



FINAL

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

Volume 2: Chapter 7
Maps

October 2014

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

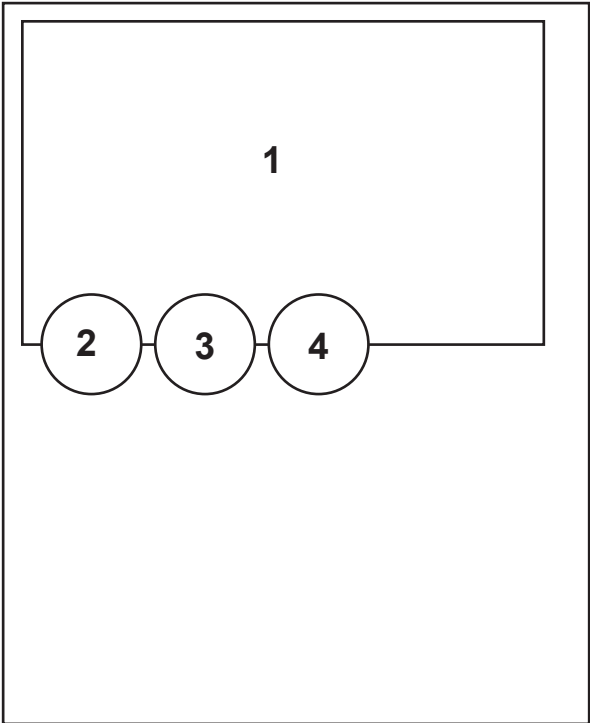
Our Vision

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**



1

2

3

4

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.
- © ConocoPhillips.

Alpine Satellite Development Plan GMT1 Development Project

Final

Supplemental Environmental Impact Statement

Volume 2: Chapter 7 Maps

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. DOI Fish and Wildlife Service
U.S. DOI Bureau of Ocean Energy Management
State of Alaska
Native Village of Nuiqsut
North Slope Borough

October 2014

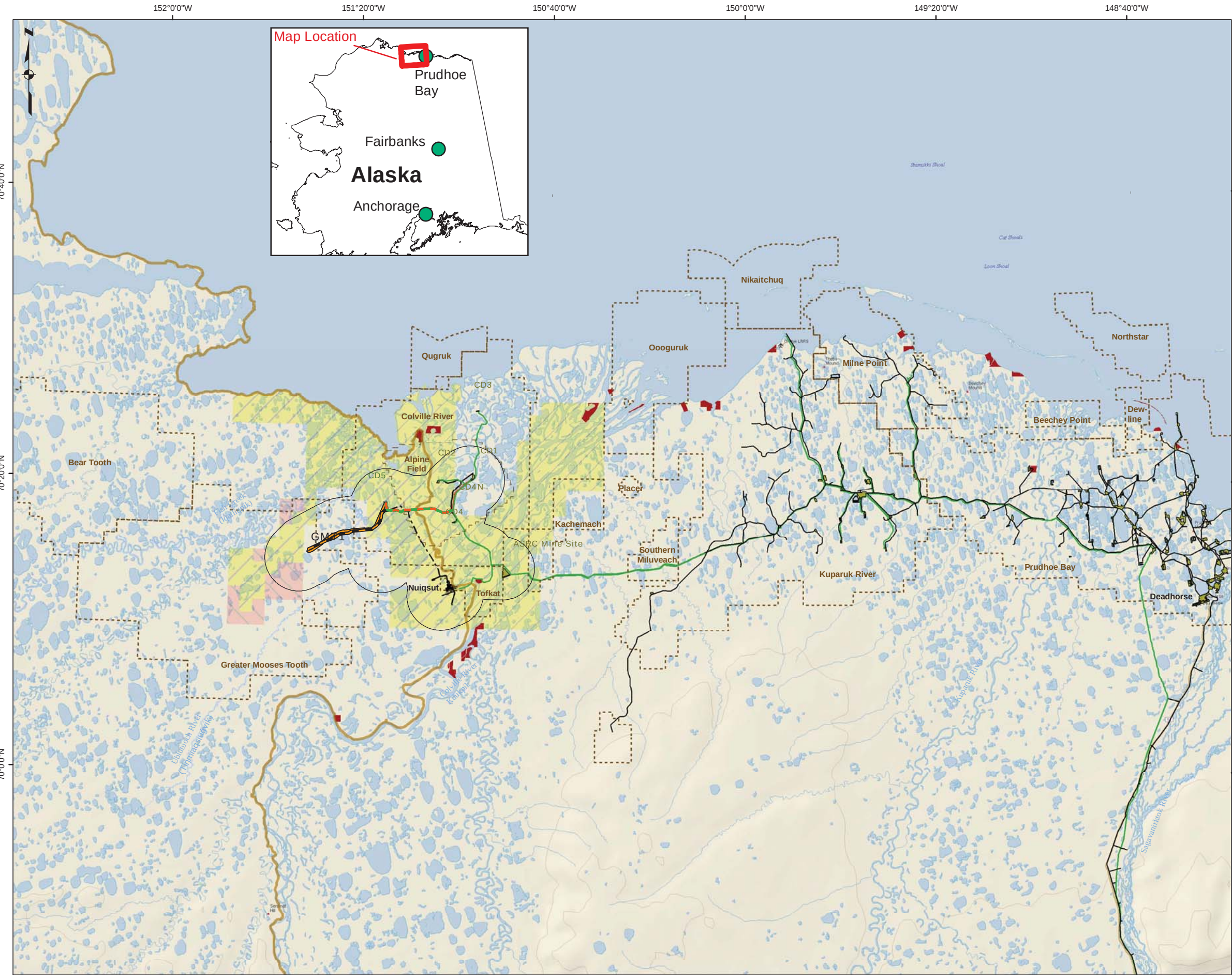
Contents of Volume 2

CHAPTER 7: MAPS

This chapter includes maps referenced throughout this document that are sized to 11x17-inch paper.

Map 1.1-1.	Greater Mooses Tooth and CPAI Proposed Project
Map 2.5-1.	Vicinity of CPAI Proposed Project
Map 2.5-2.	Alternative A: CPAI Proposed Project Layout
Map 2.5-3.	Fish Creek and Tinmiaqsigvik (Ublutuoch) River Setback Areas
Map 2.5-4.	Alternative A: CPAI Proposed Project Ice Roads
Map 2.5-5.	Historic Flights in the Eastern NPR-A, 2008-2013
Map 2.6-1.	Alternative B Layout
Map 2.6-2.	Alternative B Ice Roads
Map 2.7-1.	Alternative C Layout
Map 2.7-2.	Alternative C Nuiqsut Airport Facilities
Map 2.7-3.	Alternative C Ice Roads
Map 2.8-1.	Alternatives D1 and D2 Layout
Map 2.8-2.	Alternatives D1 and D2 Ice Roads
Map 2.10-1.	Alternative E: No Action
Map 3.1-1.	Project Study Area
Map 3.2-1.	Geomorphology
Map 3.2-2.	Drainage Basins
Map 3.2-3.	Surface Water Bodies
Map 3.3-1.	Potential and Known Fish Overwintering Habitat
Map 3.3-2.	Vegetation
Map 3.3-3.	Anadromous Waters and Essential Fish Habitat
Map 3.3-4.	Fish Species Distribution
Map 3.3-5.	Avian Study Areas
Map 3.3-6.	Wildlife Habitat
Map 3.3-7.	2012 Avian Survey
Map 3.3-8.	Ranges of the Teshekpuk and Central Arctic Caribou Herds, GPS and Aerial
Map 3.3-9.	Ranges of the Teshekpuk and Central Arctic Caribou Herds, Satellite and GPS
Map 3.3-10.	Nuiqsut Travel Routes
Map 3.3-11.	Visual and Noise Impact Analysis Areas
Map 3.3-12.	Caribou Summer Areas
Map 3.3-13.	Caribou Calving Areas
Map 3.3-14.	Polar Bear Habitat
Map 3.4-1.	Nuiqsut Contemporary Subsistence Use Areas, All Resources
Map 3.4-2.	Nuiqsut Caribou Subsistence Use Areas, 2008-2011
Map 3.4-3.	Nuiqsut Historic and Lifetime Subsistence Use Areas, All Resources
Map 4.2-1.	Water Resources Near the GMT1 Pad
Map 4.2-2.	Alternatives A and C Potential Inundation Analysis
Map 4.2-3.	Alternative B Potential Inundation Analysis
Map 4.2-4.	Alternatives D1 and D2 Potential Inundation Analysis

Map 4.2-5.	Road and Pipeline Crossings: Tiṇmiaqsigvik (Ublutuocho) River, Barely Creek, and Crea Creek
Map 4.2-6.	Tiṇmiaqsigvik (Ublutuocho) River Crossing
Map 4.2-7.	Crea Creek and Barely Creek Drainage Basins
Map 4.3-1.	Yellow-billed Loon Estimated Relative Onshore Density within the Arctic Coastal Plain, 1993-2010
Map 4.3-2.	Yellow-billed Loon Estimated Relative Onshore Density within the Project Study Area, 1993-2010
Map 4.3-3.	Teshekpuk Caribou Herd Females: Fall Migration Movements Relative to Potential New Infrastructure
Map 4.3-4.	Teshekpuk Caribou Herd Males: Fall Migration Movements Relative to Potential New Infrastructure
Map 4.4-1.	Caribou Subsistence Use Areas in the Project Study Area, 1995-2006
Map 4.4-2.	Caribou Subsistence Use Areas in the Project Study Area, 2008-2011
Map 4.4-3.	Geese Subsistence Use Areas in the Project Study Area, 1995-2006
Map 4.4-4.	Wolf and Wolverine Subsistence Use Areas in the Project Study Area, 1995-2006
Map 4.4-5.	Arctic Cisco Subsistence Use Areas in the Project Study Area, 1995-2006
Map 4.4-6.	Burbot Subsistence Use Areas in the Project Study Area, 1995-2006
Map 4.6-1.	Oil and Gas Infrastructure
Map 4.6-2.	Oil and Gas Exploratory Wells and NPR-A Special Areas



Map 2.5-1

GMT1 Project Vicinity

DSEIS Proposed Infrastructure	Proposed or Permitted (not part of GMT1)
Road	Pipeline
Pipeline	Road
Facility	Facility
14 inch Water ¹ Injection Line	Existing
Bridge	Pipeline
	Road
Boundary	Facility
Project Study Area	Surface Land Ownership
Oil & Gas Unit	Kuupik Lands
NPR-A	Conveyed
	Selected
	Native Allotments
	Private

Footnote:
1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).
2: Background layer is from Delorme World Imagery 2013.

Date: 10/20/2014

0 2 4 8 12 Miles

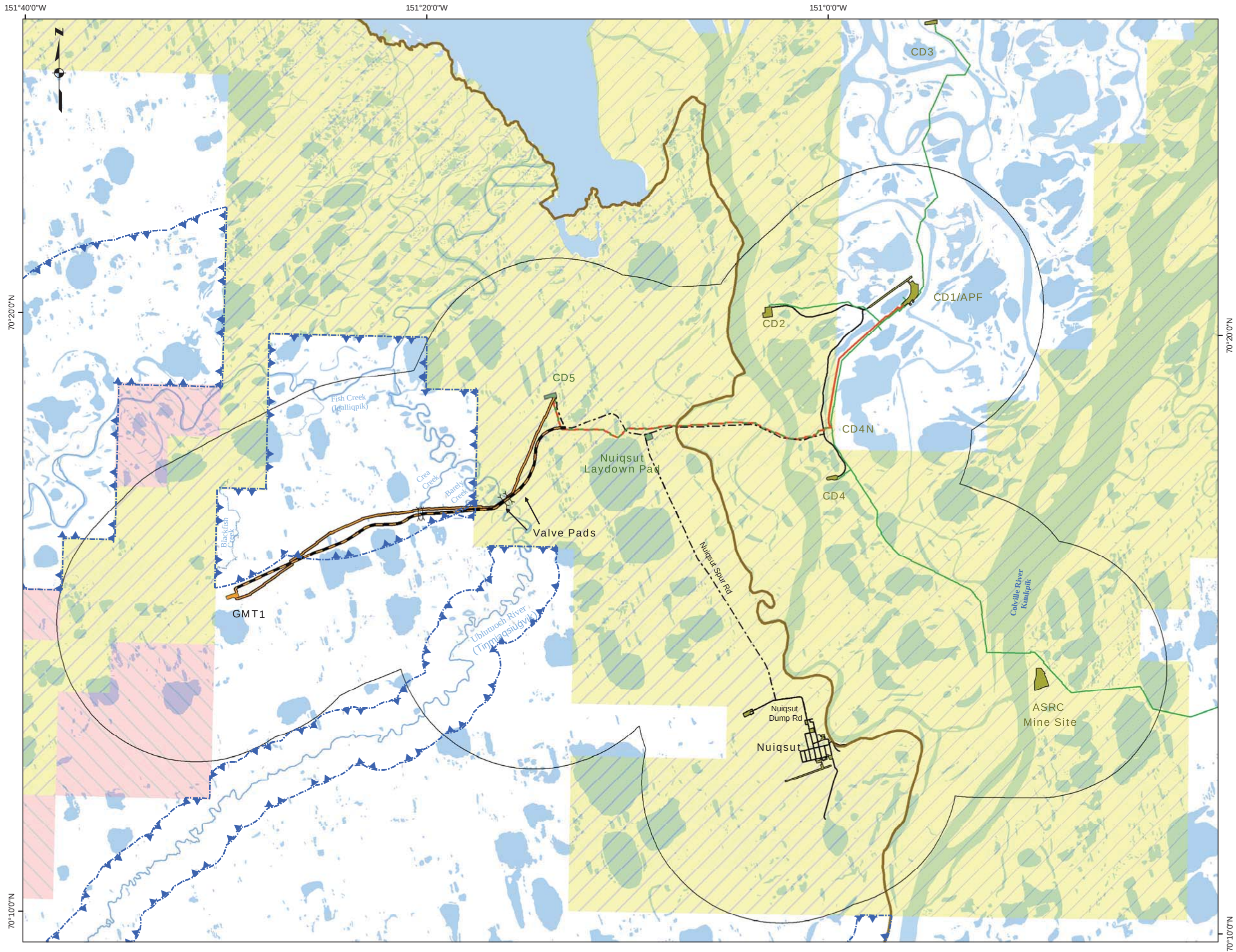
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 2.5-2

Alternative A: CPAI
Proposed Project Layout

- | | |
|---|---|
| Alternative A Infrastructure | Proposed or Permitted (not part of GMT1) |
| Road | Pipeline |
| Pipeline | Road |
| Facility | Facility |
| 14 inch Water ¹ Injection Line | Existing |
| Bridge | Pipeline |
| Boundaries | Road |
| NPR-A | Facility |
| Project Study Area | Surface Land Ownership |
| Setback Areas | Kuukpik Lands |
| Fish Creek 3mi | Conveyed |
| Ublutuooh River 0.5mi | Selected |

Footnote:
1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 9/26/2014



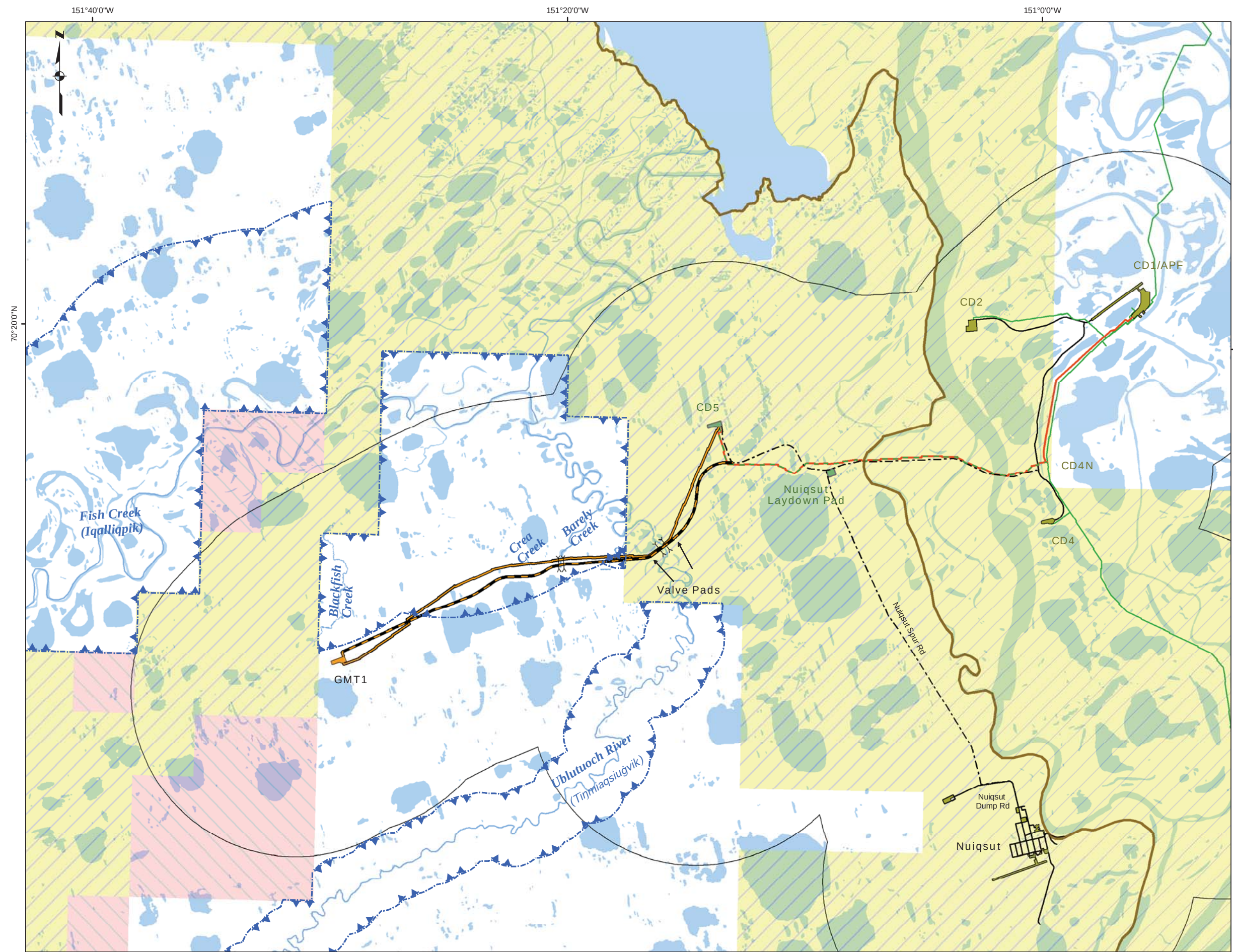
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Map 2.5-3

Fish Creek and Tinmiaqsigvik (Ublutuoch) River Setback Areas

- | | |
|---|--|
| <p>Alternative A Infrastructure</p> <ul style="list-style-type: none"> Road Pipeline Facility 14 inch Water¹ Injection Line Bridge | <p>Proposed or Permitted (not part of GMT1)</p> <ul style="list-style-type: none"> Pipeline Road Facility <p>Existing</p> <ul style="list-style-type: none"> Pipeline Road Facility <p>Boundaries</p> <ul style="list-style-type: none"> NPR-A Project Study Area <p>Setback Areas</p> <ul style="list-style-type: none"> Fish Creek 3mi Ublutuoch River 0.5mi |
|---|--|
- Surface Land Ownership**
- Kuukpik Lands
 - Conveyed
 - Selected

Footnote:
 1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).
 2: Background layer is from Delorme World Imagery 2013

Date: 10/21/2014



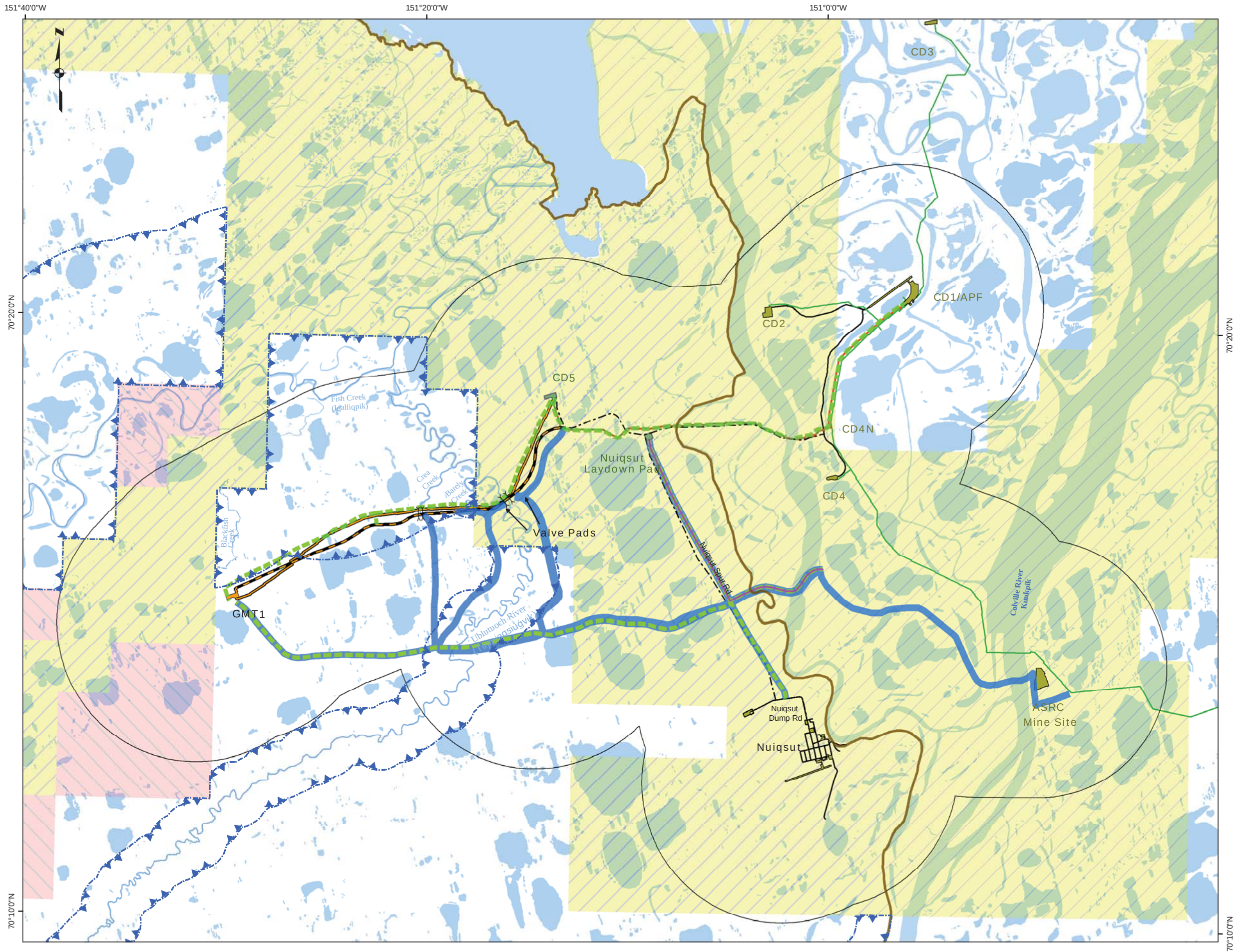
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Map 2.5-4

Alternative A:
CPAI Proposed
Project Ice Roads

Alternative A Infrastructure

Road

Pipeline

Facility

14 inch Water¹ Injection Line

Bridge

Proposed or Permitted
(not part of GMT1)

Pipeline

Road

Facility

Alternative A Ice Roads

First Year

Second Year

Annual resupply Route

Existing

Pipeline

Road

Facility

Surface Land Ownership

Kuukpik Lands

Conveyed

Selected

Boundaries

NPR-A

Project Study Area

Setback Areas

Fish Creek 3mi

Ublutuoch River 0.5mi

Footnote:

1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 10/20/2014

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Miles

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Map 2.5-5
Historic Flights in the Eastern
NPR-A, 2008-2013

Legend

- Aircraft Take-offs and Landings
- Village
- Analysis Area
- NPRA

Year	Number of Flights
2008	1202
2009	1120
2010	1487
2011	1933
2012	777
2013	1758
Total	8277

Source: BLM 2013b

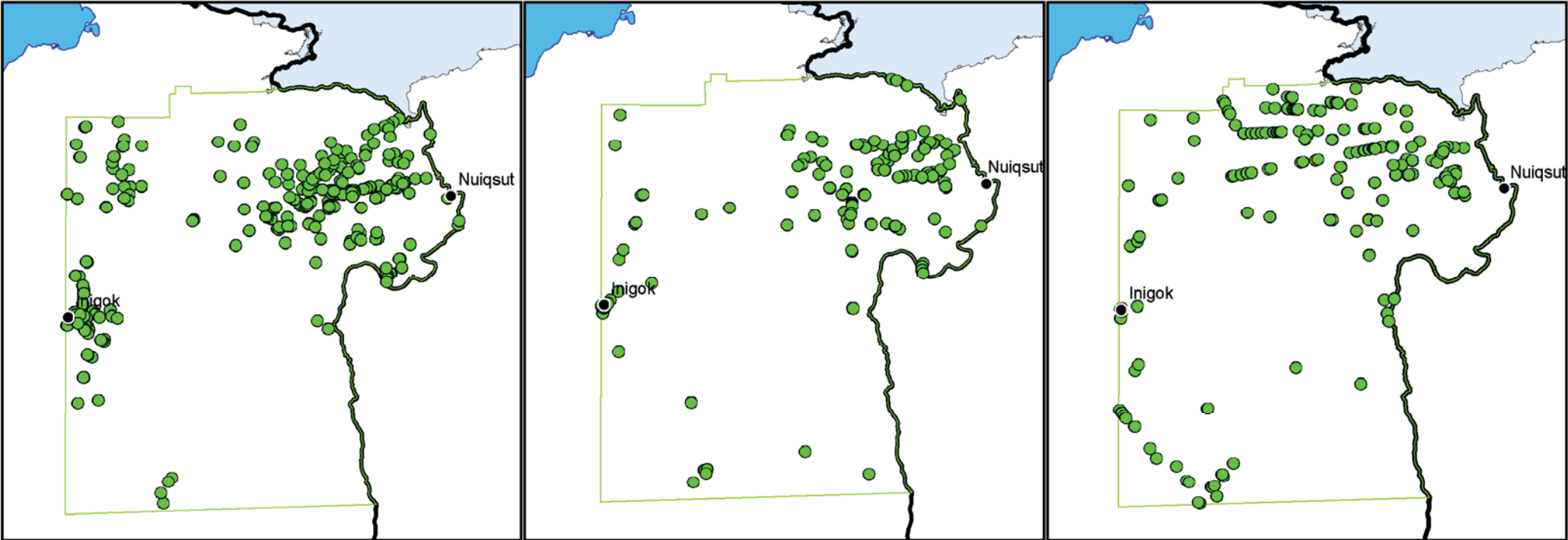
Date: 10/21/2014

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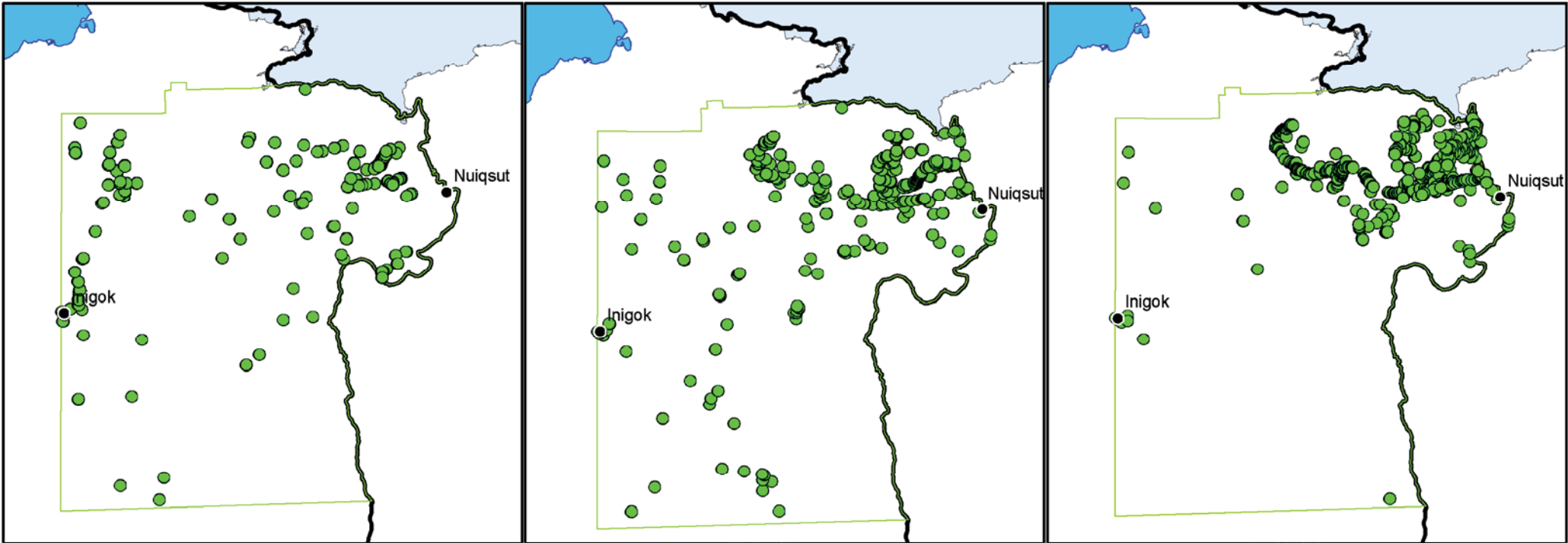


2008

2009

2010

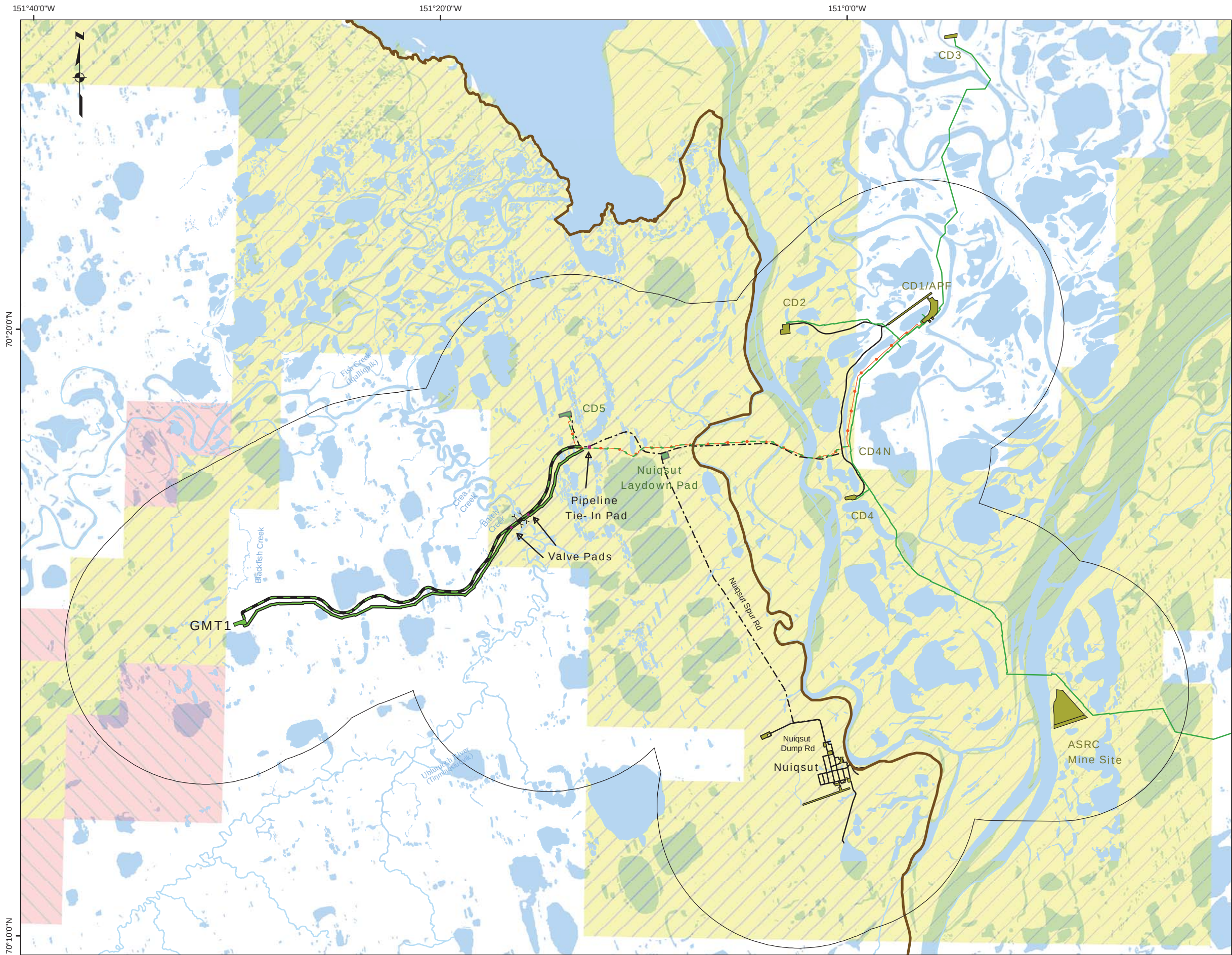
Analysis Area Aircraft Take-offs and Landings



2011

2012

2013



Map 2.6-1

Alternative B Layout

Alternative B Infrastructure

Road

Pipeline

Facility

14 inch Water¹ Injection Line

Bridge

Proposed or Permitted (not part of GMT1)

Road

Facility

Existing

Pipeline

Road

Facility

Boundary

Project Study Area

NPR-A

Surface Land Ownership

Kuukpiik Lands

Conveyed

Selected

Footnote:

1:14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 9/28/2014

00.5123

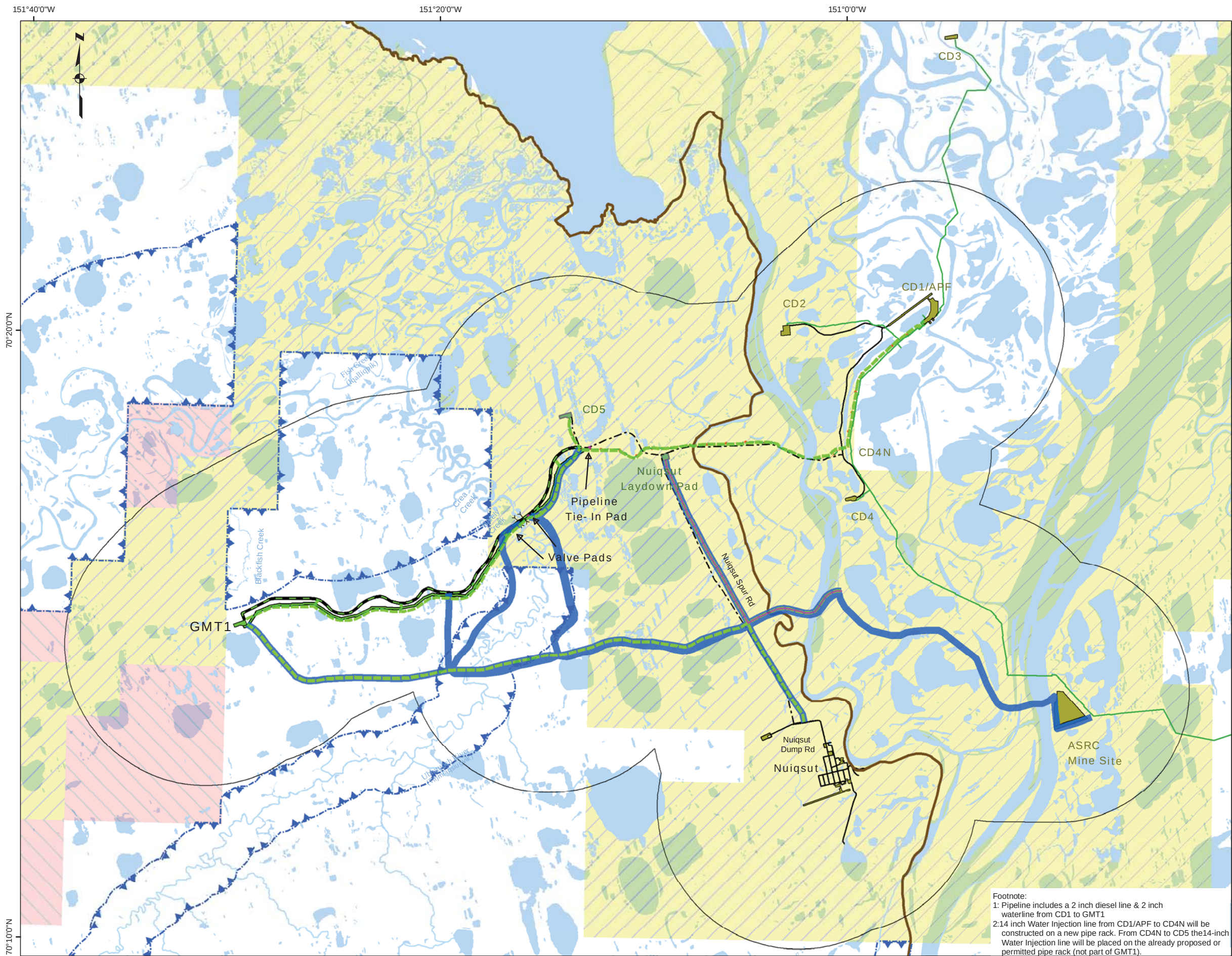
Miles

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Map 2.6-2

Alternative B Ice Roads

Alternative B Infrastructure

Road

Pipeline

Facility

14 inch Water² Injection Line

Bridge

Proposed or Permitted (not part of GMT1)

Road

Facility

Existing

Pipeline

Road

Facility

Boundary

Project Study Area

NPR-A

Surface Land Ownership

Kuukpik Lands

Conveyed

Selected

Alternative B Ice Roads

First Year

Second Year

Annual resupply Route

Setback Area

Fish Creek 3 mi

Ublutuoch River 0.5 mi

Date: 9/27/2014

0 0.5 1 2 3 Miles

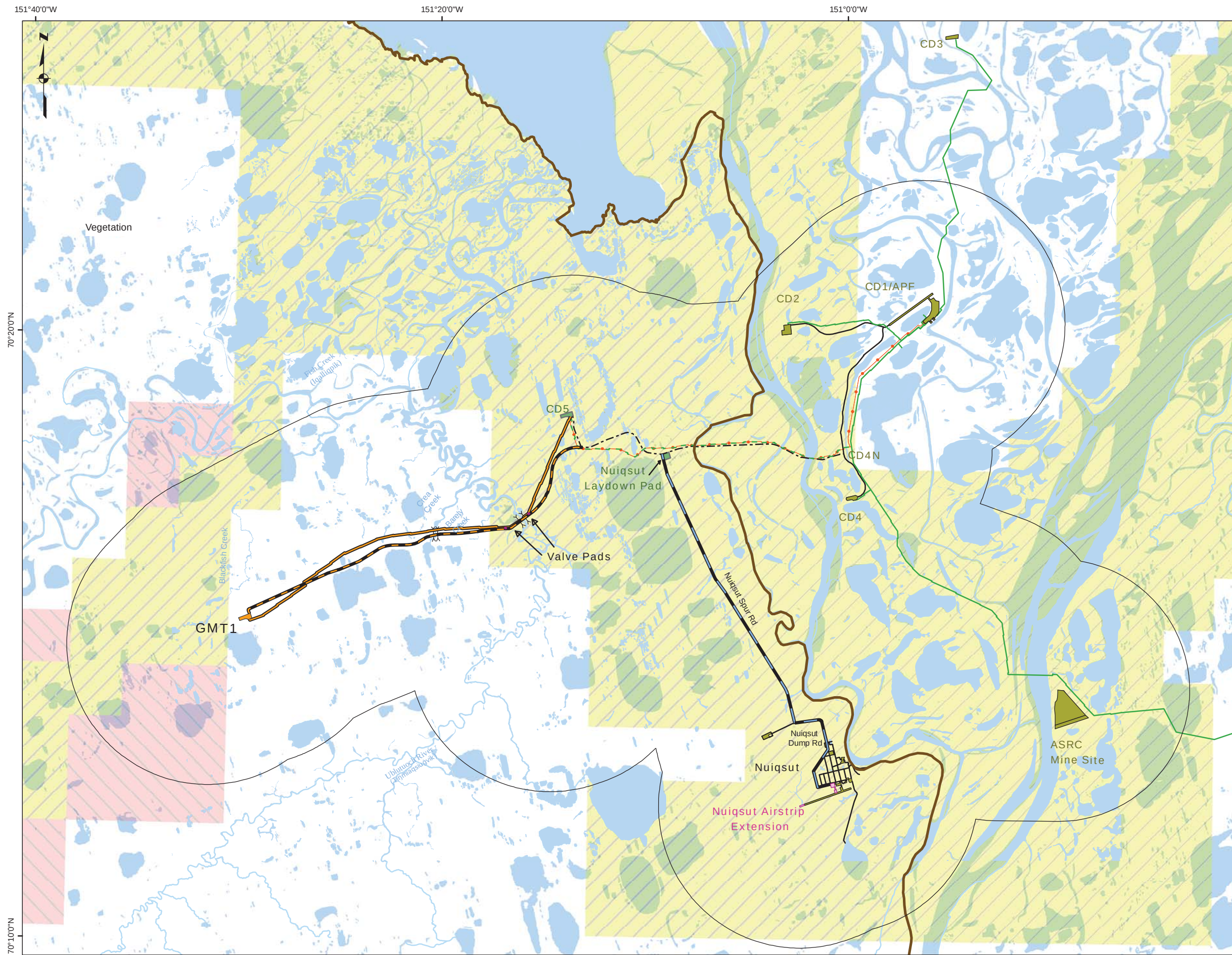
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Map 2.7-1

Alternative C Layout

Alternative C Infrastructure		Proposed or Permitted (not part of GMT1)	
Road	Pipeline	Road	Facility
Facility	Nuiqsut Road	Existing Pipeline	Existing Road
Nuiqsut Airport Upgrade Facilities	14 inch Water ¹ Injection Line	Existing Facility	Surface Land Ownership Kuukpik Lands
Bridge	Boundary	Conveyed	Selected
	Project Study Area		
	NPR-A		

Footnote:
1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).
2: Nuiqsut Laydown Pad is a 10 acre gravel storage pad.

Date: 9/27/2014

0 0.5 1 2 3 Miles

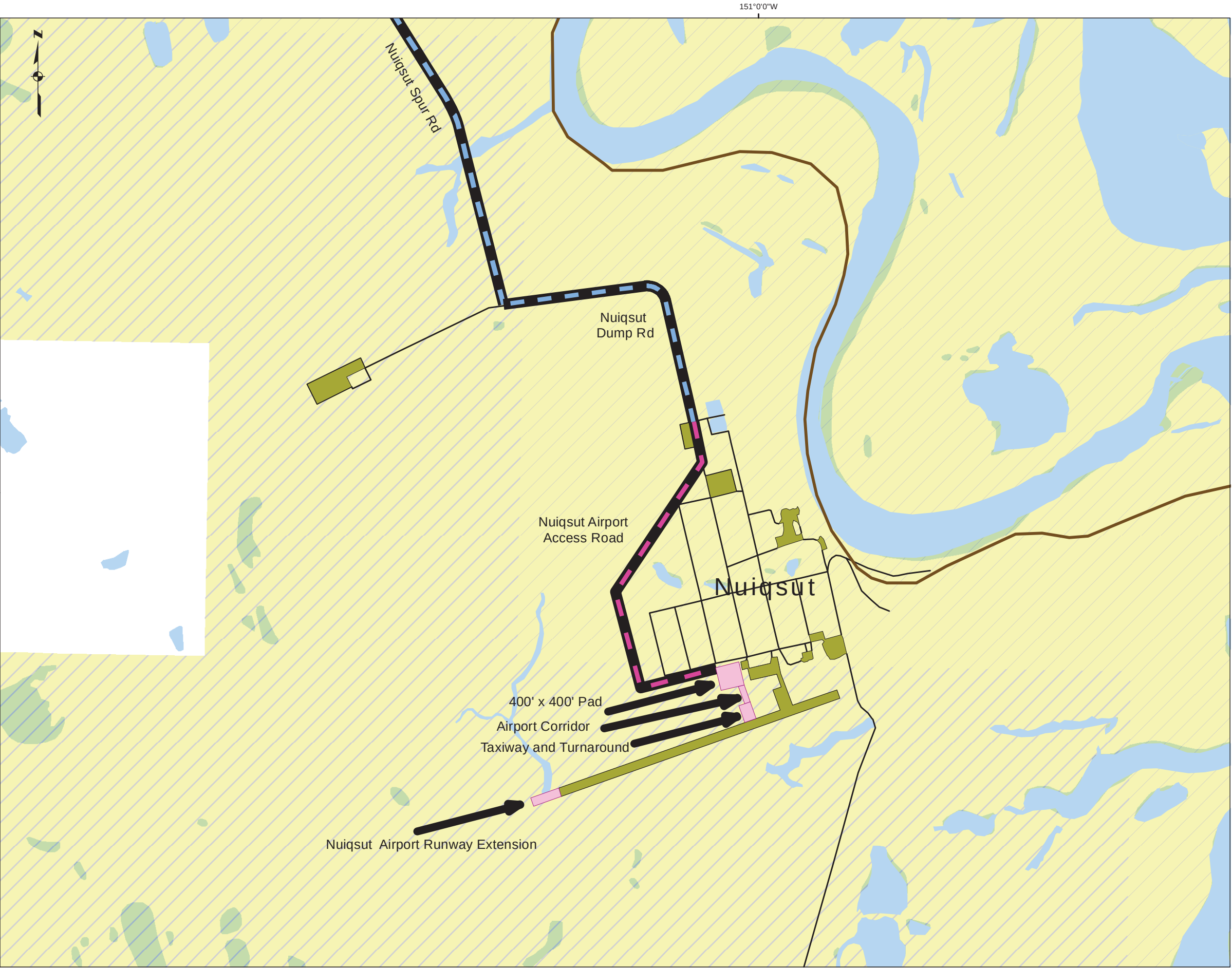
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Map 2.7-2

Alternative C

Nuiqsut Airport Facilities

Alternative C Proposed
Nuiqsut Infrastructure

Nuiqsut Dump and
Spur Road Upgrade

Nuiqsut Airport
Access Road (new)

Nuiqsut Airport
Upgrade Facilities

Existing

Road

Facility

Surface Land
Ownership

Kuukpik Lands

Conveyed

Date: 9/26/2014

0 0.050.1 0.2 0.3 0.4 0.5 Miles

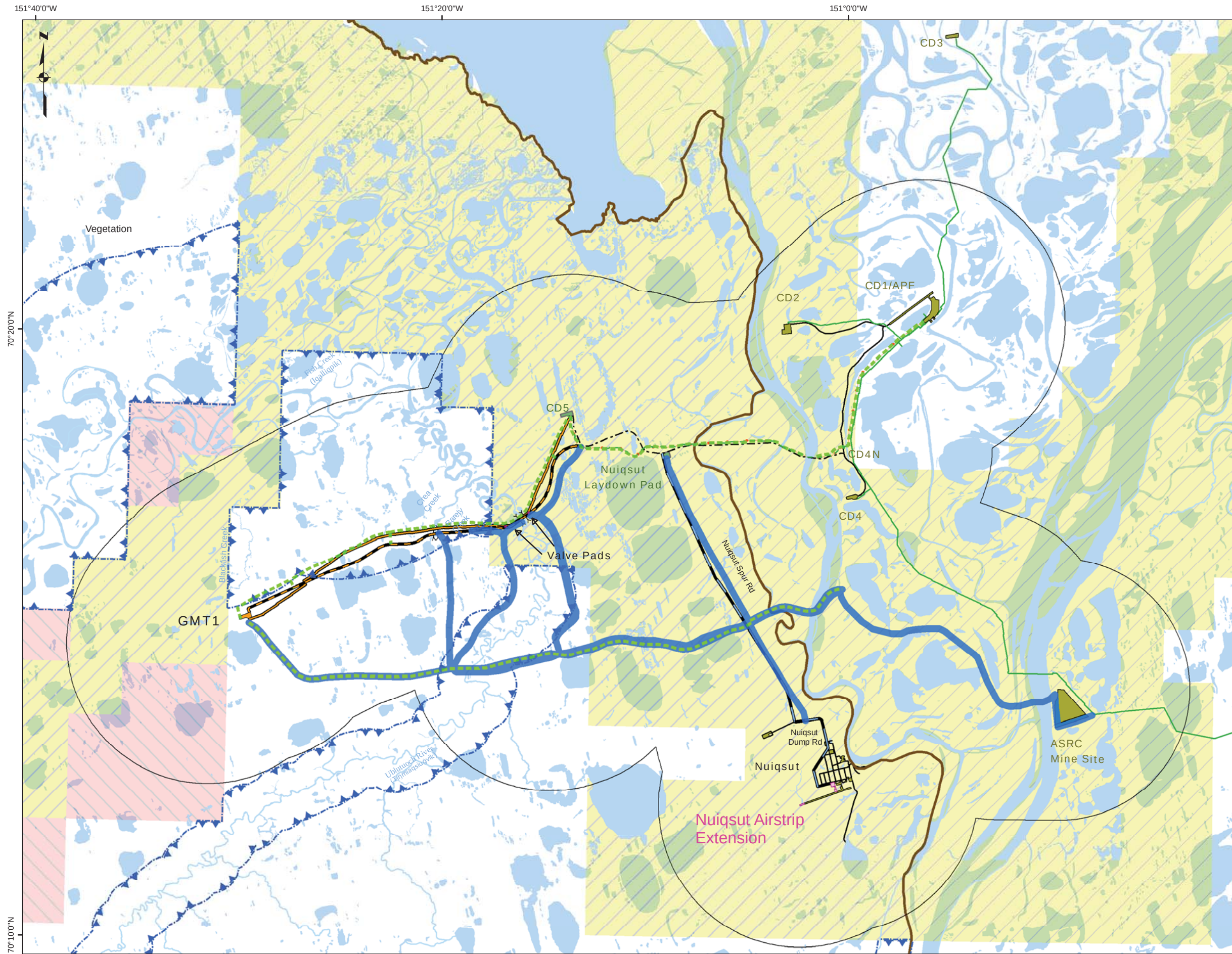
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Map 2.7-3
Alternative C Ice Roads

- | | |
|---|---|
| Alternative C Infrastructure | Proposed or Permitted (not part of GMT1) |
| Road | Road |
| Pipeline | Facility |
| Facility | Existing |
| Nuiqsut Road | Pipeline |
| Nuiqsut Airport Upgrade Facilities | Road |
| 14 inch Water ¹ Injection Line | Facility |
| Bridge | Surface Land Ownership |
| | Kuukpiik Lands |
| | Conveyed |
| | Selected |

- Boundary**
- Project Study
 - NPR-A
- Year One Proposed Ice Road**
- Year Two Proposed Ice Road**

- Setback Area**
- Fish Creek 3 mi
 - Ublutuooh River 0.5 mi

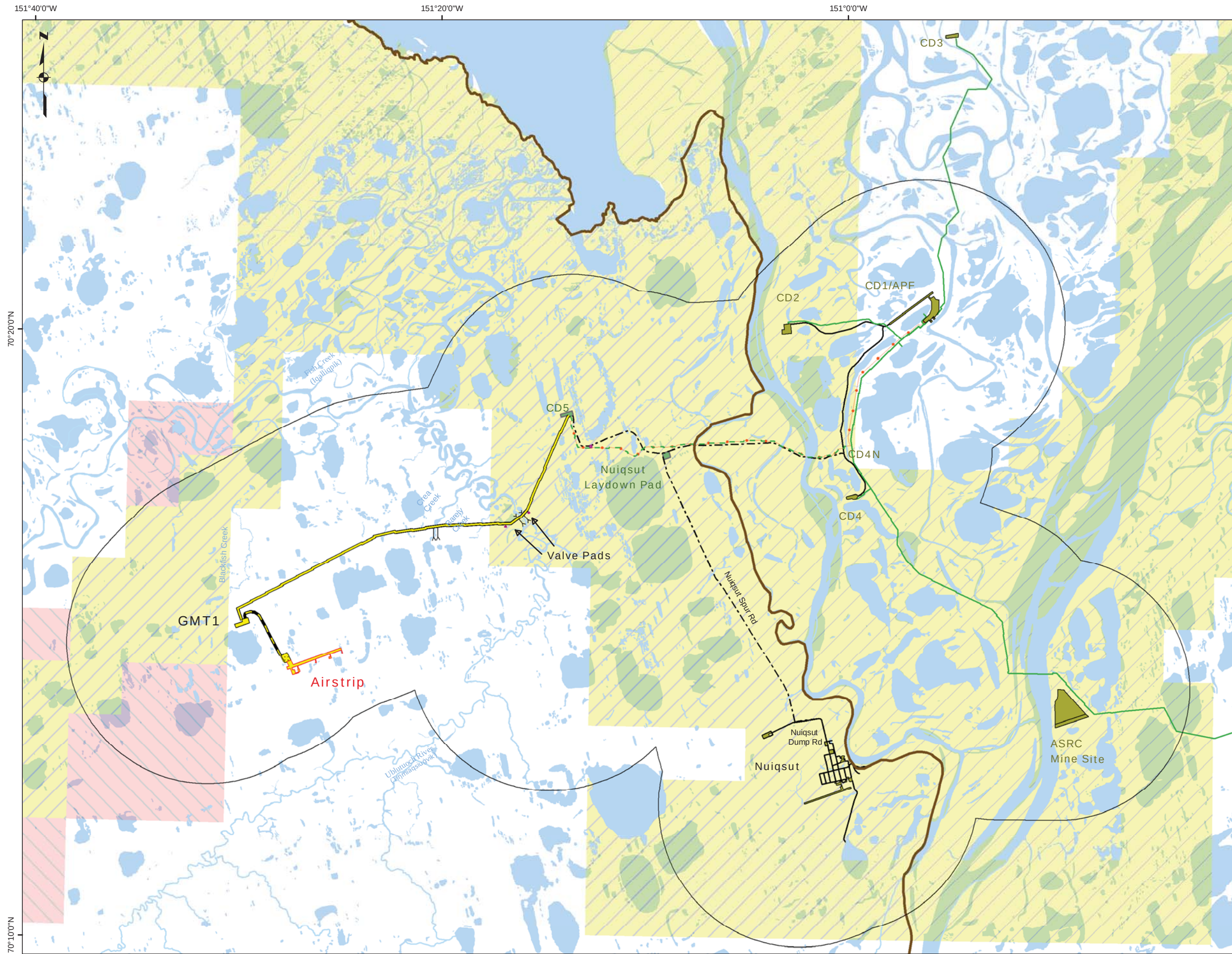
Footnote:
1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).
2: Nuiqsut Laydown Pad is a 10 acre gravel storage pad.

Date: 10/20/2014

0 0.5 1 2 3 Miles

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Map 2.8-1

Alternative D1 and D2 Layout

- | | |
|---|---|
| Alternative D1/D2 Infrastructure | Proposed or Permitted (not part of GMT1) |
| Road | Road |
| Pipeline | Facility |
| Facility | Existing |
| Airstrip | Pipeline |
| Airstrip Occupied Pad common to D1 and D 2 | Road |
| Airstrip additional Occupied Pad-for D1 | Facility |
| 14 inch Water ^{1,2} Injection Line | Surface Land Ownership |
| Bridge | Kuukpik Lands |
| Boundary | Conveyed |
| Project Study Area | Selected |
| NPR-A | |

Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 9/27/2014
0 0.5 1 2 3 Miles

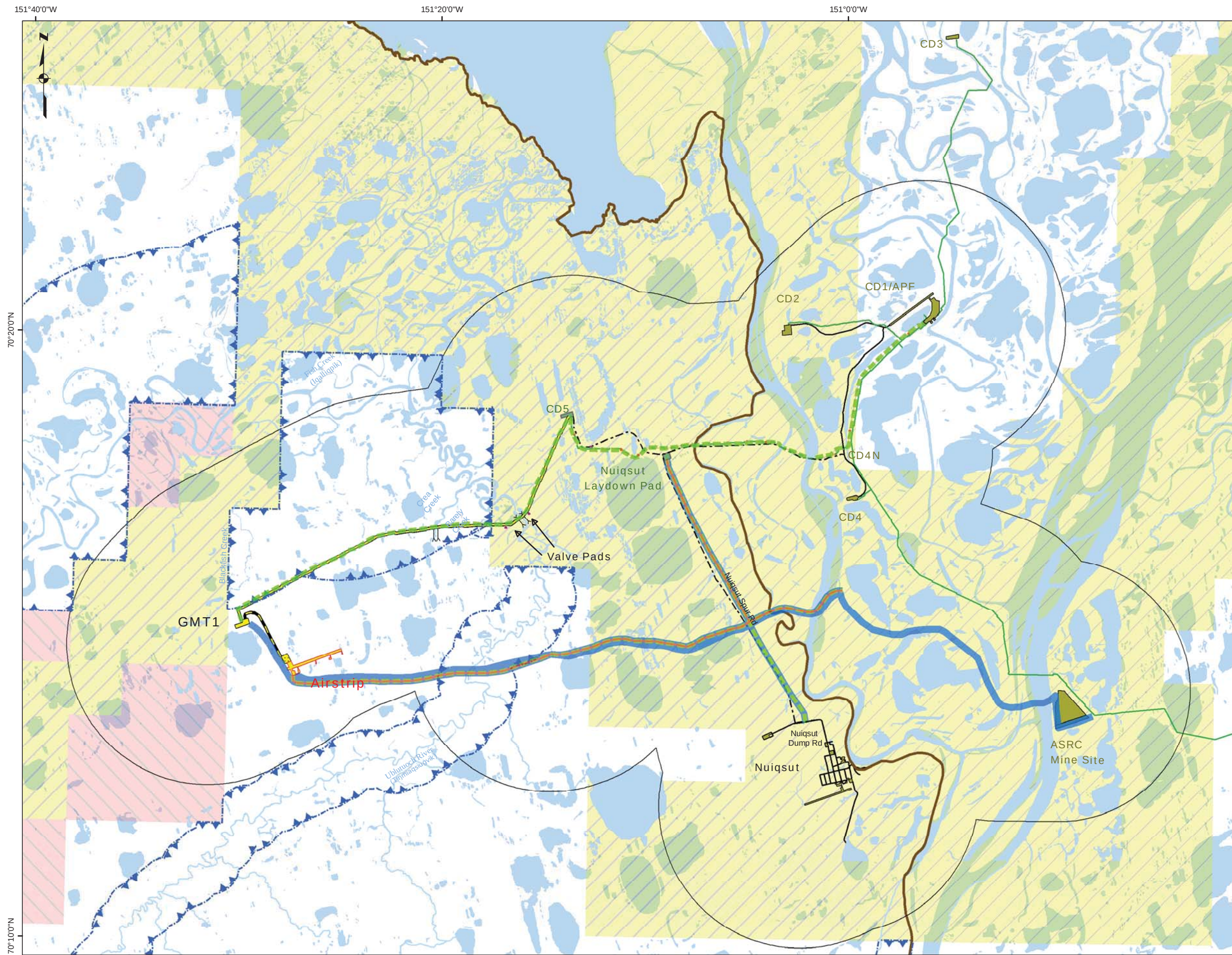
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Map 2.8-2
Alternative D1 and D2
Ice Roads

Alternative D1/D2 Infrastructure	Proposed or Permitted (not part of GMT1)
Road	Road
Pipeline	Facility
Facility	Existing
Airstrip	Pipeline
Airstrip Occupied Pad common to D1 and D 2	Road
AirStrip additional Occupied Pad-for D1	Facility
14 inch Water ^{1,2} Injection Line	Surface Land Ownership Kuukpiik Lands
	Conveyed
	Selected

Ice Roads

- First Year
- Second Year
- Annual Resupply Road

Boundary

- Project Study Area
- NPR-A

Setback Area

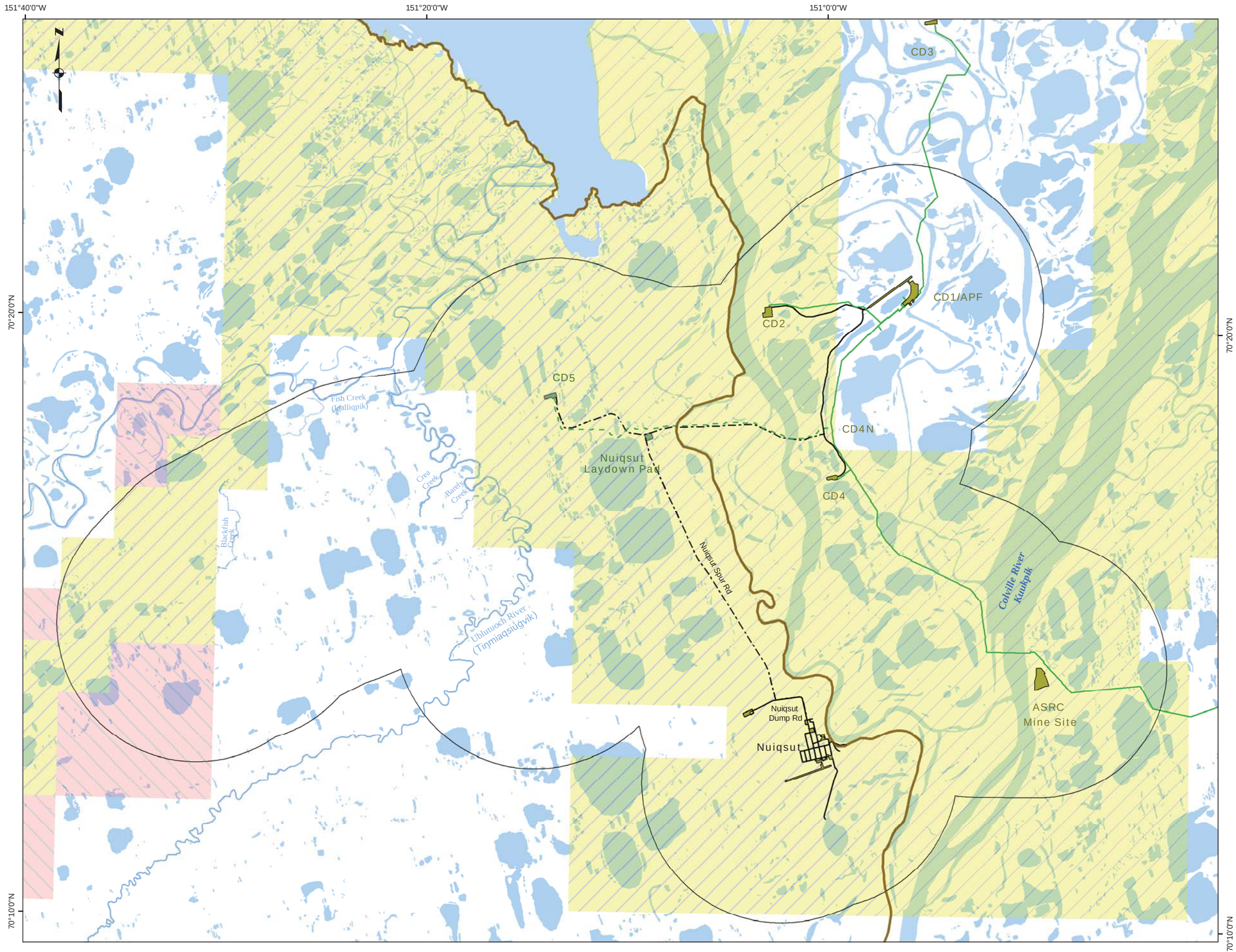
- Fish Creek 3 mi
- Ublutuch River 0.5 mi

Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 9/27/2014
0 0.5 1 2 3 Miles

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Map 2.10-1

Alternative E:
No Action

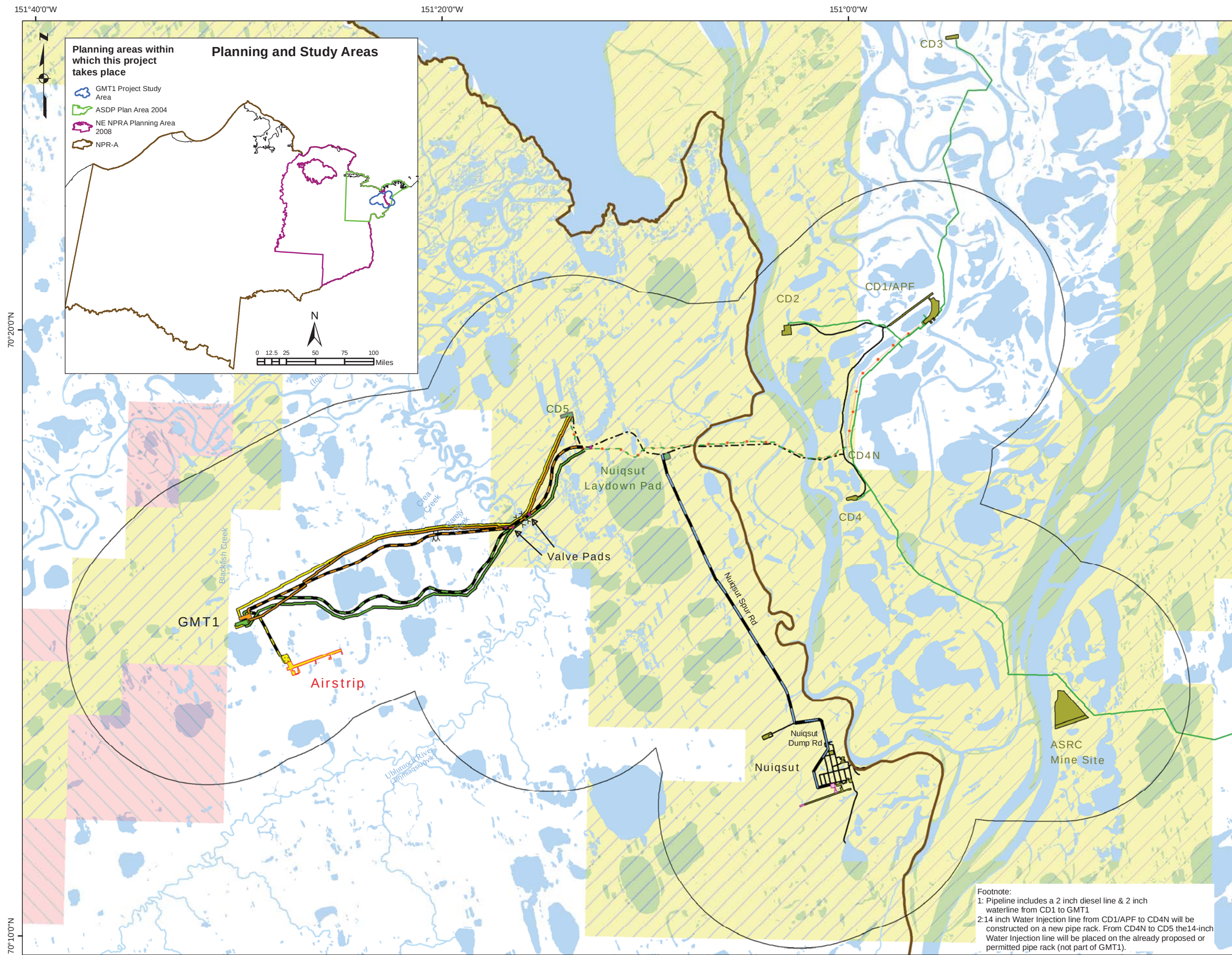
- Proposed or Permitted
(not part of GMT1)
- Pipeline
 - Road
 - Facility
- Existing
- Pipeline
 - Road
 - Facility
- Boundaries
- NPR-A
 - Project Study Area
- Surface Land Ownership
Kuukpik Lands
- Conveyed
 - Selected

Date: 10/21/2014

0 0.5 1 2 3 Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



Map 3.1-1

Project Study Area

Alternative A Infrastructure	Alternative B Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
14 inch Water ² Injection Line	14 inch Water ² Injection Line
Bridge	Bridge
Alternative C Infrastructure	Alternative D1/D2 Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
Nuiqsut Road	AirStrip
Nuiqsut Airport Upgrade Facilities	AirStrip Occupied Pad common to D1 and D 2
14 inch Water ² Injection Line	AirStrip additional Occupied Pad-for D1
Bridge	14 inch Water ^{1,2} Injection Line
Boundary	Bridge
Project Study Area	Proposed or Permitted (not part of GMT1)
NPR-A	Road
Surface Land Ownership Kuukpik Lands	Facility
Conveyed	Existing
Selected	Pipeline
	Road
	Facility

Date: 9/29/2014

0 0.5 1 2 3 Miles

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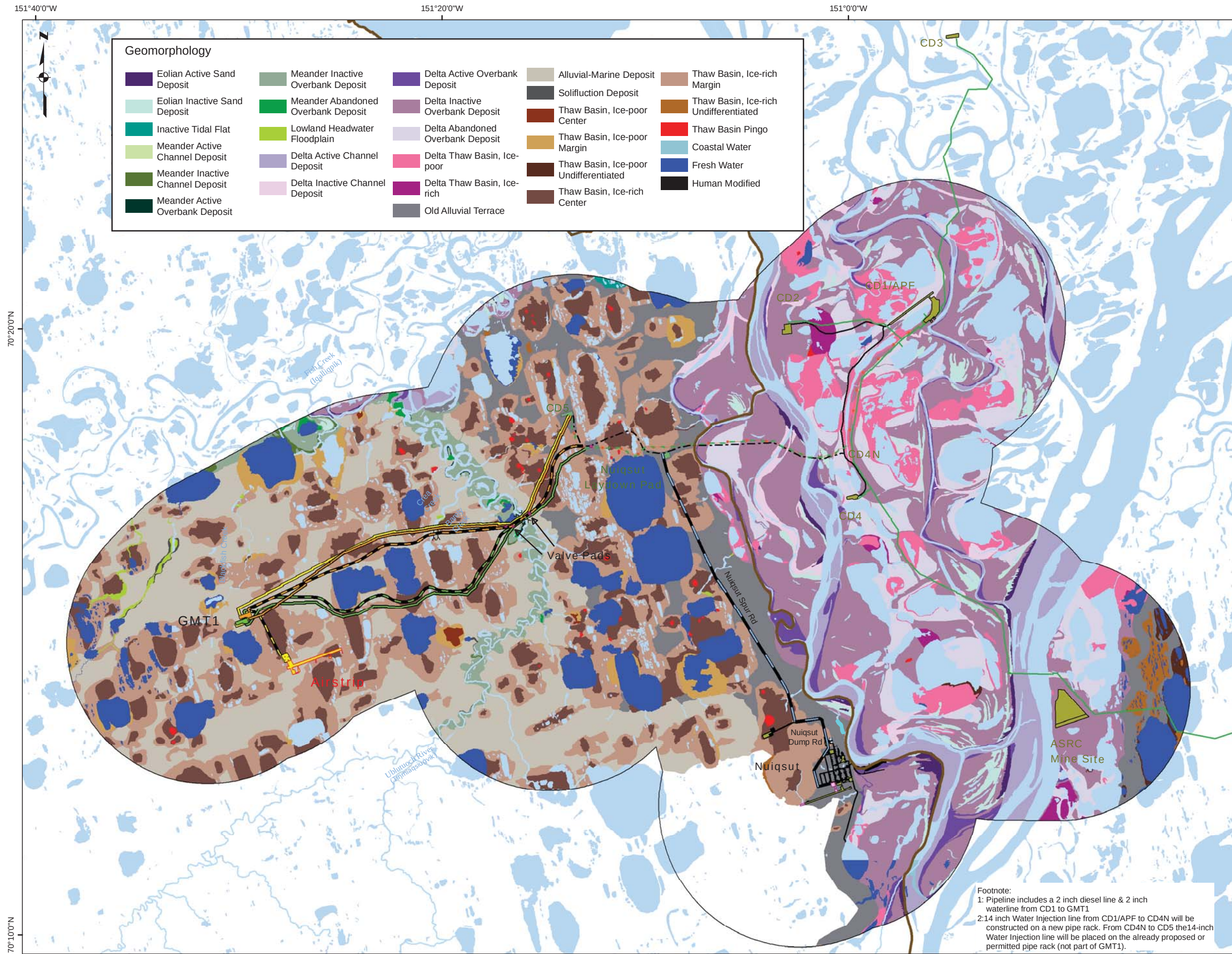
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



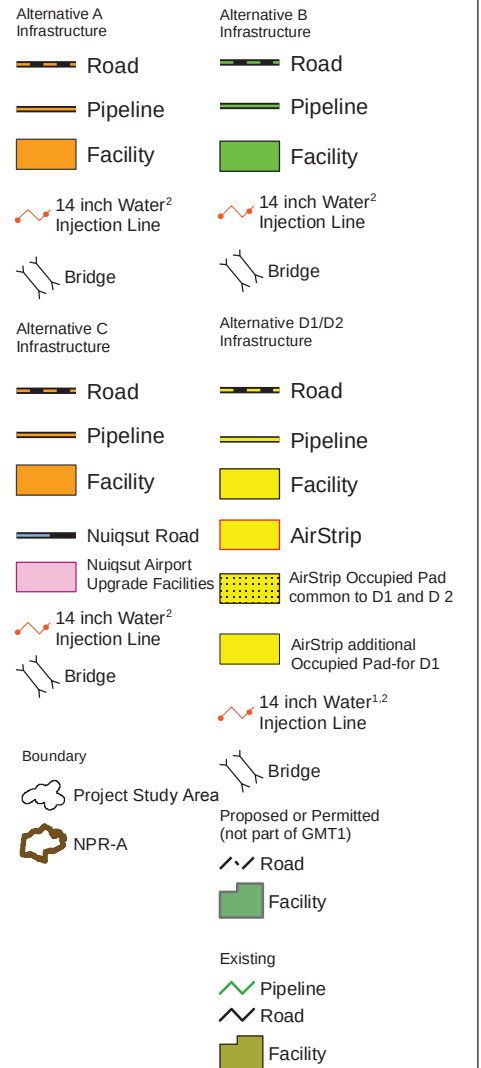
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Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2:14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).



Map 3.2-1
Geomorphology



Date: 9/27/2014



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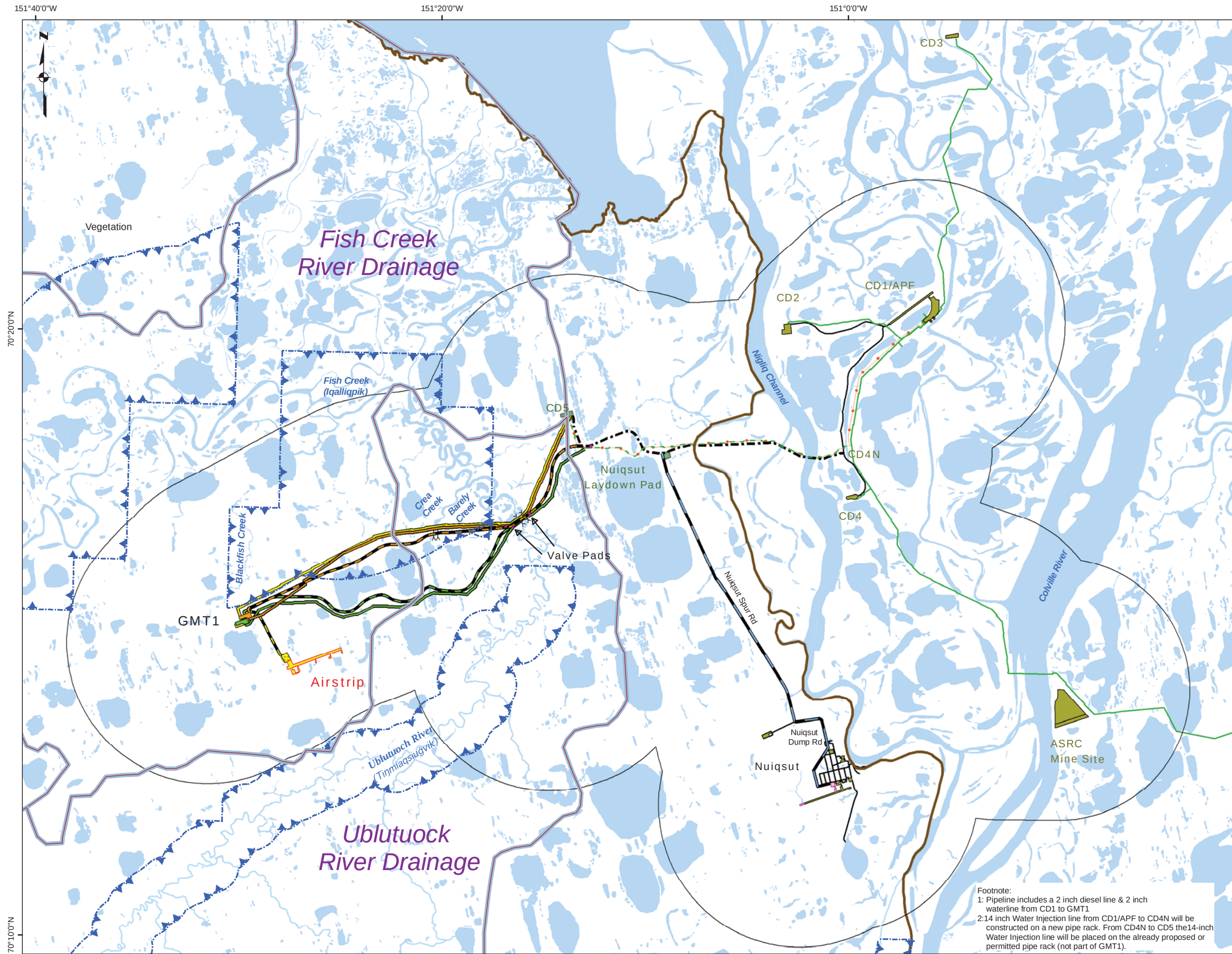
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).



Map 3.2-2
Drainage Basins

Alternative A Infrastructure	Alternative B Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
14 inch Water ² Injection Line	14 inch Water ² Injection Line
Bridge	Bridge
Alternative C Infrastructure	Alternative D1/D2 Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
Nuiqsut Road	AirStrip
Nuiqsut Airport Upgrade Facilities	AirStrip Occupied Pad common to D1 and D 2
14 inch Water ² Injection Line	AirStrip additional Occupied Pad-for D1
Bridge	14 inch Water ^{1,2} Injection Line
Proposed or Permitted (not part of GMT1)	Bridge
Road	Boundary
Facility	Project Study Area
Existing Pipeline	NPR-A
Road	
Facility	
	Drainage Basins

Setback Areas
 Fish Creek 3mi
 Ublutuoch River 0.5mi
Date: 10/21/2014

0 0.5 1 2 3
Miles

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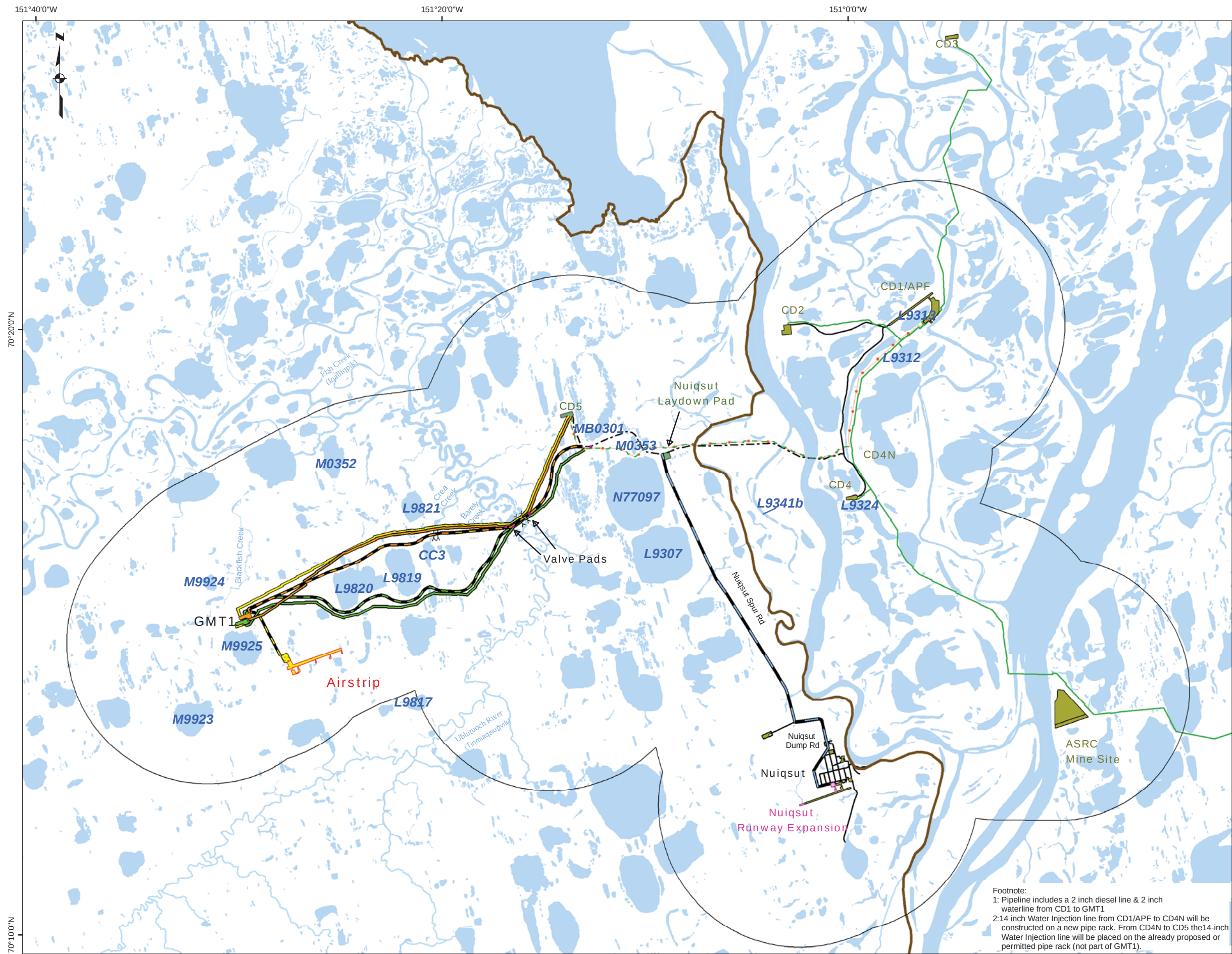
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

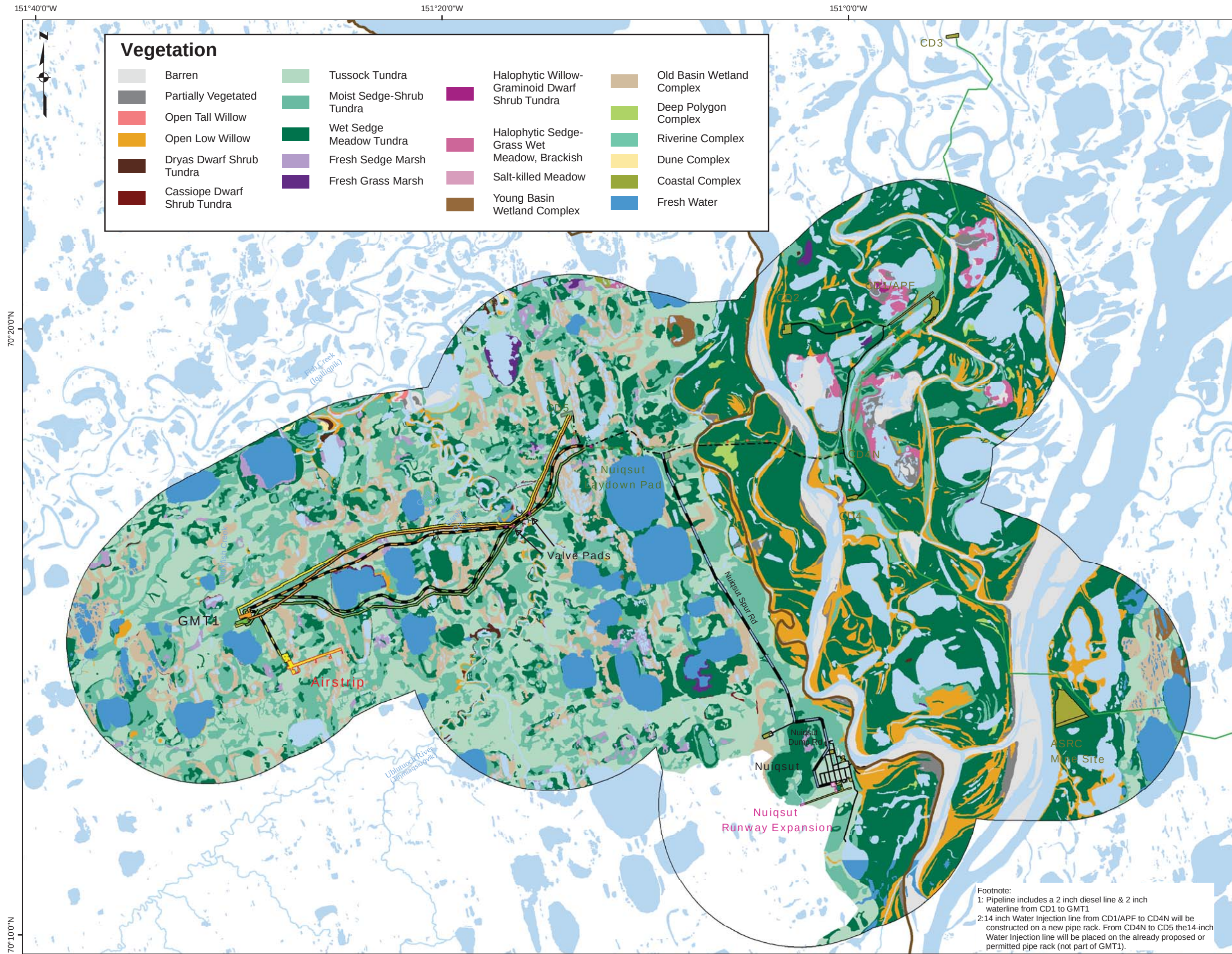


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Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).





Map 3.3-2
Vegetation

Alternative A Infrastructure	Alternative B Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
14 inch Water ² Injection Line	14 inch Water ² Injection Line
Bridge	Bridge
Alternative C Infrastructure	Alternative D1/D2 Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
Nuiqsut Road	AirStrip
Nuiqsut Airport Upgrade Facilities	AirStrip Occupied Pad common to D1 and D 2
14 inch Water ² Injection Line	AirStrip additional Occupied Pad-for D1
Bridge	14 inch Water ^{1,2} Injection Line
	Bridge
Boundary	Proposed or Permitted (not part of GMT1)
Project Study Area	Road
NPR-A	Facility
	Existing
	Pipeline
	Road
	Facility

Date: 9/27/2014
0 0.5 1 2 3 Miles

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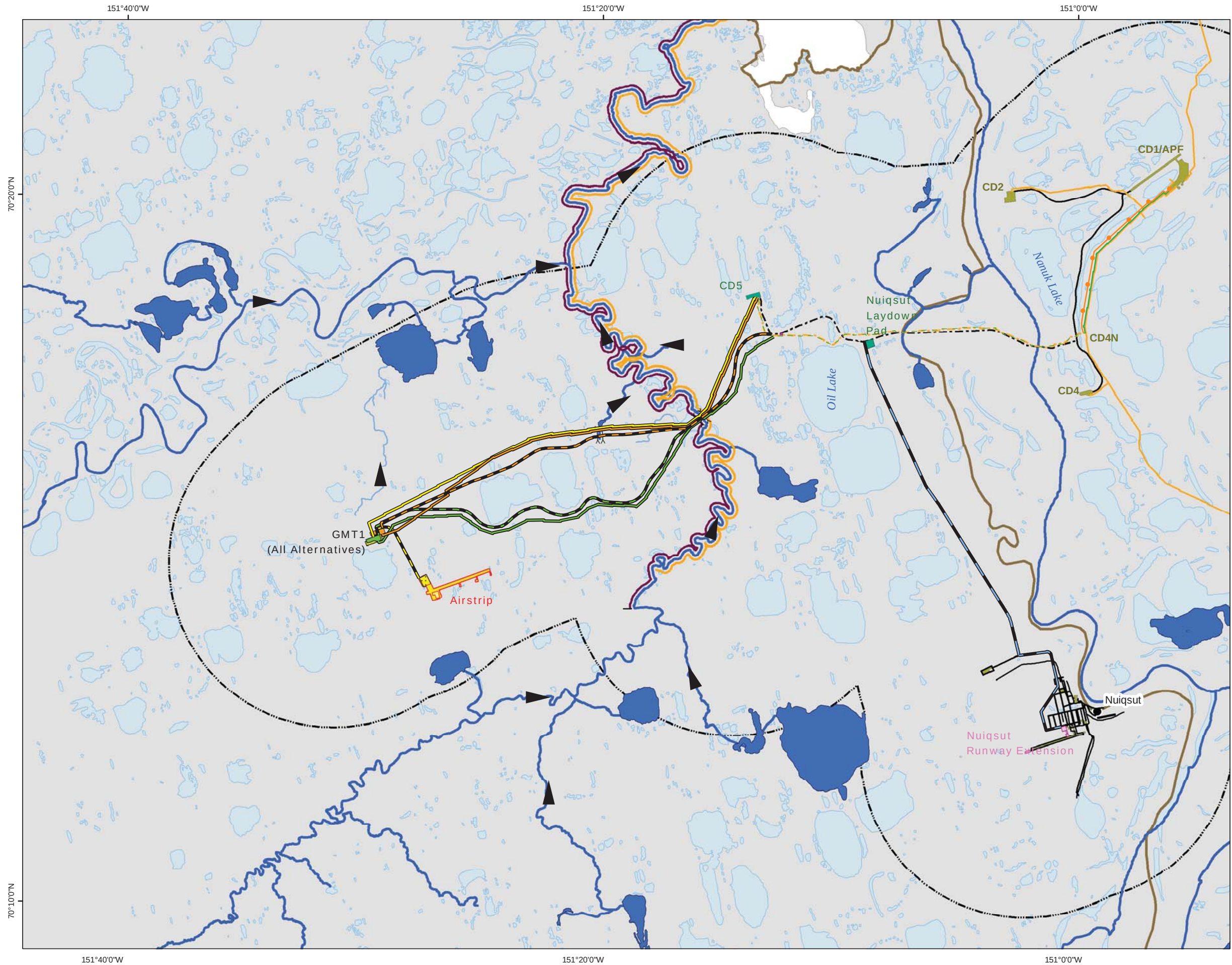
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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GMT1 Development Project Supplemental
Environmental Impact Statement 2014

Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).



Map 3.3-3

Anadromous Waters and Essential Fish Habitat

Anadromous Waters
Streams
(black arrows indicate stream flow direction)
Lakes

Essential Fish Habitat
KSp- King salmon present upstream extent
CSp- Chum salmon & PSp- Pink salmon present upstream extent

Waterbodies
Lake/Pond

Alternative A Infrastructure
Pipeline
Road
Facility

Alternative B Infrastructure
Pipeline
Road
Facility

Alternative C Infrastructure
Pipeline
Road
Nuiqsut Spur/Dump/Airport Roads
Facility

Proposed or Permitted (not part of GMT1)
Pipeline
Road
Facility

Existing
Pipeline
Road
Facility

Alternative D1/D2 Infrastructure
Pipeline
Road
Facility
Airstrip

GMT1 SEIS Project Areas
Project Study Area
NPR-A

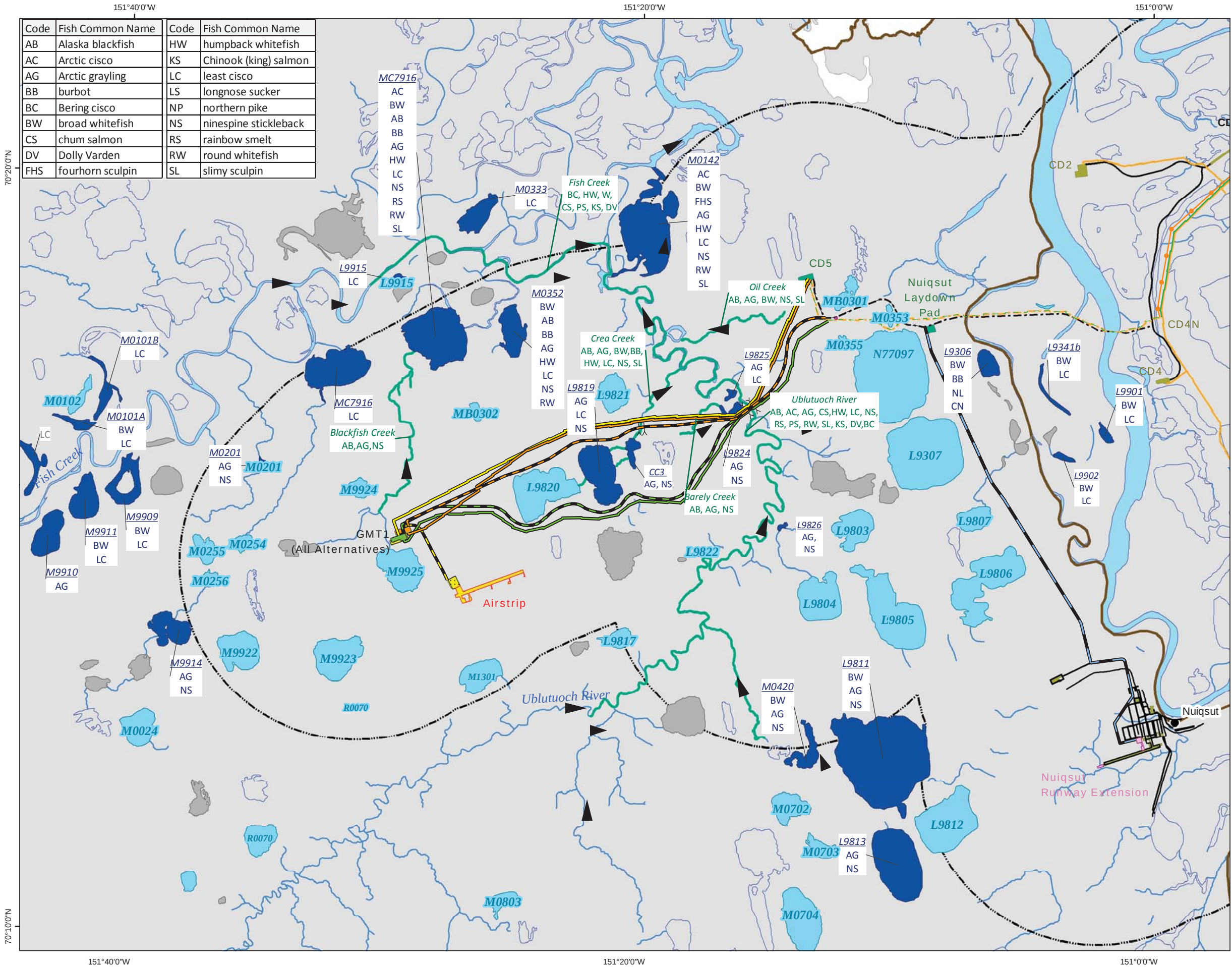
Data Sources:
Anadromous Waters Catalog (ADFG), 2013a

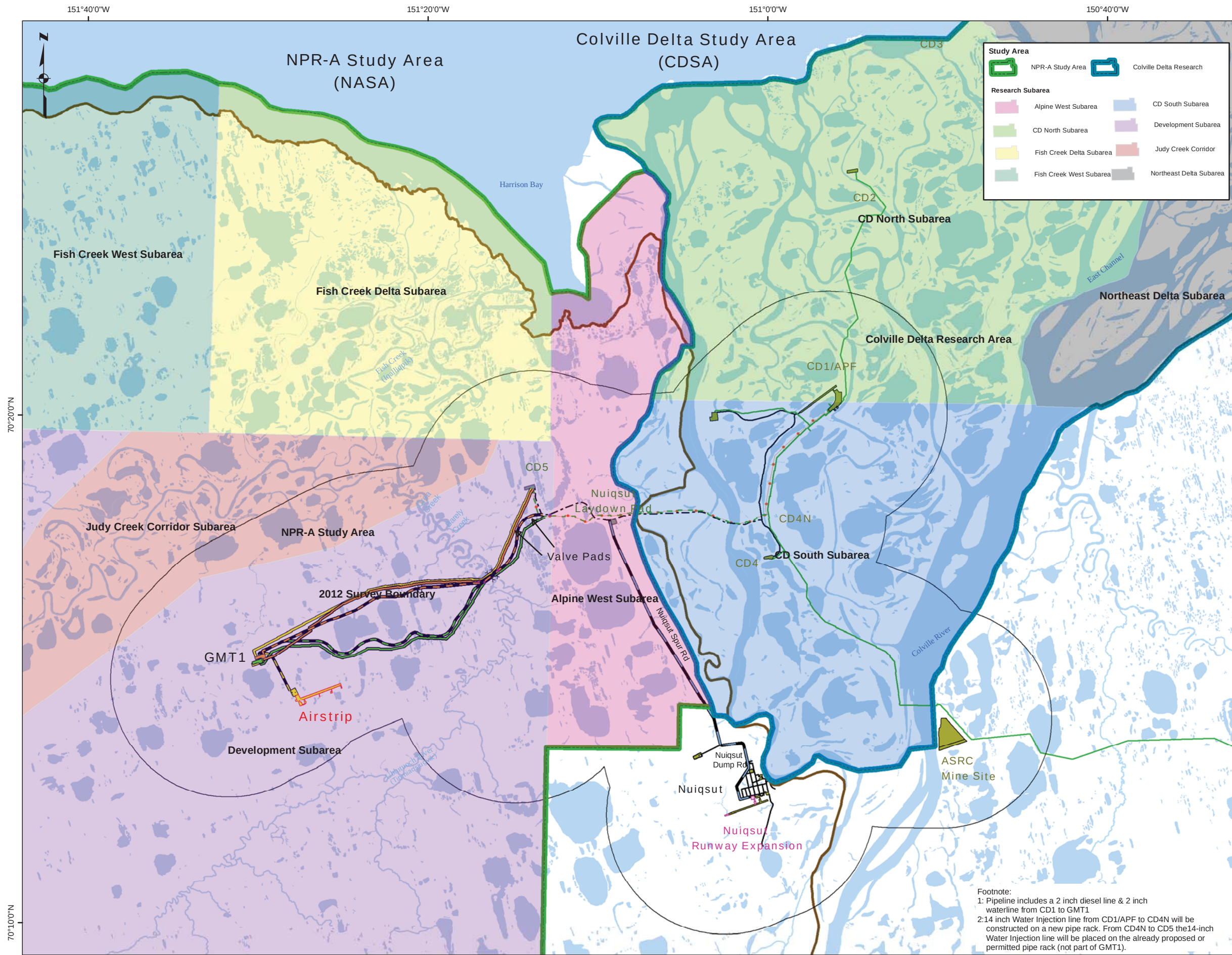
0 1 2 Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

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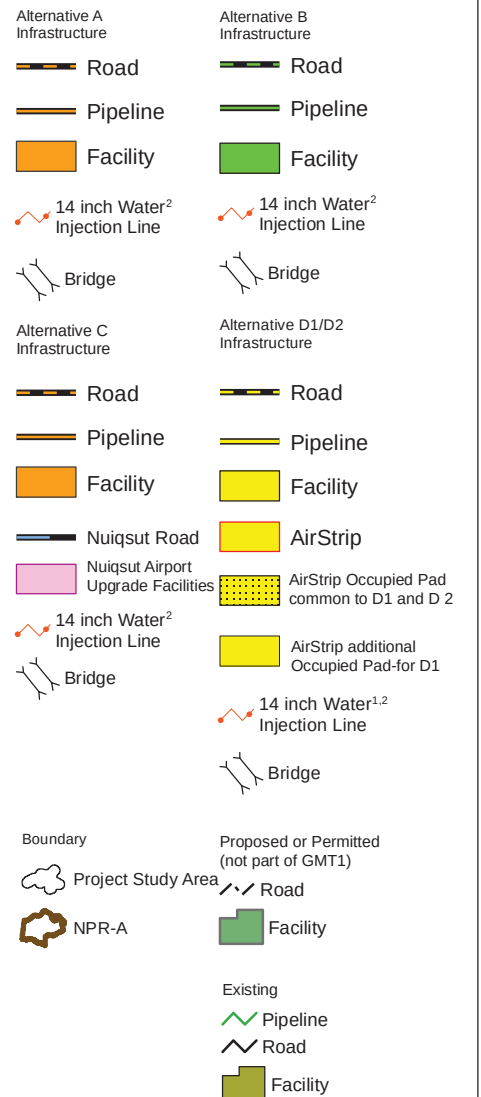
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Map 3.3-5

Avian Study Areas



Date: 9/27/2014



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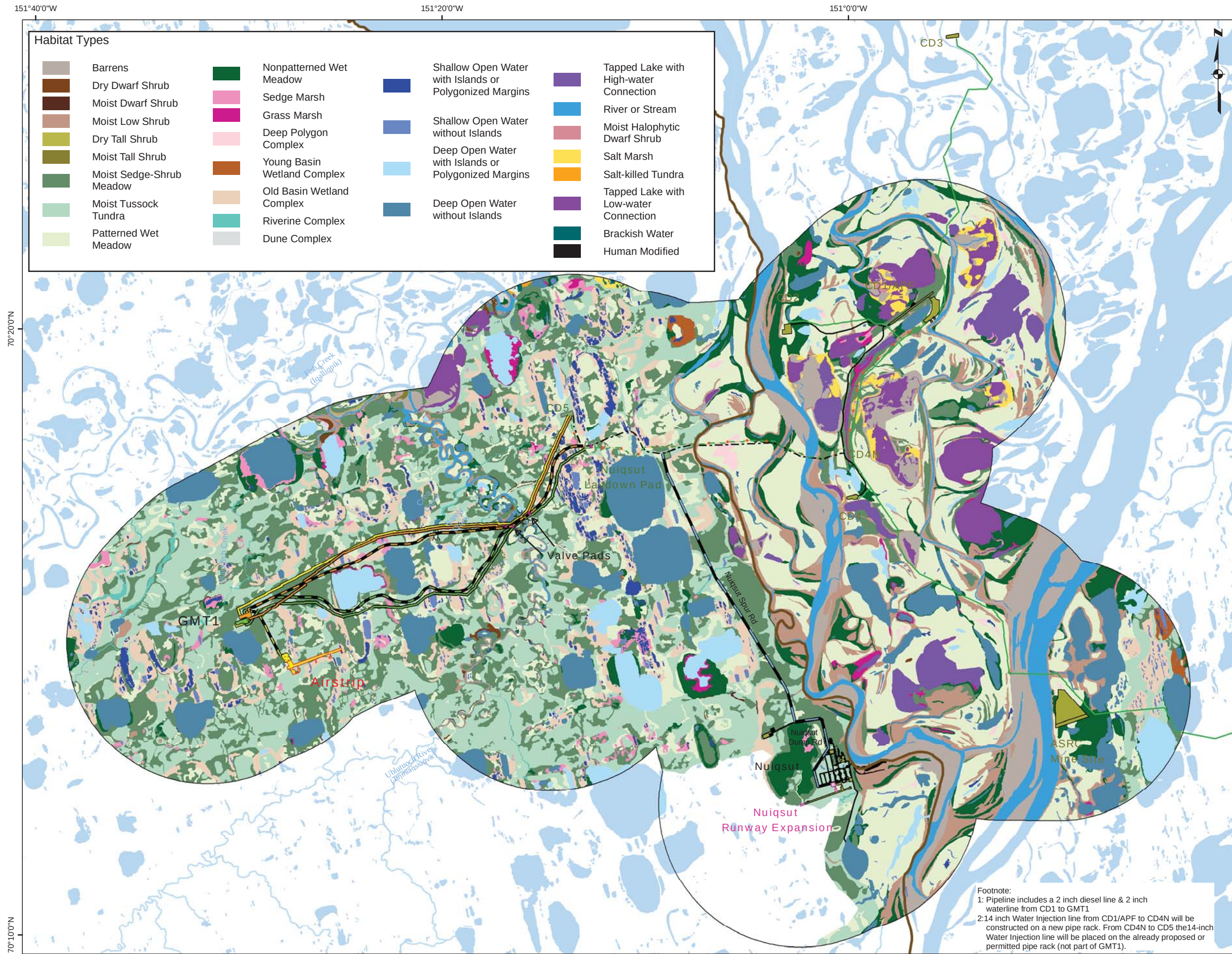
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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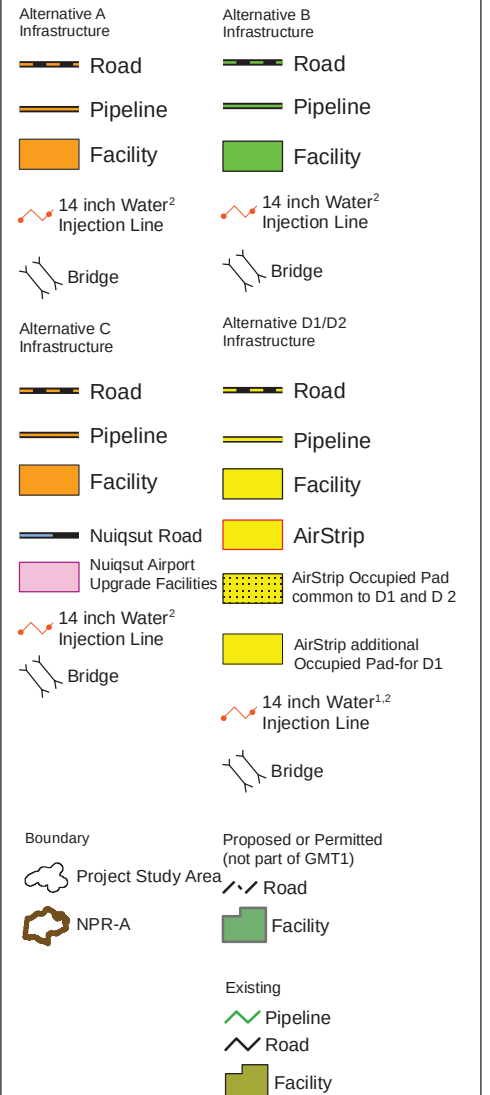
GMT1 Development Project Supplemental
Environmental Impact Statement 2014

Footnote:
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2:14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).



Map 3.3-6

Wildlife Habitat



Date: 9/29/2014

0 0.5 1 2 3 Miles

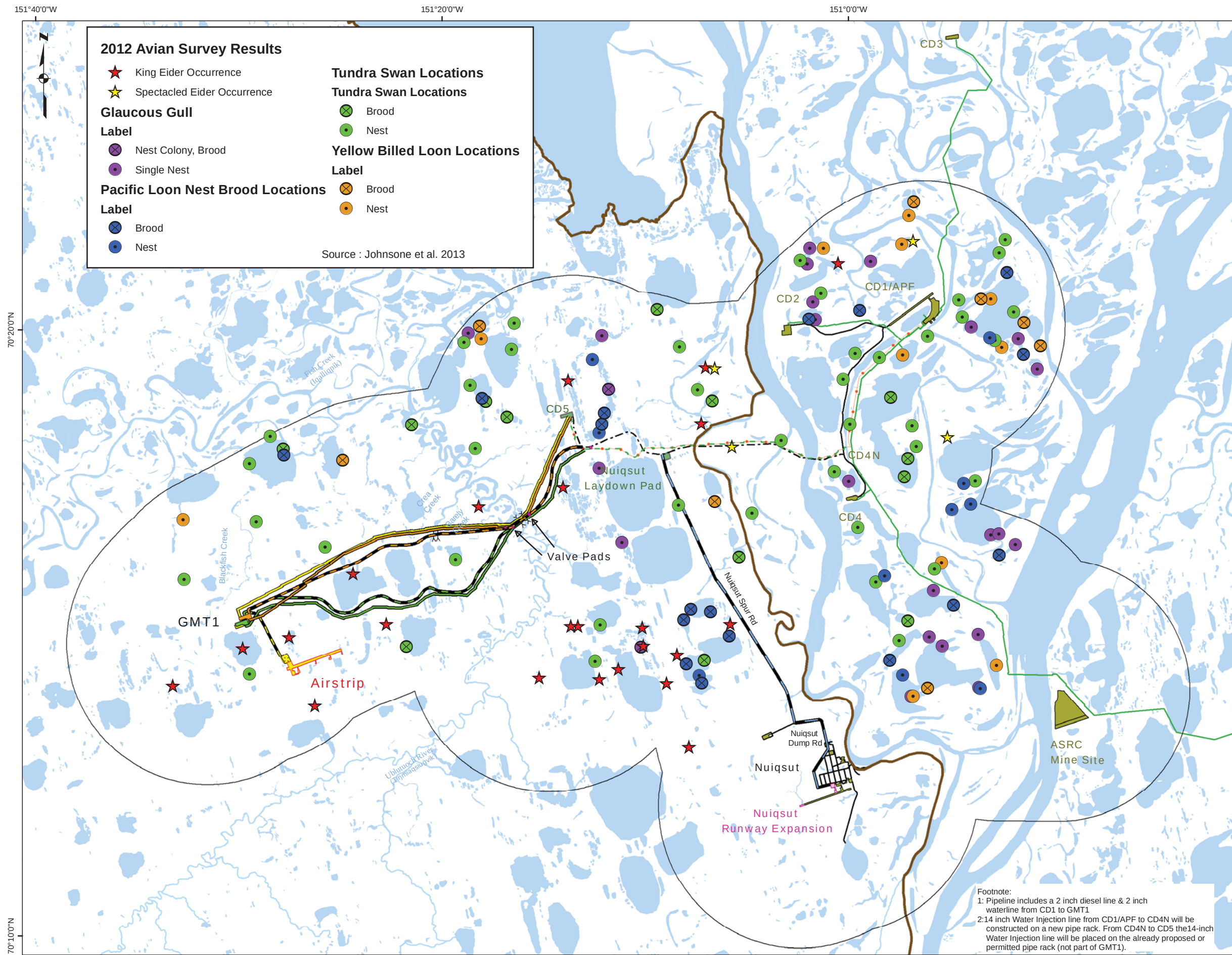
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification. for official land status information refer to Cadastral Survey plats, Master Title Plats and land status case-files.

NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

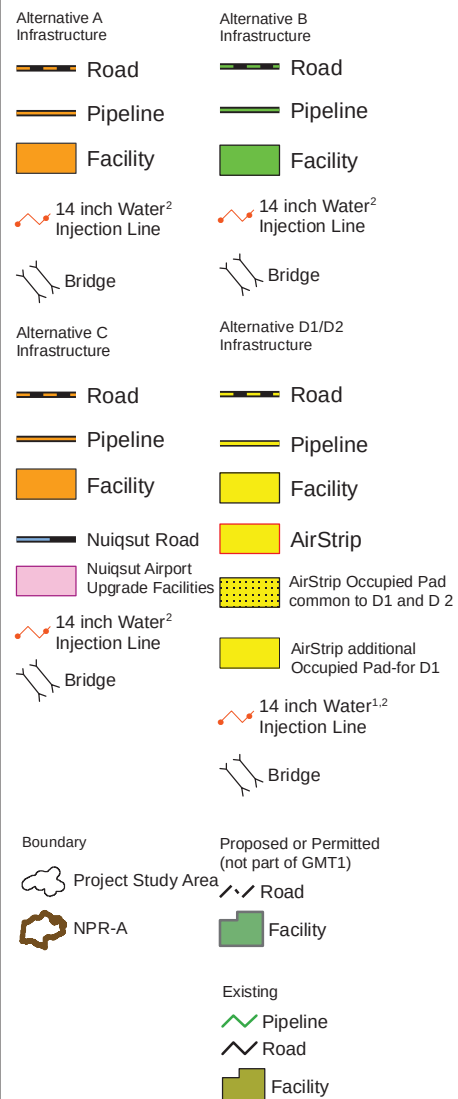


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Map 3.3-7
2012 Avian Survey



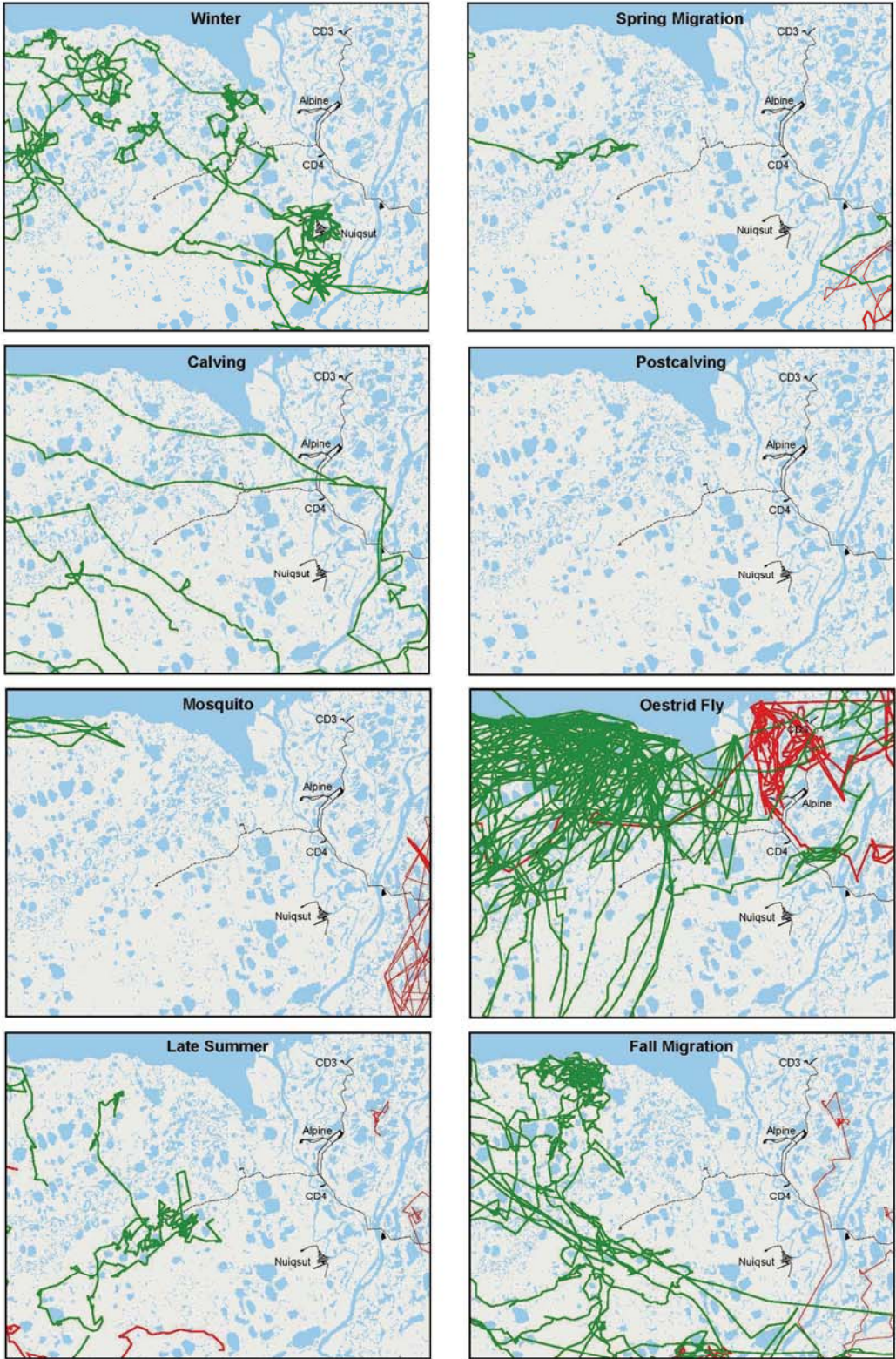
Date: 9/27/2014

0 0.5 1 2 3 Miles

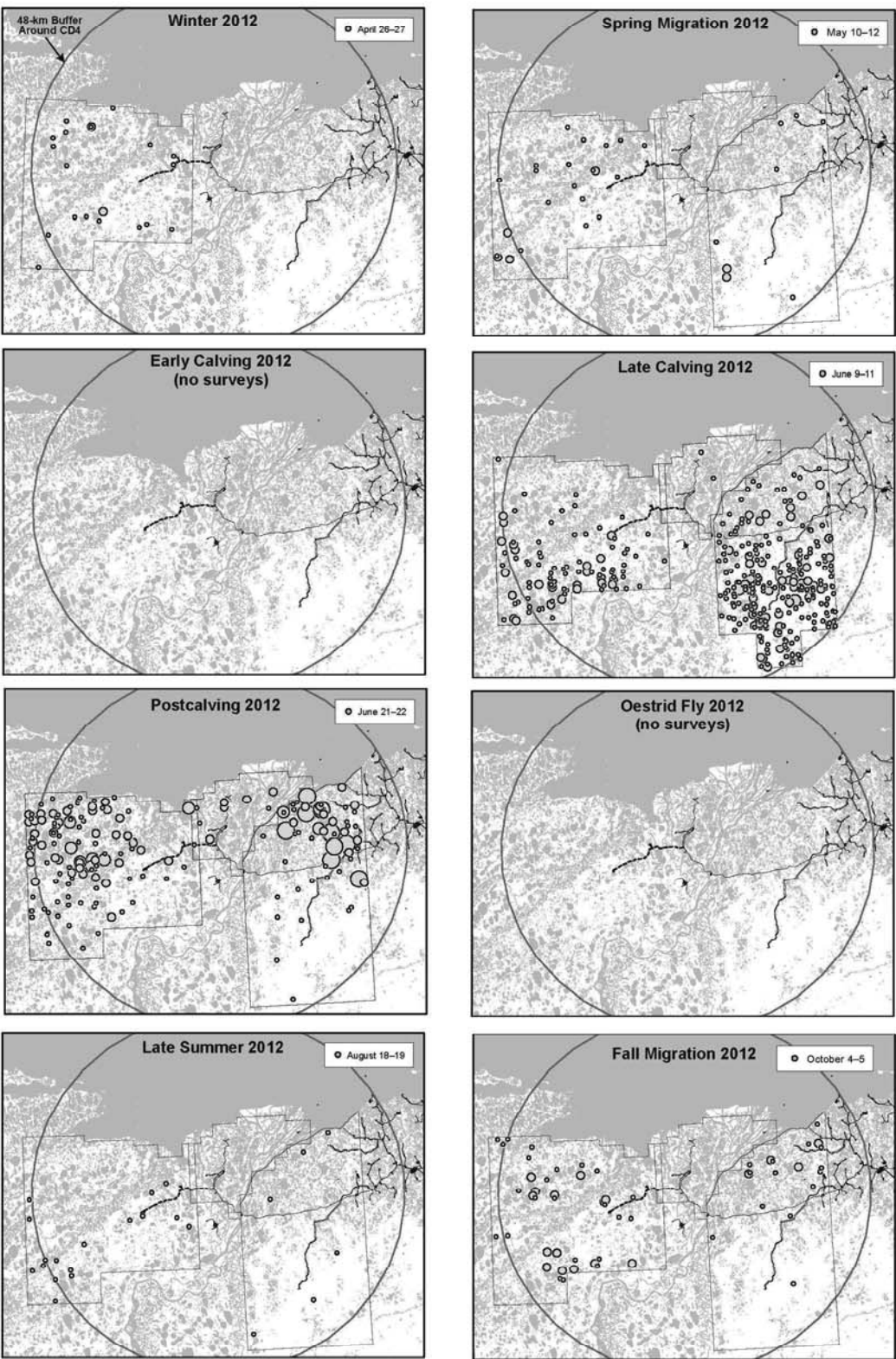
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification. For official land status information refer to Cadastral Survey plats, Master Title Plats and land status case-files.

NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

Movements of GPS-collared caribou from the Teshekpuk Herd (2004-2012) and Central Arctic Herd (2003-2006 and 2008-2012) in the vicinity of the proposed ASDP road during 8 different seasons.



Distribution and size of caribou groups during different seasons in the NPR-A, Colville River Delta, and Colville East survey areas, April-October 2012.



Map 3.3-8
Ranges of the Teshekpuk and Central Arctic Caribou Herds, GPS and Aerial

Legend

- Central Arctic Herd
- Teshekpuk Herd
- Existing Infrastructure
- Proposed ASDP Road
- Aerial Survey Area

Caribou Group Size

- 1 – 5
- 6 – 25
- 26 – 100
- 101 – 525

Existing Infrastructure

Proposed ASDP Road

Source: Lawhead et al. 2012

Date: 10/21/2014

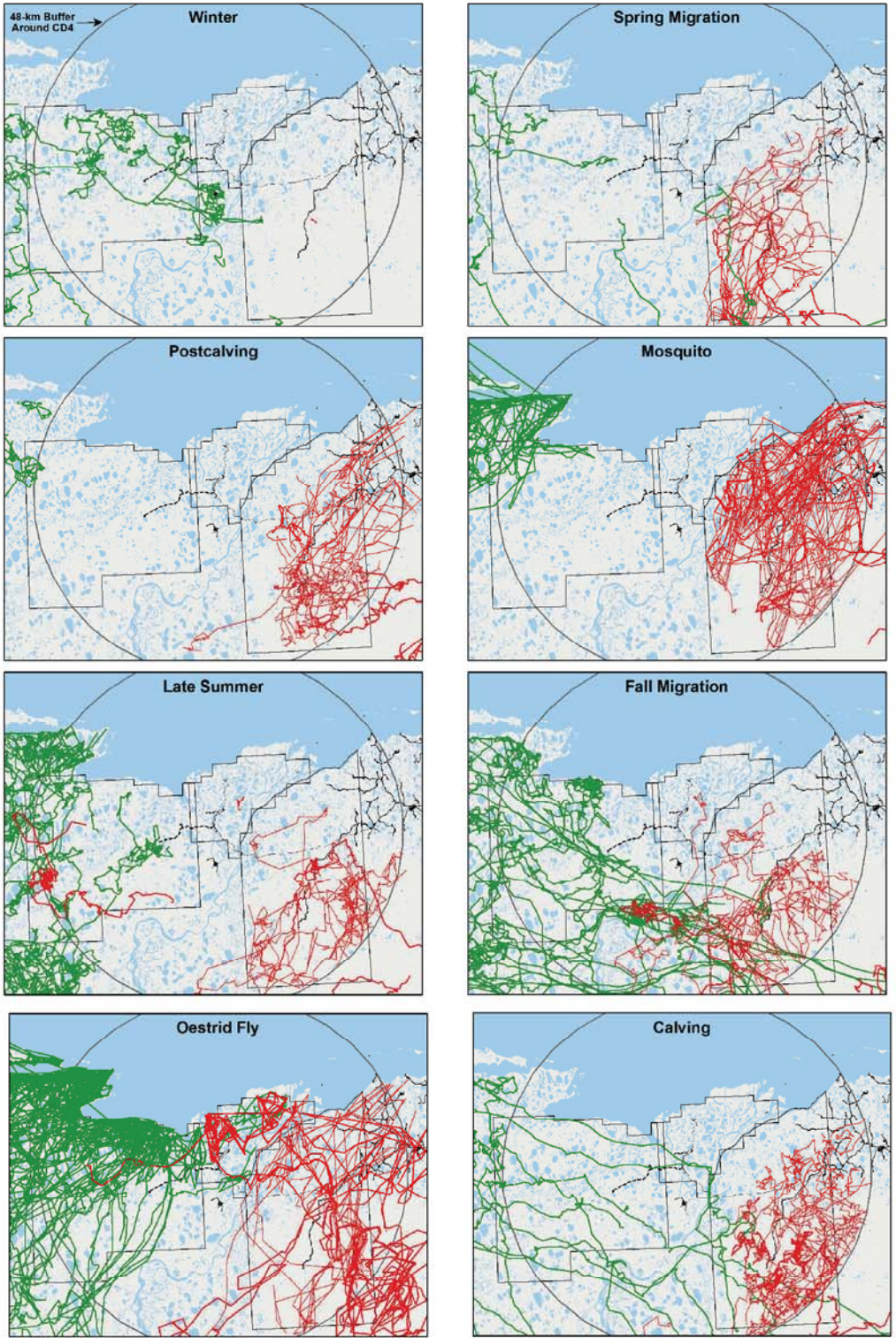
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

Movements of satellite-collared caribou from the Teshekpuk Herd (1990-2012 and Central Arctic Herd (1986-1990 and 2001-2009) in the ASDP study area during 8 different seasons.



Movements of GPS-collared caribou from the Teshekpuk Herd (2004-2012) and Central Arctic Herd (2003-2006, 2008-2012) in the ASDP study area during 8 different seasons.



Map 3.3-9
Ranges of the Teshekpuk and Central Arctic Caribou Herds, Satellite and GPS

Legend

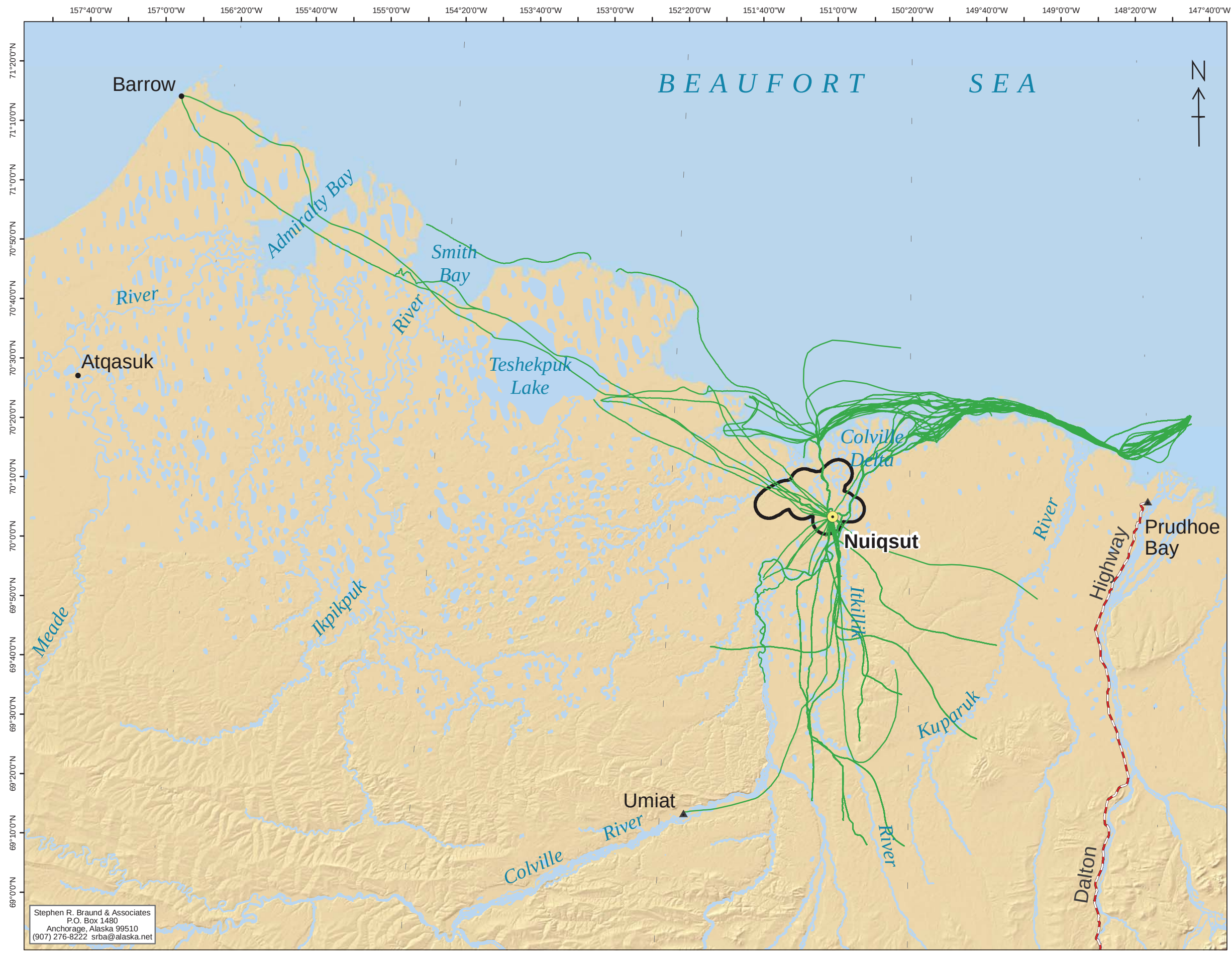
- Central Arctic Herd
- Teshekpuk Herd
- Existing Infrastructure
- Proposed ASDP Road
- Aerial Survey Area

Source: Lawhead et al. 2012

Date: 10/21/2014

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



Map 3.3-10

Nuiqsut Travel Routes

Legend

Nuiqsut Travel Route
(Source: SRBA 2010a)

Project Study Area

Subsistence Study Community

Other Community

Other Place

Draft Date: 12/6/2013

05102030

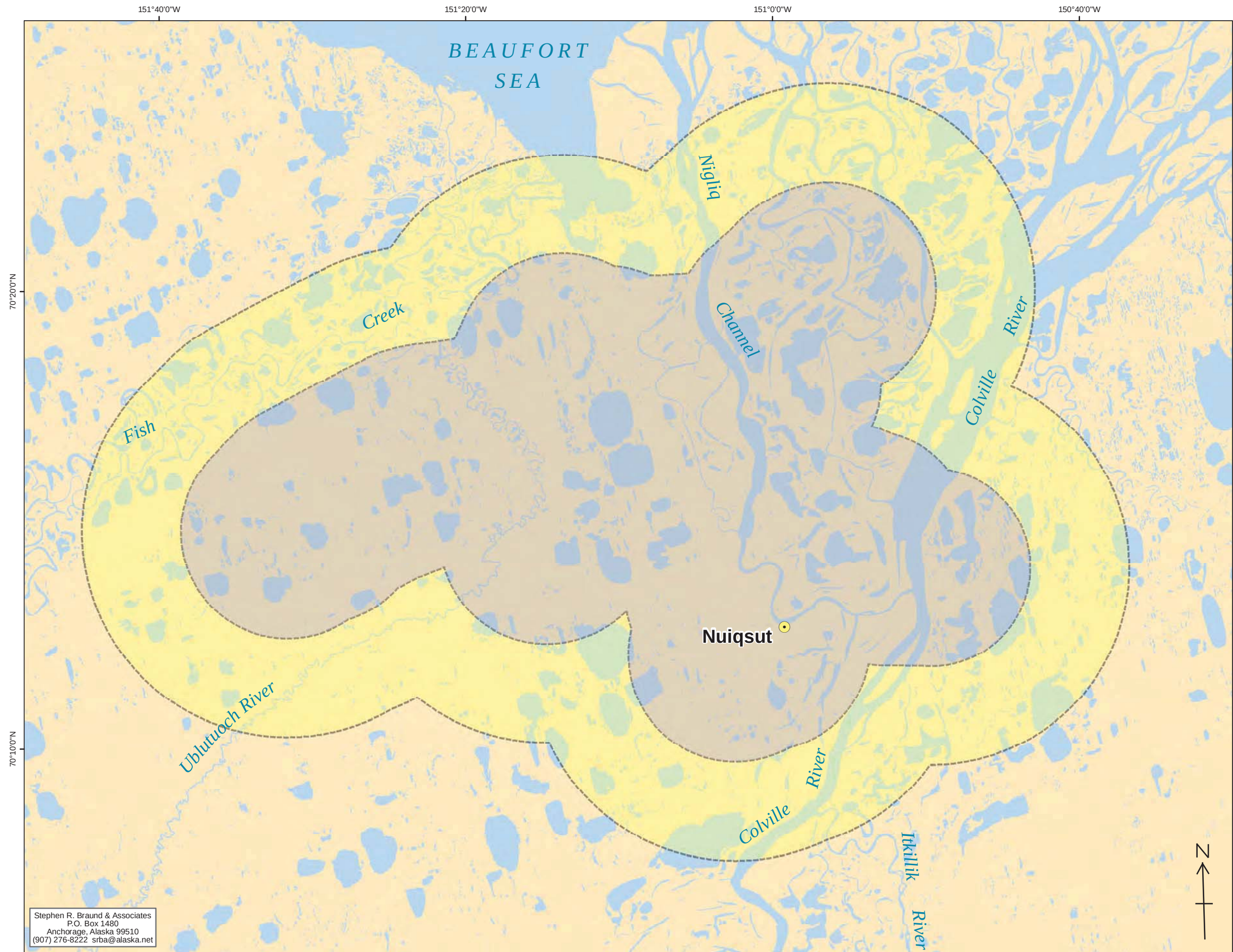
Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

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Map 3.3-11
Visual and Noise
Impact Analysis Areas

- Legend
- Indirect Impacts Analysis Area (i.e., Project Study Area)
 - Visual and Noise Impacts Analysis Area
 - Nuiqsut

0 0.5 1 2 3 Miles

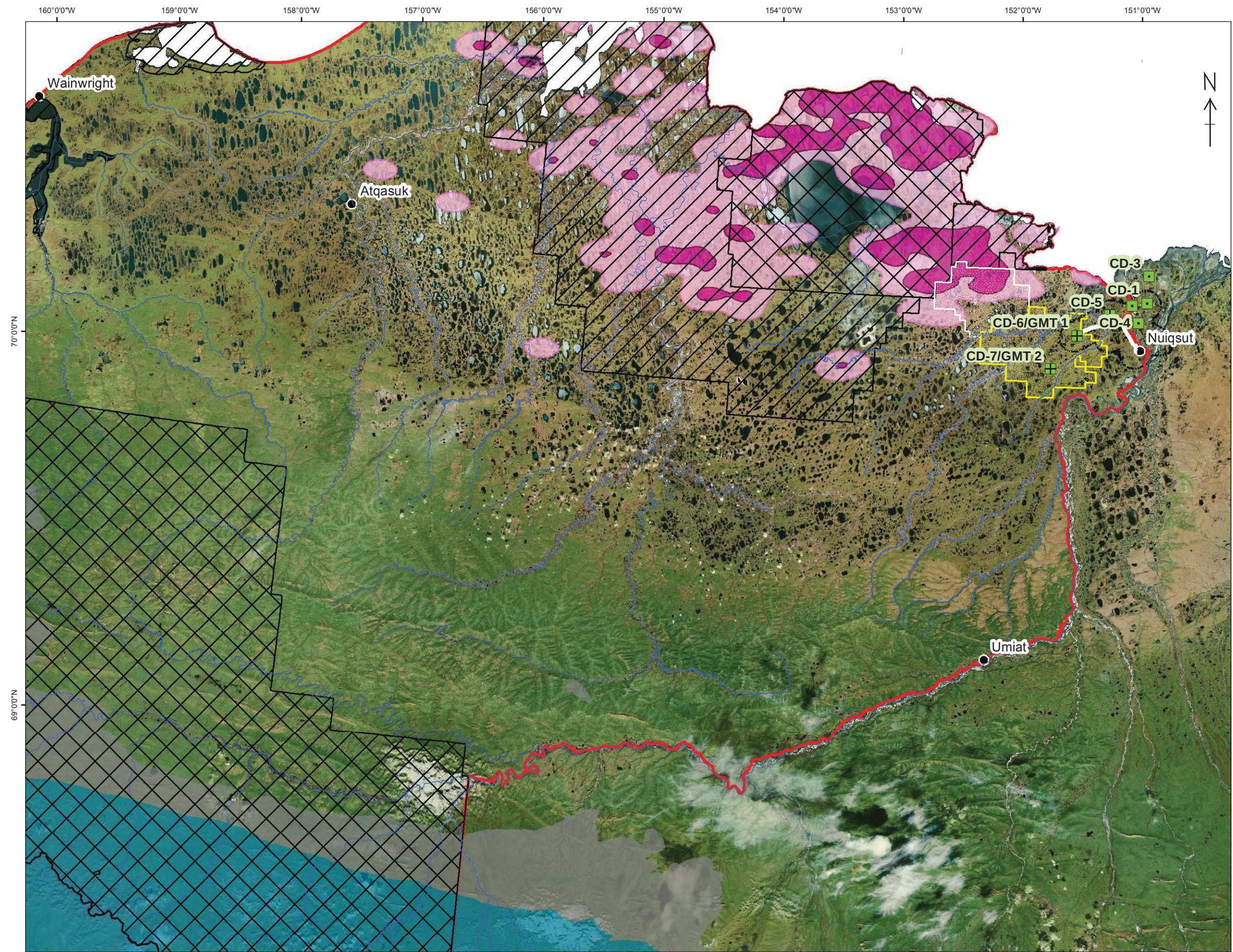
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 3.3-12

Caribou Summer Areas

**Teshekpuk Lake Caribou Herd
Mosquito Relief Areas**
(1990-2010 Satellite Telemetry Data)
1-15 July
Kernel Density Analysis - Density Contour

50 %
95 %

**Western Arctic Caribou Herd
Summer Line Density**
(1988 - 2010)

1-2 movement lines crossing
each 200 sq mi grid
>2 movement lines crossing
each 200 sq mi grid

Oil & Gas Leasing

Unavailable
Unavailable- no new
non-subsistence infrastructure
Greater Mooses Tooth Unit
Bears Tooth Unit

CONOCO PHILLIPS

Existing Facility
Proposed Facility
Proposed Roads

NPR-A Boundary

05102030

Miles

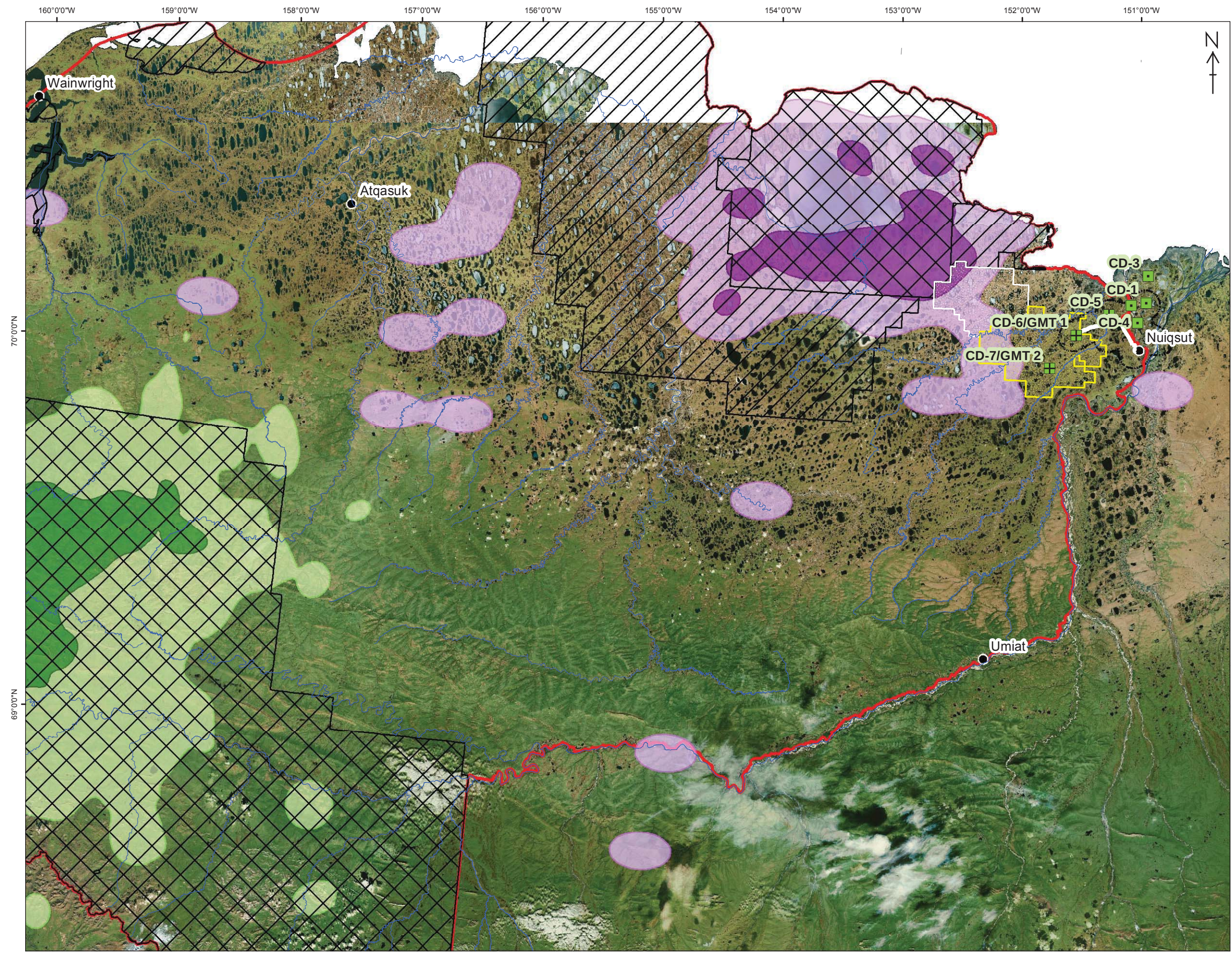
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 3.3 -13

Caribou Calving Areas

Teshekpuk Lake Caribou Herd Calving Areas
(1990-2010 Satellite Telemetry Data)
Successful Females Only, 1-15 July
Kernel Density Analysis - Density Contour

50 %

95 %

Western Arctic Caribou Herd Calving Areas
(1987 - 2010, excluding 1990-1991)
Kernel Density Analysis - Density Contour

50 %

95 %

Oil & Gas Leasing

Unavailable

Unavailable- no new non-subsistence infrastructure

Greater Mooses Tooth Unit

Bears Tooth Unit

CONOCO PHILLIPS

Existing Facility

Proposed Facility

Proposed Roads

NPR-A Boundary

05102030

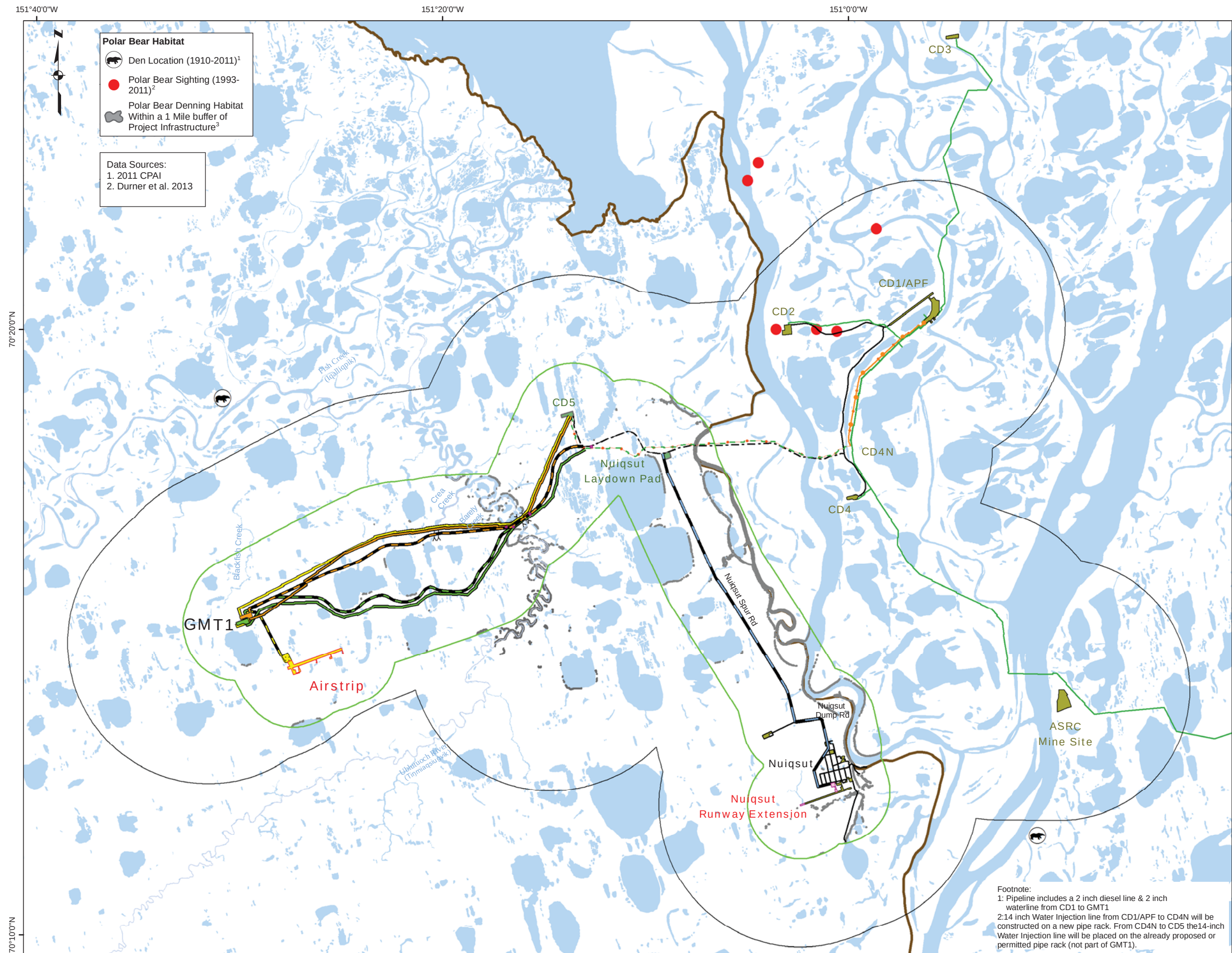
Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

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Map 3.3-14

Polar Bear Habitat

Alternative A Infrastructure	Alternative B Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
14 inch Water ² Injection Line	14 inch Water ² Injection Line
Bridge	Bridge
Alternative C Infrastructure	Alternative D1/D2 Infrastructure
Road	Road
Pipeline	Pipeline
Facility	Facility
Nuiqsut Road	AirStrip
Nuiqsut Airport Upgrade Facilities	AirStrip additional Occupied Pad-for D1
14 inch Water ² Injection Line	14 inch Water ^{1,2} Injection Line
Bridge	Bridge
Existing	Proposed or Permitted (not part of GMT1)
Pipeline	Bridge
Road	Road
Facility	Facility
Boundary	
Project Study Area	
NPR-A	
1 Mile Infrastructure Buffer	

Date: 10/21/2014

00.5123

Miles

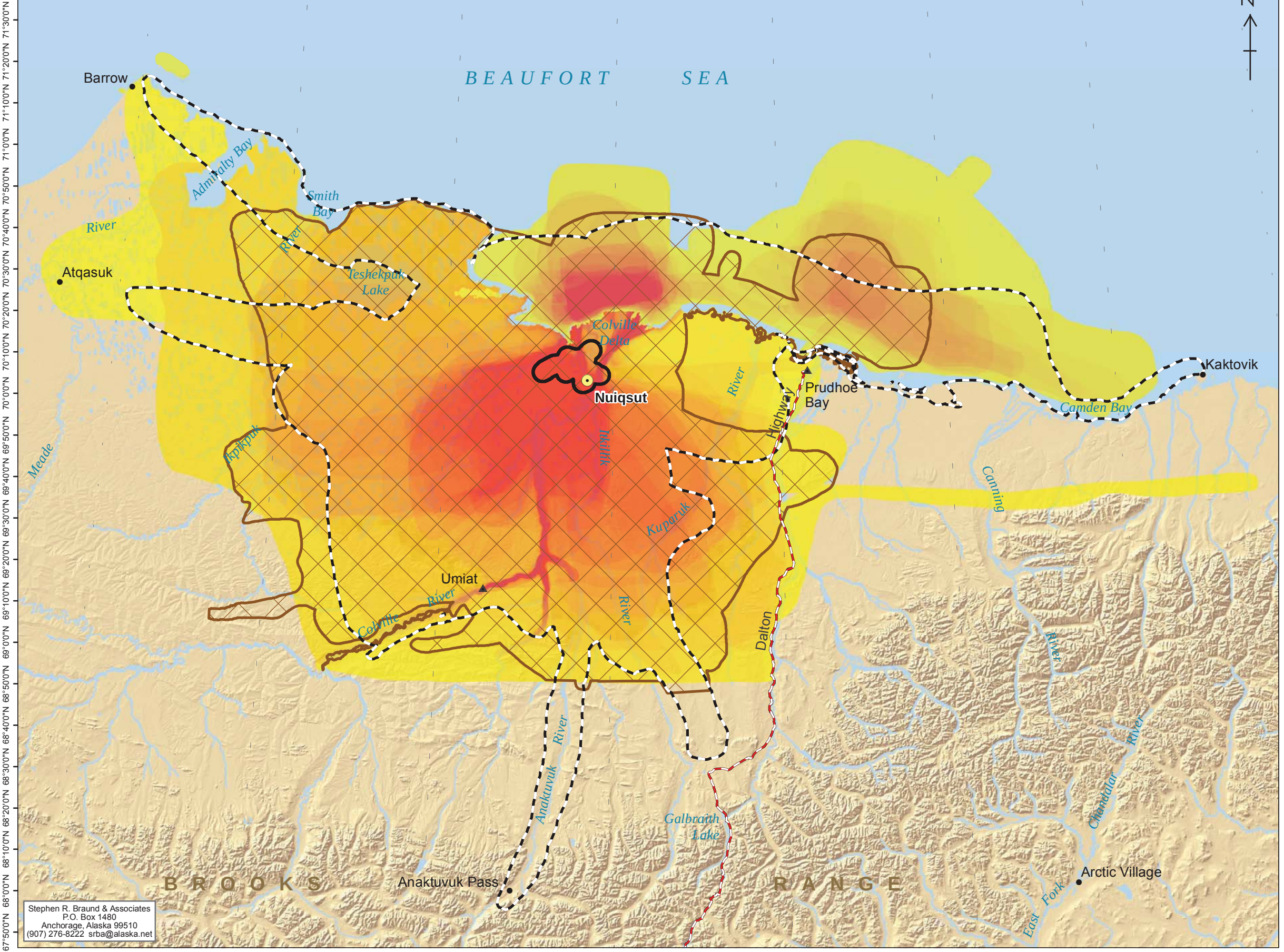
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

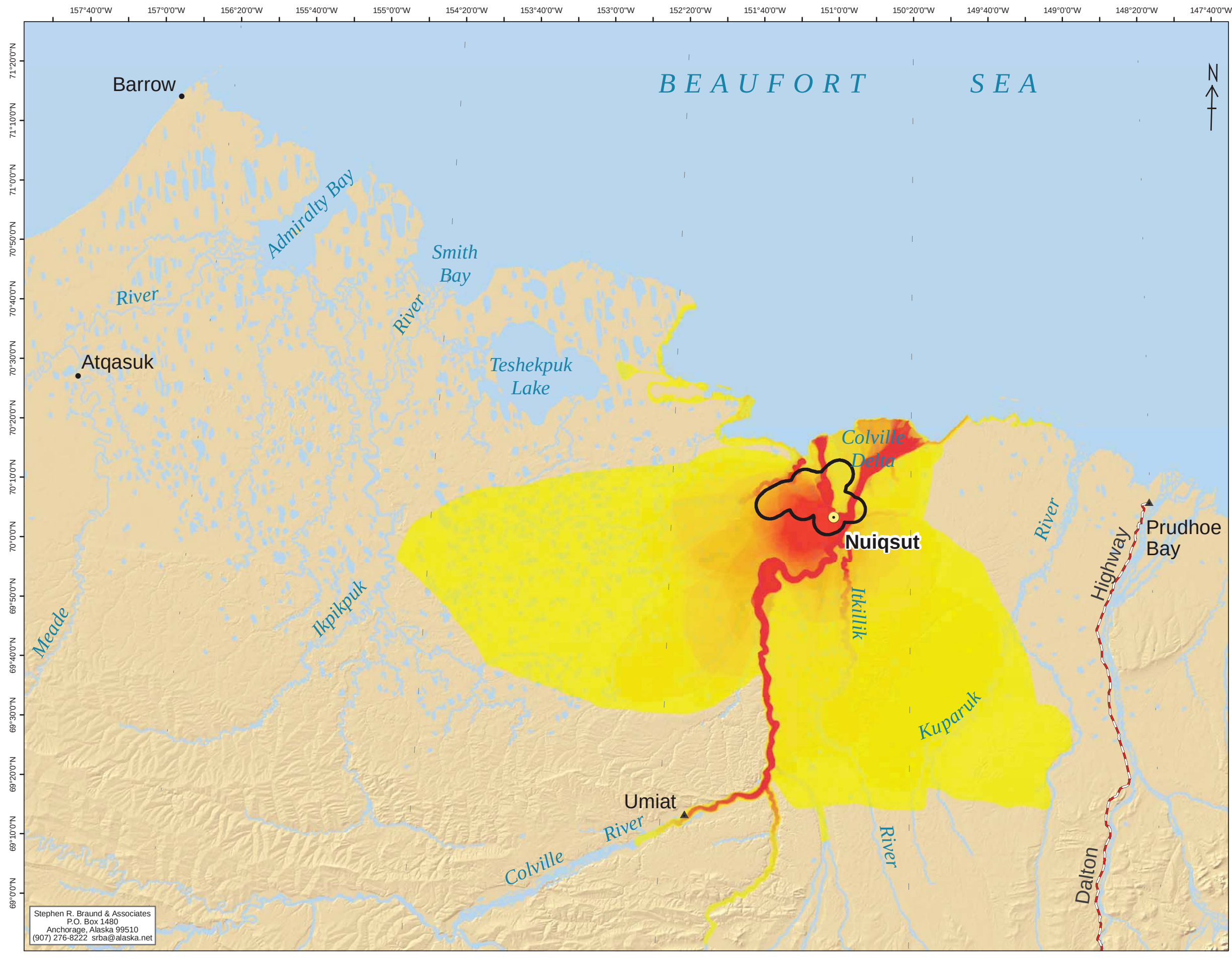
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71°30'0"N 71°20'0"N 71°10'0"N 71°0'0"N 70°50'0"N 70°40'0"N 70°30'0"N 70°20'0"N 70°10'0"N 70°0'0"N 69°50'0"N 69°40'0"N 69°30'0"N 69°20'0"N 69°10'0"N 69°0'0"N 68°50'0"N 68°40'0"N 68°30'0"N 68°20'0"N 68°10'0"N 68°0'0"N 67°50'0"N



Map 3.4-2
Nuiqsut Caribou Subsistence
Use Areas, 2008-2011

Legend

Caribou Subsistence Use Areas

- Heavy Use
- Moderate Use

 Project Study Area

Date: 12/6/2013

0 5 10 20 30 Miles

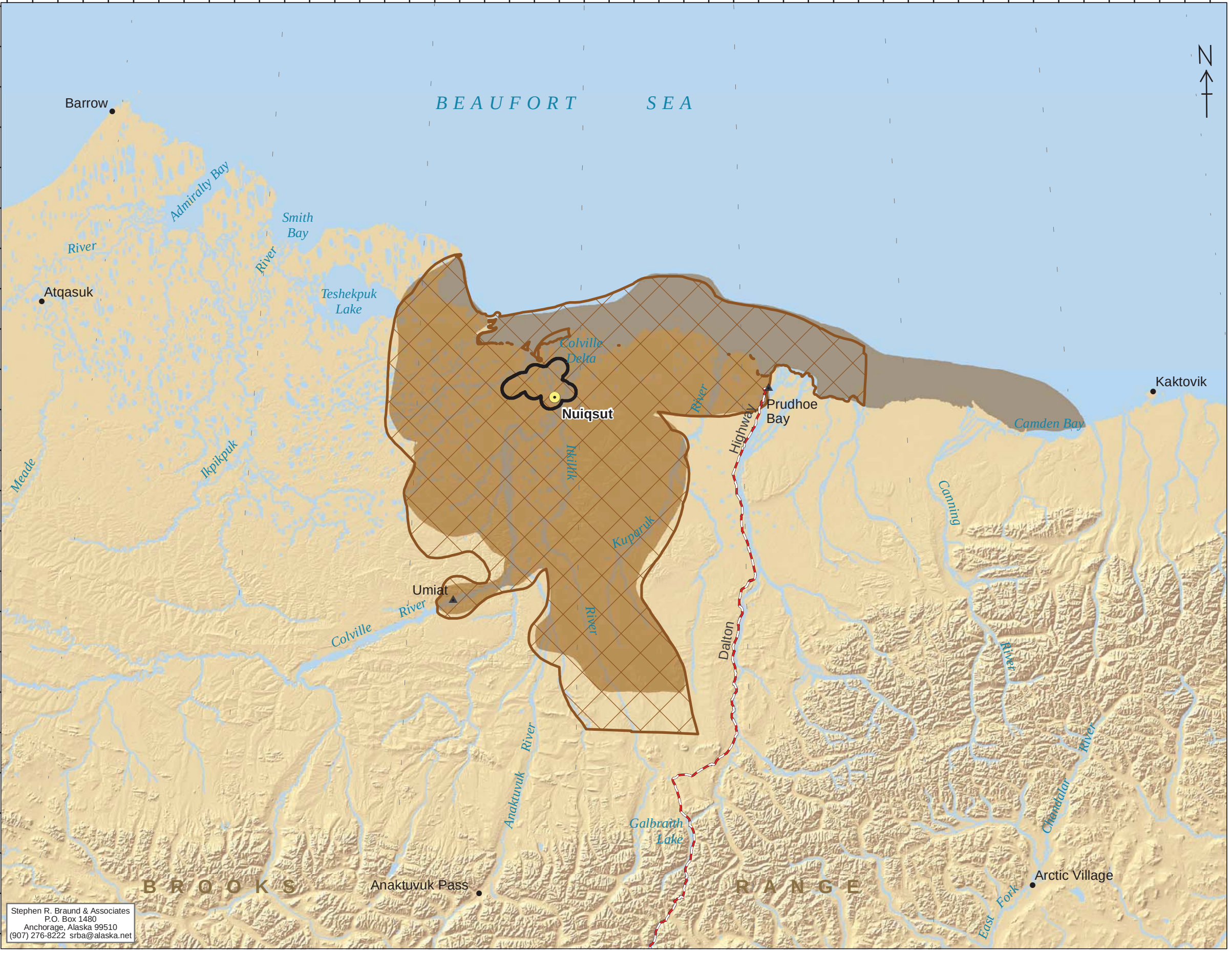
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

Stephen R. Braund & Associates
P.O. Box 1480
Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net

158°20'0"W 157°40'0"W 157°0'0"W 156°20'0"W 155°40'0"W 155°0'0"W 154°20'0"W 153°40'0"W 153°0'0"W 152°20'0"W 151°40'0"W 151°0'0"W 150°20'0"W 149°40'0"W 149°0'0"W 148°20'0"W 147°40'0"W 147°0'0"W 146°20'0"W 145°40'0"W 145°0'0"W 144°20'0"W 143°40'0"W 143°0'0"W 142°20'0"W

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



Map 3.4-3

Nuiqsut Historic and Lifetime
Subsistence Use Areas,
All Resources

- Legend
- All Resources, Lifetime
(Source: Pedersen 1979)
 - All Resources, Early 1970s
(Source: Brown 1979)

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

Date: 12/6/2013

0 5 10 20 30
Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

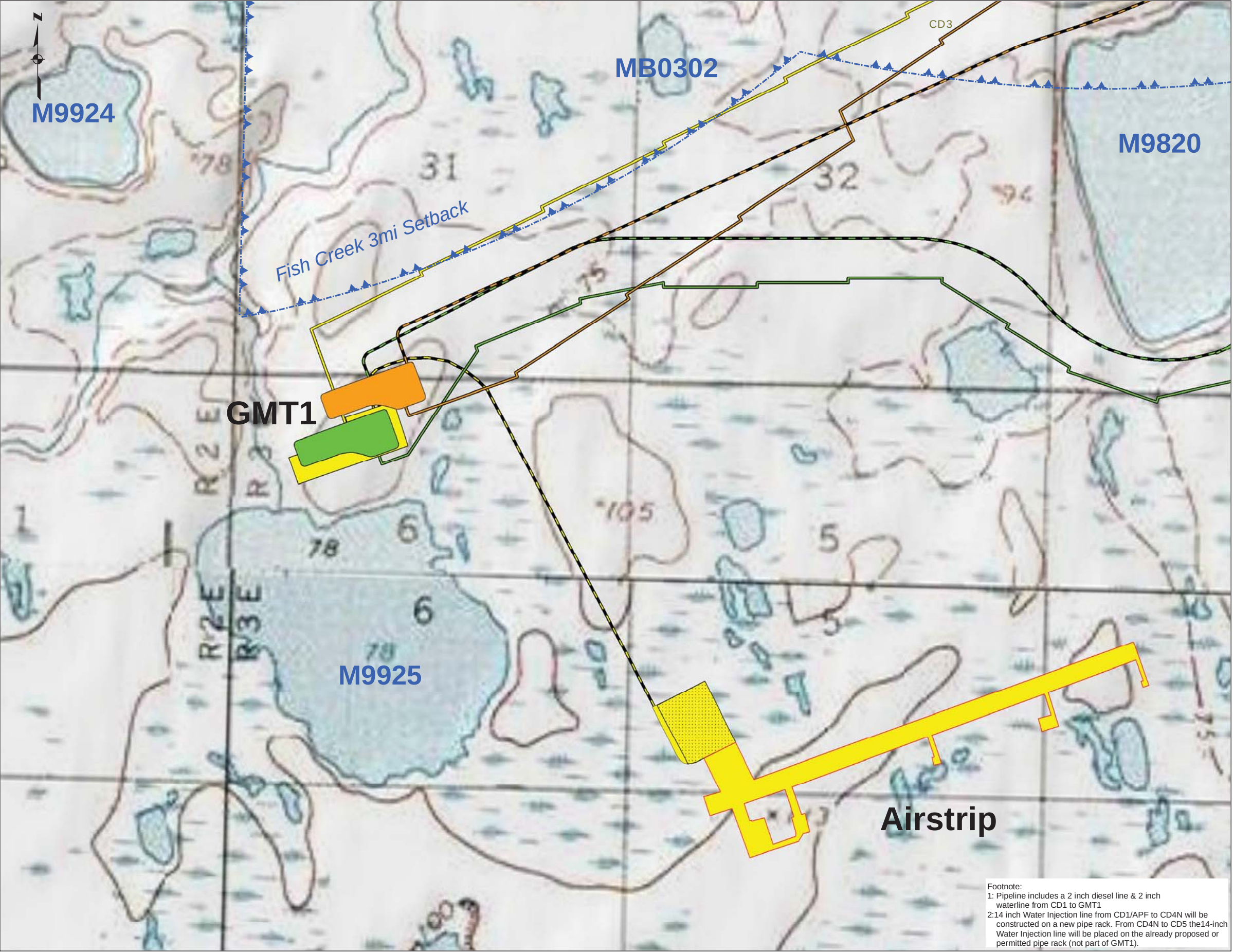


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71°30'0"N 71°20'0"N 71°10'0"N 71°0'0"N 70°50'0"N 70°40'0"N 70°30'0"N 70°20'0"N 70°10'0"N 70°0'0"N 69°50'0"N 69°40'0"N 69°30'0"N 69°20'0"N 69°10'0"N 69°0'0"N 68°50'0"N 68°40'0"N 68°30'0"N 68°20'0"N 68°10'0"N 68°0'0"N 67°50'0"N

Stephen R. Braund & Associates
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Anchorage, Alaska 99510
(907) 276-8222 srba@alaska.net



Map 4.2-1

Water Resources
Near the GMT1 Pad

- Alternative A Infrastructure
- Road
 - Pipeline
 - Facility
- Alternative B Infrastructure
- Road
 - Pipeline
 - Facility
- Alternative C Infrastructure
- Road
 - Pipeline
 - Facility
- Alternative D1/D2 Infrastructure
- Pipeline
 - Road
 - Facility
 - AirStrip
 - AirStrip Occupied Pad-D1
 - AirStrip Occupied Pad-D2

Setback Area
Fish Creek 3mi

Date: 9/27/2014

0 400 800 1,600 2,400 Feet

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



Map 4.2-2

Alternatives A and C
Potential Inundation Analysis

- | | |
|---|---|
| Alternative A Infrastructure | Proposed or Permitted (not part of GMT1) |
| Road | Pipeline |
| Pipeline | Road |
| Facility | Facility |
| 14 inch Water ¹ Injection Line | Existing Pipeline |
| Bridge | Existing Road |
| | Existing Facility |

- Boundaries**
- NPR-A
 - Project Study Area
 - Drainage Basins

- Potential Inundation Area**
- Decreased Inundation Area
 - Potential Inundation Area

Footnote:
1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 9/29/2014



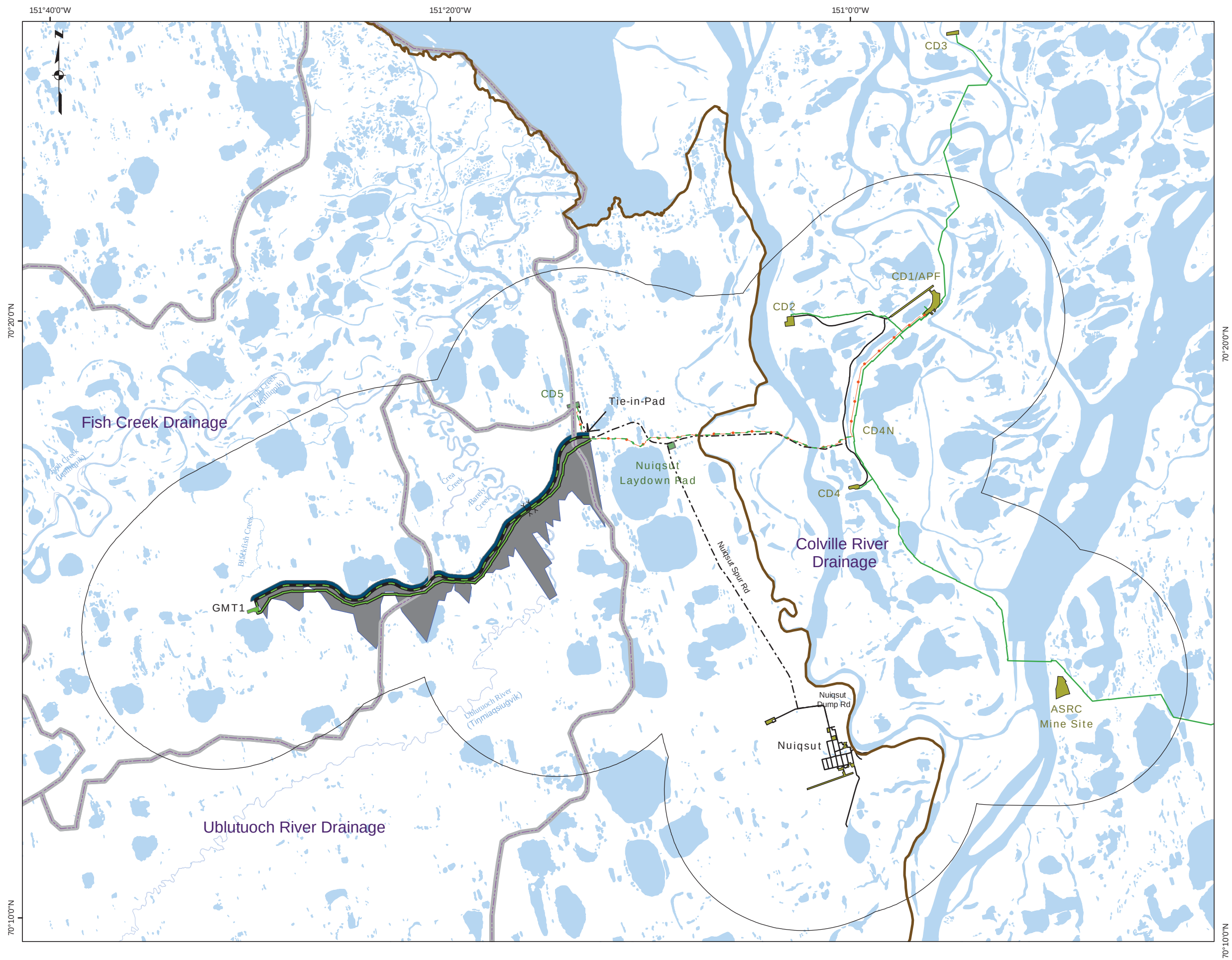
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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 4.2-3

Alternative B Potential Inundation Analysis

- | | |
|---|--|
| Alternative B Infrastructure | Proposed or Permitted (not part of GMT1) |
| Road | Pipeline |
| Pipeline | Road |
| Facility | Facility |
| 14 inch Water ¹ Injection Line | Boundary |
| Bridge | Drainage Basin |
| | Project Study Area |
| | NPR-A |

- Potential Inundation Area
- Decreased Inundation Area
 - Potential Inundation Area
- NOTE: ROUGH ORDER OF MAGNITUDE ESTIMATE OF MAXIMUM INUNDATION

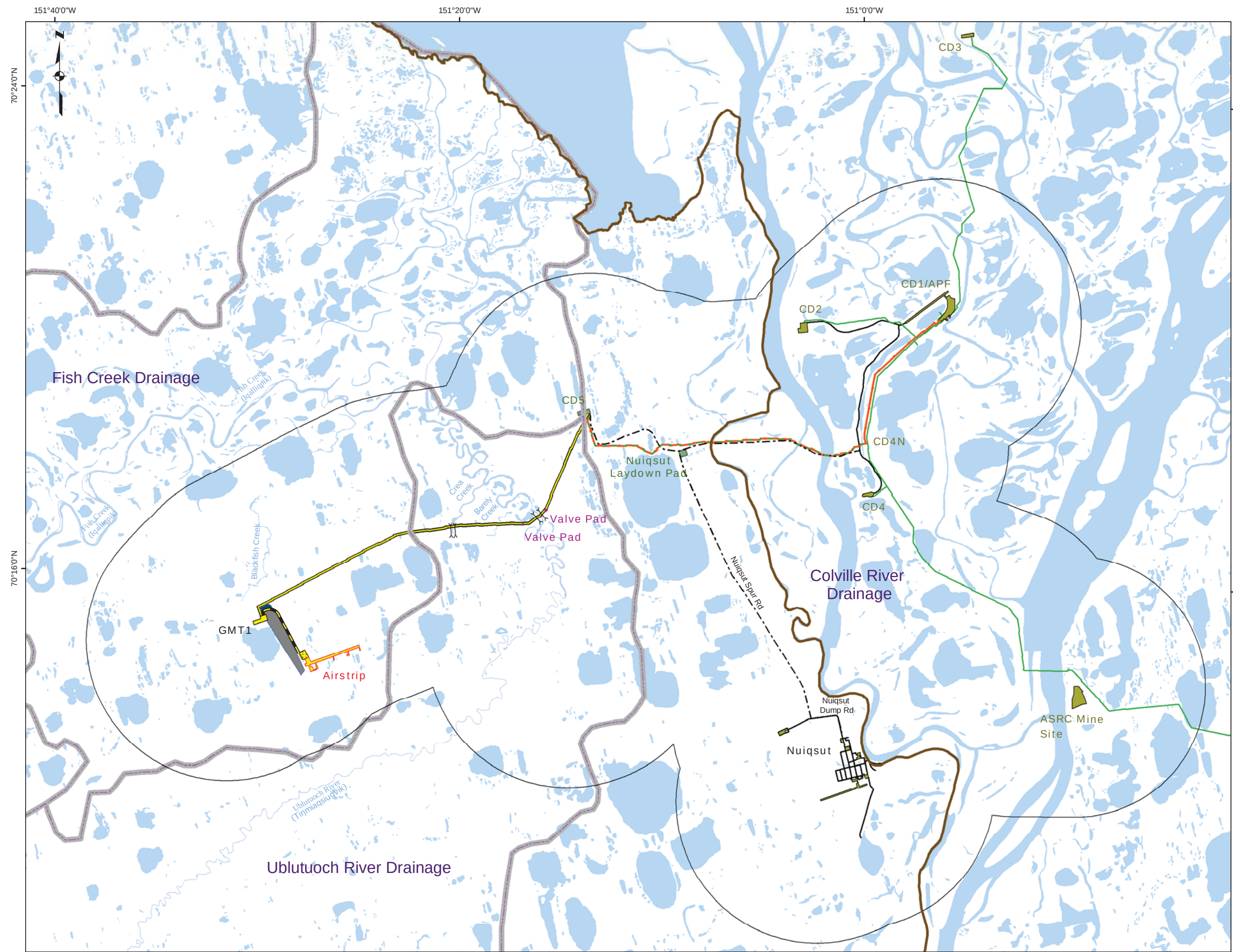
Footnote:
1: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Draft Date: 9/28/2014

0 0.5 1 2 3 Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



Map 4.2-4

Alternatives D1 and D2
Potential Inundation Analysis

Alternative D1/D2 Infrastructure

Road

Pipeline

Facility

14 inch Water^{1,2} Injection Line

Bridge

Proposed or Permitted (not part of GMT1)

Pipeline

Road

Facility

Existing Pipeline

Existing Road

Existing Facility

Boundary

Drainage Basin

Project Study Area

NPR-A

Potential Inundation Area

Decreased Inundation Area

Potential Inundation Area

NOTE: ROUGH ORDER OF MAGNITUDE
ESTIMATE OF MAXIMUM INUNDATION

Footnote:

1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1

2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).

Date: 9/29/2014

00.5123

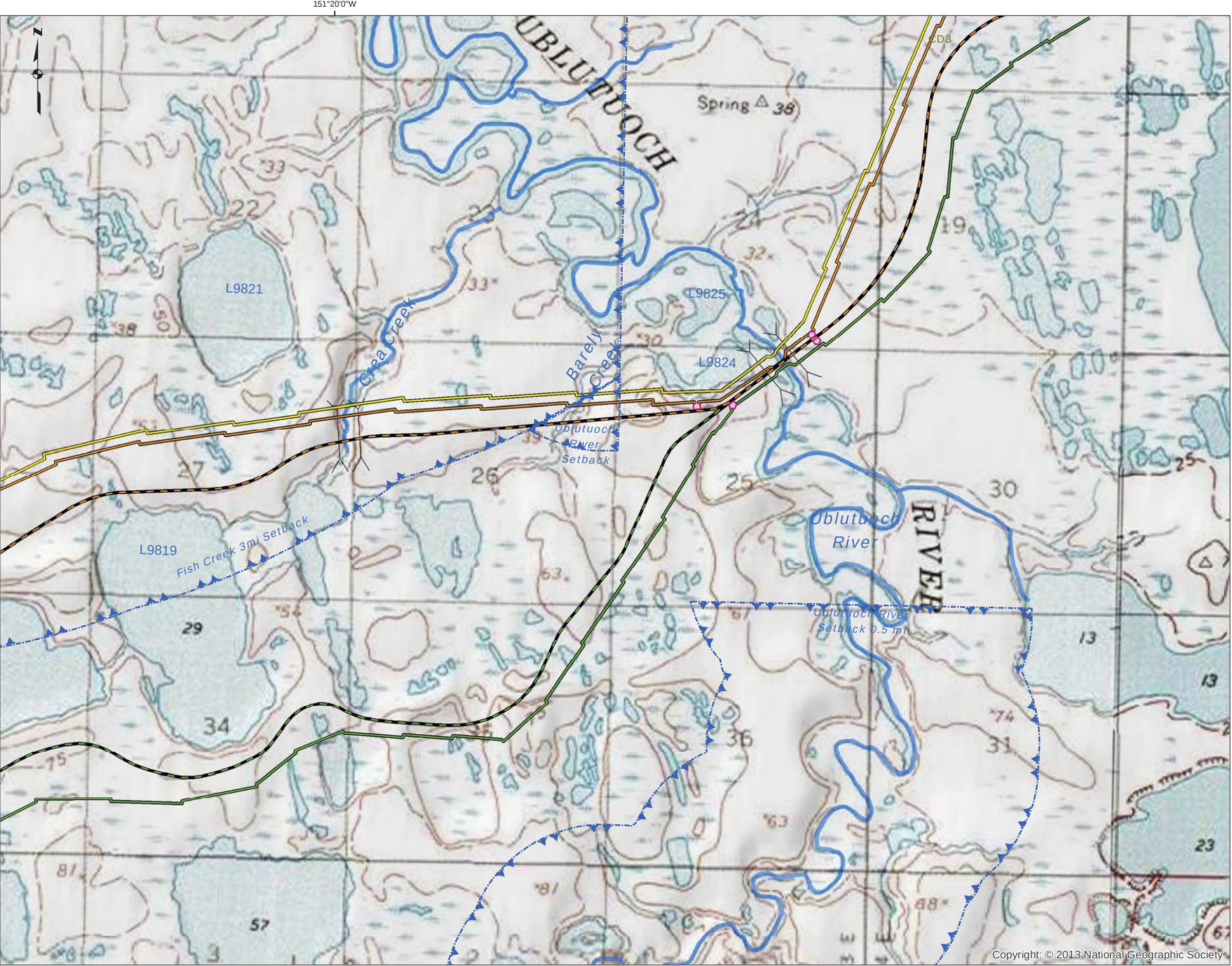
Miles

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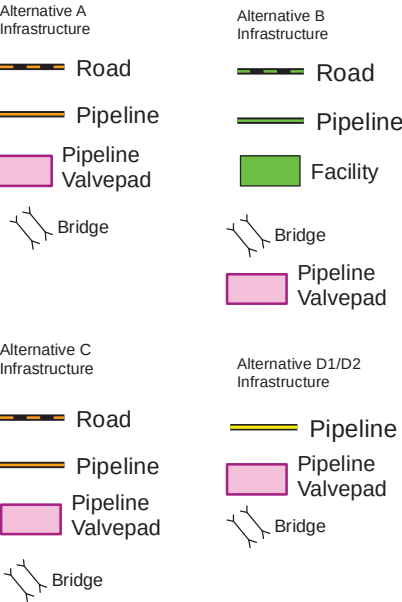
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

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Map 4.2-5
Road and Pipeline Crossings:
Tinmiasigvik (Ublutuocho) River,
Crea Creek and Barely Creek



Setback Area
Fish Creek 3mi
Ublutuocho River 0.5mi

Date: 10/21/2014
0 0.125 0.25 0.5 0.75 Miles

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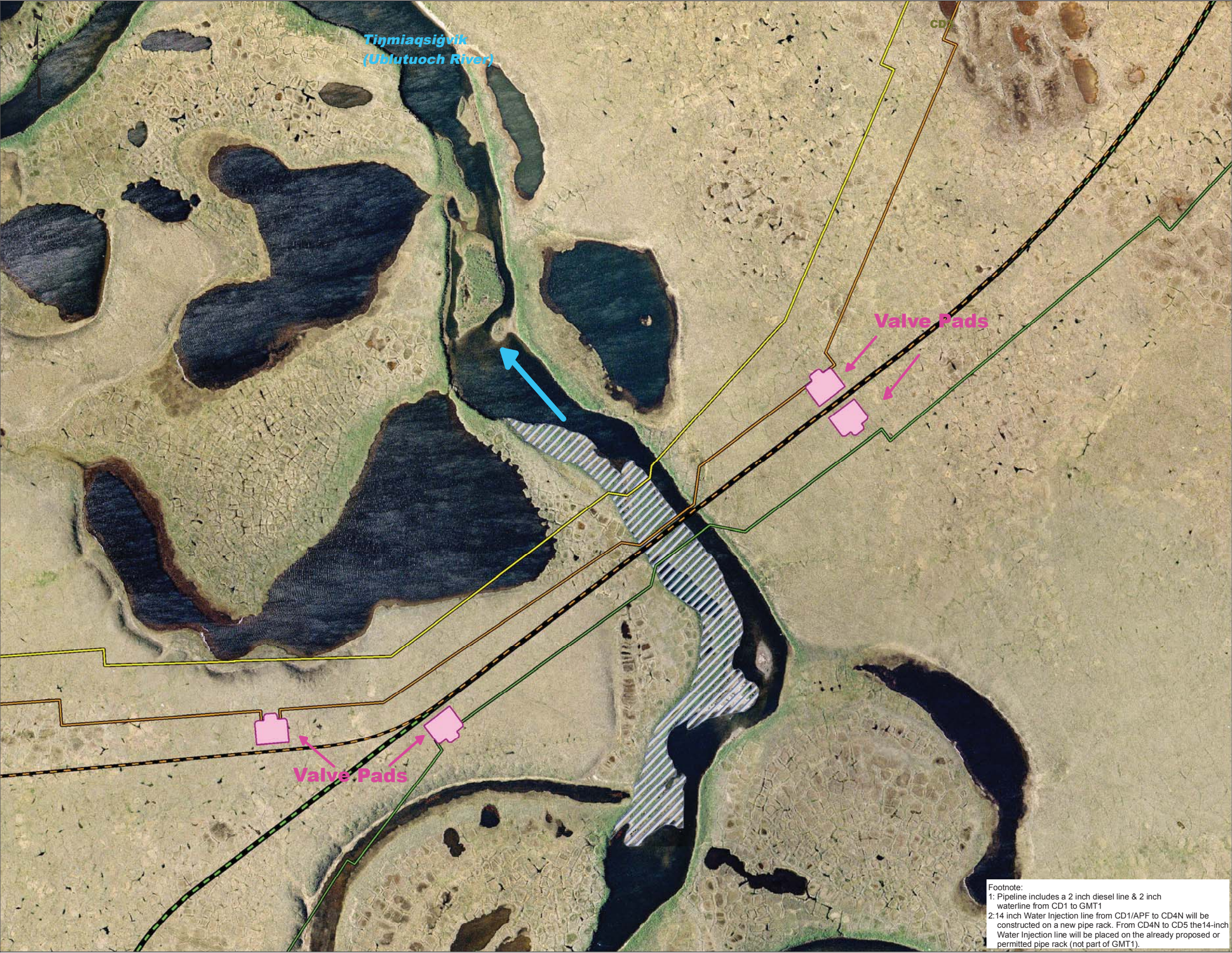
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 4.2-6
Road and Pipeline Crossings:
Tinmiasigvik (Ublutuoch)
River Crossing

Alternative A Infrastructure	Alternative B Infrastructure
Road	Road
Pipeline	Pipeline
Pipeline Valvepad	Pipeline Valvepad

Alternative C Infrastructure	Alternative D1/D2 Infrastructure
Road	Pipeline
Pipeline	Pipeline Valvepad
Pipeline Valvepad	

- Hydrology
- Water Flow Direction of Gradient
 - Lower Flood Plain Area

Date: 9/29/2014

0 140 280 560 840 Feet

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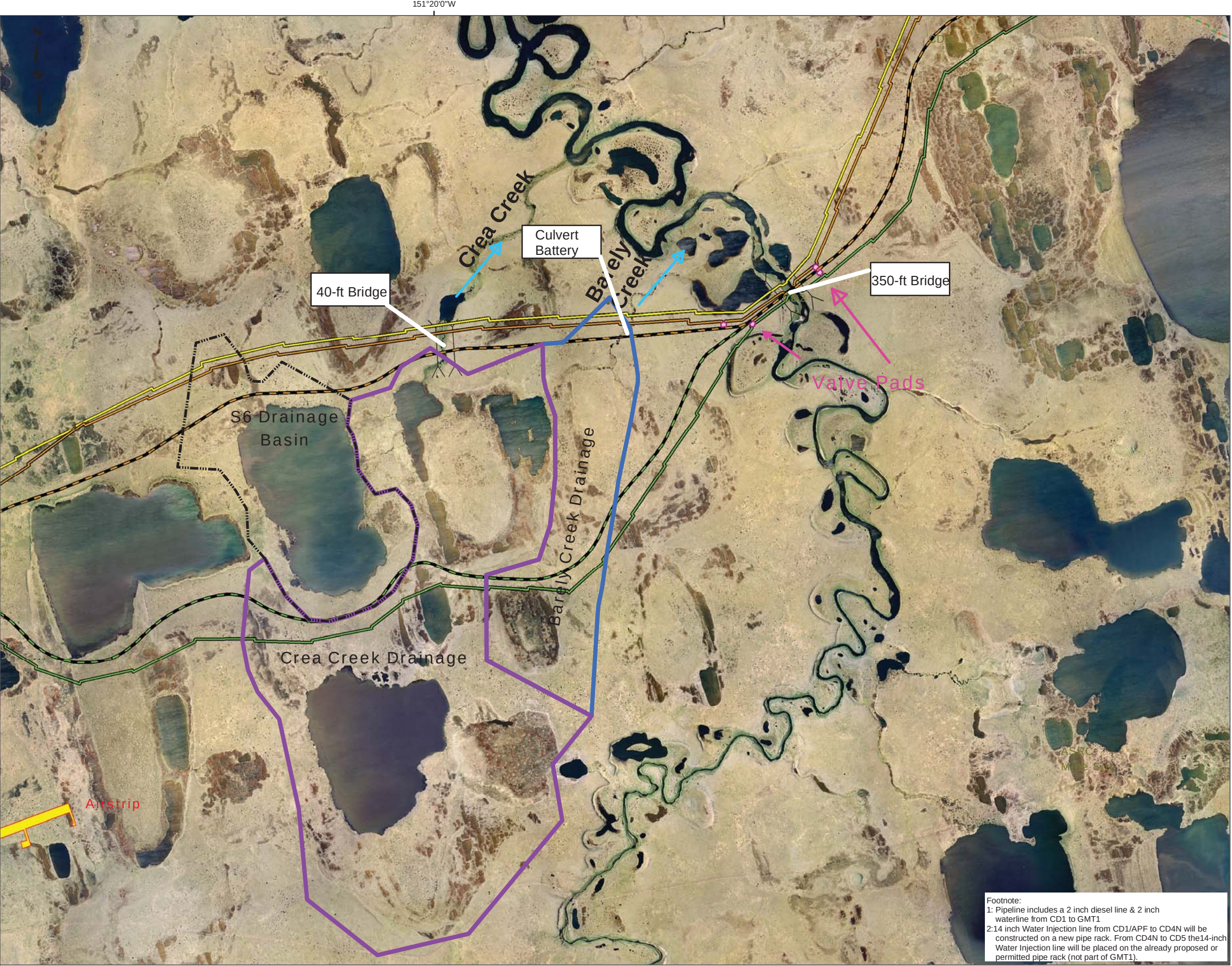
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).



Map 4.2-7
Crea Creek and Barely
Creek Drainage Basins

- Alternative A Infrastructure
- Road
 - Pipeline
 - Bridge
- Alternative B Infrastructure
- Road
 - Pipeline
 - Bridge

- Alternative C Infrastructure
- Road
 - Pipeline
 - Bridge
- Alternative D1/D2 Infrastructure
- Pipeline
 - AirStrip
 - Bridge

Creek_Drainage

- Barely Creek Drainage
- Crea Creek Drainage
- S6 Drainage Basin

Direction of water flow

Date: 9/27/2014

0 0.125 0.25 0.5 0.75 Miles

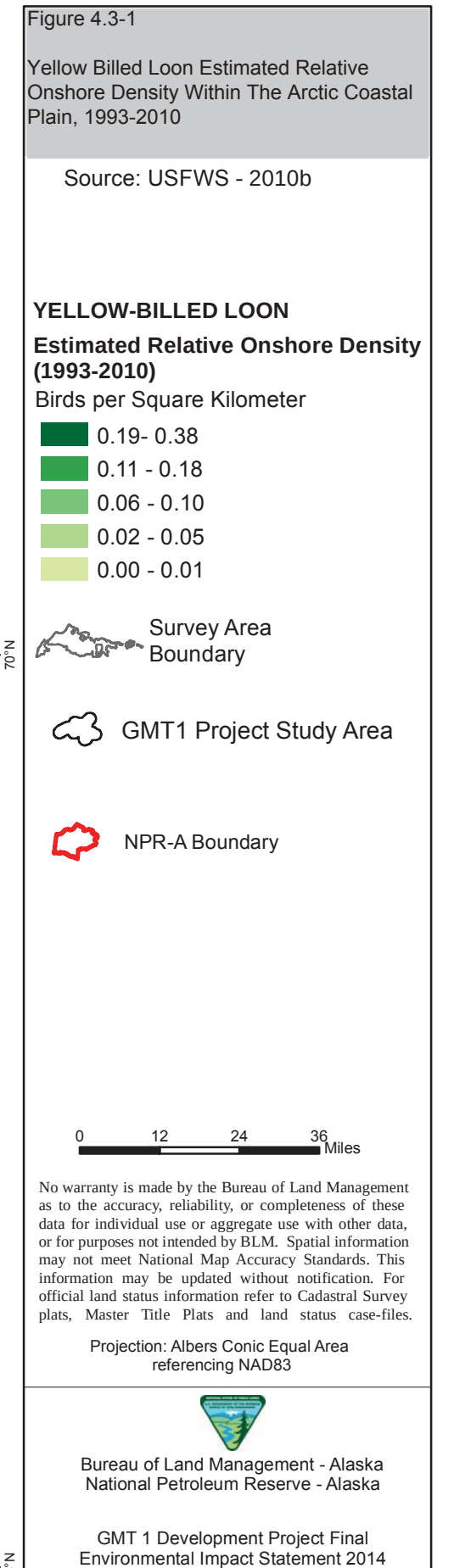
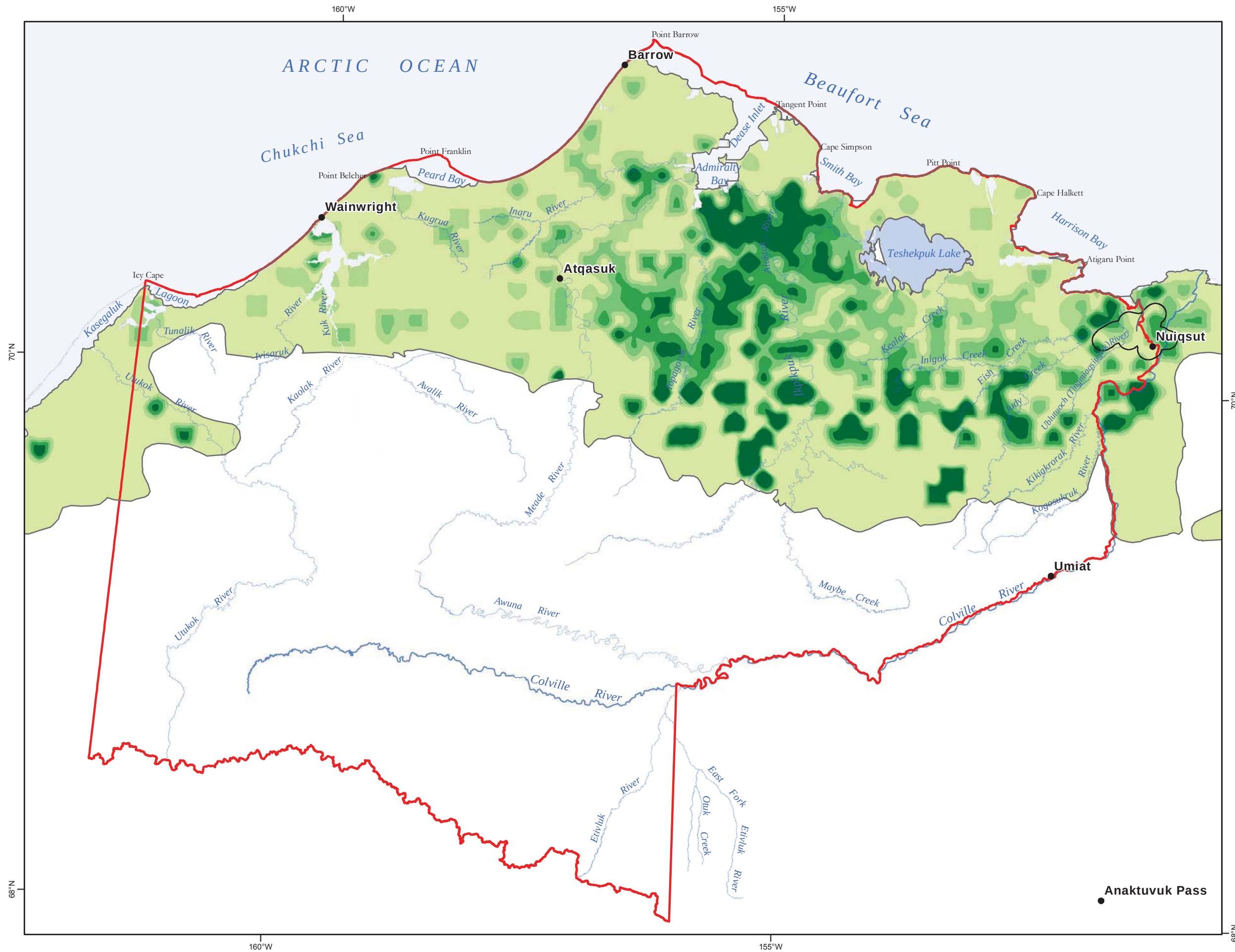
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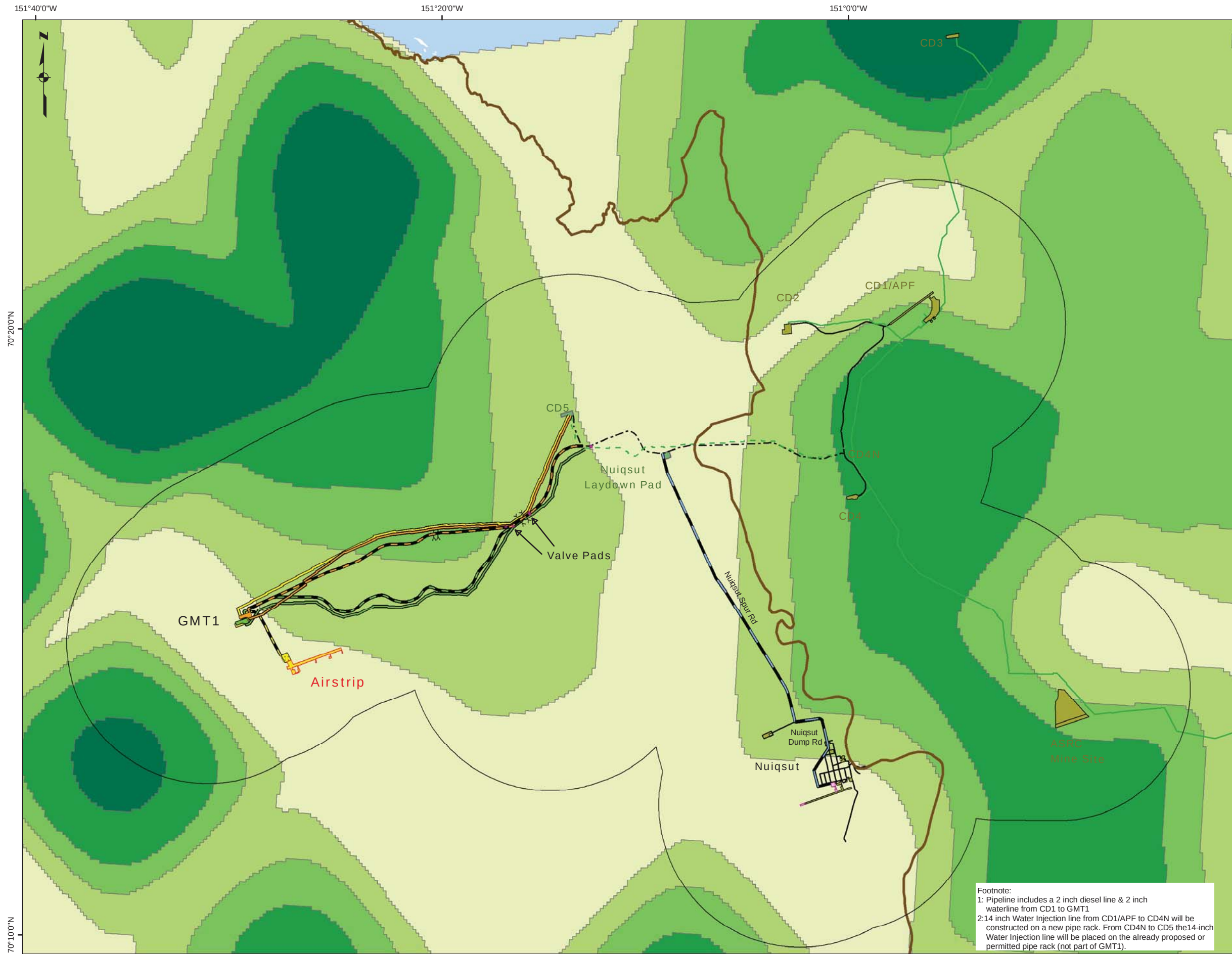
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



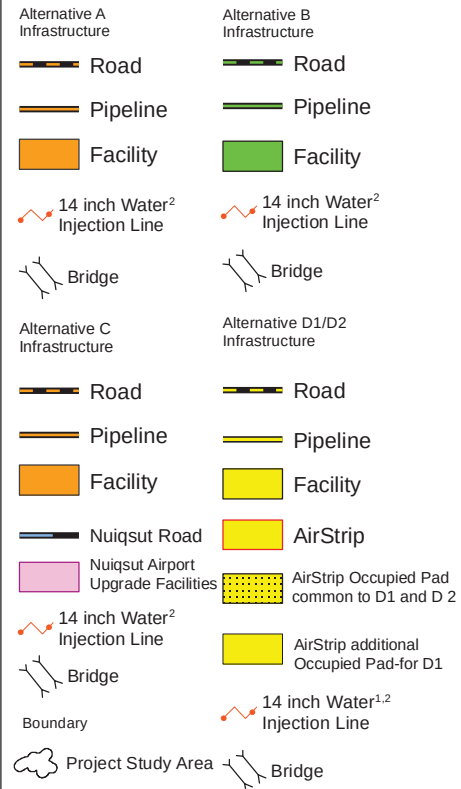
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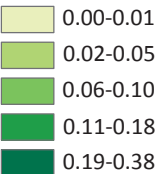




Map 4.3-2
Yellow-billed Loon
Estimated Relative Onshore
Density within the
Project Study Area, 1993-2010



**Yellow Billed Loons
Estimated Relative
Onshore Density
(1993-2010)**



Date: 9/29/2014 Source: USFWS 2010b



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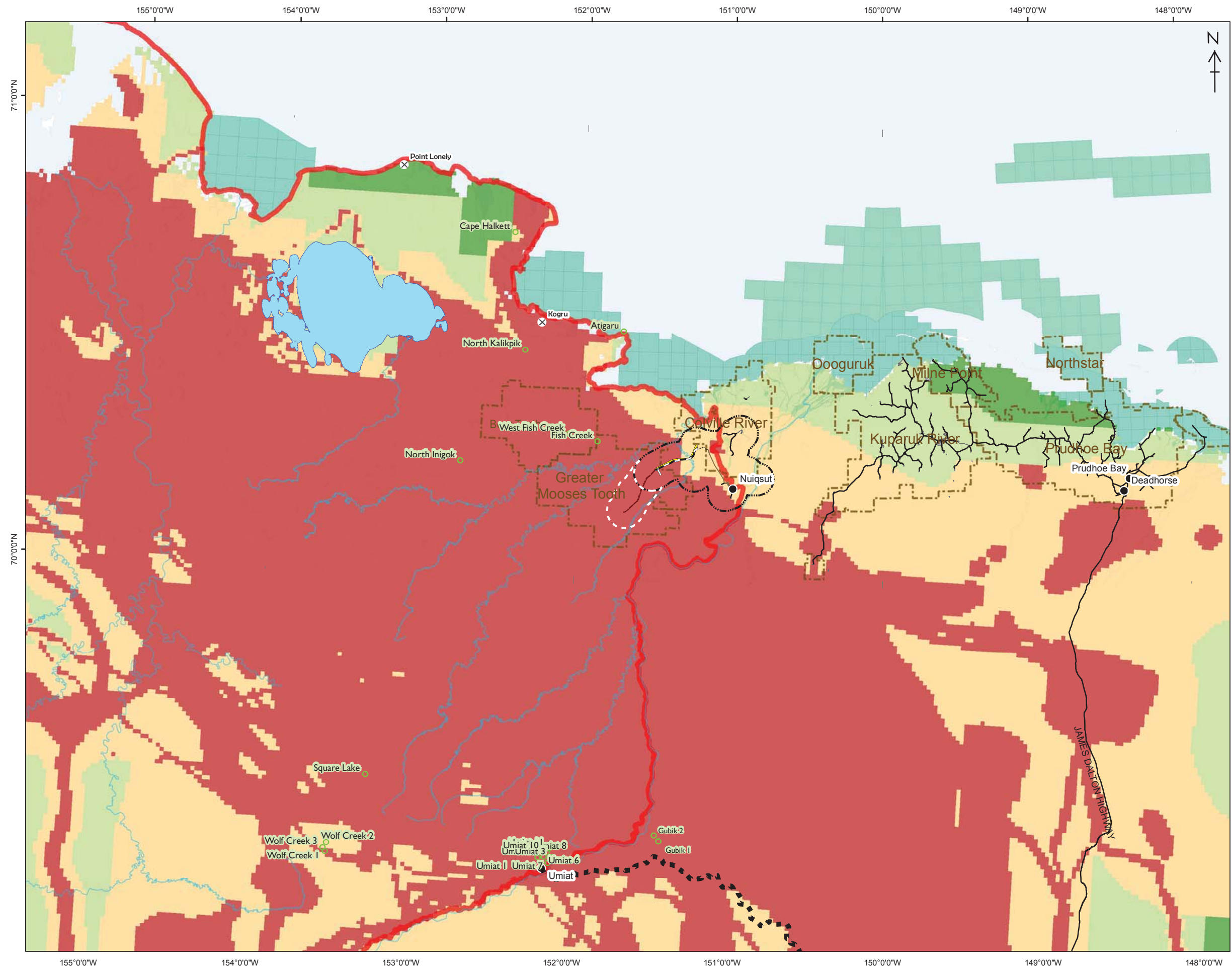
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Footnote:
1: Pipeline includes a 2 inch diesel line & 2 inch waterline from CD1 to GMT1
2: 14 inch Water Injection line from CD1/APF to CD4N will be constructed on a new pipe rack. From CD4N to CD5 the 14-inch Water Injection line will be placed on the already proposed or permitted pipe rack (not part of GMT1).



Map 4.3-3

Teshekpuk Caribou
Herd Females: Fall
Migration Movements
Relative to Potential
New Infrastructure

**Teshekpuk Caribou Herd
Males Fall Migration Movements**
Brownian Bridge Analysis

Low use

Moderately-low use

Moderately-high use

High use

Data analysis by Lincoln Parrett of ADF&G

Data gathered cooperatively by ADF&G, NSB, and BLM

Existing Oil & Gas Infrastructure

Above Ground

Existing Facility

Oil & Gas Unit

Proposed Infrastructure

GMT-1 Alt. A

GMT-2

Pipeline

Road

Access Road

Pipeline

Nuiqsut Spur Road

Road

GMT1 SEIS Project Areas

Project Study Area

GMT2 2.5-Mile Buffer

Proposed Foothills West Route (Road to Umiat)

Offshore Leases- BOEM

Offshore Leases- State of Alaska

Formerly Used Military Sites

Legacy Wells NPR-A

NPR-A

0

4

8

16

24

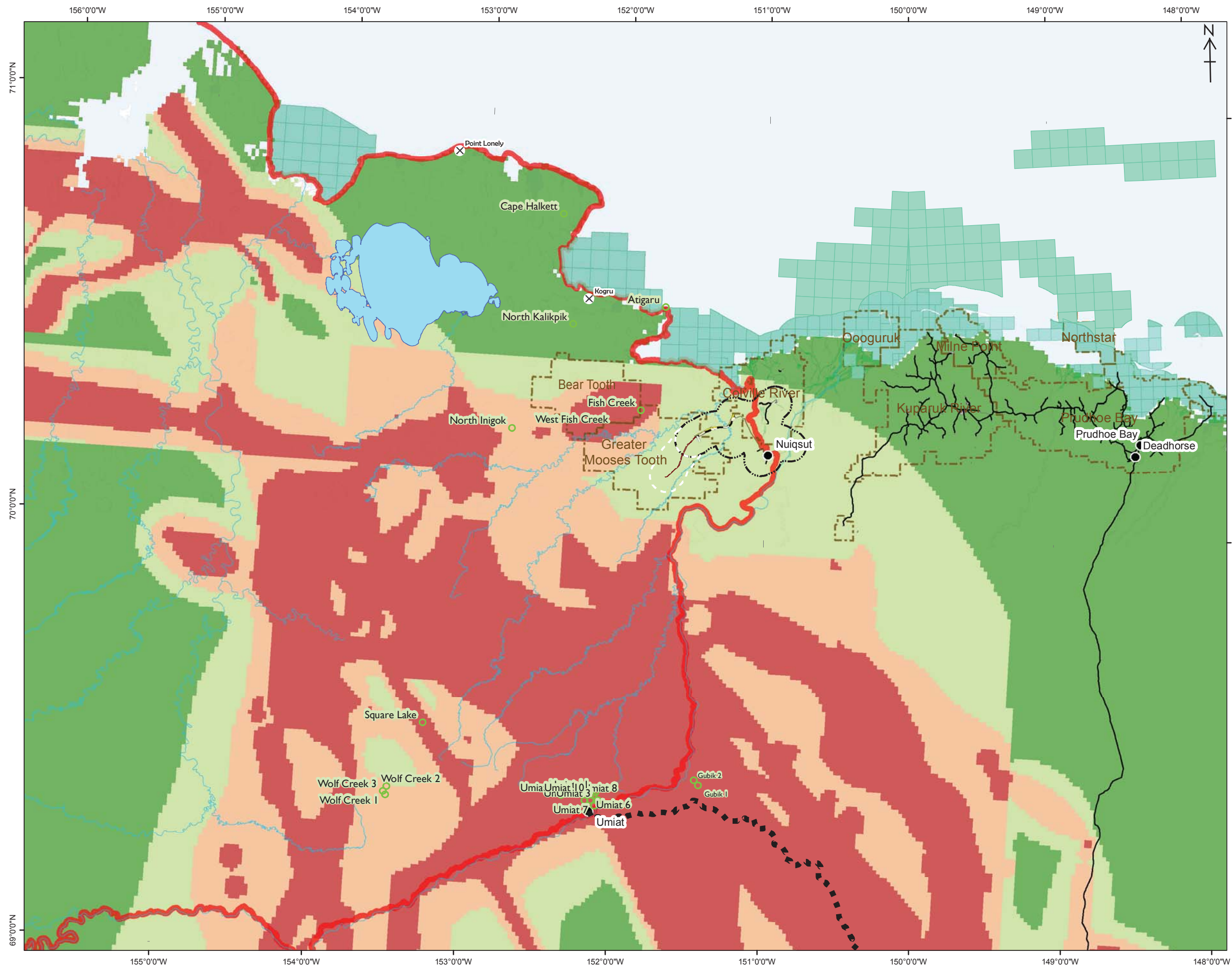
Miles

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Map 4.3-4

Teshekpuk Caribou
Herd Males: Fall
Migration Movements
Relative to Potential
New Infrastructure

**Teshekpuk Caribou Herd
Males Fall Migration Movements**
Brownian Bridge Analysis

Low use

Moderately-low use

Moderately-high use

High use

Data analysis by Lincoln Parrett of ADF&G

Data gathered cooperatively by ADF&G, NSB, and BLM

Existing Oil & Gas Infrastructure

Above Ground

Existing Facility

Oil & Gas Unit

Proposed Infrastructure

GMT-1 Alt. A

GMT-2

Pipeline

Road

Access Road

Pipeline

Nuiqsut Spur Road

Road

GMT1 SEIS Project Areas

Project Study Area

GMT2 2.5-Mile Buffer

Proposed Foothills West Route (Road to Umiat)

Offshore Leases- BOEM

Offshore Leases- State of Alaska

Formerly Used Military Sites

Legacy Wells NPR-A

NPR-A

0

4

8

16

24

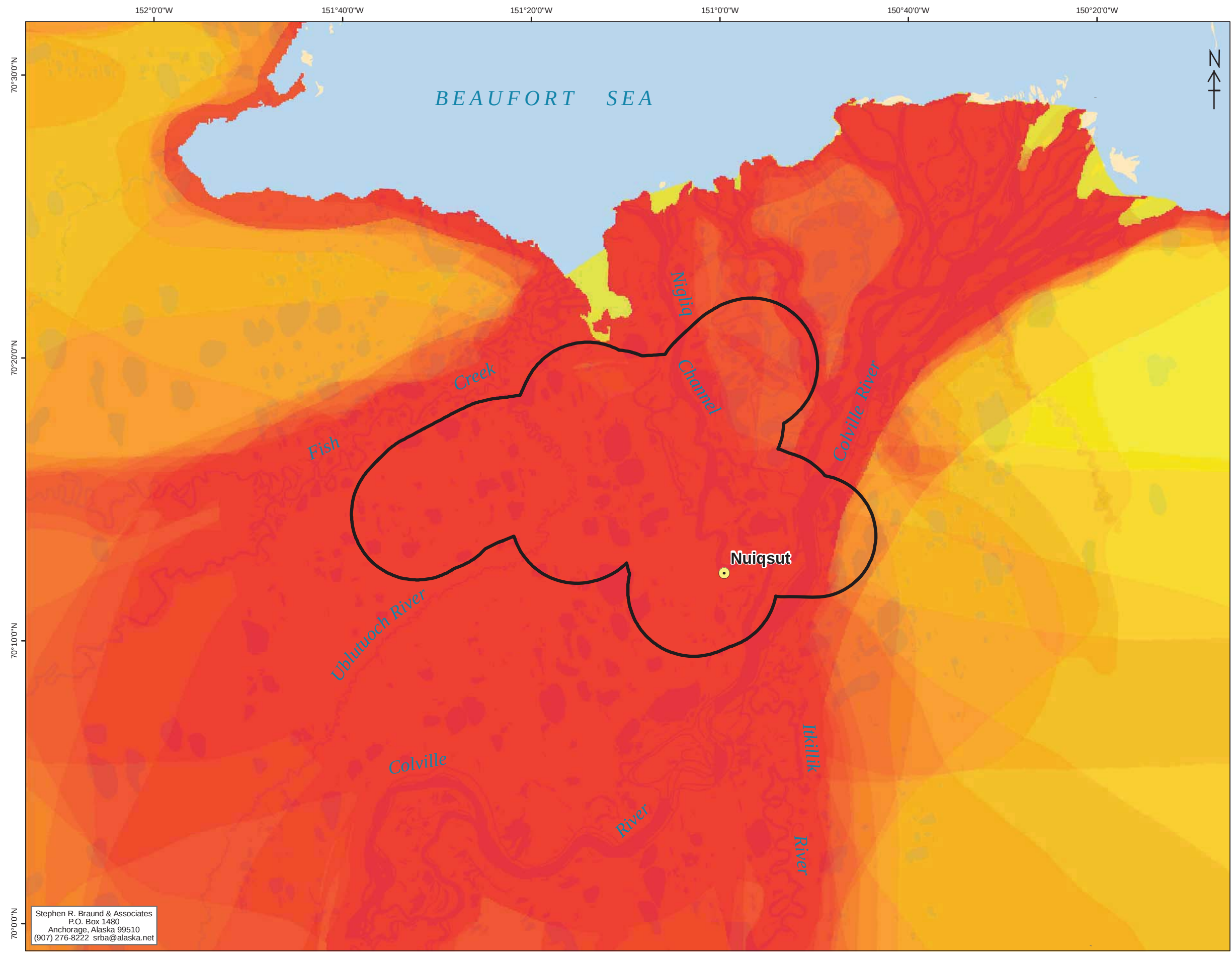
Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet

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Map 4.4-1
Caribou Subsistence Use Areas In
The Project Study Area, 1995-2006

Legend
High Overlapping Subsistence Use
Low Areas, Caribou, 1995-2006
(Source: SRBA 2010a)

In Nuiqsut, 94 caribou use areas
were reported by 32 respondents.
Use areas extend beyond the
extent of this map.

Project Study Area
Subsistence Study Community

0 1 2 4 6
Miles

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plats, Master Title Plats and land status case-files.

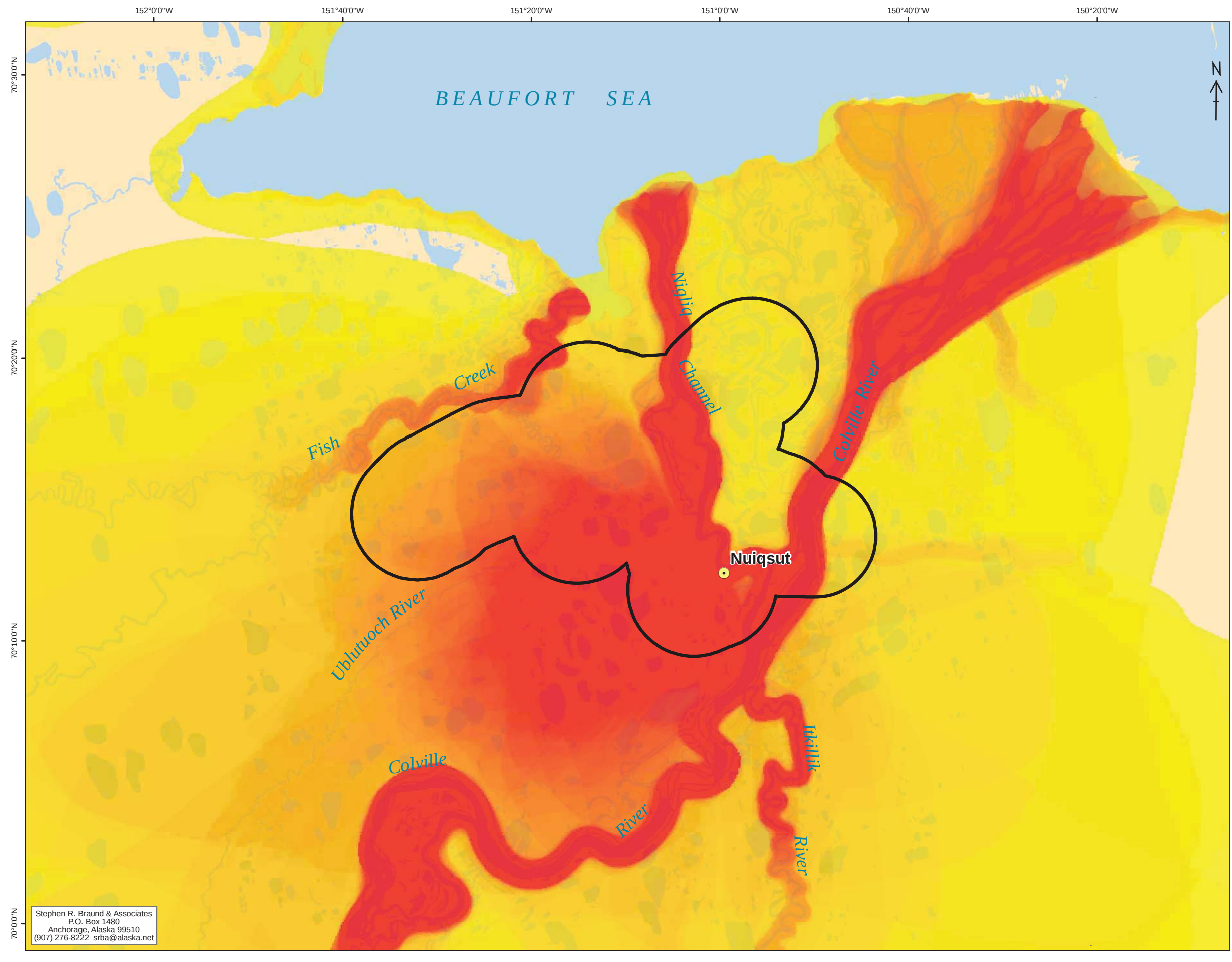
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 4.4-2
Caribou Subsistence Use Areas In
The Project Study Area, 2008-2011

Legend

High
Low

Overlapping Subsistence Use
Areas, Caribou, 2008-2011

Source: SRBA 2010b, 2011a,
2012, 2013b

SRB&A interviewed 96 active
harvesters from March 2009 through
November of 2011. The harvesters
reported 731 use areas. Use areas
extend beyond the extent of this map.

Project Study Area

Subsistence Study Community

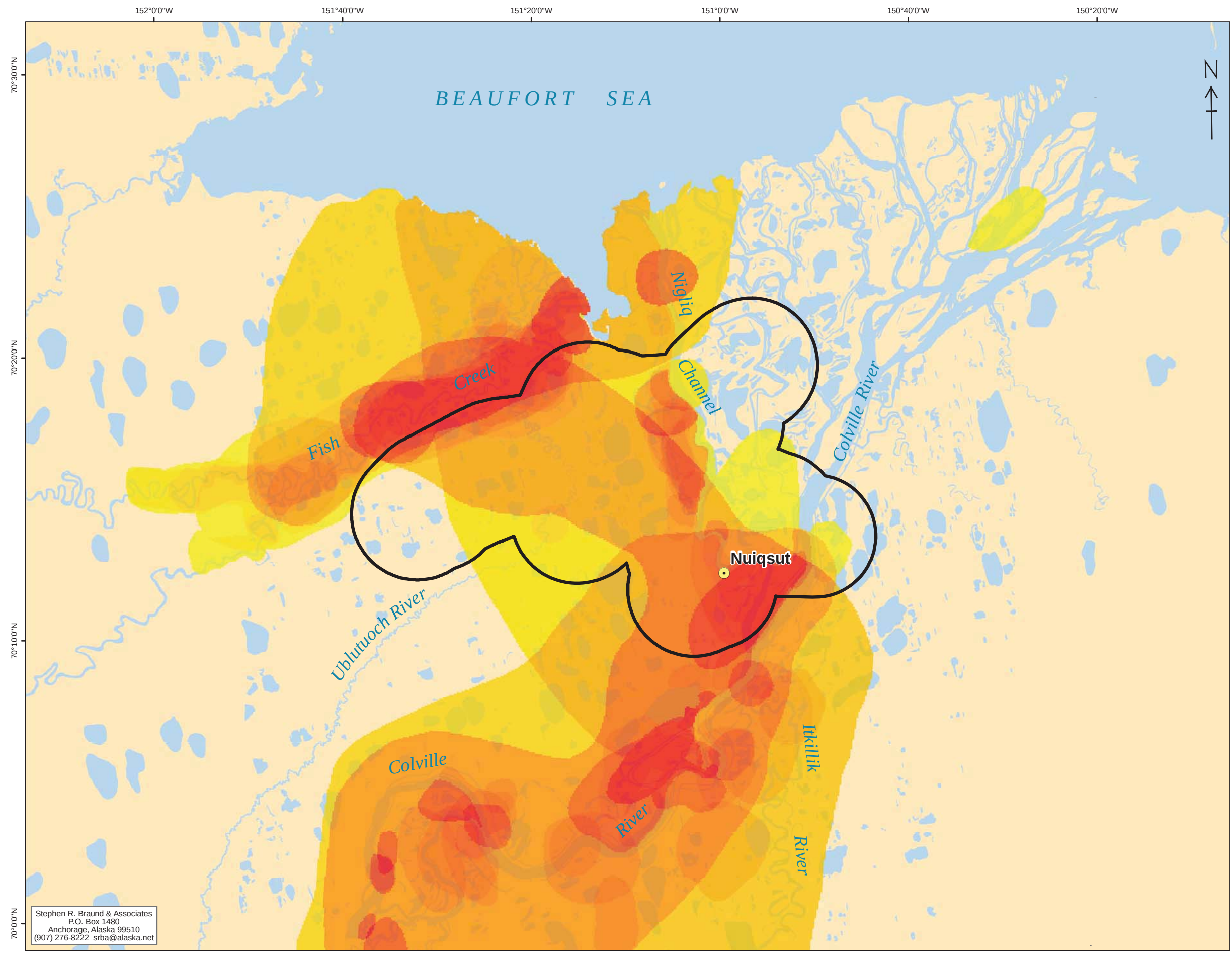
Date: 12/9/2013

0 1 2 4 6 Miles

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Map 4.4-3
Geese Subsistence Use Areas in the Project Study Area, 1995-2006

Legend
High Overlapping Subsistence Use Areas, Geese, 1995-2006 (Source: SRBA 2010a)
Low

In Nuiqsut, 179 geese use areas were reported by 33 respondents. Use areas extend beyond the extent of this map.

Project Study Area
Subsistence Study Community

Draft Date: 12/9/2013



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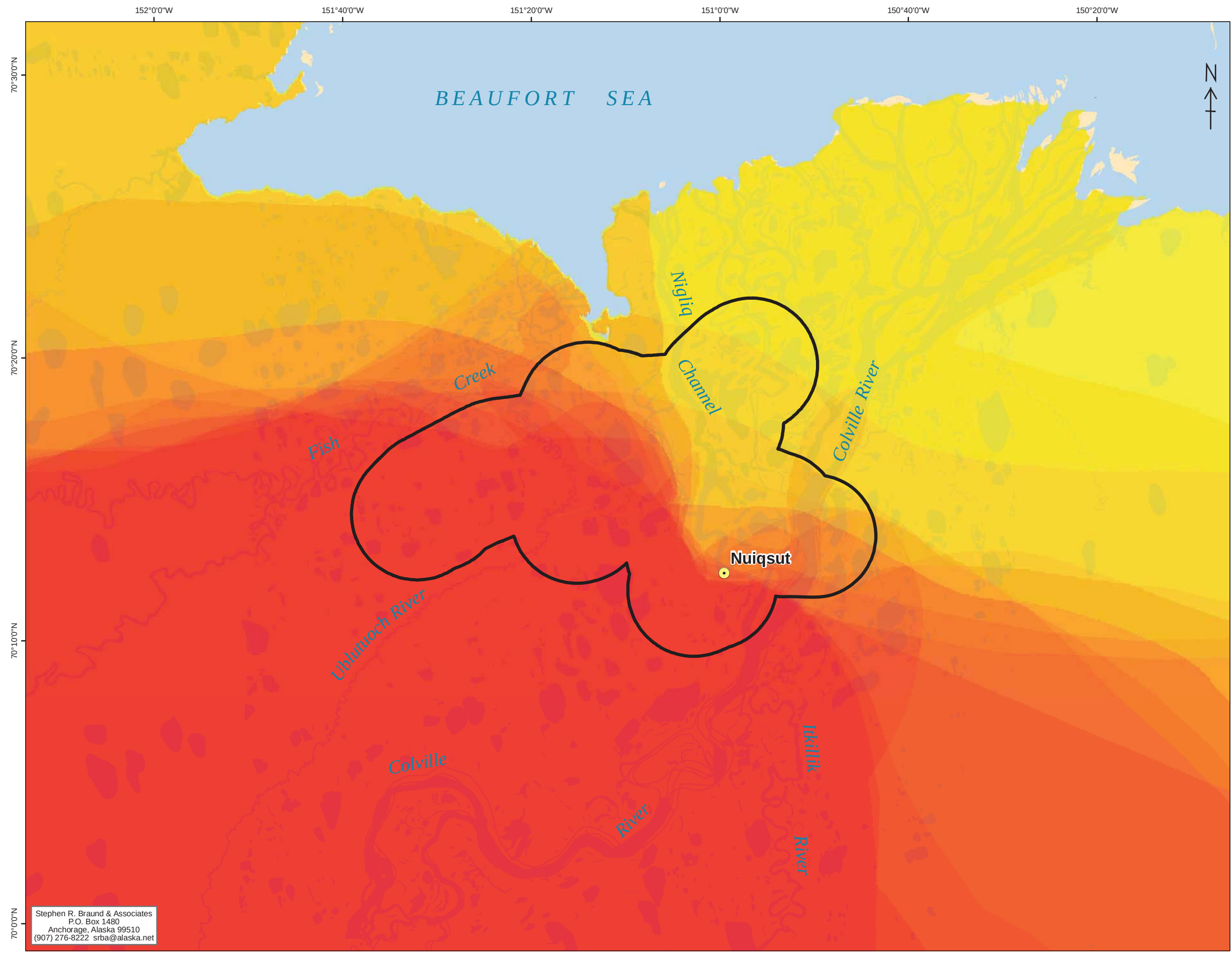
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Map 4.4-4
Wolf and Wolverine Subsistence
Use Areas in the Project Study
Area, 1995-2006

Legend
High Overlapping Subsistence Use
Low Areas, Wolf and Wolverine,
1995-2006
(Source: SRBA 2010a)

In Nuiqsut, 69 wolf and wolverine
use areas were reported by
24 respondents. Use areas extend
beyond the extent of this map.

- Project Study Area
- Subsistence Study Community

Draft Date: 12/9/2013



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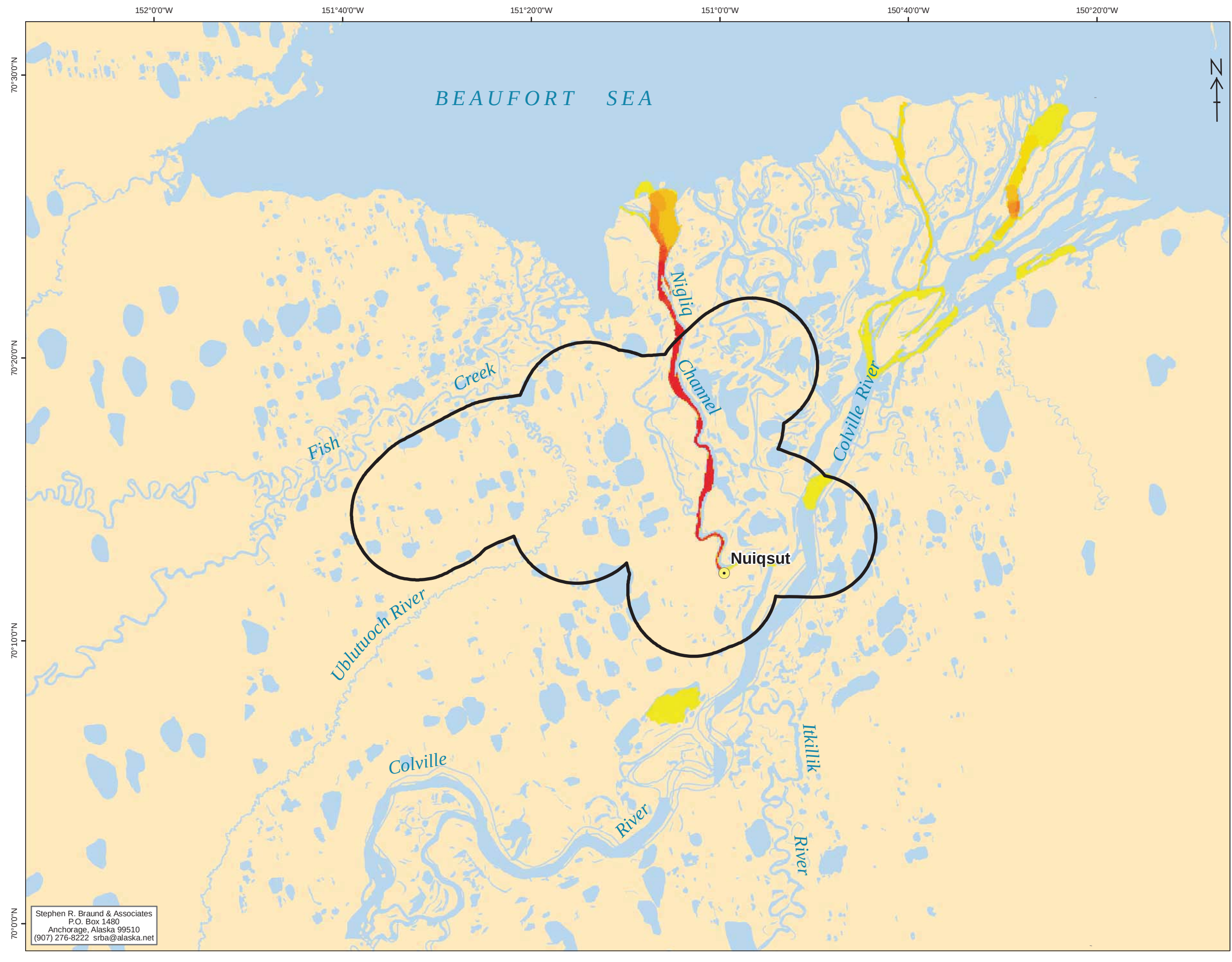
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 4.4-5

Arctic Cisco Subsistence
Use Areas in the Project
Study Area, 1995-2006

Legend

High
Low

Overlapping Subsistence Use
Areas, Arctic Cisco, 1995-2006
(Source: SRBA 2010a)

In Nuiqsut, 66 Arctic Cisco use areas
were reported by 33 respondents.
Use areas extend beyond the
extent of this map.

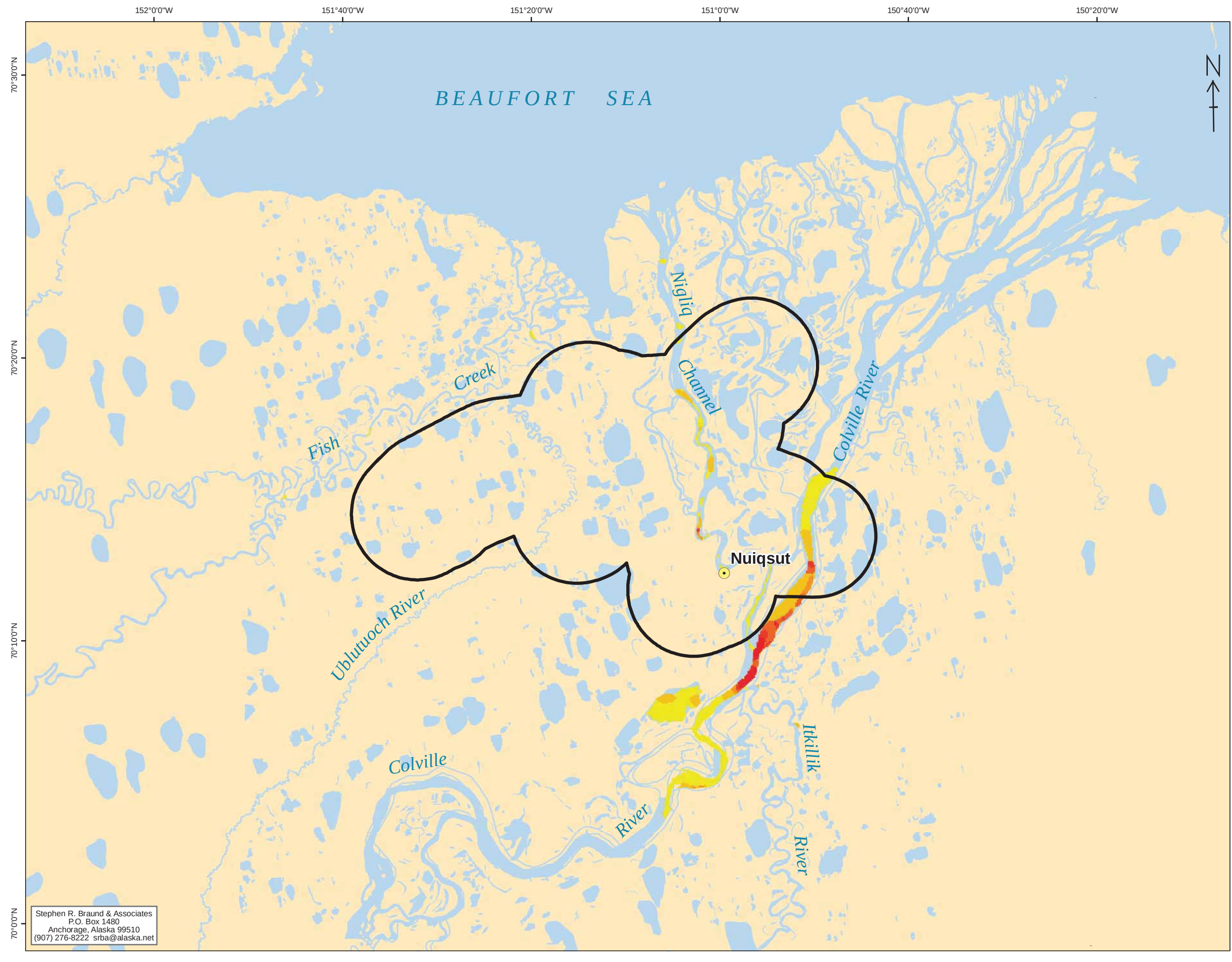
Project Study Area
Subsistence Study Community

Draft Date: 12/9/2013

0 1 2 4 6 Miles

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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



Map 4.4-6
Burbot Subsistence Use Areas in
the Project Study Area, 1995-2006

Legend
High
Low
Overlapping Subsistence Use
Areas, Burbot, 1995-2006
(Source: SRBA 2010a)

In Nuiqsut, 62 burbot use areas
were reported by 30 respondents.
Use areas extend beyond the
extent of this map.

Project Study Area
Subsistence Study Community

Draft Date: 12/9/2013



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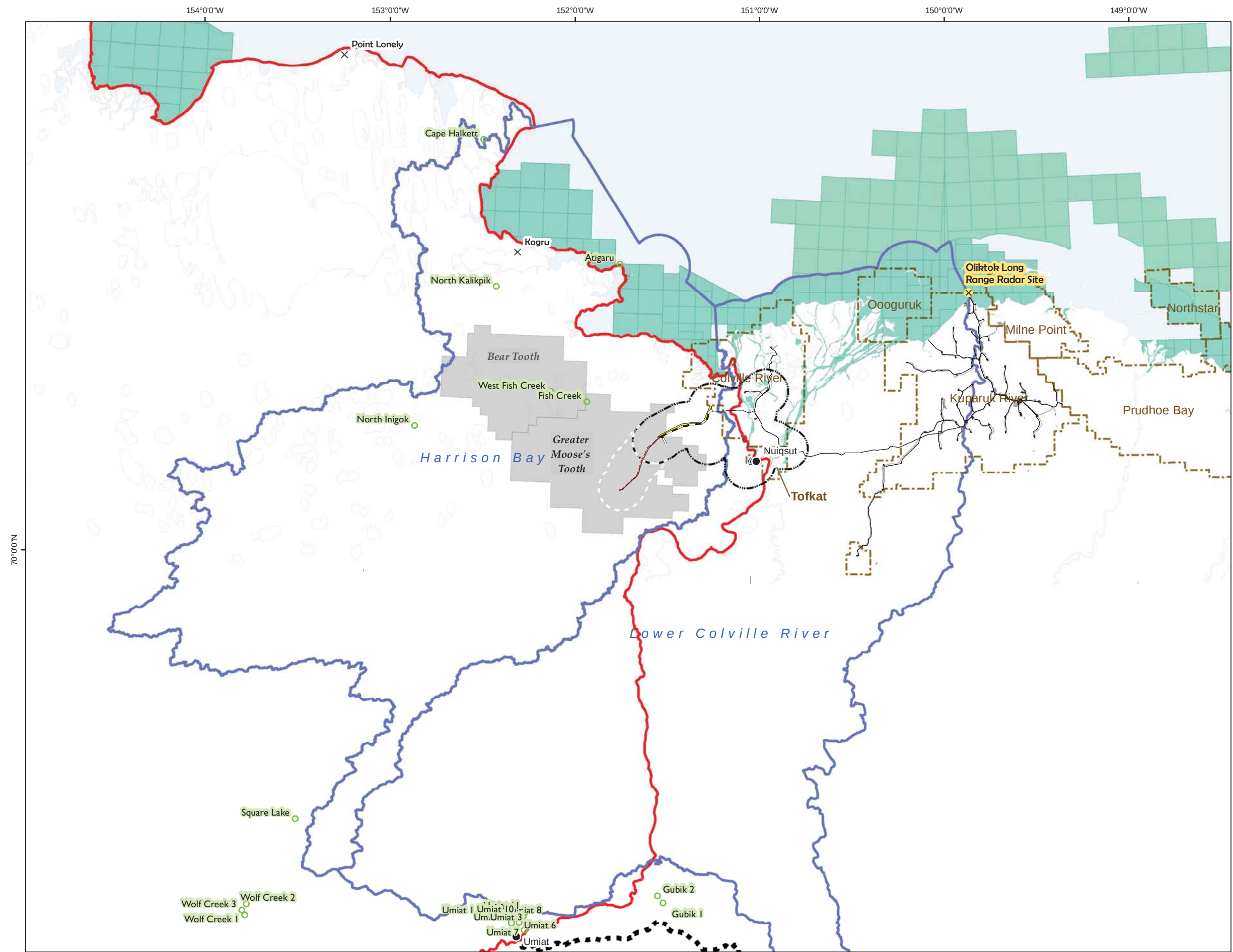
NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



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Map 4.6-1

Oil & Gas Infrastructure

Existing Oil & Gas Infrastructure

- Above Ground
- Existing Facility

Oil & Gas Producing Units

- Production Status
- Not Producing
 - Producing

Proposed Infrastructure

- | GMT-1 Alt. A | GMT-2 |
|-------------------|----------|
| Pipeline | Road |
| Access Road | Pipeline |
| Nuiqsut Spur Road | |

GMT1 SEIS Project Areas

- Project Study Area
- GMT2 2.5-Mile Buffer

- Proposed Foothills West Route (Road to Umiat)

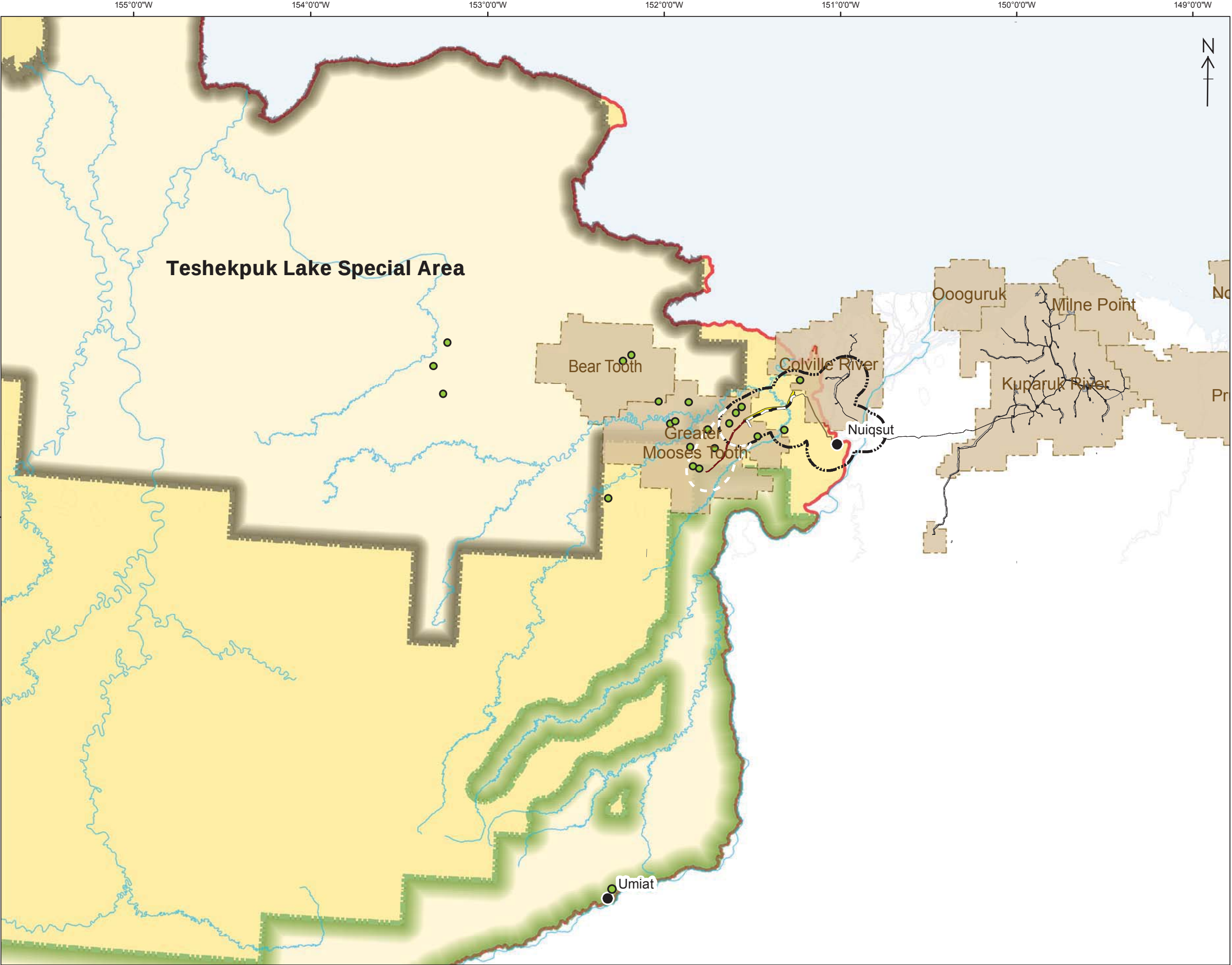
- Offshore Leases- BOEM
- Offshore Leases- State of Alaska

- Active Military Site
- Formerly Used Military Sites
- Legacy Wells NPR-A
- Hydrologic Units (HUC8)
- NPR-A



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NAD 1983 StatePlane Alaska 4 FIPS 5004 Feet



Map 4.6-2
Oil and Gas
Exploratory Wells
and NPR-A Special Areas

Exploratory Well

NPR-A Special Areas
Colville River Special Area
Teshekpuk Lake Special Area

Existing Oil & Gas Infrastructure

Above Ground
Existing Facility

Oil & Gas Producing Units

Proposed Infrastructure

GMT-1 Alt. A
Pipeline
Access Road
Nuiqsut Spur Road
GMT-2
Road
Pipeline

GMT1 SEIS Project Areas

Project Study Area
GMT2 2.5-Mile Buffer

NPR-A

0 8 16
Miles

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