes in drainage patterns, and thermokarst erosion. Produced water will be re-injected into the reservoir and will not be discharged to surface lands, surface waters, or marine waters.

Spill Prevention and Response

The Project has been designed to mitigate spills with spill prevention measures and spill response capabilities as described in detail in the CD8 Project Description. Dedicated emergency response resources available at WNS facilities to serve the Project include spill response personnel, facilities, and equipment; the proposed gravel road connecting CD4 and ACF/CD1 will provide consistent year-round access to these resources in the event of a spill or other emergency event. CPAI will follow the WNS ODPCP and Alpine SPCC Plan and will amend the plans to include CD8 as applicable based on state and federal regulatory requirements. Emergency response plans include a community communication plan to key individuals in Nuiqsut and North Slope Borough (NSB).

Proposed facilities are designed to minimize the potential for spills with spill prevention measures and spill response capabilities to mitigate the impacts of spills that occur. CPAI's design of production facilities includes provisions for secondary containment for oil and hazardous substances, as required by local, state, and federal regulatory requirements. If a spill occurs on a pad outside facilities, the fluid would remain on the pad, unless the spill is near the pad edge or exceeds the retention capacity of the gravel pad. Fuel transfers near pad edges will be limited to the extent practicable in order to mitigate this risk. Snow that contains spill residue, drill cuttings, or other contamination will be removed and hauled to a temporary storage area for contaminated material to await further treatment and disposal. Similarly, ice roads and pads constructed during winter are cleaned of spilled materials and potential remnants of spills or releases to avoid discharging to the wetlands or waterbodies.

CPAI designs and constructs pipelines to comply with applicable state, federal, and local regulations. The pipelines will be constructed of high-strength steel and will have wall thicknesses in compliance with design code requirements. Welds will be validated using non-destructive examination (i.e., radiography and/or ultrasonic) during pipeline construction to ensure their integrity, and the pipelines will be hydrostatically tested prior to operation. In addition, CPAI will implement its existing pipeline maintenance and inspection program and employee spill prevention training program to further reduce the likelihood of spills occurring. The production fluids and injection water pipelines will be capable of accommodating pigs for maintenance and inspection operations. CPAI will maintain a corrosion control program and an inspection program that includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared technology. The inspection programs are API Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.

CPAI will follow requirements for routine pipeline visual inspection in accordance with the WNS ODPCP and Alpine SPCC Plan. Consistent with these plans and as required by 40 CFR 112.9(d)(4)(ii), CPAI plans to conduct visual inspection of pipelines on a periodic and regular

schedule, weather and safety permitting. Visual inspection may be ground-based occurring from the gravel road or from the air by fixed wing aircraft. Aerial visual inspection can be aided by infrared technology as appropriate. Infrared technology, employed either aerially using aircraft or from the ground using handheld systems, is a leak detection method using the temperature "signature" that results when warm fluid leaks. Infrared technology can detect warm spots in low-light conditions or when other circumstances such as light fog or drifted snow limit visibility. Infrared technology also can identify trouble spots along the pipeline, such as damaged insulation, before a problem occurs.

In the event of a spill, CPAI will implement the ODPCP and SPCC Plan to minimize accidental oil spill impacts. As described by the WNS ODPCP, spill response equipment will be pre-staged at strategic locations to facilitate the rapid deployment of equipment by personnel. During summer, a seasonally pre-staged or pre-deployed containment boom will be placed at strategic locations using boats and/or helicopters to facilitate a rapid response. Use of this pre-staging concept will considerably reduce the effective response time and will expedite equipment deployment to contain and recover spilled oil to minimize the affected area. The threat to rivers and streams from a possible pipeline spill will be minimized by quickly intercepting, containing, and recovering spilled oil near the waterway-pipeline crossing points. Spill response actions could also include use of watercraft (airboats and/or jetboats) to access potentially affected areas. The access road will be used for access and staging for spill response. A state-registered Primary Response Action Contractor and U.S. Coast Guard classified Oil Spill Removal Organization will provide trained personnel to manage all stages of a spill response, from containment and recovery to cleanup.

CPAI provides regular training for its employees and contractors on the importance of preventing spills of oil or hazardous substances. CPAI provides new-employee orientation, annual environmental training seminars, and appropriate certification classes for specific issues, covering spill prevention. CPAI employees and contractors participate in frequent safety meetings, which address spill prevention, as appropriate. The CPAI Incident Management Team participates in regularly scheduled training programs and conducts spill response exercises in coordination with federal, state, and local agencies. Employees are encouraged to participate in the North Slope Spill Response Team (NSSRT). NSSRT members receive regularly scheduled spill response training to ensure immediate availability of skilled spill responders on the North Slope.

Subsistence

CPAI has met with and plans to expand its meetings with members of the local community on the proposed Project features, including roads and pipelines. This includes future engagements with the Kuukpikmiut Subsistence Oversight Panel (KSOP), Native Village of Nuiqsut, Kuukpik Corporation, City of Nuiqsut, and Nuiqsut public to mitigate potential impacts to subsistence activities.

Additional design measures and operational practices further minimize potential impacts to subsistence users. For example, new pipelines will be designed with a muted (non-shiny) coating to avoid bright flashes from sunlight. The design of pipelines and separation from gravel roads will further minimize impacts to caribou movement and potential effects on subsistence users.

CPAI anticipates use of the project road by hunters for subsistence activities. In recent years, use of industry roads by truck for caribou hunting has become increasingly common in Nuiqsut, particularly for individuals who previously had no access to alternative methods of transportation such as boats, ATVs, or snowmachines. CPAI has included a subsistence tundra access road turnout along the gravel access road. The turnout will be located according to community input and vegetation type and will allow local residents to access the area for subsistence use. Tundra access road turnouts will be designed taking into consideration community comments and lessons learned from Greater Mooses Tooth 1/Mooses Tooth 6 (GMT1/MT6) and Greater Mooses Tooth 2/Mooses Tooth 7 (GMT2/MT7).

During current operations at the Alpine development, CPAI has developed processes to consult with subsistence users regarding planned oil and gas activities through local subsistence representatives and ice road monitors to avoid interference with subsistence activities. These coordination and communication efforts assist in minimizing Alpine-related impacts on subsistence activities and are expected to continue for the Project. Additionally, CPAI will continue to provide cultural awareness training for all Project employees and contractors and to prohibit employees from participating in hunting and trapping activities while on "work status" to reduce the potential for increased competition for subsistence and recreational wildlife resources.

A detailed list of all avoidance and minimization measures to be employed is included as an attachment to this statement (Attachment D).

3. **Compensation for unavoidable impacts to waters of the U.S., including wetlands:**

Please describe your proposed compensatory mitigation to offset unavoidable impacts to waters of the U.S., or, alternatively, why compensatory mitigation is not appropriate or practicable for your project. Compensatory mitigation involves actions taken to offset unavoidable adverse impacts to waters of the U.S., including wetlands, streams and other aquatic resources (aquatic sites) authorized by Corps permits.

Applicable USACE regulations provide that "Mitigation is an important aspect of the review and balancing process on many Department of the Army permit applications." 33 CFR Section 320.4(r)(1). The District Engineer "must determine the compensatory mitigation to be required in a DA permit based on what is practicable and capable of compensating for the aquatic resources functions that will be lost as a result of the permitted activity." 40 CFR Section

230.93(a)(1). All compensatory mitigation "will be directly related to the impacts of the proposal, appropriate to the scope and degree of those impacts, and reasonably enforceable." 33 CFR Section 320.4(r)(2).

In the Alaska District, implementation of regulations governing compensatory mitigation is guided by a document called the "Compensatory Mitigation Considerations for the U.S. Army Corps of Engineers, Alaska District Regulatory" (CM Considerations; USACE 2025). The purpose of the CM Considerations is to provide "the Alaska District with the statutory support and rationale for determining when to require compensatory mitigation and what factors should be considered when reviewing plans for compensatory mitigation." The CM Considerations specifically provides considerations for determining whether project impacts should require compensatory mitigation and considerations for determining what approaches to compensatory mitigation are appropriate and practicable.

CPAI will work with USACE to determine if compensatory mitigation is appropriate and practicable to offset permanent unavoidable wetlands impacts of the proposed Project. CPAI plans to involve local stakeholders in this process. CPAI will also work with USACE to inform assessment of wetlands consistent with accepted North Slope methodologies. Upon completion of these efforts, CPAI will submit a revised mitigation statement to supplement this application.

ATTACHMENT D

AVOIDANCE AND MINIMIZATION MEASURES TABLE

CD8 Development
Avoidance and Minimization Measures

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
Wetlands Impact Acres Avoided						
1	Avoidance	Project Description	Facility design including use of directional drilling.	Gravel infrastructure	26	Directional drilling allows for access to approximately three times the area of the reservoir from a given surface footprint.
2	Avoidance	Project Description	Use of 20-foot well spacing avoids additional gravel fill.	Gravel infrastructure	7	Gravel footprint not needed at all drillsite because of smaller wellhead spacing.
3	Avoidance	Project Description	Use of 2H:1V side slopes avoids additional gravel fill.	Gravel infrastructure	14	Six miles of road with average height 9.5 ft.
4	Avoidance	Project Description	Use of shared facilities (e.g., processing facility, power generation, camps, airstrip, tanks, warehouses, maintenance shops, drilling support infrastructure) to reduce the overall Project gravel footprint.	Construction, Drilling and Operations	58	Based on preliminary estimated footprint for airstrip and support pad, and roads.
5	Avoidance	Project Description	Use of ice roads and pads for winter construction and staging including mine site access to avoid the need for additional gravel roads and pads for construction.	Construction	230	Based on ice roads needed for gravel haul and pipeline construction and ice pads for mine site staging, bridge construction staging, drillsite and tie-in pad staging, and module mobilization staging.
6	Avoidance	Project Description	Use of existing VSMs/HSMs to support new CD8 pipelines avoids needs for new VSMs.	Pipelines	<0.1	Use of 5.5 miles of existing VSMs.
7	Avoidance	Project Description	Tie-in to existing in-field lines near CD4N (PO lines at CD4N) avoids fill for VSMs to transport material to/from CD1/ACF.	Pipelines	<0.1	Use of 3.2 miles of existing pipeline between CD4N and ACF.
8	Avoidance	Project Description	Suspend fiber-optic and power cables via messenger cable attached to HSMs to avoid additional fill associated with utility poles, reduce the potential for bird strikes, and avoid providing perches for predators.	Pipelines	<0.1	Use of VSMs/HSMs to support 10.8 miles of cables.
Total Avoidance					**334**	
Wetlands and Hydrology Impact Minimization						
9	Avoidance	ADNR North Slope Mitigation Measures	Avoid placement of drillsite within one-half mile of the banks of the Colville River.	Facilities		
10	Avoidance	CPAI Best Practices	The bridged lake crossing was located at a narrow lake section, where practicable, to avoid placement of gravel fill and minimize the number of piers/pilings below the OHW mark of the waterbodies crossed.	Gravel infrastructure		
11	Avoidance	CPAI Best Practices	Stockpiling gravel in WOTUS will be avoided.	Gravel infrastructure		
12	Avoidance	CPAI Best Practices	New pipeline VSMs will be installed from ice roads and ice pads. VSM drill cuttings will be temporarily stored on ice and removed to the gravel mine site prior to spring breakup.	Construction		
13	Avoidance	CPAI Best Practices, Project Description	Cable trenches will be dug during winter, and trench materials will be temporarily sidecast onto plywood, plastic sheeting, or an ice pad to avoid discharge of fill in WOUS associated with sidecasting of trenched materials.	Construction		
14	Avoidance	Other Federal, State, or Local Requirements	CPAI will follow the existing Alpine Facilities Erosion Control Plan. The Plan describes ways in which it will prevent or mitigate erosion that could impact terrestrial and aquatic environments. The Plan includes CPAI's operations, monitoring, and maintenance procedures that detail the actions CPAI will undertake to monitor; maintain; and, if needed, remediate gravel fill impacting surrounding tundra and wetlands.	All		
15	Avoidance	CPAI Best Practices	CPAI will place cleared snow in designated snow-storage areas and will manage stormwater from all gravel pads to prevent contaminants from being released during spring break-up. CPAI selects snow push areas annually based on avoiding areas of thermokarsting, proximity to waterbodies, and evaluating areas used in the previous year.	Facilities		
16	Minimization	CPAI Best Practices	CPAI does not surface discharge any reserve pit fluids.	Waste		
17	Minimization	CPAI Best Practices	Roads are designed and will be constructed, maintained, and operated in ways to minimize environmental impacts and protect subsistence use areas and access. Gravel road alignments and pad layouts consider topography, maintenance of natural drainage patterns, and the effects of spring breakup and other potential flood events including placement of the pad on higher and more level ground to reduce gravel fill footprint and volume. Road and pad layout also avoid ponds, lakes, and streams to the extent practicable.	All		

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
18	Minimization	CPAI Best Practices	CPAI minimizes summer vehicle tundra access by restricting use to emergency response personnel or to permitted activities required by statute or regulation.	All		
19	Minimization	Other Federal, State, or Local Requirements	CPAI will conduct the removal of water and the collection of ice aggregate from lakes and other water sources consistent with ADNR and ADF&G permits and authorizations.	Water withdrawal		
20	Minimization	ADF&G Requirement	Ice road waterway crossings will occur at grounded ice portions of each channel crossed and will be slotted, breached, or weakened upon abandonment to facilitate breakup and to minimize potential adverse impacts to stream banks. Snow/ice used for ramps will be removed from the banks in a manner that does not disturb the natural stream bank.	Ice infrastructure		
21	Minimization	ADF&G Requirement	Rivers, streams, and lakes will be crossed with ice / snow bridges or ice / snow roads at areas where ice has grounded, when practicable.	Ice infrastructure		
22	Minimization	NSB Requirement	Snow ramps, snow/ice bridges or cribbing are used to cross frozen waterbodies to avoid cutting, eroding, or degrading their banks. All constructed ramps and bridges will be substantially free of debris.	Ice infrastructure		
23	Minimization	CPAI Best Practices	Produced water will be re-injected into the reservoir and will not be discharged to surface lands, surface waters, or marine waters.	Waste		
24	Minimization	CPAI Best Practices	CPAI has and will continue to use wetlands and habitat mapping to assess wetland and wildlife habitat types to inform the design, placement, and development of permanent (i.e., gravel) infrastructure. Gravel road alignments and pad layouts minimize impacts to important wetland types - wetlands with vegetation subclass 2 (EM2) indicating the presence of *Arctophila*, or permanently inundated or semi-permanently inundated wetlands (H and F class water regimes) - to the extent practicable.	All		
25	Minimization	CPAI Best Practices, ADNR North Slope Mitigation Measures	The gravel road and pipeline will be placed perpendicular or near perpendicular to the general flow direction when crossing natural drainages to maintain the existing flow patterns and characteristics.	Gravel infrastructure, Pipelines		
26	Minimization	Project Description	CPAI will design and construct waterbody and swale crossings to ensure the free passage of fish, to minimize erosion, to maintain natural drainage characteristics, and to maintain impacts to natural stream flow. Bridges will be used to cross larger waterbodies.	Gravel infrastructure		
27	Minimization	Other Federal, State, or Local Requirements	All culverts will be designed in consultation with ADF&G.	Gravel infrastructure		
28	Minimization	Project Description	Culverts will be installed as needed to maintain natural surface drainage to mitigate the risk of sheet flow interruption and thermokarsting. The estimated spacing of culverts is every 1,000 feet. However, CPAI (or its contractor) will walk road alignments prior to construction to optimize final culvert locations, noting low areas where culverts are needed, and will review the data with regulatory agencies for concurrence. The culverts will be installed per the final design prior to breakup of the first construction season, and additional culverts may be placed after breakup as site-specific needs are further assessed with regulatory agencies.	Construction		
29	Minimization	CPAI Best Practices	Bridge abutments will be constructed from sheet pile to reduce the overall gravel footprint and protect the structures from embankment erosion and stream scour.	Construction		
30	Minimization	CPAI Best Practices	CPAI will minimize heat transfer and impacts to permafrost from Project infrastructure on gravel pads by filling the gap between well conductors and inner pipes with polyurethane foam; using passive cooling devices (thermosyphons) adjacent to well rows and at-grade structures; and installing insulation below the foundation floors of heated, at-grade structures.	Construction and operations		
31	Minimization	CPAI Best Practices	Heated buildings or structures will be elevated using pilings, to the extent practicable, to prevent or reduce heat transfer to underlying soils and preserve the thermal integrity of the permafrost.	Facilities		
32	Minimization	CPAI Best Practices	CPAI implements snow removal management measures to reduce the potential for gravel to be pushed off roads and pads during snow removal operations.	Construction		
33	Minimization	Other Federal, State, or Local Requirements	CPAI implements dust control measures for gravel roads and pads to reduce fugitive dust that can settle on vegetation or snow, which could increase thermal conductivity (i.e., reduce albedo), lead to thermokarsting, and promote earlier spring thaw in affected areas.	Gravel infrastructure		
34	Minimization	Other Federal, State, or Local Requirements	CPAI adheres to strict guidelines for travel on ice roads to avoid tundra damage, including ice road driver's training, establishing speed and weight limits, and installing delineators along both sides of the road.	Tundra travel		

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
35	Minimization	Project Description	Ice roads will be constructed to a minimum thickness of 6 inches to avoid or otherwise minimize impacts to wetlands and tundra.	Ice infrastructure		
36	Minimization	Project Description	Gravel roads and pads will be a minimum of 5 feet thick to maintain a stable thermal regime by insulating the underlying tundra and offsetting the loss of insulating effect caused by the compression of the vegetated tundra beneath the gravel.	Gravel infrastructure		
37	Minimization	Project Description	Ice roads will be routed to avoid shrub areas, including willows, and large areas of tussock tundra to the extent practicable.	Ice infrastructure		
38	Minimization	Project Description	Pipelines will be constructed above ground, to the extent practicable, to minimize permafrost impacts.	Pipelines		
39	Minimization	Project Description, Other Federal, State, or Local Requirements	Gravel road, pad, pipelines, bridge, and culvert design follows robust hydrological design criteria based on best available data while minimizing overall footprint to the extent practicable. The hydraulic model used accounted for both open water conditions as well as the hydraulic influence of ice jam scenarios, commonly observed in the CRD. See Project Description for hydrological design criteria.	Bridges		
Minimization of Wildlife Impacts						
40	Minimization	USACE Public Interest Review	CPAI will continue to maintain and implement existing bear-interaction plans to minimize conflicts between bears and humans. These plans will be reviewed, and expanded if needed, to cover the Project.	All		
41	Minimization	CPAI Best Practices, USACE Public Interest Review, ADNR North Slope Mitigation Measures	Pipeline design and construction will minimize disruption of caribou movement by maintaining a minimum clearance of 7 feet between the bottom of pipelines and the ground surface, except where the pipeline meets gravel pads and at road crossings.	Pipelines		
42	Minimization	CPAI Best Practices	Facilities will be designed to minimize nesting, denning, or sheltering opportunities for ravens, raptors, and foxes. Intentional wildlife feeding and/or baiting will be prohibited.	All		
43	Minimization	USACE Public Interest Review	CPAI will develop and implement a Project lighting plan that will include measures to minimize the amount of light visible from outside of facilities, including directing artificial exterior lighting inward and downward or be fitted with shields to reduce reflectivity in clouds and fog conditions during all months of the year, which will prevent waterfowl (including species listed under the ESA) from striking facilities during low-light conditions.	Facilities		
44	Minimization	CPAI Best Practices	To minimize the take of species, particularly those listed under the ESA, CPAI will work with resource agencies to ensure that facilities minimize impacts to species, ensure that off-pad utility lines are either buried or suspended from pipe racks to the extent feasible, locate towers on pads near existing buildings to the extent feasible, minimize the use of support wires for towers. If guy wires are used, they will be marked and/or bird deflectors will be installed to prevent collisions.	All		
45	Minimization	CPAI Best Practices	CPAI provides ESA species training and ESA species identification cards for all workers conducting off-pad activities during the summer season.)	All		
46	Minimization	Project Description	Minimize the electrocution hazard for raptors by suspending electrical distribution lines from pipe racks or burying cables (versus the use of overhead power lines) off pad.	All		
47	Minimization	Project Description	Maintain space between roads and pipelines where practicable to minimize caribou disturbance and prevent excessive snow accumulation from snowdrifts and snow removal.	Pipelines		
48	Minimization	Project Description	Pipe racks installed adjacent and parallel to existing pipeline racks will be aligned to match existing VSMs where possible, to reduce obstructions to caribou and subsistence user movements.	Pipelines		
49	Minimization	Project Description	Pipelines will be designed with a muted (i.e., non-reflective) coating to avoid glare.	Pipelines		
50	Minimization	CPAI Best Practices	CPAI implements policies, procedures, and training to prevent wildlife attraction to Project facilities, including use of animal-proof dumpsters for food waste collection, a strict policy prohibiting the feeding or baiting of wildlife, and use of sealing bags or other sealed containers for meals-on-the-go to conceal food odors.	All		
51	Minimization	CPAI Best Practices	CPAI will continue to implement its Wildlife Avoidance and Interaction Plan which includes procedures to eliminate, minimize, and mitigate bear interactions. CPAI has training in place on waste management practices and has project-specific training on waste and attractant management for any new project to provide guidance to employees and contractors for managing predator attractants.	Waste		

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
52	Minimization	ADNR North Slope Mitigation Measures	Water intake structures in fish bearing or non-fish bearing waters will be designed, operated, and maintained to prevent fish entrapment, entrainment, or injury. All water withdrawal equipment will be equipped and use fish screening devices approved by ADF&G.	Water withdrawal		
53	Minimization	ADNR North Slope Mitigation Measures	CPAI designs facilities and organizes the layout of buildings and work areas to minimize potential interactions between humans and bears.	Facilities		
54	Minimization	ADNR North Slope Mitigation Measures, USACE Public Interest Review	CPAI will protect grizzly and polar bear denning sites by avoiding cross-country use of vehicles, equipment, oil and gas activity within 0.5 mile of occupied grizzly bear dens and within 1.0 mile of known or observed polar bear dens. Where necessary, CPAI will conduct surveys in known or suspected polar bear denning habitat during the denning season and observe exclusion zones around known polar bear dens in consultation with the USFWS.	All		
Minimization of Cultural and Subsistence Impacts						
55	Minimization	USACE Public Interest Review	CPAI conducts training for Project personnel to ensure personnel know and understand the environmental, social, and cultural regulatory requirements within the project area where they will be working. Moreover, training emphasizes protection of cultural and archaeological resources, wildlife awareness and interaction, avoiding conflicts with subsistence activities, health and safety measures, and Project mitigation commitments. This training is designed to ensure strict compliance with local and corporate drug and alcohol policies.	All		
56	Minimization	CPAI Best Practices, USACE Public Interest Review; ADNR North Slope Mitigation Measures	CPAI prohibits Project employees from hunting and trapping activities while employees are on active work status to avoid increased competition for subsistence and recreational wildlife resources.	All		
57	Minimization	USACE Public Interest Review	Project design and facilities placement has been informed by the results of cultural and paleontological resource surveys. The Project will avoid known cultural and paleontological resources during ground-disturbing activities, including the construction of ice roads.	All		
58	Minimization	USACE Public Interest Review	To protect subsistence resources, CPAI avoids disturbing caribou and strictly prohibits chasing wildlife with vehicles.	All		
59	Minimization	CPAI Best Practices, USACE Public Interest Review	CPAI will consult with affected subsistence communities, tribes, Alaska Native Corporations, and the NSB, as well as the KSOP to mitigate potential impacts to subsistence activities.	All		
60	Minimization	Project Description, USACE Public Interest Review	CPAI will consult with the KSOP, Native Village of Nuiqsut, City of Nuiqsut, and Kuukpik Corporation to ensure that Project activities do not adversely affect subsistence activities. CPAI has and will continue to hold frequent public community meetings in advance of future activities.	All		
61	Minimization	CPAI Best Practices, USACE Public Interest Review	CPAI will continue to work with KSOP to coordinate KSOP activities and continue to hire local subsistence representatives and ice road monitors to monitor activities.	All		
62	Minimization	Project Description, USACE Public Interest Review	Construction activities, including gravel and placement, and pipeline and facility construction, will occur primarily during the winter months, when subsistence activity levels are relatively low and disruptions can be minimized.	Construction		
63	Minimization	ADNR North Slope Mitigation Measures	Facilities shall be designed and operated to minimize sight, and sound impacts in areas of high residential, recreational, and subsistence use and important wildlife habitat.	Facilities, Pipelines		
64	Minimization	Project Description, USACE Public Interest Review	The gravel road may include a subsistence tundra access road turnout located according to community input. This turnout and access ramps will allow local residents to access tundra areas adjacent to roadways. The turnout and ramps will be designed taking into consideration lessons learned from GMT1 and GMT2.	Gravel infrastructure		
65	Minimization	Project Description, USACE Public Interest Review	CPAI has an internship program (Career Quest) to introduce Nuiqsut high school students to jobs and careers in the oil fields and in their community.	All		

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
66	Minimization	Project Description, USACE Public Interest Review	CPAI strives to hire qualified Nuiqsut, NSB, and Alaska residents for jobs in the oil fields.	All		
67	Minimization	Project Description, USACE Public Interest Review	CPAI will ensure that current communication protocols related to CPAI helicopter, fixed-wing aircraft, and vessel traffic are adequate to address community (Nuiqsut) concerns about traffic-related impacts to subsistence activities.	Air traffic		
68	Minimization	Project Description, USACE Public Interest Review	CPAI will allow residents of Nuiqsut reasonable use of roads to access subsistence areas throughout the life of the Project.	All		
69	Minimization	Project Description, USACE Public Interest Review	CPAI will continue its philanthropy program from local oil fields to provide grants and sponsorships and other benefits to residents of Nuiqsut.	All		
70	Minimization	NSB IHLC Guidance, USACE Public Interest Review	Protect cultural resource sites during Project activity by establishing a 500-foot avoidance buffer to the extent practicable (NSB Department of Planning and Community Services, Inupiat History, Language and Culture Division, Form 500).	All		
General Environmental Impact Minimization						
71	Minimization	ADNR North Slope Mitigation Measures	CPAI's oil and gas facilities, including pipelines, are designed using industry-accepted engineering codes and standards.	Facilities, Pipelines		
72	Minimization	USACE Public Interest Review	Air pollution will be minimized through air quality monitoring and modeling, as appropriate. An emissions inventory will be developed. Air monitoring reports are generally available to the NSB and local communities.	All		
73	Minimization	Project Description	CPAI will minimize air emissions from both Project Construction and Operations phases where practicable. Examples of potential solutions are the use of clean fuels such as ultra-low-sulfur diesel, equipment powered by electricity generated at ACF, low emissions-emitting equipment, like Tier 4 engines or similar emissions reduction technology, and closed-vent storage tank systems.	All		
74	Minimization	USACE Public Interest Review	CPAI will use ultra-low-sulfur diesel fuel (as defined by the Alaska Department of Environmental Conservation) in all diesel-fueled vehicles and engines.	Facilities		
75	Minimization	Project Description	During construction, prior to completion of the permanent power supply connection, portable generators fueled by ultra-low-sulfur diesel will provide temporary power at the drillsite. Portable diesel-fired generators will also be available to provide emergency backup power after completion of the permanent power supply connection.	Drilling		
76	Minimization	CPAI Best Practices	Vehicles and heavy equipment (i.e., rolling stock) used for oil and gas operations will be powered off when not in active use, to the extent practicable.	All		
77	Minimization	CPAI Best Practices	Vehicles will be equipped with block heaters. Idling practices are to shut off and plug in vehicles in temperatures of -30°F or above to conserve fuel and reduce emissions.	All		
78	Minimization	Other Federal, State, or Local Requirements	The Project will use a non-ozone-depleting solution for any required module fire protection.	Facilities		
79	Minimization	ADNR North Slope Mitigation Measures	Waste from operations will be reduced, reused, or recycled to the maximum extent practicable. Garbage and domestic combustibles will be incinerated whenever possible or disposed of at an approved site.	Waste		
80	Minimization	Project Description, ADNR North Slope Mitigation Measures	Drilling wastes (i.e., muds and cuttings) will be disposed of on-site through annular disposal (i.e., pumped down the well through the space between two casing strings), transported to an approved disposal well such as an ACF Class I disposal well, and/or reused as practical. Reserve pits will not be required or constructed.	Waste		

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
Spill Mitigation Measures						
81	Minimization	Other Federal, State, or Local Requirements	CPAI will follow the WNS ODPCP and Alpine SPCC Plan as applicable based on state and federal regulatory requirements to reduce impacts to human health and safety and to minimize potential effects to subsistence resources, including fish and wildlife. The plan will be amended to cover CD8 and will describe spill prevention measures and on-site cleanup materials for permanent fueling stations, use of proper storage containers and liner materials, proper container identification, and notice of reportable spills. Identification of drip pans (i.e., "duck ponds") will be addressed through Project operating procedures.	Spill prevention and response		
82	Minimization	Other Federal, State, or Local Requirements	Pipelines will be built and operated with the best available technology for detecting and preventing corrosion or mechanical defects to minimize impacts related to point source pollution from oil spills or leaks.	Pipelines		
83	Minimization	CPAI Best Practices	CPAI has an WNS Emergency Stakeholder Outreach Plan in place that outlines the communication and engagement process in the event of an incident in CPAI's operations	Spill Response		
84	Minimization	CPAI Best Practices	CPAI will continue to implement spill prevention programs designed to raise awareness around spill prevention and pass on lessons learned.	Spill prevention and response		
85	Minimization	CPAI Best Practices	CPAI will continue to implement its Fuel Transfer Standard Operating Procedure and will use secondary containment on regulated oil and hazardous materials storage tanks.	Spill prevention and response		
86	Minimization	CPAI Best Practices	CPAI will maintain a corrosion control program and an inspection program that includes ultrasonic inspection, radiographic inspection, coupon monitoring, metal loss detection pigs and geometry pigs (applicable to pig-capable pipelines), and infrared technology. The inspection programs are API Standard 570-based programs that focus inspection efforts on areas of greatest potential for spills.	Spill prevention and response		
87	Minimization	CPAI Best Practices, Other Federal, State, or Local Requirements	CPAI will continue to implement its operating practice to immediately and completely clean up all spills, recovering 100% of spilled material for recycling when possible.	Spill prevention and response		
88	Minimization	CPAI Best Practices	Pipeline fluids will be periodically treated, as appropriate to product types, with chemicals to limit corrosion potential.	Pipelines		
89	Minimization	CPAI Best Practices	Oil spill response equipment intended for use in winter conditions will be equipped and maintained for effective use in Arctic conditions. Equipment will be operated and maintained in a manner as to prevent the freezing or icing of the equipment.	Spill prevention and response		
90	Minimization	Project Description	Pipelines will undergo hydrostatic testing prior to operation.	Pipelines		
91	Minimization	Project Description	The Project will be supported by dedicated emergency response resources available at Alpine facilities to serve the CD8 Project including spill response personnel, facilities, and equipment. Gravel road access to the Willow Development will also provide additional response capabilities and minimize response time in the event of a spill or other unintended release or emergency.	Spill prevention and response		
92	Minimization	Project Description, Other Federal, State, or Local Requirements	Spill response equipment will be pre-staged at strategic locations within the Project area as outlined in the ODPCP and SPCC Plan for initial spill response. Staged equipment on site will facilitate rapid deployment of equipment by response personnel and may minimize or reduce the overall impacts associated with a spill or other accidental release.	Spill prevention and response		
93	Minimization	Project Description	CPAI will continue to participate in the Mutual Aid Agreement among North Slope operators to supply labor and equipment for immediate spill response. Spill response drills and exercises will ensure response readiness and awareness; these drills will be scheduled according to the National Preparedness and Response Exercise Program guidelines and typically involve production, drilling, or pipeline spill response scenarios.	Spill prevention and response		
94	Minimization	ADNR North Slope Mitigation Measures	CPAI will not, except as addressed and approved in the CRU plan of operations or a waiver request, refuel vehicles within the annual floodplain. Containers with an aggregate storage capacity of greater than 55 gallons that contain fuel or hazardous substances will not be stored within 100 feet of a waterbody, or within 1,500 feet of a current surface drinking water source. CPAI will ensure that secondary containment is provided for the storage of fuel or hazardous substances and sized as appropriate to container type and according to governing regulatory requirements.	Spill prevention and Response		
95	Minimization	CPAI Best Practices	Well cellars will be designed to contain drips and leaks.	Spill prevention and response		

No.	Measure Type	Measure Source	Measure	Project Component	Acreage Avoided/ Minimized	Notes
96	Minimization	ADNR North Slope Mitigation Measures	Pipelines and gravel pads will facilitate the containment and cleanup of spilled fluids.	Spill prevention and response		
97	Minimization	ADNR North Slope Mitigation Measures	During equipment storage or maintenance, the site must be protected from leaking or dripping fuel and hazardous substances by the placement of drip pans or other surface liners designed to catch and hold fluids under the equipment, or by creating an area for storage or maintenance using an impermeable liner or other suitable containment mechanism.	Spill prevention and response		
98	Minimization	Project Description	CPAI will contract with a state-registered Primary Response Action Contractor to assist with quick spill response impacts in the event of a spill.	Spill prevention and response		

ATTACHMENT E

WETLAND DELINEATION REPORT

WETLAND DELINEATION FOR PROPOSED ALTERNATIVE DEVELOPMENT OPTIONS WITHIN THE CD8 DEVELOPMENT PLAN AREA, COLVILLE RIVER DELTA, ALASKA, 2024

Prepared for

ConocoPhillips Alaska, Inc
P.O. Box 100360
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Prepared by

ABR, Inc.—Environmental Research & Services
1225 East International Airport Road, Suite 110
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28 January 2025

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ACRONYMS AND ABBREVIATIONS

µS/cm	microsiemens per centimeter
ABR	ABR, Inc.—Environmental Research & Services
CPAI	ConocoPhillips Alaska, Inc.
CWA	Clean Water Act
EC	electrical conductivity
EIS	Environmental Impact Statement
FAC	facultative species
FACU	facultative upland species
FACW	facultative wetland species
HGM	hydrogeomorphic
ITU	Integrated Terrain Unit
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
NPR-A	National Petroleum Reserve in Alaska
NWI	National Wetlands Inventory
OBL	obligate wetland species
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/Persistent Emergent Scrub (brackish)
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/Persistent Emergent Scrub
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
R1	Riverine Tidal
R1UBV	Riverine Tidal Permanently Flooded-Tidal Fresh Unconsolidated Bottom
R1USQ	Riverine Tidal Regularly Flooded-Tidal Fresh Unconsolidated Shore
RHA	Rivers and Harbors Act
TNW	Traditional Navigable Water
WOTUS	Waters of the United States

INTRODUCTION

In support of the ConocoPhillips Alaska, Inc. (CPAI) CD8 development, ABR, Inc.—Environmental Research & Services (ABR) was asked to conduct a desktop wetlands evaluation to develop wetland mapping for approximately 3,000 acres in the vicinity of the CD8 project, incorporating data from previous field surveys and Integrated Terrain Unit (ITU) mapping (Jorgenson et al. 1997 and Wells et al. 2020). The resulting map product and report will support avoidance and minimization planning in the project design phase, alternatives analysis in the National Environmental Policy Act (NEPA) process and permitting for discharge of fill into Waters of the U.S. (WOTUS) under Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA).

STUDY AREA

The entire fine-scale wetlands mapping study area for the proposed CD8 project encompasses approximately 3,000 acres which will allow for the comparison of multiple alternatives. The study area was designed to encompass preliminary project components known at the time of mapping, with a substantial buffer (generally 300 feet) to accommodate design changes and to allow for the analysis of indirect effects. The wetland mapping extends from the CD4 pad approximately 5 miles south-southeast, between the Niġliq Channel and the main channel of the Colville River (Figure 1).

The study area encompasses terrain typical of the Colville River Delta, including low-lying palustrine tundra surrounded by tidal rivers and streams, coastal barrens on tidal influenced river bars, and vegetated and unvegetated dunes. Daily tidal fluctuations are small in the Arctic but, combined with the prevalent winds during the ice-free summer months, tides and storm surge can cause some wetlands directly abutting tidal rivers to receive periodic inundation with brackish water, creating a brackish environment. The interaction of tidal riverine and freshwater palustrine permafrost wetlands results in numerous waterbodies in the study area ranging from permanently flooded deep waters to drained or partially drained features some with temporarily exposed lakebed surfaces. Sand dunes, created by a mix of aeolian and fluvial processes, are found in proximity to rivers which create a complex mixture of well-drained non-wetland terrain and depressional wetlands. Also present in Colville River Delta are areas of low-centered, high-relief polygonal ground where the polygon centers are often unvegetated and filled with deep (>5 feet) water which persists throughout most growing seasons.

The study area is centered at 70.269748, - 150.928445 (NAD83 projection), within Umiat Meridian, Township 10 North, Range 5 East, Sections 3–5 and 8–10; Township 11 North, Range

4 East, Sections 13 and 24–25; and Township 11 North, Range 5 East, Sections 18–20 and 28–33.

METHODS

DATA SOURCES

The following data sources were used to facilitate the wetland mapping efforts:

- High-resolution aerial ortho-imagery (0.75-foot resolution, acquired 1–2 July and 3 August 2022 by NV5).
- Elevation contour lines from NV5 (5-foot contour intervals).
- CD5 ITU mapping (Wells et al. 2020).
- Colville River Delta ITU mapping (Jorgenson et al. 1997).

WETLAND CLASSIFICATION AND MAPPING

The wetland classification and mapping for this study was a desktop effort and no site-specific field wetland data were collected, but rather the effort relied on current imagery and contours combined with past field and desktop studies in the area (Jorgenson et al. 1997 and Wells et al. 2020). Specific site characteristics including plant communities, vegetation structure, primary and secondary hydrology indicators, and hydric soil indicators are implied based on the relationships to similar photo-signatures. This wetland mapping effort is based on standard practices developed across several wetland delineations for nearby projects in the National Petroleum Reserve in Alaska (NPR-A), which have been reviewed and approved through the Section 404 permitting process (ABR 2016 and Ives et al. 2020). Data from the existing ITU mapping in the area are used to infer likely wetland types (National Wetland Inventory, NWI) based on the current Classification of Wetlands and Deepwater Habitats (FGDC 2013) and following the ITU-NWI crosswalking process as described in Wells et al. (2018).

The CD8 wetland mapping study area overlaps prior Colville River Delta (Jorgenson et al. 1997) and CD5 (Wells et al. 2020) ITU field surveys and mapping efforts (Figure 1). Wells et al. (2020) provides a detailed explanation of the ITU mapping process and the component geomorphic terrain units, surface forms, and vegetation classes that are mapped, and describes the process of crosswalking ITU codes to NWI codes to create a broad-scale wetlands map. For the CD8 study area, the ITU mapping line work was clipped from the broad-scale ITU maps (Jorgenson et al. 1997 and Wells et al. 2020). The ITU-NWI crosswalk used in previous wetland delineations (ABR 2016 and Ives et al. 2020) and for the Willow project (Wells et al. 2018) was expanded to include new ITU code combinations found in the CD8 study area and was used to assign preliminary NWI codes to each map polygon. The broad-scale mapping was then

reviewed and revised at a scale of 1:2,000 to reflect current conditions, and polygon attributes were updated to match overall photo-signature and ecotype relationships discerned from prior projects on the Arctic Coastal Plain.

NWI types were assigned following the classification system described in the Classification of Wetlands and Deepwater Habitats (FGDC 2013) and were mapped according to standardized techniques described in Dahl et al. (2020). In addition to NWI classes, hydrogeomorphic (HGM) classes (Brinson 1993, Smith et al. 1995) were assigned to fine-scale wetland map polygons, which may support future phases of this project where a wetland functional or conditional assessment may be needed.

Wetlands and waters identified in this mapping effort are presumed to meet the three parameters required to define a wetland: hydrophytic vegetation, hydric soils, and wetland hydrology. Those that are within the riverine and lacustrine systems, as well as any within the palustrine system that lack vegetation and have at least seasonal flooding, are considered waters; remaining areas are considered wetlands. This study does not assess whether wetlands or waters are considered WOTUS and subject to jurisdiction under Section 404 of the CWA and/or Section 10 of the RHA.

Specific wetland vegetation, hydric soil, and wetland hydrology indicators required to classify wetland types (Environmental Laboratory 1987, USACE 2007) were inferred from type descriptions in Jorgenson et al. (1997) and Wells et al. (2020). As presented below, these incorporate the typical species for a plant community, including the current wetland indicator status for vascular plants in the Arctic Coastal Plain subregion (USACE 2022). USACE (2022) assigns each individual vascular plant species a wetland indicator status denoting the probability that it occurs in a wetland. Obligate wetland species (OBL) almost always occur in wetlands (99% of the time) under natural conditions. Facultative wetland species (FACW) usually occur in wetlands (67–99% of the time) but are occasionally found in non-wetlands. Facultative (FAC) species are equally as likely to occur in wetlands (34–66% of the time) as non-wetlands. Facultative upland (FACU) species usually occur in non-wetlands (67–99% of the time) but are occasionally found in wetlands. Upland species rarely occur in wetlands (1% of the time) in the specified region.

Aerial ortho-imagery provided by CPAI (0.75-foot pixel resolution, acquired from 1–2 July and 3 August 2022) was used as the basis for the wetland classification and mapping. As described above, fine-scale wetland mapping was conducted at a scale of 1:2,000. A minimum map unit size of 0.1 acre was used for permanently to seasonally flooded-saturated wetlands (i.e., primarily waterbodies) and a minimum map unit size of 0.5 acre was used for saturated to seasonally flooded wetlands and non-wetlands. However, wetlands and waters along the

boundary of the study area that were below the minimum map unit size were retained when the wetland or water (including those portions outside the study area) met or exceeded the minimum map unit size.

WETLAND CLASSIFICATION AND MAPPING RESULTS AND DISCUSSION

WATERS

One riverine, two palustrine, and three lacustrine water types were identified in the study area covering a total of 574.7 acres (18.8% of the study area, Table 1).

Lentic waters are common in the study area and include Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom (L1UBH), Lacustrine Littoral Permanently Flooded Nonpersistent Emergent (L2EM2H), Lacustrine Littoral Seasonally Flooded Unconsolidated Shore (L2USC), Palustrine Permanently Flooded Unconsolidated Bottom (PUBH), and Palustrine Seasonally Flooded Unconsolidated Shore (PUSC). Combined, these lentic waters account for 546.1 acres or 17.8% of the study area (Table 1).

L1UBH is the most common water type within the study area, covering 431.3 acres (14.1% of the study area, Table 1). L1UBH includes both large lakes (>20 acres; e.g., Figure 2 Tile 7) and smaller waterbodies (<20 acres) identified as deep (≥5 feet deep) in the ITU mapping (Figure 2 Tile 9). Smaller waterbodies identified as shallow (<5 feet deep) in the ITU mapping are classified as PUBH. The smaller, shallow PUBH waters cover 75.2 acres (2.5% of the study area) and are found in low-lying depressions within dune complexes (e.g., eastern portion of Figure 2 Tile 5) and in areas of low-centered, high-relief polygonal tundra where thermokarst processes appear to be expanding the extent of permanently flooded waters (e.g., central and western portions of Figure 2 Tile 5).

L2EM2H and L2USC, covering 12.8 and 23.6 acres respectively (Table 1), occupy shallow littoral margins of lacustrine waters. L2EM2H is typically dominated by the aquatic grass *Arctophila fulva* (pendant grass, OBL) in permanently flooded shallow water (e.g., Figure 2 Tile 4). L2USC waters in the study area are barren to partially vegetated areas along the fringes of lakes and tapped lakes (e.g., Figure 2 Tile 3) and are assumed to flood seasonally. It is possible that flooding is dependent on storm surge effects and these areas would be better described as temporarily flooded (L2USA). PUSC waters, covering 3.2 acres (Table 1, Figure 2 Tile 3) differ from L2USC waters in that they are not immediately adjacent to an L1UBH water.

Lotic waters in the study area are mapped as Riverine Tidal (R1) because Jorgenson et al. (1997) described them as tidal rivers and with daily tidal fluctuations and correspondingly variable salinity. Mapped R1 waters are a combination of both Riverine Tidal Permanently

Flooded-Tidal Fresh Unconsolidated Bottom (R1UBV) and Riverine Tidal Regularly Flooded-Tidal Fresh Unconsolidated Shore (R1USQ) that, when combined as R1 waters, provide a reasonable estimate of ordinary high water for use in a U.S. Army Corps of Engineers CWA Section 404 permit application. R1 waters in the CD8 study area include the Niġliq (flows along the west boundary of the study area, Figure 2 Tiles 2 and 3) and Sakoonang (flows along the east boundary of the study area, Figure 2 Tiles 3–5) channels of the Colville River. Mid- and side-channel river bars that were not flooded at the time of image acquisition (July and early August 2022) are assumed to be flooded for extended periods during the growing season.

WETLANDS

Wetlands in the study area were categorized into 9 NWI types encompassing 2,423.9 acres (Table 1), which are described below based on ecotype, vegetation, and soils descriptions of similar photo-signatures in Jorgenson et al. (1997) and Wells et al. (2020).

Palustrine Semipermanently Flooded Persistent Emergent (PEM1F; 1,205.2 acres, 39.3% of the study area, Table 1) is the most common wetland type in the study area. PEM1F wetlands occur in drained lake basins (e.g., Figure 2 Tile 6) and active, inactive, and abandoned riparian zones (e.g., Figure 2 Tile 7). Vegetation classes described in Jorgenson et al. (1997) and Wells et al. (2020) that correspond to PEM1F wetlands are predominantly wet sedge types in low-centered polygonal tundra. Dominant plant species in these vegetation classes include the sedges *Carex aquatilis* (leafy tussock sedge, OBL) and *Eriophorum angustifolium* (tall cotton grass, OBL), with the possible inclusion of *C. rotundata* (pumpkin-fruit sedge, OBL), *C. saxatilis* (russet sedge, FACW), *C. membranacea* (fragile-seed sedge, FACW), *C. chordorrhiza* (rope-root sedge, OBL), and *E. russeolum* (russet-bristle cotton grass, FACW). The shrubs *Salix richardsonii* (Richardson's willow, FACW), *S. arctica* (arctic willow, FAC), and *S. pulchra* (diamond-leaf willow, FACW) may be present to abundant on drier polygon rims. PEM1F wetlands are typically flooded during early summer, and the water table is often near the surface or slightly above throughout the growing season. This satisfies the wetland hydrology parameter through the indicators Surface Water (A1), High Water Table (A2), and/or Saturation (A3) (USACE 2007). Soils are described as moderately thick (4–20 inches) surface organics over silt loam, suggesting that most PEM1F wetlands would satisfy the hydric soil parameter by meeting the requirements for Histosols/Histels (A1) and/or Histic Epipedon (A2) (USACE 2007).

Palustrine Permanently Flooded Nonpersistent Emergent (PEM2H; 3.0 acres, 0.1% of the study area, Table 1) wetlands occupy small, flooded depressions that are likely associated with thermokarst (Figure 2 Tile 1). PEM2H wetlands are found in areas with deeper and persistent water and are dominated by the grass *Arctophila fulva* (OBL). PEM2H is a permanently flooded

aquatic wetland type, satisfying the wetland hydrology parameter through the indicator Surface Water (A1). Soils are assumed to be hydric because of permanent flooding (USACE 2007).

Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub (PEM1/SS1B; 587.1 acres, 19.2% of the study area, Table 1) and Palustrine Continuously Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub (PEM1/SS1D, 191.1 acres or 6.2% of the study area) wetlands are moist sedge-shrub meadows located on abandoned riverine deposits and in recently drained lake basins. PEM1/SS1B wetlands are typically nonpatterned or with high-centered, low-relief polygons (e.g., Figure 2 Tile 2), while PEM1/SS1D wetlands have substantial thermokarst pits or high-relief polygons and associated surface water (e.g., Figure 2 Tile 3). PEM1/SS1B and PEM1/SS1D wetlands are floristically similar, typically dominated by the sedges *Carex aquatilis* (OBL), *C. bigelowii* (Bigelow's sedge, FAC), and *Eriophorum angustifolium* (OBL), and the shrubs *Dryas integrifolia* (white mountain avens, FACU), *Salix pulchra* (FACW), and *S. reticulata* (net-vein willow, FAC). PEM1/SS1D wetlands may have a higher cover of obligate sedges because of the preponderance of surface water associated with thermokarst pits and high-relief polygons. Soils are described as poorly drained and saturated at intermediate depths (>6 inches) with relatively thick (4–20 inches) surface organics over loam and a shallow depth to permafrost. These wetlands satisfy the wetland hydrology parameter through the indicators High Water Table (A2) and/or Saturation (A3) and are likely to satisfy the hydric soil parameter by meeting the requirements for Histosols/Histels (A1) and/or Histic Epipedon (A2) (USACE 2007).

Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/Persistent Emergent Scrub (brackish) (PSS1/EM1B3; 7.0 acres, 0.2% of the study area, Table 1) wetlands are in areas that are subject to annual flooding and sedimentation by tidal rivers (Figure 2 Tile 2). Consequently, PSS1/EM1B3 wetlands have high salinity levels. CD5 plot data for this community have electrical conductivity (EC) values ranging from 500 to 2,600 microsiemens per centimeter (µS/cm). For this reason, this type includes the mixosaline or brackish modifier (3). The dwarf willow *Salix ovalifolia* (arctic seashore willow, FAC) can form a dense mat, with the grasses *Dupontia fisheri* (Fisher's tundra grass, FACW) and *Deschampsia caespitosa* (tufted hair grass, FAC), the sedges *Carex aquatilis* (OBL) and *Eriophorum angustifolium* (OBL), and the herb *Pedicularis sudetica* (sudetic lousewort, no indicator) also present. The wetland hydrology parameter would presumably be satisfied through the indicators Sediment Deposits (B2) and/or Drift Deposits (B3), both of which indicate recent inundation. Soils are described as well drained to somewhat poorly drained and often show hydric characteristics. Although the color, abundance, and type of redoximorphic features were not recorded for CD5 soil profiles (Wells et al. 2020), review of individual soil profile descriptions and photographs for this community

suggest that soils likely meet the hydric soil indicator Alaska Redox (A14) or the problematic hydric soil indicator Alaska Redox with 2.5Y Hue. Patches of uplands that may not meet all required wetland indicators may be present within this wetland type, but these upland inclusions cannot be readily distinguished by photo-signature alone and so cannot be mapped without site-specific wetlands field data.

Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub (PSS1B; 335.7 acres, 11.0% of the study area, Table 1) occurs on abandoned flood deposits (e.g., western portion of Figure 2 Tile 8), along localized convexities such as steeper banks or bluffs (e.g., Figure 2 Tile 2), and in areas where dry sandy dunes are finely intermixed with mesic to wet inter-dunes in a wetland-upland complex (e.g., Figure 2 Tile 6; see discussion under Uplands, below). Vegetation is dominated by *Salix pulchra* (FACW) and *Carex bigelowii* (FAC), with *S. richardsonii* (FACW), *S. reticulata* (FAC), *Cassiope tetragona* (white arctic mountain heather, FACU), and *Arctagrostis latifolia* (broad-leaf arctic bent grass, FACW) also present. Soils are described as poorly drained with shallow thaw depths and variable organic-layer thickness. PSS1B wetlands in the study area are presumed to meet the wetland hydrology indicator Saturation (A3), and soils may meet the hydric soil indicators Histic Epipedon (A2), Alaska Redox (A14), or the problematic hydric soil indicator Alaska Redox with 2.5Y Hue. Patches of uplands may be present within this wetland type, but they cannot be readily distinguished by photo-signature alone and so cannot be mapped without site-specific wetlands field data.

Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/Persistent Emergent Scrub (PSS1/EM1E; 9.4 acres, 0.3% of the study area, Table 1) wetlands are similar to the PSS1B wetlands described above but are a slightly wetter community located in a low-lying thaw basin (Figure 2 Tile 9). This PSS1/EM1E wetland appears to be a relatively wet, low-lying sedge-shrub community likely dominated by *Salix richardsonii* (FACW) and sedges adapted to wetter conditions, such as *Carex aquatilis* (OBL) and *Eriophorum angustifolium* (OBL).

Palustrine Seasonally Flooded Persistent Emergent (PEM1C; 13.7 acres, 0.4% of the study area, Table 1) wetlands are located along the margins of lakes and tapped lakes (e.g., Figure 2 Tile 4). Neither Jorgenson et al. (1997) nor Wells et al. (2020) describe analogous communities, presumably because they were below the minimum map unit size for those projects or were undetectable at the mapping scale. These areas are assumed to seasonally flood and may be dominated by *Equisetum variegatum* (variegated scouring rush, FACW).

Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub (PSS1C; 71.7 acres, 2.3% of the study area, Table 1) occurs on active and inactive riverine deposits (e.g., Figure 2 Tile 2) where flooding and sedimentation are common, and along the margins of recently drained lakes (e.g., Figure 2 Tile 3). Regular flooding by tidal rivers is expected to affect salinity at

riverine PSS1C wetlands. Plot EC values recorded in associated ecotypes for the CD5 project ranged from fresh (<800 µS/cm) to mixosaline (800–45,000 µS/cm), with the majority of plots being fresh. In lieu of site-specific EC field data, PSS1C communities were mapped as freshwater wetlands. Vegetation in this type is dominated by *Salix richardsonii* (FACW), with abundant bare soil and *Astragalus alpinus* (alpine milk vetch, FAC), *Equisetum variegatum* (FACW), *Petasites frigidus* (arctic sweet colt's foot, FACW), and *Bistorta vivipara* (serpent grass, FAC) also present. The wetland hydrology parameter would presumably be satisfied through the indicators Sediment Deposits (B2) and/or Drift Deposits (B3), both of which indicate recent inundation. Soils are described as interbedded organics and silts, as expected in areas that regularly flood, and may meet the hydric soil indicators Alaska Redox (A14) or the problematic hydric soil indicator Alaska Redox with 2.5Y Hue. Patches of non-jurisdictional uplands may be present within this wetland type, but they cannot be readily distinguished by photo-signature alone and so cannot be mapped without site-specific wetlands field data.

HYDROGEOMORPHIC CLASSES

In general, wetlands that occur on inactive and abandoned riverine deposits were in the flats HGM class, wetlands within drained lake basins in the depressional HGM class, and lotic waters (R1) and active riparian communities directly affected by riverine waters on a seasonal basis (many PSS1C wetlands) were in the riverine HGM class. Lentic waters (L1UBH, PUBH) were in the depressional HGM class, and lacustrine littoral wetlands L2USC and L2EM2H in the lacustrine fringe HGM class. No slope or estuarine fringe HGM classes were identified in the study area.

UPLANDS

While non-wetlands (uplands) do occur on the Arctic Coastal Plain, they are relatively uncommon. Within the study area, uplands were mapped on a limited basis in areas that could be reliably interpreted from landscape position and vegetation type, and where field data from prior projects previously documented these photo-signatures as uplands. Uplands were not commonly mapped in the study area, accounting for 39.9 acres or 1.3% of the study area (Table 1). The mapping in this study may slightly underestimate the true extent of uplands within the study area because, as noted above, (1) small inclusions of uplands are known to occur in the shrub wetland types PSS1/EM1B3, PSS1B, and PSS1C; and (2) the distinct photo-signatures corresponding to upland types were sometimes below the minimum mapping size. Field plot data to support an upland classification would be required for any uplands occurring in dwarf shrub tundra occupying convex well-drained banks bordering lake basins and riverine corridors, low willow shrub communities, and in rare cases, areas of patterned moist sedge-shrub tundra. Active and

inactive dunes, because they could be reliably interpreted from landscape position and vegetation type, were mapped as uplands (e.g., Figure 2 Tile 8). These dunes are either partially vegetated or support low willow communities dominated by *Salix glauca* (gray-leaf willow, FAC), *Salix richardsonii* (FACW), *Astragalus alpinus* (FAC), and *Oxytropis borealis* (boreal locoweed, no indicator), with *Dryas integrifolia* (FACU), *Salix pulchra* (FACW), *Arctous ruber* (red torpedoberry, FAC), *Carex krausei* (Krause's sedge, no indicator), and *Poa arctica* (arctic blue grass, FAC) also present. The sandy soils in these dune areas did not meet any hydric soil indicators, and typically no wetland hydrology indicators were observed. Dunes were mapped as uplands when the dune itself met minimum map unit criteria and was not finely intermixed with (presumably) wetland interdunes. Areas where dunes and interdunes were too finely intermixed to map separately were coded as PSS1B wetlands and would require field work to reliably determine the proportion of uplands to wetlands in these complexes.

Upland fill in the study area was restricted to existing fill at the CD4 pad and access road (Figure 2 Tiles 1 and 2). Upland fill is not common and accounts for 24.5 acres or 0.8% of the study area (Table 1).

SUMMARY OF FINDINGS

PEM1F wetlands are the most abundant wetland type, covering nearly 40% of the study area. PEM1F wetlands are predominantly wet sedge types in low-centered polygonal tundra, located in drained lake basins and riverine features. PEM1/SS1B wetlands are the second most abundant wetland type. Covering nearly 20% of the study area, PEM1/SS1B wetlands are moist sedge-shrub meadows located on abandoned riverine deposits and in recently drained basins. The large and/or deep L1UBH waters are the third most abundant type, covering approximately 14% of the study area.

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Table 1. Areal extent (acres and percent of study area) of waters, wetlands, and uplands in the CD8 study area, Colville River Delta, Alaska, 2024.

NWI Code[a]	NWI Descriptions	Area (Acres)[b]	% of Study Area[b]
Waters			
R1	Riverine Tidal	28.7	0.9
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom	431.3	14.1
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent	12.8	0.4
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore	23.6	0.8
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom	75.2	2.5
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore	3.2	0.1
	Total Waters:	**574.7**	**18.8**
Wetlands			
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent	3.0	0.1
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent	1,205.2	39.3
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/Persistent Emergent Scrub	9.4	0.3
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub	191.1	6.2
PEM1C	Palustrine Seasonally Flooded Persistent Emergent	13.7	0.4
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub	71.7	2.3
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub	587.1	19.2
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/Persistent Emergent Scrub (brackish)	7.0	0.2
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub	335.7	11.0
	Total Wetlands	**2,423.9**	**79.1**
Uplands			
U	Upland	39.9	1.3
Us	Upland (fill)	24.5	0.8
	Total Uplands	**64.4**	**2.1**
	Grand Total	**3,063.0**	**100.0**

[a] National Wetland Inventory (NWI) code derived from FGDC (2013).
[b] Values were rounded to the nearest 0.1 acre.

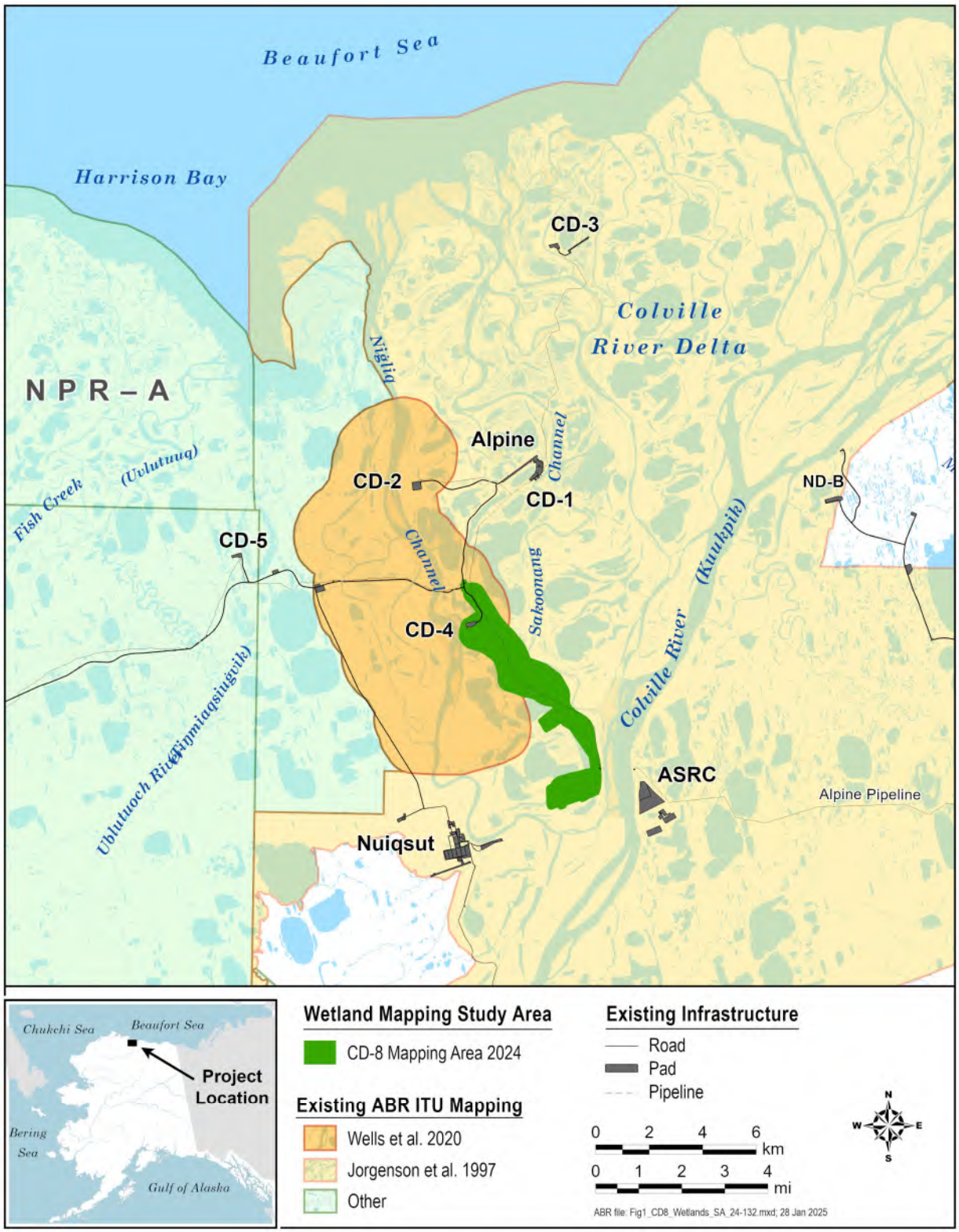
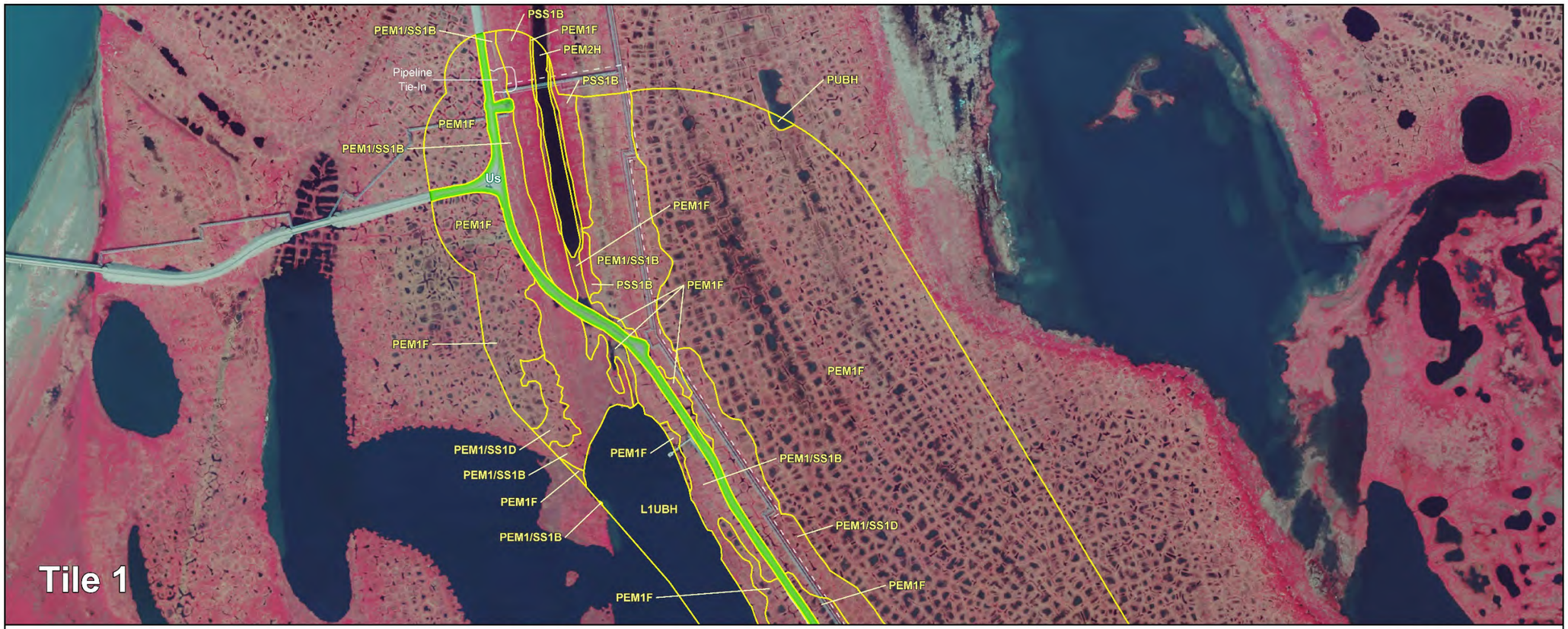


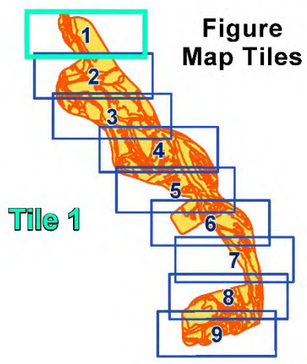
Figure 1. Location of the CD8 study area, Colville River Delta, Alaska, 2024.



NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



Mapping by ABR, Inc. Background imagery by NV5: Color Infrared (CIR) image mosaic from 1 July- 3 August 2022; 0.75 foot spatial resolution; Alaska State Plane Zone 4, NAD 1983, U.S. feet; Absolute map scale 1:7,750 applies when printed at 11"x17"

Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

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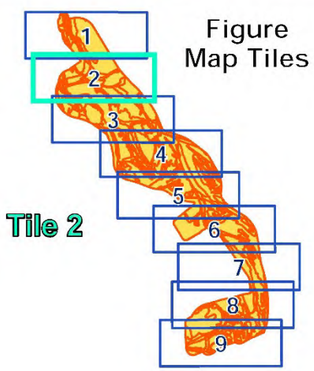
Figure 2. Tiles 1–9 Wetlands and waters within the CD8 study area, Colville River Delta, Alaska, 2024.

NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



Mapping by ABR, Inc. Background imagery by NV5: Color Infrared (CIR) image mosaic from 1 July- 3 August 2022; 0.75 foot spatial resolution; Alaska State Plane Zone 4, NAD 1983, U.S. feet; Absolute map scale 1:7,750 applies when printed at 11"x17"

Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

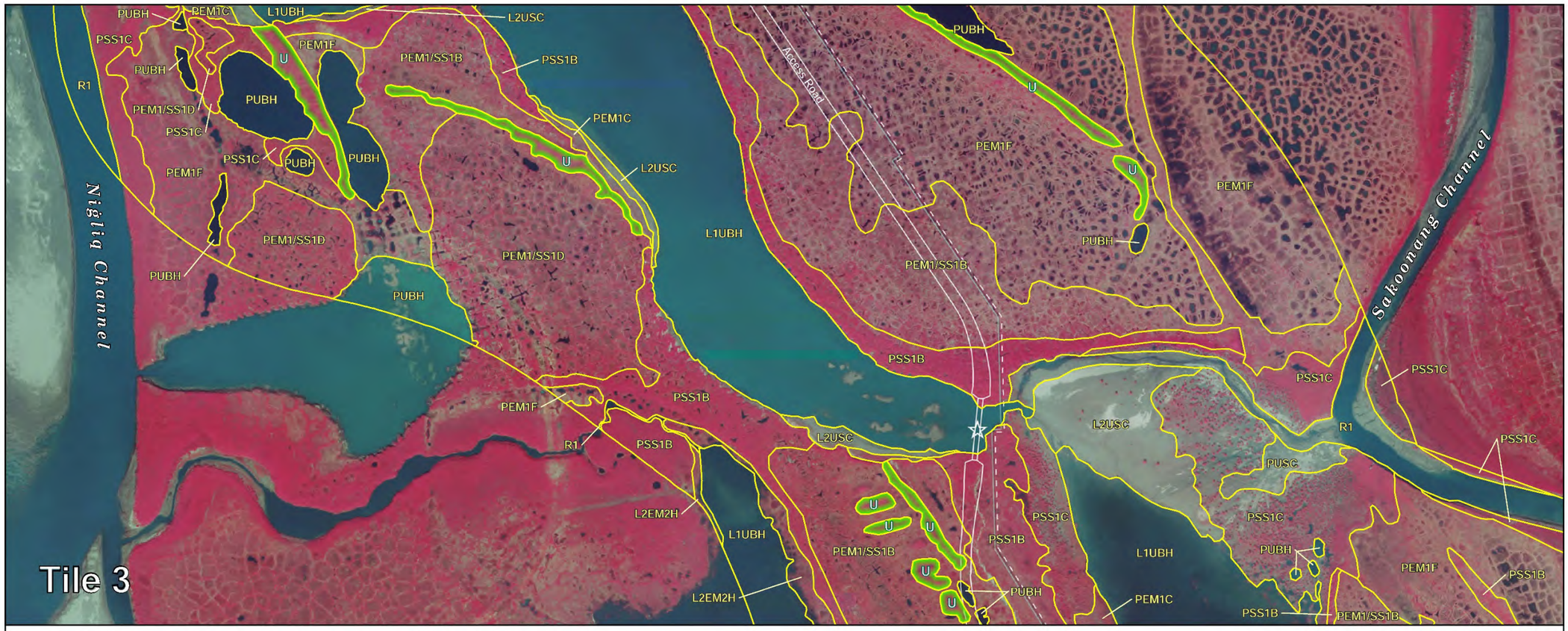
Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

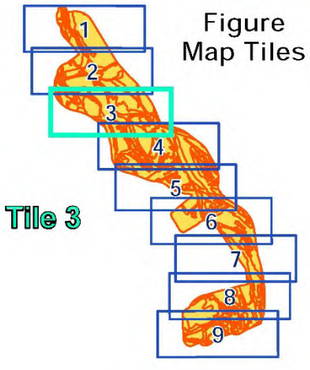
ABR Environmental Research & Services



NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



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Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

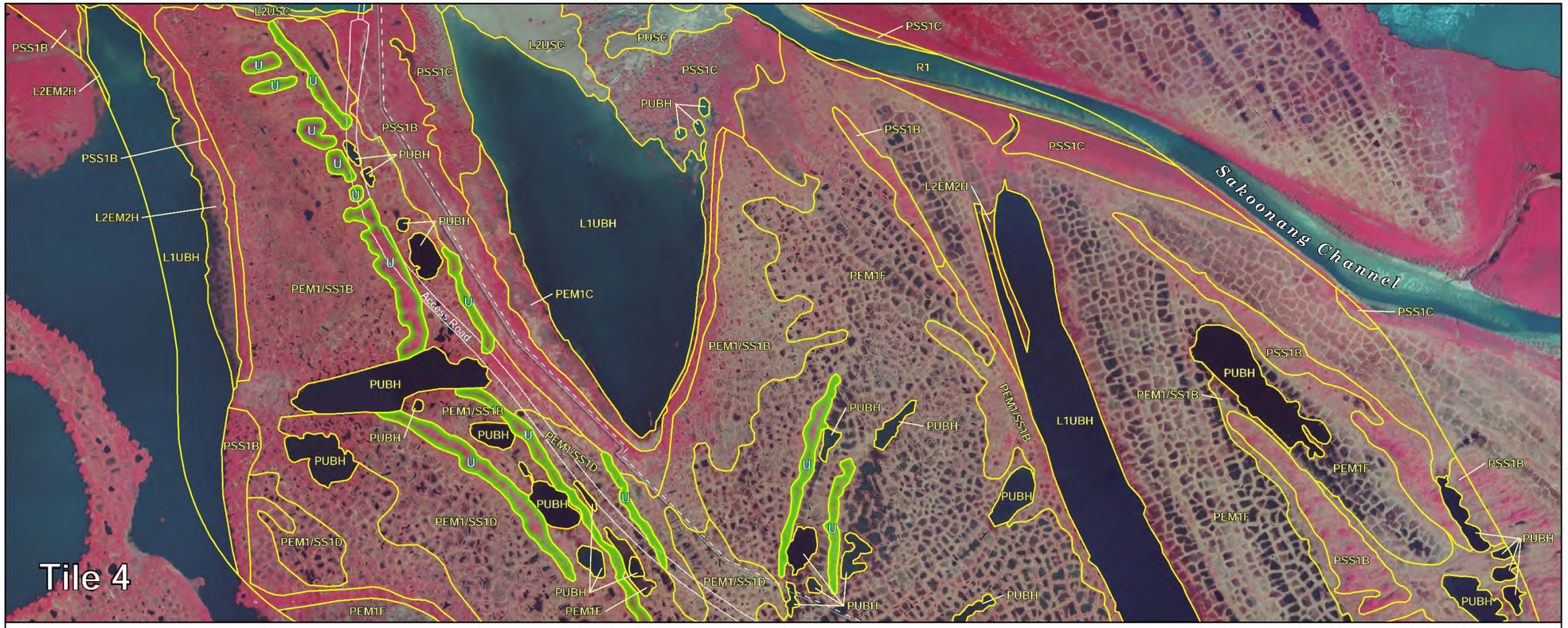
Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

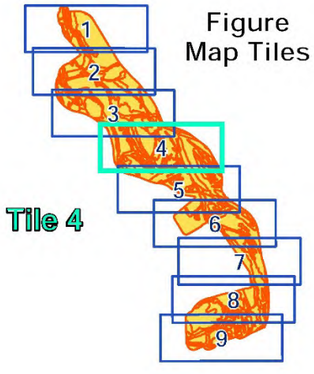
ABR Environmental Research & Services



NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



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Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

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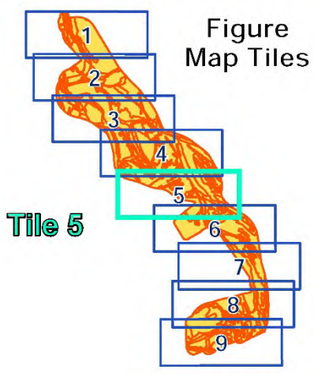
NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



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Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

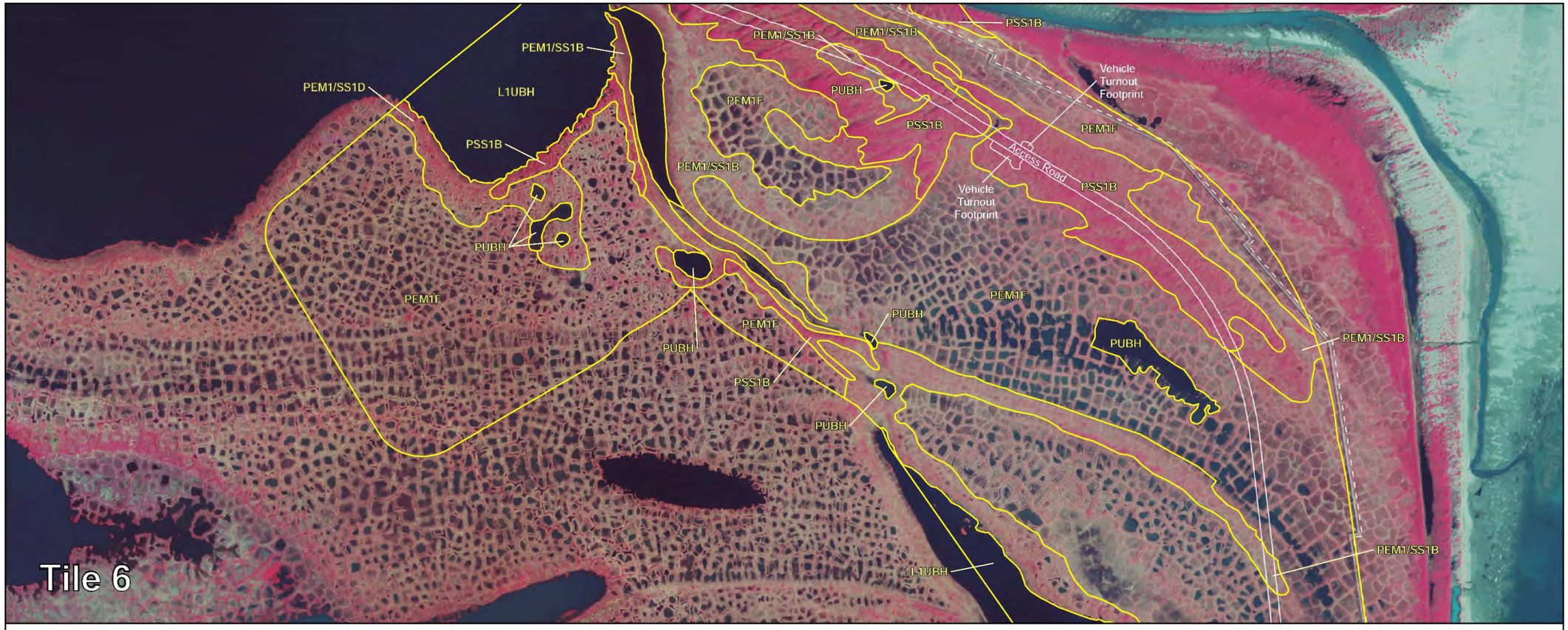
Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

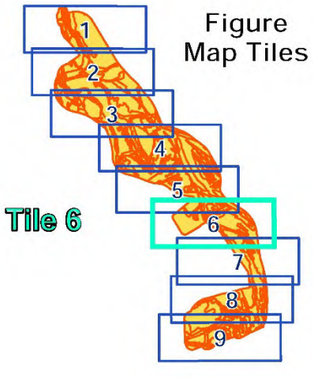
ABR Environmental Research & Services



NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



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Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

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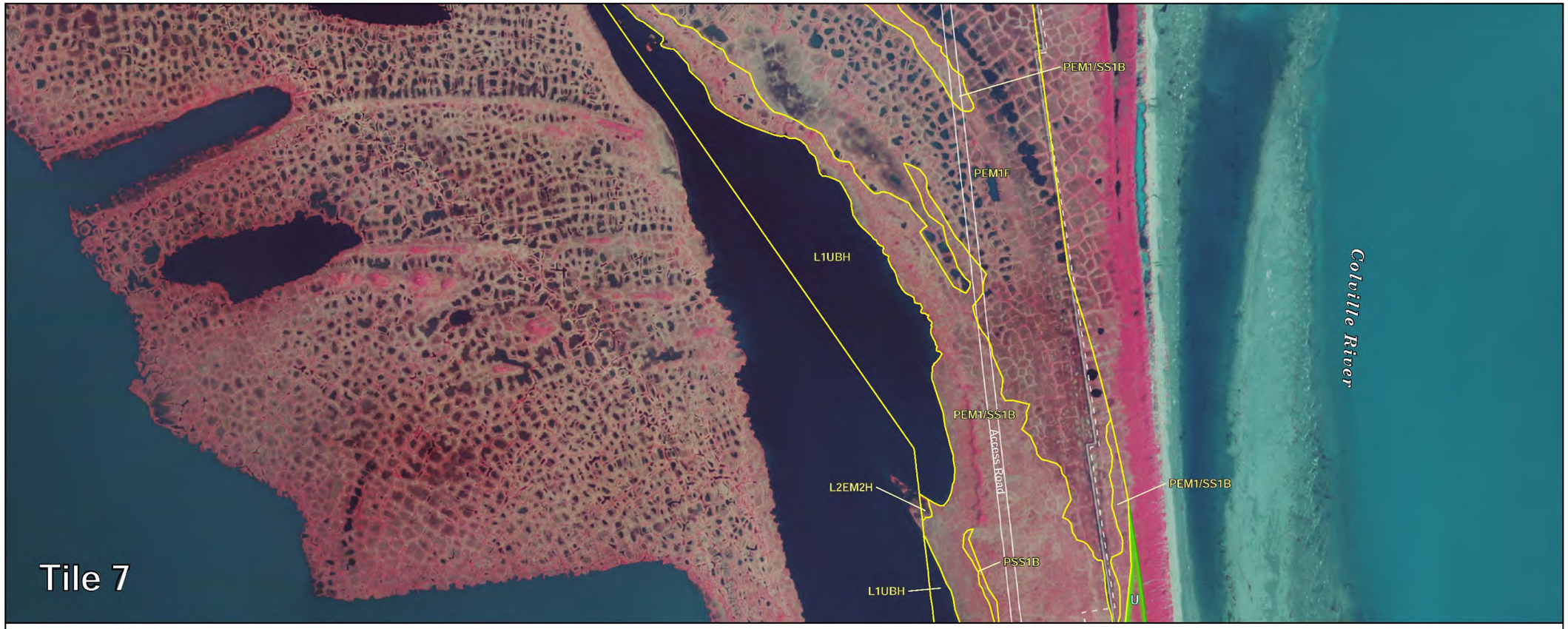
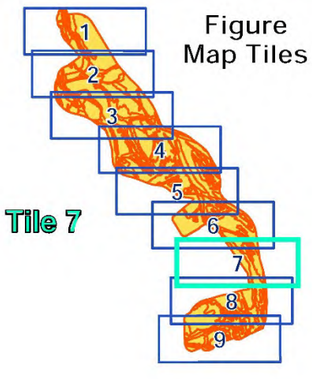


NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



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Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

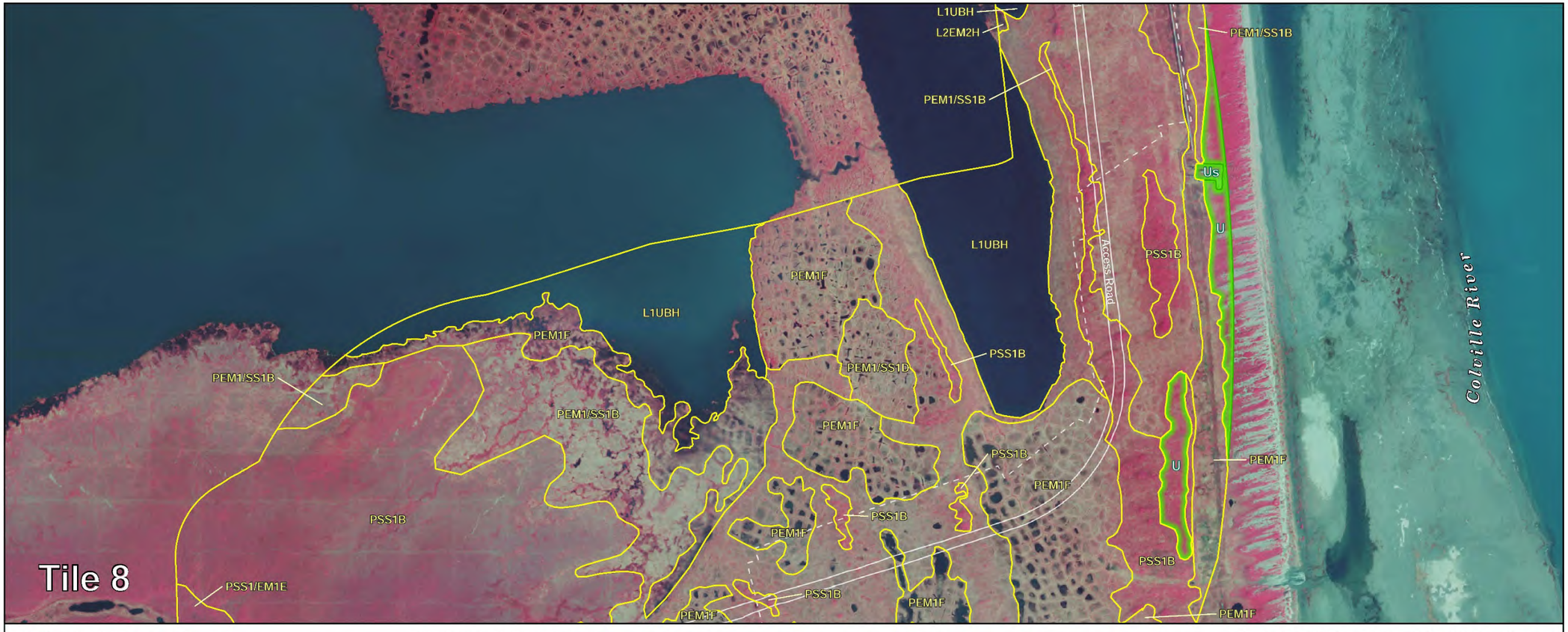
Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

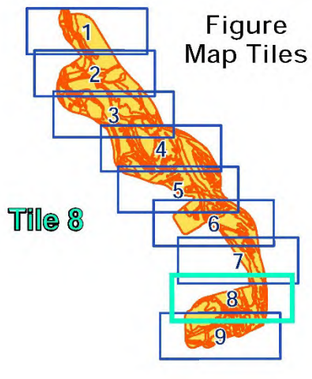
ABR Environmental Research & Services



NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



Mapping by ABR, Inc. Background imagery by NV5: Color Infrared (CIR) image mosaic from 1 July- 3 August 2022; 0.75 foot spatial resolution: Alaska State Plane Zone 4, NAD 1983, U.S. feet; Absolute map scale 1:7,750 applies when printed at 11"x17"

Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

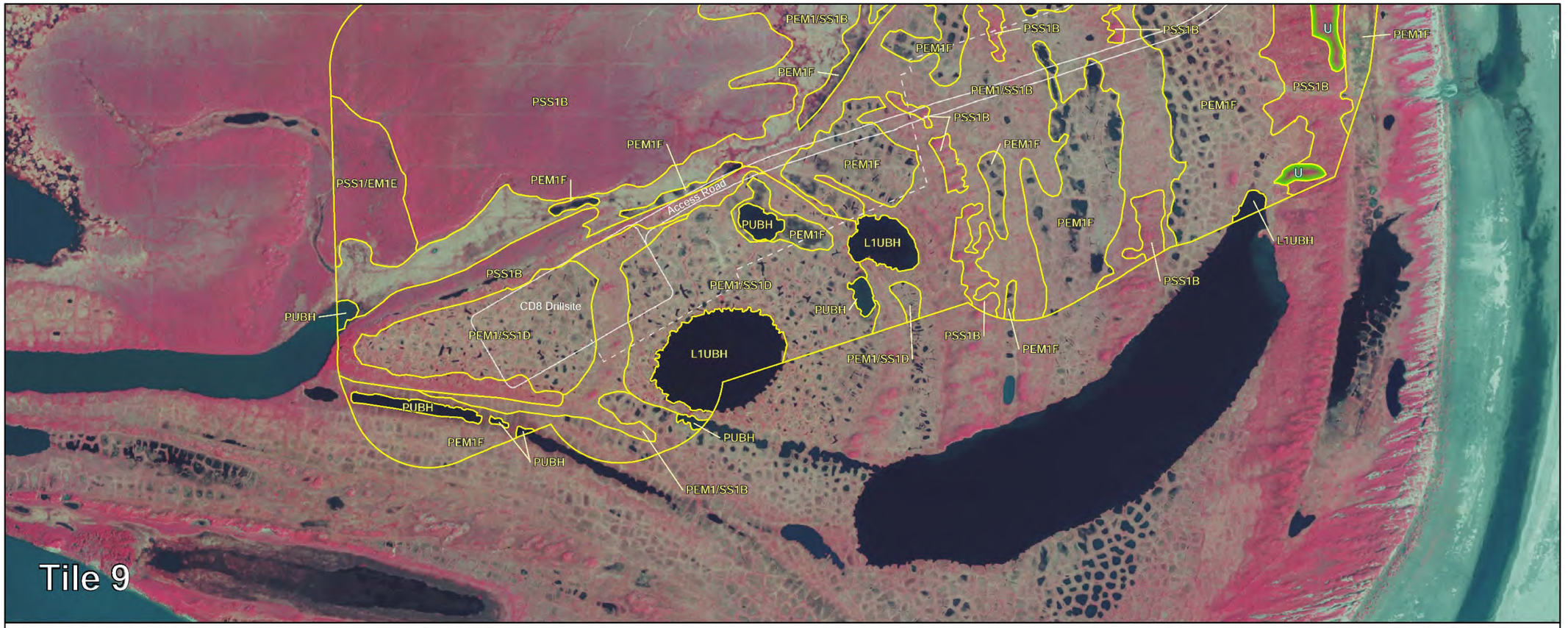
Pipeline

Bridge Crossing

0 250 500 750 1,000 Feet

0 100 200 300 Meters

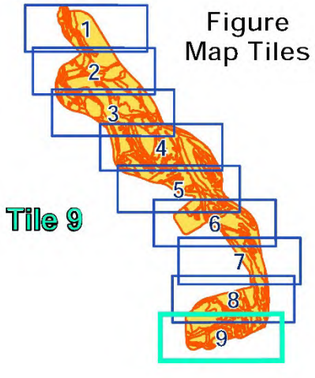
ABR Environmental Research & Services



NWI Code[1]	NWI Description
Waters	
R1	RiverineTidal
L1UBH	Lacustrine Limnetic Permanently Flooded Unconsolidated Bottom
L2EM2H	Lacustrine Littoral Permanently Flooded Nonpersistent Emergent
L2USC	Lacustrine Littoral Seasonally Flooded Unconsolidated Shore
PUBH	Palustrine Permanently Flooded Unconsolidated Bottom
PUSC	Palustrine Seasonally Flooded Unconsolidated Shore
Wetlands	
PEM2H	Palustrine Permanently Flooded Nonpersistent Emergent
PEM1F	Palustrine Semipermanently Flooded Persistent Emergent
PSS1/EM1E	Palustrine Seasonally Flooded-Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub
PEM1/SS1D	Palustrine Continuously Saturated Persistent Emergent/ Broad-leaved Deciduous Scrub-Shrub

NWI Code[1]	NWI Description
Wetlands, continued	
PEM1C	Palustrine Seasonally Flooded Persistent Emergent
PSS1C	Palustrine Seasonally Flooded Broad-leaved Deciduous Scrub-Shrub
PEM1/SS1B	Palustrine Seasonally Saturated Persistent Emergent/Broad-leaved Deciduous Scrub-Shrub
PSS1/EM1B3	Palustrine Seasonally Saturated Broad-leaved Deciduous Shrub/ Persistent Emergent Scrub (brackish)
PSS1B	Palustrine Seasonally Saturated Broad-leaved Deciduous Scrub-Shrub
Uplands	
U	Upland
Us	Upland (fill)

[1] Follows National Wetlands Inventory (NWI) map conventions and FGDC (2013) classification system.



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Wetlands and Waters

Upland

CD8 Proposed Project (A3)

Gravel Footprint

Pipeline

Bridge Crossing

N W E S

0 250 500 750 1,000 Feet

0 100 200 300 Meters

ABR Environmental Research & Services