



FINAL

SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT for the Alpine Satellite Development Plan for the Proposed Greater Mooses Tooth One Development Project

Volume 4: Appendices

October 2014

Alaska



Cooperating Agencies:

U.S. Bureau of Ocean Energy Management • U.S. Environmental Protection Agency • U.S. Fish and Wildlife Service
U.S. Army Corps of Engineers, Alaska District • State of Alaska • North Slope Borough • Native Village of Nuiqsut

The Bureau of Land Management Today

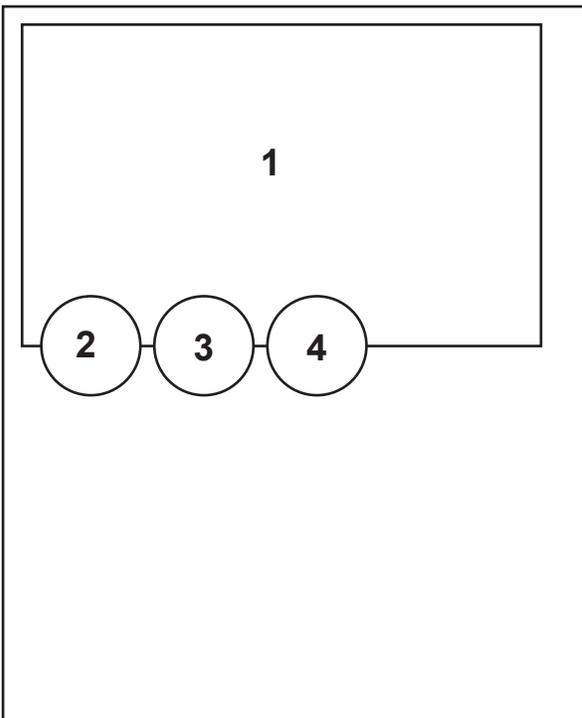
Our Vision

To enhance the quality of life for all citizens through the balanced stewardship of America's public lands and resources.

Our Mission

To sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

**DOI-BLM-AK-0000-2013-0001-EIS
BLM/AK/PL-15/002+5101+AK9300**



Cover Photos:

1. Aerial of Blackfish Creek downstream from GMT1 Drilling pad, National Petroleum Reserve in Alaska.
2. Caribou, North Slope, Alaska
3. Ice road construction, National Petroleum Reserve in Alaska.
4. Aerial of production pad, North Slope, Alaska.
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Alpine Satellite Development Plan GMT1 Development Project

Final

Supplemental Environmental
Impact Statement

Volume 4: Appendices

Prepared by:

U.S. Department of the Interior
Bureau of Land Management
Anchorage, Alaska

In cooperation with:

U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. DOI Bureau of Ocean Energy Management
State of Alaska
Native Village of Nuiqsut
North Slope Borough

October 2014

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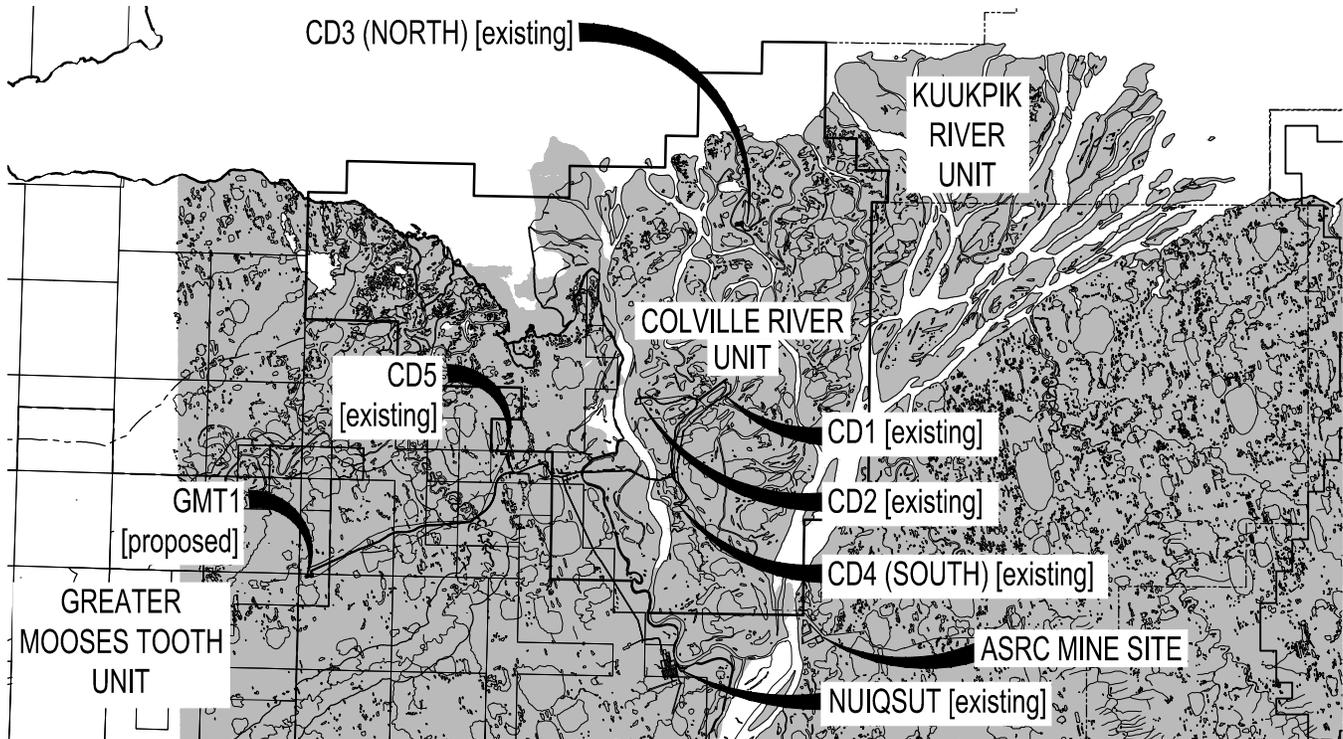
APPENDIX A

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ALASKA VICINITY MAP



ALPINE SATELLITE DEVELOPMENT VICINITY MAP



PURPOSE:
 CONSTRUCT A GRAVEL DRILLING PAD AND ROAD ACCESS FOR OILFIELD DEVELOPMENT

DATUM: BPMSL, NAD83 ASP ZONE 4

ADJACENT PROPERTY OWNERS:

1. KUUUKPIK VILLAGE CORP
2. BUREAU OF LAND MANAGEMENT
3. ARCTIC SLOPE REGIONAL CORP
4. STATE OF ALASKA DNR

REFERENCE: POA 2013-461

APPLICANT: CONOCOPHILLIPS ALASKA, INC (CPAI)

LOCATION: T10N, R3E UMIAT MERIDIAN

PROPOSED: GMT1 ROAD, PAD & PIPELINE CONSTRUCTION

IN: GREATER MOOSES TOOTH UNIT

NEAR/AT: ALPINE

COUNTY: ANS BOROUGH

STATE: ALASKA

KUUKPIK VILLAGE CORPORATION
P.O. BOX 89187
NUIQSUT, AK 99789
(907) 480-6220
ATTN: ISAAC NUKAPIGAK

BUREAU OF LAND MANAGEMENT
1150 UNIVERSITY AVENUE
FAIRBANKS, AK 99709
ATTN: STEVE HARTMANN

ARCTIC SLOPE REGIONAL CORPORATION
P.O. BOX 129
BARROW, AK 99723
ATTN: REX A. ROCK SR.

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

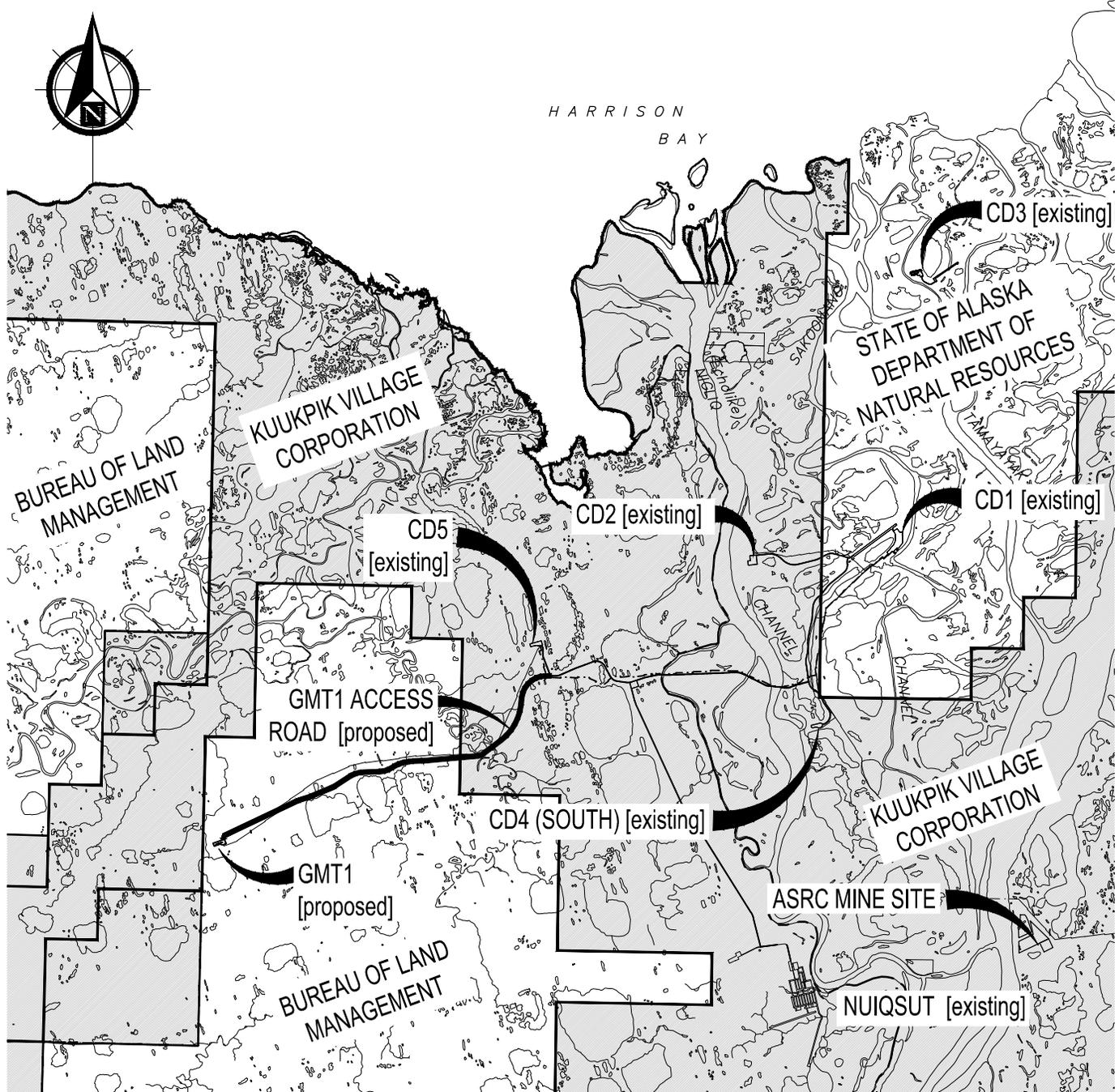


REFERENCE: POA 2013-461
APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD,
& PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **2** of **33** 09-08-14

GMT1 ADJACENT LAND OWNERS



HARRISON
BAY



GMT1 ADJACENT LAND OWNERS MAP



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Alaska, Inc.

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 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
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 CONSTRUCTION
 AT: ALASKA
 SHEET **3** of **33** 09-08-14



CD3 (NORTH) [existing]

COLVILLE RIVER UNIT

HARRISON BAY

CD5 [existing]

CD2 [existing]

GMT1 ACCESS ROAD [proposed]

CD1 [existing]

GMT1 PIPELINE [proposed]

GMT1 PIPELINE [proposed]

CD4 (SOUTH) [existing]

ASRC MINE SITE
LAT: 70.2316
LONG: 150.7998

GREATER MOOSE TOOTH UNIT

GMT1 [proposed]
LAT: 70.2561
LONG: 151.4811

NUIQSUT [existing]

ALPINE SATELLITE DEVELOPMENT LOCATION MAP



- GREATER MOOSE TOOTH UNIT BOUNDARY
- ===== COLVILLE RIVER OIL & GAS UNIT BOUNDARY
- ===== NUIQSUT MUNICIPAL BOUNDARY
- FISH CREEK 3 MILE BUFFER
- TINMIAQSIUGVIK (UBLUTUOCH) RIVER 1/2 MILE BUFFER

THIS MAP PROJECTION IS BASE UPON ALASKA STATE PLANE, NAD 83. THIS MAP IS BASED ON DATA PROVIDED BY THE U.S. GEOLOGICAL SURVEY, THE ALASKA DEPARTMENT OF NATURAL RESOURCES, AND CONOCO PHILLIPS ALASKA, INC.



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Alaska, Inc.

REFERENCE: POA 2013-461
APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION

AT: ALASKA

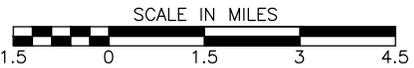
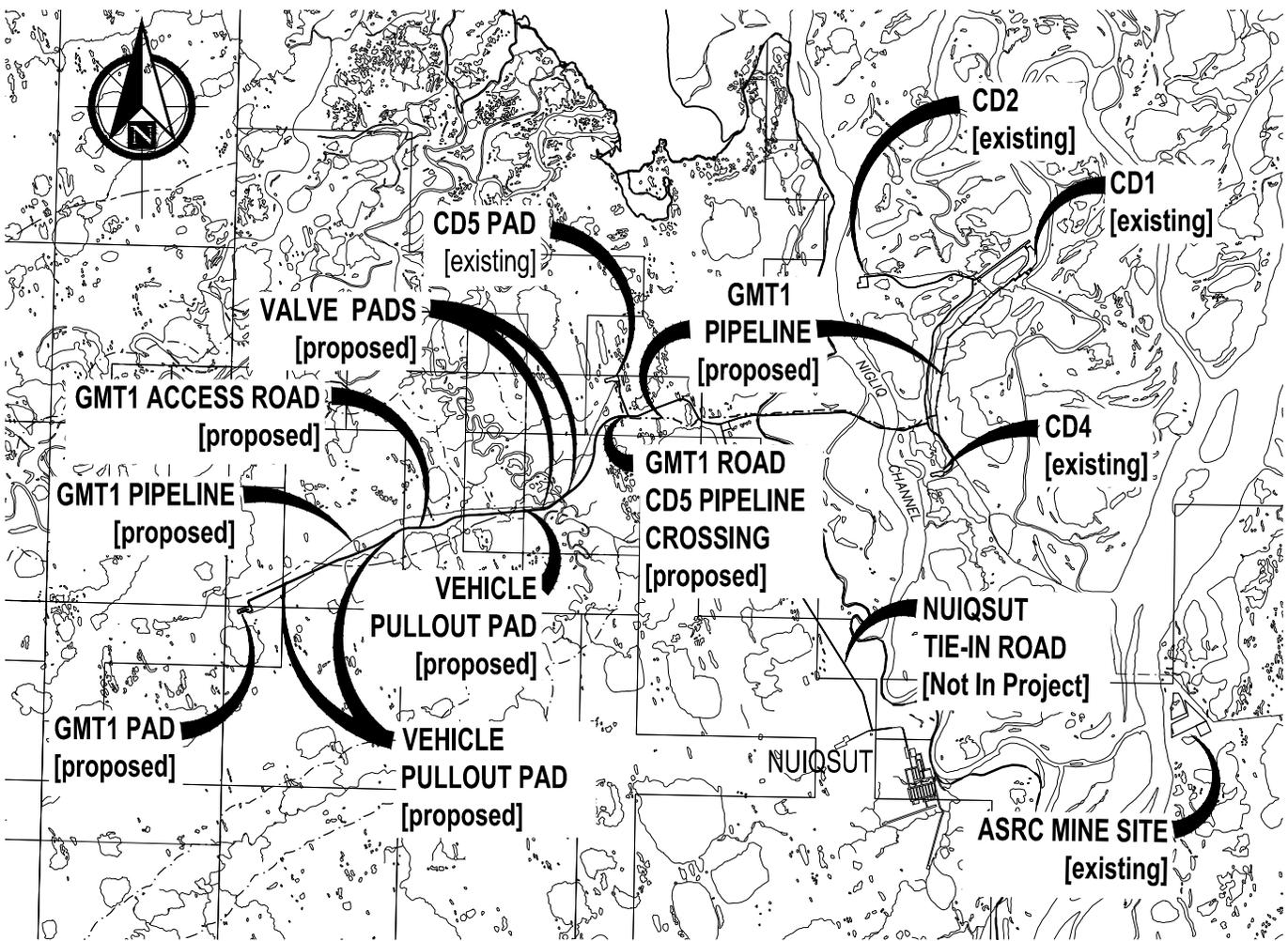
SHEET **4** of **33** 09-08-14

GMT1 FACILITIES	
ACCESS ROAD LENGTH	7.7 MILES
ACCESS ROAD FOOTPRINT	59.2 ACRES
PAD FOOTPRINT	11.8 ACRES
ACCESS ROAD FILL QUANTITY	482,000 CY
PAD FILL QUANTITY	131,000 CY

ASRC MATERIAL SOURCE	
GMT1 MATERIAL SOURCE PIT FOOTPRINT	23 ACRES
PERMIT AREA	23 ACRES
GRAVEL REQUIREMENT FOR GMT1	628,050 C.Y.

VALVE PAD QUANTITIES	
WEST VALVE PAD	
AREA OF TUNDRA COVER	0.35 ACRES
QUANTITY OF GRAVEL	3,250 CY
EAST VALVE PAD	
AREA OF TUNDRA COVER	0.35 ACRES
QUANTITY OF GRAVEL	3,250 CY

VEHICLE PULLOUT PAD QUANTITIES	
WEST VEHICLE PULLOUT PAD	
AREA OF TUNDRA COVER	0.3 ACRES
QUANTITY OF GRAVEL	2,850 CY
CENTRAL VEHICLE PULLOUT PAD	
AREA OF TUNDRA COVER	0.3 ACRES
QUANTITY OF GRAVEL	2,850 CY
EAST VEHICLE PULLOUT PAD	
AREA OF TUNDRA COVER	0.3 ACRES
QUANTITY OF GRAVEL	2,850 CY



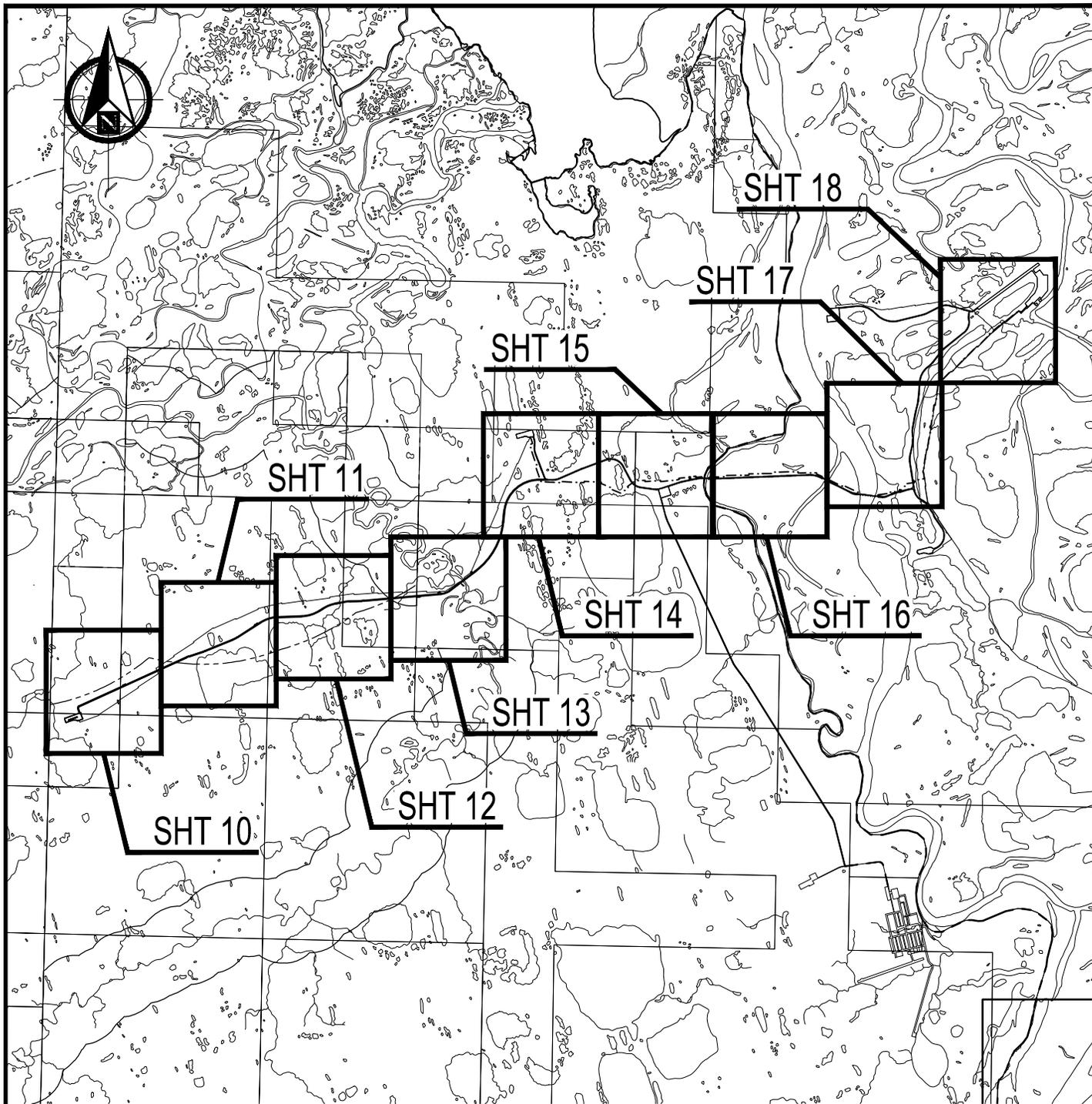
----- FISH CREEK 3 MILE BUFFER
 - - - - - TINMIAQSIUGVIK (UBLUTUOCH) RIVER 1/2 MILE BUFFER

THIS MAP PROJECTION IS BASE UPON ALASKA STATE PLANE, NAD 83. THIS MAP IS BASED ON DATA PROVIDED BY THE U.S. GEOLOGICAL SURVEY, THE ALASKA DEPARTMENT OF NATURAL RESOURCES, AND CONOCO PHILLIPS ALASKA, INC.

GMT1 PROPOSED SATELLITE FACILITY OVERVIEW



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
 SHEET **5** of **33** 09-08-14



P | N | D
ENGINEERS, INC. **ConocoPhillips**
Alaska, Inc.

**GMT1 & ALPINE PROPOSED ACCESS ROAD
AND PIPELINE ROUTE KEY MAP**

REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **6** of **33** 09-08-14



FISH CREEK
3 MILE BUFFER

VEHICLE PULLOUT PAD
[proposed]

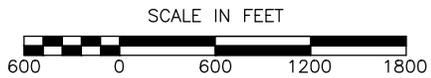
GMT1 ACCESS ROAD
[proposed]

GMT1 PIPELINES
[proposed]

CROSS DRAINAGE
CULVERT
[proposed]

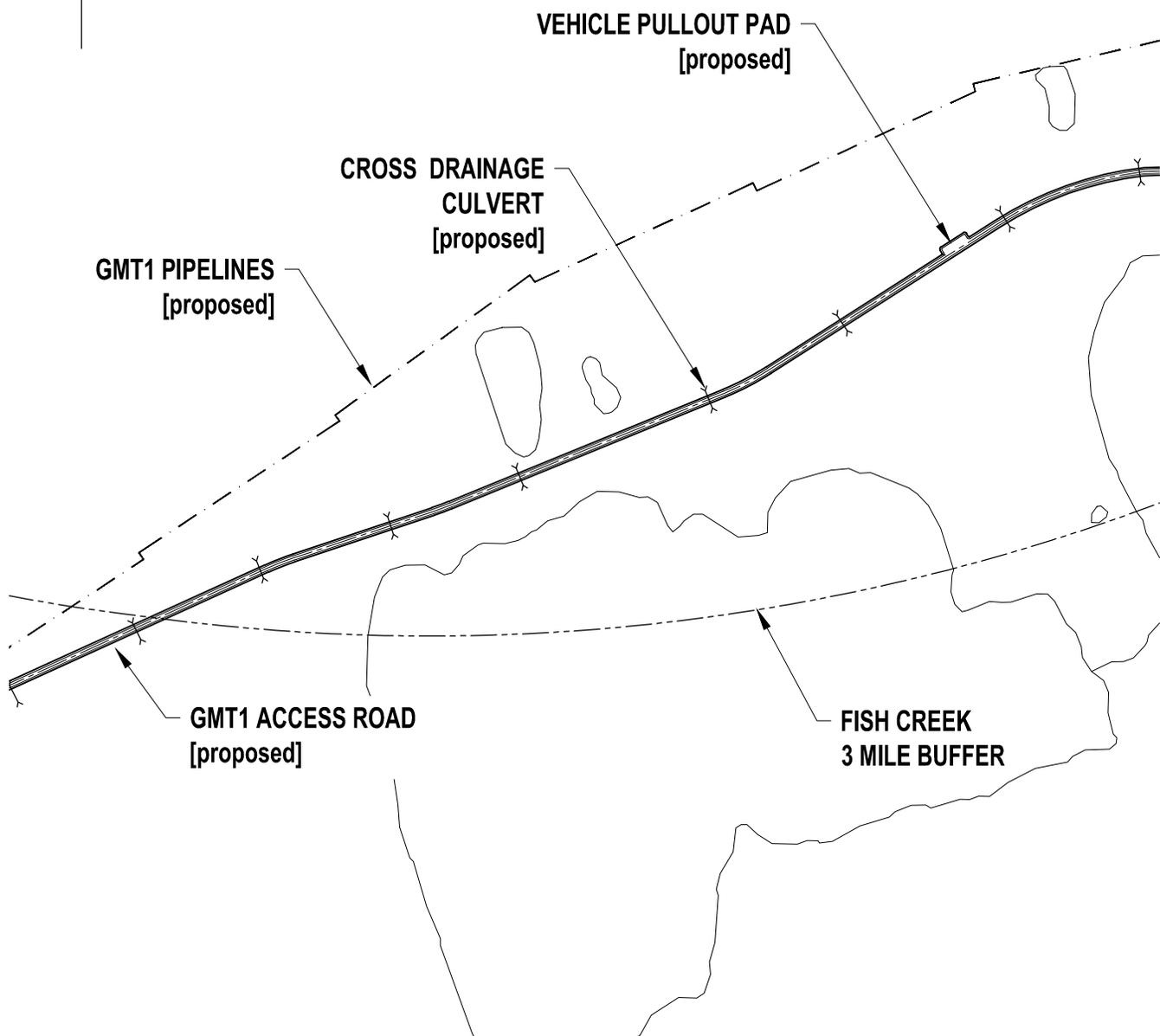
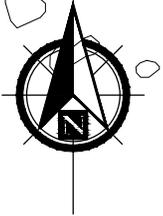
GMT1 PAD
[proposed]

NOTE: 24" MINIMUM CULVERT SIZE FOR CROSS DRAINAGE. CULVERT
LOCATIONS, SIZES, AND QUANTITIES TO BE DETERMINED DURING
A SUMMER FIELD SURVEY PRIOR TO CONSTRUCTION.

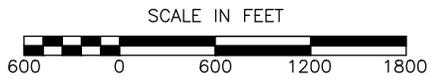


REFERENCE: POA 2013-461
APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD,
& PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **7** of **33** 09-08-14

**PROPOSED GMT1 PIPELINE AND ACCESS ROAD
ROUTE KEY MAP 1 OF 9**



NOTE: 24" MINIMUM CULVERT SIZE FOR CROSS DRAINAGE. CULVERT LOCATIONS, SIZES, AND QUANTITIES TO BE DETERMINED DURING A SUMMER FIELD SURVEY PRIOR TO CONSTRUCTION.



PROPOSED GMT1 PIPELINE AND ACCESS ROAD
ROUTE KEY MAP 2 OF 9



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
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TINMIAQSIUGVIK
(UBLUTUOCH) RIVER
1/2 MILE BUFFER

GMT1 PIPELINES
[proposed]

40' BRIDGE
[proposed]

GMT1 ACCESS ROAD
[proposed]

CREA CREEK

CROSS DRAINAGE
CULVERT
[proposed]

FISH CREEK
3 MILE BUFFER

NOTE: 24" MINIMUM CULVERT SIZE FOR CROSS DRAINAGE. CULVERT
LOCATIONS, SIZES, AND QUANTITIES TO BE DETERMINED DURING
A SUMMER FIELD SURVEY PRIOR TO CONSTRUCTION.

SCALE IN FEET

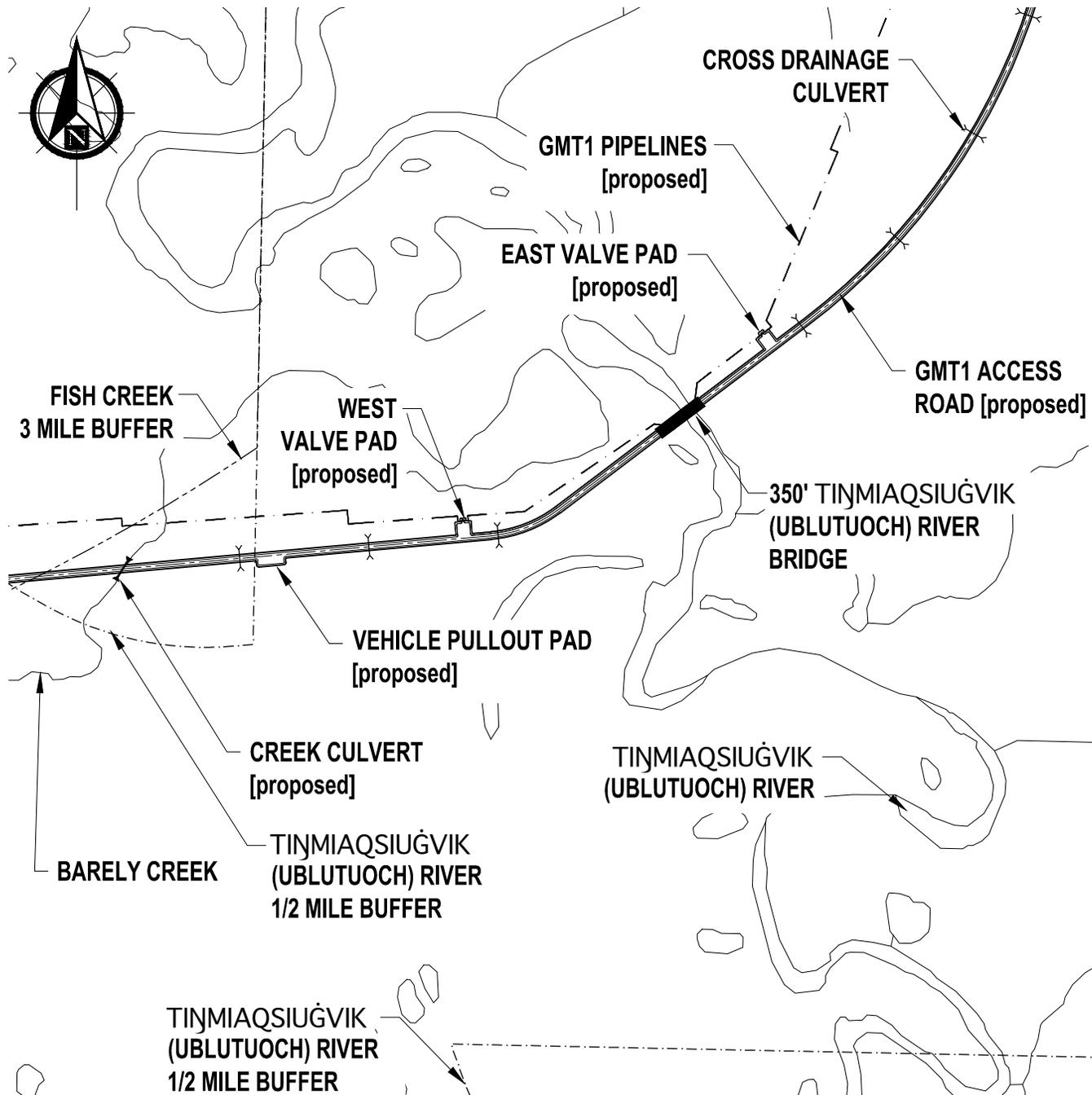


PROPOSED GMT1 PIPELINE AND ACCESS ROAD
ROUTE KEY MAP 3 OF 9



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REFERENCE: POA 2013-461
APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD,
& PIPELINE
CONSTRUCTION
AT: ALASKA
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NOTES:

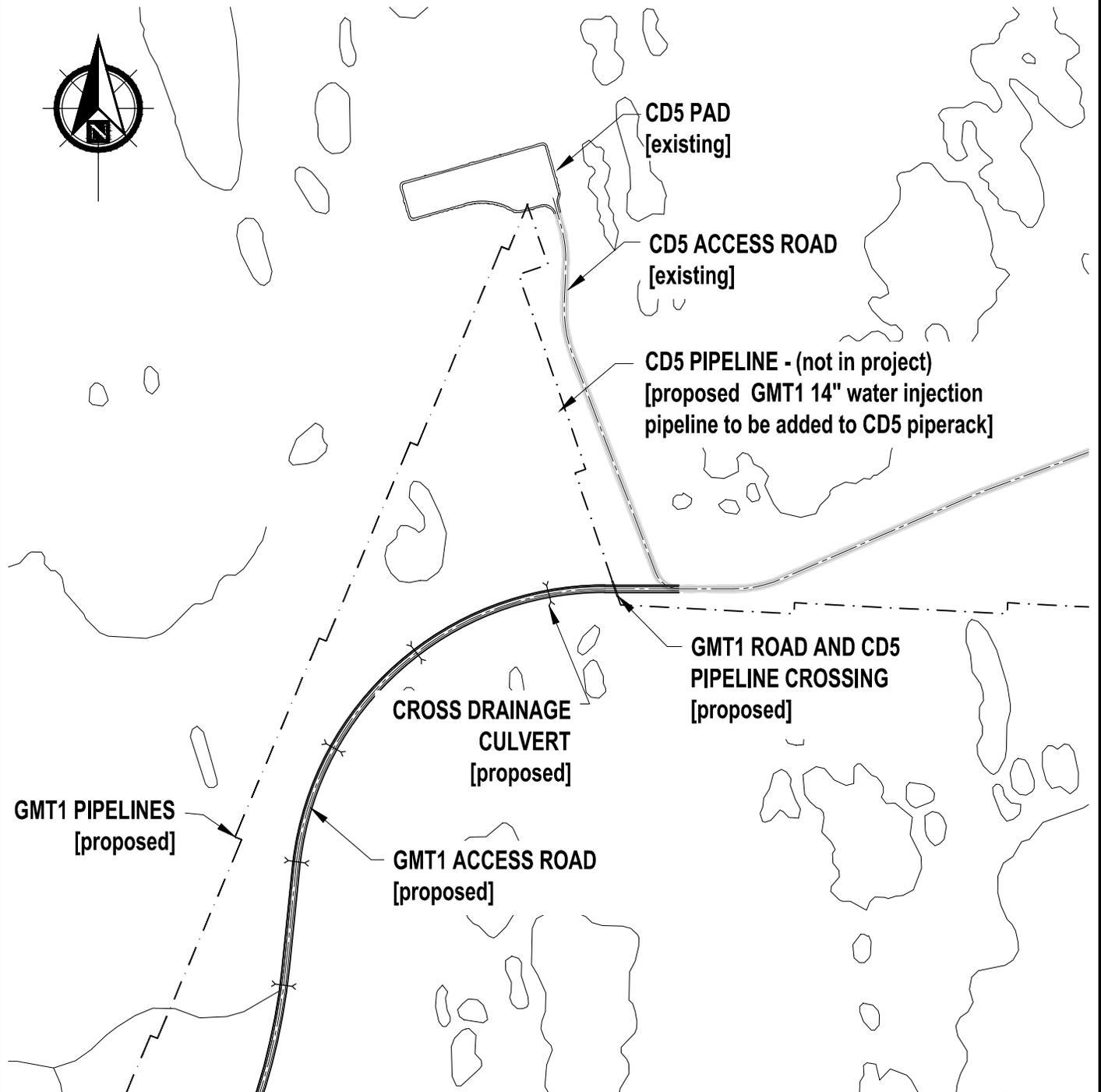
1. CROSS DRAINAGE CULVERTS ARE A MINIMUM OF 24" DIAMETER. CROSS DRAINAGE CULVERT LOCATIONS, SIZES, AND QUANTITIES TO BE DETERMINED DURING A SUMMER FIELD SURVEY PRIOR TO CONSTRUCTION.
2. BARELY CREEK CULVERT DESIGN AND FIELD VERIFICATION TO BE COMPLETED IN ACCORDANCE WITH ADF&G REQUIREMENTS DURING SUMMER PRIOR TO CONSTRUCTION.



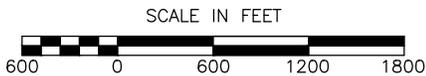
**PROPOSED GMT1 PIPELINE AND ACCESS ROAD
ROUTE KEY MAP 4 OF 9**



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
 SHEET **10** of **33** 09-08-14



NOTE: 24" MINIMUM CULVERT SIZE FOR CROSS DRAINAGE. CULVERT LOCATIONS, SIZES, AND QUANTITIES TO BE DETERMINED DURING A SUMMER FIELD SURVEY PRIOR TO CONSTRUCTION.



**PROPOSED GMT1 PIPELINE AND ACCESS ROAD
ROUTE KEY MAP 5 OF 9**



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
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CD5 ACCESS ROAD
[existing]

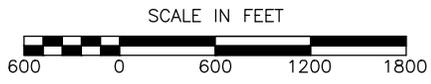
277' NIGLIAGVIK BRIDGE
[existing]

VALVE PAD
[existing]

CD5 PIPELINE - (not in project)
[proposed GMT1 14" water injection
pipeline to be added to CD5 piperack]

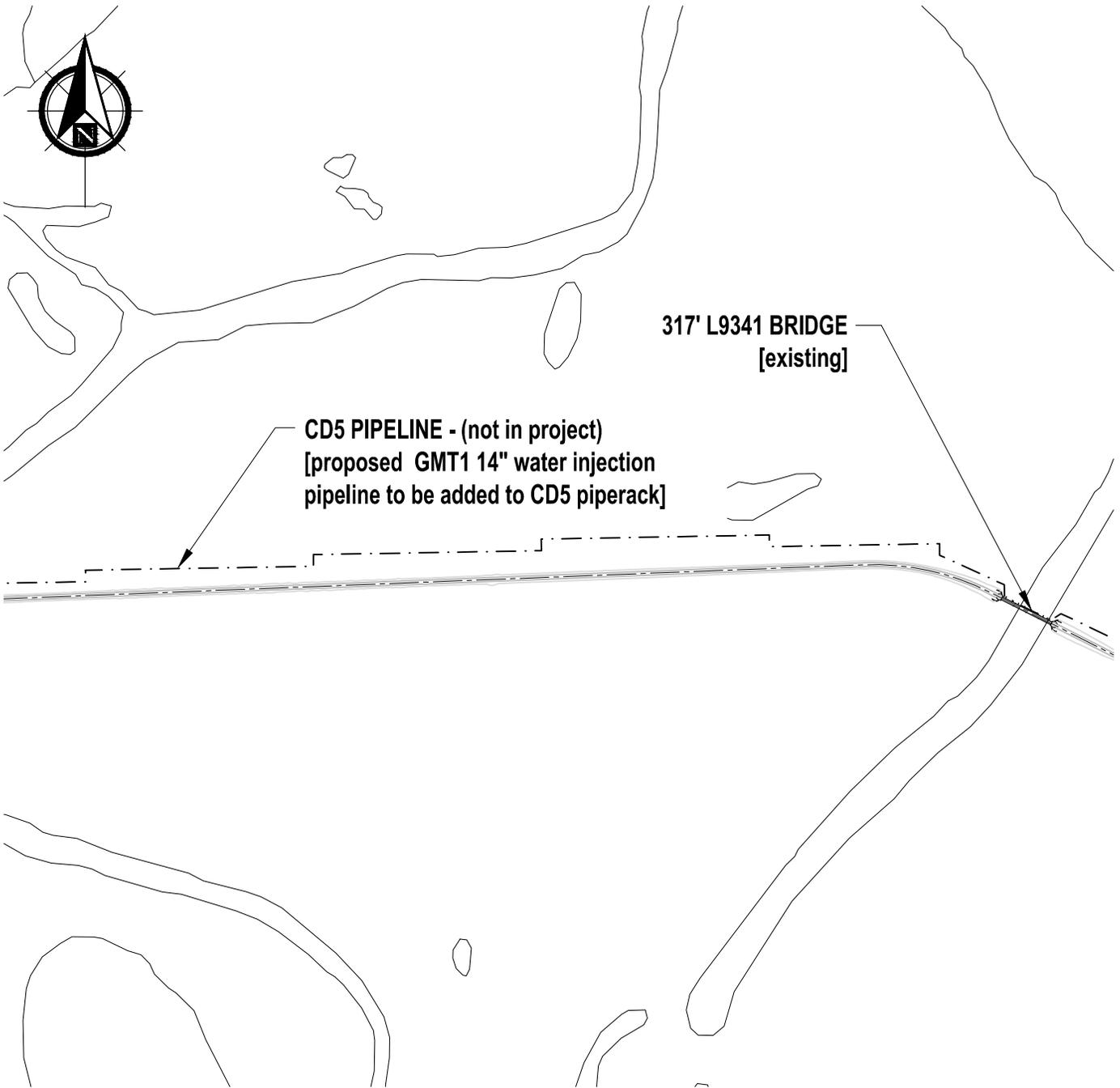
KUUKPIK LAYDOWN PAD
[not in project]

NUIQSUT TIE-IN ROAD
[not in project]



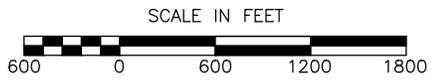
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APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD,
& PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **12** of **33** 09-08-14

EXISTING CD5 TO CD4N PIPELINE AND ACCESS ROAD
ROUTE KEY MAP 6 OF 9



317' L9341 BRIDGE
[existing]

CD5 PIPELINE - (not in project)
[proposed GMT1 14" water injection
pipeline to be added to CD5 piperack]



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
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EXISTING CD5 TO CD4N PIPELINE AND ACCESS ROAD
KEY ROUTE MAP 7 OF 9



CD4 ROAD
[existing]

CD4 & ALPINE SALES
PIPELINES [existing]
CD5 PIPELINES [not in project]

GMT1 PIPELINE
[proposed piperack with 14" water injection pipeline
parallel to existing CD4 and Alpine sales piperacks]

CD5 PIPELINE - (not in project)
[proposed GMT1 14" water injection
pipeline to be added to CD5 piperack]

1405' NIGLIQ BRIDGE
[existing]

250' L9323 BRIDGE
[existing]

CD5 ROAD
[existing]

CD4N

NIGLIQ CHANNEL

SCALE IN FEET



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PROPOSED GMT1 PIPELINE (CD4N TO CD1)
ROUTE KEY MAP 8 OF 9

REFERENCE: POA 2013-461
APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD,
& PIPELINE
CONSTRUCTION
AT: ALASKA
SHEET **14** of **33** 09-08-14



CD1 ALPINE FACILITY

CD2 ROAD [existing]

CD4 ROAD [existing]

CD4 & ALPINE SALES PIPELINES [existing]
CD5 PIPELINES [not in project]

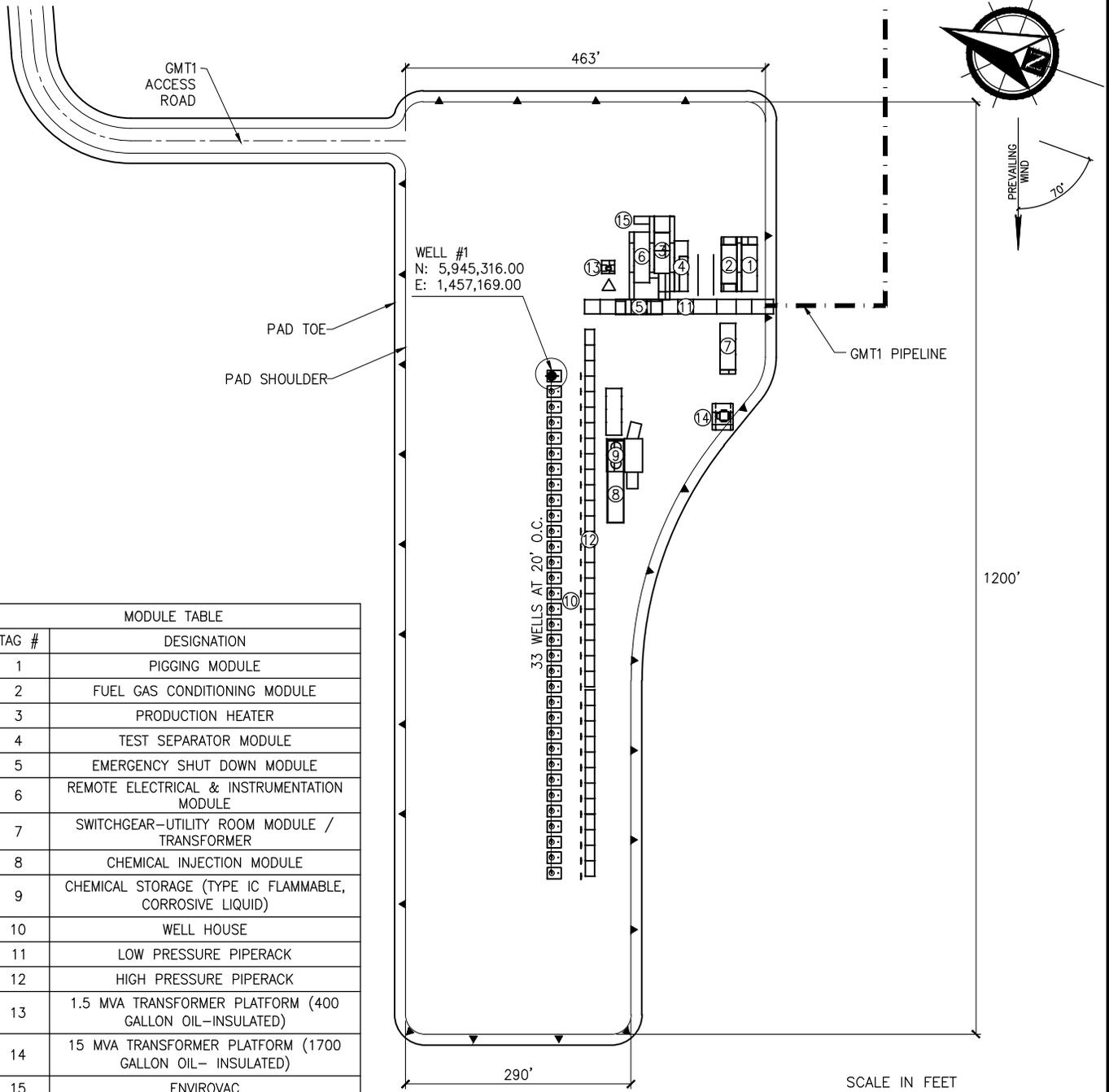
GMT1 PIPELINE
[proposed piperack with 14" water injection pipeline parallel to existing CD4 and Alpine sales piperacks]

SCALE IN FEET



PROPOSED GMT1 PIPELINE (CD4N TO CD1)
ROUTE KEY MAP 9 OF 9

REFERENCE: POA 2013-461
APPLICANT: CPAI
PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
AT: ALASKA
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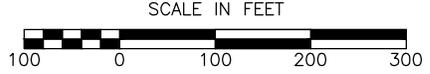


MODULE TABLE	
TAG #	DESIGNATION
1	PIGGING MODULE
2	FUEL GAS CONDITIONING MODULE
3	PRODUCTION HEATER
4	TEST SEPARATOR MODULE
5	EMERGENCY SHUT DOWN MODULE
6	REMOTE ELECTRICAL & INSTRUMENTATION MODULE
7	SWITCHGEAR-UTILITY ROOM MODULE / TRANSFORMER
8	CHEMICAL INJECTION MODULE
9	CHEMICAL STORAGE (TYPE IC FLAMMABLE, CORROSIVE LIQUID)
10	WELL HOUSE
11	LOW PRESSURE PIPERACK
12	HIGH PRESSURE PIPERACK
13	1.5 MVA TRANSFORMER PLATFORM (400 GALLON OIL-INSULATED)
14	15 MVA TRANSFORMER PLATFORM (1700 GALLON OIL- INSULATED)
15	ENVIROVAC

GMT1 PAD QUANTITIES	
AREA OF TUNDRA COVER	11.8 ACRES
QUANTITY OF GRAVEL	131,000 CY

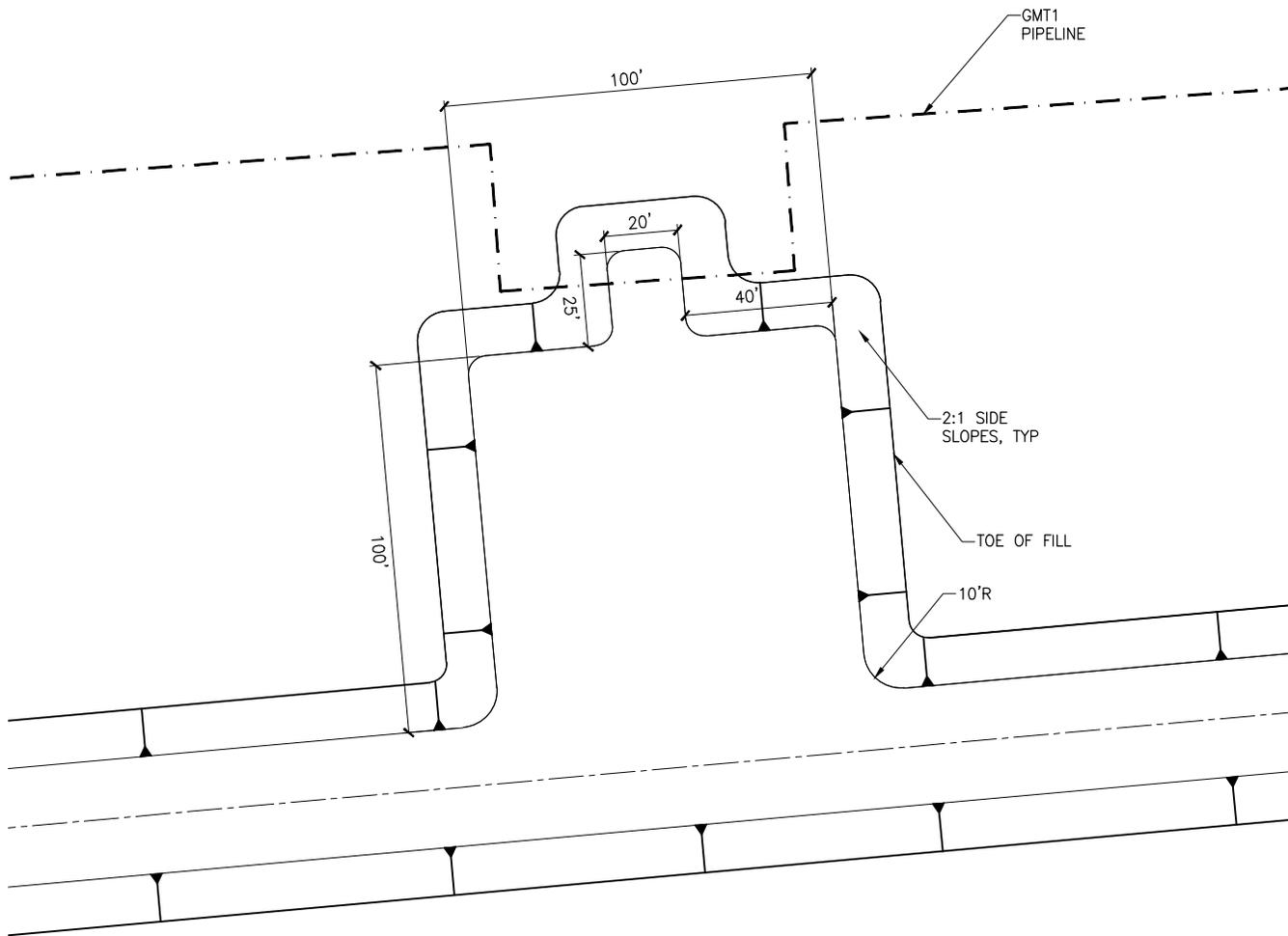
NOTE:
 MINIMUM GRAVEL DEPTH
 5.0' WITH 2:1 FILL SLOPES

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REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
 SHEET **16** of **33** 09-08-14

GMT1 PROPOSED PAD FOOTPRINT WITH 33 WELLS



VALVE PAD QUANTITIES	
WEST VALVE PAD	
AREA OF TUNDRA COVER	0.35 ACRES
QUANTITY OF GRAVEL	3,250 CY
EAST VALVE PAD	
AREA OF TUNDRA COVER	0.35 ACRES
QUANTITY OF GRAVEL	3,250 CY

NOTE:
MINIMUM GRAVEL DEPTH
5.0' WITH 2:1 FILL SLOPES

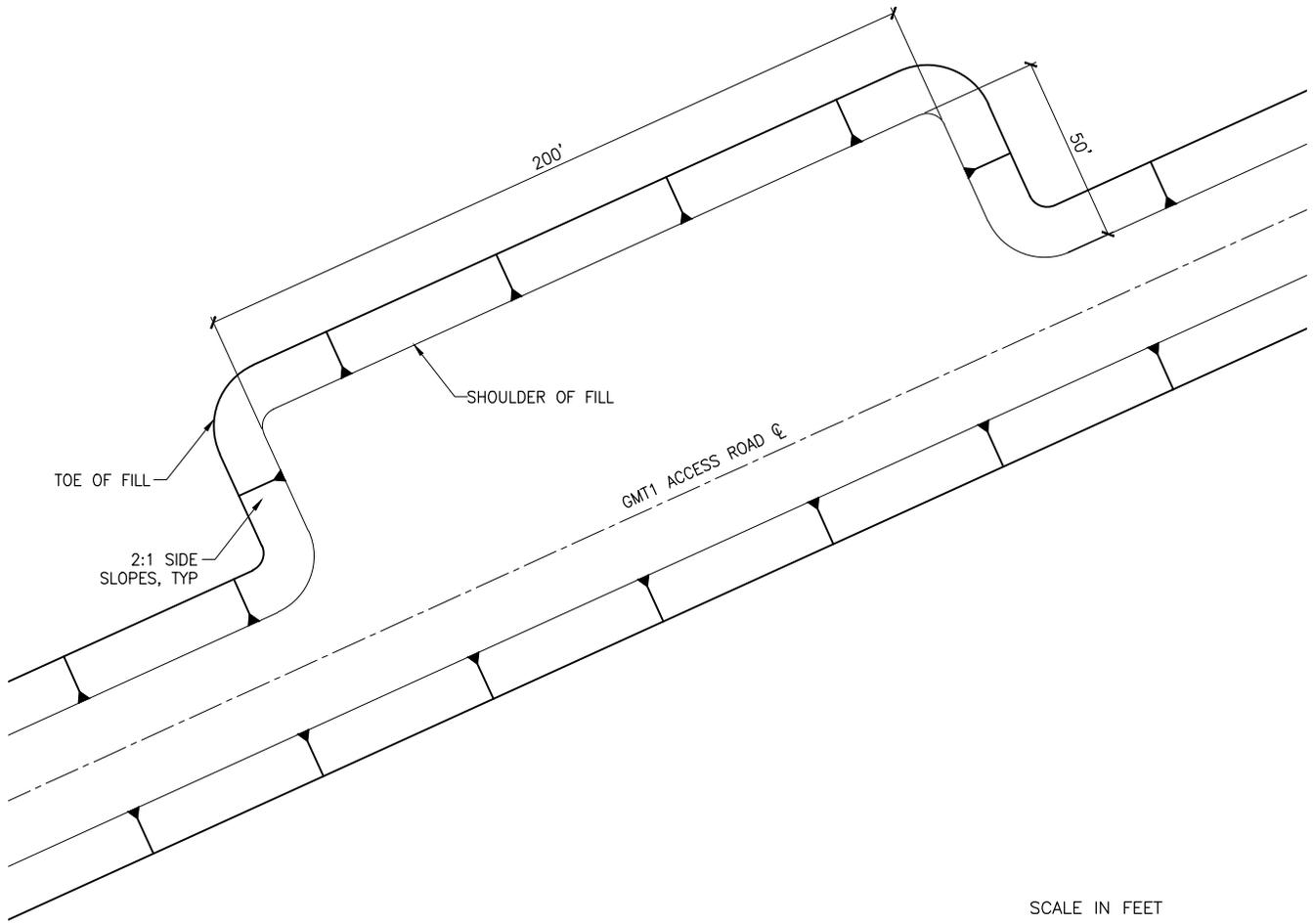


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REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION

AT: ALASKA
 SHEET **17** of **33** 09-08-14

GMT1 PROPOSED TYPICAL VALVE PAD FOOTPRINT



VEHICLE PULLOUT PAD QUANTITIES	
<u>WEST VEHICLE PULLOUT PAD</u>	
AREA OF TUNDRA COVER	0.3 ACRES
QUANTITY OF GRAVEL	2,850 CY
<u>CENTRAL VEHICLE PULLOUT PAD</u>	
AREA OF TUNDRA COVER	0.3 ACRES
QUANTITY OF GRAVEL	2,850 CY
<u>EAST VEHICLE PULLOUT PAD</u>	
AREA OF TUNDRA COVER	0.3 ACRES
QUANTITY OF GRAVEL	2,850 CY

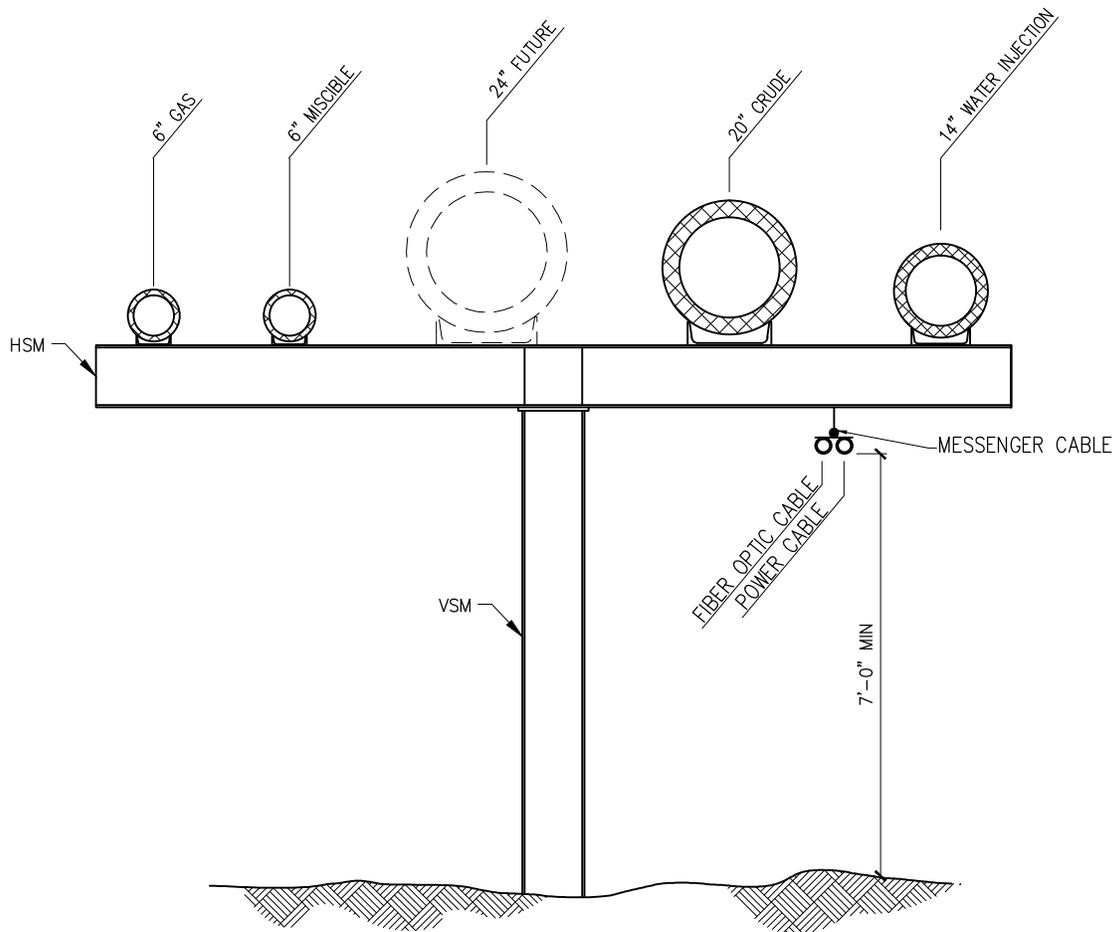
NOTE:
 MINIMUM GRAVEL DEPTH
 5.0' WITH 2:1 FILL SLOPES

THIS MAP PROJECTION IS BASE UPON ALASKA STATE PLANE, NAD 83. THIS MAP IS BASED ON DATA PROVIDED BY THE U.S. GEOLOGICAL SURVEY, THE ALASKA DEPARTMENT OF NATURAL RESOURCES, AND CONOCO PHILLIPS ALASKA, INC.



GMT1 PROPOSED TYPICAL VEHICLE PULLOUT PAD FOOTPRINT

REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
 SHEET **18** of **33** 09-08-14



GMT1 TO CD5 PROPOSED PIPELINE TYPICAL SECTION

P | N | D
ENGINEERS, INC.

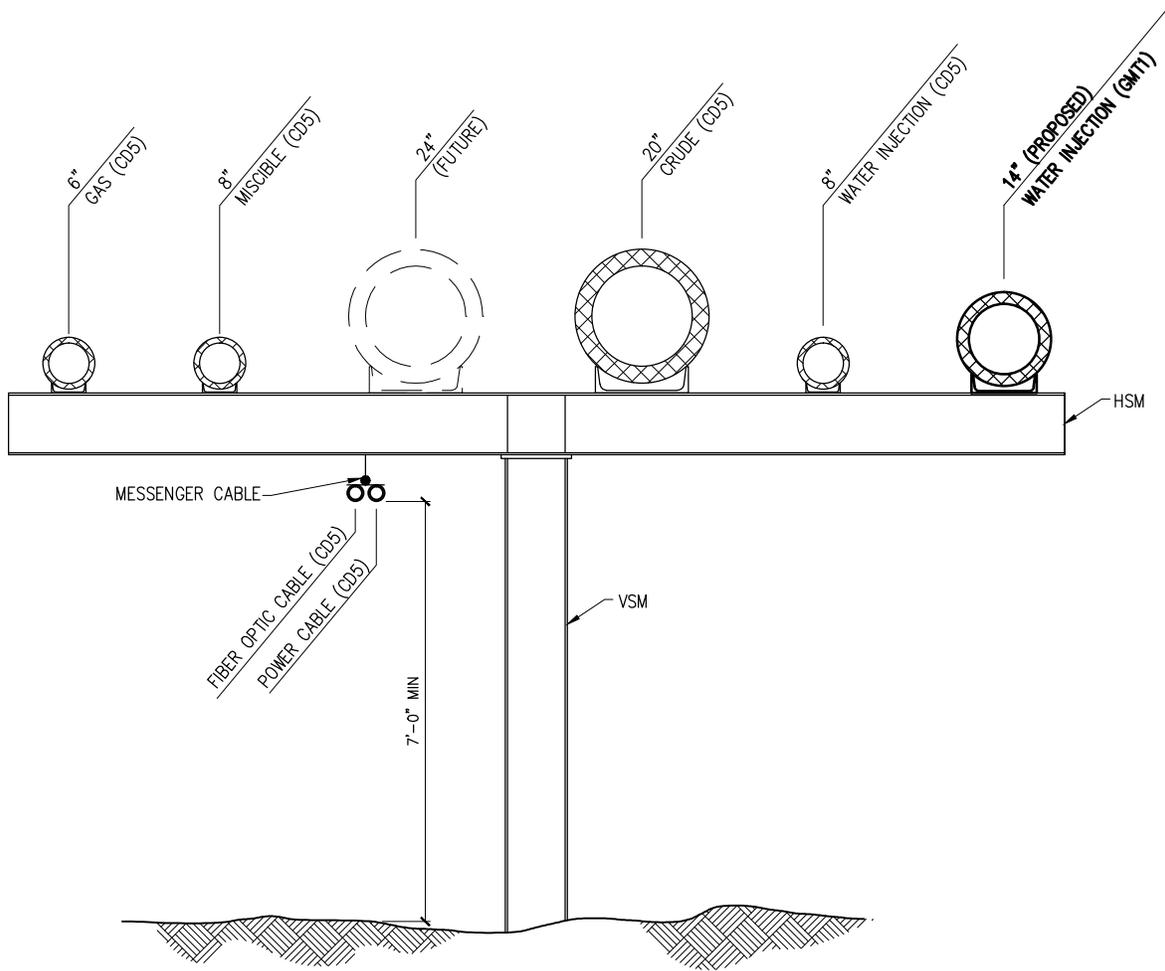
ConocoPhillips
Alaska, Inc.

REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION

AT: ALASKA

SHEET **19** of **33** 09-08-14

GMT1 TO CD5 PROPOSED PIPELINE TYPICAL SECTION



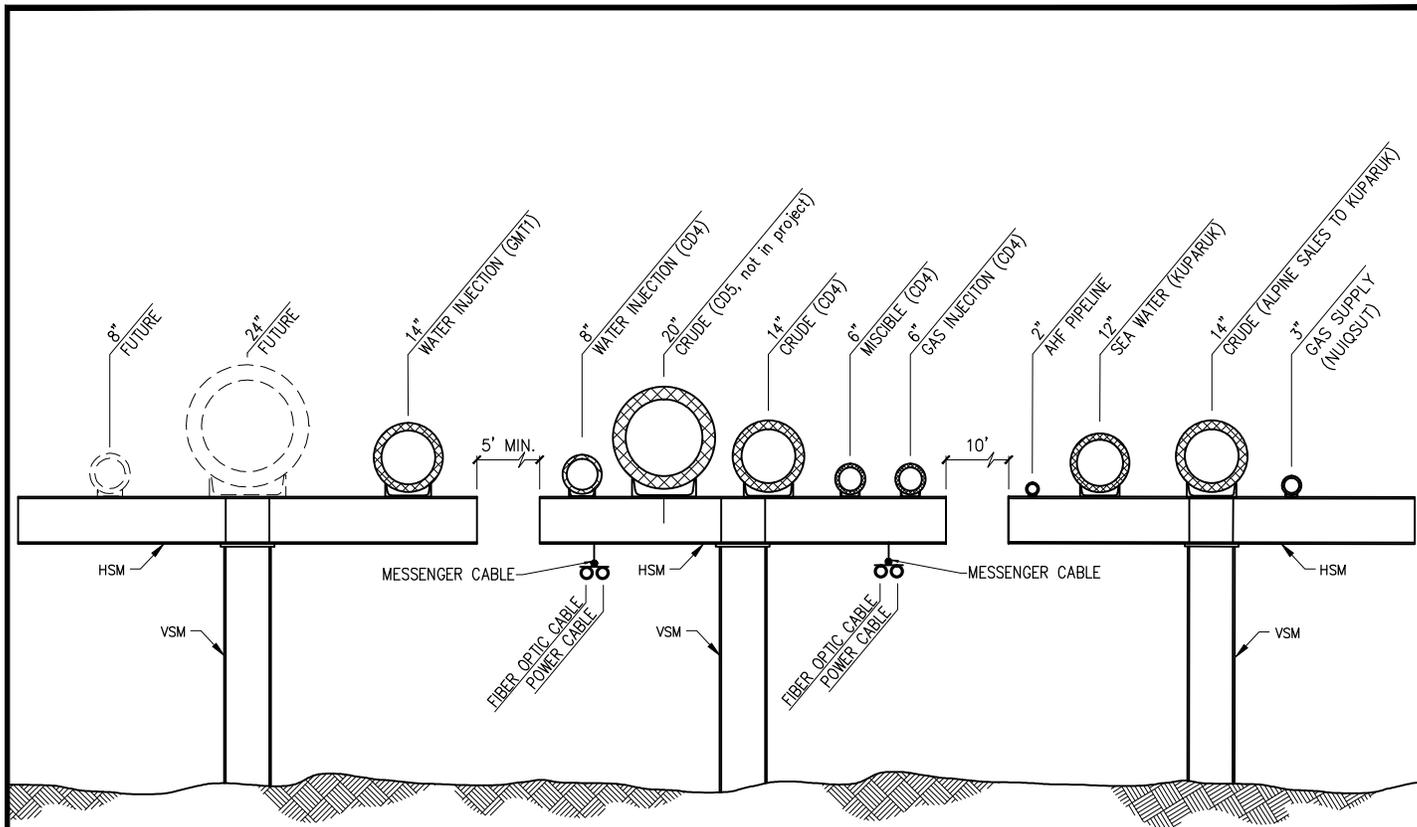
CD5 TO CD4N TYPICAL PIPELINE SECTION

NOTE: PROPOSED 14" WATER INJECTION LINE TO BE ADDED TO CD5 PIPERACK [not in project].



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **20** of **33** 09-08-14

CD5 to CD4N PROPOSED PIPELINE SECTION



**PROPOSED
GMT1 PIPELINE**

**EXISTING
CD-4 PIPELINE**

**EXISTING ALPINE
SALES PIPELINE**

CD4N TO CD1 (ALPINE) PROPOSED PIPELINE SECTION

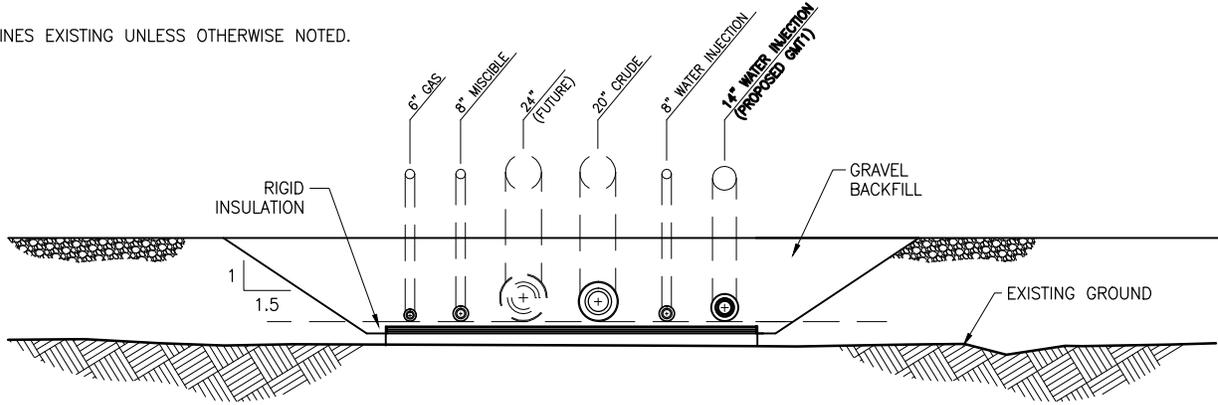


REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION

AT: ALASKA

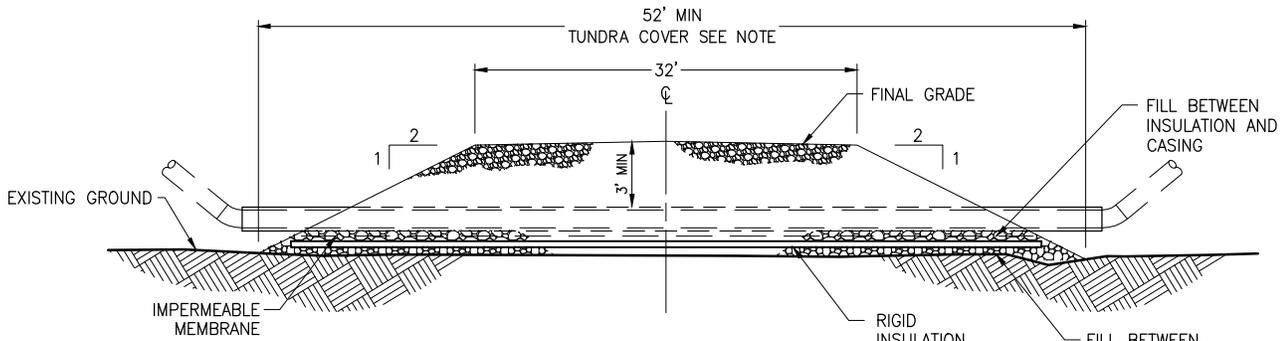
SHEET **21** of **33** 09-08-14

NOTE: PIPELINES EXISTING UNLESS OTHERWISE NOTED.



PIPE CROSSING PROFILE

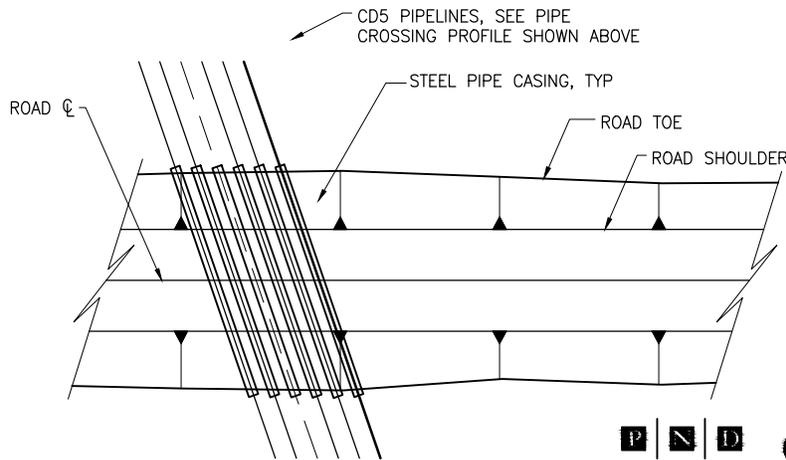
NOT TO SCALE



NOTE: FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD ELEVATION

PIPE CROSSING SECTION

NOT TO SCALE



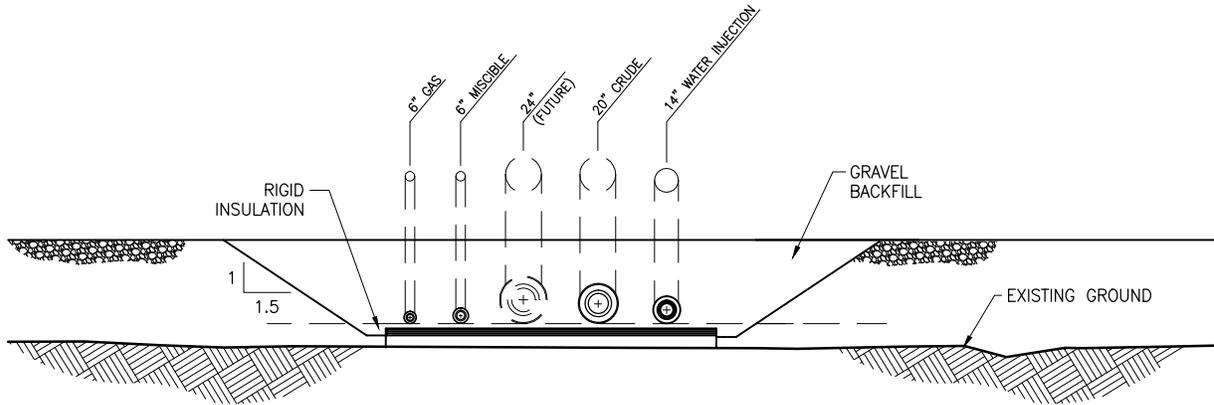
PIPE CROSSING PLAN

NOT TO SCALE



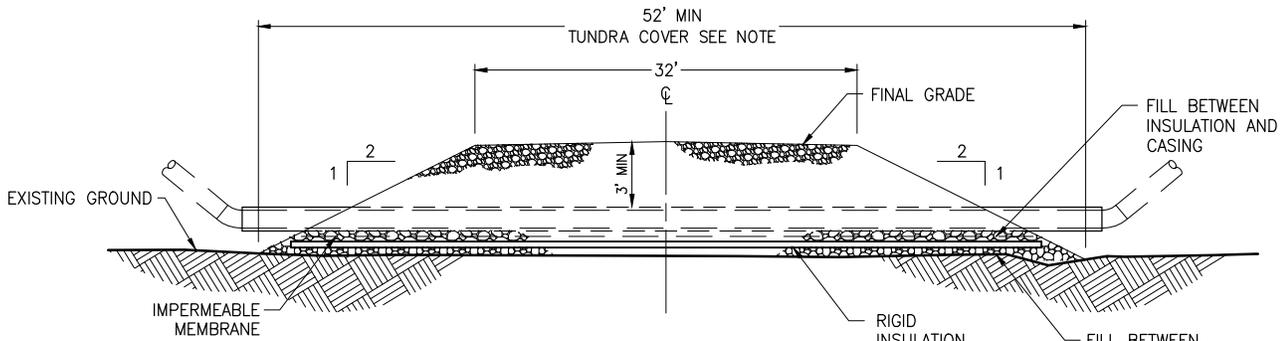
REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **22** of **33** 09-08-14

GMT1 ROAD AT CD5 PIPELINE CROSSING



PIPE CROSSING PROFILE

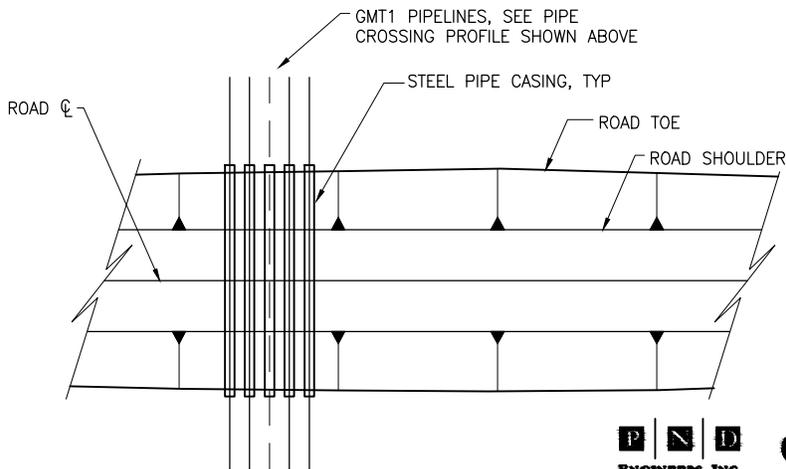
NOT TO SCALE



NOTE: FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD ELEVATION

PIPE CROSSING SECTION

NOT TO SCALE



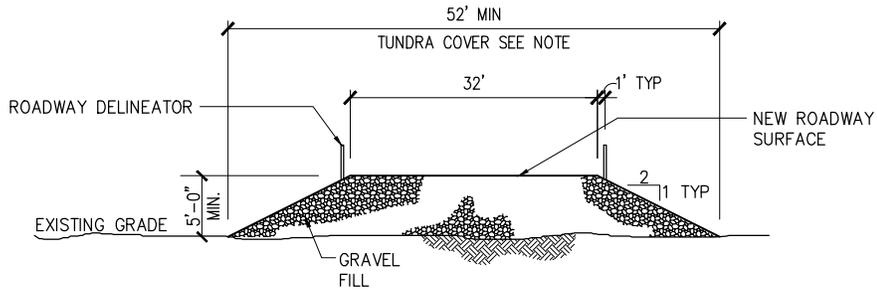
PIPE CROSSING PLAN

NOT TO SCALE

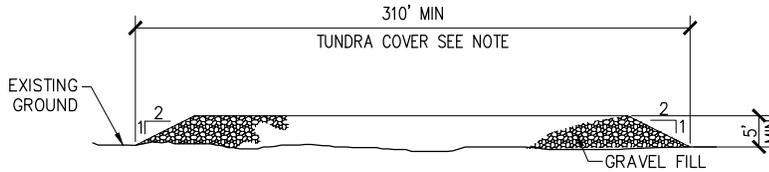


REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **23** of **33** 09-08-14

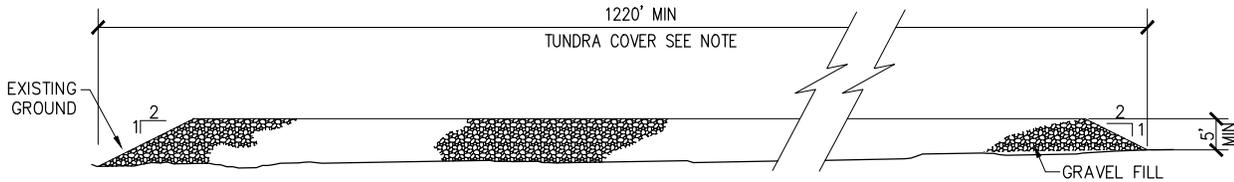
GMT1 ROAD AT GMT1 PIPELINE CROSSING



GMT1 TYPICAL GRAVEL ROADWAY SECTION
NOT TO SCALE



GMT1 TYPICAL WELL PAD TRANSVERSE SECTION
NOT TO SCALE



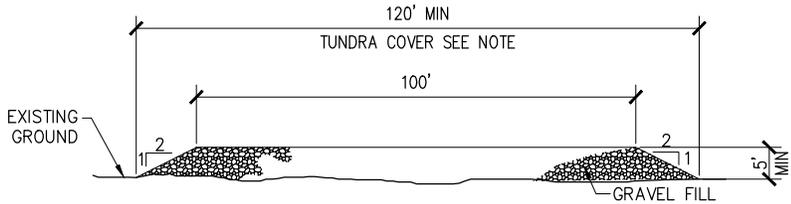
GMT1 TYPICAL WELL PAD LONGITUDINAL SECTION
NOT TO SCALE

NOTE: FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & ROAD/PAD ELEVATION



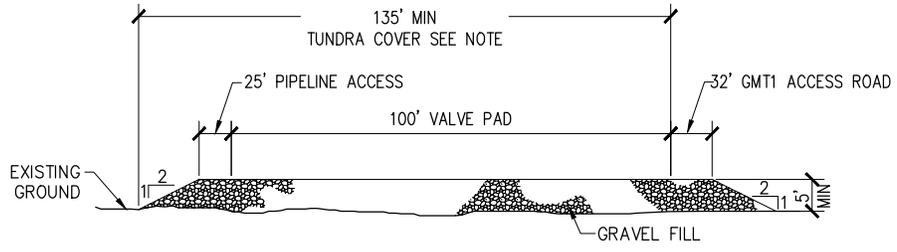
GMT1 PROPOSED TYPICAL ROAD & WELL PAD SECTIONS

REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **24** of **33** 09-08-14



VALVE PAD TYPICAL TRANSVERSE SECTION

NOT TO SCALE



**VALVE PAD TYPICAL LONGITUDINAL SECTION
WITH 25' PIPELINE ACCESS EXTENSION**

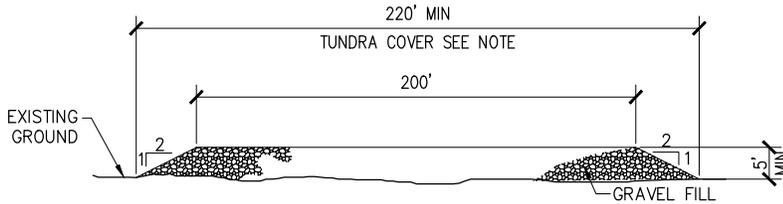
NOT TO SCALE

NOTE: FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & PAD ELEVATION



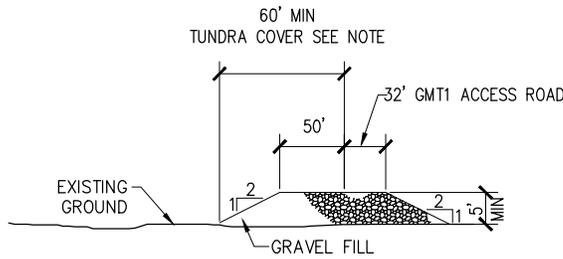
**GMT1 PROPOSED TYPICAL
VALVE PAD SECTIONS**

REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **25** of **33** 09-08-14



**VEHICLE PULLOUT PAD TYPICAL
LONGITUDINAL SECTION**

NOT TO SCALE



**VEHICLE PULLOUT PAD TYPICAL
TRANSVERSE SECTION**

NOT TO SCALE

NOTE: FILL FOOTPRINT WILL VARY BASED UPON TOPOGRAPHY & PAD ELEVATION

**GMT1 PROPOSED TYPICAL
VEHICLE PULLOUT PAD
SECTIONS**

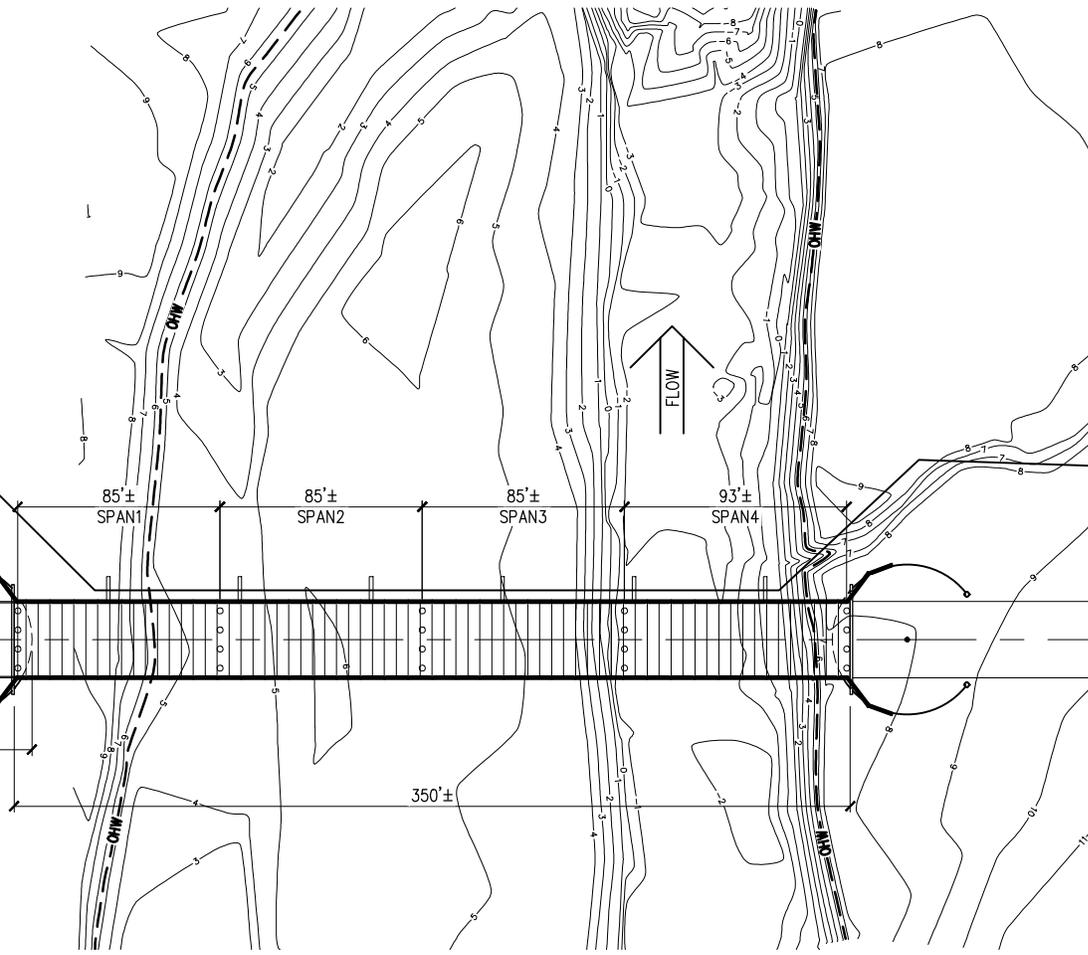
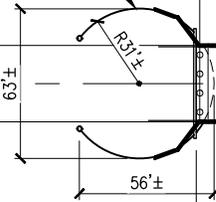


REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **26** of **33** 09-08-14



GMT1 PIPELINE
[proposed]

SHEET PILE
ABUTMENT, TYP



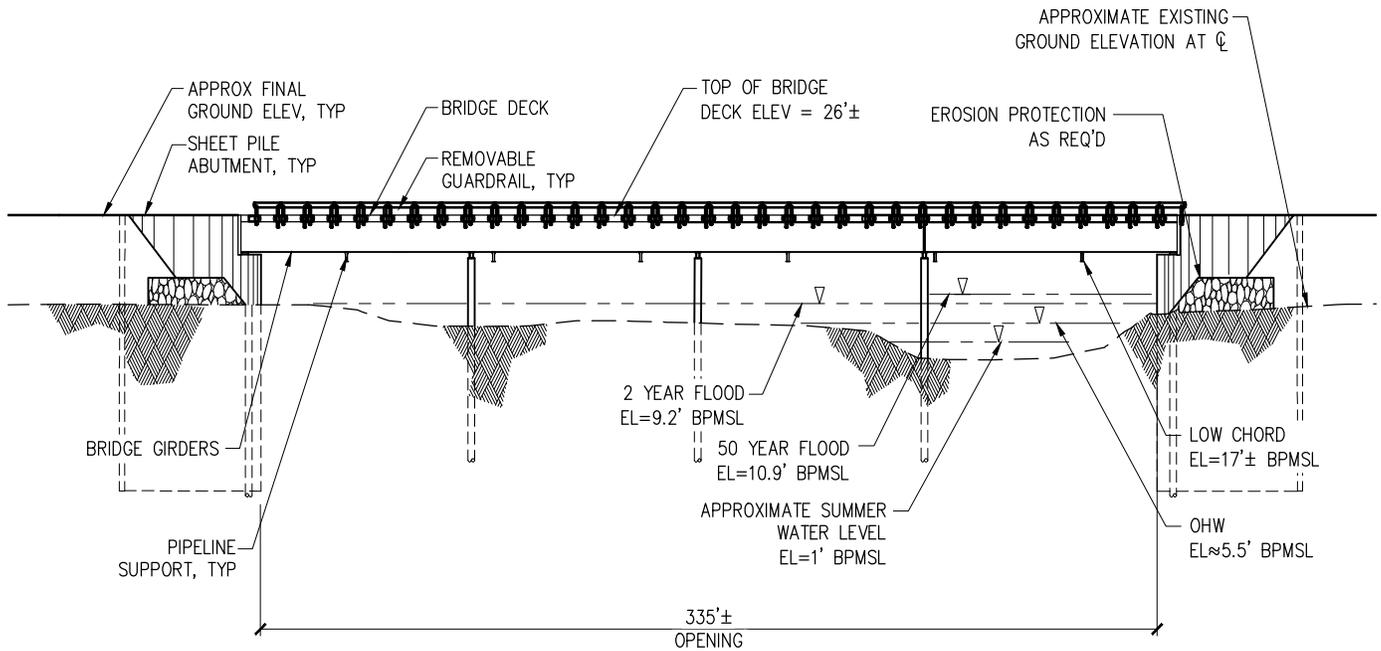
**PROPOSED TINMIAQSIUGVIK
(UBLUTUOCH) BRIDGE PLAN**

NTS

**GMT1 PROPOSED TINMIAQSIUGVIK
BRIDGE PLAN**



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **27** of **33** 09-08-14



**PROPOSED TINMIAQSIUGVIK
(UBLUTUOCH) BRIDGE ELEVATION AT CENTERLINE**

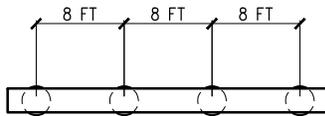
NTS

NOTE: VERTICAL SCALE SHOWN 2X HORIZONTAL SCALE

**GMT1 PROPOSED TINMIAQSIUGVIK
BRIDGE PROFILE**

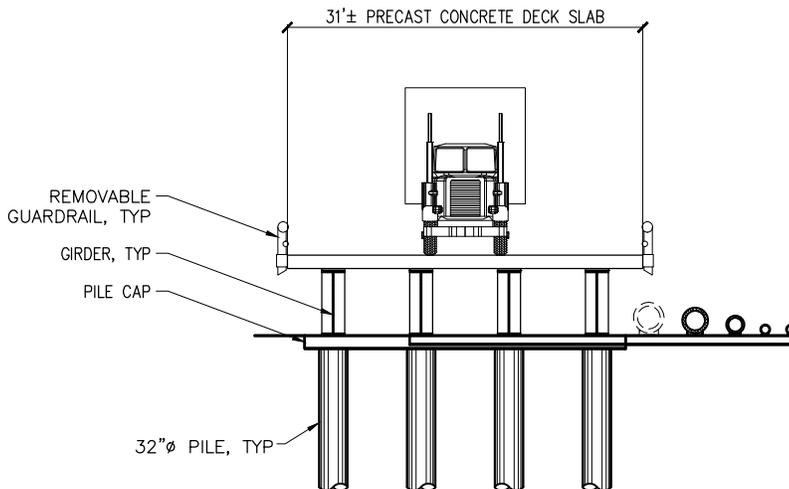


REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **28** of **33** 09-08-14



**PROPOSED TINMIAQSIUGVIK
(UBLUTUOCH) BRIDGE PIER PLAN VIEW**

NTS



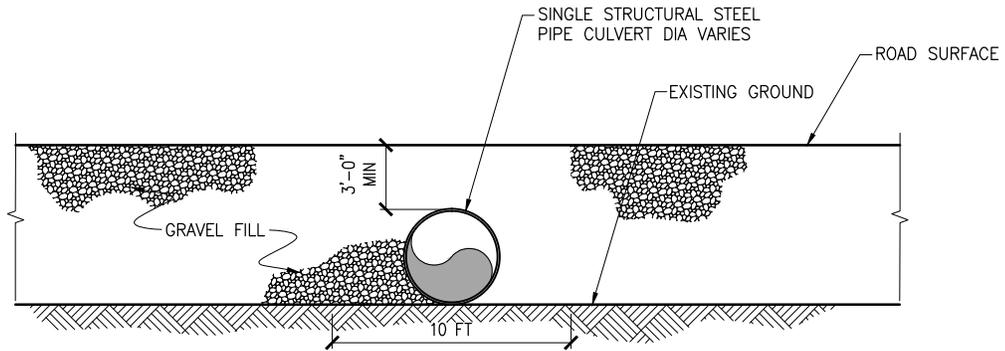
**PROPOSED TINMIAQSIUGVIK
(UBLUTUOCH) BRIDGE PIER ELEVATION VIEW**

NTS

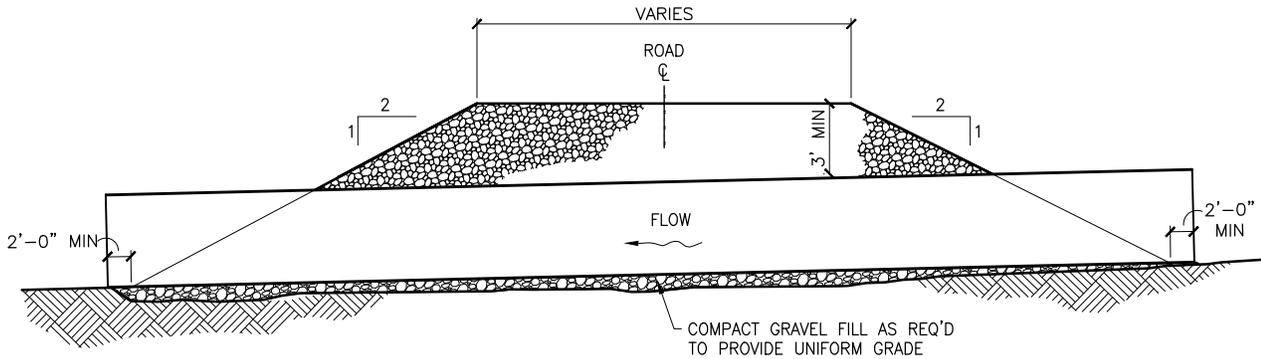
**GMT1 PROPOSED TINMIAQSIUGVIK
(UBLUTUOCH) BRIDGE PIER PLAN AND
ELEVATION**



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **29** of **33** 09-08-14



PROPOSED SINGLE CULVERT ELEVATION

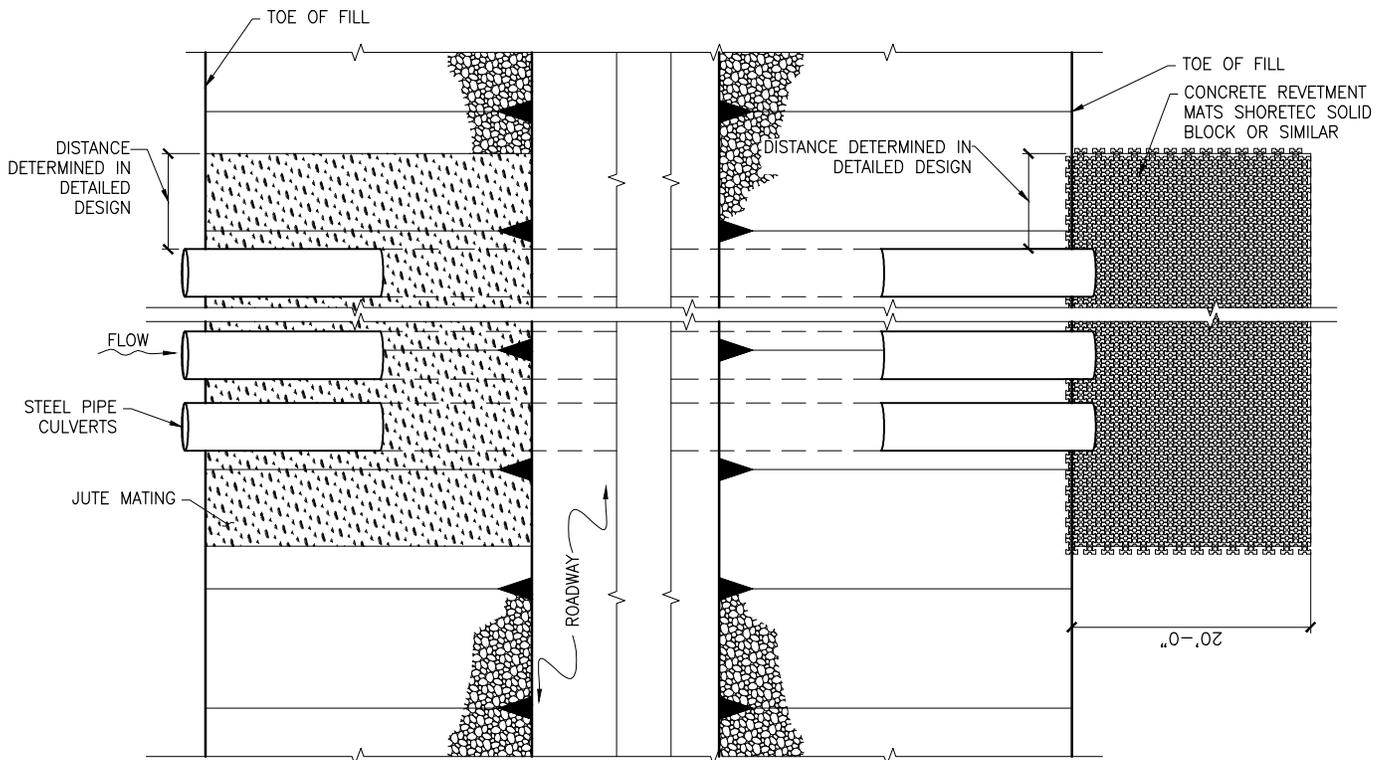


PROPOSED CULVERT SECTION

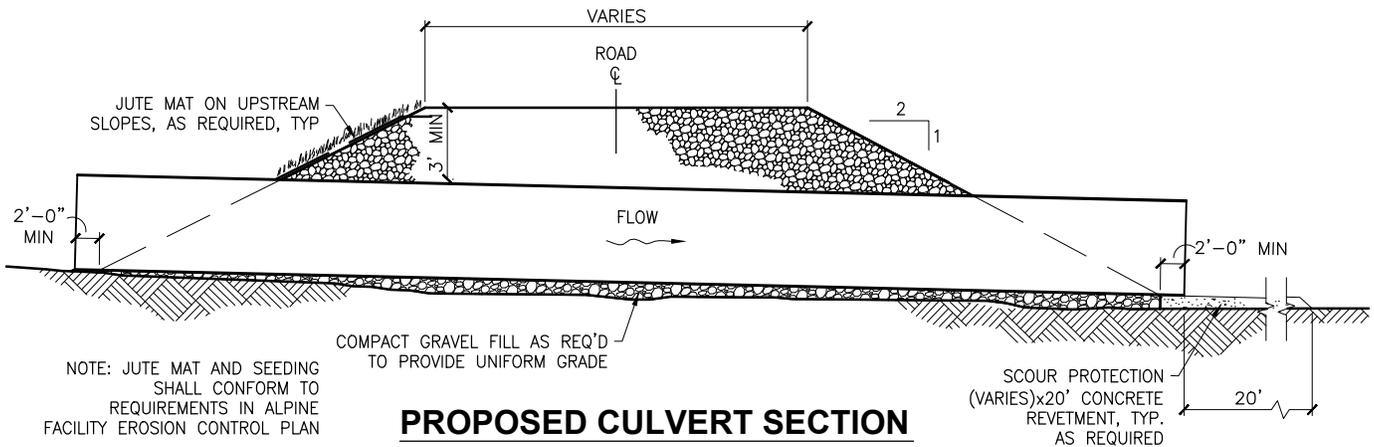
**GMT1 PROPOSED TYPICAL
CROSS DRAINAGE CULVERT
SECTION**



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **31** of **33** 09-08-14



PROPOSED CULVERT PLAN



PROPOSED CULVERT SECTION

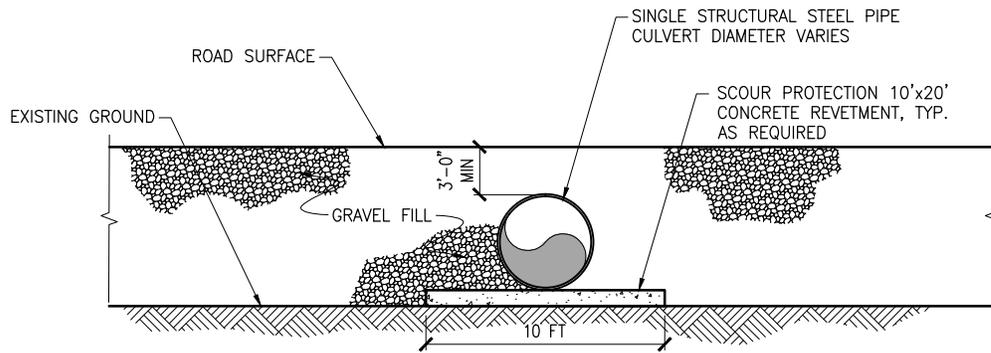
NOTE: JUTE MAT AND SEEDING SHALL CONFORM TO REQUIREMENTS IN ALPINE FACILITY EROSION CONTROL PLAN

GMT1 PROPOSED TYPICAL CREEK CULVERT

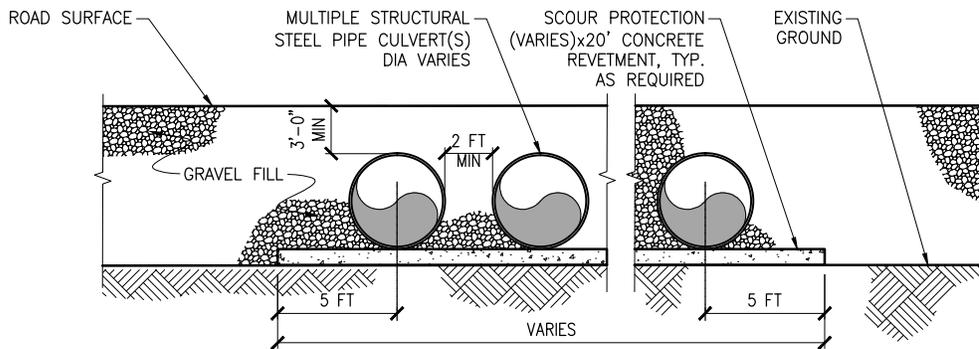


ConocoPhillips
Alaska, Inc.

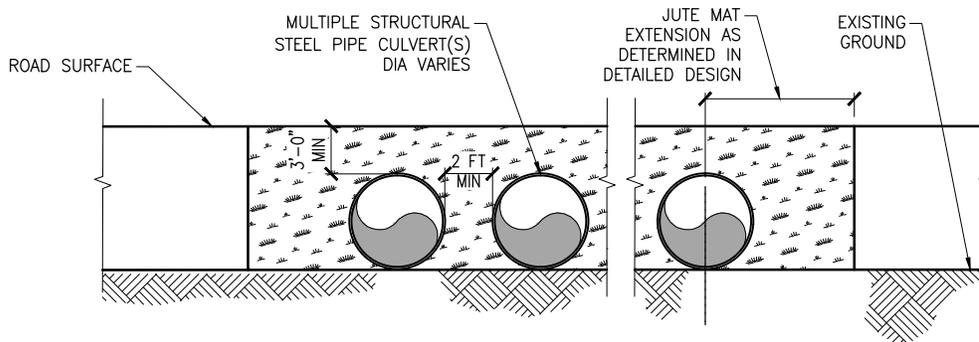
REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD, & PIPELINE CONSTRUCTION
 AT: ALASKA
 SHEET **32** of **33** 09-08-14



PROPOSED SINGLE CULVERT DOWNSTREAM ELEVATION



PROPOSED MULTIPLE CULVERTS DOWNSTREAM ELEVATION



PROPOSED MULTIPLE CULVERTS UPSTREAM ELEVATION

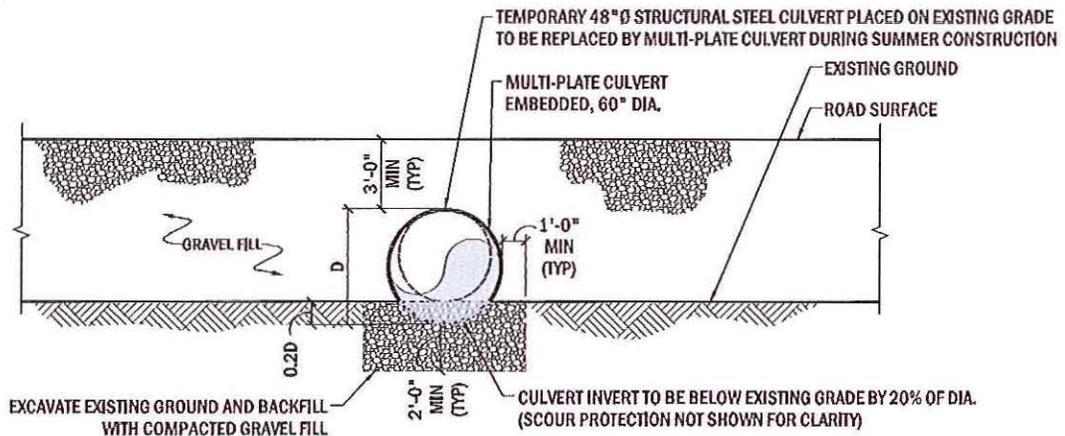
**GMT1 PROPOSED TYPICAL
CREEK CULVERT**



REFERENCE: POA 2013-461
 APPLICANT: CPAI
 PROPOSED: GMT1 ROAD, PAD,
 & PIPELINE
 CONSTRUCTION
 AT: ALASKA
 SHEET **33** of **33** 09-08-14

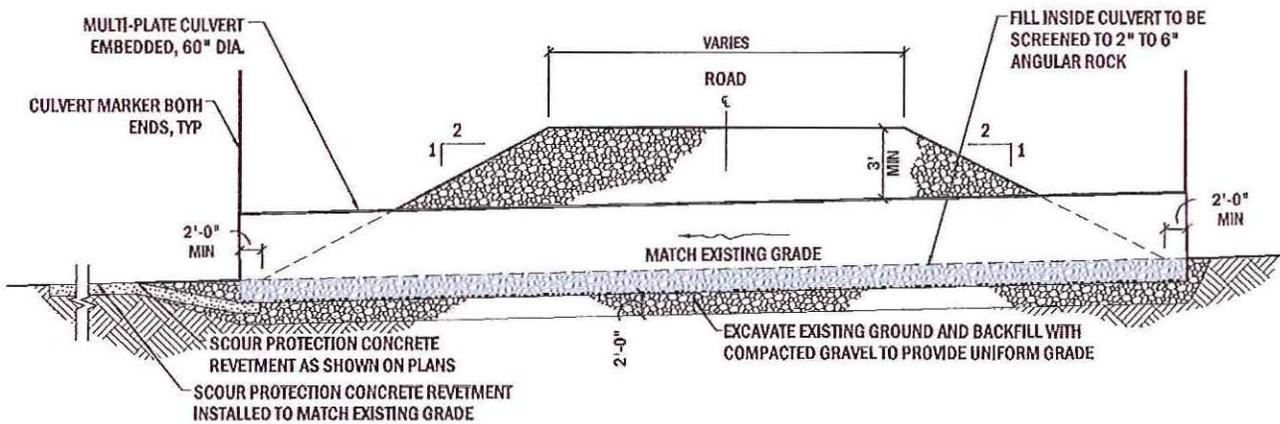
APPENDIX A - ATTACHMENT

**EXCERPT OF
TYPICAL FISH PASSAGE CULVERT DESIGN**



TYPICAL EMBEDDED CULVERT DETAIL

NOT TO SCALE



TYPICAL EMBEDDED CULVERT SECTION

NOT TO SCALE

P | N | D
ENGINEERS, INC.

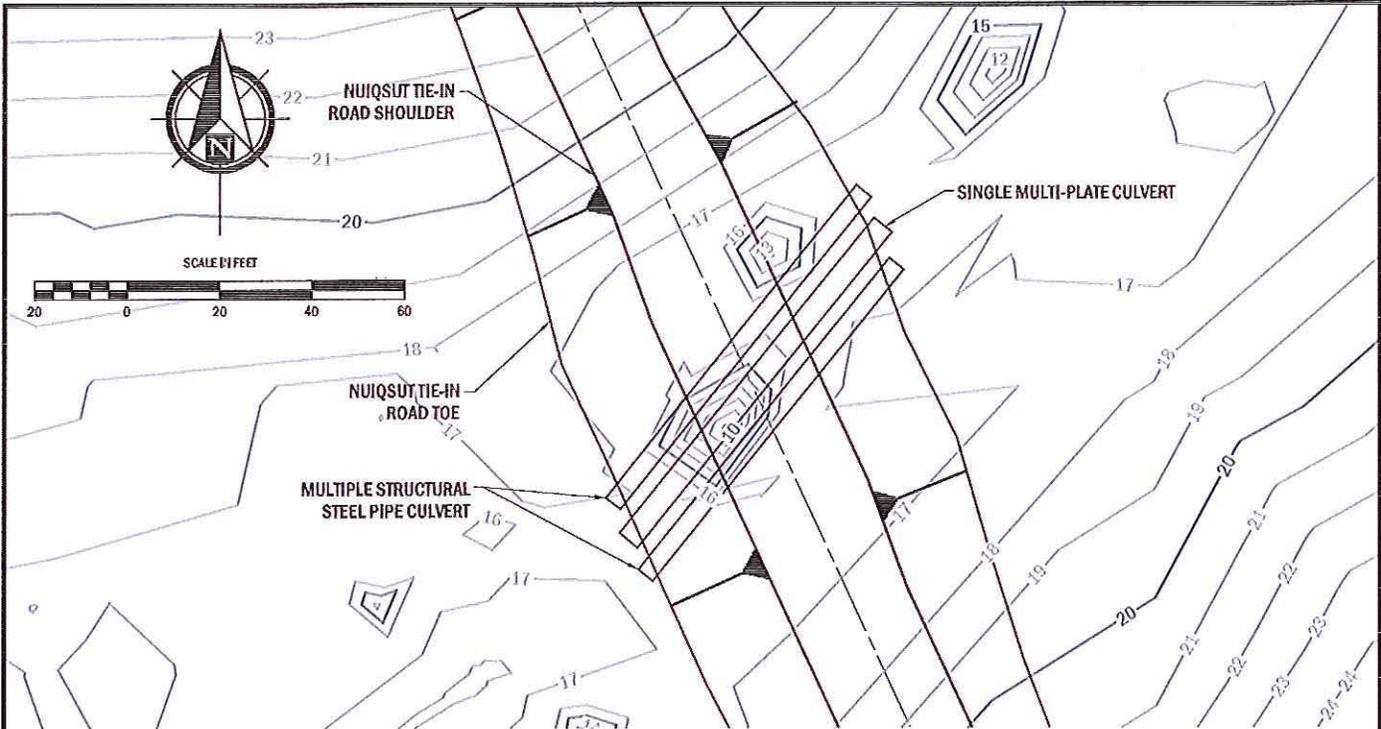
NOTE:

MULTI-PLATE CULVERT TO BE INSTALLED IN SUMMER ONLY. A TEMPORARY 48" Ø STRUCTURAL STEEL PIPE WILL BE PLACED ON EXISTING GRADE AT MULTI-PLATE CULVERT LOCATION DURING WINTER GRAVEL PLACEMENT TO PROVIDE DRAINAGE DURING SPRING BREAKUP PRIOR TO MULTI-PLATE CULVERT INSTALLATION.

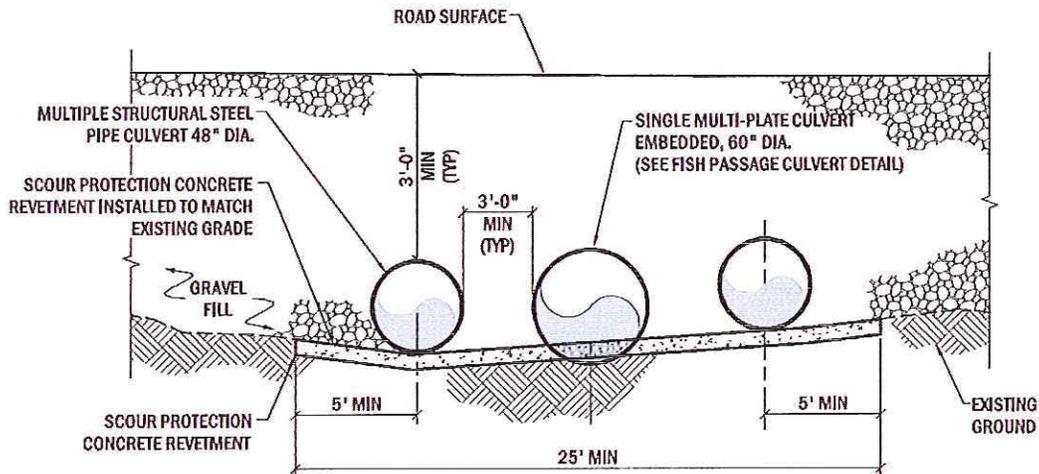
DESIGN SHOWN IS PRELIMINARY

REFERENCE: 2013
 APPLICANT: KUKUPIK CORPORATION
 PROPOSED: NUIQSUT TIE-IN ROAD CONSTRUCTION
 POA-2013-68 Colville River
 AT: ALASKA
 SHEET **11A** of **16** 2-19-13

TYPICAL FISH PASSAGE CULVERT SECTIONS



FISH PASSAGE CULVERT BATTERY PLAN



FISH PASSAGE CULVERT BATTERY ELEVATION

1H:2V

P | N | D
ENGINEERS, INC.

NOTES:
DESIGN SHOWN IS PRELIMINARY
SEE SHEET 11A FOR EMBEDDED CULVERT DETAILS

REFERENCE: 2013
 APPLICANT: KUKUPIK CORPORATION
 PROPOSED: NUIQSUT TIE-IN ROAD CONSTRUCTION
 POA-2013-68 Colville River
 AT: ALASKA
 SHEET **11B** of **16** 2-19-13

**FISH PASSAGE
CULVERT PLAN AND CROSS-SECTION**

APPENDIX B

ANILCA SECTION 810 ANALYSIS OF SUBSISTENCE IMPACTS

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APPENDIX B: ANILCA § 810 ANALYSIS OF SUBSISTENCE IMPACTS

This analysis of subsistence impacts is for the Supplemental Environmental Impact Statement (SEIS) for the Alpine Satellite Development Plan (ASDP) Environmental Impact Statement (EIS) to evaluate the proposed Greater Mooses Tooth 1 (GMT1) Development Project. ConocoPhillips Alaska, Inc. (CPAI) submitted applications with BLM for a right-of-way grant, authorization for permit to drill, and related authorizations in July 2013. CPAI is seeking approval to develop and produce oil from leases in the Greater Mooses Tooth Unit (GMTU) via a drill site and pipelines that would connect to the existing Alpine Central Processing Facilities in the Colville Delta. The proposed GMT1 project is located on the North Slope of Alaska in the northeast corner of the National Petroleum Reserve in Alaska (NPR-A) immediately west of the Colville River delta and approximately eight miles west of Nuiqsut (SEIS Volume 2, Map 2.5-1, Vicinity of CPAI Proposed Project). Three of the six alternatives analyzed in this SEIS include an access road to the GMT1 pad from the CD5 pad (Colville Delta 5), CPAI's drill site on the west side of the Colville River, for which construction began in winter 2013-2014. All of the action alternatives include a pipeline connecting GMT1 and CD5.

The GMT1 project is one of five drill sites included in the 2004 ASDP EIS. In the ASDP EIS, the GMT1 site was referred to as CD6. The Bureau of Land Management (BLM) prepared an EIS for the ASDP and issued a Record of Decision (ROD) in 2004 that approved the Preferred Alternative for permitting. After 2004, it was determined that satellites CD6 and CD7 were not located in the same reservoir as the other Alpine satellites. In 2008, the new GMTU was formed within the NPR-A, and CD6 and CD7 became known as GMT1 and GMT2, respectively.

In addition to the 2004 ASDP EIS, the BLM prepared the NPR-A Integrated Activity Plan/EIS in 2012, which is a comprehensive land use plan for the over 22 million acres of land managed by the BLM in the NPR-A. The BLM had previously (1998) completed a plan for the Northeast NPR-A (4.6 million acres). BLM amended this plan from 2003-2005, and completed a Final Supplemental plan for the Northeast NPR-A in May 2008. The GMT1 SEIS tiers to these previously conducted National Environmental Policy Act (NEPA) analyses, and incorporates new data and site-specific information.

The currently proposed GMT1 Project is similar to the project approved for permitting in the 2004 ASDP ROD, with changes that reduce the overall footprint and environmental impact. These changes include moving the drill site location out of the Fish Creek setback, reducing the road and pipeline length (and thereby reducing amount of fill required and impacts to wetlands), and increasing the length of the Tiŋmiaqsigvik (Ublutuoch) River bridge.

Chapters 3 (*Affected Environment*) and 4 (*Environmental Consequences*) of the GMT1 SEIS provide detailed descriptions of the affected environment of the planning area and the potential adverse effects of the various alternatives to subsistence and to subsistence resources. This appendix uses the detailed information presented in the SEIS to evaluate the potential impacts to subsistence pursuant to Section 810(a) of the Alaska National Interest Lands Conservation Act (ANILCA).

B.1 Subsistence Evaluation Factors

Section 810(a) of ANILCA, 16 USC § 3120(a), requires that an evaluation of subsistence uses and needs be completed for any federal determination to “*withdraw, reserve, lease, or otherwise permit the use, occupancy or disposition of public lands.*” As such, an evaluation of potential impacts to subsistence under ANILCA § 810(a) must be completed for the GMT1 SEIS. ANILCA requires that this evaluation include findings on three specific issues:

- The effect of use, occupancy, or disposition on subsistence uses and needs;
- The availability of other lands for the purposes sought to be achieved; and
- Other alternatives that would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes [16 USC § 3120(a)].

The evaluation and findings required by ANILCA § 810 are set out for each of the six alternatives considered in the GMT1 SEIS.

A finding that the proposed action may significantly restrict subsistence uses imposes additional requirements, including provisions for notices to the State of Alaska and appropriate regional and local subsistence committees, a hearing in the vicinity of the area involved, and the making of the following determinations, as required by Section 810(a)(3):

- Such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands;
- The proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of the use, occupancy, or other disposition; and
- Reasonable steps will be taken to minimize adverse effects upon subsistence uses and resources resulting from such actions.

To determine if a significant restriction of subsistence uses and needs may result from any one of the alternatives discussed in the GMT1 SEIS, including their cumulative effects, the following three factors in particular are considered:

- The reduction in the availability of subsistence resources caused by a decline in the population or amount of harvestable resources;
- Reductions in the availability of resources used for subsistence purposes caused by alteration of their normal locations and distribution patterns; and
- Limitations on access to subsistence resources, including from increased competition for the resources.

A significant restriction to subsistence may occur in at least two instances: 1) when an action substantially reduces populations or their availability to subsistence users, and 2) when an action substantially limits access by subsistence users to resources. Chapter 3 (*Affected Environment*) of the GMT1 SEIS provides information on areas and resources important for subsistence use, and the degree of dependence of the village of Nuiqsut on different subsistence populations. Chapter 4 (*Environmental Consequences*) provides much of the data on levels of reductions and limitations under each alternative, and is used to determine whether the action would cause a significant restriction to subsistence. The information contained in the GMT1 SEIS is the primary data used in this analysis.

A subsistence evaluation and findings under ANILCA § 810 must also include a cumulative impacts analysis. Section B.2 begins with evaluations and findings for each of the six alternatives discussed in the GMT1 SEIS. Finally, the cumulative case, as discussed in Chapter 4 (*Environmental Consequences*) of the GMT1 SEIS, is evaluated. This approach helps the reader to separate the subsistence restrictions that would potentially be caused by activities proposed under the five action alternatives from those that would potentially be caused by past, present, and future activities that could occur, or have already occurred, in the surrounding area.

When analyzing the effects of the six alternatives, particular attention is paid to Nuiqsut, the community that has the potential to be most directly impacted by the proposed actions. Nuiqsut is located on the Nigliq Channel of the Colville River and the GMT1 project area lies within the community's subsistence use area (SEIS Volume 2, Map 3.4-3, Nuiqsut Historic and Lifetime Subsistence Use Areas, All Resources). The cumulative analysis expands the evaluation of potential impact to consider areas beyond the project area in which past activities have impacted Nuiqsut subsistence use or in which future activities could occur that could impact Nuiqsut subsistence use and/or the subsistence resources that rely upon the habitat.

In addition to ANILCA, Environmental Justice, as defined in Executive Order 12898, also calls for an analysis of the effects of federal actions on minority populations with regard to subsistence. Specifically, Environmental Justice is:

The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including a racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies.

Section 4-4 of Executive Order 12898, regarding the subsistence consumption of fish and wildlife, requires federal agencies to collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence, and to communicate to the public any risks associated with the consumption patterns. The subsistence analyses for all the GMT1 development scenarios, located in Chapter 4 (*Environmental Consequences*), found that development of GMT1 under any of the action alternatives is likely to have major impacts on subsistence for the community of Nuiqsut according to the impact criteria established for the SEIS. Following the Council on Environmental Quality's guidance on incorporating Environmental Justice in NEPA, the BLM has worked to establish and maintain communication with the tribal government of Nuiqsut (Native Village of Nuiqsut), with the native corporation of Nuiqsut (Kuukpik Corporation), and with other residents in order to identify and understand potential impacts, to work collaboratively on mitigation, and to carefully consider the opinions of community members regarding preferences for development scenarios. Nuiqsut's village corporation (Kuukpik Corporation), the Arctic Slope Regional Corporation (ASRC), the North Slope Borough (NSB), and many residents have affirmed their support for the project and expressed a preference for Alternative A and disapproval of a roadless development scenario. These entities have also worked to clarify the significant economic benefits that the NSB and native corporation shareholders will gain from development at GMT1. Many members of the public in other North Slope communities defer to the preference of the community of Nuiqsut. The Native Village of Nuiqsut council has determined that mitigation efforts will not be sufficient to address the

impacts it predicts will occur with development of GMT1 and has expressed a preference for the no action alternative. The Native Village of Nuiqsut tribal council continues to participate as a cooperating agency on the SEIS and in weekly government-to-government consultation teleconferences with the BLM and to advocate for additional mitigation efforts. The environmental justice analyses discuss how the positive economic benefits that are expected to accrue to Nuiqsut residents from development of GMT1 may serve to mitigate a degree of the negative impacts to subsistence while identifying the range of negative impacts to subsistence that nevertheless constitute environmental justice issues.

B.2 ANILCA § 810(a) Evaluations and Findings for All Alternatives and the Cumulative Case

The following evaluations are based on information relating to the environmental and subsistence consequences of alternatives A through E and the cumulative case as presented in Chapter 4 (*Environmental Consequences*) of the GMT1 SEIS. The Best Management Practices (BMPs) established by the 2013 ROD for the NPR-A IAP/EIS would apply to all GMT1 SEIS alternatives. CPAI's leases in the GMT unit (renewed in 2008-2009) are under the lease stipulations established in the 2008 ROD for the Northeast NPR-A. The evaluations and findings focus on potential impacts to the subsistence resources themselves, as well as access to resources, and economic and cultural issues that relate to subsistence use.

B.2.1 Evaluation and Findings for Alternative A

Alternative A of the GMT1 SEIS is very similar to the preferred alternative from the 2004 ASDP EIS, and as such, a subsistence evaluation as required by ANILCA § 810 has already been completed. However, modifications to the proposed project, the decade that has passed since the ASDP was completed, the level of public interest in the project, and additional information regarding impacts to subsistence were among the factors BLM considered in its decision to prepare a Supplemental EIS. Furthermore, the 2004 ASDP did not include any analysis of impacts that may be associated with a road connecting GMT1 (and the Alpine field) to Nuiqsut, whereas construction began on the Kuukpik Corporation's Nuiqsut Spur Road project in spring 2014.

In Alternative A, the GMT1 Project would include a drill site on federal land in the GMTU, an access road and pipelines on federal and private land in the NPR-A, and a pipeline and pipe rack on private and state lands outside the NPR-A. The purpose of the project is to support development of petroleum reserves at the GMT1 pad. Several changes from the CD6 project that was approved in the 2004 ASDP would reduce the overall impact of GMT1. These include moving the drill site location out of the Fish Creek setback; reducing the road and pipeline length, and thereby reducing the amount of fill required and impacts to wetlands; and increasing the length of the Tiñmiaqsigvik (Ublutuoch) River bridge. The BMPs established in the 2013 ROD for the NPR-A and the lease stipulations from the 2008 Northeast NPR-A ROD would apply on BLM land.

B.2.1.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of Alternative A on subsistence presented in Section 4.4.5, *Subsistence*, considers reduced access to subsistence use areas, reduced availability of subsistence resources, and hunter avoidance of industrial areas due to construction and operation of GMT1. These types of

impacts are similar to those analyzed in the 2004 ASDP, however new information since 2004 indicates that the intensity of these impacts and overall degree of impacts are higher than previously anticipated.

The proposed GMT1 project study area overlaps with documented subsistence use areas and therefore would result in a loss in use areas overlapped by project components. In particular, a high number of overlapping caribou use areas has been documented throughout the project study area and recent documentation shows the highest number of overlapped areas focused along the Nigliq Channel, Fish Creek, and in overland areas west of the community toward the Tinmiaqsigvik (Ublutuoch) River and Fish Creek.

Although the actual footprint of the proposed project overlaps with only a small portion of Nuiqsut residents' subsistence use areas, avoidance of the area will be at a greater distance than the footprint and therefore the effective loss of subsistence use areas will be larger than the direct overlap. Moving to another area to avoid project components and activities means increasing competition among harvesters in areas with potentially fewer and less densely distributed subsistence resources. The access road to GMT1 will facilitate movement and access to subsistence resources but it may introduce increased hunting pressure among local harvesters in areas accessible by road. The road itself and traffic on the road may divert caribou, and some hunters will avoid the oil and gas infrastructure, including the road, altogether, resulting in a loss of hunting areas for those individuals.

Impacts on resource availability related to noise, traffic, and infrastructure, particularly during the construction phase, could affect the availability of key resources. Project components may cause local disruption of caribou in and near the project area. Even localized and limited changes in caribou distribution can affect the availability of caribou to harvesters because of residents' limited means to access caribou at different times of the year and the fact that caribou are not always available near Nuiqsut. Helicopter traffic is the most commonly cited impact on caribou hunting, but ground traffic on the road could also affect caribou distribution. Caribou, especially females with calves, tend to avoid areas of human activity. Because the Colville Delta is in the peripheral range of both the Teshekpuk and Central Arctic caribou herds, impacts to caribou populations are expected to be minor across alternatives. However, Nuiqsut harvesters are particularly vulnerable to changes in the distribution and/or behavior of caribou in these herds.

These impacts could result in increased investments in time, money, fuel, and equipment and potentially change hunting success. These impacts will likely have a greater negative impact on financially disadvantaged residents and/or residents for whom the project area has constituted a primary hunting area. If subsistence users stop using the project area, either due to avoidance or to reduced availability of resources, the opportunity to transmit traditional knowledge to younger generations about that traditional use area would be diminished and eventually lost. The loss of that knowledge could result in a permanent reduction in Nuiqsut's subsistence use area. The impacts will last for multiple generations and affect key subsistence use areas and overall Nuiqsut subsistence activities. Any changes to residents' ability to participate in subsistence activities, to harvest subsistence resources in traditional places at the appropriate times, and to eat subsistence foods could have long-term or permanent effects on culture by diminishing social ties within the community.

Mitigation measures developed by BLM in conjunction with Nuiqsut would serve to minimize, to the extent possible, impacts to subsistence use. Section 4.4.5.9, *Effectiveness of Lease Stipulations and Best Management Practices*, provides a detailed discussion of the BMPs and

lease stipulations already established. The measures seek to protect specific resources and subsistence practices by establishing buffer zones around infrastructure, scheduling disruptive activity when there is the least potential for conflict, including community residents in project planning, monitoring impacts on subsistence resources, and making other efforts to minimize the interference of oil and gas exploration and development activities with subsistence resources and activities. These measures include BMP E-1, which requires that all roads be designed to protect subsistence use and access to traditional hunting and fishing areas. BMP F-1 mitigates the impacts of low-flying aircraft on wildlife. BMP H-1 established the NPR-A Subsistence Advisory Panel, which is comprised of tribal and community representatives who review proposed and permitted activities in the NPR-A and make recommendations to BLM on how impacts could be lessened.

The Applicant (CPAI) has numerous voluntary policies and measures in place that also minimize impacts to subsistence. CPAI has attempted to coordinate helicopter-based hydrology studies with other regional oil development companies, has improved its ice road cleanup program to reduce helicopter flights, has established a daily call-in service to share updates on aircraft activity, and is attempting to schedule flights to avoid the peak hunting season. Any new mitigation measures would be established with the ROD for the GMT1 SEIS. Potential new mitigation measures that have been put forward for consideration and that might be established in the ROD include a legally binding Right of Access Agreement for the GMT1 road, the extension of subsistence monitoring studies on caribou and the initiation of similar studies on fish and fowl, a subsistence foods safety testing service, an aircraft monitoring plan, a measure to further reduce flights associated with ice road cleanup, and a measure that would require industry to use non-disruptive technology for monitoring whenever possible.

B.2.1.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The Naval Petroleum Reserves Production Act of 1976 (NPRPA), as amended, instructs the Secretary of the Interior to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the NPR-A. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.1.3 Evaluation of Other Alternatives that Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes include Alternative E (No Action). Section 2.3.2, *Alternatives Considered but Not Carried Forward*, discusses other alternatives that were considered, but eliminated from

detailed analysis due to economic or technological disadvantages, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

B.2.1.4 Findings

The effects of Alternative A fall above the level of significantly restricting subsistence use for the community of Nuiqsut. The potential impacts to subsistence resources by displacement, and impacts to access by subsistence users exceed the non-significant level; therefore, a positive determination pursuant to ANILCA § 810 is required.

According to BLM ANILCA policy, *“significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or a slight effect as opposed to large or substantial effects”* (BLM Instructional Memorandum No. AK86-350, Policy for Section 810 Compliance with the Alaska National Interest Lands Conservation Act). Further direction states *“no significant restriction results when there would be ‘no or a slight’ reduction in the abundance of harvestable resources and no or only ‘occasional’ redistribution of these resources; there would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources”* (ibid.).

The positive finding for Alternative A of a significant restriction to subsistence for the village of Nuiqsut is based on the following criteria:

- Displacement of caribou, wolf and wolverine from the Fish Creek traditional hunting area during the winter construction phase is expected to last for two years; two years is considered greater than “occasional redistribution,” it is substantial.
- The presence of oil and gas infrastructure in Nigliq and Fish Creek traditional hunting areas is considered more than a “slight inconvenience” to the subsistence users in Nuiqsut, who have historically altered their traditional hunting patterns to avoid oil and gas development. There would be a substantial effect on harvesters’ use of areas near the GMT1 infrastructure.
- The proposed project study area overlaps with 86 percent of all 2008-2011 caribou use areas and 22 percent of overland 2008-2011 caribou use areas. Forty-four percent of all Nuiqsut use areas and 31 percent of overland Nuiqsut use areas are overlapped by the project study area for the 1995-2006 time period (3.4-10). Infrastructure, traffic, and industrial effects such as noise and emissions in this area have the potential to reduce the abundance of harvestable resources, alter the distribution of these resources, and result in the non-use of traditional harvest areas.

The impacts to subsistence access discussed above will likely be affected by the increased ease of access provided by the GMT1 road in conjunction with the Nuiqsut Spur Road. While the road will make it easier for hunters to access the area by vehicle or off-road vehicle (ORV), it is likely that this increased amount of traffic will further displace animals from the area while concurrently increasing pressure among hunters who attempt to use the area.

B.2.2 Evaluation and Findings for Alternative B

Alternative B is based on keeping all GMT1 infrastructure out of the Fish Creek setback. Alternative A (the proposed project) already locates the drill site and portions of the road and pipeline outside the Fish Creek setback. Alternative B has the same design and location for the drill site, and east and west valve pads as Alternative A. Alternative B would differ from

Alternative A in that it would route the access road and pipeline from CD5 to GMT1 south of the Fish Creek setback and would tie-in to the CD5 road and pipeline east of the CD5 drill site (CD5 is within the Fish Creek setback). Alternative B would require a slightly longer road and pipeline as well as an additional pad for an emergency shut-off valve and vehicular access to valves. Alternative B would eliminate the need for a bridge over Crea Creek.

B.2.2.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of Alternative B on subsistence is presented in Section 4.4.5.4, *Impacts under Alternative B*. This analysis considers reduced access to subsistence use areas, reduced availability of subsistence resources, and hunter avoidance of industrial areas due to construction and operation of GMT1. These types of impacts are similar to those analyzed in the 2004 ASDP; however, new information since 2004 indicates that the intensity of these impacts and overall degree of impacts are higher than previously anticipated.

The analysis concludes that the effect of Alternative B on subsistence would be generally very similar to that of Alternative A. Under Alternative B, the road and pipeline would be slightly closer to Nuiqsut than under Alternative A. The potential for user avoidance may be higher due to the closer location, but this impact may be offset by the advantage of fewer disturbances to subsistence use of Fish Creek. Furthermore, some residents perceive an advantage in keeping industrial activities as close as possible to town, thereby leaving the more remote hunting areas less impacted. This is advantageous for those with the means and time to travel and hunt remote areas but disadvantageous for those who depend on hunting close to town. Bridges are perceived as highly impactful, therefore the one fewer bridge that would be constructed under Alternative B mean that this alternative is perceived as less impactful than Alternative A with its two required bridges.

B.2.2.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the Reserve. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the Petroleum Reserve. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.2.3 Evaluation of Other Alternatives that Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes include Alternative E (No Action). Section 2.3.2, *Alternatives Considered but Not*

Carried Forward, discusses other alternatives that were considered, but eliminated from detailed analysis due to economic or technological disadvantages, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

B.2.2.4 Findings

The effects of Alternative B fall above the level of significantly restricting subsistence use for the community of Nuiqsut. The potential impacts to subsistence resources by displacement, and impacts to access by subsistence users exceed the non-significant level; therefore, a positive determination pursuant to ANILCA § 810 is required.

According to BLM ANILCA policy, “*significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or a slight effect as opposed to large or substantial effects*” (BLM Instructional Memorandum No. AK86-350, Policy for Section 810 Compliance with the Alaska National Interest Lands Conservation Act). Further direction states “*no significant restriction results when there would be ‘no or a slight’ reduction in the abundance of harvestable resources and no or only ‘occasional’ redistribution of these resources; there would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources*” (ibid.).

The positive finding for Alternative B of a significant restriction to subsistence for the village of Nuiqsut is based on the following criteria:

- Displacement of caribou, wolf and wolverine from a traditional hunting area close to the community during the winter construction phase is expected to last for two years; two years is considered greater than “occasional redistribution,” it is substantial.
- The presence of oil and gas infrastructure in and adjacent to the Fish Creek traditional hunting area is considered more than a “slight inconvenience” to the subsistence users in Nuiqsut, who have historically altered their traditional hunting patterns to avoid oil and gas development. There would be a substantial effect on harvesters’ use of areas near the GMT1 infrastructure.
- The proposed project study area overlaps with 86 percent of all 2008-2011 caribou use areas and 22 percent of overland 2008-2011 caribou use areas. Forty four percent of all Nuiqsut use areas and 31 percent of overland Nuiqsut use areas are overlapped by the project study area for the 1995-2006 time period (Table 3.4-10). Infrastructure, traffic, and industrial effects such as noise and emissions in this area have the potential to reduce the abundance of harvestable resources, alter the distribution of these resources, and result in the non-use of traditional harvest areas.

The impacts to subsistence access discussed above will likely be affected by the increased ease of access provided by the GMT1 road in conjunction with the Nuiqsut Spur Road. While the road will make it easier for hunters to access the area by vehicle or ORV, it is likely that this increased amount of traffic will further displace animals from the area while concurrently increasing competition among hunter who attempt to use the area and leading to unauthorized trails and tundra damage.

B.2.3 Evaluation and Findings for Alternative C

Alternative C of the GMT1 SEIS is referred to as “the Alternative Access (via Nuiqsut)” alternative or the “Nuiqsut Hub” alternative. Alternative C has the following features in

common with Alternative A: GMT1 drill site, access road to CD5, pipeline, and east and west valve pads. Alternative C differs from Alternative A in that it includes upgrades (widening) of the Nuiqsut Spur Road and Nuiqsut Dump Road; construction of a new logistics pad connected to the existing Nuiqsut airstrip; construction of a new Airport Access Road between that logistics pad and the Dump Road, and a 500-foot extension of the runway at the Nuiqsut Airport that would include a bridge to support the extension. This alternative would allow the Nuiqsut Airport, rather than Alpine Central Facility, to be used as a logistics center (crews and supplies) for GMT1. Some residents of Nuiqsut perceive that a significantly increased economic benefit would accrue to Nuiqsut from this alternative because it would bring business to town and result in lower prices for goods and services in town. Alternative C has the largest footprint of any of the alternatives. Although the drill pad itself is not larger, the additional fill required for the industrialized spur road and extension of the airport contribute to the larger total footprint. The landowner of the Nuiqsut Spur Road is the Kuukpik Corporation, which has officially stated its opposition to this alternative in part due to anticipated impacts to subsistence. The BLM and its cooperating agencies recognize some benefit to analyzing the impacts of this alternative although the alternative could not be selected in the ROD without the support of the Kuukpik Corporation.

B.2.3.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of the effects of Alternative C on subsistence, presented in Section 4.4.5.5, *Impacts under Alternative C*, considers reduced access to subsistence use areas, reduced availability of subsistence resources, and hunter avoidance of industrial areas. These types of impacts are similar to those analyzed in the 2004 ASDP; however, new information since 2004 indicates that the intensity of these impacts and overall degree of impacts are higher than previously anticipated.

The impacts to subsistence under Alternative C would be similar to those for the proposed GMT1 Project (Alternative A) except for impacts related to increased road and air traffic near the community. Alternative C may divert air traffic from the Alpine Central Processing Facility (APF) to Nuiqsut and the potential reduction of air traffic at APF could reduce the disturbance to subsistence activities and resources in the Colville River delta around APF. Nuiqsut residents would already have the benefit of increased access from the Nuiqsut Spur Road that is being developed independently of this proposed project. The increased amount of traffic along the upgraded Nuiqsut Spur Road, however, would create additional impacts to resource availability beyond those anticipated under Alternative A. This increased traffic could create additional local displacement of caribou and would create the greatest impact for caribou hunters waiting for caribou along the Nigliq Channel. Alternative C would increase air traffic near Nuiqsut, which in itself could potentially benefit summer caribou hunters along the Nigliq Channel because there would be fewer flights into APF. This benefit, however, could be negated by the increased traffic on the Spur Road. Impacts to subsistence activities near Nuiqsut would disproportionately affect those hunters with less equipment, time, and funds for fuel who depend on harvesting game near town.

B.2.3.2 Evaluation of Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of

potential oil and gas tracts in the NPR-A. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the NPR-A. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.3.3 Evaluation of Other Alternatives that Would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes include Alternative E (No Action). Section 2.3.2, *Alternatives Considered but Not Carried Forward*, discusses other alternatives that were considered, but eliminated from detailed analysis due to economic or technological disadvantages, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

B.2.3.4 Findings

The effects of Alternative C fall above the level of significantly restricting subsistence use for the community of Nuiqsut. The potential impacts to subsistence resources by displacement, and impacts to access by subsistence users exceed the non-significant level; therefore, a positive determination pursuant to ANILCA § 810 is required.

According to BLM ANILCA policy, *“significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or a slight effect as opposed to large or substantial effects”* (BLM Instructional Memorandum No. AK86-350, Policy for Section 810 Compliance with the Alaska National Interest Lands Conservation Act). Further direction states *“no significant restriction results when there would be ‘no or a slight’ reduction in the abundance of harvestable resources and no or only ‘occasional’ redistribution of these resources; there would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources”* (ibid.).

The positive finding for Alternative C of a significant restriction to subsistence for the village of Nuiqsut is based on the fact that it would involve all of the impacts described above for alternatives A and B as well as additional impacts close to Nuiqsut and along the Nigliq Channel:

- Kuukpik Corporation has negotiated agreements with industry that prohibit a road connecting Nuiqsut to the oil fields as well as any industrial activity within a three-mile boundary of town. These agreements are based on the belief that industrial activity close to town would negatively impact subsistence activities. The Nuiqsut Spur Road is intended to allow residents to commute to work in the oil field and provide access to subsistence use areas and it was specifically designed to be inadequate for industrial uses.

- Nuiqsut caribou hunters cite aircraft traffic as the most common impact on caribou hunting and believe that increased air traffic diverts caribou herds away from areas, resulting in reduced harvest opportunities. Increased aircraft activity at Nuiqsut (particularly when combined with industrial road activity along the Spur Road) would likely deter caribou from the immediate area of town. This would disproportionately disadvantage those hunters without the means of traveling to remote areas to hunt.
- The proposed project study area overlaps with 86 percent of all 2008-2011 caribou use areas and 22 percent of overland 2008-2011 caribou use areas. Forty four percent of all Nuiqsut use areas and 31 percent of overland Nuiqsut use areas are overlapped by the project study area for the 1995-2006 time period (Table 3.4-10). Infrastructure, traffic, and industrial effects such as noise and emissions in this area have the potential to reduce the abundance of harvestable resources, alter the distribution of these resources, and result in the non-use of traditional harvest areas.

B.2.4 Evaluation and Findings for Alternative D1

Alternative D1 of the GMT1 SEIS is a Limited Access or “Roadless Alternative.” Under this alternative, there would be no year-round road access to GMT1 from the existing APF. In this scenario, transportation to GMT1 would be by aircraft approximately nine months of the year (May through January) and primarily via ice road approximately three months of the year (February through April). The only components in common with the proposed Alternative A are the pipeline and east and west valve pads. A 5,000-foot airstrip would be required near the GMT1 pad with the associated parking apron and storage building. The GMT1 pad would be larger and the access road (to the airstrip) shorter. Numerous other additional facilities required in the roadless alternative would include a mud plant and cement facility; a class-one disposal well; drilling and mud plant water supply; a 75-man drill rig support camp; an incremental 150-man construction support camp; a permanent full-service operations camp; a water and wastewater treatment plant; a 2-inch potable water pipeline; and other additional infrastructure required for a stand-alone facility. The footprint of Alternative D1 (with the addition of an airstrip and a larger drill pad) is greater than Alternatives A, B, or D2. Water use would also be greater as would emissions due to the redundant facilities at GMT1 as well as to annual ice road construction and increased air traffic. Power increase is estimated to be at least five-fold for this roadless development scenario.

B.2.4.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of the effects of Alternative D1 on subsistence, presented in Section 4.4.5.6, *Impacts under Alternative D1*, considers reduced access to subsistence use areas, reduced availability of subsistence resources, and hunter avoidance of industrial areas. These types of impacts are similar to those analyzed in the 2004 ASDP, however new information since 2004 indicates that the intensity of these impacts and overall degree of impacts are higher than previously anticipated.

The impacts to subsistence under Alternative D1 would be likely be greater than impacts under alternatives A, B, or C. Alternative D1 would result in increased air traffic in hunting areas west of the community and would create a new and significant source of air traffic that did not exist before. As noted, air traffic is the most frequently reported caribou hunting impact associated with development. Alternative D1 would result in fewer impacts associated with road traffic and facilitated motorized access to the area that are associated with Alternatives A, B, and C. Alternative D1 would create increased impacts to caribou, waterfowl, and furbearer

hunting due to increased air traffic and due to the additional project components and footprint. Annual ice road construction could impact fish habitat. The lack of a gravel road could present less physical disruption to caribou movement outside of the ice road season, although it is unclear whether this benefit would be offset by the increased air traffic, greater footprint than Alternatives A or B, increased emissions, and the continued presence of the pipeline. Hunter avoidance may increase due to the larger and more numerous project components west of the community and the continued presence of the pipeline. Hunters who would take advantage of a permanent gravel road to access the area would not have that opportunity in this scenario.

B.2.4.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the NPR-A. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the NPR-A. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.4.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes include Alternative E (No Action). Section 2.3.2, *Alternatives Considered but Not Carried Forward*, discusses other alternatives that were considered, but eliminated from detailed analysis due to economic or technological disadvantages, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

B.2.4.4 Findings

The effects of Alternative D1 fall above the level of significantly restricting subsistence use for the community of Nuiqsut. The potential impacts to subsistence resources by displacement, and impacts to access by subsistence users exceed the non-significant level; therefore, a positive determination pursuant to ANILCA § 810 is required.

According to BLM ANILCA policy, “*significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or a slight effect as opposed to large or substantial effects*” (BLM Instructional Memorandum No. AK86-350, Policy for Section 810 Compliance with the Alaska National Interest Lands Conservation Act). Further direction states “*no significant restriction results when there would be ‘no or a slight’ reduction in the abundance of harvestable resources and no or only ‘occasional’ redistribution of these resources; there would be no effect (or slight inconvenience) on the ability of harvesters to*

reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources” (ibid.).

The positive finding for Alternative D1 of a significant restriction to subsistence for the village of Nuiqsut is based on the following criteria:

- Significantly greater noise, light, and emissions from the drill and camp site are likely to displace subsistence resources to a greater degree relative to the footprint than a drill pad with year-round road support.
- The significant increase in air traffic is likely to displace animals (particularly caribou) from the area and will almost certainly lead to greater hunter avoidance of the area.
- Displacement of caribou, wolf, and wolverine from a traditional hunting area close to the community during two years of winter construction and annual winter ice road construction throughout the lifetime of the project is considered greater than “occasional redistribution.”
- The presence of oil and gas infrastructure adjacent to the Fish Creek traditional hunting area is disruptive to the subsistence users in Nuiqsut, who have historically altered their traditional hunting patterns to avoid oil and gas development.
- The proposed project study area overlaps with 86 percent of all 2008-2011 caribou use areas and 22 percent of overland 2008-2011 caribou use areas. Forty four percent of all Nuiqsut use areas and 31 percent of overland Nuiqsut use areas are overlapped by the project study area for the 1995-2006 time period (Table 3.4-10). Infrastructure, traffic, and industrial effects such as noise and emissions in this area have the potential to reduce the abundance of harvestable resources, alter the distribution of these resources, and result in the non-use of traditional harvest areas.

B.2.5 Evaluation and Findings for Alternative D2

Alternative D2 of the GMT1 SEIS is a second roadless development scenario under which only seasonal drilling (during the winter ice road season) would be permitted. The layout of GMT1 infrastructure would be the same as under Alternative D1. Unlike Alternative D1, there would not be additional drilling or well tie-in support personnel under Alternative D2. The drill rig and drilling support camp would be demobilized and transported off the GMT1 pad after each drilling season and remobilized and transported back to GMT1 once the ice roads are open. Because of the seasonal drilling limitation, infill drilling is expected to take 24 years, with first oil anticipated in 5 years. Production operations would continue for 30 years after first oil for a project lifetime of 35 years.

B.2.5.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

The analysis of the effects of Alternative D2 on subsistence, presented in Section 4.4.5.7, *Impacts under Alternative D2*, considers reduced access to subsistence use areas, reduced availability of subsistence resources, and hunter avoidance of industrial areas. These types of impacts are similar to those analyzed in the 2004 ASDP, however new information since 2004 indicates that the intensity of these impacts and overall degree of impacts are higher than previously anticipated.

The impacts to subsistence under Alternative D2 would be likely be greater than impacts under alternatives A, B, C, or D1 Alternative D2 would result in increased air traffic in hunting areas west of the community and would create a new and significant source of air traffic that did not exist before. As noted, air traffic is the most frequently reported caribou hunting impact associated with development. As with Alternative D1, Alternative D2 would result in fewer impacts associated with road traffic and facilitated motorized access to the area that are associated with Alternatives A, B, and C. As with Alternative D1, Alternative D2 would create increased impacts to caribou, waterfowl, and furbearer hunting due to increased air traffic and due to the additional project components and footprint. Annual ice road construction could impact fish habitat. As with Alternative D1, the lack of a gravel road could present less physical disruption to caribou movement outside of the ice road season, although it is unclear whether this benefit would be offset by the increased air traffic, greater footprint than Alternatives A or B, increased emissions, and the continued presence of the pipeline. Hunter avoidance may increase due to the larger and more numerous project components west of the community and the continued presence of the pipeline. Hunters who would take advantage of a permanent gravel road to access the area would not have that opportunity in this scenario.

B.2.5.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the NPR-A. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the NPR-A. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.5.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes include Alternative E (No Action). Section 2.3.2, *Alternatives Considered but Not Carried Forward*, discusses other alternatives that were considered, but eliminated from detailed analysis due to economic or technological disadvantages, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

B.2.5.4 Findings

The effects of Alternative D2 fall above the level of significantly restricting subsistence use for the community of Nuiqsut. The potential impacts to subsistence resources by displacement, and impacts to access by subsistence users exceed the non-significant level; therefore, a positive determination pursuant to ANILCA § 810 is required.

According to BLM ANILCA policy, “*significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or a slight effect as opposed to large or substantial effects*” (BLM Instructional Memorandum No. AK86-350, Policy for Section 810 Compliance with the Alaska National Interest Lands Conservation Act). Further direction states “*no significant restriction results when there would be ‘no or a slight’ reduction in the abundance of harvestable resources and no or only ‘occasional’ redistribution of these resources; there would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources*” (ibid.).

The positive finding for Alternative D2 of a significant restriction to subsistence for the village of Nuiqsut is based on the following criteria:

- All impacts from Alternative D2 would occur over a longer period of time (35 years instead of 30).
- Annual ice road construction would result in heavy industrial traffic during the construction period and numerous helicopter flights in early spring to clean up debris.
- Seasonally, greater noise, light, and emissions from the drill and camp site are likely to displace subsistence resources to a greater degree relative to the footprint than a drill pad with year-round road support.
- The significant increase in air traffic is likely to displace animals (particularly caribou) from the area and will almost certainly lead to greater hunter avoidance of the area.
- Displacement of caribou, wolf, and wolverine from a traditional hunting area close to the community during two years of winter construction and annual winter ice road construction throughout the lifetime of the project is considered greater than “occasional redistribution.”

The presence of oil and gas infrastructure adjacent to the Fish Creek traditional hunting area is disruptive to the subsistence users in Nuiqsut, who have historically altered their traditional hunting patterns to avoid oil and gas development. The proposed project study area overlaps with 86 percent of all 2008-2011 caribou use areas and 22 percent of overland 2008-2011 caribou use areas. Forty four percent of all Nuiqsut use areas and 31 percent of overland Nuiqsut use areas are overlapped by the project study area for the 1995-2006 time period (Table 3.4-10). Infrastructure, traffic, and industrial effects such as noise and emissions in this area have the potential to reduce the abundance of harvestable resources, alter the distribution of these resources, and result in the non-use of traditional harvest areas.

B.2.6 Evaluation and Findings for Alternative E

The No Action Alternative of the GMT1 SEIS precludes the currently proposed development in the GMTU. No oil from the GMT1 field would be produced. No new roads, airstrips, pipelines or other oil and gas facilities would be constructed pursuant to CPAI’s application for GMT1.

However, activities that are currently allowed as a result of the 1998 Northeast National Petroleum Reserve-Alaska Integrated Activity Plan/Environmental Impact Statement ROD and 2013 NPR-A IAP/EIS ROD would continue. These activities include seismic exploration, exploratory drilling of test wells, and the construction of ice roads and pads to support these operations.

B.2.6.1 Evaluation of the Effect of Use, Occupancy, or Disposition on Subsistence Uses and Needs

No additional impacts to subsistence would be expected under the No Action Alternative. Impacts can be expected to result in the project area from those actions associated with scientific research during the summer, and oil and gas exploration during the winter. Numerous studies are conducted on a year-round basis on the North Slope, and aerial survey by fixed-wing aircraft or helicopter, or ground surveys on foot or by ORV, all have the potential to disturb animals. However, the effects of these activities on species utilized by subsistence users are expected to be local and short-term, and to have no regional population effects.

B.2.6.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the NPR-A. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the NPR-A. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.6.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

No new oil and gas production or processing facilities would be developed in the GMT1 project area under the No Action Alternative, thus no additional public lands would be made unavailable for subsistence uses.

B.2.6.4 Findings

The effects of the No Action Alternative fall below the level of possibly significantly restricting subsistence uses and needs. The impacts to subsistence resources and access discussed above are minimal. This finding applies to the entire project study area.

B.2.7 Evaluation and Findings for the Cumulative Case

The goal of the cumulative analysis, as presented in Section 4.6, *Cumulative Impacts*, is to evaluate the incremental impact of the current action in conjunction with all past, present and reasonably foreseeable future activities in the Colville River drainage/Nuiqsut subsistence use area. It considers in detail activities that are more certain to happen, and gives special attention to activities that have been identified as being of great concern.

The cumulative effects analyses described in the ASDP EIS Section 4.G, pp. 1233-1333 (BLM 2004), NPR-A IAP/EIS Section 4.7, pp. 4-631 - 4-929 (BLM 2008), NPR-A IAP/EIS Section 4.8, pp. 1- 296 (BLM 2012), and Point Thomson EIS (Corps 2012, § 4.2 p. 4-2) provide an

overarching picture of existing and potential oil and gas related activities on the North Slope, to which the SEIS analysis is tiered and which are incorporated by reference.

Actions considered in the cumulative effects analysis for GMT1 include but are not limited to the following:

- CD5 Development Project
- GMT2 (conceptual development)
- Future development of the Bear Tooth Unit
- Nuiqsut Spur Road
- Colville River Access Road
- Winter oil and gas exploration
- Offshore oil and gas development in the Beaufort and Chukchi seas and onshore support infrastructure
- Road and pipeline between Umiat Area and Dalton Highway
- ASRC Mine site expansion
- Natural gas pipeline to move North Slope gas to market

These actions are moreover considered in light of the shifting environmental conditions presented by climate change.

B.2.7.1 Evaluation of the Effect of Such Use, Occupancy, or Disposition on Subsistence Uses and Needs

Section 4.6, *Cumulative Impacts*, of the GMT1 SEIS contains a detailed description of the cumulative-case scenario, including past effects, present effects, and the future possible oil field and infrastructure development upon which this evaluation is based. The cumulative analysis expands the geographic area of potential impact beyond the project study area to include areas in which activities could occur that would impact subsistence users of Nuiqsut, subsistence resources, and wildlife habitat.

The extent of expected cumulative effects on subsistence resources and subsistence access and other activities would be very similar if Alternative A, B, or C is selected in the ROD. The expected cumulative effects if Alternative D1 or D2 is selected would be quite different due to the lack of access roads and the increase in aircraft traffic. However, the analysis of the effects of the cumulative case presented in Section 4.6.10.8, *Subsistence*, indicates that, irrespective of the alternative selected, cumulative activity in the Nuiqsut subsistence use area has the potential to significantly restrict subsistence use. Subsistence resources also have the potential to be impacted under the cumulative case. The remainder of this analysis focuses in part on the impacts that would be associated with an access road to GMT1 and assumes access roads to any future development west of GMT1. For the roadless scenarios (Alternatives D1 and D2), impacts from roads as described below would not accumulate from development of GMT1 and impacts from aircraft traffic (noise, emissions, larger footprint of sites) would accumulate.

The CD5 development project, construction of which began in the winter 2013-2014 season, is the most closely connected action to the proposed GMT1 project and will likely have the most immediate cumulative impacts on subsistence. Development of GMT1 is dependent upon the

construction and operation of CD5. CD5 is located directly west of the Nigliq Channel (approximately eight miles north of Nuiqsut) and, when complete, will be connected via a bridge and pipeline to the Alpine field in the Colville Delta. Due in part to its potential impacts on subsistence resources, development of the CD5 project has been delayed by permit complications and controversy. Some Nuiqsut subsistence hunters claim that development of CD5 will negatively impact their traditional subsistence use areas because they have set net sites and fish camps and they fish for several species of fish in the Nigliq Channel, that they use the Nigliq Channel for transportation to other subsistence resources and to access the Beaufort Sea for whaling and hunting, and that they hunt for birds and caribou in the area of the CD5 well pad and in the area of the proposed bridge. In the cumulative case, the impacts of CD5 may be considered synergistic, since further development in the GMTU is dependent on CD5.

The combined footprint of GMT1, CD5, and the other existing development in the Colville Delta, and the reasonably foreseeable development at GMT2 and in the Bear Tooth Unit could create a large amount of development west of Nuiqsut. Considered along with Kuparuk to the east, this effectively establishes a corridor of industrial development between Nuiqsut and the coast that extends eastward to Prudhoe and westward in a direction that partly encircles the community. The GMT2 development project is a reasonably foreseeable future activity that, like CD5 and GMT1, was approved for permitting in the 2004 ASDP ROD. Because the exact location and parameters of GMT2 development are unclear, this SEIS uses a conceptual GMT2 development plan to analyze potential impacts. GMT2 would be located approximately 22 miles west of Nuiqsut, approximately 7 to 8 miles southwest of GMT1, and would include similar infrastructure and footprint as GMT1. GMT2 is dependent on GMT1 (and both are dependent on CD5). The potential direct and indirect impacts of GMT2 would be very similar to that of GMT1 and these impacts would be additive. However, it is likely that development of GMT2 would make it feasible to develop other oil drill sites further west (i.e., most immediately in the Bear Tooth Unit). In that case, the impacts of GMT2 would be considered synergistic. Considered together with development east of the Colville Delta (Kuparuk and Prudhoe), in the Delta (CD1, CD2, CD3, and CD4), west of the Delta with CD5 and GMT1, and additional development further west, the cumulative impacts of GMT2 would include an extension of the corridor of industrial development between Nuiqsut and the coast. The westward expansion of industry could place Nuiqsut in an even more disadvantageous position regarding the Teshekpuk Herd. An access road to GMT2, like that to GMT1, would have some countervailing effects, but these would be outweighed by the adverse impacts of additional development within the area. If GMT1 is developed, it is likely that the pre-development GMT2 area will have an even higher value for subsistence because it will become one of the increasingly rare areas near town without industrial development.

The Nuiqsut Spur Road is a new gravel road (5.8 mile-long, 24 ft. wide) that, when complete, will connect Nuiqsut to the CD5 access road. The Nuiqsut Spur Road is a private road owned by the Kuukpik Corporation and is located entirely on Kuukpik land. Construction began in winter 2013-2014. The Kuukpik Corporation proposed the road in order to increase user access to subsistence resources in subsistence hunting areas in the Colville Delta and CD5 area and, with the access road to GMT1 proposed in Alternatives A, B, and C, the GMT Unit. The road would also enhance the ability of Nuiqsut residents to obtain training and employment, and to support Kuukpik Corporation business activities by providing year-round access to the Alpine field. Residents will be able to use the road with road vehicles, ORVs, and snowmachines. Residents already use ice roads seasonally with all these vehicles and also commonly use road vehicles to transport snowmachines to more remote hunting areas via the ice roads, therefore it is likely that the Nuiqsut Spur Road will be used in the same ways during the winter and for vehicles and ORVs during the rest of the year. It is likely that the Nuiqsut Spur Road will result in

increased subsistence hunting in the Colville Delta and GMTU areas. This facilitated access to traditional hunting areas can be considered a countervailing effect that partially mitigates the negative impact of loss of subsistence use areas by industrial development. The road may increase hunting pressure in the areas where access is facilitated, and these areas could likely experience greater disturbance to subsistence resources, particularly caribou, due to industrial activity and traffic on the road.

The Colville River access road is proposed by the Native Village of Nuiqsut that would allow residents to drive from town to a boat launch area south of town on the main channel of the Colville River. This is desirable because otherwise subsistence boating requires travel up the Nigliq Channel to reach the Colville and that area of the Nigliq is often too shallow to allow safe passage. The Colville River access road will facilitate boat access to upriver and downriver areas of the Colville including to tributaries of the Colville that are traditionally valuable for subsistence, and that will likely become increasingly valuable due to additional development to the North and West of town. The Colville River access road is therefore a countervailing impact with regards to the decreasing utility of subsistence land to the north, east, and west of town.

Annual winter oil and gas exploration activities are expected to continue in areas west of Nuiqsut in the coming decades. These activities include seismic exploration, ice road construction and well testing. Seismic is thought to disturb animals from the area and create difficult terrain for snowmachines. Ice road construction requires substantial fresh water use from local fish-bearing lakes and results in summer air traffic to plan routes and to retrieve marker stakes. The ice roads facilitate access to remote areas that some subsistence hunters appreciate and can be considered a minor countervailing effect although hunter avoidance, considered with the other adverse impacts, means that overall impacts of winter oil and gas activities are adverse and additive.

Foreseeable development in the NPR-A could also include onshore facilities to support offshore development in the Chukchi Sea and could extend across much of the NPR-A and land west of the NPR-A via a pipeline that would tie into the Trans Alaska Pipeline System. Foreseeable development in the Beaufort Sea would require onshore pipelines and could require onshore processing facilities west of the GMT1 project study area that could impact the Teshekpuk Herd. The onshore support infrastructure for offshore activities could make it more economically viable to extract oil and gas reserves from a wide area spanning the NPR-A in which oil and gas would otherwise not be economically recoverable, many of which may be subsistence use areas. This could cause a synergistic increase in disturbance sources. There is the potential for this scenario to have a significant impact on subsistence resources and access to those resources for the communities of Point Lay, Wainwright, Barrow, Atqasuk, Anaktuvuk Pass, and Nuiqsut. Furthermore, infrastructure built for coastal onshore oil and gas activities could also encourage offshore development, creating a self-reinforcing system.

An all-season gravel road and pipeline connecting Umiat (in southeast NPR-A, about 60 miles south of Nuiqsut on the Colville River) with the Dalton Highway is another reasonably foreseeable development within the geographic scope considered for cumulative effects to subsistence. The U.S. Army Corps of Engineers (Corps) was the lead agency on a recent EIS for the proposal, which is currently suspended. Industry is currently exploring oil reserves at Umiat, the success of which may determine the viability of this road and pipeline. If a relatively direct route from the Dalton Highway to Umiat were used, the road would be approximately 102 miles long with an estimated footprint of 505 acres. It is unknown whether the road would be open to the public or restricted to industry; this analysis considers both uses while noting that the impacts of the road would be much more significant were it open to the public. There would

likely be important effects on subsistence by oil and gas and non-oil and gas use of the road, which would cut across north-south caribou migration paths and potentially affect animals in the Teshekpuk Herd and Central Arctic Herd during some autumn and spring migrations. A public road would provide increased access to caribou by non-local hunters and, if hunting were not appropriately managed, this could result in a cumulative increase in caribou mortality. Also, caribou may adapt to the presence of a road in a way that does not substantially affect the herds, but may have a substantial effect on subsistence hunters that rely on specific paths of movement by migrating caribou. If public, the road would provide access to all navigable parts of the Colville River drainage to hunters and recreationalists with boats from other areas, increasing hunting pressure and disturbance in both Nuiqsut and Anaktuvuk Pass's subsistence use areas. If boaters use this access to reach the Beaufort Sea, this could increase disturbance to Nuiqsut's marine mammal subsistence hunting areas. The Umiat road and pipeline would also increase the likelihood of additional impacts to fish to the southeast of the GMT1 project study area because permanent infrastructure (e.g. roads, pads, pipelines, and causeways) and gravel mining are likely to continue contributing to changes in natural drainage patterns and water quality, alternations to physical habitat, barriers to fish movement, and increased water pollution. If public, the road could also lead to synergistic pressures on fish in the Colville River and its tributaries due to greater use of the area for sport and subsistence fishing.

The cumulative effects of these current and future activities on caribou distribution and abundance are likely to be long-term, lasting as long as the life of the onshore and offshore oil fields. Any reduction in the calving and summer habitat use by cows and calves from future onshore development would represent a functional loss of habitat that could result in long-term effects on the caribou herds' productivity and abundance.

B.2.7.2 Evaluation of the Availability of Other Lands for Oil and Gas Exploration and Development

The NPRPA, as amended, gave the Secretary of the Interior the authority to conduct oil and gas leasing in the NPR-A. In 1980, Congress granted the authorization for petroleum production to occur and directed the Secretary of the Interior to undertake a program of competitive leasing of potential oil and gas tracts in the NPR-A. In 2004, the ASDP ROD approved the GMT1 (then CD6) project for permitting, and in 2013, the NPR-A IAP ROD analyzed impacts of future development in and around the Alpine Field, particularly GMT1 and the reasonably foreseeable GMT2. The purpose of the GMT1 SEIS is to consider any new and site-specific information relevant to this previously authorized project. The proposed project was designed to develop oil from a delineated oil field on valid leases within the NPR-A. Other lands managed by the BLM are either too remote for economically viable oil and gas production, or have not had discoveries of sufficient quantities of oil or gas to make oil production feasible and economic. State lands located east of the Colville River are over a different delineated oil and gas reservoir, and could not be used to access the GMTU reservoir.

B.2.7.3 Evaluation of Other Alternatives that would Reduce or Eliminate the Use, Occupancy, or Disposition of Public Lands Needed for Subsistence Purposes

Alternatives that would reduce or eliminate the use of public lands needed for subsistence purposes include Alternative E (No Action). Section 2.3.2, *Alternatives Considered but Not Carried Forward*, discusses other alternatives that were considered, but eliminated from

detailed analysis due to economic or technological disadvantages, or because they did not meet the purpose of the proposed action to produce the oil discovered on CPAI's leases.

B.2.7.4 Findings

The effects of the cumulative case as presented in this analysis, when taken in conjunction with all alternatives, fall above the level of significantly restricting subsistence use for the communities of Nuiqsut, Barrow, Atqasuk, Anaktuvuk Pass, Point Lay, and Wainwright. The potential impacts to subsistence resources by displacement, and impacts to access by subsistence users exceed the non-significant level; therefore, a positive determination pursuant to ANILCA § 810 is required.

According to BLM ANILCA policy, *“significant restrictions are differentiated from insignificant restrictions by a process assessing whether the action undertaken shall have no or a slight effect as opposed to large or substantial effects”* (BLM Instructional Memorandum No. AK86-350, Policy for Section 810 Compliance with the Alaska National Interest Lands Conservation Act). Further direction states *“no significant restriction results when there would be ‘no or a slight’ reduction in the abundance of harvestable resources and no or only ‘occasional’ redistribution of these resources; there would be no effect (or slight inconvenience) on the ability of harvesters to reach and use active subsistence harvesting sites; and there would be no substantial increase in competition for harvestable resources”* (ibid.).

B.3 Notice and Hearings

ANILCA § 810(a) provides that no “withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected” until the federal agency gives the required notice and holds a hearing in accordance with ANILCA § 810(a)(1) and (2). BLM provided notice in the Federal Register that it made positive findings pursuant to ANILCA § 810 that the alternatives A, B, C, D and cumulative case presented in the GMT1 SEIS, met the “may significantly restrict” threshold (the notice and hearings did not refer to Alternative D2 because it was not included in the Draft SEIS). As a result, public hearings were held in the potentially affected communities of Nuiqsut, Barrow, Atqasuk, Anaktuvuk Pass, Point Lay, and Wainwright. Notice of these hearings was provided in the Federal Register and by way of the local media, including the Arctic Sounder newspaper, and KBRW, the local Barrow radio station with coverage to all villages on the North Slope. Meetings were held on the following dates as posted on BLM’s website at www.blm.gov/ak/gmt

- 3/10/2014: Point Lay
- 3/11/2014: Atqasuk
- 3/12/2014: Barrow
- 3/13/2014: Nuiqsut
- 3/17/2014: Wainwright
- 3/18/2014: Anaktuvuk Pass

B.4 Subsistence Determinations Under ANILCA § 810(a)(3)(A), (B), and (C)

ANILCA § 810(a) provides that no “withdrawal, reservation, lease, permit, or other use, occupancy or disposition of the public lands which would significantly restrict subsistence uses shall be effected” until the federal agency gives the required notice and holds a hearing in accordance with ANILCA §810(a)(1) and (2), and makes the three determinations required by ANILCA § 810(a)(3)(A), (B), and (C). The three determinations that must be made are: 1) that such a significant restriction of subsistence use is necessary, consistent with sound management principles for the utilization of the public lands; 2) that the proposed activity will involve the minimal amount of public lands necessary to accomplish the purposes of such use, occupancy, or other such disposition; and 3) that reasonable steps will be taken to minimize adverse impacts to subsistence uses and resources resulting from such actions [16 U.S.C. § 3120(a)(3)(A), (B), and (C)].

The BLM has found in this subsistence evaluation that Alternatives A, B, C, D1, and D2 would significantly restrict subsistence uses for the community of Nuiqsut and that the cumulative case would significantly restrict subsistence uses for Nuiqsut, Point Lay, Atqasuk, Wainwright, Barrow, and Anaktuvuk Pass. Therefore, BLM undertook the notice and hearing procedures required by ANILCA § 810 (a)(1) and (2) in conjunction with release of the Draft GMT1 SEIS in order to solicit public comment from the potentially affected communities of Nuiqsut, Barrow, Atqasuk, Anaktuvuk Pass, Point Lay, and Wainwright and subsistence users.

B.4.1 Significant Restriction of Subsistence Use is Necessary, Consistent with Sound Management Principles for the Utilization of Public Lands

BLM is undertaking this ASDP SEIS for the GMT1 project to fulfill BLM’s responsibilities to manage these lands under authority of the Naval Petroleum Reserves Production Act and Federal Land Policy and Management Act while providing special protections for specific habitats and site-specific resources and uses. This SEIS is in response to CPAI’s applications with BLM to develop and produce oil from leases in the GMTU and in accordance with BLM obligations to permit development on leased tracks in the NPR-A. The SEIS will provide the opportunity, subject to appropriate conditions developed through a NEPA process, to construct the necessary infrastructure to produce oil resources from the GMTU. The Naval Petroleum Reserves Production Act authorizes and directs the Secretary of the Interior to “further explore, develop and operate” the NPR-A (10 U.S.C § 7421). At the same time, the statute also requires that all oil and gas activities “undertaken pursuant to this section shall include or provide for such conditions, restrictions, and prohibitions as the Secretary deems necessary or appropriate to mitigate reasonably foreseeable and significantly adverse effects on the surface resources” of the National Petroleum Reserve in Alaska (42 U.S.C. § 6508).

It was in furtherance of these objectives, together with other management guidance found in the NPRPA, Federal Land Policy and Management Act, NEPA, and ANILCA, that this SEIS was undertaken. After considering the range of alternatives, the BLM has determined that Alternative B best fulfills the purpose and need of this proposed action, while incorporating protective measures that serve to minimize impacts to important subsistence resources and subsistence use areas. Alternative B considers the necessity for economically feasible development while providing protections to minimize impacts to subsistence resources and uses. Under Alternative B, the lease stipulations and BMPs that accompany the alternative serve as

primary mitigation measures to be used to reduce the impact of the proposed activity on subsistence uses and resources.

The BLM has considered and balanced a variety of factors with regard to the proposed activity on public lands, including, most prominently, the comments received during the public meetings and hearings which stressed the importance of facilitating Nuiqsut residents' continued use of the project area and local preferences for development scenarios that contribute the lowest increase in aircraft traffic. The BLM has determined that the significant restriction that may occur under Alternative B, when considered together with all the possible impacts of the cumulative case, is necessary, consistent with sound management principles for the use of these public lands, and for BLM to fulfill the management goals of the NPR-A as directed by the 2013 NPR-A IAP/EIS, the NPRPA, Federal Land Policy and Management Act, and other applicable laws.

B.4.2 The Proposed Activity will involve the Minimal Amount of Public Lands Necessary to Accomplish the Purposes of such Use, Occupancy or Other Disposition

The BLM has determined that Alternative B involves the minimal amount of public lands necessary to accomplish the purpose of the proposed activity—namely, to allow for the development and production of oil reserves in the GMT Unit, while providing special protections for specific habitats and site-specific resources and uses. Alternatives that varied between GMT1 access road routes, roadless development scenarios, roadless development with seasonal drilling, and the no action alternative were analyzed. Alternative B would be in full compliance with BLM's BMP/Lease Stipulation K-1(e) for oil and gas development in the NPR-A, which prohibits permanent oil and gas facilities, including gravel pads, roads, and pipelines, within a three-mile setback from Fish Creek. In consultation with residents of Nuiqsut and the North Slope Borough, the BLM established the 3-mile Fish Creek setback in the 1998 Northeast NPR-A ROD to protect important subsistence activities and resources. In 2013, when BLM adopted its new ROD for the NPR-A, BLM maintained the Fish Creek setback.

Aside from reducing subsistence impacts, the Alternative B route eliminates the bridge and pipeline crossing over Crea Creek and the crossing of Barely Creek, which are components of the Alternative A route. The Alternative B route is also preferable to maintain the Fish Creek setback for subsistence, to reduce impacts to fish, and to minimize potential disturbance from the road in Nuiqsut's hunting areas by keeping traffic and infrastructure closer to the village. The Corps has not yet determined whether Alternative B is the Least Environmentally Damaging Practicable Alternative (LEDPA). The Corps' determination will be considered by the BLM when making a final decision in its ROD.

B.4.3 Reasonable Steps will be Taken to Minimize Adverse Impacts upon Subsistence Uses and Resources Resulting from such Actions

BLM determined that a supplement to the 2004 ASDP EIS was appropriate to analyze the GMT1 project due to changes in project component locations, the amount of time passed since the ASDP ROD, and potential impacts to subsistence. The information found through the analysis of impacts to subsistence, including access, harvests, and traditional use patterns, as well as the results of public meetings and ANILCA Subsistence Hearings in the aforementioned villages of the North Slope, meetings with the NPR-A Subsistence Advisory Panel, input from the newly established NPR-A Working Group, and consultation with tribal and local

governments (especially the NSB and the Native Village of Nuiqsut, both cooperating agencies), were used to analyze the impacts of the various alternatives and identify Alternative B as the BLM's Preferred Alternative. The information gathered through analysis and consultation resulted in the retention and addition of several protective measures that are designed to minimize adverse impacts to subsistence uses and resources. Sections 4.4.5.9– 4.4.5.10 of the SEIS provide a detailed discussion of the effectiveness of existing lease stipulations and BMPs and of potential new mitigation measures. Existing measures include:

- BMP A-11 specifically addresses contaminants in subsistence foods and requires that baseline data be collected prior to development, as well as monitored during operation through the abandonment phase. The program to collect baseline data for GMT1 commenced in winter 2013-2014 and continues to be improved according to input from Nuiqsut. A potential new mitigation measure, included at the request of hunters, could be established with the ROD for GMT1 that would expand this program to include a subsistence foods testing service and therefore allow harvesters to submit samples of sick or questionable fish and game for testing.
- BMP E-1 addresses access to subsistence resources and the protection of resource habitats by requiring that all roads must be designed, constructed, maintained, and operated to create minimal environmental impacts and to protect subsistence use and access to subsistence hunting and fishing areas. To assure access is not unduly impacted by the GMT1 access road, BLM will require that access ramps will be included in the project design at regular intervals along the road. Similarly, Lease Stipulation E-3 sets the requirements for the construction of dock and causeways so as not to impede fish passage or subsistence access. BMP E-7 sets forth the requirements for pipelines and associated roads in order to allow the free movement of caribou and access to subsistence users.
- BMP F-1 addresses aircraft use by permittees in the NPR-A and sets forth altitude requirements for flying over multiple species at various times during the year and BLM's expectations for aircraft use near subsistence camps and cabins and during sensitive subsistence hunting periods. The permit for GMT1 may establish additional measures to address impacts from aircraft, including requiring an aircraft monitoring plan that will be designed to track and analyze industry's aircraft use, reduce unnecessary flights, report all instances of deviation from BMP F-1, and iteratively improve flight management to reduce impacts.
- BMP H-1 requires consultation by permittees with communities that are potentially affected by proposed activity in order to determine whether any traditional knowledge or other input could be used to minimize impacts to subsistence use. The best management practice also requires applicants to submit a subsistence plan to BLM that discusses the results of their consultation and outlines steps the applicant is taking to minimize any impacts identified.

As required by BMP H-1, CPAI submitted a subsistence plan for GMT1 in June 2014. BLM considers the steps described in the plan when analyzing the impacts of GMT1 and expects that additional reasonable steps could be adopted by the applicant throughout the life of the plan as identified by either industry personnel, Nuiqsut residents, the NPR-A Subsistence Advisory Panel, the NPR-A Working Group, or other interested entities. The 2014 GMT1 Subsistence Plan includes details on:

- ConocoPhillips' past and future communication with the community about the planned development, including daily construction activities

- Monitoring positions (Subsistence Representatives, Ice Road Monitors, the Village Liaison, and the Field Environmental Coordinator)
- Monitoring programs on caribou, contaminants in subsistence foods, and Nuiqsut fall fisheries
- Aircraft use and communication
- Orientation and training required for personnel and contractors
- Conflict resolution
- Barging activities
- Subsistence Impact Mitigation (measures established by the 2013 NPR-A IAP, measures that CPAI has established voluntarily, and mitigation funds required by NSB permits or as part of agreements with the Kuukpik Corporation that are paid to the community to defray increased costs such as fuel for travel which might be incurred in connection with GMT1)

Furthermore, the Applicant (CPAI) has implemented various voluntary policies and measures to address impacts to subsistence. CPAI has attempted to coordinate helicopter-based hydrology studies with other regional oil development companies, has improved its ice road cleanup program to reduce helicopter flights, has established a daily call-in service to share updates on aircraft activity, and is attempting to schedule flights to avoid the peak hunting season.

A step that could be taken to minimize impacts to subsistence identified by the Native Village of Nuiqsut is the completion of a road project from Nuiqsut to the main channel of the Colville River that would facilitate access to other, increasingly important subsistence use areas. The BLM has determined that such a project would not be effective. As discussed in Section 4.4.5.11, *Mitigation*, of the GMT1 SEIS, BLM is considering several new mitigation measures that could reduce impacts to subsistence. Any new mitigation measures would be established by the ROD for the GMT1 SEIS. Potential new mitigation measures that have been put forward for consideration and that might be established in the ROD include a legally binding Right of Access Agreement for the GMT1 road, the extension of subsistence monitoring studies on caribou and the initiation of similar studies on fish and fowl, a subsistence foods safety testing service, an aircraft monitoring plan, a measure to further reduce flights associated with ice road cleanup, and a measure that would require industry to use non-disruptive technology for monitoring whenever possible. To that extent that such subsistence-focused actions were to be implemented, negative impacts to subsistence would be reduced.

Given these steps and the other lease stipulations and best management practices that serve to directly protect various subsistence resources and their habitat, the BLM has determined that any roaded alternative will include reasonable steps to minimize impacts on subsistence uses and resources.

APPENDIX C

POTENTIAL NEW MITIGATION MEASURES FOR THE AGENCY-PREFERRED ALTERNATIVE

APPENDIX C: POTENTIAL NEW MITIGATION MEASURES FOR THE AGENCY-PREFERRED ALTERNATIVE

In addition to project design features and BLM Lease Stipulations and BMPs already applicable to the project, BLM is considering several potential new mitigation measures designed to further avoid, reduce or compensate for impacts from the proposed action. These measures are fully discussed in the relevant resource sections in Chapter 4 of this SEIS, and were developed based on suggestions from cooperating agencies, stakeholders, the public, and BLM staff. The decision to adopt or eliminate each new mitigation measure will be made in the Record of Decision.

Some potential new mitigation measures would require the Permittee (CPAI) to provide funding to carry out compensatory mitigation. In lieu of providing separate funding streams for multiple specific measures, the Permittee might instead contribute funds to a new Compensatory Mitigation Fund. The Fund would be administered by BLM or through other arrangements if appropriate, in consultation with relevant stakeholders, and would be used to implement a variety of new mitigation measures as described further in the various resource sections that follow. The Fund would give BLM flexibility to direct expenditures towards those mitigation measures determined to be most appropriate and effective, and to better coordinate compensatory mitigation efforts with other regulatory agencies such as the Corps of Engineers. The dollar amount that would be contributed by the Permittee would be identified in the record of decision.

Terrestrial Environment

The Permittee shall contribute funds to BLM for the development and implementation of a landscape-level conservation plan and regional mitigation strategy.

The Permittee will contribute funds to BLM for clean-up of legacy well sites associated with historic exploration programs conducted by the Navy and USGS, and other appropriate contaminated sites.

Air Quality

To the extent practicable, all oil and gas operations (vehicles and equipment) must be powered by natural gas, electric power, or gasoline rather than diesel fuel.

Permittee will provide funding for monitoring to identify and address concerns related to air quality in the Nuiqsut area.

Vegetation and Wetlands

Interim reclamation on portions of a development site shall begin once the BLM determines that environmental conditions are favorable for the replacement and reestablishment of natural soils and vegetation and such reclamation is feasible.

Wildlife and Birds

The Permittee shall establish a road kill reporting system to monitor vehicle collisions of birds and other wildlife on the CD5-GMT1 road.

Establishment of ground vehicle traffic restrictions on the CD5-GMT1 road, based on caribou migration and sightings of caribou in the GMT1 road vicinity.

Subsistence

Permittee will fund all necessary engineering design work, construction costs, compensatory mitigation expenses, and permitting leadership to facilitate and expedite construction of a boat launch and associated parking area on the Ublutuoch River.

The Permittee will produce a clear and legally binding Right of Access Agreement that will provide the community of Nuiqsut with concise policies regarding use of the roads associated with the project and hunting prohibitions, if any, along the roads and near project components.

Permittee will continue to facilitate, improve, and expand communication protocols to inform subsistence users of daily flight patterns and identify potential conflict areas during peak hunting times.

Permittee will be responsible for funding and providing data to BLM for a monitoring study of aircraft flight patterns and impacts related to aircraft traffic on subsistence activities.

Reduce aircraft traffic through the following measures: (1) Suspend non-essential helicopter traffic during peak caribou hunting season to reduce the impacts of helicopter traffic on Nuiqsut caribou hunters; (2) Reduce helicopter flights associated with ice road cleanup by requiring cleanup on foot when feasible; (3) The number of takeoffs and landings to support oil and gas operations with necessary materials and supplies shall be limited to the maximum extent possible. Trips shall be combined when possible, and studies shall be conducted by boat and foot when possible; (4) Reduce helicopter flights by utilizing unmanned aerial vehicles.

The Permittee will fund conservation easements or leases on Kuukpik lands along Fish Creek, pursuant to the BLM Restricted Surface Occupancy (“setback”) corridor identified in the 2013 IAP-ROD and timed to coincide with the life of the impacts of GMT production.

Except in the case of emergencies, the Permittee and its contractors will be prohibited from using airboats on rivers on BLM-managed lands in the Nuiqsut subsistence use area.

The Permittee will monitor, through the life of the project, changes in subsistence activities in the community of Nuiqsut. The Permittee will fund a study to quantify changes in subsistence use and harvest levels. The study would identify changes resulting from the proposed project, and at a minimum, monitor impacts to caribou, fish, and bird harvests.

Permittee will undertake a thorough economic study of the costs that individuals and families incur to continue subsistence activities.

Permittee will expand the current contaminants in subsistence food study (established by BMP A-11) to establish a subsistence food sample testing service for residents who have concerns about harvested food.

Public Health

The Permittee will contribute funds to create a public health monitoring program at a regional level to track health indicators that are vulnerable to impacts from oil and gas activities.

The Permittee shall fund the creation of an Emergency Contingency Plan and associated Evacuation Plan for the community of Nuiqsut to identify the appropriate response by the community to a variety of health and safety events that could concur at the GMT1 development. The North Slope Borough should be consulted and the City of Nuiqsut, Native Village of Nuiqsut and Kuukpik Corporation will be directly involved in the creation of both plans.

Minimize the undue idling of vehicles to reduce emissions associated with vehicle use, and decrease noise impacts associated with the GMT1 Project.

Project Design and Spill Measures

Establish additional measures above current regulatory protections by use of impermeable lining, and using liners for protection outside of secondary containment.

Oil spill response equipment must be designed to be effective in arctic conditions; Mechanisms must be available to prevent the freezing of response equipment and/or to de-ice it.

Equipment used to develop hydrocarbons must be designed in accordance with standard arctic engineering practices for use in arctic conditions, and design criteria must be based on conservative estimates.

Spill Prevention and Response Plan – Specific additions to current BLM BMPs.

The Permittee will develop a spill prevention and response plan that adopts the Alpine Development Participant Area Oil Discharge Prevention and Contingency Plan (Alpine C-Plan) and develop a response plan for blowouts that addresses communication with the BLM.

Implement leak detection systems for GMT1 facilities to reduce the extent of potential spills.

The Permittee will install increased spill minimization measures at the Ublutuoch Bridge, which may include use of a thicker wall diameter pipeline spanning the bridge or automated valves on either side of the bridge.

Other

Establishment and Implementation of an Effectiveness Monitoring and Scientific Studies Program at BLM to monitor wildlife populations, habitat, and ecosystem processes potentially impacted by development; to ensure public involvement and transparency; and to maintain a high standard of oversight for industry-funded scientific studies related directly to the GMT1 project.

APPENDIX D

ESSENTIAL FISH HABITAT

APPENDIX D: ESSENTIAL FISH HABITAT

Regulatory Background

The 1996 Sustainable Fisheries Act (Public Law 104-297) enacted additional management measures to protect commercially harvested fish species from overfishing. Along with reauthorizing the Magnuson- Stevens Fishery Conservation and Management Act (Public Law 94-265 [Magnuson-Stevens Act]), one of those added measures is to describe, identify, and minimize adverse effects to “essential fish habitat.” Definitions and rules involving essential fish habitat are in 50 CFR Part 600. The National Marine Fisheries Service implements the requirements of the Magnuson-Stevens Act.

Essential fish habitat definition: “...those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat:

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

Adverse effect definition: “...any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat- wide impacts, including individual, cumulative, or synergistic consequences of actions” (50 CFR Part 600.810).

Federal action requirement: “For any Federal action that may adversely affect EFH, Federal agencies must provide National Marine Fisheries Service with a written assessment of the effects of that action on EFH.... Federal agencies may incorporate an EFH Assessment into documents prepared for other purposes such as...the National Environmental Policy Act” (50 CFR Part 600.920).

In 1997, the National Marine Fisheries Service issued an interim final rule to implement the essential fish habitat provisions of the Magnuson-Stevens Act (62 FR 66531). This included the clarification that Regional Fishery Management Councils would describe and identify essential fish habitat in fishery management plans. In Alaska, fishery management plans are developed by the North Pacific Fishery Management Council and approved by Secretary of Commerce. In 2002, National Marine Fisheries Service issued a final rule with no substantial changes to the interim rule (67 FR 2343).

Arctic Essential Fish Habitat

Fish species with essential fish habitat designated in and near the NPR-A include all five species of Pacific salmon [chum (*Oncorhynchus keta*), pink (*O. gorbuscha*), Chinook (*O. tshawytscha*), coho (*O. kisutch*), and sockeye (*O. nerka*)], Arctic cod (*Boreogadus saida*), and saffron cod (*Eleginus gracilis*). Of these, only the Pacific salmon occur in and near the project study area. Salmon are managed under the “Fishery Management Plan for the Salmon Fisheries in the EEZ off the Coast of Alaska” (Salmon Fishery Management Plan; North Pacific Fishery Management Council 1990).

All of the salmon species have anadromous life histories that are described broadly in Table 1 according to Mecklenburg et al. (2002). For more detailed information on each species, see Groot and Margolis (1991).

Table 1. Pacific salmon life history characteristics

Species	Spawning habitat	Migration to sea from spawning habitat	Time at sea
Chum salmon	Freshwater	Immediately	3 to 5 years
Pink salmon	Freshwater or intertidal	Immediately	18 months
Chinook	Freshwater	3 months to 2 years	1 to 5 years
Coho salmon	Freshwater	1 to 4 years	2 to 3 years
Sockeye	Freshwater (lakes)	1 to 2 years	1 to 4 years

In the northeast Chukchi Sea and western Beaufort Sea, all five species of Pacific salmon have been reported (Craig and Haldorson 1986). However, salmon have a very difficult time establishing sustainable runs in the Arctic, most likely because of marginal freshwater habitats (Craig 1989a). Pink and chum salmon occur in the greatest numbers. Although the number of actual spawning stocks (versus probable stray runs) is unknown, they are relatively common in the Chukchi Sea and Beaufort Sea (Moss et al. 2009).

Chinook salmon are much more uncommon in the NPR-A and its coastal waters and sockeye and coho salmon are rare. Due to the colder temperatures in the Beaufort Sea, these salmon species are more likely to be present in the northeast Chukchi Sea, although captures anywhere north of Point Hope are most commonly limited to only one or a few individuals (Craig and Haldorson 1986). In 17 years of summer coastal sampling in the Prudhoe Bay region of the Beaufort Sea (1981–1997), only one king salmon and zero sockeye or coho salmon were captured (BLM 2012, Appendix D, p. 66).

The most current essential fish habitat descriptions for salmon in the Arctic are included in amendments 7 and 8 to the Salmon Fishery Management Plan (North Pacific Fishery Management Council 2006), which implemented the preferred alternative from the “Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska” (National Marine Fisheries Service 2005). This describes essential fish habitat that encompasses all life history stages for all Pacific salmon species as marine waters extending to the outer limit of the U.S. Exclusive Economic Zone, estuarine waters extending to the salinity

transition zone, and freshwaters that are identified as being used by salmon in Alaska Department of Fish and Game’s “Catalogue of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes” (Alaska Department of Fish and Game 2011), also known as the “Anadromous Waters Catalog.” The outer limit of the U.S. Exclusive Economic Zone is 200 nautical miles; for analysis purposes here, the salinity transition zone is considered to be 10 kilometers offshore, as this is typically the greatest extent of the estuarine band that forms along the coast of the Beaufort Sea during the summer (Craig 1984a); and a more recent version of freshwaters documented as being utilized by salmon is available in the current version of the Anadromous Waters Catalog (Alaska Department of Fish and Game 2011). These essential fish habitat designations for salmon are shown on Map 3.3.2.1-2 ANADROMOUS WATERS. Table 2 lists the stream and river systems with essential fish habitat in the project study area.

Table 2. Stream and river systems in the GMT1 project area with freshwater essential fish habitat based on the Anadromous Waters Catalog

Stream system	AWC Code	Salmon species utilizing
Colville River	330-00-10700	pink, chum
Fish Creek	330-00-10840	pink, chum, Chinook
Ublutuoch River	330-00-10840-2017	pink, chum, Chinook

Source: Alaska Department of Fish and Game (2011a)

Proposed Action and Alternatives

The BLM is undertaking the GMT1 Supplemental Environmental Impact Statement (SEIS) to determine the appropriate management decisions for allowing the applicant to construct and operate an oil production infrastructure in the project study area. The BLM will consider the best management practices, while providing special protections for specific habitats and site-specific resources and uses.

Potential Adverse Effects on Essential Fish Habitat

The potential adverse effects on essential fish habitat from the GMT1 project alternatives would be the same as those described for other fish habitat in Section 4.3.2. No effects on marine or estuarine essential fish habitat would be expected. Potential effects on freshwater essential fish habitat from a variety of oil and gas activities described in detail in Section 4.3.2 broadly include altered water quality, physical habitat changes (water quantity, flow patterns, and geomorphology), increased turbidity and sedimentation, and barriers to fish movements. The primary difference among alternatives is the type, amount, and location of impacts that have the potential to affect fish populations. Based on the proximity to and the potential for impacts to waters listed for salmon in the Anadromous Waters Catalog, the greatest potential impacts to freshwater essential fish habitat are expected to occur under Alternative C, with increasingly less risk under Alternatives A, B, and D, respectively.

Proposed Mitigation Measures

Lease stipulations and best management practices would mitigate potential effects on essential fish habitat. Proper implementation of these protective measures should ensure that impacts to essential fish habitat are avoided or minimized. The following list summarizes the mitigation measures. These management standards largely address relevant comparable Recommended

Conservation Measures identified in “Impacts to Essential Fish Habitat from Non-fishing Activities in Alaska” (National Marine Fisheries Service 2011).

- Best Management Practice A-2: Requires comprehensive waste management plan.
- Best Management Practice A-3: Requires a hazardous materials emergency contingency plan.
- Best Management Practice A-4: Requires a comprehensive spill prevention and response contingency plan.
- Best Management Practice A-5: Establishes refueling setbacks from waterbodies.
- Best Management Practice A-6: Prohibits discharge of reserve-pit fluids.
- Best Management Practice A-7: Prohibits discharge of produced water in upland areas and marine waters.
- Best Management Practice B-1: Prohibits water withdrawals from rivers and streams during winter.
- Best Management Practice B-2: Establishes lake water withdrawal limits and practices to protect fish.
- Best Management Practice C-2: Requires sufficient ground frost and snow cover prior to winter overland moves, contributing to the protection of stream banks and frozen waterbodies.
- Best Management Practice C-3: Establishes winter river and stream crossing guidelines related to protecting runoff patterns, fish passage, and natural channel characteristics, including the requirement that crossings reinforced with additional snow or ice ("bridges") be removed, breached, or slotted before spring breakup.
- Best Management Practice C-4: Establishes winter river and stream crossing guidelines related to avoiding additional freeze-down into fish habitat, including restrictions on traveling up and down streambeds.
- Lease Stipulation D-1: Prohibits exploratory drilling within the floodplain of rivers and streams and within fish-bearing lakes.
- Lease Stipulation D-2: Prohibits construction of permanent or gravel facilities (including pads, roads, and airstrips) for exploratory drilling.
- Best Management Practice E-1: Requires that all roads be designed, constructed, maintained, and operated in a manner that minimizes environmental impacts.
- Lease Stipulation E-2: Prohibits permanent facilities (including pads, roads, airstrips, and pipelines) within 500 feet of fish-bearing waterbodies, except for essential road and pipeline crossings that will be permitted on a case-by-case basis.
- Lease Stipulation E-3: Prohibits causeways, docks, artificial gravel islands, and bottom-founded structures in river mouths or deltas. Requires that the design of any coastal structure ensures free fish passage and doesn't cause significant changes to nearshore oceanographic circulation patterns and water quality characteristics.
- Best Management Practice E-4: Requires that pipelines be designed, constructed, and operated according to the best available technology for detecting and preventing corrosion that can lead to leaks.

- Best Management Practice E-5: Establishes guidelines to minimize the development footprint, which would minimize the total impervious surface area within individual drainages.
- Best Management Practice E-6: Requires that stream and marsh crossings be designed and constructed to ensure free fish passage, reduce erosion, maintain natural drainage, and minimize effects to natural stream flow.
- Best Management Practice E-8: Establishes gravel mine guidelines for design that will minimize negative effects on fish habitat and for reclamation that will promote potential positive effects on fish habitat.
- Best Management Practice E-14: Requires that stream and river road crossings utilize the most current design tools that will facilitate free fish passage, including a minimal of 3 years of hydrology and fish data to guide decisions.
- Lease Stipulation/Best Management Practice K-1: Establishes setback distances for permanent facilities (including pads, roads, airstrips, and pipelines) of 0.5 mile, 0.75 mile, 1 mile, and, under Alternative B-1 and B-2, 2 miles from many major streams and rivers, except for essential road and pipeline crossings that will be permitted on a case-by-case basis.
- Lease Stipulation/Best Management Practice K-3b: Establishes additional protective measurements for "major coastal waterbodies" regarding exploration and development.
- Lease Stipulation/Best Management Practice K-8b: Prohibits permanent facilities within the existing Kasegaluk Lagoon Special Area.

Essential Fish Habitat Finding

No marine or estuarine essential fish habitat impacts are probable based on the scope of the proposed action. The multitude of required operating procedures/best management practices listed above would provide substantial environmental protections that would minimize or avoid effects on freshwater essential fish habitat. Although unavoidable impacts will occur to some freshwater habitat in the project study area, those streams and rivers with freshwater essential fish habitat are much less likely to experience those impacts. For example, all streams and rivers currently considered freshwater essential fish habitat (Table 2 above) are provided an additional safeguard through infrastructure setbacks included in Lease Stipulation/Best Management Practice K-1. Also, since streams and rivers comprising freshwater essential fish habitat are listed within the Anadromous Waters Catalog, they are granted further regulatory protection under the Anadromous Fish Act (AS 16.05.871) which requires additional review and permitting of activities by Alaska Department of Fish and Game. Based on these considerations, oil and gas exploration and development in the NPR-A is assigned the essential fish habitat assessment determination: May affect, not likely to adversely affect.

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- Alaska Region

APPENDIX E

2013 NPR-A IAP ROD: LEASE STIPULATIONS AND BEST MANAGEMENT PRACTICES

APPENDIX A: LEASE STIPULATIONS AND BEST MANAGEMENT PRACTICES

Definitions

The following definitions apply to the stipulations and best management practices listed in this appendix. The Glossary of the Final IAP/EIS has additional definitions.

Active Floodplain: The lowland and relatively flat areas adjoining inland and coastal waters, including the flood-prone areas of offshore islands, composing, at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year (also referred to as the 100-year or base floodplain).

Authorized Officer: A position of authority for approval of various activities through delegation from the Secretary of the Interior. Currently, the designated authorized officers in Alaska for leasing, surface use, and permitting are 1) State Director, 2) Manager of the Arctic Field Office in Fairbanks, and 3) Deputy State Director, Division of Resources.

Best Management Practice: Mitigation developed through the BLM planning process/NEPA process that is not attached to the oil and gas lease but is required, implemented, and enforced at the operational level for all authorized (not just oil and gas) activities in the planning area.

Best management practices were developed with various mechanisms in place to ensure compliance. These mechanisms include the following:

1. Some best management practices are pre-application requirements; therefore compliance will precede approval of the proposed activity. For example, Best Management Practice H-1(a) requires consultation with affected communities prior to submission of an application for relevant activities within the NPR-A. If consultation has not taken place, the application will be rejected or will be considered incomplete until such time that the consultation has occurred.
2. Other best management practices are required design features, and will have to be incorporated into the applicant's proposal. As an integral part of the proposal and the authorization, the requirement

- does not need to be stipulated to be enforceable. For example, a minimum pipeline height of 7 feet for above ground pipelines is a required design of any approved above ground pipeline (Best Management Practice E-7). Since the authorization (a ROW in this case) authorizes a pipeline with a minimum height of 7 feet, anything less (unless specifically approved through additional NEPA analysis and the permit) is not in compliance and enforcement actions may be taken even if the permit does not specify a minimum of 7 feet.
3. Other best management practices will become conditions of approval on post lease land use authorizations. For example, Best Management Practice C-1 prohibits heavy equipment used for cross-country moves within ½ mile of occupied grizzly bear dens.

Body of Water or Water body: A lake, river, stream, creek, or pond that holds water throughout the summer and supports a minimum of aquatic life.

Buffer: A zone extending outward or inward from the periphery of a “protected” feature for a specified distance. Activities and development may be prohibited or limited by type or time within the buffer dependent on the goal associated with applying the buffer.

Class I air quality area: One of 156 protected areas such as national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence as of August 1977, where air quality should be given special protection. Federal Class I areas are subject to maximum limits on air quality degradation called air quality increments (often referred to as Prevention of Significant Deterioration [PSD] increments). All areas of the United States not designated as Class I are Class II areas. The air quality standards in Class I areas are more stringent than national ambient air quality standards.

Consultation: Consultation, as it is referenced in the lease stipulations, does not infer formal consultation as required under other legal mandates such as “Section 7 Consultation” under the ESA. Rather, consultation implies that the BLM or the Lessee/Permittee will contact other agencies or entities to inform them of potential actions and to seek input on noted topics. This includes informal contacts, and written, electronic, and/or verbal communication.

Criteria Air Pollutants: Those pollutants subject to the National Air Quality Standards (<http://www.epa.gov/air/criteria.html>). They currently include carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (both PM₁₀ and PM_{2.5} – inhalable and respirable particulates), and sulfur dioxide (SO₂).

Development Activities: Any activity associated with construction and operation of facilities or equipment post exploration.

Field: The term used to describe the area containing surface infrastructure above one or more subsurface reservoirs. In this sense, “field” is analogous to “a Unit participating area or collection of participating areas.” The infrastructure in the field includes, but is not limited to, drilling and production pads, service roads, perhaps an airstrip, and processing and support facilities. Field infrastructure may be used in the development and production of several oil/gas accumulations in different subsurface reservoirs. Fields typically have a primary reservoir that supports initial development in addition to satellite reservoirs that are developed later and tie into the main facilities. Although oil and gas reservoirs may vary greatly in subsurface depth and other geologic characteristics, because they are located in the same geographic area it is more efficient to coordinate and share the necessary surface infrastructure. Fields may or may not be connected by permanent roads to adjacent fields or transportation facilities outside the field area.

Greenhouse gas (GHG): A gas that absorbs and emits thermal radiation within the lowest layers of the atmosphere. This process is the fundamental cause of the greenhouse effect. The primary greenhouse gases that are considered air pollutants are carbon dioxide, (CO₂), methane (CH₄), nitrous oxide (N₂O), and chlorofluorocarbons (CFCs).

Hazardous air pollutants (HAPs): (also known as toxic air pollutants) Those pollutants that cause or may cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental and ecological effects. The Environmental Protection Agency (EPA) is required to control 187 hazardous air pollutants. Examples of HAPs include benzene (found in gasoline), perchlorethylene (emitted from dry cleaning facilities), and methylene chloride (used as a solvent).

Lease Stipulation: Mitigation developed through BLM planning process/NEPA process that is specifically attached to a lease.

NO_x: Mono-nitrogen oxides, including nitric oxide (NO) and nitrogen dioxide (NO₂). It is formed when naturally occurring atmospheric nitrogen and oxygen are combusted with fuels in automobiles, power plants, industrial processes, and home and office heating units.

Permanent Oil and Gas Facilities: Permanent Facilities include production facilities, pipelines, roads, airstrips, production pads, docks and other bottom-founded structures, seawater-treatment plants, and other structures associated with an oil and gas operation that occupy land for more than one winter season; also included are material sites such as sand and gravel, and “temporary platforms” if those platforms are used for production rather than exploration. Exploration wellheads and seasonal facilities such as ice roads and ice pads are excluded, even when the pads are designed for use in successive winters. This definition does not include over-summering ice pads for exploration purposes.

Setback: A distance measured from a named ground feature, such as a river or lake, in which certain activities or structures would not be allowed. All setback distances are to be measured as of the time of the application for a permit for a development. In addition, facility development along the coast would be required to be designed to maintain the prescribed setback distance for the anticipated life of the facility.

SO_x: Sulfur oxides, including sulfur dioxide (SO₂). A product of vehicle tailpipe emissions.

Stipulation: A requirement or condition placed by the Bureau of Land Management on the leaseholder for operations the leaseholder might carry out within that lease. The Bureau of Land Management develops stipulations that apply to all future leases within the National Petroleum Reserve-Alaska.

Temporary Platform: A facility that does not require the use of an ice or gravel pad to support oil and gas and related exploration activities. An example of a temporary platform recently used on the North Slope is Anadarko Petroleum's Arctic Drilling Platform used for the company's Hot Ice Project during the winters of 2003-2004. The facility consisted of a series of platform modules joined together and supported above the tundra

surface on steel legs. Once the project was completed the platform was disassembled and the support legs were removed, leaving the tundra surface undisturbed. Note: A temporary platform that is used for production, as opposed to exploration, would be considered a permanent oil and gas facility and be subject to the restrictions on placement of such structures.

Valid existing: in the context of exceptions for the development of “valid existing NPR-A oil and gas leases,” “valid existing” leases refers to oil and gas leases issued by the BLM prior to the signing of this record of decision and valid at the time of the application for approval of an action for which the “valid existing NPR-A oil and gas lease” exception is requested.

Volatile Organic Compounds (VOCs): A group of chemicals that react in the atmosphere with nitrogen oxides in the presence of sunlight and heat to form ozone. VOCs contribute significantly to photochemical smog production and certain health problems. Examples of VOCs are gasoline fumes and oil-based paints.

Applicability of Requirements/Standards

All surface disturbing activities such as exploratory drilling, road/pipeline construction, seismic acquisition, and overland moves require additional authorization(s) issued subsequent to leasing. The stipulations and best management practices require that certain protections of resources and uses be achieved. Requirements and standards listed with the stipulations and best management practices represent BLM’s current understanding of how lessees/permittees would achieve the objectives of the stipulation or best management practice.

A lessee/permittee may propose a deviation from the requirements/standards of stipulations and best management practices as part of an authorization application. Prior to approving an alternative procedure as part of the authorization, BLM’s staff would analyze the proposal and determine if the proposal incorporating the alternative procedure would achieve the objectives of the stipulations and best management practices. If the BLM determines that the alternative procedure proposed by the applicant would meet the stipulation’s or best management practice’s objective, BLM could approve the alternative procedure. If BLM determines that the alternative procedure proposed by the applicant is unlikely to meet the objectives of a

stipulation or best management practice, the requirements/standards would still be required. However, the authorized officer may allow a deviation from the objectives and requirement/standard in a new decision document supported by additional NEPA analysis.

The BLM could independently require different actions than those listed under requirements/standards. If, after experience or additional study, BLM concludes that a requirement/standard is not achieving or is unlikely to achieve the protective objective when applied to a specific future on-the-ground action or would not do so as well as the use of recently proven technology or techniques, BLM could at the permitting stage and under the terms of the stipulation or best management practice, impose other restrictions to meet the objective.

Stipulations and Best Management Practices

Waste Prevention, Handling, Disposal, Spills, Air Quality, and Public Health and Safety

A-1 Best Management Practice

Objective: Protect the health and safety of oil and gas field workers and the general public by disposing of solid waste and garbage in accordance with applicable federal, State, and local law and regulations.

Requirement/Standard: Areas of operation shall be left clean of all debris.

A-2 Best Management Practice

Objective: Minimize impacts on the environment from non-hazardous and hazardous waste generation. Encourage continuous environmental improvement. Protect the health and safety of oil field workers and the general public. Avoid human-caused changes in predator populations.

Requirement/Standard: Lessees/permittees shall prepare and implement a comprehensive waste management plan for all phases of exploration and development, including seismic activities. The plan shall be submitted to the authorized officer for approval, in consultation with federal, State, and North Slope Borough regulatory and resource agencies, as appropriate (based on agency legal authority and jurisdictional responsibility), as part of a plan of operations or other similar permit application.

Management decisions affecting waste generation shall be addressed in the following order of priority: 1) prevention and reduction, 2) recycling, 3)

treatment, and 4) disposal. The plan shall consider and take into account the following requirements:

- a. Methods to avoid attracting wildlife to food and garbage. The plan shall identify precautions that are to be taken to avoid attracting wildlife to food and garbage
- b. Disposal of putrescible waste. Requirements prohibit the burial of garbage. Lessees and permitted users shall have a written procedure to ensure that the handling and disposal of putrescible waste will be accomplished in a manner that prevents the attraction of wildlife. All putrescible waste shall be incinerated, backhauled, or composted in a manner approved by the authorized officer. All solid waste, including incinerator ash, shall be disposed of in an approved waste-disposal facility in accordance with EPA and Alaska Department of Environmental Conservation regulations and procedures. The burial of human waste is prohibited except as authorized by the authorized officer.
- c. Disposal of pumpable waste products. Except as specifically provided, the BLM requires that all pumpable solid, liquid, and sludge waste be disposed of by injection in accordance with EPA, Alaska Department of Environmental Conservation, and the Alaska Oil and Gas Conservation Commission regulations and procedures. On-pad temporary muds and cuttings storage, as approved by Alaska Department of Environmental Conservation, will be allowed as necessary to facilitate annular injection and/or backhaul operations.
- d. Disposal of wastewater and domestic wastewater. The BLM prohibits wastewater discharges or disposal of domestic wastewater into bodies of fresh, estuarine, and marine water, including wetlands, unless authorized by a National Pollutant Discharge Elimination System or State permit.

A-3 Best Management Practice

Objective: Minimize pollution through effective hazardous-materials contingency planning.

Requirement/Standard: For oil- and gas-related activities, a hazardous materials emergency contingency plan shall be prepared and implemented before transportation, storage, or use of fuel or hazardous substances. The plan shall include a set of procedures to ensure prompt response, notification, and cleanup in the event of a hazardous substance spill or threat of a release. Procedures in the plan applicable to fuel and hazardous substances handling (associated with transportation vehicles) shall consist of

best management practices if approved by the authorized officer. The plan shall include a list of resources available for response (e.g., heavy-equipment operators, spill-cleanup materials or companies), and names and phone numbers of federal, State, and North Slope Borough contacts. Other federal and State regulations may apply and require additional planning requirements. All appropriate staff shall be instructed regarding these procedures. In addition contingency plans related to facilities developed for oil production shall include requirements to:

- a. provide refresher spill-response training to North Slope Borough and local community spill-response teams on a yearly basis,
- b. plan and conduct a major spill-response field-deployment drill annually,
- c. prior to production and as required by law, develop spill prevention and response contingency plans and participate in development and maintenance of the North Slope Subarea Contingency Plan for Oil and Hazardous Substances Discharges/Releases for the National Petroleum Reserve-Alaska operating area. Planning shall include development and funding of detailed (e.g., 1:26,000 scale) environmental sensitivity index maps for the lessee's/permittee's operating area and areas outside the lessee's/permittee's operating area that could be affected by their activities. (The specific area to be mapped shall be defined in the lease agreement and approved by the authorized officer in consultation with appropriate resource agencies.) Maps shall be completed in paper copy and geographic information system format in conformance with the latest version of the U.S. Department of Commerce, National Oceanic and Atmospheric Administration's Environmental Sensitivity Index Guidelines. Draft and final products shall be peer reviewed and approved by the authorized officer in consultation with appropriate federal, State, and North Slope Borough resource and regulatory agencies.

A-4 Best Management Practice

Objective: Minimize the impact of contaminants on fish, wildlife, and the environment, including wetlands, marshes and marine waters, as a result of fuel, crude oil, and other liquid chemical spills. Protect subsistence resources and subsistence activities. Protect public health and safety.

Requirement/Standard: Before initiating any oil and gas or related activity or operation, including field research/surveys and/or seismic operations, lessees/permittees shall develop a comprehensive spill prevention and

response contingency plan per 40 CFR § 112 (Oil Pollution Act). The plan shall consider and take into account the following requirements:

- a. On-site Clean-up Materials. Sufficient oil-spill-cleanup materials (absorbents, containment devices, etc.) shall be stored at all fueling points and vehicle-maintenance areas and shall be carried by field crews on all overland moves, seismic work trains, and similar overland moves by heavy equipment.
- b. Storage Containers. Fuel and other petroleum products and other liquid chemicals shall be stored in proper containers at approved locations. Except during overland moves and seismic operations, fuel, other petroleum products, and other liquid chemicals designated by the authorized officer that in total exceed 1,320 gallons shall be stored within an impermeable lined and diked area or within approved alternate storage containers, such as over packs, capable of containing 110% of the stored volume. In areas within 500 feet of water bodies, fuel containers are to be stored within appropriate containment.
- c. Liner Materials. Liner material shall be compatible with the stored product and capable of remaining impermeable during typical weather extremes expected throughout the storage period.
- d. Permanent Fueling Stations. Permanent fueling stations shall be lined or have impermeable protection to prevent fuel migration to the environment from overfills and spills.
- e. Proper Identification of Containers. All fuel containers, including barrels and propane tanks, shall be marked with the responsible party's name, product type, and year filled or purchased.
- f. Notice of Reportable Spills. Notice of any reportable spill (as required by 40 CFR § 300.125 and 18 AAC § 75.300) shall be given to the authorized officer as soon as possible, but no later than 24 hours after occurrence.
- g. Identification of Oil Pans (“duck ponds”). All oil pans shall be marked with the responsible party's name.

A-5 Best Management Practice

Objective: Minimize the impact of contaminants from refueling operations on fish, wildlife and the environment.

Requirement/Standard: Refueling of equipment within 500 feet of the active floodplain of any water body is prohibited. Fuel storage stations shall be located at least 500 feet from any water body with the exception that small caches (up to 210 gallons) for motor boats, float planes, ski planes, and small equipment, e.g. portable generators and water pumps, are permitted.

The authorized officer may allow storage and operations at areas closer than the stated distances if properly designed to account for local hydrologic conditions.

A-6 Best Management Practice

Objective: Minimize the impact on fish, wildlife, and the environment from contaminants associated with the exploratory drilling process.

Requirement/Standard: Surface discharge of reserve-pit fluids is prohibited.

A-7 Best Management Practice

Objective: Minimize the impacts to the environment of disposal of produced fluids recovered during the development phase on fish, wildlife, and the environment.

Requirement/Standard: Discharge of produced water in upland areas and marine waters is prohibited.

A-8 Best Management Practice

Objective: Minimize conflicts resulting from interaction between humans and bears during oil and gas activities.

Requirement/Standard: Oil and gas lessees and their contractors and subcontractors will, as a part of preparation of lease operation planning, prepare and implement bear-interaction plans to minimize conflicts between bears and humans. These plans shall include measures to:

- a. Minimize attraction of bears to the drill sites.
- b. Organize layout of buildings and work sites to minimize human/bear interactions.
- c. Warn personnel of bears near or on work sites and identify proper procedures to be followed.
- d. Establish procedures, if authorized, to discourage bears from approaching the work site.
- e. Provide contingencies in the event bears do not leave the site or cannot be discouraged by authorized personnel.
- f. Discuss proper storage and disposal of materials that may be toxic to bears.
- g. Provide a systematic record of bears on the work site and in the immediate area.

A-9 Best Management Practice

Objective: Reduce air quality impacts.

Requirement/Standard: All oil and gas operations (vehicles and equipment) that burn diesel fuels must use “ultra-low sulfur” diesel as defined by the Alaska Department of Environmental Conservation-Division of Air Quality.

A-10 Best Management Practice

Objective: Prevent unnecessary or undue degradation of the lands and protect health.

Requirement/Standard: This measure includes the following elements:

- a. Prior to initiation of a NEPA analysis for an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source (hereafter project), the authorizing officer (BLM) may require the project proponent to provide a minimum of one year of baseline ambient air monitoring data for any pollutant(s) of concern as determined by BLM if no representative air monitoring data are available for the project area, or existing representative ambient air monitoring data are insufficient, incomplete, or do not meet minimum air monitoring standards set by the Alaska DEC or the EPA. If BLM determines that baseline monitoring is required, this pre-analysis data must meet Alaska DEC and EPA air monitoring standards, and cover the year immediately prior to the submittal. Pre-project monitoring may not be appropriate where the life of the project is less than one year.
- b. The BLM may require monitoring for the life of the project depending on the magnitude of potential air emissions from the project, proximity to a federally mandated Class I area, sensitive Class II area (as identified on a case-by-case basis by Alaska DEC or a federal land management agency), or population center, location within or proximity to a non-attainment or maintenance area, meteorological or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during NEPA undertaken for the project.
- c. For an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source, the project proponent shall prepare (and submit for BLM approval) an emissions inventory that includes quantified emissions of regulated air pollutants from all direct and indirect sources related to the proposed project, including

- reasonably foreseeable air pollutant emissions of criteria air pollutants, volatile organic compounds, hazardous air pollutants, and greenhouse gases estimated for each year for the life of the project. The BLM will use this estimated emissions inventory to identify pollutants of concern and to determine the appropriate level of air analysis to be conducted for the proposed project.
- d. For an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source, the BLM may require the proponent to provide an emissions reduction plan that includes a detailed description of operator committed measures to reduce project related air pollutant emissions including, but not limited to greenhouse gases and fugitive dust.
 - e. For an application to develop a central production facility, production pad/well, airstrip, road, gas compressor station, or other potential substantial air pollutant emission source, the authorized officer may require air quality modeling for purposes of analyzing project direct, indirect or cumulative impacts to air quality. The BLM may require air quality modeling depending on the magnitude of potential air emissions from the project or activity, duration of the proposed action, proximity to a federally mandated Class I area, sensitive Class II area (as identified on a case-by-case basis by Alaska DEC or a federal land management agency), or population center, location within a non-attainment or maintenance area, meteorological or geographic conditions, existing air quality conditions, magnitude of existing development in the area, or issues identified during NEPA undertaken for the project. The BLM will determine the information required for a project specific modeling analysis through the development of a modeling protocol for each analysis. The authorized officer will consult with appropriate federal, State, and/or local agencies regarding modeling to inform his/her modeling decision and avoid duplication of effort. The modeling shall compare predicted impacts to all applicable local, State, and federal air quality standards and increments, as well as other scientifically defensible significance thresholds (such as impacts to air quality related values, incremental cancer risks, etc.).
 - f. The BLM may require air quality mitigation measures and strategies within its authority (and in consultation with local, state, federal, and tribal agencies with responsibility for managing air resources) in addition to regulatory requirements and proponent committed

- emission reduction measures, and for emission sources not otherwise regulated by Alaska DEC or EPA, if the air quality analysis shows potential future impacts to NAAQS or AAAQS or impacts above specific levels of concern for air quality related values (AQRVs).
- g. If ambient air monitoring indicates that project-related emissions are causing or contributing to impacts that would cause unnecessary or undue degradation of the lands, cause exceedances of NAAQS, or fail to protect health (either directly or through use of subsistence resources), the authorized officer may require changes in activities at any time to reduce these emissions to comply with the NAAQS and/or minimize impacts to AQRVs. Within the scope of BLM's authority, the BLM may require additional emission control strategies to minimize or reduce impacts to air quality.
 - h. Publicly available reports on air quality baseline monitoring, emissions inventory, and modeling results developed in conformance with this best management procedure shall be provided by the project proponent to the North Slope Borough and to local communities and Tribes in a timely manner.

A-11 Best Management Practice

Objective: Ensure that permitted activities do not create human health risks through contamination of subsistence foods.

Requirement/Standard: A lessee proposing a permanent oil and gas development shall design and implement a monitoring study of contaminants in locally-used subsistence foods. The monitoring study shall examine subsistence foods for all contaminants that could be associated with the proposed development. The study shall identify the level of contaminants in subsistence foods prior to the proposed permanent oil and gas development and monitor the level of these contaminants throughout the operation and abandonment phases of the development. If ongoing monitoring detects a measurable and persistent increase in a contaminant in subsistence foods, the lessee shall design and implement a study to determine how much, if any, of the increase in the contaminant in subsistence foods originates from the lessee's activities. If the study determines that a portion of the increase in contamination in subsistence foods is caused by the lessee's activities, the authorized officer may require changes in the lessee's processes to reduce or eliminate emissions of the contaminant. The design of the study/studies must meet the approval of the authorized officer. The authorized officer may consult with appropriate federal, State, and North Slope Borough agencies prior to approving the study/studies design. The authorized officer may

require/authorize changes in the design of the studies throughout the operations and abandonment period, or terminate or suspend studies if results warrant.

A-12 Best Management Practice

Objective: To minimize negative health impacts associated with oil spills.

Requirement/Standard: If an oil spill with potential impacts to public health occurs, the BLM, in undertaking its oil spill responsibilities, will consider:

- a. Immediate health impacts and responses for affected communities and individuals.
- b. Long-term monitoring for contamination of subsistence food sources.
- c. Long-term monitoring of potential human health impacts.
- d. Perceptions of contamination and subsequent changes in consumption patterns.
- e. Health promotion activities and communication strategies to maintain the consumption of traditional food.

Water Use for Permitted Activities

B-1 Best Management Practice

Objective: Maintain populations of, and adequate habitat for, fish and invertebrates.

Requirement/Standard: Withdrawal of unfrozen water from rivers and streams during winter is prohibited. The removal of ice aggregate from grounded areas ≤ 4 -feet deep may be authorized from rivers on a site-specific basis.

B-2 Best Management Practice

Objective: Maintain natural hydrologic regimes in soils surrounding lakes and ponds, and maintain populations of, and adequate habitat for, fish, invertebrates, and waterfowl.

Requirement/Standard: Withdrawal of unfrozen water from lakes and the removal of ice aggregate from grounded areas ≤ 4 -feet deep may be authorized on a site-specific basis depending on water volume and depth and the waterbody's fish community. Current water use requirements are:

- a. Lakes with sensitive fish (i.e., any fish except ninespine stickleback or Alaska blackfish): unfrozen water available for withdrawal is limited to 15% of calculated volume deeper than 7 feet; only ice aggregate may be removed from lakes that are ≤ 7 -feet deep.

- b. Lakes with only non-sensitive fish (i.e., ninespine stickleback or Alaska blackfish): unfrozen water available for withdrawal is limited to 30% of calculated volume deeper than 5 feet; only ice aggregate may be removed from lakes that are ≤ 5 .
- c. Lakes with no fish present, regardless of depth: water available for use is limited to 35% of total lake volume.
- d. In lakes where unfrozen water and ice aggregate are both removed, the total use shall not exceed the respective 15%, 30%, or 35% volume calculations.
- e. Additional modeling or monitoring may be required to assess water level and water quality conditions before, during, and after water use from any fish-bearing lake or lake of special concern.
- f. Any water intake structures in fish bearing or non-fish bearing waters shall be designed, operated, and maintained to prevent fish entrapment, entrainment, or injury. Note: All water withdrawal equipment must be equipped and must utilize fish screening devices approved by the Alaska Department of Fish and Game, Division of Habitat.
- g. Compaction of snow cover or snow removal from fish-bearing waterbodies shall be prohibited except at approved ice road crossings, water pumping stations on lakes, or areas of grounded ice.

Winter Overland Moves and Seismic Work

The following best management practices apply to overland moves, seismic work, and any similar cross-country vehicle use of heavy equipment on non-roaded surfaces during the winter season. These restrictions do not apply to the use of such equipment on ice roads after they are constructed.

C-1 Best Management Practice

Objective: Protect grizzly bear, polar bear, and marine mammal denning and/or birthing locations.

Requirement/Standard:

- a. Cross-country use of heavy equipment and seismic activities is prohibited within $\frac{1}{2}$ mile of occupied grizzly bear dens identified by the Alaska Department of Fish and Game unless alternative protective measures are approved by the authorized officer in consultation with the Alaska Department of Fish and Game.
- b. Cross-country use of heavy equipment and seismic activity is prohibited within 1 mile of known or observed polar bear dens or seal

birthing lairs. Operators near coastal areas shall conduct a survey for potential polar bear dens and seal birthing lairs and consult with the USFWS and/or NOAA-Fisheries, as appropriate, before initiating activities in coastal habitat between October 30 and April 15.

C-2 Best Management Practice

Objective: Protect stream banks, minimize compaction of soils, and minimize the breakage, abrasion, compaction, or displacement of vegetation.

Requirement/Standard:

- a. Ground operations shall be allowed only when frost and snow cover are at sufficient depths to protect the tundra. Ground operations shall cease when the spring snowmelt begins (approximately May 5 in the foothills area where elevations reach or exceed 500 feet and approximately May 15 in the northern coastal areas). The exact dates will be determined by the authorized officer.
- b. Low-ground-pressure vehicles shall be used for on-the-ground activities off ice roads or pads. Low-ground-pressure vehicles shall be selected and operated in a manner that eliminates direct impacts to the tundra by shearing, scraping, or excessively compacting the tundra mat. Note: This provision does not include the use of heavy equipment such as front-end loaders and similar equipment required during ice road construction.
- c. Bulldozing of tundra mat and vegetation, trails, or seismic lines is prohibited; however, on existing trails, seismic lines or camps, clearing of drifted snow is allowed to the extent that the tundra mat is not disturbed.
- d. To reduce the possibility of ruts, vehicles shall avoid using the same trails for multiple trips unless necessitated by serious safety or superseding environmental concern. This provision does not apply to hardened snow trails for use by low-ground-pressure vehicles such as Rolligons.
- e. The location of ice roads shall be designed and located to minimize compaction of soils and the breakage, abrasion, compaction, or displacement of vegetation. Offsets may be required to avoid using the same route or track in the subsequent year.
- f. Motorized ground-vehicle use within the Colville River Special Area associated with overland moves, seismic work, and any similar use of heavy equipment shall be minimized within an area that extends 1 mile west or northwest of the bluffs of the Colville River, and 2 miles on either side of the Kogosukruk and Kikiakrorak rivers and

tributaries of the Kogosukruk River from April 15 through August 5, with the exception that use will be minimized in the vicinity of gyrfalcon nests beginning March 15. Such use will remain 1/2 mile away from known raptor nesting sites, unless authorized by the authorized officer.

C-3 Best Management Practice

Objective: Maintain natural spring runoff patterns and fish passage, avoid flooding, prevent streambed sedimentation and scour, protect water quality, and protect stream banks.

Requirement/Standard: Crossing of waterway courses shall be made using a low-angle approach. Crossings that are reinforced with additional snow or ice (“bridges”) shall be removed, breached, or slotted before spring breakup. Ramps and bridges shall be substantially free of soil and debris.

C-4 Best Management Practice

Objective: Avoid additional freeze-down of deep-water pools harboring over-wintering fish and invertebrates used by fish.

Requirement/Standard: Travel up and down streambeds is prohibited unless it can be demonstrated that there will be no additional impacts from such travel to over-wintering fish or the invertebrates they rely on. Rivers, streams, and lakes shall be crossed at areas of grounded ice whenever possible.

C-5 Best Management Practice

Objective: Minimize the effects of high-intensity acoustic energy from seismic surveys on fish.

Requirement/Standard:

- a. When conducting vibroseis-based surveys above potential fish overwintering areas (water 6 feet deep or greater, ice plus liquid depth), operators shall follow recommendations by Morris and Winters (2005): only a single set of vibroseis shots should be conducted if possible; if multiple shot locations are required, these should be conducted with minimal delay; multiple days of vibroseis activity above the same overwintering area should be avoided if possible.
- b. When conducting air gun-based surveys in freshwater, operators shall follow standard marine mitigation measures that are applicable to fish (e.g., Minerals Management Service 2006): operators will use the lowest sound levels feasible to accomplish their data-collection needs;

- ramp-up techniques will be utilized (ramp-up involves the gradual increase in emitted sound levels beginning with firing a single air gun and gradually adding air guns until the desired operating level of the full array is obtained).
- c. When conducting explosive-based surveys, operators shall follow setback distances from fish-bearing waterbodies based on requirements outlined by Alaska Department of Fish and Game (1991).

Oil and Gas Exploratory Drilling

D-1 Lease Stipulation

Objectives: Protect fish-bearing rivers, streams, and lakes from blowouts and minimize alteration of riparian habitat.

Requirement/Standard: Exploratory drilling is prohibited in rivers and streams, as determined by the active floodplain, and fish-bearing lakes.

D-2 Lease Stipulation

Objective: Minimize surface impacts from exploratory drilling.

Requirement/Standard: Construction of permanent or gravel oil and gas facilities shall be prohibited for exploratory drilling. Use of a previously constructed road or pad may be permitted if it is environmentally preferred.

Facility Design and Construction

E-1 Best Management Practice

Objective: Protect subsistence use and access to subsistence hunting and fishing areas and minimize the impact of oil and gas activities on air, land, water, fish, and wildlife resources.

Requirement/Standard: All roads must be designed, constructed, maintained, and operated to create minimal environmental impacts and to protect subsistence use and access to subsistence hunting and fishing areas. The authorized officer will consult with appropriate federal, State, and North Slope Borough regulatory and resources agencies prior to approving construction of roads. Subject to approval by the authorized officer, the construction, operation, and maintenance of oil and gas field roads is the responsibility of the lessee unless the construction, operation, and maintenance of roads are assumed by the appropriate governing entity.

E-2 Lease Stipulation

Objective: Protect fish-bearing water bodies, water quality, and aquatic habitats.

Requirement/Standard: Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited upon or within 500 feet as measured from the ordinary high water mark of fish-bearing waterbodies. Essential pipeline and road crossings will be permitted on a case-by-case basis. Note: Also refer to Stipulations/Best Management Practices K-1 and K-2. Construction camps are prohibited on frozen lakes and river ice. Siting of construction camps on river sand and gravel bars is allowed and encouraged. Where leveling of trailers or modules is required and the surface has a vegetative mat, leveling shall be accomplished through blocking rather than use of a bulldozer.

E-3 Lease Stipulation

Objective: Maintain free passage of marine and anadromous fish and protect subsistence use and access to subsistence hunting and fishing.

Requirement/Standard: Causeways and docks are prohibited in river mouths or deltas. Artificial gravel islands and bottom-founded structures are prohibited in river mouths or active stream channels on river deltas. Causeways, docks, artificial islands, and bottom-founded drilling structures shall be designed to ensure free passage of marine and anadromous fish and to prevent significant changes to nearshore oceanographic circulation patterns and water quality characteristics. A monitoring program, developed in consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies, shall be required to address the objectives of water quality and free passage of fish.

E-4 Best Management Practice

Objective: Minimize the potential for pipeline leaks, the resulting environmental damage, and industrial accidents.

Requirement/Standard: All pipelines shall be designed, constructed, and operated under an authorized officer-approved Quality Assurance/Quality Control plan that is specific to the product transported and shall be constructed to accommodate the best available technology for detecting and preventing corrosion or mechanical defects during routine structural integrity inspections.

E-5 Best Management Practice

Objective: Minimize impacts of the development footprint.

Requirement/Standard: Facilities shall be designed and located to minimize the development footprint. Issues and methods that are to be considered include:

- a. use of maximum extended-reach drilling for production drilling to minimize the number of pads and the network of roads between pads;
- b. sharing facilities with existing development;
- c. collocation of all oil and gas facilities, except airstrips, docks, and seawater-treatment plants, with drill pads;
- d. integration of airstrips with roads;
- e. use of gravel-reduction technologies, e.g., insulated or pile-supported pads,
- f. coordination of facilities with infrastructure in support of offshore development.

Note: Where aircraft traffic is a concern, consideration shall be given to balancing gravel pad size and available supply storage capacity with potential reductions in the use of aircraft to support oil and gas operations.

E-6 Best Management Practice

Objective: Reduce the potential for ice-jam flooding, impacts to wetlands and floodplains, erosion, alteration of natural drainage patterns, and restriction of fish passage.

Requirement/Standard: Stream and marsh crossings shall be designed and constructed to ensure free passage of fish, reduce erosion, maintain natural drainage, and minimize adverse effects to natural stream flow. Note:

Bridges, rather than culverts, are the preferred method for crossing rivers. When necessary, culverts can be constructed on smaller streams, if they are large enough to avoid restricting fish passage or adversely affecting natural stream flow.

E-7 Best Management Practice

Objective: Minimize disruption of caribou movement and subsistence use.

Requirement/Standard: Pipelines and roads shall be designed to allow the free movement of caribou and the safe, unimpeded passage of the public while participating in subsistence activities. Listed below are the accepted design practices:

- a. Above ground pipelines shall be elevated a minimum of 7 feet as measured from the ground to the bottom of the pipeline at vertical support members.

- b. In areas where facilities or terrain may funnel caribou movement, ramps over pipelines, buried pipelines, or pipelines buried under roads may be required by the authorized officer after consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate, based on agency legal authority and jurisdictional responsibility).
- c. A minimum distance of 500 feet between pipelines and roads shall be maintained. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipelines and roads converge on a drill pad. Where it is not feasible to separate pipelines and roads, alternative pipeline routes, designs and possible burial within the road will be considered by the authorized officer.

E-8 Best Management Practice

Objective: Minimize the impact of mineral materials mining activities on air, land, water, fish, and wildlife resources.

Requirement/Standard: Gravel mine site design and reclamation will be in accordance with a plan approved by the authorized officer. The plan shall be developed in consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies and consider:

- a. Locations outside the active flood plain.
- b. Design and construction of gravel mine sites within active flood plains to serve as water reservoirs for future use.
- c. Potential use of the site for enhancing fish and wildlife habitat.
- d. Potential storage and reuse of sod/overburden for the mine site or at other disturbed sites on the North Slope.

E-9 Best Management Practice

Objective: Avoidance of human-caused increases in populations of predators of ground nesting birds.

Requirement/Standard:

- a. Lessee shall utilize best available technology to prevent facilities from providing nesting, denning, or shelter sites for ravens, raptors, and foxes. The lessee shall provide the authorized officer with an annual report on the use of oil and gas facilities by ravens, raptors, and foxes as nesting, denning, and shelter sites.
- b. Feeding of wildlife is prohibited and will be subject to non-compliance regulations.

E-10 Best Management Practice

Objective: Prevention of migrating waterfowl, including species listed under the Endangered Species Act, from striking oil and gas and related facilities during low light conditions.

Requirement/Standard: Illumination of all structures between August 1 and October 31 shall be designed to direct artificial exterior lighting inward and downward, rather than upward and outward, unless otherwise required by the Federal Aviation Administration.

E-11 Best Management Practice

Objective: Minimize the take of species, particularly those listed under the Endangered Species Act and BLM Special Status Species, from direct or indirect interaction with oil and gas facilities.

Requirement/Standard: In accordance with the guidance below, before the approval of facility construction, aerial surveys of the following species shall be conducted within any area proposed for development.

Special Conditions in Spectacled and/or Steller's Eiders Habitats:

- a. Surveys shall be conducted by the lessee for at least 3 years before authorization of construction, if such construction is within the USFWS North Slope eider survey area and at least 1 year outside that area. Results of aerial surveys and habitat mapping may require additional ground nest surveys. Spectacled and/or Steller's eider surveys shall be conducted following accepted BLM-protocol. Information gained from these surveys shall be used to make infrastructure siting decisions as discussed in subparagraph b, below.
- b. If spectacled and/or Steller's eiders are determined to be present within the proposed development area, the applicant shall work with the USFWS and BLM early in the design process to site roads and facilities in order to minimize impacts to nesting and brood-rearing eiders and their preferred habitats. Such consultation shall address timing restrictions and other temporary mitigating measures, location of permanent facilities, placement of fill, alteration of eider habitat, aircraft operations, and management of high noise levels.
- c. To reduce the possibility of spectacled and/or Steller's eiders or other birds colliding with above-ground utility lines (power and communication), such lines shall either be buried in access roads or suspended on vertical support members except in rare cases which are to be few in number and limited in extent. Exceptions are limited to the following situations, and must be reported to the USFWS when exceptions are authorized:

1. Overhead power or communication lines may be allowed when located entirely within the boundaries of a facility pad;
 2. Overhead power or communication lines may be allowed when engineering constraints at the specific and limited location make it infeasible to bury or connect the lines to a vertical support member; or
 3. Overhead power or communication lines may be allowed in situations when human safety would be compromised by other methods.
- d. To reduce the likelihood of spectacled and/or Steller's eiders or other birds colliding with communication towers, towers should be located, to the extent practicable, on existing pads and as close as possible to buildings or other structures, and on the east or west side of buildings or other structures if possible. Support wires associated with communication towers, radio antennas, and other similar facilities, should be avoided to the extent practicable. If support wires are necessary, they should be clearly marked along their entire length to improve visibility to low flying birds. Such markings shall be developed through consultation with the USFWS.

Special Conditions in Yellow-billed Loon Habitats:

- e. Aerial surveys shall be conducted by the lessee for at least 3 years before authorization of construction of facilities proposed for development which are within 1 mile of a lake 25 acres or larger in size. These surveys along shorelines of large lakes shall be conducted following accepted BLM protocol during nesting in late June and during brood rearing in late August.
- f. Should yellow-billed loons be present, the design and location of facilities must be such that disturbance is minimized. The default standard mitigation is a 1-mile buffer around all recorded nest sites and a minimum 1,625-foot (500-meter) buffer around the remainder of the shoreline. Development will generally be prohibited within buffers unless no other option exists.

Protections for Birds

- g. To reduce the possibility of birds colliding with above-ground utility lines (power and communication), such lines shall either be buried in access roads or suspended on vertical support members except in rare cases, which are to be few in number and limited in extent. Exceptions are limited to the following situations:
 1. Overhead power or communication lines may be allowed when located entirely within the boundaries of a facility pad;

2. Overhead power or communication lines may be allowed when engineering constraints at the specific and limited location make it infeasible to bury or connect the lines to a vertical support member; or
 3. Overhead power or communication lines may be allowed in situations when human safety would be compromised by other methods.
- h. To reduce the likelihood of birds colliding with communication towers, towers should be located, to the extent practicable, on existing pads and as close as possible to buildings or other structures, and on the east or west side of buildings or other structures if possible. Support wires associated with communication towers, radio antennas, and other similar facilities, should be avoided to the extent practicable. If support wires are necessary, they should be clearly marked along their entire length to improve visibility to low-flying birds. Such markings shall be developed through consultation with the USFWS.

E-12 Best Management Practice

Objective: Use ecological mapping as a tool to assess wildlife habitat before development of permanent facilities to conserve important habitat types during development.

Requirement/Standard: An ecological land classification map of the development area shall be developed before approval of facility construction. The map will integrate geomorphology, surface form, and vegetation at a scale, level of resolution, and level of positional accuracy adequate for detailed analysis of development alternatives. The map shall be prepared in time to plan one season of ground-based wildlife surveys, if deemed necessary by the authorized officer, before approval of the exact facility location and facility construction.

E-13 Best Management Practice

Objective: Protect cultural and paleontological resources.

Requirement/Standard: Lessees shall conduct a cultural and paleontological resources survey prior to any ground-disturbing activity. Upon finding any potential cultural or paleontological resource, the lessee or their designated representative shall notify the authorized officer and suspend all operations in the immediate area of such discovery until written authorization to proceed is issued by the authorized officer.

E-14 Best Management Practice

Objective: Ensure the passage of fish at stream crossings.

Requirement/Standard: To ensure that crossings provide for fish passage, all proposed crossing designs shall adhere to the best management practices outlined in “Stream Crossing Design Procedure for Fish Streams on the North Slope Coastal Plain” by McDonald et al. (1994), “Fundamentals of Culvert Design for Passage of Weak-Swimming Fish” by Behlke et al. (1991), and other generally accepted best management procedures prescribed by the authorized officer. To adhere to these best management practices, at least 3 years of hydrologic and fish data shall be collected by the lessee for any proposed crossing of a stream whose structure is designed to occur, wholly or partially, below the stream’s ordinary high watermark. These data shall include, but are not limited to, the range of water levels (highest and lowest) at the location of the planned crossing, and the seasonal distribution and composition of fish populations using the stream.

E-15 Best Management Practice

Objective: Prevent or minimize the loss of nesting habitat for cliff nesting raptors.

Requirement/Standard:

- a. Removal of greater than 100 cubic yards of bedrock outcrops, sand, and/or gravel from cliffs shall be prohibited.
- b. Any extraction of sand and/or gravel from an active river or stream channel shall be prohibited unless preceded by a hydrological study that indicates no potential impact by the action to the integrity of the river bluffs.

E-16 Best Management Practice

Objective: Prevent or minimize the loss of raptors due to electrocution by power lines.

Requirement/Standard: Comply with the most up-to-date industry-accepted suggested practices for raptor protection on power lines. Current accepted standards were published in *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* by the Avian Power Line Interaction Committee and are updated as needed.

E-17 Best Management Practice

Objective: Manage permitted activities to meet Visual Resource Management class objectives described below.

Class I: Natural ecological changes and very limited management activity are allowed. The level of change to the characteristic landscape should be very low and must not attract attention.

Class II: The level of change to the characteristic landscape should be low. Management activities may be seen, but should not dominate the view of the casual observer. Any changes should repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

Class III: The level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Class IV: The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize impacts through location and design by repeating form, line, color, and texture.

Requirement/Standard: At the time of application for construction of permanent facilities, the lessee/permittee shall, after consultation with the authorized officer, submit a plan to best minimize visual impacts, consistent with the Visual Resource Management class for the lands on which facilities would be located. A photo simulation of the proposed facilities may be a necessary element of the plan.

E-18 Best Management Practice

Objective: Avoid and reduce temporary impacts to productivity from disturbance near Steller's and/or spectacled eider nests.

Requirement/Standard: Ground-level activity (by vehicle or on foot) within 200 meters of occupied Steller's and/or spectacled eider nests, from June 1 through August 15, will be restricted to existing thoroughfares, such as pads and roads. Construction of permanent facilities, placement of fill, alteration of habitat, and introduction of high noise levels within 200 meters of occupied Steller's and/or spectacled eider nests will be prohibited. In instances where summer (June 1 through August 15) support/construction activity must occur off existing thoroughfares, USFWS-approved nest surveys must be conducted during mid-June prior to the approval of the activity. Collected data will be used to evaluate whether the action could occur based on employment of a 200-meter buffer around nests or if the activity would be delayed until after mid-August once ducklings are mobile

and have left the nest site. Also, in cases in which oil spill response training is proposed to be conducted within 200 meters of shore in riverine, marine, or inter-tidal areas, the BLM will work with the USFWS to schedule the training at a time that is not a sensitive nesting/brood-rearing period or require that nest surveys be conducted in the training area prior to the rendering a decision on approving the training. The protocol and timing of nest surveys for Steller's and/or spectacled eiders will be determined in cooperation with the USFWS, and must be approved by the USFWS. Surveys should be supervised by biologists who have previous experience with Steller's and/or spectacled eider nest surveys.

E-19 Best Management Practice

Objective: Provide information to be used in monitoring and assessing wildlife movements during and after construction.

Requirement/Standard: A representation, in the form of ArcGIS-compatible shape-files, of all new infrastructure construction shall be provided to the authorized officer. During the planning and permitting phase, shape-files representing proposed locations shall be provided. Within 6 months of construction completion, shape-files (within GPS accuracy) of all new infrastructure shall be provided. Infrastructure includes all gravel roads and pads, facilities built on pads, pipelines and independently constructed powerlines (as opposed to those incorporated in pipeline design). Gravel pads shall be included as polygon feature. Roads, pipelines, and powerlines may be represented as line features but must include ancillary data to denote width, number pipes, etc. Poles for power lines may be represented as point features. Ancillary data shall include construction beginning and ending dates.

Use of Aircraft for Permitted Activities

F-1 Best Management Practice

Objective: Minimize the effects of low-flying aircraft on wildlife, subsistence activities, and local communities.

Requirement/Standard: The lessee shall ensure that aircraft used for permitted activities maintain altitudes according to the following guidelines (Note: This best management practice is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objectives of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.):

- a. Aircraft shall maintain an altitude of at least 1,500 feet above ground level when within ½ mile of cliffs identified as raptor nesting sites from April 15 through August 15 and an altitude of at least 1,500 feet above ground level when within ½ mile of known gyrfalcon nest sites from March 15 to August 15, unless doing so would endanger human life or violate safe flying practices. Permittees shall obtain information from the BLM necessary to plan flight routes when routes may go near falcon nests.
- b. Aircraft shall maintain an altitude of at least 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, unless doing so would endanger human life or violate safe flying practices. Caribou wintering areas will be defined annually by the authorized officer. The BLM will consult directly with the Alaska Department of Fish and Game in annually defining caribou winter ranges.
- c. Land user shall submit an aircraft use plan as part of an oil and gas exploration or development proposal. The plan shall address strategies to minimize impacts to subsistence hunting and associated activities, including but not limited to the number of flights, type of aircraft, and flight altitudes and routes, and shall also include a plan to monitor flights. Proposed aircraft use plans should be reviewed by appropriate federal, State, and borough agencies. Consultations with these same agencies will be required if unacceptable disturbance is identified by subsistence users. Adjustments, including possible suspension of all flights, may be required by the authorized officer if resulting disturbance is determined to be unacceptable. The number of takeoffs and landings to support oil and gas operations with necessary materials and supplies should be limited to the maximum extent possible. During the design of proposed oil and gas facilities, larger landing strips and storage areas should be considered to allow larger aircraft to be employed, resulting in fewer flights to the facility.
- d. Use of aircraft, especially rotary wing aircraft, near known subsistence camps and cabins or during sensitive subsistence hunting periods (spring goose hunting and fall caribou and moose hunting) should be kept to a minimum.
- e. Aircraft used for permitted activities shall maintain an altitude of at least 2,000 feet above ground level (except for takeoffs and landings) over the Teshekpuk Lake Caribou Habitat Area (Map 2) from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices. Aircraft use (including fixed wing and

- helicopter) by oil and gas lessees in the Goose Molting Area (Map 2) should be minimized from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices.
- f. Aircraft used for permitted activities shall maintain an altitude of at least 2,000 feet above ground level (except for takeoffs and landings) over the Utukok River Uplands Special Area (Map 2) from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices.
 - g. Hazing of wildlife by aircraft is prohibited. Pursuit of running wildlife is hazing. If wildlife begins to run as an aircraft approaches, the aircraft is too close and must break away.
 - h. Fixed wing aircraft used as part of a BLM-authorized activity along the coast shall maintain minimum altitude of 2,000 feet when within a ½-mile of walrus haulouts, unless doing so would endanger human life or violate safe flying practices. Helicopters used as part of a BLM-authorized activity along the coast shall maintain minimum altitude of 3,000 feet and a 1-mile buffer from walrus haulouts, unless doing so would endanger human life or violate safe flying practices.
 - i. Aircraft used as part of a BLM-authorized activity along the coast and shore fast ice zone shall maintain minimum altitude of 3,000 feet when within 1 mile from aggregations of seals, unless doing so would endanger human life or violate safe flying practices.

Oil Field Abandonment

G-1 Lease Stipulation

Objective: Ensure long-term reclamation of land to its previous condition and use.

Requirement/Standard: Prior to final abandonment, land used for oil and gas infrastructure—including but not limited to well pads, production facilities, access roads, and airstrips—shall be reclaimed to ensure eventual restoration of ecosystem function. The leaseholder shall develop and implement an abandonment and reclamation plan approved by the BLM. The plan shall describe short-term stability, visual, hydrological, and productivity objectives and steps to be taken to ensure eventual ecosystem restoration to the land's previous hydrological, vegetative, and habitat condition. The BLM may grant exceptions to satisfy stated environmental or public purposes.

Subsistence Consultation for Permitted Activities

H-1 Best Management Practice

Objective: Provide opportunities for participation in planning and decision making to prevent unreasonable conflicts between subsistence uses and other activities.

Requirement/Standard: Lessee/permittee shall consult directly with affected communities using the following guidelines:

- a. Before submitting an application to the BLM, the applicant shall consult with directly affected subsistence communities, the North Slope Borough, and the National Petroleum Reserve-Alaska Subsistence Advisory Panel to discuss the siting, timing, and methods of their proposed operations to help discover local traditional and scientific knowledge, resulting in measures that minimize impacts to subsistence uses. Through this consultation, the applicant shall make every reasonable effort, including such mechanisms as conflict avoidance agreements and mitigating measures, to ensure that proposed activities will not result in unreasonable interference with subsistence activities. In the event that no agreement is reached between the parties, the authorized officer shall consult with the directly involved parties and determine which activities will occur, including the timeframes.
- b. The applicant shall submit documentation of consultation efforts as part of its operations plan. Applicants should submit the proposed plan of operations to the National Petroleum Reserve-Alaska Subsistence Advisory Panel for review and comment. The applicant must allow time for the BLM to conduct formal government-to-government consultation with Native Tribal governments if the proposed action requires it.
- c. A plan shall be developed that shows how the activity, in combination with other activities in the area, will be scheduled and located to prevent unreasonable conflicts with subsistence activities. The plan will also describe the methods used to monitor the effects of the activity on subsistence use. The plan shall be submitted to the BLM as part of the plan of operations. The plan should address the following items:
 1. A detailed description of the activity(ies) to take place (including the use of aircraft).
 2. A description of how the lessee/permittee will minimize and/or deal with any potential impacts identified by the authorized officer during the consultation process.

3. A detailed description of the monitoring effort to take place, including process, procedures, personnel involved and points of contact both at the work site and in the local community.
 4. Communication elements to provide information on how the applicant will keep potentially affected individuals and communities up-to-date on the progress of the activities and locations of possible, short-term conflicts (if any) with subsistence activities. Communication methods could include holding community meetings, open house meetings, workshops, newsletters, radio and television announcements, etc.
 5. Procedures necessary to facilitate access by subsistence users to the permittees' area of activity or facilities during the course of conducting subsistence activities.
- d. During development, monitoring plans must be established for new permanent facilities, including pipelines, to assess an appropriate range of potential effects on resources and subsistence as determined on a case-by-case basis given the nature and location of the facilities. The scope, intensity, and duration of such plans will be established in consultation with the authorized officer and NPR-A Subsistence Advisory Panel.
 - e. Permittees that propose barging facilities, equipment, supplies, or other materials to NPR-A in support of oil and gas activities in the NPR-A shall notify, confer, and coordinate with the Alaska Eskimo Whaling Commission, the appropriate local community whaling captains' associations, and the North Slope Borough to minimize impacts from the proposed barging on subsistence whaling activities.
 - f. Barge operators requiring a BLM permit are required to demonstrate that barging activities will not have unmitigable adverse impacts on the availability of marine mammals to subsistence hunters.
 - g. All vessels over 50 ft. in length engaged in operations requiring a BLM permit must have an Automatic Identification System (AIS) transponder system on the vessel.

H-2 Best Management Practice

Objective: Prevent unreasonable conflicts between subsistence activities and geophysical (seismic) exploration.

Requirement/Standard: In addition to the consultation process described in Best Management Practice H-1 for permitted activities, before activity to conduct geophysical (seismic) exploration commences, applicants shall notify the local search and rescue organizations of proposed seismic survey

locations for that operational season. For the purpose of this standard, a potentially affected cabin/campsite is defined as any camp or campsite used for subsistence purposes and located within the boundary of the area subject to proposed geophysical exploration and/or within 1 mile of actual or planned travel routes used to supply the seismic operations while it is in operation.

- a. Because of the large land area covered by typical geophysical operations and the potential to impact a large number of subsistence users during the exploration season, the permittee/operator will notify all potentially affected subsistence-use cabin and campsite users.
- b. The official recognized list of subsistence-use cabin and campsite users is the North Slope Borough's most current inventory of cabins and campsites, which have been identified by the subsistence users' names.
- c. A copy of the notification, a map of the proposed exploration area, and the list of potentially affected users shall also be provided to the office of the appropriate Native Tribal government.
- d. The authorized officer will prohibit seismic work within 1 mile of any known subsistence-use cabin or campsite unless an alternate agreement between the cabin/campsite owner/user is reached through the consultation process and presented to the authorized officer. (Regardless of the consultation outcome, the authorized officer will prohibit seismic work within 300 feet of a known subsistence-use cabin or campsite.)
- e. The permittee shall notify the appropriate local search and rescue (e.g., Nuiqsut Search and Rescue, Atqasuk Search and Rescue) of their current operational location within the NPR-A on a weekly basis. This notification should include a map indicating the current extent of surface use and occupation, as well as areas previously used/occupied during the course of the operation in progress. The purpose of this notification is to allow hunters up-to-date information regarding where seismic exploration is occurring, and has occurred, so that they can plan their hunting trips and access routes accordingly. Identification of the appropriate search and rescue offices to be contacted can be obtained from the coordinator of the NPR-A Subsistence Advisory Panel in the BLM's Arctic Field Office.

H-3 Best Management Practice

Objective: Minimize impacts to sport hunting and trapping species and to subsistence harvest of those animals.

Requirement/Standard: Hunting and trapping by lessee's/permittee's employees, agents, and contractors are prohibited when persons are on "work status." Work status is defined as the period during which an individual is under the control and supervision of an employer. Work status is terminated when the individual's shift ends and he/she returns to a public airport or community (e.g., Fairbanks, Barrow, Nuiqsut, or Deadhorse). Use of lessee/permittee facilities, equipment, or transport for personal access or aid in hunting and trapping is prohibited.

Orientation Programs Associated with Permitted Activities

I-1 Best Management Practice

Objective: Minimize cultural and resource conflicts.

Requirement/Standard: All personnel involved in oil and gas and related activities shall be provided information concerning applicable stipulations, best management practices, standards, and specific types of environmental, social, traditional, and cultural concerns that relate to the region. The lessee/permittee shall ensure that all personnel involved in permitted activities shall attend an orientation program at least once a year. The proposed orientation program shall be submitted to the authorized officer for review and approval and should:

- a. provide sufficient detail to notify personnel of applicable stipulations and best management practices as well as inform individuals working on the project of specific types of environmental, social, traditional and cultural concerns that relate to the region.
- b. Address the importance of not disturbing archaeological and biological resources and habitats, including endangered species, fisheries, bird colonies, and marine mammals, and provide guidance on how to avoid disturbance.
- c. Include guidance on the preparation, production, and distribution of information cards on endangered and/or threatened species.
- d. Be designed to increase sensitivity and understanding of personnel to community values, customs, and lifestyles in areas in which personnel will be operating.
- e. Include information concerning avoidance of conflicts with subsistence, commercial fishing activities, and pertinent mitigation.

- f. Include information for aircraft personnel concerning subsistence activities and areas/seasons that are particularly sensitive to disturbance by low-flying aircraft. Of special concern is aircraft use near traditional subsistence cabins and campsites, flights during spring goose hunting and fall caribou and moose hunting seasons, and flights near North Slope communities.
- g. Provide that individual training is transferable from one facility to another except for elements of the training specific to a particular site.
- h. Include on-site records of all personnel who attend the program for so long as the site is active, though not to exceed the 5 most recent years of operations. This record shall include the name and dates(s) of attendance of each attendee.
- i. Include a module discussing bear interaction plans to minimize conflicts between bears and humans.
- j. Provide a copy of 43 CFR 3163 regarding Non-Compliance Assessment and Penalties to on-site personnel.
- k. Include training designed to ensure strict compliance with local and corporate drug and alcohol policies. This training should be offered to the North Slope Borough Health Department for review and comment.
- l. Include training developed to train employees on how to prevent transmission of communicable diseases, including sexually transmitted diseases, to the local communities. This training should be offered to the North Slope Borough Health Department for review and comment.

Endangered Species Act—Section 7 Consultation Process

J. The lease areas may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or to have some other special status. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activities that will contribute to the need to list such a species or their habitat. The BLM may require modifications to or disapprove a proposed activity that is likely to adversely affect a proposed or listed endangered species, threatened species, or critical habitat. The BLM will not approve any activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 USC § 1531 et seq., including completion of any required procedure for conference or consultation.

Additional Protections that Apply in Select Biologically Sensitive Areas

K-1 Lease Stipulation/Best Management Practice – Rivers

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternatives, K-1 would be a best management practice. The decision indicated below in subparagraphs (a) and (d) modify Protection 1 of the Colville River Special Area Management Plan by widening its applicability to 2 miles.

Objective: Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of floodplain and riparian areas; the loss of spawning, rearing or over-wintering habitat for fish; the loss of cultural and paleontological resources; the loss of raptor habitat; impacts to subsistence cabin and campsites; the disruption of subsistence activities; and impacts to scenic and other resource values.

Requirement/Standard: Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited in the streambed and adjacent to the rivers listed below at the distances identified. (Gravel mines may be located within the active floodplain consistent with Best Management Practice E-8). On a case-by case basis, and in consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate, based on agency legal authority and jurisdictional responsibility), essential pipeline and road crossings to the main channel will be permitted through setback areas. The below setbacks may not be practical within river deltas; in such deltas, permanent facilities shall be designed to withstand a 200-year flood event. In the below list, if no upper limit for the setback is indicated, the setback extends to the head of the stream as identified in the National Hydrography Dataset.

- a. **Colville River**: a 2-mile setback from the boundary of NPR-A where the river determines the boundary along the Colville River as determined by cadastral survey to be the highest high watermark on the left (western or northern) bank and from both banks' ordinary high watermark where BLM-manages both sides of the river up through T5S, R30W, U.M. Above that point to its source at the juncture of Thunder and Storm creeks the setback will be ½ mile. Note: The planning area excludes conveyed Native lands along the lower reaches of the Colville River. Development of road crossings intended to support oil and gas activities shall be consolidated with other similar projects and uses to the maximum extent possible. Note: This provision does not apply to intercommunity or other permanent roads

- constructed with public funds for general transportation purposes, though the BLM would encourage minimal use of the setback area. This preserves the opportunity to plan, design, and construct public transportation systems to meet the economic, transportation, and public health and safety needs of the State of Alaska and/or communities within National Petroleum Reserve-Alaska.
- b. **Ikpikpuk River:** a 2-mile setback from of the ordinary high watermark of the Ikpikpuk River extending from the mouth upstream through T7 N, R11W, U.M.; above that the setback would be for 1 mile to the confluence of the Kigalik River and Maybe Creek.
 - c. **Miguakiak River:** a ½-mile setback from the ordinary high watermark.
 - d. **Kikiakrorak and Kogosukruk Rivers:** A 2-mile setback from the top of the bluff (or ordinary high watermark if there is no bluff) on the Kikiakrorak River downstream from T2N., R4W, U.M. and on the Kogosukruk River (including Branch of Kogosukruk River, Henry Creek, and two unnamed tributaries off the southern bank) downstream from T2N, R3W, U.M. The setback from these streams in the named townships and further upstream as applicable will be a ½-mile from the top of the bluff or bank if there is no bluff.
 - e. **Fish Creek:** a 3-mile setback from the highest high watermark of the creek downstream from the eastern edge of section 31, T11N, R1E., U.M. and a ½-mile setback from the bank's highest high watermark farther upstream.
 - f. **Judy Creek:** a ½-mile setback from the ordinary high watermark.
 - g. **Ublutuoch (Tiṅmiaqsiugvik) River:** a ½-mile setback from the ordinary high water mark.
 - h. **Alaktak River:** a 1-mile setback from the ordinary high water mark.
 - i. **Chipp River:** a 1-mile setback from the ordinary high water mark.
 - j. **Oumalik River:** a ½-mile setback from the Oumalik River ordinary high water mark from the mouth upstream to section 5, T8N, R14W, U.M., and a ½ mile setback in and above section 5, T8N, R14W, U.M.
 - k. **Titaluk River:** a 2-mile setback from the ordinary high water mark from its confluence with the Ikpikpuk River upstream through T7N, R12W, U.M.; above that point the setback would be ½-mile from the ordinary high water mark.
 - l. **Kigalik River:** a ½-mile setback from the ordinary high water mark.
 - m. **Maybe Creek:** a ½-mile setback from the ordinary high water mark.
 - n. **Topagoruk River:** a 1-mile setback from the ordinary high water mark.

- o. **Ishuktak Creek:** a ½-mile setback from the ordinary high water mark.
- p. **Meade River:** a 1-mile setback from the ordinary high water mark on BLM-managed lands.
- q. **Usuktuk River:** a 1-mile setback from the ordinary high water mark on BLM-managed lands.
- r. **Pikroka Creek:** a ½-mile setback from the ordinary high water mark.
- s. **Nigisaktuvik River:** a 1-mile setback from the ordinary high water mark.
- t. **Inaru River:** a 1-mile setback from the ordinary high water mark.
- u. **Kucheak Creek:** a ½-mile setback from the ordinary high water mark.
- v. **Avalik River:** a 1-mile setback from the ordinary high water mark.
- w. **Niklavik Creek:** a ½-mile setback from the ordinary high water mark.
- x. **Kugrua River:** a ½-mile setback from the ordinary high water mark.
- y. **Kungok River:** a 1-mile setback from the ordinary high water mark on BLM-managed lands.
- z. **Kolipsun Creek:** a ½-mile setback from the ordinary high water mark upstream through T13N, R28W, U.M.
- aa. **Maguriak Creek:** a ½-mile setback from the ordinary high water mark upstream through T12N, R29W, U.M.
- ab. **Mikigealiak River:** a ½-mile setback from the ordinary high water mark upstream through T12N, R30W, U.M.
- ac. **Kuk River:** a 1-mile setback from the ordinary high water mark on BLM-managed lands.
- ad. **Ketik River:** a 1-mile setback from the ordinary high water mark.
- ae. **Kaolak River:** a 1-mile setback from the ordinary high water mark.
- af. **Ivisaruk River:** a 1-mile setback from the ordinary high water mark.
- ag. **Nokotlek River:** a ½-mile setback from the ordinary high water mark.
- ah. **Ongorakvik River:** a ½-mile setback from the ordinary high water mark.
- ai. **Tunalik River:** a ½-mile setback from the ordinary high water mark.
- aj. **Avak River:** a ½-mile setback from the ordinary high water mark within the NPR-A.
- ak. **Nigu River:** a ½-mile setback from the ordinary high water mark from the confluence with the Etivluk River upstream to the boundary of NPR-A
- al. **Etivluk River:** a ½-mile setback from the ordinary high water mark.
- am. **Ipnavig River:** a ½-mile setback from the ordinary high water mark.
- an. **Kuna River:** a ½-mile setback from the ordinary high water mark.
- ao. **Kiligwa River:** a ½-mile setback from the ordinary high water mark.

- ap. **Nuka River:** a ½-mile setback from the ordinary high water mark.
- aq. **Driftwood Creek:** a ½-mile setback from the ordinary high water mark.
- ar. **Utukok River:** a 1-mile setback from the ordinary high water mark within the NPR-A.
- as. **Awuna River:** a ½-mile setback from the ordinary high water mark.
- at. **Carbon Creek:** a ½-mile setback from the ordinary high water mark.
- au. **Kokolik River:** a 1-mile setback from the ordinary high water mark within the NPR-A.
- av. **Keolok Creek:** a ½-mile setback from the ordinary high water mark.

The decisions in subparagraphs K-1(a) and K-1(d) modify Colville River Management Plan Protection 1 by widening the setback in that measure to 2 miles. Protection 1 thus is modified to the following:

Colville River Special Area Management Plan-Protection 1

Objective: Minimize the loss of arctic peregrine falcon nesting habitat in the Colville River Special Area.

Requirement/Standard: To minimize the direct loss of arctic peregrine falcon nesting habitat and to protect nest sites in the Colville River Special Area the following protective measures apply: Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited in the stream bed and adjacent to the rivers listed below at the distances identified. On a case-by-case basis, and in consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate; based on agency legal authority and jurisdictional responsibility), essential pipeline and road crossings perpendicular to the main channel will be permitted through setback areas.

- a. Colville River: downstream of the Etivluk River a continuous 2-mile setback measured from the highest high watermark on the left bank (facing downstream); upstream of the Etivluk River a 2-mile setback measured from the ordinary high watermark of the bank on both sides of the river. Development of road crossings intended to support oil and gas activities shall be consolidated with other similar projects and uses to the maximum extent possible. This provision does not apply to intercommunity or other permanent roads constructed with public funds for general transportation purposes.
- b. Kikiakrorak River: downstream from T2N, R4W, U.M., a continuous 2-mile setback as measured from the top of the bluff (or bank if there is no bluff) of both sides of the river.

- c. Kogosukruk River: downstream from T2N, R3W, U.M., a continuous 2-mile setback as measured from the top of the bluff (or bank if there is no bluff) of both sides of the river and several of its tributaries.

K-2 Lease Stipulation/Best Management Practice – Deep Water Lakes

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing, K-2 would be a best management practice.

Objective: Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss or change to vegetative and physical characteristics of deep water lakes; the loss of spawning, rearing or over wintering habitat for fish; the loss of cultural and paleontological resources; impacts to subsistence cabin and campsites; and the disruption of subsistence activities.

Requirement/Standard: Generally, permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited on the lake or lakebed and within ¼ mile of the ordinary high water mark of any deep lake as determined to be in lake zone III (i.e., depth greater than 13 feet [4 meters]; Mellor 1985). On a case-by-case basis in consultation with federal, State and North Slope Borough regulatory and resource agencies (as appropriate based on agency legal authority and jurisdictional responsibility), essential pipeline(s), road crossings, and other permanent facilities may be considered through the permitting process in these areas where the lessee can demonstrate on a site-specific basis that impacts will be minimal.

K-3 Best Management Practice – Kogru River, Dease Inlet, Admiralty Bay, Elson Lagoon, Peard Bay, Wainwright Inlet/Kuk River, and Kasegaluk Lagoon, and their associated Islands

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-3 will apply as a best management practice.

Objective: Protect fish and wildlife habitat (including, but not limited to, that for waterfowl and shorebirds, caribou insect-relief, and marine mammals), preserve air and water quality, and minimize impacts to subsistence activities and historic travel routes on the major coastal waterbodies.

Requirement/Standard (Development): With the exception of linear features such as pipelines, no permanent oil and gas facilities are permitted on or under the water within ¾ mile seaward of the shoreline (as measured from mean high tide) of the major coastal waterbodies or the natural coastal islands (to the extent that the seaward subsurface is within NPR-A).

Elsewhere, permanent facilities within the major coastal waterbodies will

only be permitted on or under the water if they can meet all the following criteria:

- a. Design and construction of facilities shall minimize impacts to subsistence uses, travel corridors, seasonally concentrated fish and wildlife resources.
- b. Daily operational activities, including use of support vehicles, watercraft, and aircraft traffic, alone or in combination with other past, present, and reasonably foreseeable activities, shall be conducted to minimize impacts to subsistence uses, travel corridors, and seasonally concentrated fish and wildlife resources.
- c. The location of oil and gas facilities, including artificial islands, platforms, associated pipelines, ice or other roads, bridges or causeways, shall be sited and constructed so as to not pose a hazard to navigation by the public using traditional high-use subsistence-related travel routes into and through the major coastal waterbodies as identified by the North Slope Borough.
- d. Demonstrated year-round oil spill response capability, including the capability of adequate response during periods of broken ice or open water, or the availability of alternative methods to prevent well blowouts during periods when adequate response capability cannot be demonstrated. Such alternative methods may include seasonal drilling restrictions, improvements in blowout prevention technology, equipment and/or changes in operational procedures, and “top-setting” of hydrocarbon-bearing zones.
- e. Reasonable efforts will be made to avoid or minimize impacts related to oil spill response activities, including vessel, aircraft, and pedestrian traffic that add to impacts or further compound “direct spill” related impacts on area resources and subsistence uses.
- f. Before conducting open water activities, the permittee shall consult with the Alaska Eskimo Whaling Commission and the North Slope Borough to minimize impacts to the fall and spring subsistence whaling activities of the communities of the North Slope.

K-4a Best Management Practice – Goose Molting Area

Note: Except for less than 10,000 acres east of the mouth of the Ikpikpuk River, new non-subsistence infrastructure would be prohibited in the goose molting area. None of the area is available for oil and gas leasing or exploratory drilling.

Objective: Minimize disturbance to molting geese and loss of goose molting habitat in and around lakes in the Goose Molting Area.

Requirement/Standard (General): Within the Goose Molting Area no permanent oil and gas facilities, except for pipelines, will be allowed within 1 mile of the shoreline of goose molting lakes. No waiver, exception, or modification will be considered. Prior to the permitting of a pipeline in the Goose Molting Area, a workshop will be convened to determine the best corridor for pipeline construction in efforts to minimize impacts to wildlife and subsistence resources. The workshop participants will include but will not be limited to federal, state, and North Slope Borough representatives. In addition, only “in field” roads will be authorized as part of oil and gas field development.

Requirement/Standard (Development): In the Goose Molting Area, the following standards will be followed for permitted activities:

- a. Within the Goose Molting Area from June 15 through August 20, all off-pad activities and major construction activities using heavy equipment (e.g., sand/gravel extraction and transport, pipeline and pad construction, but not drilling from existing production pads) shall be suspended (see also Best Management Practice K-5(d)), unless approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough regulatory and resource agencies. The intent of this requirement is to restrict activities that will disturb molting geese during the period when geese are present.
- b. Water extraction from any lakes used by molting geese shall not alter hydrological conditions that could adversely affect identified goose-feeding habitat along lakeshore margins. Considerations will be given to seasonal use by operators (generally in winter) and geese (generally in summer), as well as recharge to lakes from the spring snowmelt.
- c. Oil and gas activities will avoid altering (i.e., damage or disturbance of soils, vegetation, or surface hydrology) critical goose-feeding habitat types along lakeshore margins (grass/sedge/moss) and salt marsh habitats.
- d. Permanent oil and gas facilities (including gravel roads, pads, and airstrips, but excluding pipelines) and material sites will be sited outside the identified buffers and restricted surface occupancy areas. Additional limits on development footprint apply
- e. Between June 15 and August, 20 within the Goose Molting Area, oil and gas facilities shall incorporate features (e.g., temporary fences, siting/orientation) that screen/shield human activity from view of any Goose Molting Area lake, as identified by the authorized officer in

- consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies.
- f. Strategies to minimize ground traffic shall be implemented from June 15 through August 20. These strategies may include limiting trips, use of convoys, different vehicle types, etc. to the extent practicable. The permittee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
 - g. Within the Goose Molting Area aircraft use (including fixed wing and helicopter) shall be restricted from June 15 through August 20 unless doing so endangers human life or violates safe flying practices. Restrictions may include: (1) limiting flights to two round-trips/week, and (2) limiting flights to corridors established by the BLM after discussions with appropriate federal, State, and North Slope Borough regulatory and resource agencies. The permittee shall submit with the development proposal an aircraft use plan that considers these and other mitigation. The aircraft use plan shall also include an aircraft monitoring plan. Adjustments, including perhaps suspension of all aircraft use, will be required by the authorized officer if resulting disturbance is determined to be unacceptable. Note: This site-specific best management practice is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.
 - h. Any permit for development issued under this IAP/EIS will include a requirement for the permittee to conduct monitoring studies necessary to adequately determine consequences of development and any need for change to mitigations. Monitoring studies will be site- and development-specific within a set of over-arching guidelines developed by the BLM after conferring with appropriate federal, State, North Slope Borough agencies. The study(ies) will include the construction period and will continue for a minimum of 3 years after construction has been completed and production has begun. The monitoring studies will be a continuation of evaluating the effectiveness of Best Management Practice K-4a's requirements in meeting the objective of K-4a and determine if any changes to the best management practice or any project specific mitigation(s) are

necessary. If changes are determined to be necessary, the BLM, with the permittee and/or their representative, will conduct an assessment of the feasibility of altering development operation (e.g., reduced human activity, visibility barriers, noise abatement). Any changes determined necessary will be implemented prior to authorization of any new construction.

K-4b Best Management Practice – Brant Survey Area

Objective: Minimize the loss or alteration of habitat for, or disturbance of, nesting and brood rearing brant in the Brant Survey Area. None of the area is available for oil and gas leasing or exploratory drilling.

Requirement/Standard:

- a. Aerial surveys for brant nesting colonies and brood-rearing areas shall be conducted for a minimum of 2 years before authorization of construction of permanent facilities. At a minimum, the survey area shall include the proposed development site(s) (i.e., the footprint) and the surrounding ½-mile area. These surveys shall be conducted following accepted BLM protocol.
- b. Development may be prohibited or activities curtailed within ½-mile of all identified brant nesting colonies and brood-rearing areas identified during the 2-year survey

K-5 Best Management Practice – Teshekpuk Lake Caribou Habitat Area

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-5 will apply as a best management practice. Portions of K-5 that apply to permanent infrastructure are only relevant to the portion of the Teshekpuk Lake Caribou Habitat Area available to application for such infrastructure, i.e., to those areas outside of the approximately 1.1 million acres near the lake where no new non-subsistence permanent infrastructure will be permitted.

Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements through portions the Teshekpuk Lake Caribou Habitat Area that are essential for all season use, including calving and rearing, insect-relief, and migration.

Requirement/Standard: In the Teshekpuk Lake Caribou Habitat Area the following standards will be applied to permitted activities:

- a. Before authorization of construction of permanent facilities (limited as they may be by surface occupancy restrictions established in this decision), the permittee shall design and implement and report a study of caribou movement unless an acceptable study(s) specific to the

Teshekpuk Caribou Herd has been completed within the last 10 years. The study shall include a minimum of four years of current data on the Teshekpuk Caribou Herd movements and the study design shall be approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies. The study should provide information necessary to determine facility (including pipeline) design and location. Permittee may submit individual study proposals or they may combine with other permittees in the area to do a single, joint study for the entire Teshekpuk Lake Caribou Habitat Area. Study data may be gathered concurrently with other activities as approved by the authorized officer and in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies. A final report of the study results will be prepared and submitted. Prior to the permitting of a pipeline in the Teshekpuk Lake Caribou Habitat Area, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife (specifically the Teshekpuk Caribou Herd) and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives. All of these modifications will increase protection for caribou and other wildlife that utilize the Teshekpuk Lake Caribou Habitat Area during all seasons.

- b. Within the Teshekpuk Lake Caribou Habitat Area, permittee shall orient linear corridors when laying out oil and gas field developments to address migration and corralling effects and to avoid loops of road and/or pipeline that connect facilities.
- c. Ramps over pipelines, buried pipelines, or pipelines buried under the road may be required by the authorized officer, after consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies, in the Teshekpuk Lake Caribou Habitat Area where pipelines potentially impede caribou movement.
- d. Major construction activities using heavy equipment (e.g., sand/gravel extraction and transport, pipeline and pad construction, but not drilling from existing production pads) shall be suspended within Teshekpuk Lake Caribou Habitat Area from May 20 through August 20, unless approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough regulatory and resource agencies. The intent of this requirement is to restrict activities that will disturb caribou during calving and insect-relief

- periods. If caribou arrive on the calving grounds prior to May 20, major construction activities will be suspended. The permittee shall submit with the development proposal a “stop work” plan that considers this and any other mitigation related to caribou early arrival. The intent of this latter requirement is to provide flexibility to adapt to changing climate conditions that may occur during the life of fields in the region.
- e. The following ground and air traffic restrictions shall apply in the areas and time periods indicated. Ground traffic restrictions apply to permanent oil and gas-related roads:
1. Within the Teshekpuk Lake Caribou Habitat Area, from May 20 through August 20, traffic speed shall not exceed 15 miles per hour when caribou are within ½ mile of the road. Additional strategies may include limiting trips, using convoys, using different vehicle types, etc., to the extent practicable. The permittee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
 2. The permittee or a contractor shall observe caribou movement from May 20 through August 20, or earlier if caribou are present prior to May 20. Based on these observations, traffic will be stopped:
 - a. temporarily to allow a crossing by 10 or more caribou. Sections of road will be evacuated whenever an attempted crossing by a large number of caribou appears to be imminent. The permittee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation.
 - b. by direction of the authorized officer throughout a defined area for up to four weeks to prevent displacement of calving caribou. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
 3. Major equipment, materials, and supplies to be used at oil and gas work sites in the Teshekpuk Lake Caribou Habitat Area shall be stockpiled prior to or after the period of May 20 through August 20 to minimize road traffic during that period.
 4. Within the Teshekpuk Lake Caribou Habitat Area aircraft use (including fixed wing and helicopter) shall be restricted from May

20 through August 20 unless doing so endangers human life or violates safe flying practices. Authorized users of the NPR-A may be restricted from using aircraft larger than a Twin Otter, and limited to an average of one fixed-wing aircraft takeoff and landing per day per airstrip, except for emergency purposes. Restrictions may include prohibiting the use of aircraft larger than a Twin Otter by authorized users of the NPR-A, including oil and gas permittee, from May 20 through August 20 within the Teshekpuk Lake Caribou Habitat Area, except for emergency purposes. The permittee shall submit with the development proposal an aircraft use plan that considers these and other mitigation. The aircraft use plan shall also include an aircraft monitoring plan. Adjustments, including perhaps suspension of all aircraft use, will be required by the authorized officer if resulting disturbance is determined to be unacceptable. This best management practice is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

5. Aircraft shall maintain a minimum height of 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, and 2,000 feet above ground level over the Teshekpuk Lake Caribou Habitat Area from May 20 through August 20, unless doing so endangers human life or violates safe flying practices. Caribou wintering ranges will be defined annually by the authorized officer in consultation with the Alaska Department of Fish and Game. This best management practice is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

K-6 Lease Stipulation/Best Management Practice – Coastal Area

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing in the respective alternatives, K-6 would be a best management practice.

Objective: Protect coastal waters and their value as fish and wildlife habitat (including, but not limited to, that for waterfowl, shorebirds, and marine

mammals), minimize hindrance or alteration of caribou movement within caribou coastal insect-relief areas; protect the summer and winter shoreline habitat for polar bears, and the summer shoreline habitat for walrus and seals; prevent loss of important bird habitat and alteration or disturbance of shoreline marshes; and prevent impacts to subsistence resources and activities.

Requirement/Standard:

- a. Exploratory well drill pads, production well drill pads, or a central processing facility for oil or gas would not be allowed in coastal waters or on islands between the northern boundary of the Reserve and the mainland, or in inland areas within one mile of the coast. (Note: This would include the entirety of the Kasegaluk Lagoon and Peard Bay Special Areas.) Other facilities necessary for oil and gas production within NPR-A that necessarily must be within this area (e.g., barge landing, seawater treatment plant, or spill response staging and storage areas) would not be precluded. Nor would this stipulation preclude infrastructure associated with offshore oil and gas exploration and production or construction, renovation, or replacement of facilities on existing gravel sites. Lessees/permittees shall consider the practicality of locating facilities that necessarily must be within this area at previously occupied sites such as various Husky/USGS drill sites and Distant Early Warning-Line sites. All lessees/permittees involved in activities in the immediate area must coordinate use of these new or existing sites with all other prospective users. Before conducting open water activities, the lessee shall consult with the Alaska Eskimo Whaling Commission, the North Slope Borough, and local whaling captains associations to minimize impacts to the fall and spring subsistence whaling activities of the communities of the North Slope. In a case in which the BLM authorizes a permanent oil and gas facility within the Coastal Area, the lessee/permittee shall develop and implement a monitoring plan to assess the effects of the facility and its use on coastal habitat and use.
- b. Marine vessels used as part of a BLM-authorized activity shall maintain a 1-mile buffer from the shore when transiting past an aggregation of seals (primarily spotted seals) using a terrestrial haulout unless doing so would endanger human life or violate safe boating practices. Marine vessels shall not conduct ballast transfers or discharge any matter into the marine environment within 3 miles of the coast except when necessary for the safe operation of the vessel.

- c. Marine vessels used as part of a BLM-authorized activity shall maintain a ½-mile buffer from shore when transiting past an aggregation of walrus using a terrestrial haulout.

K-7 Lease Stipulation/Best Management Practice - Colville River Special Area

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing, K-7 would be a best management practice.

Objective: Prevent or minimize loss of raptor foraging habitat (also see Lease Stipulation K-1).

Requirement/Standard: If necessary to construct permanent facilities within the Colville River Special Area, all reasonable and practicable efforts shall be made to locate permanent facilities as far from raptor nests as feasible. Additionally, within 15 miles of raptor nest sites, significant alteration of high quality foraging habitat shall be prohibited unless the lessee can demonstrate on a site-specific basis that impacts would be minimal. Of particular concern are ponds, lakes, wetlands, and riparian habitats. Note: On a case-by-case basis, and in consultation with appropriate federal and State regulatory and resource agencies, essential pipeline and road crossings will be permitted through the Colville River Special Area where no other feasible or prudent options are available.

K-8 Best Management Practice - Pik Dunes

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-8 will apply as a best management practice.

Objective: Retain unique qualities of the Pik Dunes, including geologic and scenic uniqueness, insect-relief habitat for caribou, and habitat for several uncommon plant species.

Requirement/Standard: Surface structures, except approximately perpendicular pipeline crossings and ice pads, are prohibited within the Pik Dunes.

K-9 Best Management Practice – Teshekpuk Lake Caribou Movement Corridor

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-9 will apply as a best management practice. All of the former movement corridor northwest of Teshekpuk Lake and all but the eastern-most part of the other corridor that lies north of the Kogru River are within an area prohibiting new non-subsistence infrastructure. Therefore,

this best management practice only applies to the lands in the former corridor north of the Kogru River in Ts. 14-15 N., R. 2 W., U.M.

Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements (that are essential for all season use, including calving and rearing, insect-relief, and migration) in the area extending from the eastern shore of Teshekpuk Lake eastward to the Kogru River.

Requirement/Standard: Within the Teshekpuk Lake Caribou Movement Corridor, no permanent oil and gas facilities, except for pipelines or other infrastructure associated with offshore oil and gas exploration and production, will be allowed. Prior to the permitting of permanent oil and gas infrastructure in the Caribou Movement Corridor, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives.

K-10 Best Management Practice – Southern Caribou Calving Area

Note: None of the area is available for oil and gas leasing or exploratory drilling. Therefore, K-10 will apply as a best management practice. All but the eastern-most part of the former Southern Caribou Calving Area lies within an area prohibiting new non-subsistence infrastructure. Therefore, this best management practice only applies to the lands in the former area T. 14 N., Rs. 1-2 W., U.M.; T. 14 N., R. 1 E., U.M; and T. 15 N., R. 2 W., U.M.

Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements (that are essential for all season use, including calving and post calving, and insect-relief) in the area south/southeast of Teshekpuk Lake.

Requirement/Standard: Within the Southern Caribou Calving Area, no permanent oil and gas facilities, except pipelines or other infrastructure associated with offshore oil and gas exploration and production, will be allowed. Prior to the permitting of permanent oil and gas infrastructure in the Southern Caribou Calving Area, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives.

K-11 Lease Stipulation/Best Management Practice – Western Arctic Herd Habitat Area

Note: This measure would be applied to relevant new leases. On lands unavailable for leasing, K-11 would be a best management practice. Portions of K-11 that apply to permanent infrastructure are only relevant to the northern portion of the Utukok River Uplands Special Area available to application for such infrastructure.

Objective: Minimize disturbance and hindrance of caribou, or alteration of caribou movements through the Utukok River Uplands Special Area that are essential for all season use, including calving and rearing, insect-relief, and migration.

Requirement/Standard: In the Utukok River Uplands Special Area the following standards will be applied to permitted activities:

- a. Before authorization of construction of permanent facilities, the lessee shall design and implement and report a study of caribou movement unless an acceptable study(s) specific to the Western Arctic Herd has been completed within the last 10 years. The study shall include a minimum of four years of current data on the Western Arctic Herd's movements and the study design shall be approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies and the Western Arctic Caribou Herd Working Group. The study should provide information necessary to determine facility (including pipeline) design and location. Lessees may submit individual study proposals or they may combine with other lessees in the area to do a single, joint study for the entire Utukok River Uplands Special Area. Study data may be gathered concurrently with other activities as approved by the authorized officer and in consultation with the appropriate federal, State, and North Slope Borough wildlife and resource agencies. A final report of the study results will be prepared and submitted. Prior to the permitting of a pipeline in the Utukok River Uplands Special Area, a workshop will be convened to identify the best corridor for pipeline construction in efforts to minimize impacts to wildlife (specifically the Western Arctic Herd) and subsistence resources. The workshop participants will include but will not be limited to federal, State, and North Slope Borough representatives. All of these modifications will increase protection for caribou and other wildlife that utilize the Utukok River Uplands Special Area during all seasons.
- b. Within the Utukok River Uplands Special Area, lessees shall orient linear corridors when laying out oil and gas field developments to

- address migration and corralling effects and to avoid loops of road and/or pipeline that connect facilities.
- c. Ramps over pipelines, buried pipelines, or pipelines buried under the road may be required by the authorized officer, after consultation with appropriate federal, State, and North Slope Borough regulatory and resource agencies, in the Utukok River Uplands Special Area where pipelines potentially impede caribou movement.
 - d. Major construction activities using heavy equipment (e.g., sand/gravel extraction and transport, pipeline and pad construction, but not drilling from existing production pads) shall be suspended within Utukok River Uplands Special Area from May 20 through August 20, unless approved by the authorized officer in consultation with the appropriate federal, State, and North Slope Borough regulatory and resource agencies. The intent of this requirement is to restrict activities that will disturb caribou during calving and insect-relief periods. If caribou arrive on the calving grounds prior to May 20, major construction activities will be suspended. The lessee shall submit with the development proposal a “stop work” plan that considers this and any other mitigation related to caribou early arrival. The intent of this latter requirement is to provide flexibility to adapt to changing climate conditions that may occur during the life of fields in the region.
 - e. The following ground and air traffic restrictions shall apply to permanent oil and gas-related roads in the areas and time periods indicated:
 1. Within the Utukok River Uplands Special Area, from May 20 through August 20, traffic speed shall not exceed 15 miles per hour when caribou are within ½ mile of the road. Additional strategies may include limiting trips, using convoys, using different vehicle types, etc., to the extent practicable. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
 2. The lessee or a contractor shall observe caribou movement from May 20 through August 20, or earlier if caribou are present prior to May 20. Based on these observations, traffic will be stopped:
 - a. Temporarily to allow a crossing by 10 or more caribou.
Sections of road will be evacuated whenever an attempted

- crossing by a large number of caribou appears to be imminent. The lessee shall submit with the development proposal a vehicle use plan that considers these and any other mitigation.
- b. By direction of the authorized officer throughout a defined area for up to four weeks to prevent displacement of calving caribou. The vehicle use plan shall also include a vehicle-use monitoring plan. Adjustments will be required by the authorized officer if resulting disturbance is determined to be unacceptable.
3. Major equipment, materials, and supplies to be used at oil and gas work sites in the Utukok River Uplands Special Area shall be stockpiled prior to or after the period of May 20 through August 20 to minimize road traffic during that period.
 4. Within the Utukok River Uplands Special Area aircraft use (including fixed wing and helicopter) shall be restricted from May 20 through August 20 unless doing so endangers human life or violates safe flying practices. Authorized users of the NPR-A may be restricted from using aircraft larger than a Twin Otter, and limited to an average of one fixed-wing aircraft takeoff and landing per day per airstrip, except for emergency purposes. Restrictions may include prohibiting the use of aircraft larger than a Twin Otter by authorized users of the NPR-A, including oil and gas lessees, from May 20 through August 20 within the Utukok River Uplands Special Area, except for emergency purposes. The lessee shall submit with the development proposal an aircraft use plan that considers these and other mitigation. The aircraft use plan shall also include an aircraft monitoring plan. Adjustments, including perhaps suspension of all aircraft use, will be required by the authorized officer if resulting disturbance is determined to be unacceptable. This lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.
 5. Aircraft shall maintain a minimum height of 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, and 2,000 feet above ground level over the Utukok River Uplands Special Area from May 20 through August 20, unless doing so endangers human life or violates safe flying practices. Caribou wintering ranges will be

defined annually by the authorized officer in consultation with the Alaska Department of Fish and Game. This lease stipulation is not intended to restrict flights necessary to survey wildlife to gain information necessary to meet the stated objective of the stipulations and best management practices. However, flights necessary to gain this information will be restricted to the minimum necessary to collect such data.

Summer Vehicle Tundra Access

L-1 Best Management Practice

Objective: Protect stream banks and water quality; minimize compaction and displacement of soils; minimize the breakage, abrasion, compaction, or displacement of vegetation; protect cultural and paleontological resources; maintain populations of, and adequate habitat for birds, fish, and caribou and other terrestrial mammals; and minimize impacts to subsistence activities.

Requirement/Standard: On a case-by-case basis, BLM may permit low-ground-pressure vehicles to travel off of gravel pads and roads during times other than those identified in Best Management Practice C-2a. Permission for such use would only be granted after an applicant has:

- a. Submitted studies satisfactory to the authorized officer of the impacts on soils and vegetation of the specific low-ground-pressure vehicles to be used. These studies should reflect use of such vehicles under conditions similar to those of the route proposed for use and should demonstrate that the proposed use would have no more than minimal impacts to soils and vegetation.
- b. Submitted surveys satisfactory to the authorized officer of subsistence uses of the area as well as of the soils, vegetation, hydrology, wildlife and fish (and their habitats), paleontological and archaeological resources, and other resources as required by the authorized officer.
- c. Designed and/or modified the use proposal to minimize impacts to the authorized officer's satisfaction. Design steps to achieve the objectives and based upon the studies and surveys may include, but not be limited to, timing restrictions (generally it is considered inadvisable to conduct tundra travel prior to August 1 to protect ground-nesting birds), shifting of work to winter, rerouting, and not proceeding when certain wildlife are present or subsistence activities are occurring. At the discretion of the authorized officer, the plan for summer tundra vehicle access may be included as part of the spill

prevention and response contingency plan required by 40 CFR 112 (Oil Pollution Act) and Best Management Practice A-4.

General Wildlife and Habitat Protection

M-1 Best Management Practice

Objective: Minimize disturbance and hindrance of wildlife, or alteration of wildlife movements through the NPR-A.

Requirement/Standard: Chasing wildlife with ground vehicles is prohibited. Particular attention will be given to avoid disturbing caribou.

M-2 Best Management Practice

Objective: Prevent the introduction, or spread, of non-native, invasive plant species in the NPR-A.

Requirement/Standard: Certify that all equipment and vehicles (intended for use either off or on roads) are weed-free prior to transporting them into the NPR-A. Monitor annually along roads for non-native invasive species, and initiate effective weed control measures upon evidence of their introduction. Prior to operations in the NPR-A, submit a plan for the BLM's approval, detailing the methods for cleaning equipment and vehicles, monitoring for weeds and weed control.

M-3 Best Management Practice

Objective: Minimize loss of populations of, and habitat for, plant species designated as Sensitive by the BLM in Alaska.

Requirement/Standard: If a development is proposed in an area that provides potential habitat for a BLM Sensitive Plant Species, the development proponent would conduct surveys at appropriate times of the summer season and in appropriate habitats for the Sensitive Plant Species that might occur there. The results of these surveys will be submitted to the BLM with the application for development.

M-4 Best Management Practice

Objective: Minimize loss of individuals of, and habitat for, mammalian species designated as Sensitive by the BLM in Alaska.

Requirement/Standard: If a development is proposed in an area that provides potential habitat for the Alaska tiny shrew, the development proponent would conduct surveys at appropriate times of the year and in appropriate

habitats in an effort to detect the presence of the shrew. The results of these surveys will be submitted to BLM with the application for development.

APPENDIX F

CPAI REQUEST FOR EXCEPTIONS TO STIPULATIONS



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October 14, 2014

Mr. Lon Kelly
Bureau of Land Management
1150 University Avenue
Fairbanks, AK 99709

**Re: Request for Exception to Lease Stipulations and Best Management Practices
GMT1 Development**

Dear Ms. Psarianos,

In connection with the GMT1 right-of-way application, ConocoPhillips Alaska, Inc. as Operator on behalf of the working interest owners of the Greater Mooses Toot Unit (CPAI) seeks Bureau of Land Management (BLM) approval for limited exceptions to Required Operating Procedures (ROP) A-5, E-7, and K-1(g), and confirmation of the existing limited exceptions to Lease Stipulations E-2, and K-1[e]. For the reasons explained below, these five targeted exceptions to the roughly 70 ROPs and lease stipulations that apply to GMT1-area leases are necessary to achieve the optimal balance of resource protection measures.

The two existing exceptions for which CPAI seeks confirmation were approved in the Record of Decision (ROD) for the 2004 Alpine Satellite EIS. In that decision, BLM previously approved exceptions to Lease Stipulation E-2, the 500-foot set back from water bodies, and Lease Stipulation K-1[e], the 3-mile set back from Fish Creek setback. Those existing two exceptions should be confirmed now because they allow for road construction on the driest land with the lowest habitat value and the shortest road length. For the three new approvals now being sought, CPAI seeks an exception from ROP A-5 to allow equipment refueling on a frozen river during bridge installation; exceptions to ROP E-7, to allow the pipelines to come closer than 500 feet to the road at river crossings, allowing the pipelines to use the road bridges, and to be lower than 7 feet above the ground surface at the two road crossings where the pipeline will be buried within the road; and an exception to BMP K-1(g)

Background on ROPs and Lease Stipulations

Oil and gas leases being developed in the GMT1 project were issued in 1999, subject to stipulations identified in the detailed statement of sale for NPR-A Oil and Gas Lease Sale 991, which are also reflected in the ROD for the 1998 NPR-A Integrated Activity Plan / Environmental Impact Statement (1998 ROD). The ROD clearly anticipated and provided for exceptions to lease stipulations upon a finding that implementation of a stipulation is (1) technically not feasible, economically prohibitive, or that an environmentally preferable alternative is available, and (2) the alternative means proposed fully satisfies the objective of the stipulations. See Appendix B to 1998 ROD. Thus, the lease stipulations were not intended to be inflexible, and were not intended to preclude or unduly impede reasonable oil and gas development proposals.

The suite of lease stipulations and ROPs were modified and supplemented in the ROD for the 2008 Integrated Activity Plan / Environmental Impact Statement (2008 ROD). The 2008 ROD did not purport to apply the modified lease stipulations to pre-existing leases, but in connection with lease extension applications, CPAI notified BLM, in a letter dated April 6, 2009, that it “will apply the IAP/EIS lease stipulations and Required Operating Procedures under the 2008 Record of Decision.” The stipulations and ROPs were essentially reiterated in the 2013 ROD for the most recent NPR-A IAP/EIS.

Many of the lands within the scope of the GMT1 project have been conveyed to Kuukpik Corporation and Arctic Slope Regional Corporation (ASRC) under the Alaska Native Claims Settlement Act. On those lands, the pre-existing oil and gas leases are now administered by ASRC under the governing regulations, which provide in relevant part that the lease terms “will be enforceable by the regional corporation as the lessor until the lease terminates.” 43 CFR § 3135.1-8(c). For purposes of the GMT1 project and request for approval, BLM need not (and should not) consider the stipulations on oil and gas leases that are now administered by ASRC.

Exception Request for ROP A-5 (Refueling within 500 feet of water bodies)

CPAI requests an exception to ROP A-5, which prohibits the refueling of equipment within 500 feet of the active flood plains of water bodies. The exception is needed during construction of the Ublutuoch River and Crea Creek bridges. CPAI requests this waiver because some heavy construction equipment operated during the bridge construction is too impractical or heavy to move off the frozen water bodies for refueling. Equipment that may require this waiver includes cranes, hammers, drill rigs and support equipment that are all critical to bridge construction. The equipment will be on the ice for long durations during pier, abutment, and bridge infrastructure installation and cannot always be moved during construction operations; therefore, refueling over the frozen ice or immediately adjacent to the river and creek is required to complete the proposed activity. CPAI will minimize refueling over ice and adjacent to the river and creek and will move the equipment a distance greater than 100 feet from any open water body to refuel for all construction activities. All equipment and vehicles that are nonessential to ongoing construction activities will be moved off the river channel for refueling. Except for during refueling of essential equipment, fuel will be stored greater than 100 feet away from any open water body. A list of potential equipment that may require refueling over ice at the bridge site is included as Attachment 2 for reference.

All of the tanks associated with the cranes, hammers and drill rigs are less than 660 gallons (the largest is anticipated to be 300 gallons) and would be double walled with 110% containment. Therefore, there would not be an impermeable liner or diking constructed beneath the tanks. A fuel transfer standard operating procedure has been prepared for this activity. These procedures were used and approved during 2014 bridge construction activities associated with the CD5 development and were deemed acceptable and approved by agencies granting permits for the CD5 development.

The objective of ROP A-5 is to minimize the potential for a release of fuel, which could result in contaminants adversely impacting fish, wildlife and the environment. The standard operating procedures incorporate checklists and practices to prevent spills of fuel during transfer and refueling. Operator training; pre-site inspections including inspections of hoses, connections and valves; placement of secondary containment beneath connections, valves, vehicles, etc. during transfer; two-person refueling operations with line-of-site control are all preventive measures that will be incorporated into CPAI operations to prevent spills, leaks, drip and drops from being released during the fuel transfer procedures. CPAI requests an exception to ROP A-5 during bridge construction activities.

Exception Request for Lease Stipulation E-2 (Facilities within 500 feet of water bodies)

A map illustrating all rivers, streams, and lakes within 500 feet of the Alternative A facilities is included as Attachment 3 for reference. The Ublutuoch River Channel and four unnamed rivers/streams fall within the 500-foot buffer. Three named lakes (L9819, L9820, and L9824) and 17 unnamed lakes fall within the 500-foot buffer.

The objective of Lease Stipulation E-2 is to protect fish-bearing water bodies, water quality, and aquatic habitats. In the 2013 ROD, this Lease Stipulation was modified to apply only to water bodies that are fish

bearing. The terms of Lease Stipulation E-2 in both the 2008 and 2012 versions expressly provide: "Essential pipeline and road crossings will be permitted on a case-by-case basis."

The development area contains abundant lakes, rivers, streams, creeks, and ponds. These water bodies are prevalent because the area is underlain by permafrost, which prohibits drainage. Additionally, this area is classified as wetlands, attesting to presence of numerous water bodies. The 2004 ASDP EIS (Sections 3.2.1.1 and 3.2.2.1) states:

- "The tundra covered Arctic Coastal Plain ... is generally characterized by periglacial features associated with flat topography, poor drainage, and underlying permafrost. Thaw-lakes and polygonal surface patterns on inter-lake ice wedges are the dominant terrain features."
- "Abundant thaw-lakes and marshy thaw-lake basins, generally only a few feet deep, cover 25 to 30 percent of the landscape."
- "Lakes and ponds are the most prevalent features of the Plan Area."

Because of the abundance of water bodies in the Plan Area, it is not technically possible, let alone technically feasible, to locate all facilities farther than 500 feet from the highest high water mark of all active floodplains. CPAI selected the proposed locations for pads, roads, and pipelines by balancing engineering, habitat, economics, hydrology, and other environmental factors such as avoiding bird nest locations to the extent possible. Maintaining a distance of 500 feet from every water body is not possible in this type of an environment.

Even where facilities need to be placed closer than 500 feet from a water body, the objective of Lease Stipulation E-2, protection of water quality, would still be satisfied. Standard practices such as pipeline inspections and other spill prevention efforts will protect water bodies from potential spills to the extent possible. Secondary containment for tanks, tank inspection procedures, and refueling practices minimize the chance of a potential tank spill leaving a pad and entering a water body. Spill response equipment would be staged near river crossings or other sensitive areas, and agency approved spill plans would be in place.

BLM granted approval for this exception in 2004, based on technical infeasibility of total compliance due to the hydrology and number of water bodies in the area as well as implementation of other measures that would protect water bodies (e.g., use of secondary containment). For the reasons set forth above CPAI requests confirmation that the approval for an exception to Lease Stipulation E-2 remains in effect to allow the location of facilities closer than 500 feet from water bodies where necessary based on other environmental and engineering factors.

Exception Request for E-7(a) and E-7(c) (elevation of pipeline less than 7 feet and less than 500 feet between pipelines and roads)

A map illustrating the locations where pipelines cross the gravel road and will be less than 7 feet above the ground surface and where pipelines are within 500 feet of the proposed gravel road is included as Attachment 4 for reference. The pipelines will be buried within the gravel road at two locations where the road crosses the pipeline. Three general stretches of the road and pipeline routes locate the pipeline within 500 feet of the gravel road: a curved portion of the route turning south from the CD5 road tie in; the approaches to the CD5 bridge where the manual valves are planned; and where the pipeline crosses the GMT1 road as it approaches the GMT1 pad (see Attachment 4).

The objective of ROP E-7 is to minimize disruption of caribou movement and subsistence use. The standard is for pipelines and roads to be designed to allow the free movement of caribou and the safe, unimpeded passage of the public while participating in subsistence activities. One of the accepted design practices (item a) suggests a minimum height of 7 feet above the ground surface and a second design practice (item c) suggests a minimum distance of 500 feet between pipelines and roads be maintained.

The locations where the pipeline will be below the 7 foot minimum should not impede caribou movement or subsistence use because there will be no funneling of caribou movement and there is plenty of passage area nearby where the pipelines are elevated at least 7 feet high. The pipeline and road

crossings are required because at one location the CD5 road and pipeline will already be installed and the road connection requires crossing the pipeline, and at the second location the pipeline must cross to the south side of the road to approach the GMT1 pad. There is no feasible other approach to either the CD5 road or the GMT1 pad that would not involve than crossing the pipeline.

The ROP also states: "Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipelines and roads converge on a drill pad. Where it is not feasible to separate pipelines and roads, alternative pipeline routes, designs and possible burial within the road will be considered by the authorizing officer."

Separating the pipeline from the gravel road by more than 500 feet is not feasible at the bridge crossings, the manual tie-in pads required by the 2004 ROD (BLM 2004a), or locations where the pipeline must cross the road. As discussed in the request for an exception to Lease Stipulation E-2, Because of the abundance of water bodies in the Plan Area, it is not technically possible, let alone technically feasible, to locate all pipelines and roads greater than 500 feet apart along the entire road route. CPAI selected the proposed locations for pads, roads, and pipelines by balancing engineering, habitat, economics, hydrology, and other environmental factors such as avoiding bird nest locations to the extent possible. Maintaining a distance of 500 feet between the pipeline and the road is not possible in this type of an environment.

Even where pipelines and roads would be placed closer than 500 feet, the objective of Lease Stipulation E-7, that the pipelines and roads would be designed to allow the free movement of caribou and the safe, unimpeded passage of the public while participating in subsistence activities, would still be satisfied. The pipeline height will be a minimum of 7 feet allowing unimpeded passage and road pullouts have been proposed to support subsistence activities and provide a safe place for subsistence hunters to rendezvous while hunting or traveling to camp and cabin sites.

For the reasons set forth above, CPAI requests an exception to Lease Stipulation E-2 to allow the location of facilities closer than 500 feet from water bodies where necessary based on other environmental and engineering factors.

Exception Request for ROP K-1(e) (Fish Creek setback)

The objective of ROP K-1(e) is to:

Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss of change to vegetative and physical characteristics of floodplain and riparian areas; the loss of spawning, rearing or overwintering habitat for fish; the loss of cultural and paleontological resources; the loss of raptor habitat; impacts to subsistence cabin and campsites; the disruption of subsistence activities; and impacts to scenic and other resource values.

CPAI's proposed development as set forth in Alternative A includes development of the Lookout reservoir that underlies the Fish Creek area in the NPRA. ROP K-1(e) provides in relevant part:

Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited in the streambed and adjacent to the rivers listed below at the distances identified.

On a case-by case basis, and in consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate based on agency legal authority and jurisdictional responsibility), essential pipeline and road crossing to the main channel will be permitted through setback areas.

....

e. Fish Creek: a 3-mile setback from the highest high water mark of the creek downstream from the eastern edge of section 31, T11N, R1E., U.M. and a ½ mile setback from the banks highest high watermark further upstream.

Since the time of the 2004 EIS and ROD that initially approved GMT1 development, CPAI relocated the drill site outside the Fish Creek setback and shortened the length of the road and pipeline within the Fish Creek setback. The road and pipeline are located on the driest land with the lowest habitat value. This is also the shortest most direct route between the CD5 road and the GMT1 pad site. The GMT1 pad site has been relocated outside the 3-mile Fish Creek setback. Relocation of the drill pad allowed for modifications to the access road and pipeline corridor lengths, resulting in a road length reduction of 3.5 miles and a pipeline length reduction of 2.9 miles. These changes to the project have resulted in a reduction in gravel fill needs of approximately 23 acres for development of the drill site access road. However, the GMT1 road and pipeline encroaches the outer boundary of the established 3-mile Fish Creek setback due to the location of two large water bodies which straddle the 3-mile boundary. The road and pipeline are as close to these large lakes as allowed by Lease Stipulation E-2, which stipulates a 500-foot setback from the ordinary high water mark of fish-bearing water bodies. In total, 3.1 miles of gravel road and 3.5 miles of pipeline traverse Fish Creek setback. The proposed pipeline lies 2.5 miles southeast from Fish Creek at the nearest point, and the road is slightly further away from Fish Creek. The nearest camp or cabin site is 2.2 miles north on the Ublutuoch River.

CPAI's proposed GMT1 development plan includes plans to protect the fish and subsistence resources in the Fish Creek area. Practical avoidance methods have been incorporated into the Alternative A project location and design. GMT1 construction and development activities would occur during the winter months when wetlands are frozen and covered by snow and ice. Gravel harvest and construction will be limited to a single winter season. CPAI would avoid adding any treatment substances (such as chemical binders) to the gravel fill needed for GMT1 construction, as treatment substances would introduce these chemical substances into the tundra and wetland environments. CPAI would instead utilize water misting or spreading application methods to provide dust suppression. All activities would take place over two miles away from Fish Creek.

Practical minimization measures have been incorporated into the Alternative A project location and design. CPAI's proposed minimization measures include the following: river crossing designed for water flow and faunal movement, access roads designed for water flows, equipment and techniques designed to reduce surface compaction, and erosion control planning.

The GMT1 project design accommodates predicted water flow by incorporating culverts and bridge structures which would sustain both high and low water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement. The proposed all-season access gravel road has been sited to reduce and minimize the length of road within the setback. CPAI has further designed the gravel road with a minimum gravel thickness of 5 feet. This thickness would maintain stable permafrost conditions by insulating the underlying tundra and offsetting the loss of insulating effect caused by compression of the vegetated tundra below the gravel. The design criteria for all the culverts would prevent raising the water level on the up-gradient side of the crossings by more than 6 inches (compared to the down-gradient side) for more than one week after peak discharge.

CPAI updated its Alpine Erosion Control Plan to accommodate the GMT1 project detailing methods used to prevent and mitigate erosion impacting both terrestrial and aquatic environments. Included within this plan are Operations, Monitoring, and Maintenance (OM&M) Procedures which detail the actions CPAI would undertake to monitor, maintain, and if needed remediate gravel fill impacting surrounding tundra and wetlands.

During design of the GMT1 project CPAI consulted with the local community on the locations of the proposed roads and pipelines. This includes consultation with Kuukpik Subsistence Oversight Panel, the Native Village of Nuiqsut (NVN), Kuukpik Corporation, and the Nuiqsut public to ensure that operations will not adversely affect subsistence activities. As a result of those consultations, CPAI will coat new pipelines with a muted (non-shiny) coating to avoid bright flashes of sunlight that might frighten caribou. The Alternative A pipeline would be the shortest route between CD5 and GMT1 and will be a minimum of 7-feet above the tundra.

During operations at the current Alpine development, CPAI has developed processes to consult with subsistence users regarding daily planned oil and gas activities through local Subsistence Representatives and Ice Road Monitors to avoid interference with subsistence activities and consultation

will continue. These coordination and communication efforts have been identified as having reduced Alpine-related impacts on subsistence activities and would continue with GMT1 development. Finally, CPAI would provide cultural awareness training for all project employees and contractors and prohibits employees from participating in hunting, fishing and trapping activities to reduce the potential for increased competition for subsistence resources.

Finally, testimony and formal written comments submitted by all north-slope entities during the public comment support Alternative A over other alternatives, with the exception of the NVN. NVN preferred Alternative C which included the Alternative A pipeline and road route within the Fish Creek setback and is equivalent to Alternative A for this portion of the project.

The Preferred Alternative adopted by BLM in the 2004 ASDP (BLM 2004) approved this exception to the 1998 lease stipulation 39(d), which is equivalent to the 2008 Lease Stipulation K-1[e]. The rationale provided in BLM (2004a, pp 16 through 19) for granting an exception to this lease stipulation was as follows:

The setback for permanent oil and gas facilities from Fish Creek was established to minimize impacts to "fish and subsistence resources." The location of CD-6 [now called GMT1] and its associated road and pipeline approximately 2 miles from Fish Creek are not anticipated to have adverse impacts to fish. Although locating the pad farther from Fish Creek would further reduce the potential for contaminants to reach the creek, the likelihood of contaminants reaching the creek is already small and spills are not likely to have a measurable effect on arctic fish populations. No important fish habitat has been identified in the immediate area of the pad. Caribou and other subsistence resources may incur some disturbance during operations from infrastructure closer to riparian areas. However, elevating the pipeline to a minimum of 7 feet as measured at the VSMs; maintaining at least a 500-foot distance between the road and pipeline if feasible; restricting road use to industry, local residents, and government employees; and other design and operation features of the Preferred Alternative will ensure that impacts to subsistence resources and uses are avoided or minimized and the objectives of the stipulations are fully satisfied.

The same conclusions apply now, and the updated project design incurs into the Fish Creek setback much less than the design presented to BLM in 2004.

In conclusion, CPAI's propose project design slightly encroaches on Fish Creek setback, but supports the intent of ROP K-1[e] through avoidance and minimization measures incorporated into the location selected for the gravel road footprint and design elements incorporated into the project. CPAI encourages BLM to confirm its approval of an exception to the Fish Creek setback lease stipulation K-1[e] and allow the road and pipeline proposed in Alternative A, and supported by local residents, to be constructed within the setback.

Exception Request for ROP K-1(g) (Tinmiaksiqvik River setback)

The objective of ROP K-1(g) is to:

Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss of change to vegetative and physical characteristics of floodplain and riparian areas; the loss of spawning, rearing or overwintering habitat for fish; the loss of cultural and paleontological resources; the loss of raptor habitat; impacts to subsistence cabin and campsites; the disruption of subsistence activities; and impacts to scenic and other resource values.

(g.) Tinmiaksiqvik River: No permanent oil and gas surface facilities except essential transportation crossings would be allowed within ½ mile (from the banks highest high water mark) of this river from its headwaters within Sec. 13, T.7 N., R.1 W., U.M. downstream to its confluence with Fish Creek.

CPAI has minimized the gravel road and pipeline length by taking the shortest route available between the CD5 road and the proposed GMT1 pad. This direct route traverses a very small section of the Tinmiaksiqvik River setback adjacent to the Fish Creek setback and surface land owned by the Kuukpik Corporation. A total of 0.18 miles of pipeline and 0.32 miles of road cross the setback, avoiding this small setback area by circumventing it would result in a longer road and pipeline route for the project.

In conclusion, CPAI's propose project design slightly encroaches in the Tinmiaksiqvik River setback, but supports the intent of ROP K-1[g] through avoidance and minimization measures incorporated into the location selected for the gravel road and pipeline route. CPAI encourages BLM to confirm its approval of an exception to the Tinmiaqsiuqvik River setback lease stipulation K-1[g] and allow the road and pipeline proposed in Alternative A, and supported by local residents, to be constructed within the setback.

Respectfully,



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Sr. Environmental Coordinator
ConocoPhillips Alaska, Inc.

Cc:

Serena Sweet, BLM
Gene Augustine, BOEM
John Boyle, NSB
Jeff Bruno, State of Alaska
Hank Baij, USACE
Louise Smith, USFWS
Gayle Martin, USEPA
Jennifer Curtis, USEPA

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.2008. Northeast National Petroleum Reserve Alaska Integrated Activity Plan/Environmental Impact Statement Record of Decision (ROD). BLM/AK/PL-05/002+3130+931.

.2004. Alpine Satellite Development Plan Record of Decision (ROD). BLM/AK/PL-05/002+3130+931

.1998. Northeast National Petroleum Reserve Alaska Integrated Activity Plan/Environmental Impact Statement Record of Decision. U.S. DOI, Bureau of Land Management.

**Lease Stipulation and Best Management Practices
Requiring Exception for GMT1 Alternative A**

A-5 Required Operating Procedures

Objective: Minimize the impact of contaminants from refueling operations on fish, wildlife and the environment.

Requirement/Standard: Refueling of equipment within 500 feet of the active floodplain of any water body is prohibited. Fuel storage stations shall be located at least 500 feet from any water body with the exception of small caches (up to 210 gallons) for motor boats, float planes, ski planes, and small equipment, e.g. portable generators and water pumps, are permitted.

E-2 Lease Stipulation

Objective: Protect fish-bearing water bodies, water quality, and aquatic habitats.

Requirement Standard: Permanent oil and gas facilities, including roads, airstrips, and pipelines, are prohibited upon or within 500 feet as measured from the ordinary high water mark of fish-bearing waterbodies. Essential pipeline and road crossings will be permitted on a case-by-case basis.

E-7 Required Operating Procedure

Objective: Minimize disruption of caribou movement and subsistence use.

Requirement/Standard: Pipelines and roads shall be designed to allow the free movement of caribou and the safe, unimpeded passage of the public while participating in subsistence activities.

Listed below are the accepted design practices:

- a. Above ground pipelines should be elevated a minimum of 7 feet as measured from the ground to the bottom of the pipeline at vertical support members.
- c. A minimum distance of 500 feet between pipelines and roads shall be maintained. Separating roads from pipelines may not be feasible within narrow land corridors between lakes and where pipelines and roads converge on a drill pad. Where it is not feasible to separate pipelines and roads, alternative pipeline routes, designs and possible burial within the road will be considered by the authorizing officer.

K-1 Lease Stipulation/Best Management Practice – Rivers

Objective: Minimize the disruption of natural flow patterns and changes to water quality; the disruption of natural functions resulting from the loss of change to vegetative and physical characteristics of floodplain and riparian areas; the loss of spawning, rearing or overwintering habitat for fish; the loss of cultural and paleontological resources; the loss of raptor habitat; impacts to subsistence cabin and campsites; the disruption of subsistence activities; and impacts to scenic and other resource values.

Requirement/Standard: Permanent oil and gas facilities, including gravel pads, roads, airstrips, and pipelines, are prohibited in the streambed and adjacent to the rivers listed below at the distances identified. On a case-by case basis, and in consultation with federal, State, and North Slope Borough regulatory and resource agencies (as appropriate based on agency legal authority and jurisdictional responsibility), essential pipeline and road crossing to the main channel will be permitted through setback areas. The below setbacks may not be practical within river deltas; in such deltas, permanent facilities shall be designed to withstand a 200-year flood event.

e. Fish Creek: a 3-mile setback from the highest high water mark of the creek downstream from the eastern edge of section 31, T11N, R1E., U>M> and a ½ mile setback from the banks highest high watermark further upstream.

g. Ublutuoch (Tinmiaqsiugvik) River: a ½ mile setback from the ordinary high water mark.

Attachment 2

Ublutuoch River Bridge Construction Equipment Requiring Refueling Over Ice and within 500 Feet of a Water body

Fueled in Permanent Containment on Nigliagvik and L9341 River Ice Pads		
Quantity	Equipment Description	Category
2	Break Shack	Support
2	Envirovac	Support
4	Genset	Support

Fueled with Mobile Containment Nigliagvik and L9341 on River Ice Pads		
Quantity	Equipment Description	Category
1	130 Ton Crane	Crane
1	Crawler Crane (CONTINGENCY)	Crane
8	Welding Machine	Misc
6	Heater	Support
8	Light Plant	Support
2	Welding Shelter	Support
2	185 CFM Air Compressor	Support
1	IR CM 2000 Drill and 1600 Compressor	Drill
1	Large Auger Drill (CONTINGENCY)	Drill
1	Watson 3110 Drill	Drill
1	APE 200-6 Vibratory Hammer	Hammer
1	APE 200-6 Vibratory Hammer (CONTINGENCY)	Hammer
1	D-62 Impact Hammer	Hammer
1	Concrete Air Vibrator	Misc
1	Steam Boiler (CONTINGENCY)	Misc
1	Steam Boiler 200 H.P.	Misc
4	Manlift	Support

Attachment 3

Water Bodies within 500 Feet

151°30'0"W

151°20'0"W

151°10'0"W

70°18'0"N

70°16'0"N

70°14'0"N

151°30'0"W

151°20'0"W

151°10'0"W

GMT1 Proposed Infrastructure Alternative A

WaterBodies Within 500 Feet

Water Bodies Within 500 Feet of Alternative A

- Rivers/Stream within 500'
- Lake within 500'

GMT1 Alternative

- Pipeline
- Road
- Pad
- Valve Pad
- 500' Buffer of Alt A Facilities

Proposed Infrastructure

CD5

- Pipeline
- Road
- Pad

Setbacks

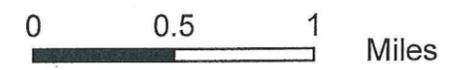
- Fish Creek 3 Mile
- Ublutuoch 1 Mile

Land Status

- NPR-A
- Not Conveyed
- Interim / Conveyed
- Camps and Cabins

Unit Boundary

- Unit



September 11, 2014

Tingmeachsiovik River
Fish Creek Iqalliqik

Ublutuoch River
Tinmiaqsiugvik

Ublutuoch River
Tinmiaqsiugvik

Greater Mooses Tooth Unit

Colville River Unit

GMT1

CD5

L9824

L9819

L9820

Water Bodies Within 500 Feet of Alternative A

Rivers/Stream within 500'
Lake within 500'

GMT1 Alternative

Pipeline
Road
Pad
Valve Pad
500' Buffer of Alt A Facilities

Proposed Infrastructure

CD5

Pipeline
Road
Pad

Setbacks

Fish Creek 3 Mile
Ublutuoch 1 Mile

Land Status

NPR-A
Not Conveyed
Interim / Conveyed
Camps and Cabins

Unit Boundary

Unit

0 0.5 1 Miles

ConocoPhillips
Alaska, Inc.

September 11, 2014

Attachment 4

Pipeline and Road within 500 Feet

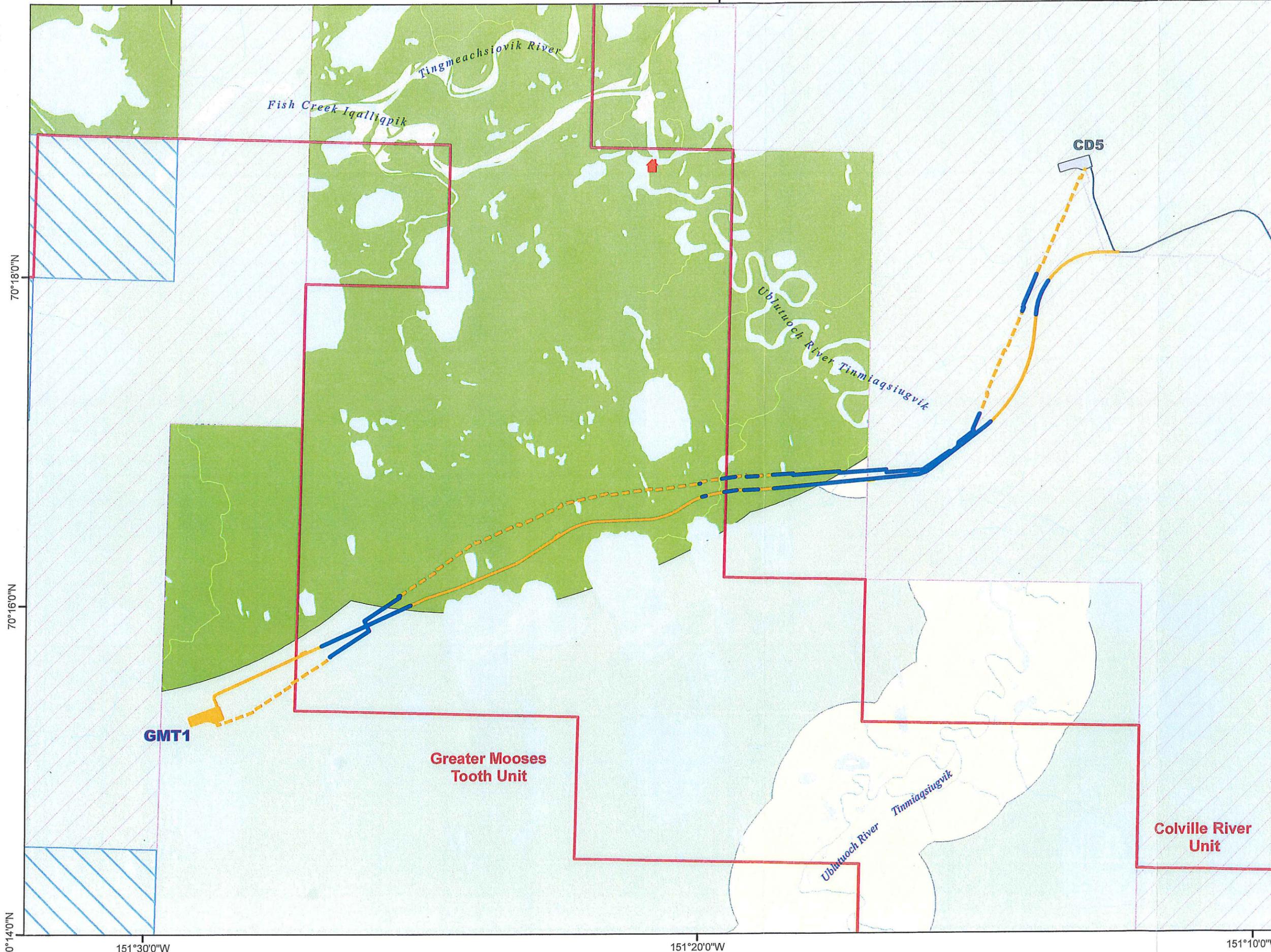
151°30'0"W

151°20'0"W

151°10'0"W

GMT1 Proposed Infrastructure Alternative A

Pipeline and Road Within 500'



70°18'0"N

70°16'0"N

70°14'0"N

151°30'0"W

151°20'0"W

151°10'0"W

Areas of Pipeline/Road Within 500' of One Another

GMT1 Alternative A

Pipeline Road

Pad Valve Pad

Proposed Infrastructure

CD5

Pipeline

Road

Pad

Setbacks

Fish Creek 3 Mile Ublutuoch 1 Mile

Land Status

NPR-A

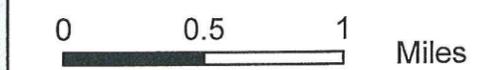
Not Conveyed

Interim / Conveyed

Camps and Cabins

Unit Boundary

Unit



ConocoPhillips
Alaska, Inc.
September 12, 2014

GMT1

Greater Mooses Tooth Unit

Colville River Unit

Fish Creek Iqalliqik

Tingmeachsiovik River

Ublutuoch River Tinmiagsiugvik

Ublutuoch River Tinmiagsiugvik

CD5



APPENDIX G

OVERVIEW OF NUIQSUT SUBSISTENCE USES

Greater Mooses Tooth 1 Development
Supplemental Environmental Impact Statement
Subsistence

APPENDIX G:
Overview of Nuiqsut Subsistence Uses

DRAFT

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October 2013

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ACRONYMS

ANCSA - Alaska Native Claims Settlement Act

ATV - All terrain vehicle

GMT - Greater Mooses Tooth

IAI - Impact Assessment, Inc.

ISER - Institute of Social and Economic Research

NSB - North Slope Borough

SRB&A - Stephen R. Braund & Associates

Introduction¹

The proposed Greater Mooses Tooth 1 (GMT1) Development is located in the North Slope region, a geographical area that extends north of the Brooks Range in Alaska to the Beaufort Sea. The North Slope environment includes the Brooks Range, Arctic Foothills, and Arctic Coastal Plain eco-regions. The GMT1 Project area is located in the Arctic Coastal Plain, which consist of flat tundra environment with poor drainage and numerous lakes (Gallant et al. 1995). This region is characterized by low mean annual temperatures and precipitation.

At the time of European contact, the North Slope was inhabited by indigenous Iñupiat populations, which were comprised of two primary cultural groups. The Tagiugmiut inhabited coastal areas of the Arctic Coastal Plain and the Nunamiut inhabited the interior including the Brooks Range and Arctic Foothills areas. Iñupiaq is the language spoken by both North Slope cultural groups as well as in other areas of Alaska (including Northwestern Alaska and the Seward Peninsula) and Canada (known as Inuktitut). Coastal Iñupiat (Tagiugmiut) relied primarily on harvests of marine mammals, terrestrial mammals, and fish, while their inland neighbors, the Nunamiut, relied mostly on terrestrial mammals and fish, with caribou comprising the majority of their subsistence harvests.

Iñupiat are still the primary occupants of the North Slope today and continue the hunting and harvesting traditions of their ancestors. Local residents often harvest subsistence resources from specific camps that are situated in locations that provide multiple resource harvest opportunities throughout the year. Harvest activities tend to occur near communities, along rivers and coastlines, or at particularly productive sites where resources are known to occur seasonally. Traditional knowledge concerning the distribution, migration, seasonal variation of animal populations, and other environmental factors (e.g., tides, currents, ice, and snow conditions), is often used when determining what, where, and when a subsistence resource will be harvested.

While some harvest locations may be used infrequently, they can still be important to a subsistence user or a community if they are particularly productive areas or if they have cultural, historical, or familial significance to the user. Prior to the 1950s, when mandatory school attendance and economic factors such as a decline in fur prices compelled families to permanently settle in one of the few centralized communities, the Iñupiat were highly mobile and ranged over large geographic areas for trapping, fishing, gathering, and hunting activities. Contemporary subsistence use areas include many of these traditional use areas. The advent of snowmachines and all-terrain vehicles (ATVs) including four wheelers has reduced the time required to travel to traditional hunting and harvesting areas, but has also increased the need for cash employment to purchase, maintain, and procure supplies for the new equipment (Ahtuanguaruk 1997, Impact Assessment Inc. [IAI] 1990a, b, Stephen R. Braund & Associates [SRB&A] and Institute of Social and Economic Research [ISER] 1993, Worl and Smythe 1986). The nomadic land

¹ This subsistence appendix was prepared by Stephen R. Braund & Associates (SRB&A). SRB&A adapted many of the sections of this appendix from previous reports or report sections prepared by SRB&A including the baseline report for the Alaska Pipeline Project and Foothills West Transportation Access Project EIS. Both reports were never published due to the projects being stopped.

use patterns once typical of North Slope Iñupiat have evolved to the use of base camps consisting of tent platforms, cabins, and/or caches located near productive resource bases. Residents conduct subsistence hunting, harvesting, and processing activities from these locations (IAI 1990b, SRB&A 2010a). The following section provides a brief introduction Nuiqsut, followed by a description of their subsistence use areas, harvest data, and seasonal round data as available.

Nuiqsut

Nuiqsut is located on the Colville River, approximately 35 miles upstream from the Beaufort Sea, in an area that provides abundant fishing, hunting, birding, and gathering. Although the location is less advantageous for marine mammal harvests, residents regularly travel to the ocean to harvest them. The Colville River is the largest river system on the North Slope and supports the largest overwintering areas for whitefish, which local residents harvest in substantial quantities (Craig 1987).

The Nuiqsut area was formerly a place where Iñupiat and Athabascan people gathered to trade and fish, maintaining connections between the Nunamiut of the inland areas and the Taremiut of the coast (Brown 1979). After the passage of the Alaska Native Claims Settlement Act (ANCSA), twenty-seven Iñupiat families from Barrow resettled at Nuiqsut to live a more traditional lifestyle and to reconnect with familial ties to the area (IAI 1990a). Easy access to the main channel of the Colville River for fishing and hunting and for ease of movement between upriver hunting sites and downriver whaling and sealing sites was the primary reason for selection of the site (Brown 1979).

Since its resettlement, Nuiqsut has grown to a population of 402 residents living in 114 households (U.S. Census Bureau 2011). Primary sources of employment in the community include the village corporation (Kuukpik Corporation), the North Slope Borough (NSB), and the NSB school district (NSB 2013). Nuiqsut is one of 11 Alaska Eskimo bowhead whaling communities. It is the closest community to the major oil producing fields of the North Slope, which has impacted local subsistence activities (Fuller and George 1999, IAI 1990a, Pedersen et al. 2000), jobs, corporate dividends, and local revenue.

Subsistence Use Areas

Figure A-1 depicts Nuiqsut all resources subsistence use areas for multiple time periods, as documented by Pedersen (1979, 1986), SRB&A (2003a, 2010a). Pedersen's (1979) lifetime (pre-1979) use areas show Nuiqsut residents utilizing a large area centered on the community to harvest subsistence resources; reported use areas extended offshore approximately 15 miles, as far east as Camden Bay, south along the Itkillik River, and west as far as Teshekpuk Lake. Subsequent use area data shows Nuiqsut residents traveling across a progressively larger area to harvest subsistence resources. SRB&A's (2010a) most recent use areas document Nuiqsut residents traveling beyond Atqasuk in the west, offshore more than 50 miles northeast of Cross Island, overland to Cape Halkett and Barrow in the north, to Camden Bay in the east, and beyond the Colville River in the south. The majority of Nuiqsut 1995-2006 use areas are

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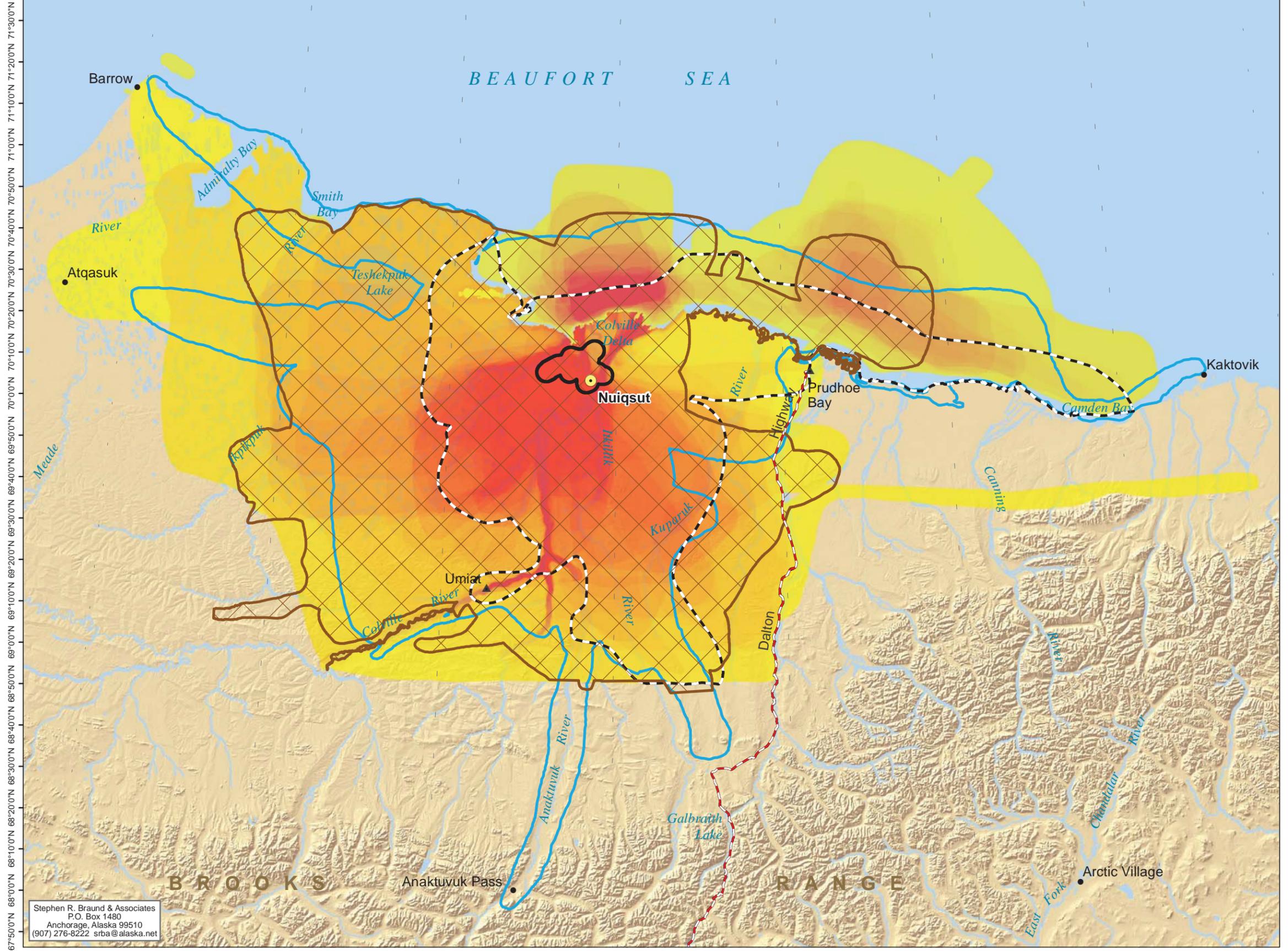


Figure G-1
Nuiqsut Subsistence Use Areas,
All Resources

Legend

- All Resources, Lifetime (Source: Pedersen 1979)
- All Resources, 1973-1986 (Source: Pedersen 1986)
- All Resources, 1994-2003 (Source: SRBA 2003)
- Overlapping Subsistence Use Areas, All Resources, 1995-2006, 756 use areas reported by 33 respondents (Source: SRBA 2010a)

- Project Study Area
- Subsistence Study Community
- Other Community
- Other Place

Map Date 1/23/2014

0 5 10 20 30
Miles

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67°50'0"N 68°10'0"N 68°20'0"N 68°30'0"N 68°40'0"N 68°50'0"N 69°0'0"N 69°10'0"N 69°20'0"N 69°30'0"N 69°40'0"N 69°50'0"N 70°0'0"N 70°10'0"N 70°20'0"N 70°30'0"N 70°40'0"N 70°50'0"N 71°0'0"N 71°10'0"N 71°20'0"N 71°30'0"N

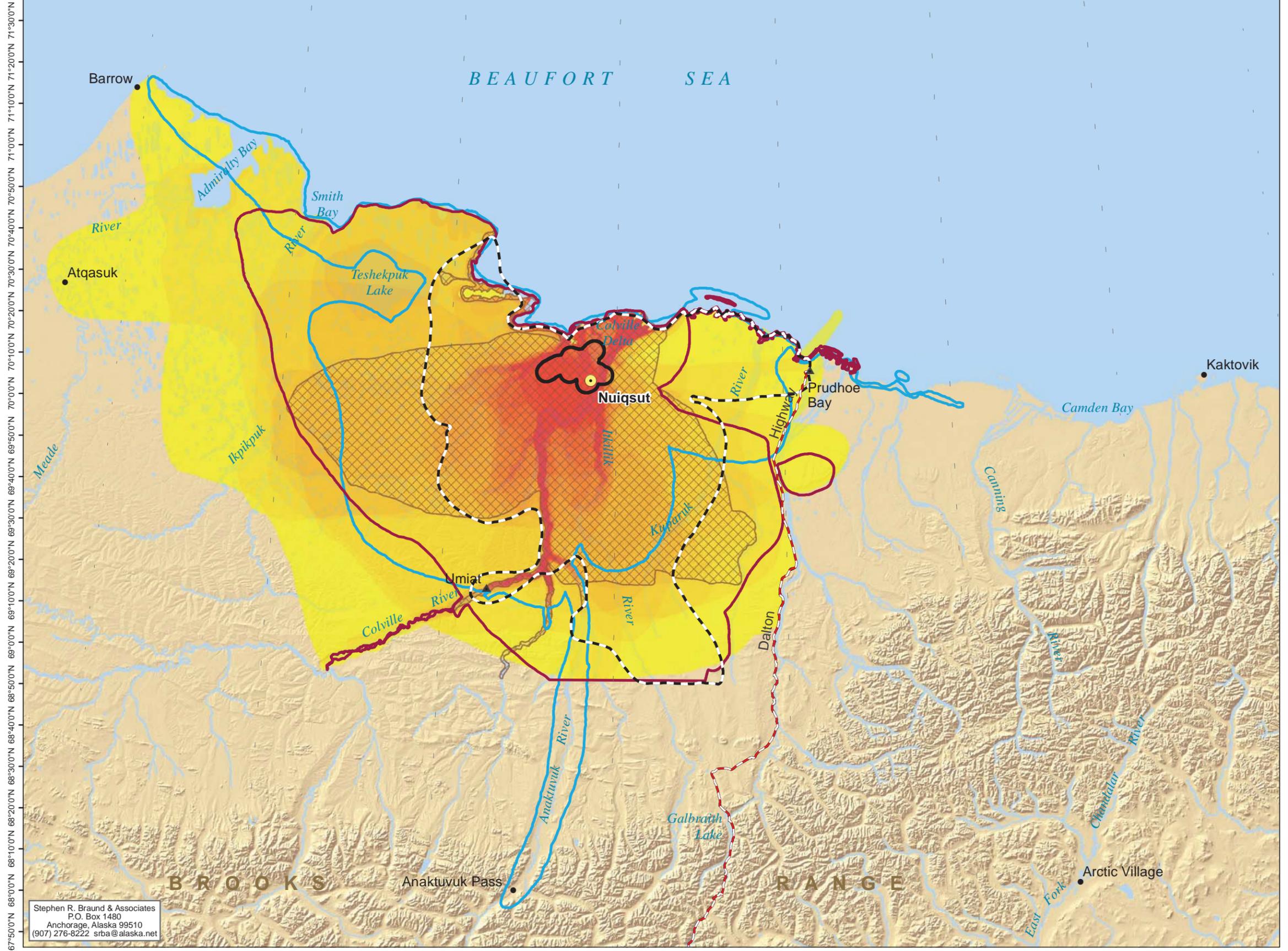
concentrated around the Colville River, overland areas to the southwest of the community, offshore areas north of the Colville River delta, and northeast of Cross Island. Pedersen (1986) and SRB&A (2003) use areas for Nuiqsut are all within the extent of Pedersen (1979) and SRB&A (2010a) use areas described above with the exception of extending as far as Kaktovik in the east and along the Anaktuvuk River as far as Anaktuvuk Pass to the south. Nuiqsut all resources use areas from all available studies (Pedersen 1979, Pedersen 1986, SRB&A 2003, and SRB&A 2010) overlap with large portions of the study area.

Nuiqsut subsistence use area maps organized by resource are shown on Figure A-2 through Figure A-9 for the lifetime (pre-1979), 1973-1986, 1994-2003, 1995-2006, 2008, and 2009 time periods. Nuiqsut subsistence use areas for large land mammals are shown on Figure A-2 through Figure A-4. Nuiqsut caribou use areas are shown on Figure A-2 and include use areas documented by Pedersen (1979), Pedersen (1986), and SRB&A (2003, 2010a, 2010b, 2011, 2012, and 2013b). As indicated on the map, areas consistently used by Nuiqsut residents for caribou hunting occur in an overland area between the Ikpikpuk and Kuparuk Rivers, north to the coast, and south along the Colville River. The maximum extent of their use areas documented between all the studies extends from Atqasuk in the west towards Point Thomson in the east and south along the Colville and Anaktuvuk Rivers. SRB&A's (2010a) overlapping use areas show the greatest number of caribou use areas are concentrated along the Colville River and delta, along the Itkillik River, and overland to the west and south of the community; these areas correspond to the caribou hunting areas reported during the 2008 through 2011 study years (SRB&A 2010b, 2011, 2012, and 2013).

Nuiqsut moose use areas (Figure A-3) as documented by Pedersen (1979, 1986) and SRB&A (2003, 2010a) show residents' consistent use of areas adjacent to the Colville River for moose harvests. While lifetime (pre-1979) use areas were completely confined to the Colville River, more recent moose use areas for the 1973-1986, 1994-2003, and 1995-2006 time periods have expanded to include other tributaries including the Chandler and Anaktuvuk Rivers, and Fish Creek. The 1995-2006 moose use areas show the highest amount of overlap along the Colville River south of Nuiqsut as far as Umiat. Figure A-4 depicts Nuiqsut use areas for bear as documented by Pedersen (1979, 1986). Use areas for grizzly bear for the lifetime and 1973-1986 time periods include areas along the Colville River watershed from Fish Creek to Umiat. Polar bear use areas for the 1973-1986 time period were documented in the Colville River delta and offshore areas extending east to Cross and Tigvariak islands.

Nuiqsut small land mammal use areas are shown on Figure A-5 for the lifetime, 1973-1986, 1994-2003, and 1995-2006 time periods. Lifetime (pre-1979) use areas documented by Pedersen (1979) showed residents using overland areas near the community, as well as the more southern Colville, Chandler,

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Figure G-2
Nuiqsut Subsistence Use Areas, Caribou

- Legend**
- Caribou, Lifetime (Source: Pedersen 1979)
 - Caribou, 1973-1986 (Source: Pedersen 1986)
 - Caribou, 1994-2003 (Source: SRBA 2003)
 - Caribou, 2008-2011 (Sources: SRBA 2010b, SRBA 2011, SRBA 2012, SRBA 2013b)
 - Overlapping Subsistence Use Areas, Caribou, 1995-2006, 94 use areas reported by 32 respondents (Source: SRBA 2010a)
 - Project Study Area
 - Subsistence Study Community
 - Other Community
 - Other Place

Map Date 1/23/2014

0 5 10 20 30 Miles

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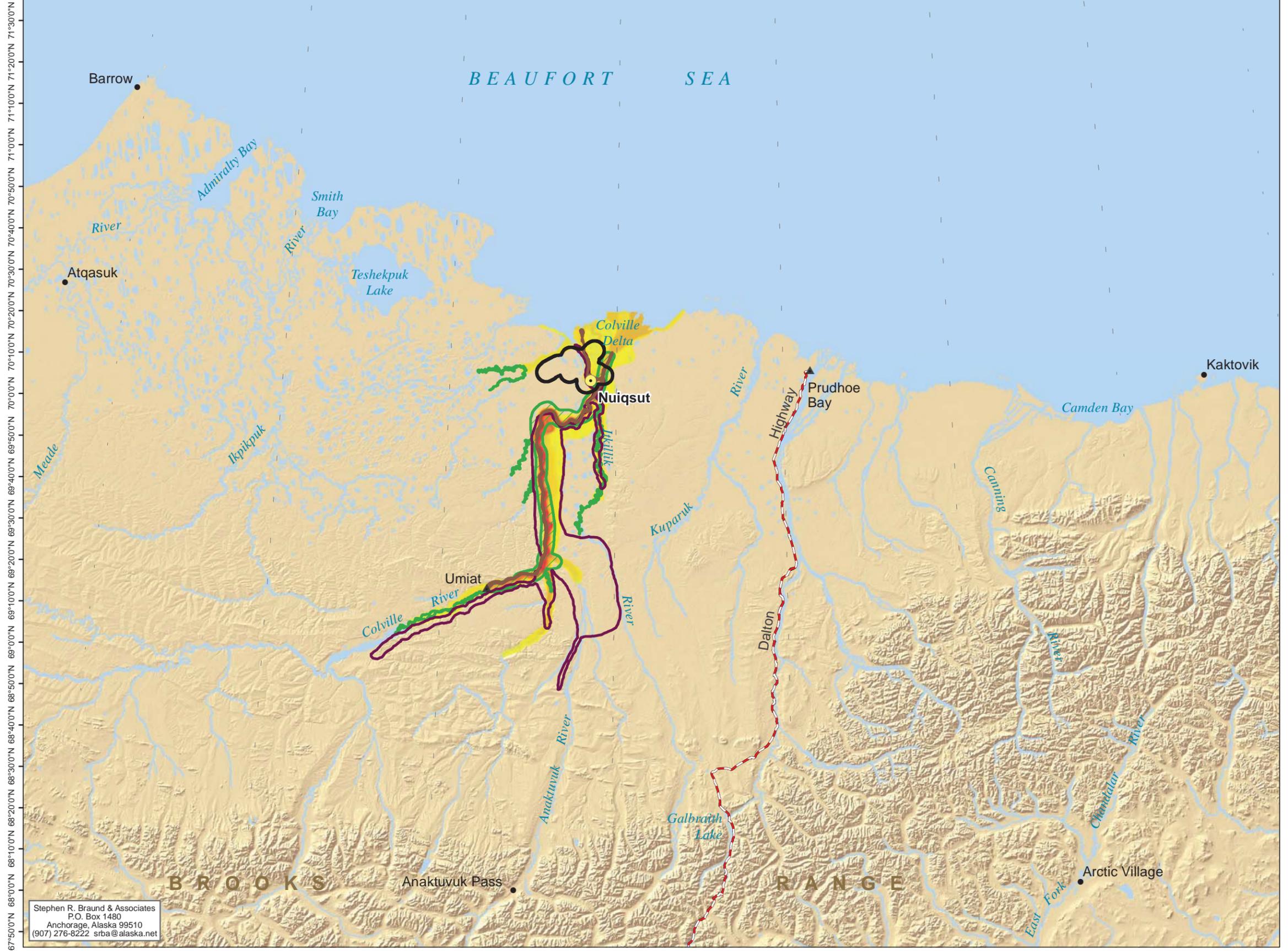


Figure G-3
Nuiqsut Subsistence Use Areas, Moose

- Legend**
- Moose, Lifetime (Source: Pedersen 1979)
 - Moose, 1973-1986 (Source: Pedersen 1986)
 - Moose, 1994-2003 (Source: SRBA 2003)
 - Overlapping Subsistence Use Areas, Moose, 1995-2006, 36 use areas reported by 31 respondents (Source: SRBA 2010a)

- Project Study Area
- Subsistence Study Community
- Other Community
- Other Place

Map Date 1/23/2014



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Figure G-4
Nuiqsut Subsistence Use Areas, Other Large Land Mammals

- Legend**
-  Grizzly Bear, Lifetime (Source: Pedersen 1979)
 -  Grizzly Bear, 1973-1986 (Source: Pedersen 1986)
 -  Polar Bear, 1973-1986 (Source: Pedersen 1986)

-  Project Study Area
-  Subsistence Study Community
-  Other Community
-  Other Place

Map Date 1/23/2014



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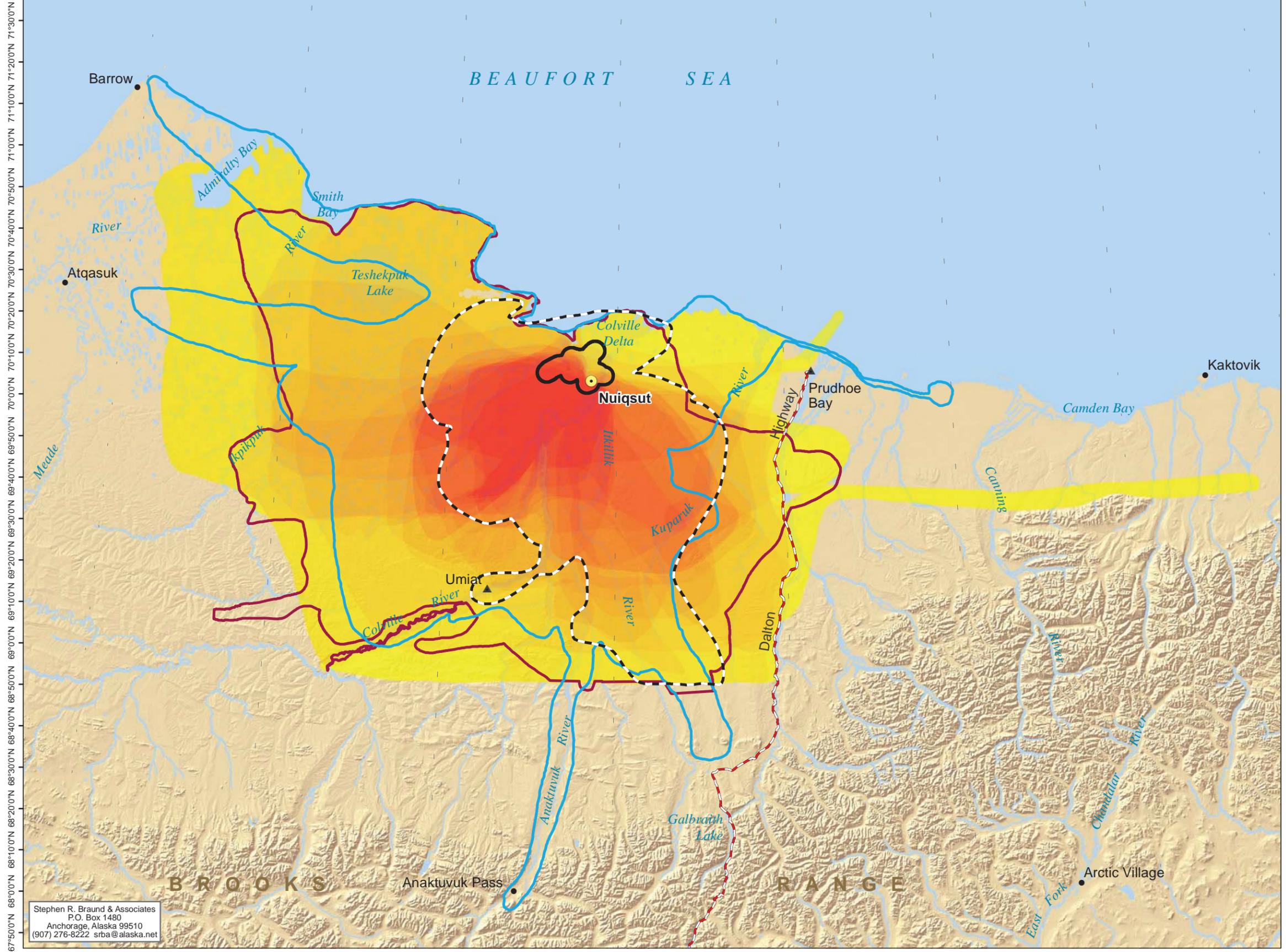


Figure G-5
Nuiqsut Subsistence Use Areas,
Furbearers and
Small Land Mammals

- Legend**
- Furbearers and Trapping, Lifetime (Source: Pedersen 1979)
 - Furbearers and Small Land Mammals, 1973-1986 (Source: Pedersen 1986)
 - Wolf and Wolverine, 1994-2003 (Source: SRBA 2003)
 - Overlapping Subsistence Use Areas, Wolf and Wolverine, 1995-2006, 69 use areas reported by 24 respondents (Source: SRBA 2010a)

- Project Study Area
- Subsistence Study Community
- Other Community
- Other Place

Map Date 1/23/2014



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Figure G-6
Nuiqsut Subsistence Use Areas, Fish

- Legend**
- Fish, Lifetime (Source: Pedersen 1979)
 - Fish, 1973-1986 (Source: Pedersen 1986)
 - Fish, 1994-2003 (Source: SRBA 2003)
 - Fish, 1995-2006 (Source: SRBA 2010a)

- Project Study Area
- Subsistence Study Community
- Other Community
- Other Place

Map Date 1/23/2014



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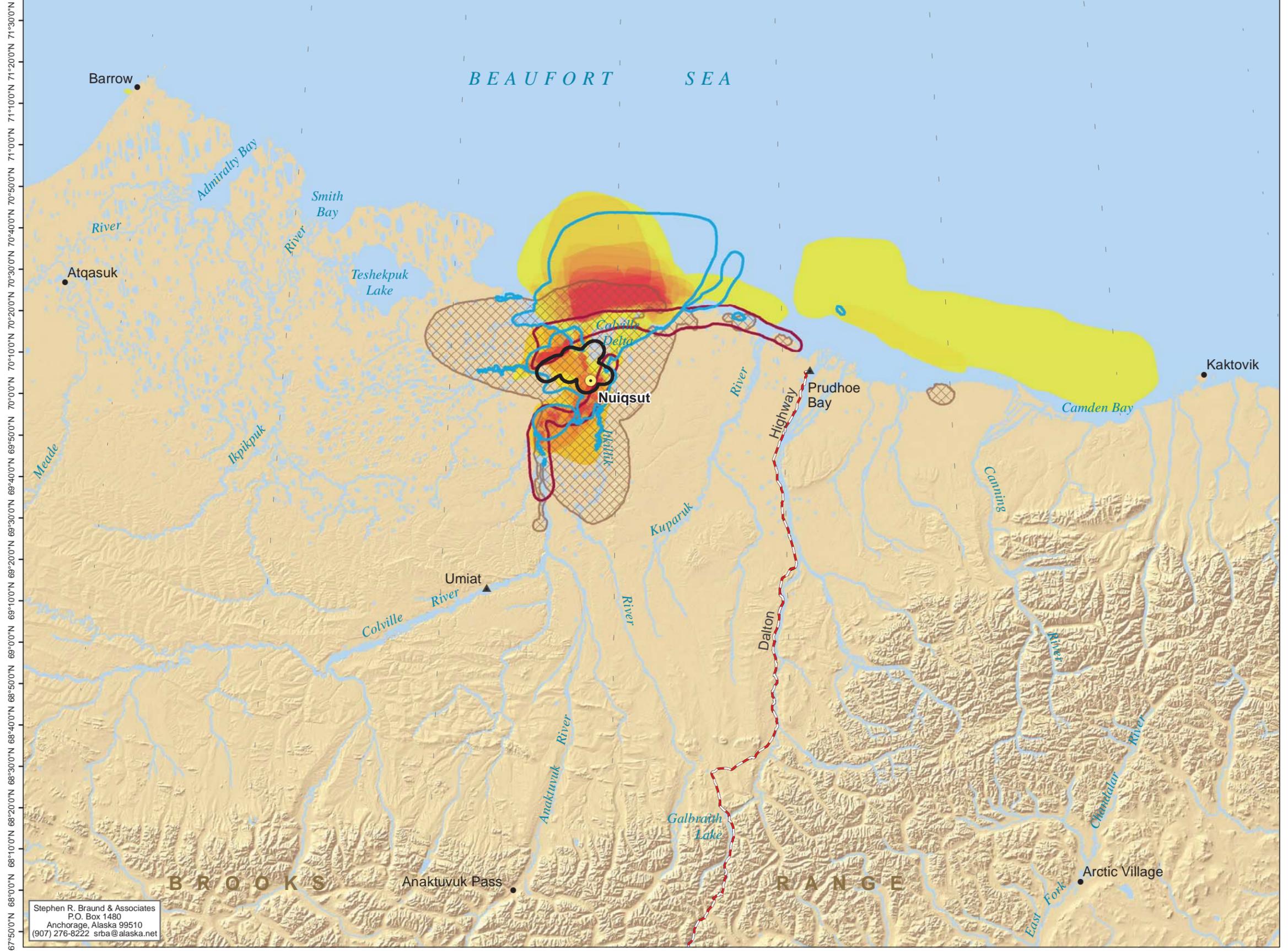


Figure G-7
Nuiqsut Subsistence Use Areas, Birds

- Legend**
- Birds, Lifetime (Source: Pedersen 1979)
 - Wildfowl, 1973-1986 (Source: Pedersen 1986)
 - Birds, 1994-2003 (Source: SRBA 2003)
 - Overlapping Subsistence Use Areas, Birds, 1995-2006, 240 use areas reported by 33 respondents (Source: SRBA 2010a)
 - Project Study Area
 - Subsistence Study Community
 - Other Community
 - Other Place

Map Date 1/23/2014

0 5 10 20 30 Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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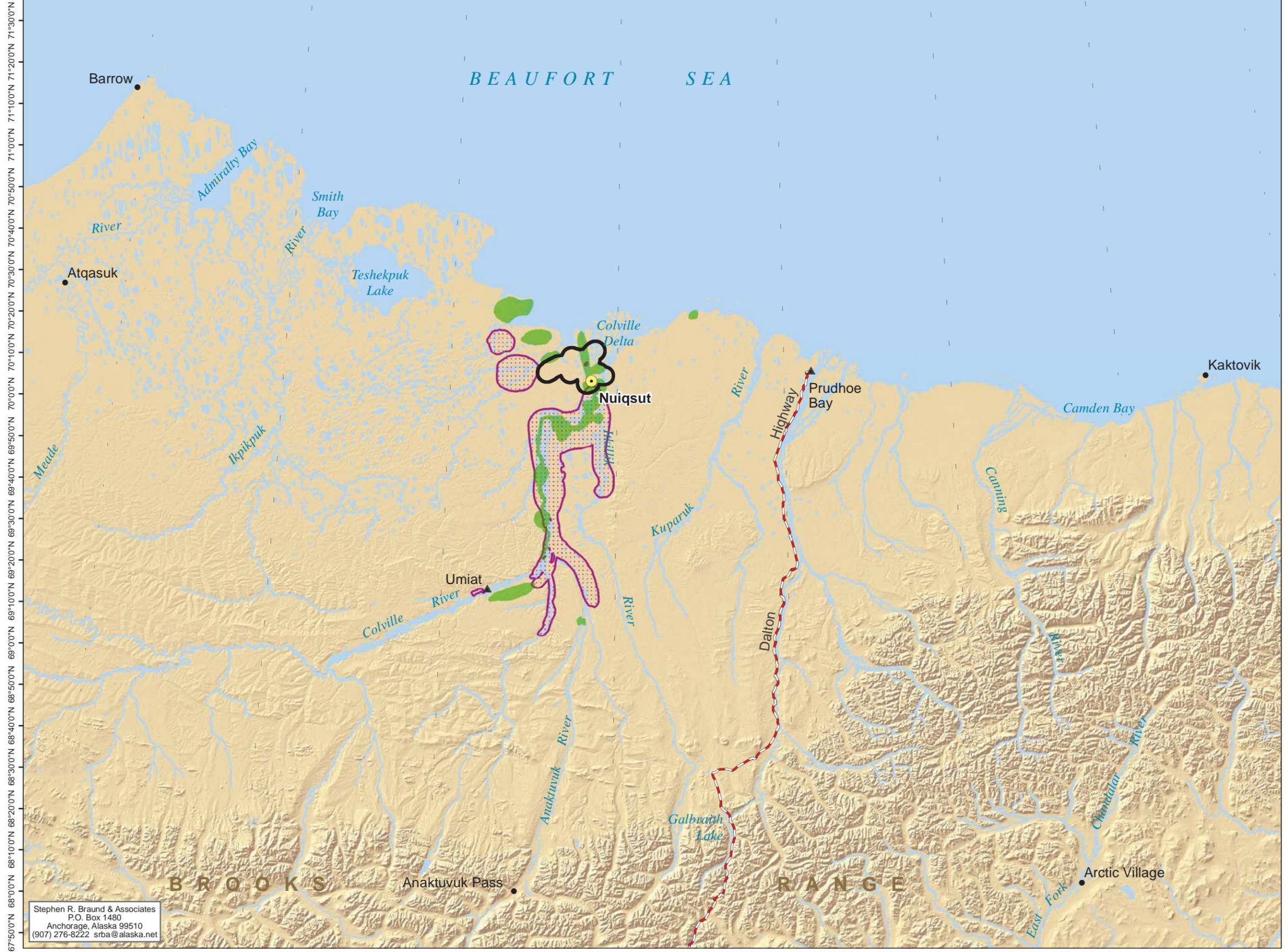


Figure G-8
Nuiqsut Subsistence Use Areas, Vegetation

- Legend**
- Vegetation, 1973-1986
(Source: Pedersen 1986)
 - Berries, 1994-2003
(Source: SRBA 2003)

- Project Study Area
- Subsistence Study Community
- Other Community
- Other Place

Map Date 1/23/2014



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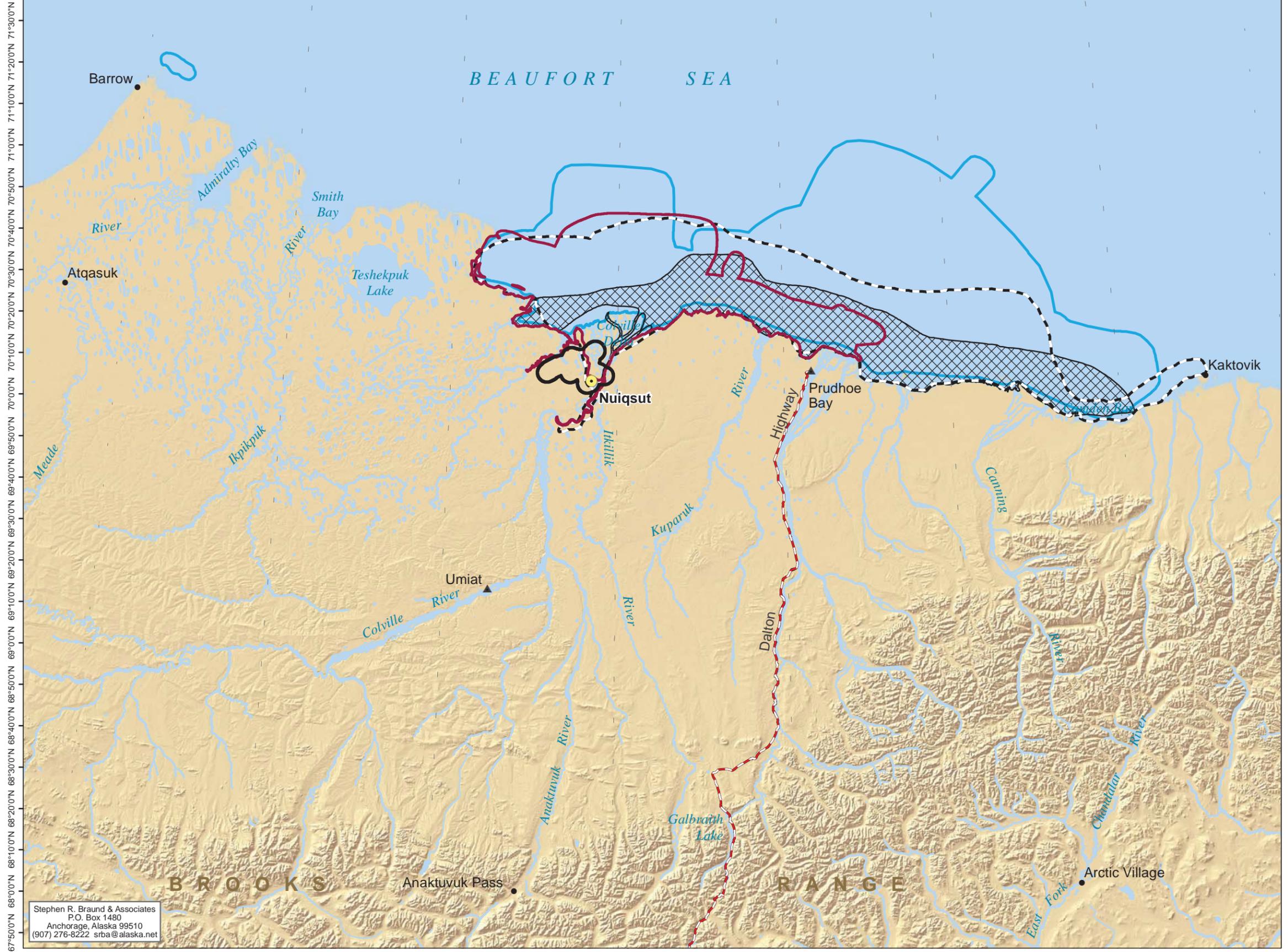


Figure G-9
Nuiqsut Subsistence Use Areas, Marine Mammals

- Legend**
-  Marine Mammals, Lifetime (Source: Pedersen 1979)
 -  Marine Mammals, 1973-1986 (Source: Pedersen 1986)
 -  Marine Mammals, 1995-2006 (Source: SRBA 2010a)
 -  Seal, 1994-2003 (Source: SRBA 2003)

-  Project Study Area
-  Subsistence Study Community
-  Other Community
-  Other Place

Map Date 1/23/2014



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Anaktuvuk, Itkillik, and Kuparuk Rivers to harvest small land mammals. Pedersen's (1986) furbearer and small land mammal use areas for the 1973-1986 time period expanded from previously recorded use areas to the west beyond the Ikpikpuk River and south to Anaktuvuk Pass. SRB&A's (2010a) most recent wolf and wolverine use areas for the 1995-2006 time period indicated a further expansion of use areas to the Meade River in the west and beyond the Dalton Highway in the east, including an eastward area reaching to just south of Kaktovik.

Nuiqsut lifetime (1973-1986 and pre-1979) and contemporary (1994-2003 and 1995-2006) fishing areas are shown on Figure A-6. These use areas indicate consistent use of the Colville River and smaller tributaries including the Itkillik, Chandler, and Anaktuvuk Rivers as well as Fish and Judy creeks. Contemporary use areas extend somewhat farther along the Colville, Chandler, and Anaktuvuk Rivers as well as along Fish Creek.

Nuiqsut use areas for birds (Figure A-7) are mostly concentrated along the Colville River and nearby overland areas for the lifetime (pre-1979), 1973-1986, 1994-2003, and 1995-2006 time periods, though they also include offshore eider hunting areas extending from Cape Halkett to Camden Bay. Lifetime (pre-1979) wildfowl use areas include areas near the Colville River and near-shore locations extending east to Prudhoe Bay. SRB&A's (2003, 2010a) most recent use areas for geese and eider for the 1994-2003 and 1995-2006 time period expanded previously recorded bird use areas to include areas offshore and east of Prudhoe Bay to Camden Bay.

Figure A-8 displays Nuiqsut use areas for vegetation for the 1973-1986 and 1994-2003 time periods. Both studies document use of the Colville River as far as Umiat and areas near Fish Creek for harvests of vegetation and berries. SRB&A (2003) also documented berry gathering areas along the Itkillik, Chandler, and Anaktuvuk Rivers. Contemporary and lifetime use areas overlap the study area, especially contemporary use areas, which span the western portion of the study area and overlap the Galbraith, Meltwater, and Pump Station 2 corridor alternatives in their western or southern portions.

Nuiqsut subsistence use areas for marine mammals are shown on Figure A-9. Nuiqsut marine mammal use areas are depicted for the lifetime (pre-1979), 1973-1986, 1994-2003 (seal only), and 1995-2006 time periods. Lifetime Nuiqsut use areas for marine mammals included offshore areas from Atigaru Point to Kaktovik at distances of less than 20 miles; subsequent studies documented use areas extending to Cape Halkett in the west and varying distances to the east. SRB&A's (2010a) most recent use areas showed Nuiqsut residents harvesting marine mammals up to 40 miles offshore to the north of the community and even farther offshore (approximately 60 miles) in an area near Cross Island, a sandy barrier island used traditionally and currently as a base of operations for Nuiqsut whaling crews. Galginaitis (2009a, 2009b, and 2010) documented Cross Island bowhead whaling tracks from 2001-2009. These tracks were recorded by participating whaling crews using Geographic Positioning System (GPS) units for an ongoing MMS funded subsistence bowhead whaling study and represent actual boat hunting routes taken by whaling crews during each study year. Nuiqsut 2001-2009 bowhead whale hunting GPS tracks extend as far east as Flaxman Island and over 30 miles offshore from Cross Island.

Harvest Data

Table G-1 and Table G-2 provide Nuiqsut harvest data for various years between 1985 and 2007. Comprehensive (i.e., all resources) study years are available for 1985, 1992, 1993, 1994-1995, 1995-1996, and 2000-2001 (Table G-1, Table G-2). Seven study years include data solely for caribou harvests (Braem et al. 2011, SRB&A 2012, 2013) (Table G-2).

During years with per capita harvest data, Nuiqsut households harvested 399 (in 1985) and 742 (in 1993) pounds of subsistence resources per capita (Table G-1). Land mammals, marine mammals, and fish are all major subsistence resources in Nuiqsut. Table G-1 shows that marine mammals contributed more, total edible pounds during three comprehensive study years (1992, 1995-1996, and 2000-2001) than any other resource. Non-salmon fish were the top harvested resource during the remaining three study years (1985, 1993, and 1994-1995) and accounted for 173 and 248 pounds per capita in 1985 and 1993, respectively. Large land mammals were generally the second or third most harvested resource during all study years and provided 169 (in 1985) and 242 (in 1993) pounds per capita.

Specifically, bowhead whales, whitefish (Arctic cisco or *qaaktaq* and broad whitefish), and caribou are the primary subsistence resources harvested in Nuiqsut. Bowhead whale harvests accounted for between 28.7 percent and 60.3 percent of the total harvest during all study years (except for 1985 and 1994-1995, when Nuiqsut did not successfully harvest a whale) (Table G-2). Arctic cisco harvests have accounted for between 1.9 and 14.9 percent of the total harvest, broad whitefish have accounted for between 5.5 and 45 percent of the total harvest, and caribou have accounted for between 21.7 and 37.5 percent of the total harvest. Other subsistence species with substantial contributions to Nuiqsut subsistence harvests include moose, seals, geese, Arctic grayling, and burbot. Nuiqsut residents also harvest vegetation, although in comparably small quantities (e.g., berries and plants) (Table G-1).

Household participation data (in terms of percentage of households harvesting) are available for three comprehensive study years (1985, 1992, 1993) and seven caribou only study years (2002-2003 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2010, 2011) (Table G-1 and Table G-2). Nuiqsut relies heavily on subsistence resources. As shown in Table G-1, 100 percent of households reported using subsistence resources in 1985 and 1993, and over 90 percent of households participated in subsistence activities (i.e., attempted to harvest). Sharing subsistence resources is also high; 100 percent of households received resources in 1985 and 98 percent received resources in 1993. Over 90 percent of households used caribou during all caribou only study years, and between 47 percent and 90 percent of households attempted to harvest caribou during these years (Table G-2).

Table G-1: Nuiqsut Subsistence Harvest Estimates by Resource Category, All Resources Study Years

Study Year	Resource	Percentage of Households					Estimated Harvest				% of Total Harvest
		Use	Try to Harvest	Harvest	Give	Receive	Number*	Total Pounds**	Average HH Pounds	Per Capita Pounds	
1985	All Resources	100	98	98	95	100		160,035	2,106	399	100
	Salmon	60	43	40	23	23	441	1,366	18	3	0.9

Study Year	Resource	Percentage of Households					Estimated Harvest				% of Total Harvest
		Use	Try to Harvest	Harvest	Give	Receive	Number*	Total Pounds**	Average HH Pounds	Per Capita Pounds	
	Non-Salmon Fish	100	93	93	83	75	67,712	69,243	911	173	43.3
	Large Land Mammals	98	90	90	80	70	536	67,621	890	169	42.3
	Small Land Mammals	65	63	58	23	13	688	245	3	1	0.2
	Marine Mammals	100	48	23	30	100	59	13,355	176	33	8.3
	Migratory Birds	90	90	85	60	55	1,733	6,626	87	17	4.1
	Upland Game Birds	88	88	88	58	13	1,957	1,370	18	3	0.9
	Bird Eggs	25	25	23	8	10	262	40	1	0	0.0
	Vegetation	38	50	18	10	20		169	2	0	0.1
1992***	All Resources							150,195			100
	Salmon						6	65			0.0
	Non-Salmon Fish		74					36,701	51,890		34.5
	Large Land Mammals						299	41,386			27.6
	Small Land Mammals						46	1			0.0
	Marine Mammals						49	52,865			35.2
	Migratory Birds						1,105	3,655			2.4
	Upland Game Birds						378	265			0.2
	Eggs						25	4			0.0
	Vegetation		32					66			0.0
1993	All Resources	100	94	90	92	98		267,818	2,943	742	100.
	Salmon	71	45	36	39	47	272	1,009	11	3	0.4
	Non-Salmon Fish	97	79	79	87	90	71,626	89,481	983	248	33.4
	Large Land Mammals	98	76	74	82	92	691	87,306	959	242	32.6
	Small Land Mammals	53	45	42	27	18	599	84	1	0	0.0
	Marine Mammals	97	58	37	79	97	113	85,216	936	236	31.8
	Migratory Birds	87	74	73	63	65	2,238	3,540	39	10	1.3
	Upland Game Birds	60	45	45	42	26	973	681	7	2	0.3
	Eggs	40	21	19	15	23	346	104	1	0	0.0
	Vegetation	79	71	71	27	40		396	4	1	0.1
1994-1995****	All Resources							83,228			100
	Salmon						10	31			0.0
	Non-Salmon Fish						15,190	46,569			56.0
	Large Land Mammals						263	32,686			39.3
	Small Land Mammals						42	0			0.0
	Marine Mammals						25	1,504			1.8
	Migratory Birds						569	2,289			2.8
	Upland Game Birds						58	58			0.1
	Vegetation						14	91			0.1

Study Year	Resource	Percentage of Households					Estimated Harvest				% of Total Harvest
		Use	Try to Harvest	Harvest	Give	Receive	Number*	Total Pounds**	Average HH Pounds	Per Capita Pounds	
1995-1996	All Resources							183,576			100
	Salmon						42	131			0.1
	Non-Salmon Fish						10,612	16,822			9.2
	Large Land Mammals						364	43,554			23.7
	Small Land Mammals						27	0			0.0
	Marine Mammals						178	120,811			65.8
	Migratory Birds						683	2,166			1.2
	Upland Birds						19	13			0.0
	Vegetation						12	78			0.0
2000-2001	All Resources							183,246			100
	Salmon						10	75			0.0
	Non-Salmon Fish						26,545	27,933			15.2
	Large Land Mammals						504	62,171			33.9
	Small Land Mammals						108	2			0.0
	Marine Mammals						31	87,929			48.0
	Migratory Birds						1,192	5,108			2.8
	Upland Birds						23	16			0.0
	Vegetation						2	13			0.0

Notes: *Estimated numbers represent individuals in all cases except vegetation, where they represent gallons.
 **Estimated pounds include only edible pounds and therefore do not include estimates for resources that are not typically eaten by community residents (e.g., furbearers).
 ***The estimated pounds of moose harvested in 1992 is likely too high (Fuller and George 1999).
 ****The 1994-1995 study year underrepresents the harvest of Arctic cisco and humpback whitefish (Brower and Hepa 1998); Nuiqsut did not successfully harvest a bowhead whale in 1994-1995.
 The estimated harvest numbers for the 1994-1995, 1995-1996 and 2000-2001 data were derived by summing individual species in each resource category. For those study years, total pounds were derived from conversion rates found at ADF&G (2013) and total (usable) pounds for bowhead whales were calculated based on the method presented in SRB&A and ISER (1993). These estimates do not account for whale girth and should be considered approximate; more exact methods for estimating total whale weights are available in George et al. (n.d.).
 Sources: ADF&G 2013 (1985, 1993), Bacon et al. 2009 (1995-1996, 2000-2001), Brower and Hepa 1998 (1994-1995), and Fuller and George 1999 (1992).

Table G-2: Nuiqsut Subsistence Harvest Estimates by Selected Species, All Study Years

Study Year	Resource*	Percentage of Households					Estimated Harvest				% of Total Harvest
		Use	Try to Harvest	Harvest	Give	Receive	Number**	Total Pounds***	Average HH Pounds	Per Capita Pounds	
1985	Caribou	98	90	90	80	60	513	60,021	790	150	37.5
	Cisco	98	75	73	65	60	46,478	29,354	386	73	18.3

Study Year	Resource*	Percentage of Households					Estimated Harvest				% of Total Harvest
		Use	Try to Harvest	Harvest	Give	Receive	Number**	Total Pounds***	Average HH Pounds	Per Capita Pounds	
	Broad Whitefish	95	80	78	70	40	7,900	26,861	353	67	16.8
	Bowhead Whale	100	23	5	8	100	0	7,458	98	19	4.7
	Moose	40	40	18	20	25	13	6,650	88	17	4.2
	Geese	90	90	85	55	48	1,345	6,045	80	15	3.8
	Arctic Grayling	78	65	63	48	35	4,055	3,650	48	9	2.3
	Humpback Whitefish	48	45	38	33	13	4,345	3,476	46	9	2.2
	Arctic Char	75	63	60	33	35	1,060	2,969	39	7	1.9
	Burbot	75	60	60	43	33	669	2,675	35	7	1.7
	Bearded Seal	48	25	15	15	35	15	2,675	35	7	1.7
	Ringed Seal	53	25	18	23	40	40	1,676	22	4	1.0
1992	Bowhead Whale						2	48,715			32.4
	Caribou		81				278	32,551			21.7
	Arctic Cisco						22,391	22,391			14.9
	Broad Whitefish						6,248	15,621			10.4
	Moose****						18	8,835			5.9
	Humpback Whitefish						1,802	4,504			3.0
	Arctic Char						1,544	4,324			2.9
	Bearded Seal		50				16	2,760			1.8
	Arctic Grayling						3,114	2,491			1.7
	Canada Geese						319	1,437			1.0
1993	Caribou	98	74	74	79	79	672	82,169	903	228	30.7
	Bowhead Whale	97	37	5	76	97	3	76,906	845	213	28.7
	Broad Whitefish	90	66	66	65	66	12,193	41,455	456	115	15.5
	Arctic Cisco	89	69	68	81	60	45,237	31,666	348	88	11.8
	Ringed Seal	65	42	31	40	55	98	7,277	80	20	2.7
	Burbot	79	63	57	53	55	1,416	5,949	65	16	2.2
	Moose	69	47	10	29	63	9	4,403	48	12	1.6
	Arctic Grayling	79	69	65	44	27	4,515	4,063	45	11	1.5
	Least Cisco	63	52	47	36	27	6,553	3,277	36	9	1.2
1994-1995*****	Broad Whitefish						3,237	37,417			45.0
	Caribou						258	30,186			36.3
	Arctic Cisco						9,842	6,889			8.3
	Moose						5	2,500			3.0
	Geese						474	2,133			2.6
	Ringed Seal						24	1,008			1.2
1995-1996	Bowhead Whale						4	110,715			60.3
	Caribou						362	42,354			23.1
	Broad Whitefish						2,863	9,735			5.3
	Ringed Seal						155	6,527			3.6
	Arctic Cisco						5,030	3,521			1.9
	Bearded Seal						17	2,974			1.6

Study Year	Resource*	Percentage of Households					Estimated Harvest				% of Total Harvest
		Use	Try to Harvest	Harvest	Give	Receive	Number**	Total Pounds***	Average HH Pounds	Per Capita Pounds	
	Least Cisco						1,804	1,804			1.0
2000-2001	Bowhead Whale						4	86220			47.1
	Caribou						496	57,985			31.6
	Arctic Cisco						18,222	12,755			7.0
	Broad Whitefish						2,968	10,092			5.5
	Geese						1,107	4,980			2.7
	Moose						6	3,000			1.6
2002-2003	Caribou	95	47	45	49	80	397	46,449	445	118	
2003-2004	Caribou	97	74	70	81	81	564	65,988	620	157	
2004-2005	Caribou	99	62	61	81	96	546	63,882	597	147	
2005-2006	Caribou	100	60	59	97	96	363	42,471	445	102	
2006-2007	Caribou	97	77	74	66	69	475	55,575	573	143	
2010	Caribou	94	86	76			471	55,107	593		
2011	Caribou	92	70	56	49	58	498	58,226	619	134	

Notes: *Except in the case of ducks and geese, which are lumped into more general species categories, this table shows individual species unless they are not available for a given study year.
 **Estimated numbers represent individuals in all cases except vegetation, where they represent gallons.
 ***Estimated pounds include only edible pounds and therefore do not include estimates for resources that are not typically eaten by community residents (e.g., furbearers).
 ****The estimated pounds of moose harvested in 1992 is likely too high (Fuller and George, 1999).
 *****The 1994-1995 study year underrepresents the harvest of Arctic cisco and humpback whitefish (Brower and Hepa 1998); Nuiqsut did not successfully harvest a bowhead whale in 1994-1995.
 For All Resources study years (1985, 1992, 1993, 1994-1995, 1995-1996, 2000-2001), species are listed in descending order by percent of total harvest and are limited to species accounting for at least 1.0 percent of the total harvest; for single-resource study years, species are listed in descending order by total estimated pounds (or total number harvested, in the case of salmon study years) and limited to the five top species. Years lacking "% of total harvest" data were not comprehensive (i.e., all resources) study years.
 The estimated harvest numbers for the 1992, 1994-1995, 1995-1996 and 2000-2001 data were derived by summing individual species in each resource category. Also for those study years, total pounds were derived from conversion rates found at ADF&G (2013) and total (usable) pounds for bowhead whales were calculated based on the method presented in SRB&A and ISER (1993). These estimates do not account for whale girth and should be considered approximate; more exact methods for estimating total whale weights are available in George et al. (n.d.). For the 2002-2003, 2003-2004, 2004-2005, 2005-2006, 2006-2007, 2010, and 2011 study years, total pounds were derived from conversion rates from Braem et al. (2011).
 Sources: ADF&G 2013 (1985, 1993), Bacon et al. 2009 (1995-1996, 2000-2001), Braem et al. 2011 (2002-2007), Brower and Hepa 1998 (1994-1995), Fuller and George 1999 (1992), and SRB&A 2012, 2013 (2010, 2011).

Seasonal Round

A general depiction of Nuiqsut seasonal subsistence activities is shown in Table G-3, based on information collected by IAI (1990a) and Research Foundation of the State University of New York (1984). Additional seasonal round data are available from more recent sources (Fuller and George 1999, Bacon et al. 2009, Braem et al. 2011, SRB&A 2010a, 2010b, 2011, 2012, 2013). Spring harvests in Nuiqsut are focused on caribou, furbearers, and seals (Table G-3). While Table G-3 shows bird and egg

harvests in June, SRB&A (2010a) and Bacon et al. (2009) also documented Nuiqsut residents actively harvesting waterfowl in May.

Summer brings the peak caribou season for Nuiqsut (Table G-3). Braem et al. (2011) reported that the majority of caribou harvests occur during June, July, and August. SRB&A (2010a, 2011, and 2012) reported relatively high harvests in September as well. In addition to their summer travels inland along the Colville River for fishing and caribou hunting, residents travel to the ocean to hunt for ringed seals, bearded seals, and eiders during June, July, and August. Vegetation harvests (e.g. berries and plants) also occur during the summer months (Table G-3).

Fall (September and October) begins the moose season in Nuiqsut, with continued harvests of caribou as well as increased harvests of freshwater fish. September is also the time when whaling crews are stationed at Cross Island. Moose hunting takes place in August and September along the rivers south of Nuiqsut (Fuller and George 1999). Nuiqsut hunters harvest few polar bears, but if they are harvested it is often after the fall whaling season. Gill netting, primarily for Arctic cisco, is most productive between October and mid-November. Residents jig for burbot throughout the winter months at nearby locations. Also during the winter months, furbearer hunters pursue wolves and wolverines and target caribou and ptarmigan as needed and available (Table G-3). The prime wolf and wolverine hunting months are February and March (SRB&A 2010a).

Table G-3: Nuiqsut Annual Cycle of Subsistence Activities

	Winter					Spring		Summer			Fall	
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct
Bowhead Whale												
Seals												
Polar Bear												
Birds/Eggs												
Caribou												
Moose												
Grizzly Bear												
Furbearers												
Small Mammals												
Freshwater Fish												
Berries/Roots/Plants												
	No to Very Low Levels of Subsistence Activity											
	Low to Medium Levels of Subsistence Activity											
	High Levels of Subsistence Activity											
Source: Impact Assessment Inc. 1990a, and Research Foundation of the State University of New York 1984.												

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APPENDIX H

GMT1 AIRCRAFT TRANSPORTATION PLAN

ConocoPhillips Alaska, Inc.

GMT1 Aircraft Transportation Plan

DRAFT

Flights Required for Construction

Construction is scheduled to occur during the winters of Jan-May 2016 and 2017. Although the proposed GMT1 Development Project would not include an airstrip, construction activities will include some increase in air traffic; predominately work crew transportation to CD1/ACF. Some materials and equipment may also be transported to CD1/ACF by air. Between 10 and 40 aircraft flights would be required each month to support construction activities. Detailed flight estimates are shown on Table 1. Aircraft would maintain elevations of 1,000 ft. or more except during takeoff and touchdown (within 3.6 miles of the airstrip). Flight paths would depend upon prevailing winds, but would generally align with the airstrip orientation.

Flights Required for Drilling

Drilling is scheduled to occur in 2017. During drilling activities at GMT-1 it is anticipated that there will be no need for routine additional fixed wing flights since drilling needs will be handled by flights that are already part of the ongoing operations at Alpine.

Flights Required for Operations

Once construction is complete, and the facility is transitioned to production, routine flights will not be necessary since the core Alpine personnel will handle the day-to-day operations and road access will be available from the main camp, CD1.

Flights for Special Studies

The GMT1 development will require some additional environmental study and monitoring flights, the majority of which will be in support of hydrological assessments associated with the gravel roads and water use in the area. During the summer months an estimated 1-5 Helicopter flights will occur daily, likely originating and terminating at the Alpine facility, utilizing multiple landings and takeoffs. Values in table 1 reflect estimated landings and takeoffs that will occur in the NPR-A. All such flights will comply with the General Aircraft Requirements in the NPR-A discussed below.

Aircraft Support for Construction, Drilling, and Operation of a Roadless Facility

If GMT1 was developed as a roadless facility it would have a different level of facility and personnel requirements dependent upon aircraft support. Critical spares, materials inventory, and a resident workforce would need to be flown in year-round with the exception of what could be brought via a winter iceroad. An estimate of fixed wing flights required for this scenario is included in Table 1.

General Aircraft Requirements in the NPR-A

If GMT1 were developed as a roadless facility a runway would be constructed on site, and would bring increased air traffic into the National Petroleum Reserve-Alaska (NPR-A). CPAI has operated aircraft in the NPR-A for many years in support of their environmental studies and surveys. All aircraft and pilots are required to adhere to the following stipulations as identified in BLM's Final EIS/IAP and reiterated in the annual permits obtained by CPAI:

- Aircraft shall maintain an altitude of at least 1,500 feet above ground level when within 1/2 mile of cliffs identified as raptor nesting sites from April 15 through August 15 and an altitude of at least 1,500 feet above ground level when within 1/2 mile of known gyrfalcon next sites from March 15 to August 15, unless doing so would endanger human life or violate safe flying practices. Permittees shall obtain information from the BLM necessary to plan flight routes when routes may go near falcon nests.
- Aircraft shall maintain an altitude of at least 1,000 feet above ground level (except for takeoffs and landings) over caribou winter ranges from December 1 through May 1, unless doing so would endanger human life or violate safe flying practices. Caribou wintering areas will be defined annually by the authorized officer. The BLM will consult directly with the Alaska Department of Fish and Game in annually defining caribou winter ranges.
- Use of aircraft, especially rotary wing aircraft, near known subsistence camps and cabins or during sensitive subsistence hunting periods (spring goose hunting and fall caribou/moose hunting) should be kept to a minimum.
 - CPAI has developed robust helicopter protocols and communication with the village of Nuiqsut to minimize conflict with subsistence activities.
- Aircraft used for permitted activities shall maintain an altitude of at least 2,000 feet above ground level (except for takeoffs and landings) over the Teshekpuk Lake Caribou Habitat Area from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices. Aircraft use (including fixed wing and helicopter) by oil and gas lessees in the Goose Molting Area should be minimized from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices.
- Aircraft used for permitted activities shall maintain an altitude of at least 2,000 feet above ground level (except for takeoffs and landings) over the Utukok River Uplands Special Area from May 20 through August 20, unless doing so would endanger human life or violate safe flying practices.
- Hazing of wildlife by aircraft is prohibited. Pursuit of running wildlife is hazing. If wildlife begins to run as an aircraft approaches, the aircraft is too close and must break away.
- Fixed wing aircraft used as part of a BLM-authorized activity along the coast shall maintain minimum altitude of 2,000 feet when within a 1/2-mile of walrus haulouts unless doing so would endanger human life or violate safe flying practices. Helicopters used as part of a BLM-authorized activity along the coast shall maintain minimum altitude of 3,000 feet and a 1-mile buffer from walrus haulouts, unless doing so would endanger human life or violate safe flying practices.

- Aircraft used as part of a BLM-authorized activity along the coast and shore fast ice zone shall maintain minimum altitude of 3,000 feet when within 1 mile from aggregations of seals, unless doing so would endanger human life or violate safe flying practices.
- Include information for aircraft personnel concerning subsistence activities and areas/seasons that are particularly sensitive to disturbance by low-flying aircraft. Of special concern is aircraft use near traditional subsistence cabins and campsites, flights during spring goose hunting and fall caribou and moose hunting seasons, and flights near North Slope communities.

APPENDIX I

ECONOMICS ANALYSIS

APPENDIX I: ECONOMICS ANALYSIS

In considering alternatives and a seasonal drilling restriction in the SEIS, the BLM requested Northern Economics to provide an independent third-party analysis to determine whether such restriction (Alternative D2) would result in the project being not economically feasible. CPAI communicated to the BLM that the specifications of Alternative D2 would not be a project they would pursue because it would not be economically viable. The BLM engaged Northern Economics in order to independently verify this conclusion. The determination of economic viability is relevant in considering alternatives because an alternative that is deemed to not be economically viable would not be a “reasonable alternative” under NEPA. CPAI provided additional royalty and production information to support their cost estimates.

The relative differences between alternatives represent cost estimates for specific requirement changes. This is the only use of this cost information for which the BLM has performed an analysis and these costs should not be relied upon for other uses.

Economic Modeling Approach

Economic feasibility requires the consideration of estimated project costs (including tax burdens) and projected revenues, but also consideration of risk, time/schedule, and desired return on the investment. Every project is considered an investment option. Therefore, the timing of when project costs are incurred and revenues are received are key factors in a company’s evaluation of a project due to the effects of inflation and the opportunity costs associated with alternative investment options. A company’s desired rate of return also reflects various factors including, for example, current return on other investments, the estimated return on other potential investment opportunities, the cost of capital, and the level of risk. An economic feasibility analysis combines all these factors to generate various metrics to facilitate a company’s evaluation of a project or investment. For example, the discounted expected monetary value (EMV) presented here represents the estimated discounted after-tax cash flow as one monetary number by considering estimated costs and revenues as well as projected risks, inflation rates, and desired rates of return.

Northern Economics used the Alaska Department of Natural Resources’ (DNR) MAPA model for the Alaska North Slope as the basis for the economic feasibility analysis for GMT1 alternatives. This model is a discounted cash flow model that allows the analyst to evaluate the economics of oil development in the Alaska North Slope given Alaska’s current fiscal system, More Alaska Production Act [MAPA]. Northern Economics reviewed, evaluated, adjusted and calibrated the model to ensure it accurately reflected the specifications of the GMT1 alternatives and analytical requirement of this economic feasibility analysis.

As an initial step in determining required model inputs and identifying data needs, Northern Economics reviewed information on alternatives contained in the Draft SEIS. In addition to information contained within the Draft SEIS, other sources for deriving revenue and cost estimates for GMT1 include:

- CPAI for supplemental projected royalty and production volume data;
- Capital expenditure (CAPEX) and operating expenditures (OPEX) gathered in 2010 for an economic model developed for the Bureau of Ocean Energy Management (BOEM) called MAG-PLAN Alaska;

- Alaska Department of Revenue's (DOR) Sources Book Fall 2013 and Spring 2014 for crude oil price forecasts and operating expenditure forecasts;
- Studies, data, and models available from the Alaska Department of Natural Resources (DNR); and
- Internal Revenue Service publications.

Two additional key inputs in the analysis are the assumed inflation rate and rate of return. The threshold rate of returns and the associated discount rate¹ for most major oil companies are typically considered proprietary information, thus Northern Economics worked with independent consultants to assist in review of oil industry rates of return.

In general, the rates of return for evaluating projects in the industry over the past few years range from 8 to 12 percent with 10 percent (real) being the most common number.² A 10 percent real discount rate is also the number most commonly seen in oil and gas industry quarterly or annual reports where companies are demonstrating to investors the value of their known and probable reserves. The assumed inflation rate was 2 percent. Combining these two assumptions results in a nominal rate of return of 12.2 percent. The outputs from the DNR model provided several metrics to consider when evaluating whether a proposed alternative is economically viable.

Economic Modeling Findings

Table I-1 presents the outputs from the modified DNR model for each alternative. In general, a comparison of these financial metrics indicates that the alternatives should be ranked A, B, C, D1, and D2 with Alternative A being the most attractive and Alternative D2 being the least attractive from the perspective of the proponent. Alternatives A and B have positive discounted after-tax cash flow values (EMV) of about \$63 million and \$31 million, respectively. Alternatives C and D1 have negative EMVs of about \$53 million and \$64 million, respectively. Alternative D2, with the seasonal drilling restriction, has a negative EMV of about \$339 million.

With respect to Alternative D2, the large difference in the EMV in comparison to the other alternatives is primarily driven by delays oil production, the subsequent monetizing of the oil resource, and lower total oil production. Additional costs incurred under Alternative D2 also contribute to the difference in EMV including the need to construct ice bridges that can accommodate the drilling rigs since the conventional bridges in the area are not designed to handle the weight of drilling rigs, and the mobilization and de-mobilization of the drilling rig and associated equipment and supplies for each drilling season.

The Internal Rate of Return (IRR) is the discount rate that makes the net present value of all cash flows from a particular project equal to zero. For example, in the case of Alternative D2, an IRR of 3 percent would result in a net present value after-tax cash flow (or EMV) of zero. Thus, the higher the discount rate, the more attractive the project. This metric indicates that Alternative A is the most preferred followed by Alternative B. Alternatives C, D1, and D2 have IRRs that are lower than the discount rate, so they would not meet the typical oil industry threshold rate of return requirement.

¹ In an economic feasibility analysis the threshold or desired rate of return are incorporated into the analysis as a discount rate. The discount rate takes into account the time value of money as well as the risk and uncertain of future cash flows.

² The real value refers to a value that removes the effects of general price level change over time (i.e., inflation); whereas, the nominal value expresses a value in monetary terms without adjusting for inflation.

Table I-1

	Alternative A	Alternative B	Alternative C	Alternative D1	Alternative D2
Discounted After Tax Expected Monetary Value (2014\$ MM)	63.13	30.69	-52.64	-64.47	-339.07
Internal Rate of Return (%)	14%	13%	11%	11%	3%

Model outputs were reviewed by the BLM, and a sensitivity analysis was completed to ensure the accuracy of the assumptions and estimates used in the model. The sensitivity analysis indicated that the absolute EMV values could change for each alternative but the relative rankings would not likely change. Changes in inflation rates or discount rates would affect all of the alternatives in a similar manner. Reductions in CAPEX would benefit the projects with the largest CAPEX more than alternatives with smaller CAPEX, but the sensitivity analysis suggests that while the delta for EMV between the projects would change, the rankings would not likely be altered.

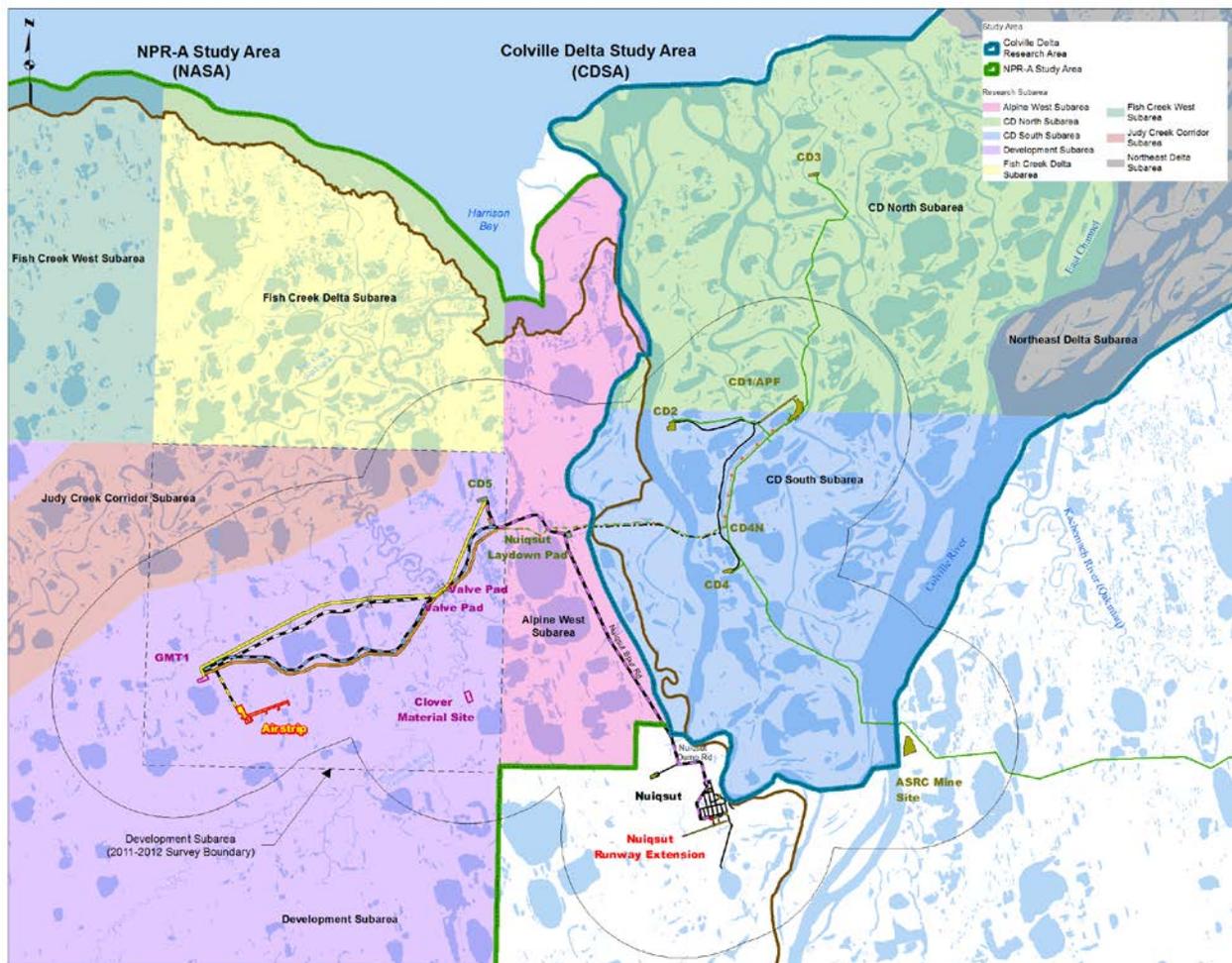
APPENDIX J

SUMMARY OF CONOCOPHILLIPS AVIAN SURVEYS RELEVANT TO THE GMT1 PROJECT STUDY AREA 1989 – 2013

Appendix J contains available ConocoPhillips Alaska Inc. (CPAI) avian survey records relevant to the GMT1 project study area. Two avian survey study areas (NPR-A Study Area and Colville Delta Study Area), and six avian survey subareas (CD North Subarea, CD South Subarea, Alpine West Subarea, Development Subarea, Judy Creek Corridor Subarea, and Fish Creek Delta Subarea) contain portions that fall within the project study area. The survey records in Appendix J include focal avian species selected by CPAI’s biological contractor (ABR, Inc. Environmental Research and Services) from available years within the range of 1989 to 2013 for each of the six aforementioned avian survey subareas.

Focal avian species include: king eider, tundra swan, greater white-fronted goose, brant, snow goose, Canada goose, glaucous gull, Sabine’s gull, yellow-billed loon, spectacled eider, and Steller’s eider.

Relevant avian survey study areas and subareas in relation to the GMT1 project study area are pictured below. Additional details are provided in Section 3.3.3 and Map 3.3-5.



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Acronyms:

BRAN	brant
CAGO	Canada goose
GLGU	glaucous gull
GWFG	greater white-fronted goose
KIEI	king eider
SAGU	Sabine's gull
SNGO	snow goose
SPEI	spectacled eider
TUSW	tundra swan
YBLO	yellow-billed loon

ALPINE WEST SUBAREA

Brant - Alpine West Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1992 ^a	yes	no	no	yes	yes	yes
1993 ^a	yes	no	no	yes	yes	yes
1995 ^a	yes	no	no	yes	no	yes
1996 ^b	yes	no	no	yes	no	yes
1997 ^b	yes	no	no	yes	no	yes
1998 ^b	yes	no	no	yes	no	yes
2000 ^{b,c}	yes	yes	no	yes	no	no
2001 ^b	yes	no	no	no	no	no
2002 ^{b,c}	yes	yes	no	yes	yes	yes
2003 ^{b,c}	yes	yes	no	yes	yes	yes
2004 ^{b,c}	no	yes	no	yes	yes	yes
2005 ^b	yes	no	no	no	yes	no
2006 ^b	yes	no	no	no	yes	no
2007 ^b	yes	no	no	no	yes	no
2008 ^b	yes	no	no	no	no	yes
2009 ^{b,c}	yes	yes	no	no	no	yes
2010 ^c	yes	no	no	no	no	no
2011 ^b	yes	no	no	no	yes	no
2012 ^b	yes	no	no	no	yes	no
2013 ^{c,d}	yes	yes	no	no	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c General avian surveys targeted large waterfowl

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Canada Goose - Alpine West Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1992 ^a	yes	no	no	no	yes	yes
1993 ^a	yes	no	no	no	yes	yes
1995 ^a	yes	no	no	no	no	yes
1996 ^b	yes	no	no	no	no	yes
1997 ^b	yes	no	no	no	yes	yes
1998 ^b	yes	no	no	no	yes	yes
2000 ^{b,c}	yes	yes	no	yes	yes	no
2001 ^b	yes	no	no	no	no	no
2002 ^{b,c}	yes	yes	no	yes	yes	yes
2003 ^{b,c}	yes	yes	no	yes	yes	yes
2004 ^{b,c}	no	yes	no	yes	yes	yes
2005 ^b	yes	no	no	no	yes	no
2006 ^b	yes	no	no	no	yes	no
2007 ^b	yes	no	no	no	yes	no
2008 ^b	yes	no	no	no	no	yes
2009 ^{b,c}	no	yes	no	yes	no	yes
2010 ^c	yes	no	no	no	no	no
2011 ^b	yes	no	no	no	yes	no
2012 ^b	yes	no	no	no	yes	no
2013 ^{c,d}	no	yes	no	yes	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c General avian surveys targeted large waterfowl

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Glaucous Gull - Alpine West Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2000 ^a	yes	yes	no	yes	no
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,d}	yes	yes	no	yes	yes
2004 ^{a,d}	yes	yes	no	yes	yes
2005 ^d	yes	no	no	yes	yes
2006 ^d	yes	no	no	yes	yes
2008 ^d	yes	no	no	yes	yes
2009 ^d	yes	yes	no	yes	yes
2010 ^d	yes	no	no	yes	yes
2011 ^d	yes	no	no	yes	yes
2012 ^d	yes	no	no	yes	yes
2013 ^d	yes	yes	no	yes	yes

^a General avian surveys targeted large waterfowl

^b Opportunistic gull sightings during geese surveys

^c Opportunistic gull sightings during swan surveys

^d Opportunistic gull sightings during loon surveys

Greater White-fronted Goose - Alpine West Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1992 ^a	yes	no	no	no	yes	yes
1993 ^a	yes	no	no	no	yes	yes
1995 ^a	yes	no	no	no	no	yes
1996 ^b	yes	no	no	no	no	yes
1997 ^b	yes	no	no	no	yes	yes
1998 ^b	yes	no	no	no	yes	yes
2000 ^{b,c}	yes	yes	no	yes	yes	no
2001 ^b	yes	no	no	no	no	no
2002 ^{b,c}	yes	yes	no	yes	yes	yes
2003 ^{b,c}	yes	yes	no	yes	yes	yes
2004 ^{b,c}	no	yes	no	yes	yes	yes
2005 ^b	yes	no	no	no	yes	no
2006 ^b	yes	no	no	no	yes	no
2007 ^b	yes	no	no	no	yes	no
2008 ^b	yes	no	no	no	no	yes
2009 ^{b,c}	no	yes	no	yes	no	yes
2010 ^c	yes	no	no	no	no	no
2011 ^b	yes	no	no	no	yes	no
2012 ^b	yes	no	no	no	yes	no
2013 ^{c,d}	no	yes	no	yes	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c General avian surveys targeted large waterfowl

^d Targeted Greater White-fronted goose, all other geese species opportunistic

King Eider - Alpine West Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1993 ^a	yes	no	yes	no	no
2000 ^b	no	yes	no	yes	yes
2001 ^a	yes	no	no	no	no
2002 ^{a,b,c}	yes	yes	yes	yes	yes
2003 ^{a,b,c}	yes	yes	yes	yes	yes
2004 ^{a,b}	yes	yes	yes	yes	yes
2005 ^a	yes	no	yes	no	no
2006 ^a	yes	no	yes	no	no
2007 ^a	yes	no	yes	no	no
2008 ^a	yes	no	yes	no	no
2009 ^a	yes	no	yes	yes	no
2010 ^a	yes	no	yes	no	no
2011 ^a	yes	no	yes	no	no
2012 ^a	yes	no	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

^c Opportunistic eider sightings during geese surveys

Sabine's Gull - Alpine West Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2000 ^a	yes	yes	no	yes	no
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,d}	yes	yes	no	yes	yes
2004 ^{a,d}	yes	yes	no	yes	yes
2005 ^d	yes	no	no	yes	yes
2006 ^d	yes	no	no	yes	yes
2008 ^d	yes	no	no	yes	yes
2009 ^d	yes	no	no	yes	yes
2010 ^d	yes	no	no	yes	yes
2011 ^d	yes	no	no	yes	yes
2012 ^d	yes	no	no	yes	yes
2013 ^d	yes	yes	no	yes	yes

^a General avian surveys targeted large waterfowl

^b Opportunistic gull sightings during geese surveys

^c Opportunistic gull sightings during swan surveys

^d Opportunistic gull sightings during loon surveys

Snow Goose - Alpine West Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1992 ^a	yes	no	no	yes	yes	yes
1993 ^a	yes	no	no	yes	yes	yes
1995 ^a	yes	no	no	yes	no	yes
1996 ^b	yes	no	no	yes	no	yes
1997 ^b	yes	no	no	yes	no	yes
1998 ^b	yes	no	no	yes	no	yes
2000 ^{b,c}	yes	yes	no	yes	no	no
2001 ^b	yes	no	no	no	no	no
2002 ^{b,c}	yes	yes	no	yes	yes	yes
2003 ^{b,c}	yes	yes	no	yes	yes	yes
2004 ^{b,c}	no	yes	no	yes	yes	yes
2005 ^b	yes	no	no	no	yes	no
2006 ^b	yes	no	no	no	yes	no
2007 ^b	yes	no	no	no	yes	no
2008 ^b	yes	no	no	no	no	yes
2009 ^{b,c}	yes	yes	no	no	no	yes
2010 ^c	yes	no	no	no	no	no
2011 ^b	yes	no	no	no	yes	no
2012 ^b	yes	no	no	no	yes	no
2013 ^{c,d}	yes	yes	no	no	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c General avian surveys targeted large waterfowl

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Spectacled Eider - Alpine West Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1993 ^a	yes	no	yes	no	no
2000 ^b	no	yes	no	yes	yes
2001 ^a	yes	no	no	no	no
2002 ^{a,b,c}	yes	yes	yes	yes	yes
2003 ^{a,b,c}	yes	yes	yes	yes	yes
2004 ^{a,b}	yes	yes	yes	yes	yes
2005 ^a	yes	no	yes	no	no
2006 ^a	yes	no	yes	no	no
2007 ^a	yes	no	yes	no	no
2008 ^a	yes	no	yes	no	no
2009 ^a	yes	no	yes	yes	no
2010 ^a	yes	no	yes	no	no
2011 ^a	yes	no	yes	no	no
2012 ^a	yes	no	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

^c Opportunistic eider sightings during geese surveys

Tundra Swan - Alpine West Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1992 ^a	yes	no	no	yes	yes
1993 ^a	yes	no	no	yes	yes
1997 ^a	yes	no	no	no	no
1998 ^a	yes	no	no	no	no
2000 ^{a,b}	yes	yes	no	yes	no
2001 ^a	yes	no	no	yes	no
2002 ^{a,b,c,d}	yes	yes	no	yes	yes
2003 ^{a,b,c,d}	yes	yes	no	yes	yes
2004 ^{a,b,d}	yes	yes	no	yes	yes
2005 ^{a,d}	yes	no	no	yes	yes
2006 ^{a,d}	yes	no	no	yes	yes
2007 ^a	yes	no	no	yes	yes
2008 ^{a,d}	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^{a,d}	yes	no	no	yes	yes
2013 ^{a,d}	yes	no	no	yes	yes

^a Swans on nests targeted

^b General avian surveys targeted large waterfowl

^c Opportunistic swan sightings during geese surveys

^d Opportunistic swan sightings during loon surveys

Yellow-billed Loon - Alpine West Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1997 ^a	no	no	no	no	no
2002 ^a	yes	yes	no	yes	yes
2003 ^a	yes	yes	no	yes	yes
2004 ^a	yes	yes	no	yes	yes
2005 ^a	yes	no	no	yes	yes
2006 ^a	yes	no	no	yes	yes
2007 ^a	yes	no	no	yes	yes
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	yes	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^a	yes	yes	no	yes	yes

^a All loons targeted

CD NORTH SUBAREA

Brant - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Prenest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	no	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	yes	no	no
2005 ^{a,b}	yes	yes	no	yes	yes	no	no
2006 ^{a,b}	yes	yes	no	yes	yes	no	no
2007 ^{a,b}	yes	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	no	yes	yes	no
2009 ^{a,b}	yes	yes	no	yes	yes	yes	no
2010 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2011 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2012 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2013 ^{b,c,d}	yes	yes	no	yes	yes	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

Canada Goose - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Prenest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	no	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	yes	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	no	no	no
2005 ^{a,b}	no	yes	no	yes	no	no	no
2006 ^{a,b}	no	yes	no	yes	no	no	no
2007 ^{a,b}	no	yes	no	yes	no	no	no
2008 ^a	yes	no	no	no	no	yes	no
2009 ^{a,b}	yes	yes	no	yes	no	yes	no
2010 ^{b,c,d}	no	yes	no	yes	no	no	no
2011 ^{b,c,d}	no	yes	no	yes	no	no	no
2012 ^{b,c,d}	no	yes	no	yes	no	no	no
2013 ^{b,c,d}	no	yes	no	yes	no	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

Glauous Gull - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Pre nest	Nest	Brood	Lake Use
1992 ^{a,b,c}	no	yes	no	yes	yes	no
1993 ^{a,b,c}	no	yes	no	yes	yes	no
1995 ^{a,b,c}	no	yes	no	yes	yes	no
1996 ^{a,b,c}	no	yes	no	yes	yes	no
1997 ^{a,b,c}	yes	yes	no	yes	yes	yes
1998 ^{a,b,c}	yes	yes	no	yes	yes	yes
1999 ^c	yes	yes	no	yes	yes	yes
2000 ^{a,b,c}	yes	yes	no	yes	yes	yes
2001 ^{a,b,c}	yes	yes	no	yes	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes	no
2003 ^{a,b,c,d}	yes	no	no	yes	yes	no
2004 ^{a,b,c}	yes	no	no	yes	yes	no
2005 ^{a,b,c}	yes	no	no	yes	yes	no
2006 ^{a,b,c}	yes	no	no	yes	yes	no
2007 ^{a,b,c}	yes	no	no	yes	yes	no
2008 ^{a,b,c}	yes	no	no	yes	yes	no
2009 ^{a,b,c}	yes	no	no	yes	yes	no
2010 ^{a,b,c}	yes	no	no	yes	yes	no
2011 ^{a,b,c}	yes	no	no	yes	yes	no
2012 ^{a,b,c}	yes	no	no	yes	yes	no
2013 ^{a,b,c}	yes	no	no	yes	yes	no

^a Gulls on nests targeted during swan surveys

^b Opportunistic gull sightings during loon surveys

^c General avian surveys targeted large waterfowl

^d Opportunistic Glauous Gull nests recorded during eider surveys

Greater White-fronted Goose - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Pre-nest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	no	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	yes	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	yes	no	no
2005 ^{a,b}	no	yes	no	yes	no	no	no
2006 ^{a,b}	no	yes	no	yes	yes	no	no
2007 ^{a,b}	no	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	no	no	yes	no
2009 ^{a,b}	yes	yes	no	yes	no	yes	no
2010 ^{b,c,d}	no	yes	no	yes	no	no	no
2011 ^{b,c,d}	no	yes	no	yes	no	no	no
2012 ^{b,c,d}	no	yes	no	yes	no	no	no
2013 ^{b,c,d}	no	yes	no	yes	no	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

King Eider - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	no
1994 ^{a,b}	yes	no	yes	no	no	no
1995 ^{a,b}	yes	yes	yes	yes	yes	no
1996 ^{a,b}	yes	yes	yes	yes	yes	no
1997 ^{a,b}	yes	yes	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	yes	yes	yes	yes
1999 ^{a,b}	no	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	yes	yes	yes	no
2003 ^{a,b}	yes	yes	yes	yes	yes	no
2004 ^{a,b}	yes	yes	yes	yes	yes	no
2005 ^{a,b}	yes	yes	yes	yes	yes	no
2006 ^{a,b}	yes	yes	yes	yes	yes	no
2007 ^{a,b}	yes	yes	yes	yes	yes	no
2008 ^a	yes	no	yes	no	no	no
2009 ^{a,b}	yes	yes	yes	yes	no	no
2010 ^{a,b}	yes	yes	yes	yes	no	no
2011 ^{a,b}	yes	yes	yes	yes	no	no
2012 ^{a,b}	yes	yes	yes	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

Sabine's Gull - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b,c}	no	yes	no	yes	yes	no
1993 ^{a,b,c}	no	yes	no	yes	yes	no
1995 ^{a,b,c}	no	yes	no	yes	yes	no
1996 ^{a,b,c}	no	yes	no	yes	yes	no
1997 ^{a,b,c}	yes	yes	no	yes	yes	yes
1998 ^{a,b,c}	yes	yes	no	yes	yes	yes
1999 ^c	yes	yes	no	yes	yes	yes
2000 ^{a,b,c}	yes	yes	no	yes	yes	yes
2001 ^{a,b,c}	yes	yes	no	yes	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes	no
2003 ^{a,b,c}	yes	no	no	yes	yes	no
2004 ^{a,b,c}	yes	no	no	yes	yes	no
2005 ^{a,b,c}	yes	no	no	yes	yes	no
2006 ^{a,b,c}	yes	no	no	yes	yes	no
2007 ^{a,b,c}	yes	no	no	yes	yes	no
2008 ^{a,b,c}	yes	no	no	yes	yes	no
2009 ^{a,b,c}	yes	no	no	yes	yes	no
2010 ^{a,b,c}	yes	no	no	yes	yes	no
2011 ^{a,b,c}	yes	no	no	yes	yes	no
2012 ^{a,b,c}	yes	no	no	yes	yes	no
2013 ^{a,b,c}	yes	no	no	yes	yes	no

^a Gulls on nests targeted during swan surveys

^b Opportunistic gull sightings during loon surveys

^c General avian surveys targeted large waterfowl

Snow Goose - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Pre-nest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	no	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	yes	no	no
2005 ^{a,b}	yes	yes	no	yes	yes	no	no
2006 ^{a,b}	yes	yes	no	yes	yes	no	no
2007 ^{a,b}	yes	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	no	yes	yes	no
2009 ^{a,b}	yes	yes	no	yes	yes	yes	no
2010 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2011 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2012 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2013 ^{b,c,d}	yes	yes	no	yes	yes	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

Spectacled Eider - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	no
1994 ^{a,b}	yes	no	yes	no	no	no
1995 ^{a,b}	yes	yes	yes	yes	yes	no
1996 ^{a,b}	yes	yes	yes	yes	yes	no
1997 ^{a,b}	yes	yes	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	yes	yes	yes	yes
1999 ^{a,b}	no	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	yes	yes	yes	no
2003 ^{a,b}	yes	yes	yes	yes	yes	no
2004 ^{a,b}	yes	yes	yes	yes	yes	no
2005 ^{a,b}	yes	yes	yes	yes	yes	no
2006 ^{a,b}	yes	yes	yes	yes	yes	no
2007 ^{a,b}	yes	yes	yes	yes	yes	no
2008 ^a	yes	no	yes	no	no	no
2009 ^{a,b}	yes	yes	yes	yes	no	no
2010 ^{a,b}	yes	yes	yes	yes	no	no
2011 ^{a,b}	yes	yes	yes	yes	no	no
2012 ^{a,b}	yes	yes	yes	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

Steller's Eider - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	no
1994 ^{a,b}	yes	no	yes	no	no	no
1995 ^{a,b}	yes	yes	yes	yes	yes	no
1996 ^{a,b}	yes	yes	yes	yes	yes	no
1997 ^{a,b}	yes	yes	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	yes	yes	yes	yes
1999 ^{a,b}	no	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	yes	yes	yes	no
2003 ^{a,b}	yes	yes	yes	yes	yes	no
2004 ^{a,b}	yes	yes	yes	yes	yes	no
2005 ^{a,b}	yes	yes	yes	yes	yes	no
2006 ^{a,b}	yes	yes	yes	yes	yes	no
2007 ^{a,b}	yes	yes	yes	yes	yes	no
2008 ^a	yes	no	yes	no	no	no
2009 ^{a,b}	yes	yes	yes	yes	no	no
2010 ^{a,b}	yes	yes	yes	yes	no	no
2011 ^{a,b}	yes	yes	yes	yes	no	no
2012 ^{a,b}	yes	yes	yes	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

Tundra Swan - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Preneest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	no	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	no	yes
2002 ^{a,b}	yes	yes	no	yes	yes	no	no
2003 ^{a,b}	yes	yes	no	yes	yes	no	no
2004 ^{a,b}	yes	yes	no	yes	yes	no	no
2005 ^{a,b}	yes	yes	no	yes	yes	no	no
2006 ^{a,b}	yes	yes	no	yes	yes	no	no
2007 ^{a,b}	yes	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	yes	yes	no	no
2009 ^{a,b}	yes	yes	no	yes	yes	no	no
2010 ^{a,b}	yes	yes	no	yes	yes	no	no
2011 ^{a,b}	yes	yes	no	yes	yes	no	no
2012 ^{a,b}	yes	yes	no	yes	yes	no	no
2013 ^{a,b}	yes	yes	no	yes	yes	no	no

^a Swans on nests targeted

^b General avian surveys targeted large waterfowl

Yellow-billed Loon - Colville River Delta North Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Preneest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes
1999 ^b	yes	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	no
2003 ^{a,b}	yes	yes	no	yes	yes	no
2004 ^{a,b}	yes	yes	no	yes	yes	no
2005 ^{a,b}	yes	yes	no	yes	yes	no
2006 ^{a,b}	yes	yes	no	yes	yes	no
2007 ^{a,b}	yes	yes	no	yes	yes	no
2008 ^{a,b}	yes	no	no	yes	yes	no
2009 ^{a,b}	yes	no	no	yes	yes	no
2010 ^{a,b}	yes	yes	yes	yes	yes	no
2011 ^{a,b}	yes	no	no	yes	yes	no
2012 ^{a,b}	yes	no	no	yes	yes	no
2013 ^{a,b}	yes	no	no	yes	yes	no

^a All loons targeted

^b General avian surveys targeted large waterfowl

CD SOUTH SUBAREA

Brant - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Pre-nest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	no	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	yes	no	no
2005 ^{a,b}	yes	yes	no	yes	yes	no	no
2006 ^{a,b}	yes	yes	no	yes	yes	no	no
2007 ^{a,b}	yes	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	no	yes	yes	no
2009 ^{a,b}	yes	yes	no	yes	yes	yes	no
2010 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2011 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2012 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2013 ^{b,c,d}	yes	yes	no	yes	yes	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

Canada Goose - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Prenest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	no	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	yes	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	no	no	no
2005 ^{a,b}	no	yes	no	yes	no	no	no
2006 ^{a,b}	no	yes	no	yes	no	no	no
2007 ^{a,b}	no	yes	no	yes	no	no	no
2008 ^a	yes	no	no	no	no	yes	no
2009 ^{a,b}	yes	yes	no	yes	no	yes	no
2010 ^{b,c,d}	no	yes	no	yes	no	no	no
2011 ^{b,c,d}	no	yes	no	yes	no	no	no
2012 ^{b,c,d}	no	yes	no	yes	no	no	no
2013 ^{b,c,d}	no	yes	no	yes	no	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

Glaucaous Gull - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Preneest	Nest	Brood	Lake Use
1992 ^{a,b,c}	no	yes	no	yes	yes	no
1993 ^{a,b,c}	no	yes	no	yes	yes	no
1995 ^{a,b,c}	no	yes	no	yes	yes	no
1996 ^{a,b,c}	no	yes	no	yes	yes	no
1997 ^{a,b,c}	yes	yes	no	yes	yes	yes
1998 ^{a,b,c}	yes	yes	no	yes	yes	yes
1999 ^c	yes	yes	no	yes	yes	yes
2000 ^{a,b,c}	yes	yes	no	yes	yes	yes
2001 ^{a,b,c}	yes	yes	no	yes	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes	no
2003 ^{a,b,c,d}	yes	no	no	yes	yes	no
2004 ^{a,b,c}	yes	no	no	yes	yes	no
2005 ^{a,b,c}	yes	no	no	yes	yes	no
2006 ^{a,b,c}	yes	no	no	yes	yes	no
2007 ^{a,b,c}	yes	no	no	yes	yes	no
2008 ^{a,b,c}	yes	no	no	yes	yes	no
2009 ^{a,b,c}	yes	no	no	yes	yes	no
2010 ^{a,b,c}	yes	no	no	yes	yes	no
2011 ^{a,b,c}	yes	no	no	yes	yes	no
2012 ^{a,b,c}	yes	no	no	yes	yes	no
2013 ^{a,b,c}	yes	no	no	yes	yes	no

^a Gulls on nests targeted during swan surveys

^b Opportunistic gull sightings during loon surveys

^c General avian surveys targeted large waterfowl

^d Opportunistic Glaucaous Gull nests recorded during eider surveys

Greater White-fronted Goose - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Pre-nest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	no	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	yes	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	yes	no	no
2005 ^{a,b}	no	yes	no	yes	no	no	no
2006 ^{a,b}	no	yes	no	yes	yes	no	no
2007 ^{a,b}	no	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	no	no	yes	no
2009 ^{a,b}	yes	yes	no	yes	no	yes	no
2010 ^{b,c,d}	no	yes	no	yes	no	no	no
2011 ^{b,c,d}	no	yes	no	yes	no	no	no
2012 ^{b,c,d}	no	yes	no	yes	no	no	no
2013 ^{b,c,d}	no	yes	no	yes	no	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

King Eider - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	no
1994 ^{a,b}	yes	no	yes	no	no	no
1995 ^{a,b}	yes	yes	yes	yes	yes	no
1996 ^{a,b}	yes	yes	yes	yes	yes	no
1997 ^{a,b}	yes	yes	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	yes	yes	yes	yes
1999 ^{a,b}	no	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	yes	yes	yes	no
2003 ^{a,b}	yes	yes	yes	yes	yes	no
2004 ^{a,b}	yes	yes	yes	yes	yes	no
2005 ^{a,b}	yes	yes	yes	yes	yes	no
2006 ^{a,b}	yes	yes	yes	yes	yes	no
2007 ^{a,b}	yes	yes	yes	yes	yes	no
2008 ^a	yes	no	yes	no	no	no
2009 ^{a,b}	yes	yes	yes	yes	no	no
2010 ^{a,b}	yes	yes	yes	yes	no	no
2011 ^{a,b}	yes	yes	yes	yes	no	no
2012 ^{a,b}	yes	yes	yes	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

Sabine's Gull - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Preneest	Nest	Brood	Lake Use
1992 ^{a,b,c}	no	yes	no	yes	yes	no
1993 ^{a,b,c}	no	yes	no	yes	yes	no
1995 ^{a,b,c}	no	yes	no	yes	yes	no
1996 ^{a,b,c}	no	yes	no	yes	yes	no
1997 ^{a,b,c}	yes	yes	no	yes	yes	yes
1998 ^{a,b,c}	yes	yes	no	yes	yes	yes
1999 ^c	yes	yes	no	yes	yes	yes
2000 ^{a,b,c}	yes	yes	no	yes	yes	yes
2001 ^{a,b,c}	yes	yes	no	yes	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes	no
2003 ^{a,b,c}	yes	no	no	yes	yes	no
2004 ^{a,b,c}	yes	no	no	yes	yes	no
2005 ^{a,b,c}	yes	no	no	yes	yes	no
2006 ^{a,b,c}	yes	no	no	yes	yes	no
2007 ^{a,b,c}	yes	no	no	yes	yes	no
2008 ^{a,b,c}	yes	no	no	yes	yes	no
2009 ^{a,b,c}	yes	no	no	yes	yes	no
2010 ^{a,b,c}	yes	no	no	yes	yes	no
2011 ^{a,b,c}	yes	no	no	yes	yes	no
2012 ^{a,b,c}	yes	no	no	yes	yes	no
2013 ^{a,b,c}	yes	no	no	yes	yes	no

^a Gulls on nests targeted during swan surveys

^b Opportunistic gull sightings during loon surveys

^c General avian surveys targeted large waterfowl

Snow Goose - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Prenest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	no	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	yes	no
2003 ^b	no	yes	no	yes	yes	no	no
2004 ^b	no	yes	no	yes	yes	no	no
2005 ^{a,b}	yes	yes	no	yes	yes	no	no
2006 ^{a,b}	yes	yes	no	yes	yes	no	no
2007 ^{a,b}	yes	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	no	yes	yes	no
2009 ^{a,b}	yes	yes	no	yes	yes	yes	no
2010 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2011 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2012 ^{b,c,d}	yes	yes	no	yes	yes	no	no
2013 ^{b,c,d}	yes	yes	no	yes	yes	no	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Opportunistic geese observed during eider surveys

Spectacled Eider - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Preneest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	no
1994 ^{a,b}	yes	no	yes	no	no	no
1995 ^{a,b}	yes	yes	yes	yes	yes	no
1996 ^{a,b}	yes	yes	yes	yes	yes	no
1997 ^{a,b}	yes	yes	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	yes	yes	yes	yes
1999 ^{a,b}	no	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	yes	yes	yes	no
2003 ^{a,b}	yes	yes	yes	yes	yes	no
2004 ^{a,b}	yes	yes	yes	yes	yes	no
2005 ^{a,b}	yes	yes	yes	yes	yes	no
2006 ^{a,b}	yes	yes	yes	yes	yes	no
2007 ^{a,b}	yes	yes	yes	yes	yes	no
2008 ^a	yes	no	yes	no	no	no
2009 ^{a,b}	yes	yes	yes	yes	no	no
2010 ^{a,b}	yes	yes	yes	yes	no	no
2011 ^{a,b}	yes	yes	yes	yes	no	no
2012 ^{a,b}	yes	yes	yes	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

Steller's Eider - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	no
1994 ^{a,b}	yes	no	yes	no	no	no
1995 ^{a,b}	yes	yes	yes	yes	yes	no
1996 ^{a,b}	yes	yes	yes	yes	yes	no
1997 ^{a,b}	yes	yes	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	yes	yes	yes	yes
1999 ^{a,b}	no	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	yes	yes	yes	yes
2002 ^{a,b}	yes	yes	yes	yes	yes	no
2003 ^{a,b}	yes	yes	yes	yes	yes	no
2004 ^{a,b}	yes	yes	yes	yes	yes	no
2005 ^{a,b}	yes	yes	yes	yes	yes	no
2006 ^{a,b}	yes	yes	yes	yes	yes	no
2007 ^{a,b}	yes	yes	yes	yes	yes	no
2008 ^a	yes	no	yes	no	no	no
2009 ^{a,b}	yes	yes	yes	yes	no	no
2010 ^{a,b}	yes	yes	yes	yes	no	no
2011 ^{a,b}	yes	yes	yes	yes	no	no
2012 ^{a,b}	yes	yes	yes	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no	no

^a All species of eider targeted

^b General avian surveys targeted large waterfowl

Tundra Swan - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose				
	Aerial	Ground	Prenest	Nest	Brood	Staging	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	yes	no
1993 ^{a,b}	yes	yes	yes	yes	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes	yes
1999 ^b	no	yes	no	yes	yes	no	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	no	yes
2002 ^{a,b}	yes	yes	no	yes	yes	no	no
2003 ^{a,b}	yes	yes	no	yes	yes	no	no
2004 ^{a,b}	yes	yes	no	yes	yes	no	no
2005 ^{a,b}	yes	yes	no	yes	yes	no	no
2006 ^{a,b}	yes	yes	no	yes	yes	no	no
2007 ^{a,b}	yes	yes	no	yes	yes	no	no
2008 ^a	yes	no	no	yes	yes	no	no
2009 ^{a,b}	yes	yes	no	yes	yes	no	no
2010 ^{a,b}	yes	yes	no	yes	yes	no	no
2011 ^{a,b}	yes	yes	no	yes	yes	no	no
2012 ^{a,b}	yes	yes	no	yes	yes	no	no
2013 ^{a,b}	yes	yes	no	yes	yes	no	no

^a Swans on nests targeted

^b General avian surveys targeted large waterfowl

Yellow-billed Loon - Colville River Delta South Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Lake Use
1992 ^{a,b}	yes	yes	no	yes	yes	no
1993 ^{a,b}	yes	yes	no	yes	yes	no
1995 ^{a,b}	yes	yes	no	yes	yes	no
1996 ^{a,b}	yes	yes	no	yes	yes	no
1997 ^{a,b}	yes	yes	no	yes	yes	yes
1998 ^{a,b}	yes	yes	no	yes	yes	yes
1999 ^b	yes	yes	no	yes	yes	yes
2000 ^{a,b}	yes	yes	no	yes	yes	yes
2001 ^{a,b}	yes	yes	no	yes	yes	yes
2002 ^{a,b}	yes	yes	no	yes	yes	no
2003 ^{a,b}	yes	yes	no	yes	yes	no
2004 ^{a,b}	yes	yes	no	yes	yes	no
2005 ^{a,b}	yes	yes	no	yes	yes	no
2006 ^{a,b}	yes	yes	no	yes	yes	no
2007 ^{a,b}	yes	yes	no	yes	yes	no
2008 ^{a,b}	yes	no	no	yes	yes	no
2009 ^{a,b}	yes	no	no	yes	yes	no
2010 ^{a,b}	yes	yes	yes	yes	yes	no
2011 ^{a,b}	yes	no	no	yes	yes	no
2012 ^{a,b}	yes	no	no	yes	yes	no
2013 ^{a,b}	yes	no	no	yes	yes	no

^a All loons targeted

^b General avian surveys targeted large waterfowl

DEVELOPMENT SUBAREA

Brant - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^a	no	yes	no	yes	no
2000 ^a	no	yes	no	yes	no
2001 ^{a,b,c}	yes	yes	no	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,c}	yes	yes	no	yes	yes
2004 ^{a,b,c}	yes	yes	no	yes	yes
2008 ^{a,c}	yes	no	no	no	no
2009 ^{a,b}	yes	yes	no	yes	no
2013 ^{a,c,d}	no	yes	no	yes	no

^a General avian surveys targeted large waterfowl

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c Opportunistic geese sightings during loon surveys

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Canada Goose - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^a	no	yes	no	yes	no
2000 ^a	no	yes	no	yes	no
2001 ^{a,b,c}	yes	yes	no	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,c}	yes	yes	no	yes	yes
2004 ^{a,b,c}	yes	yes	no	yes	yes
2008 ^{a,c}	yes	no	no	no	no
2009 ^{a,b}	yes	yes	no	yes	no
2013 ^{a,c,d}	no	yes	no	yes	no

^a General avian surveys targeted large waterfowl

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c Opportunistic geese sightings during loon surveys

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Glaucous Gull - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^{a,b,d,e}	no	yes	no	yes	no
2000 ^{a,b,d,e}	yes	yes	no	yes	no
2001 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2002 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2003 ^{a,b,c,d,e}	yes	yes	yes	yes	yes
2004 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2008 ^{a,c,d,e}	yes	no	no	yes	yes
2009 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2010 ^{c,e}	yes	no	no	yes	no
2011 ^{a,c,d,e}	yes	no	no	yes	no
2012 ^{a,c,d,e}	yes	no	no	yes	yes
2013 ^{a,b,c,d,e}	yes	yes	no	yes	yes

^a Gulls on nests targeted during swan surveys

^b General avian surveys targeted large waterfowl

^c Opportunistic gull nests recorded during loon surveys

^d Opportunistic gull nests recorded during goose surveys

^e Opportunistic gull nests recorded during eider surveys

Greater White-fronted Goose - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^a	no	yes	no	yes	no
2000 ^a	no	yes	no	yes	no
2001 ^{a,b,c}	yes	yes	no	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,c}	yes	yes	no	yes	yes
2004 ^{a,b,c}	yes	yes	no	yes	yes
2008 ^{a,c}	yes	no	no	no	no
2009 ^{a,b}	yes	yes	no	yes	no
2013 ^{a,c,d}	no	yes	no	yes	no

^a General avian surveys targeted large waterfowl

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c Opportunistic geese sightings during loon surveys

^d Targeted Greater White-fronted goose, all other geese species opportunistic

King Eider - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^{a,b}	yes	yes	yes	yes	no
2000 ^{a,b}	yes	yes	yes	yes	no
2001 ^{a,b,c,d}	yes	yes	yes	yes	no
2002 ^{a,b,c}	yes	yes	yes	yes	yes
2003 ^{a,b,c}	yes	yes	yes	yes	yes
2004 ^{a,b}	yes	yes	yes	yes	yes
2005 ^a	yes	no	yes	no	no
2006 ^a	yes	no	yes	no	no
2008 ^a	yes	no	yes	no	no
2009 ^{a,b}	yes	yes	yes	yes	no
2010 ^a	yes	no	yes	no	no
2011 ^a	yes	no	yes	no	no
2012 ^a	yes	no	yes	no	no
2013 ^{a,b}	yes	yes	yes	yes	no

^a All species of eider targeted.

^b General avian surveys targeted large waterfowl

^c Opportunistic eider sightings during geese surveys

^d Opportunistic eider sightings during loon surveys

Sabine's Gull - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^{a,b,d,e}	no	yes	no	yes	no
2000 ^{a,b,d,e}	yes	yes	no	yes	no
2001 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2002 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2003 ^{a,b,c,d,e}	yes	yes	yes	yes	yes
2004 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2008 ^{a,c,d,e}	yes	no	no	yes	yes
2009 ^{a,b,c,d,e}	yes	yes	no	yes	yes
2010 ^{c,e}	yes	no	no	yes	no
2011 ^{a,c,d,e}	yes	no	no	yes	no
2012 ^{a,c,d,e}	yes	no	no	yes	yes
2013 ^{a,b,c,d,e}	yes	yes	no	yes	yes

^a Gulls on nests targeted during swan surveys

^b General avian surveys targeted large waterfowl

^c Opportunistic gull nests recorded during loon surveys

^d Opportunistic gull nests recorded during goose surveys

^e Opportunistic gull nests recorded during eider surveys

Snow Goose - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^a	no	yes	no	yes	no
2000 ^a	no	yes	no	yes	no
2001 ^{a,b,c}	yes	yes	no	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,c}	yes	yes	no	yes	yes
2004 ^{a,b,c}	yes	yes	no	yes	yes
2008 ^{a,c}	yes	no	no	no	no
2009 ^{a,b}	yes	yes	no	yes	no
2013 ^{a,c,d}	no	yes	no	yes	no

^a General avian surveys targeted large waterfowl

^b Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^c Opportunistic geese sightings during loon surveys

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Spectacled Eider - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^{a,b}	yes	yes	yes	yes	no
2000 ^{a,b}	yes	yes	yes	yes	no
2001 ^{a,b,c,d}	yes	yes	yes	yes	no
2002 ^{a,b,c}	yes	yes	yes	yes	yes
2003 ^{a,b,c}	yes	yes	yes	yes	yes
2004 ^{a,b}	yes	yes	yes	no	no
2005 ^a	yes	no	yes	no	no
2006 ^a	yes	no	yes	no	no
2008 ^a	yes	no	yes	no	no
2009 ^{a,b}	yes	yes	yes	no	no
2010 ^a	yes	no	yes	no	no
2011 ^a	yes	no	yes	no	no
2012 ^a	yes	no	yes	no	no
2013 ^{a,b}	yes	no	yes	no	no

^a All species of eider targeted.

^b General avian surveys targeted large waterfowl

^c Opportunistic eider sightings during geese surveys

^d Opportunistic eider sightings during loon surveys

Tundra Swan - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^{a,b}	yes	yes	no	yes	yes
2000 ^{a,b}	yes	yes	no	yes	yes
2001 ^{a,b,c}	yes	yes	yes	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,c}	yes	yes	no	yes	yes
2004 ^{a,b,c}	yes	yes	no	yes	yes
2005 ^{a,c}	yes	no	no	yes	yes
2006 ^{a,c}	yes	no	no	yes	yes
2008 ^{a,c}	yes	no	no	yes	yes
2009 ^{a,b,c}	yes	yes	no	yes	yes
2011 ^{a,c}	yes	no	no	yes	yes
2012 ^{a,c}	yes	no	no	yes	yes
2013 ^{a,b,c}	yes	yes	no	yes	yes

^a Swans on nests targeted

^b General avian surveys targeted large waterfowl

^c Opportunistic swan sightings during loon surveys

Yellow-billed Loon - Development Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
1999 ^a	no	yes	no	yes	no
2000 ^a	yes	yes	no	yes	no
2001 ^{a,b,c}	yes	yes	no	yes	yes
2002 ^{a,b,c}	yes	yes	no	yes	yes
2003 ^{a,b,c}	yes	yes	no	yes	yes
2004 ^{a,b}	yes	yes	no	yes	yes
2005 ^b	yes	no	no	no	no
2006 ^b	yes	no	no	no	no
2008 ^b	yes	no	no	yes	yes
2009 ^{a,b}	yes	yes	no	yes	yes
2010 ^b	yes	no	no	yes	yes
2011 ^b	yes	no	no	yes	yes
2012 ^b	yes	no	no	yes	yes
2013 ^{a,b}	yes	yes	no	yes	yes

^a General avian surveys targeted large waterfowl

^b All loons targeted

^c Opportunistic loon sightings during geese surveys

FISH CREEK DELTA SUBAREA

Brant - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1992 ^a	yes	no	no	no	yes	no
1993 ^b	yes	no	no	yes	yes	yes
1998 ^b	yes	no	no	no	yes	yes
2001 ^b	yes	no	no	yes	no	no
2002 ^b	yes	no	no	yes	yes	no
2003 ^{b,c}	yes	no	no	yes	no	no
2004 ^d	yes	no	no	no	yes	yes
2005 ^b	yes	no	no	no	yes	no
2006 ^b	yes	no	no	no	yes	no
2007 ^b	yes	no	no	no	yes	no
2008 ^d	yes	no	no	no	yes	yes
2009 ^d	yes	no	no	no	yes	yes
2011 ^d	yes	no	no	no	yes	no
2012 ^d	yes	no	no	no	yes	no
2013 ^{c,d,e}	yes	no	no	no	yes	no

^a Opportunistic Brant sighting during swan survey

^b Targeted Brant surveys, all other geese species opportunistic

^c General avian surveys targeted large waterfowl

^d Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^e Targeted Greater White-fronted goose, all other geese species opportunistic

Canada Goose - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1993 ^a	yes	no	no	yes	yes	yes
1998 ^a	yes	no	no	no	yes	yes
2001 ^a	yes	no	no	yes	no	no
2002 ^a	yes	no	no	no	no	no
2003 ^{a,b}	yes	no	no	yes	no	no
2004 ^c	yes	no	no	no	yes	yes
2005 ^a	yes	no	no	no	no	no
2006 ^a	yes	no	no	no	no	no
2007 ^a	yes	no	no	no	no	no
2008 ^c	yes	no	no	no	no	yes
2009 ^c	yes	no	no	no	no	yes
2011 ^c	yes	no	no	no	yes	no
2012 ^c	yes	no	no	no	yes	no
2013 ^{b,c,d}	yes	no	no	no	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Glaucous Gull - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2002 ^{a,b}	yes	no	no	yes	no
2003 ^{a,b,c}	yes	no	no	yes	no
2004 ^{a,b,d}	yes	no	no	yes	no
2005 ^a	yes	no	no	yes	yes
2006 ^a	yes	no	no	yes	yes
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^{a,c}	yes	no	no	yes	yes

^a Opportunistic gull sightings during loon surveys

^b Opportunistic gull sightings during geese surveys

^c General avian surveys targeted large waterfowl

^d Opportunistic gull sightings during swan surveys

Greater White-fronted Goose - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1993 ^a	yes	no	no	yes	yes	yes
1998 ^a	yes	no	no	no	yes	yes
2001 ^a	yes	no	no	yes	no	no
2002 ^a	yes	no	no	no	no	no
2003 ^{a,b}	yes	no	no	yes	no	no
2004 ^c	yes	no	no	no	yes	yes
2005 ^a	yes	no	no	no	no	no
2006 ^a	yes	no	no	no	no	no
2007 ^a	yes	no	no	no	no	no
2008 ^c	yes	no	no	no	no	yes
2009 ^c	yes	no	no	no	no	yes
2011 ^c	yes	no	no	no	yes	no
2012 ^c	yes	no	no	no	yes	no
2013 ^{b,c,d}	yes	no	no	no	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Targeted Greater White-fronted goose, all other geese species opportunistic

King Eider - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2000 ^a	yes	no	yes	no	no
2002 ^a	yes	no	yes	no	no
2003 ^a	yes	no	yes	no	no
2004 ^a	yes	no	yes	no	no
2005 ^a	yes	no	yes	no	no
2006 ^a	yes	no	yes	no	no
2008 ^a	yes	no	yes	no	no
2009 ^a	yes	no	yes	no	no
2010 ^a	yes	no	yes	no	no
2011 ^a	yes	no	yes	no	no
2012 ^a	yes	no	yes	no	no
2013 ^a	yes	no	yes	no	no

^a All species of eider targeted.

Sabine's Gull - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2002 ^{a,b,d}	yes	no	no	yes	no
2003 ^{a,b,c,d}	yes	no	no	yes	no
2004 ^{a,d}	yes	no	no	yes	yes
2005 ^{b,d}	yes	no	no	yes	yes
2006 ^{b,d}	yes	no	no	yes	yes
2008 ^{b,d}	yes	no	no	yes	yes
2009 ^{c,d}	yes	no	no	yes	yes
2010 ^{b,d}	yes	no	no	yes	yes
2011 ^{b,d}	yes	no	no	yes	yes
2012 ^{b,d}	yes	no	no	yes	yes
2013 ^{b,d}	yes	no	no	yes	yes

^a Opportunistic gull sightings during loon surveys

^b Opportunistic gull sightings during geese surveys

^c General avian surveys targeted large waterfowl

^d Opportunistic gull sightings during swan surveys

Snow Goose - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1993 ^a	yes	no	no	yes	yes	yes
1998 ^a	yes	no	no	no	yes	yes
2001 ^a	yes	no	no	yes	no	no
2002 ^a	yes	no	no	no	no	no
2003 ^{a,b}	yes	no	no	yes	no	no
2004 ^c	yes	no	no	no	yes	yes
2005 ^a	yes	no	no	no	yes	no
2006 ^a	yes	no	no	no	yes	no
2007 ^a	yes	no	no	no	yes	no
2008 ^c	yes	no	no	no	yes	yes
2009 ^c	yes	no	no	no	yes	yes
2011 ^c	yes	no	no	no	yes	no
2012 ^c	yes	no	no	no	yes	no
2013 ^{b,c,d}	yes	no	no	no	yes	no

^a Targeted Brant surveys, all other geese species opportunistic

^b General avian surveys targeted large waterfowl

^c Targeted Brant and Snow Goose surveys, all other geese species opportunistic

^d Targeted Greater White-fronted goose, all other geese species opportunistic

Spectacled Eider - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2000 ^a	yes	no	yes	no	no
2002 ^a	yes	no	yes	no	no
2003 ^a	yes	no	yes	no	no
2004 ^a	yes	no	yes	no	no
2005 ^a	yes	no	yes	no	no
2006 ^a	yes	no	yes	no	no
2008 ^a	yes	no	yes	no	no
2009 ^a	yes	no	yes	no	no
2010 ^a	yes	no	yes	no	no
2011 ^a	yes	no	yes	no	no
2012 ^a	yes	no	yes	no	no
2013 ^a	yes	no	yes	no	no

^a All species of eider targeted.

Tundra Swan - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose			
	Aerial	Ground	Prenest	Nest	Brood	Staging
1992 ^a	yes	no	no	yes	yes	no
1993 ^a	yes	no	no	no	no	yes
1998 ^a	yes	no	no	no	no	yes
2000 ^a	yes	no	no	no	no	yes
2001 ^{a,b}	yes	no	no	yes	yes	no
2002 ^{a,c}	yes	no	no	no	yes	no
2003 ^{a,b}	yes	no	no	yes	yes	no
2004 ^a	yes	no	no	yes	yes	no
2005 ^{a,c}	yes	no	no	yes	yes	no
2006 ^{a,c}	yes	no	no	yes	yes	no
2008 ^{a,c}	yes	no	no	yes	yes	no
2009 ^{a,c}	yes	no	no	yes	yes	no
2011 ^{a,c}	yes	no	no	yes	yes	no
2012 ^{a,c}	yes	no	no	yes	yes	no
2013 ^{a,c}	yes	no	no	yes	yes	no

^a Swans on nests targeted

^b Opportunistic swan sightings during Brant surveys

^c Opportunistic swan sightings during loon surveys

Yellow-billed Loon - Fish Creek Delta Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2001 ^a	yes	no	no	yes	no
2002 ^a	yes	no	no	yes	no
2003 ^a	yes	no	no	yes	no
2004 ^a	yes	no	no	yes	no
2005 ^a	yes	no	no	yes	yes
2006 ^a	yes	no	no	yes	yes
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^a	yes	no	no	yes	yes

^a All loons targeted

FISH-JUDY CREEK CORRIDOR SUBAREA

Glauous Gull - Fish-Judy Creek Corridor Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^a	yes	no	no	yes	yes

^a Opportunistic gull sightings during loon surveys

Sabine's Gull - Fish-Judy Creek Corridor Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^a	yes	no	no	yes	yes

^a Opportunistic gull sightings during loon surveys

Yellow-Billed Loon - Fish-Judy Creek Corridor Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^a	yes	no	no	yes	yes

^a All loons targeted

Tundra Swan - Fish-Judy Creek Corridor Subarea

Year	Survey Type		Survey Purpose		
	Aerial	Ground	Prenest	Nest	Brood
2008 ^a	yes	no	no	yes	yes
2009 ^a	yes	no	no	yes	yes
2010 ^a	yes	no	no	yes	yes
2011 ^a	yes	no	no	yes	yes
2012 ^a	yes	no	no	yes	yes
2013 ^a	yes	no	no	yes	yes

^aSwans on nests targeted