



U.S. Department of the Interior
Bureau of Land Management

Willow Master Development Plan

Supplemental Environmental Impact Statement

DRAFT

Volume 3: Figure 3.13.1 through Figure 4.3.5B

June 2022

Prepared by:

U.S. Department of the Interior
Bureau of Land Management

In Cooperation with:

U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
Native Village of Nuiqsut
Iñupiat Community of the Arctic Slope
City of Nuiqsut
North Slope Borough
State of Alaska

Estimated Total Costs Associated
with Developing and Producing this
SEIS: \$1,318,200



Mission

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

Cover Photo Illustration: North Slope Alaska oil rig during winter drilling.

Photo by: Judy Patrick, courtesy of ConocoPhillips.

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BLM/AK/PL-22/032+1610+F010

Willow Master Development Plan

Appendix A – Part 2

Figures

June 2022

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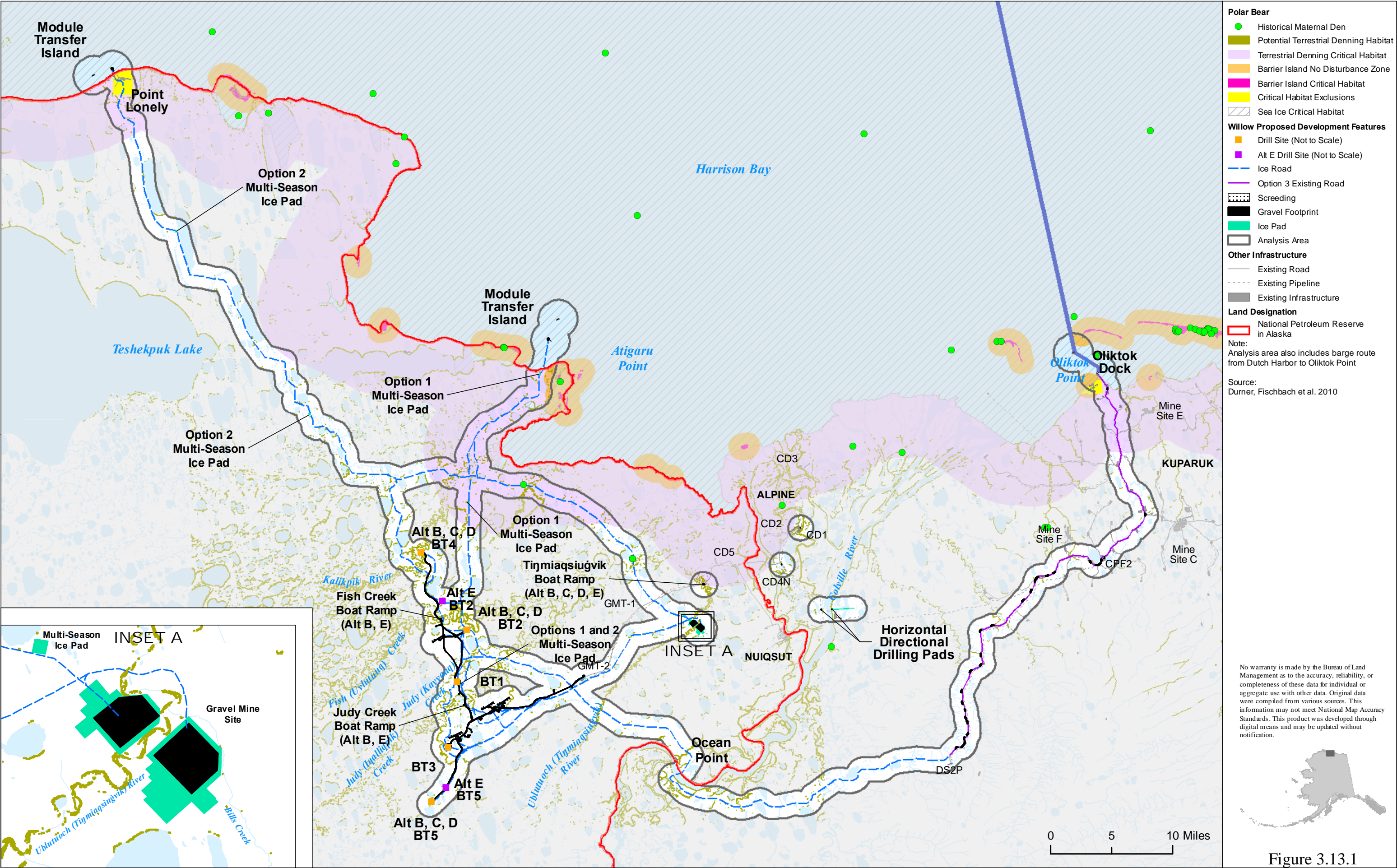
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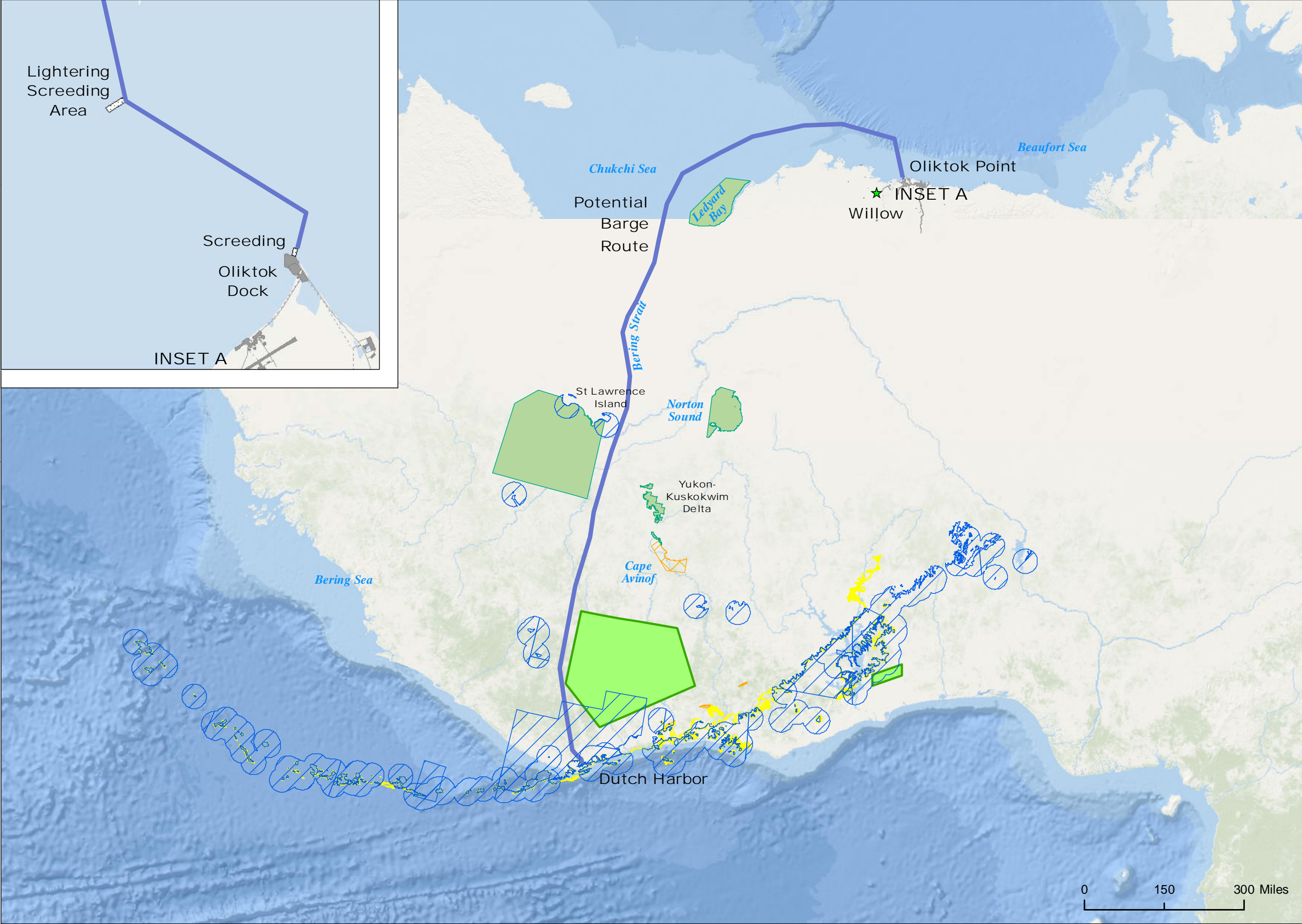


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0 5 10 Miles

Figure 3.13.1



Potential Marine Vessel Route

- Potential Vessel Route

National Marine Fisheries Service Critical Habitat

- Stellar Sea Lion Critical Habitat (Foraging area and 20 nautical mile aquatic zone)
- North Pacific Right Whale Critical Habitat

United States Fish and Wildlife Service Critical Habitat

- Sea Otter Critical Habitat
- Steller's Eider Critical Habitat
- Spectacled Eider Critical Habitat

Willow Proposed Development Features

- Willow Project
- Screeding

Other Infrastructure

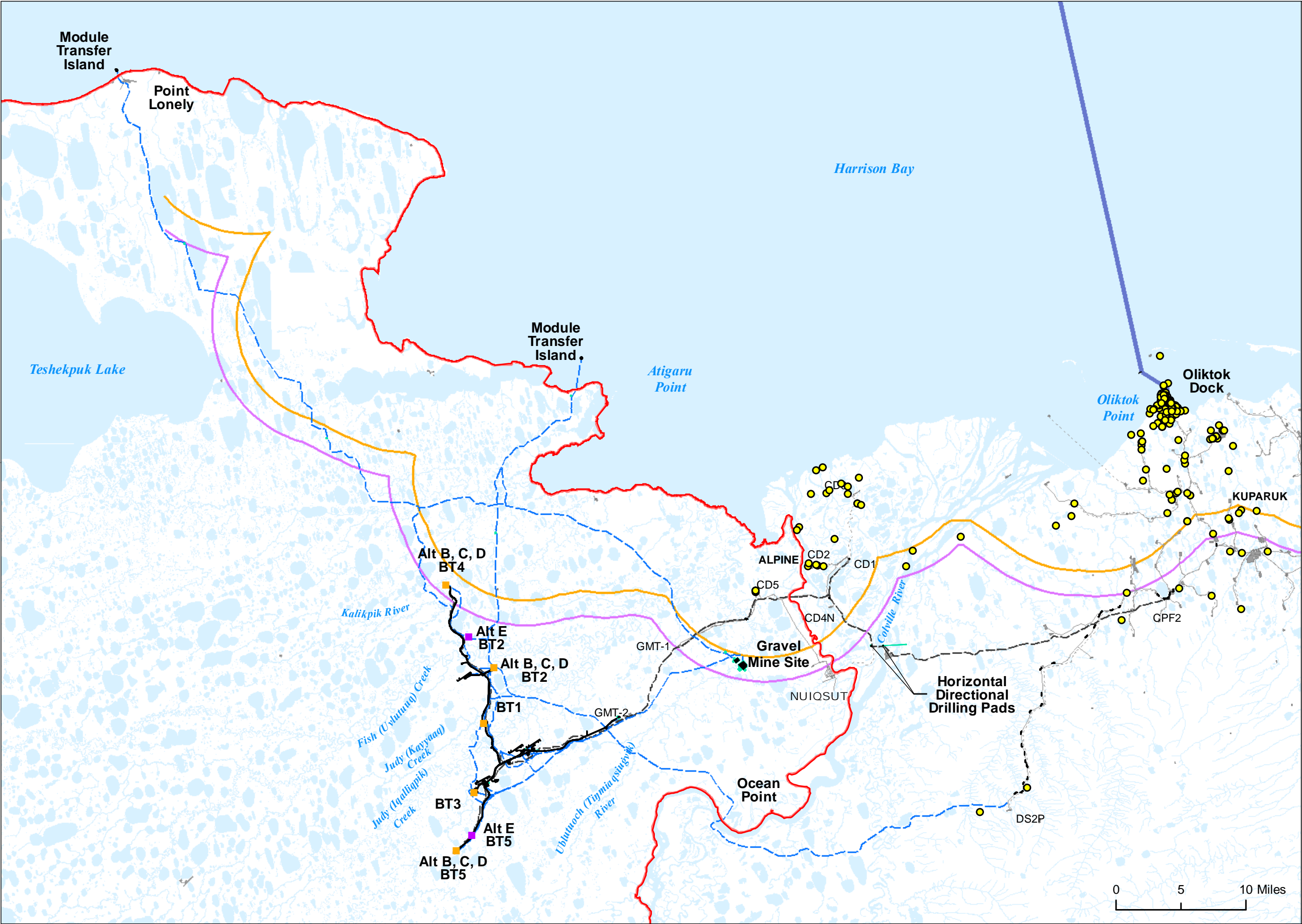
- Existing Road

Note: Action Area encompasses a 1.5 mile radius around barge route, support vessel route, screeding and 1 mile radius around onshore project components.

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Figure 3.13.2



Polar Bear

- CPAI Observations (1993-2019)
- 90th Percentile (Observations) 7.7 Miles From Coast
- 95th Percentile (Observations) 9.6 Miles From Coast

Willow Proposed Development Features

- Drill Site (Not to Scale)
- Ice Road
- New Pipeline
- Potential Vessel Route
- Gravel Footprint
- Screeding
- Ice Pad

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Land Designation

- National Petroleum Reserve in Alaska

Data Source: CPAI 2020

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Figure 3.13.3

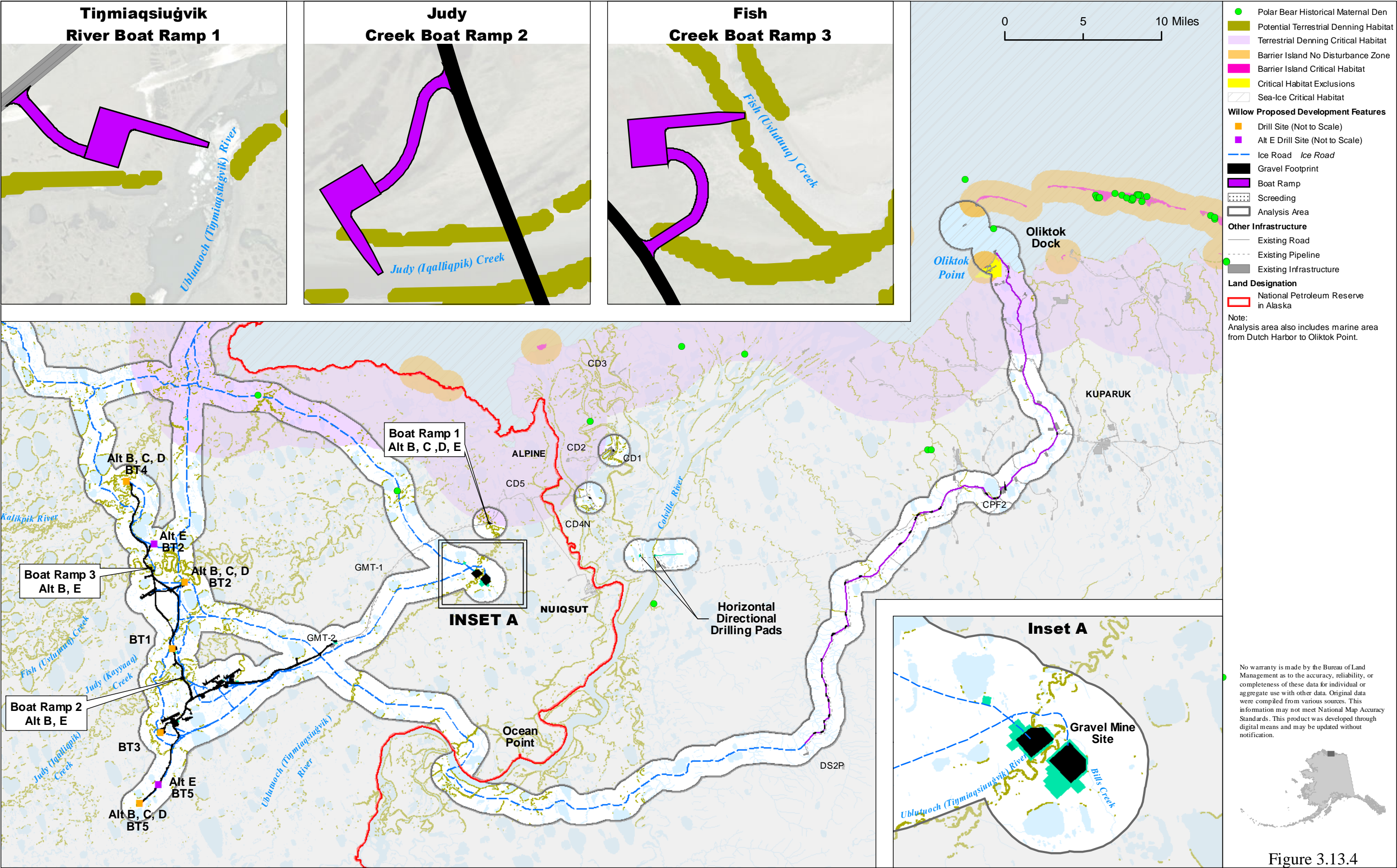
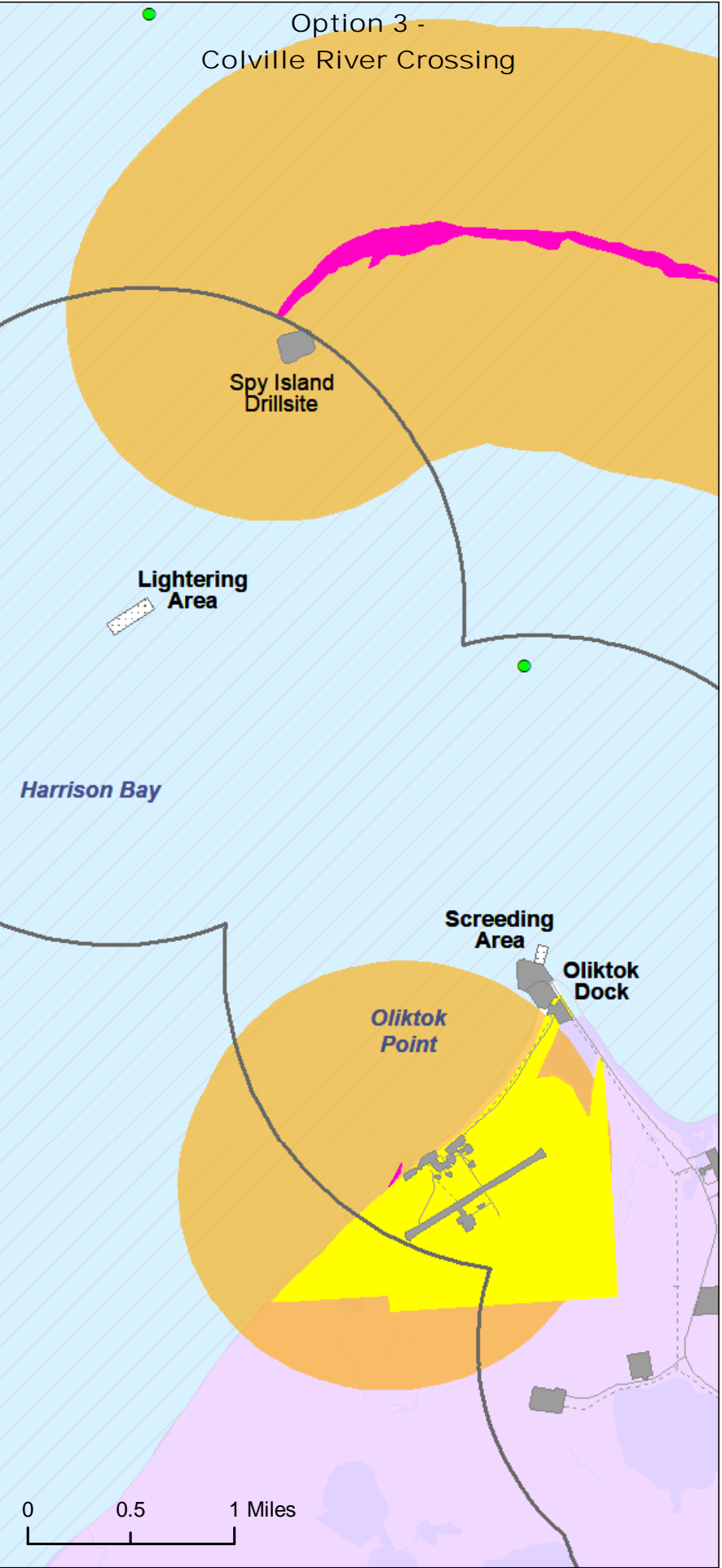
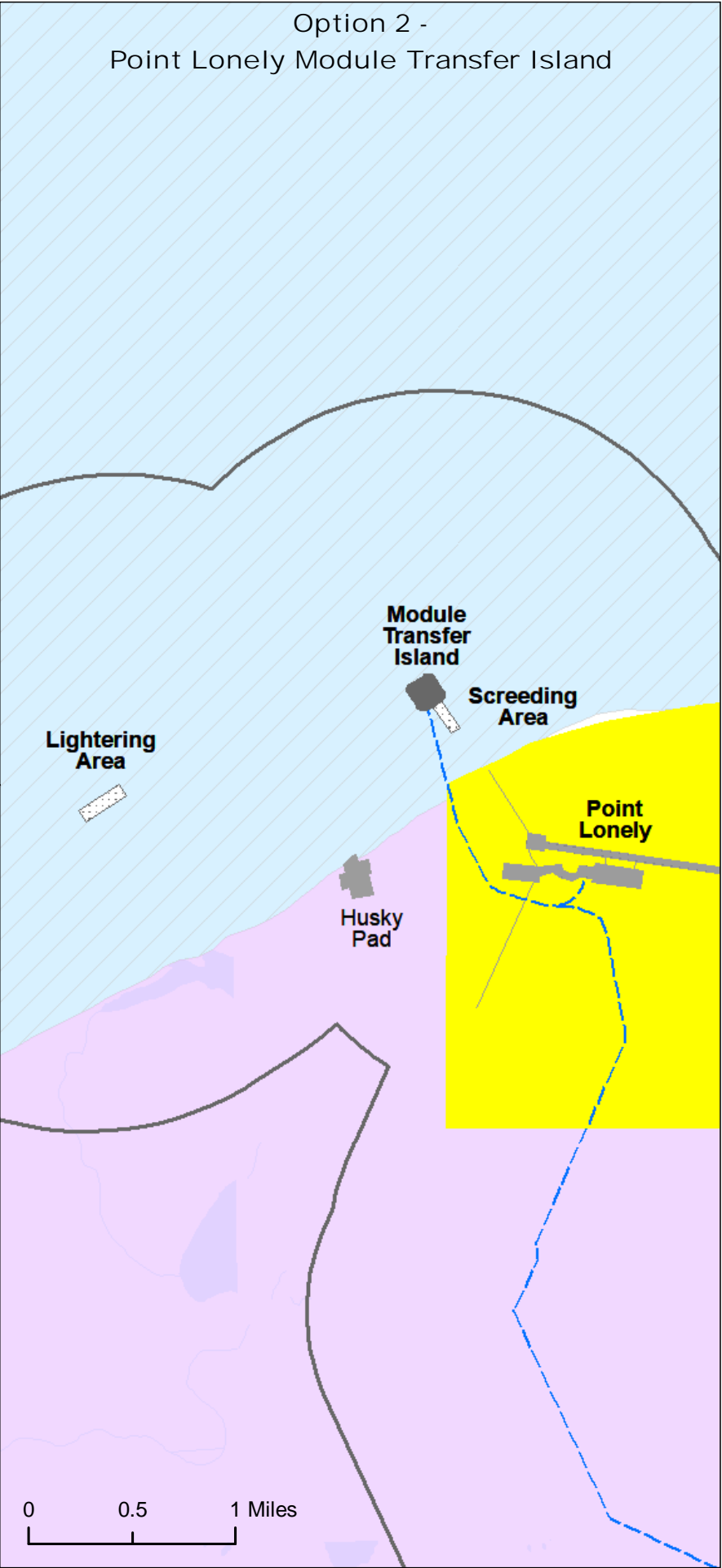
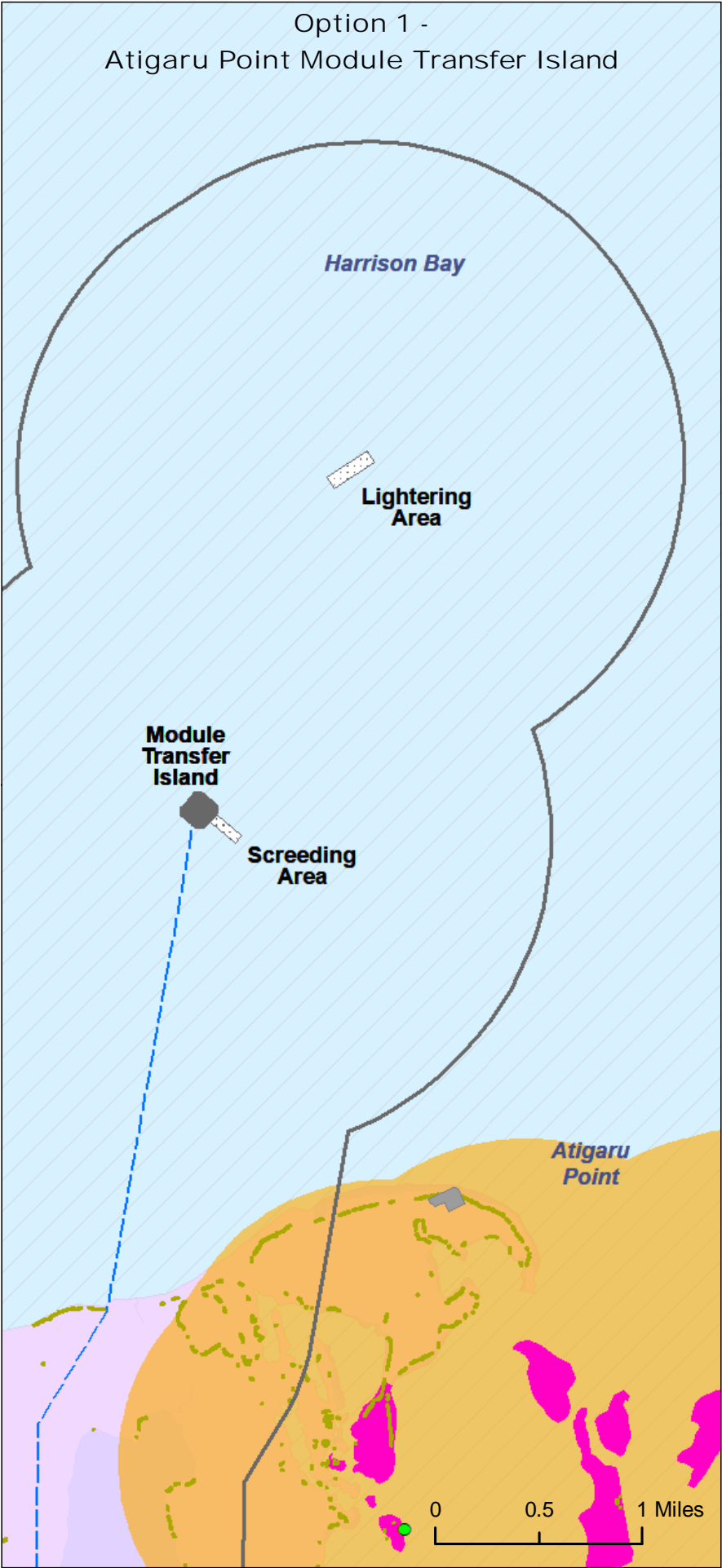


Figure 3.13.4



Polar Bear

- Historical Maternal Den
- Potential Terrestrial Denning Habitat
- Terrestrial Denning Critical Habitat
- Barrier Island No Disturbance Zone
- Barrier Island Critical Habitat
- Critical Habitat Exclusions
- Sea-Ice Critical Habitat

Willow Proposed Development Features

- Ice Road
- Screeding
- Analysis Area

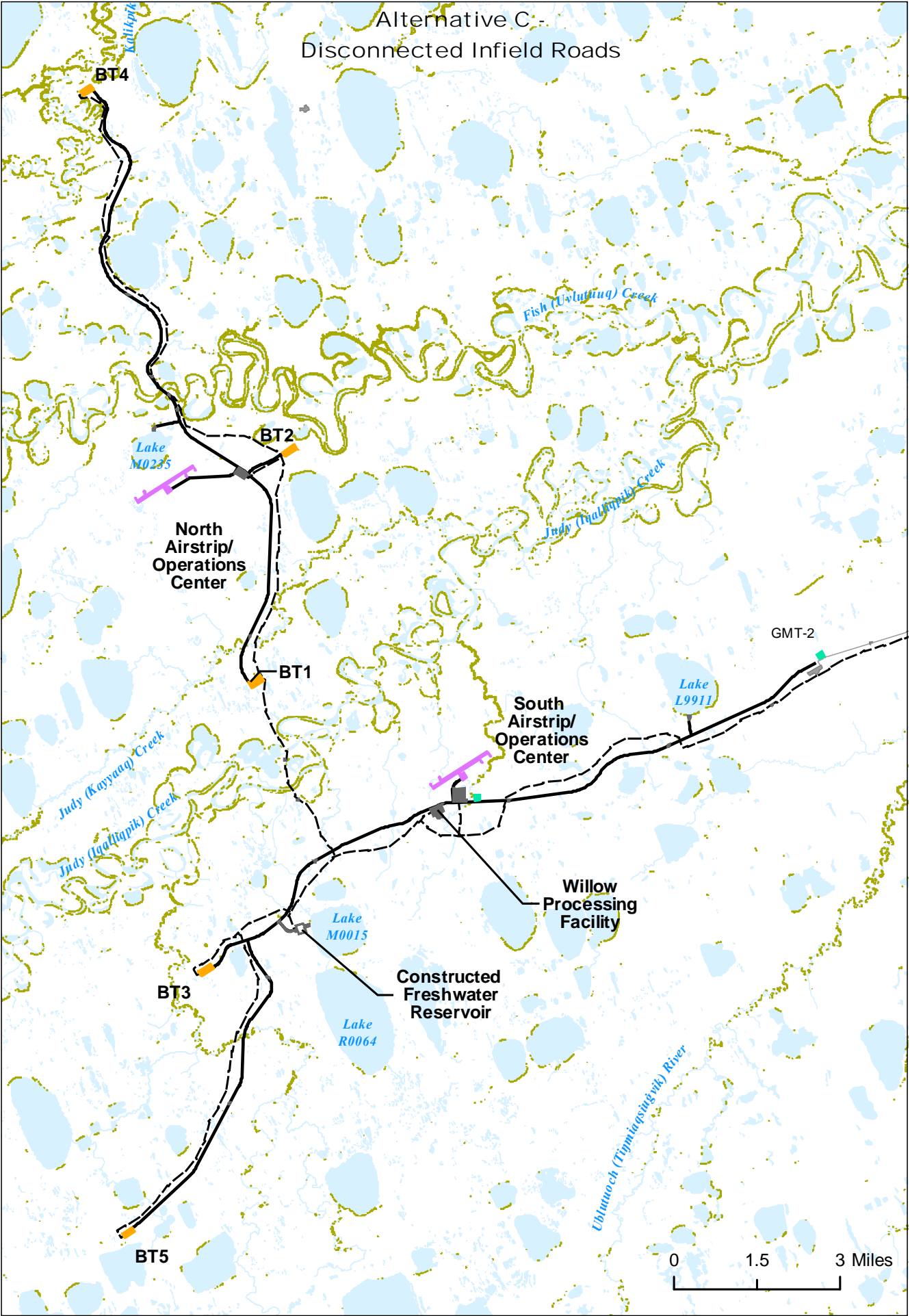
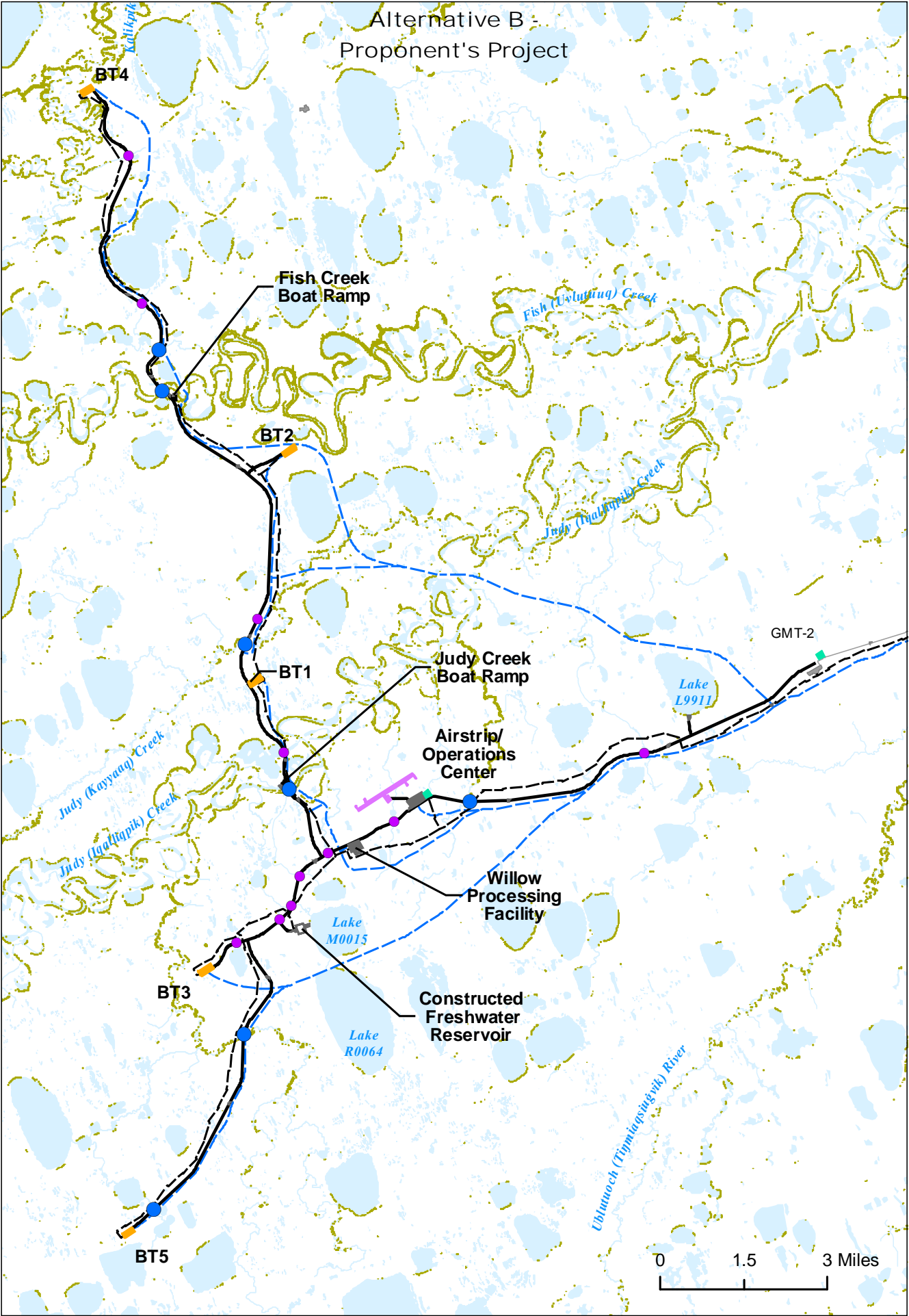
Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Notes:
1. Oliktok Dock activity would occur under all action alternatives and Option 3: Colville River Crossing.

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Figure 3.13.5



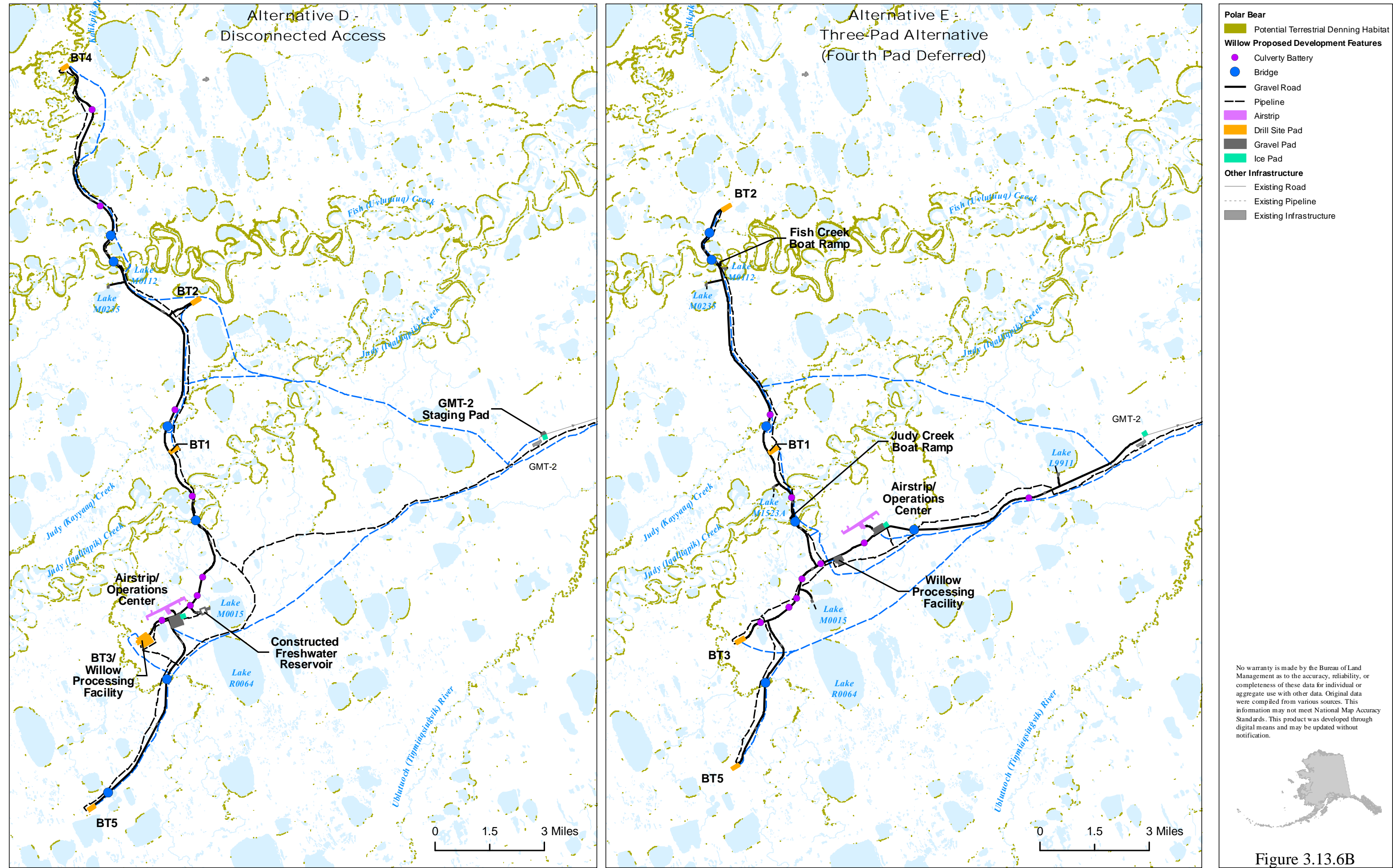


Figure 3.13.6B

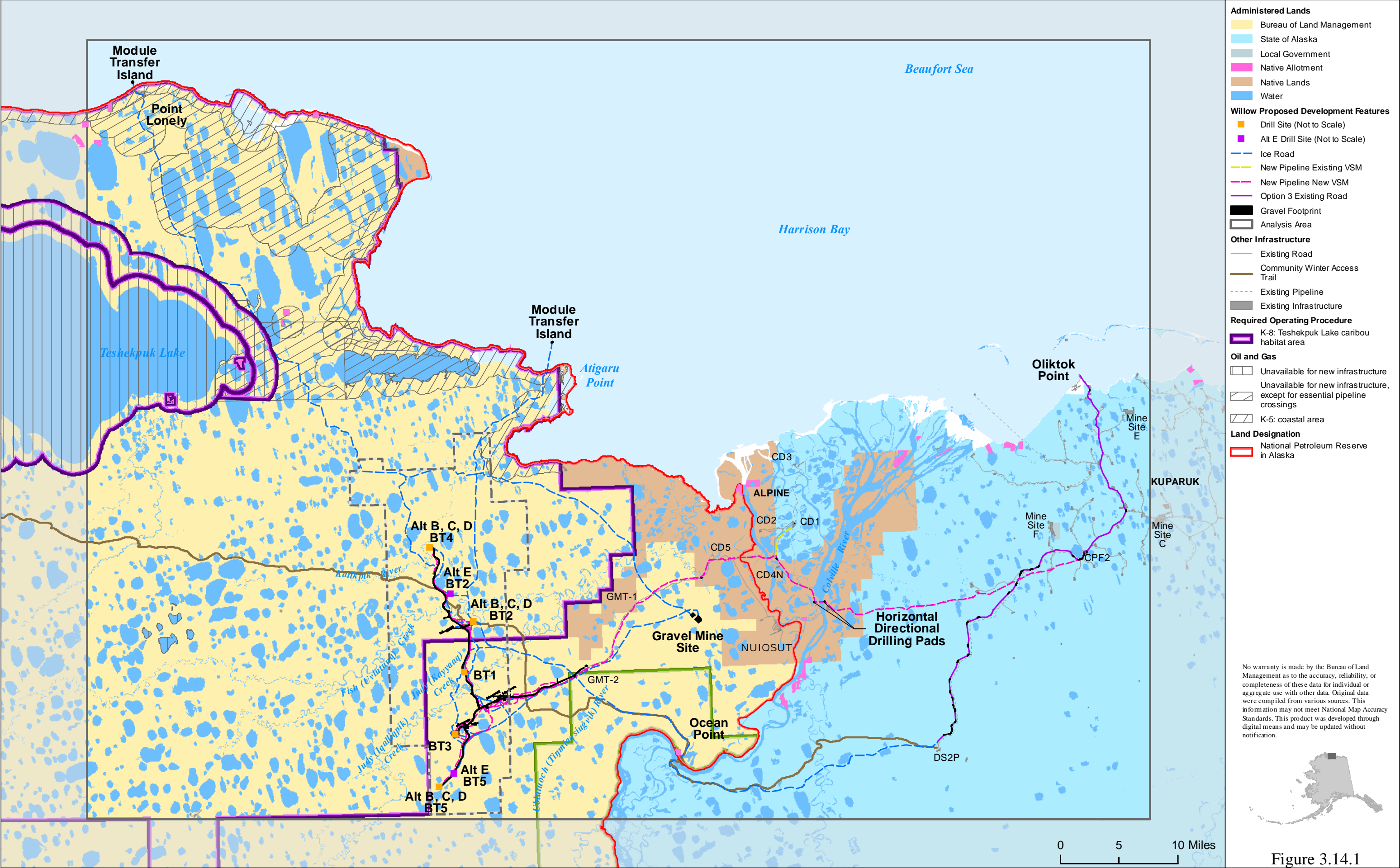
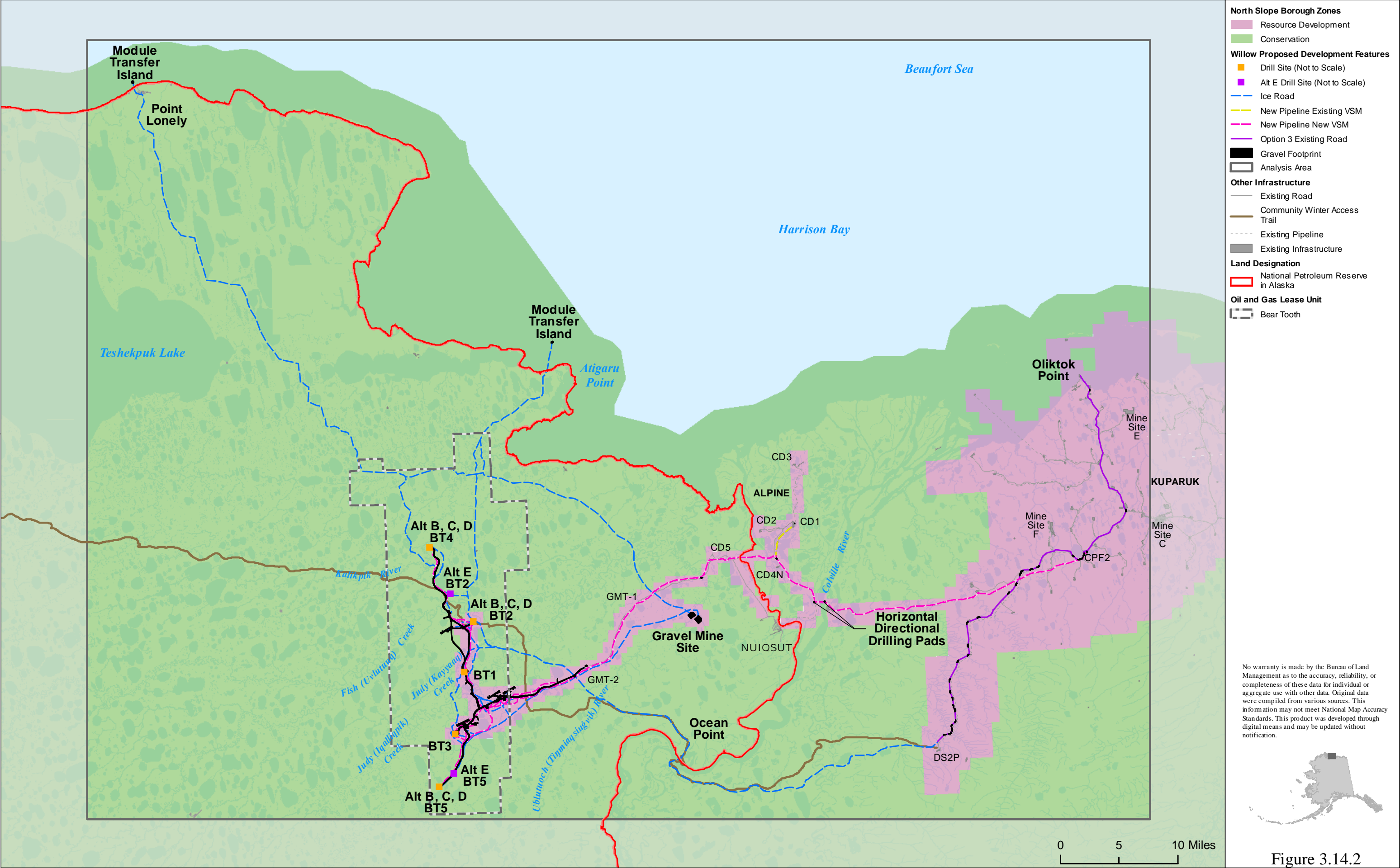
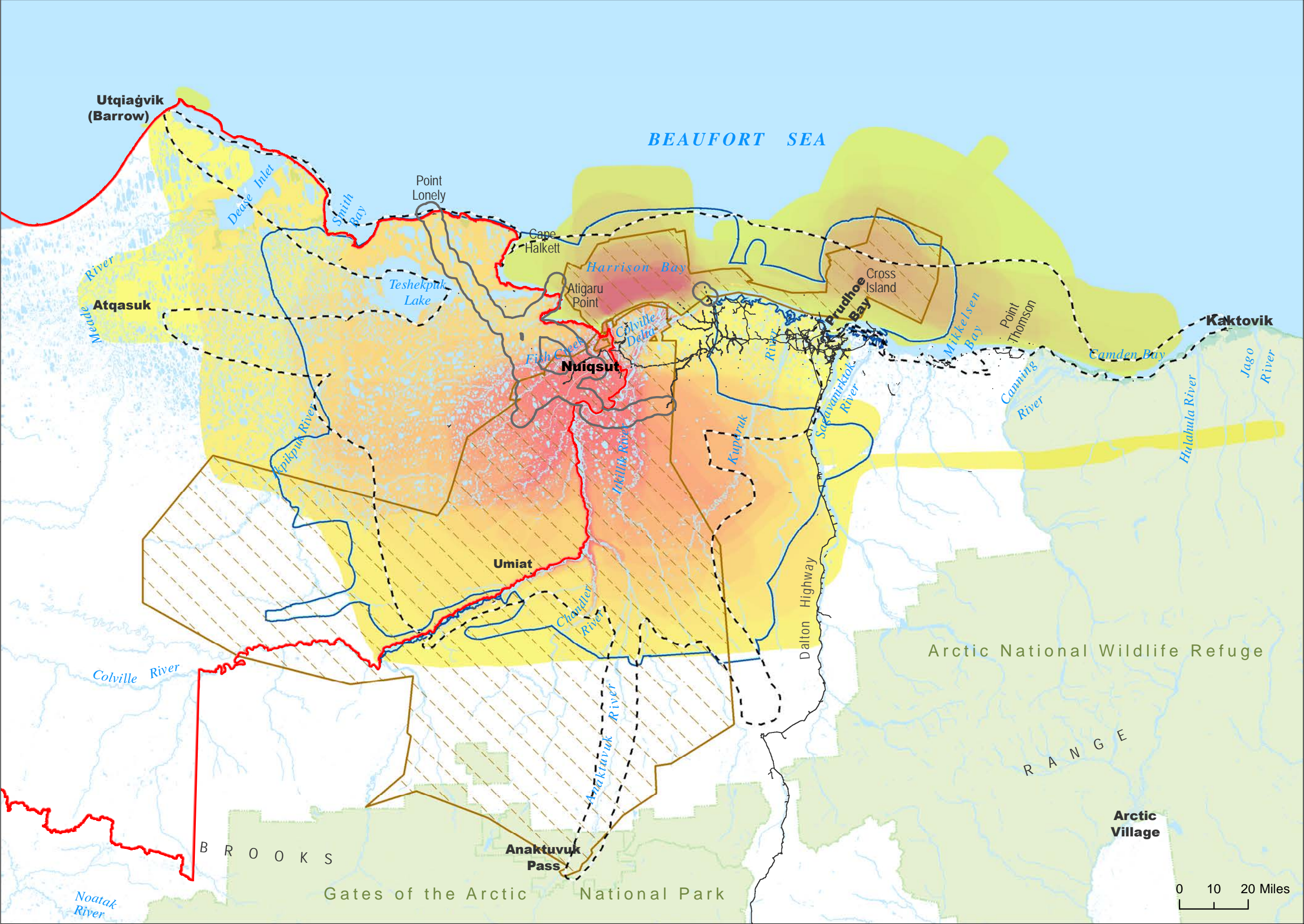


Figure 3.14.1





Subsistence Data

- All Resources, 1973-1986 ^a
- All Resources, 1994-2003 ^b
- All Resources, 2014 ^c
- High Overlapping Subsistence Use Areas All Resources, 1995-2006 ^d
- Low

Willow Proposed Development Features

- Direct Effects Area

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Land Designation

- National Petroleum Reserve in Alaska

Map prepared by
Stephen R. Braund & Associates

Source

- a. Pedersen 1986
- b. BLM 2004
- c. Brown et al. 2016
- d. SRB&A 2010a

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0 10 20 Miles

Figure 3.16.1



Subsistence Data

- All Resources, Early 1970s ^a
- All Resources, Lifetime Previous to 1979 ^b

Willow Proposed Development Features

- Direct Effects Area

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

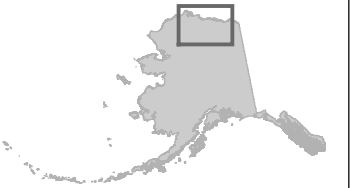
Land Designation

- National Petroleum Reserve in Alaska

Map prepared by
Stephen R. Braund & Associates

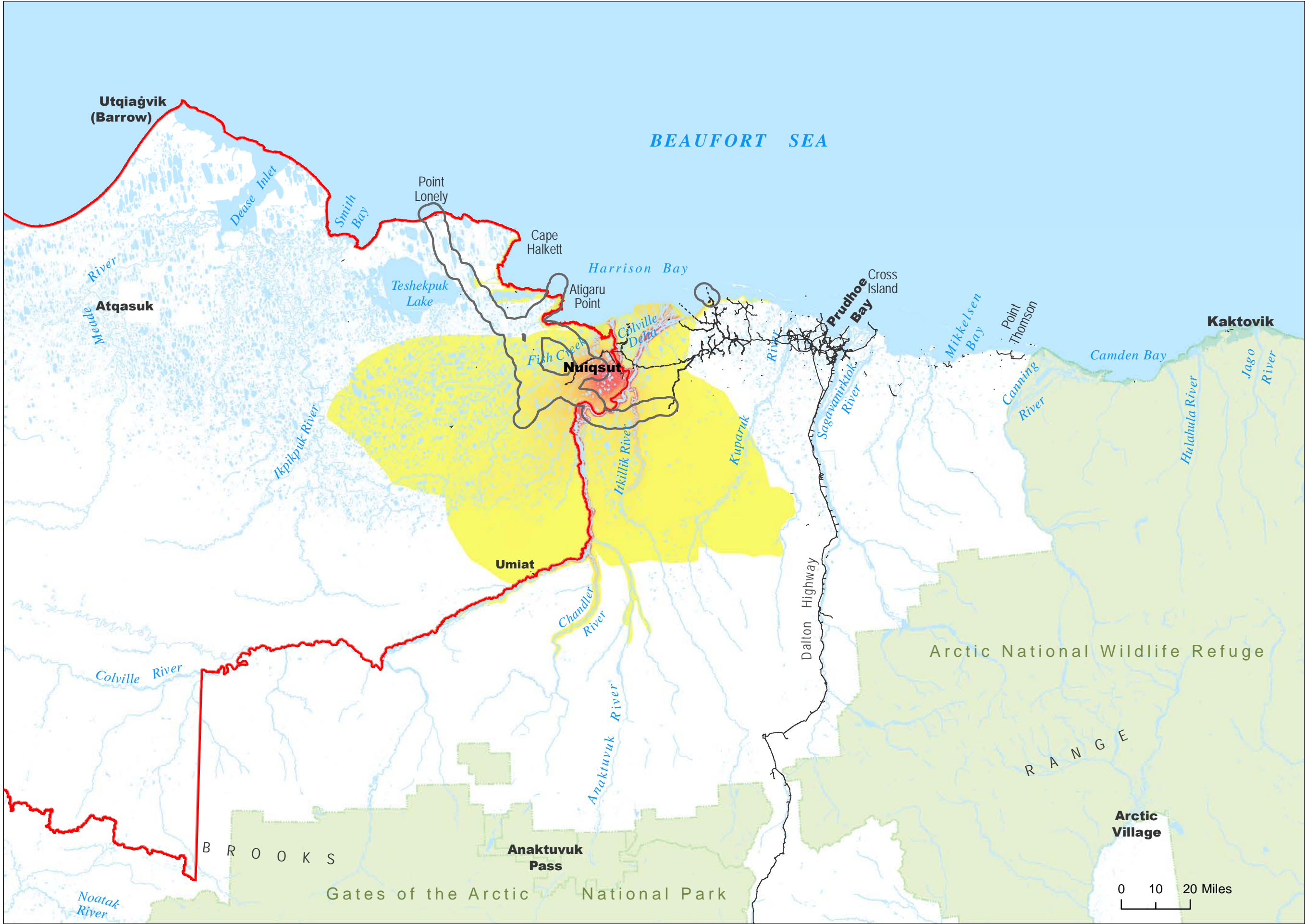
Source
a. Brown 1979
b. Pedersen 1979

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0 10 20 Miles

Figure 3.16.2



Subsistence Data

High Overlapping Subsistence Use Areas^a
Low Caribou, January 2008 through December 2019

Willow Proposed Development Features

Direct Effects Area

Other Infrastructure

Existing Road
 Existing Pipeline
 Existing Infrastructure

Land Designation

National Petroleum Reserve in Alaska

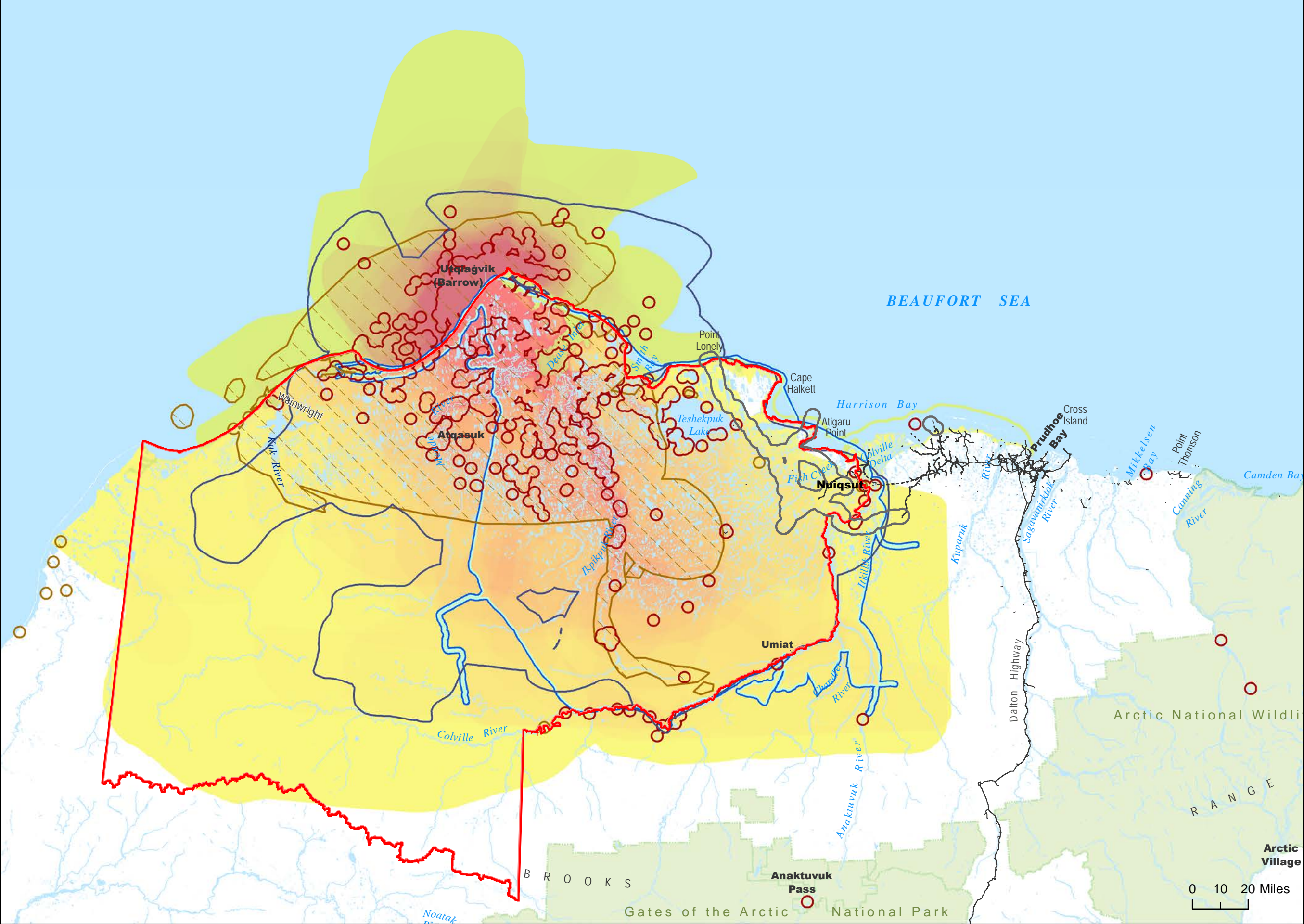
Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2021

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Figure 3.16.3



Subsistence Data

- All Resource Harvest Sites Buffered, 1987-1989^a
- All Resources, 1987-1989^b
- All Resources, 1994-2003^c
- All Resources, 2014^d
- Overlapping Subsistence Use Areas
- All Resources, 1997-2006^e

Willow Proposed Development Features

- Direct Effects Area

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Land Designation

- National Petroleum Reserve in Alaska

Map prepared by
Stephen R. Braund & Associates

Source

- a. SRB&A and ISER 1993
- b. SRB&A Unpublished
- c. BLM 2004
- d. Brown et al. 2016
- e. SRB&A 2010a

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Arctic Village

0 10 20 Miles

Figure 3.16.4



Subsistence Data

All Resources, Lifetime Previous to 1979 ^a

Willow Proposed Development Features

Direct Effects Area

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

Land Designation

National Petroleum Reserve in Alaska

Map prepared by
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Source
a. Pedersen 1979

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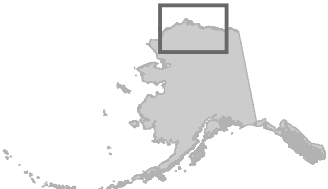
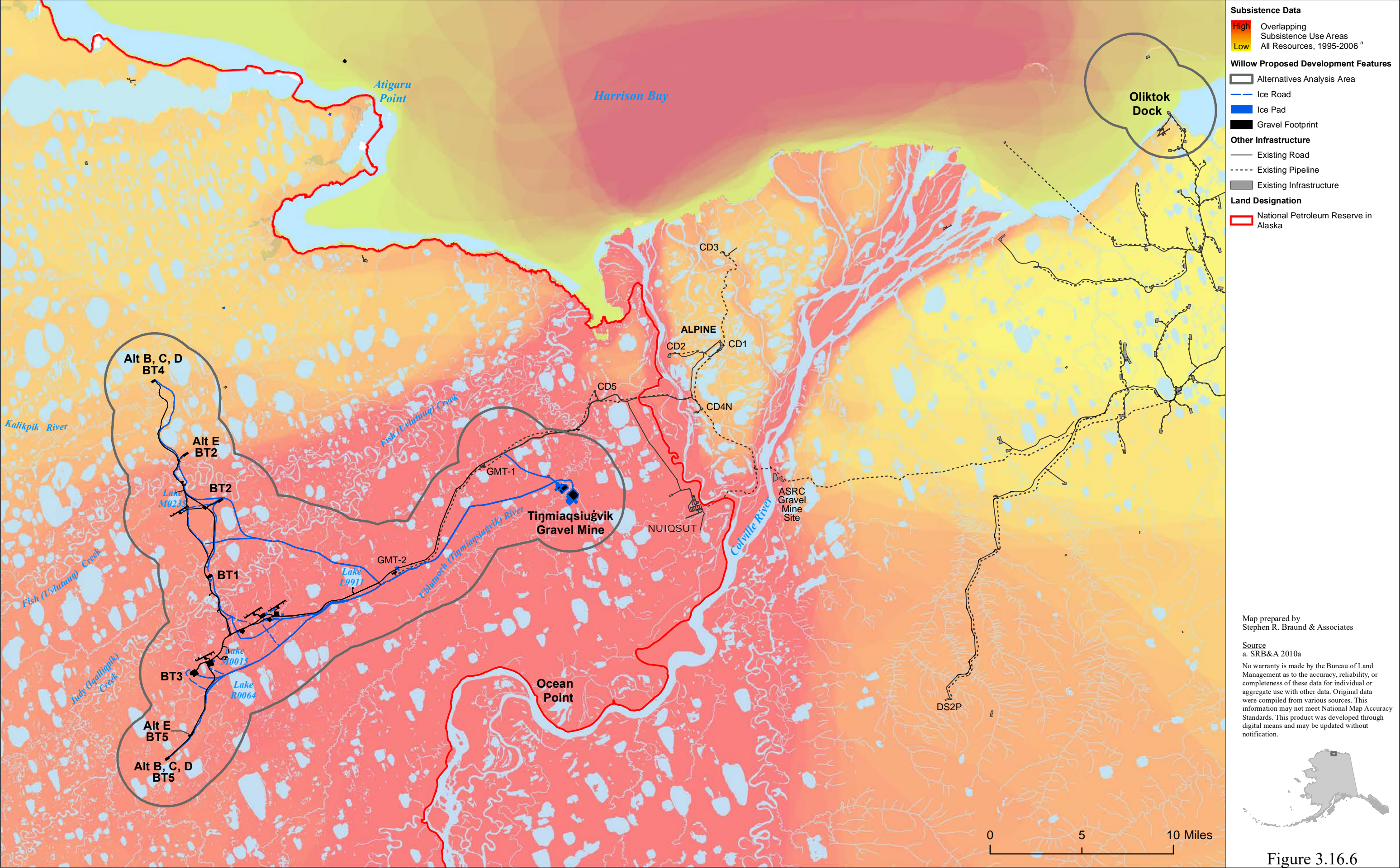
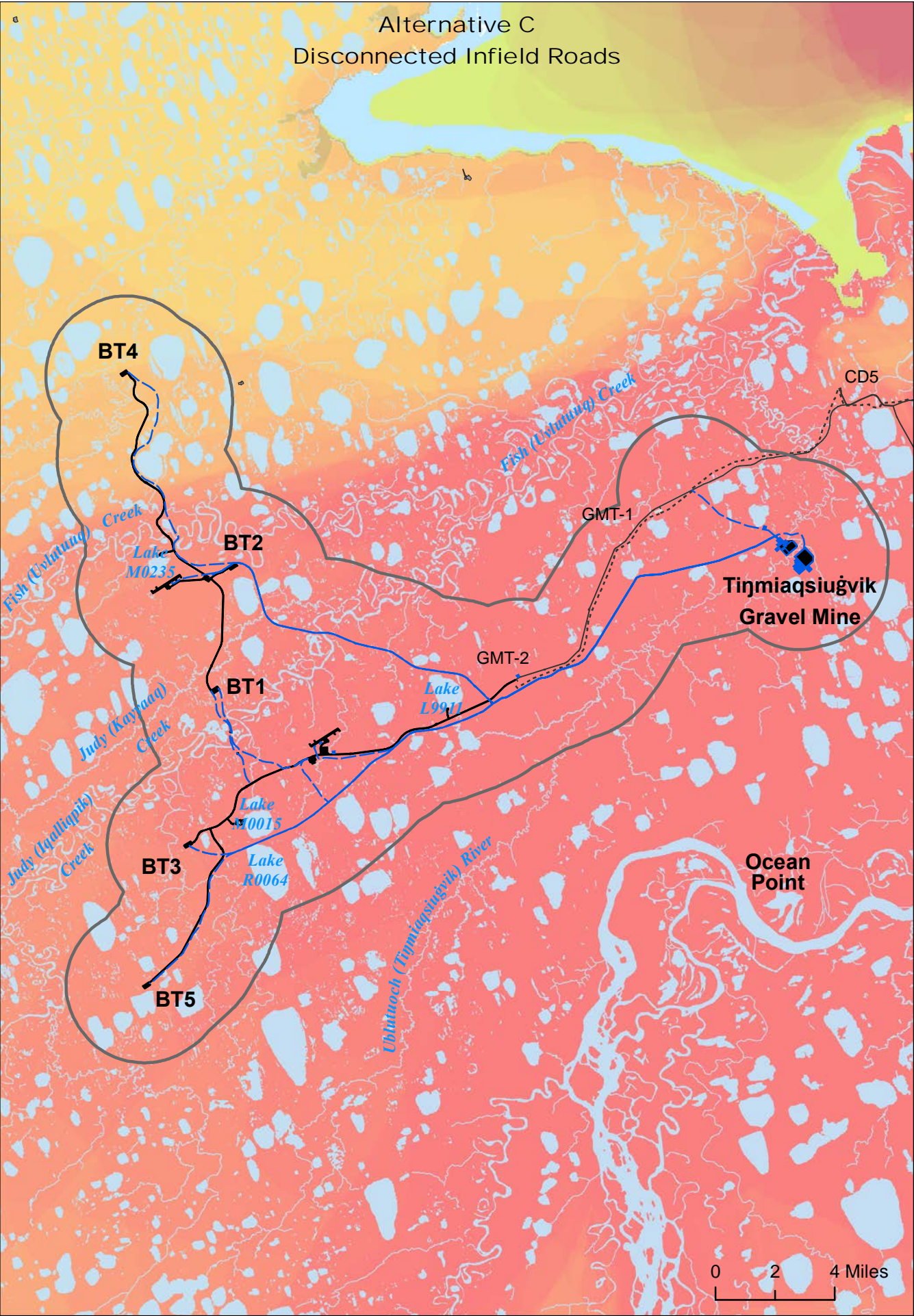
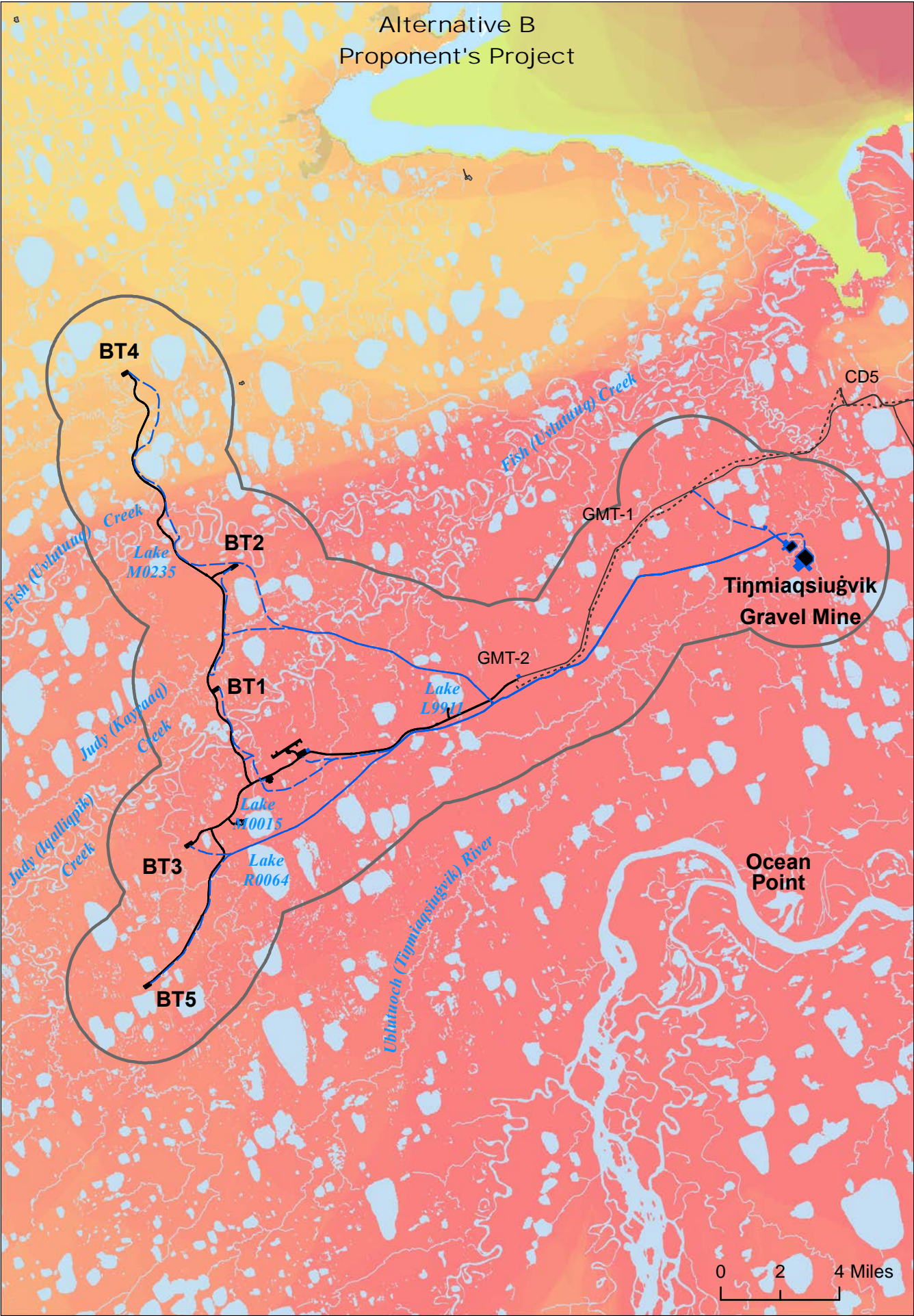


Figure 3.16.5





Subsistence Data

High	Overlapping Subsistence Use Areas
Low	All Resources, 1995-2006 ^a

Willow Proposed Development Features

Alternative Analysis Area *
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

Existing Road
Existing Pipeline
Existing Infrastructure

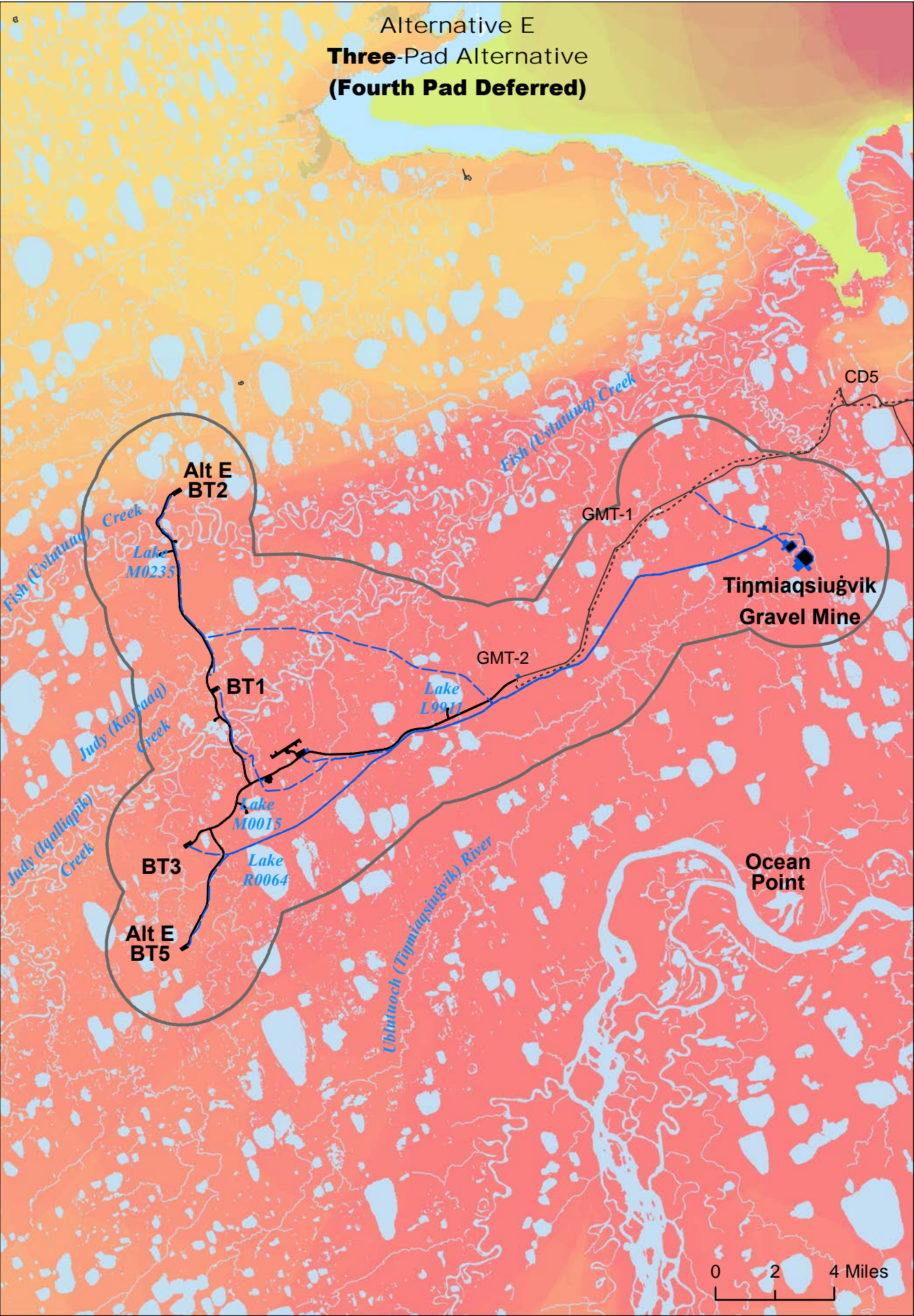
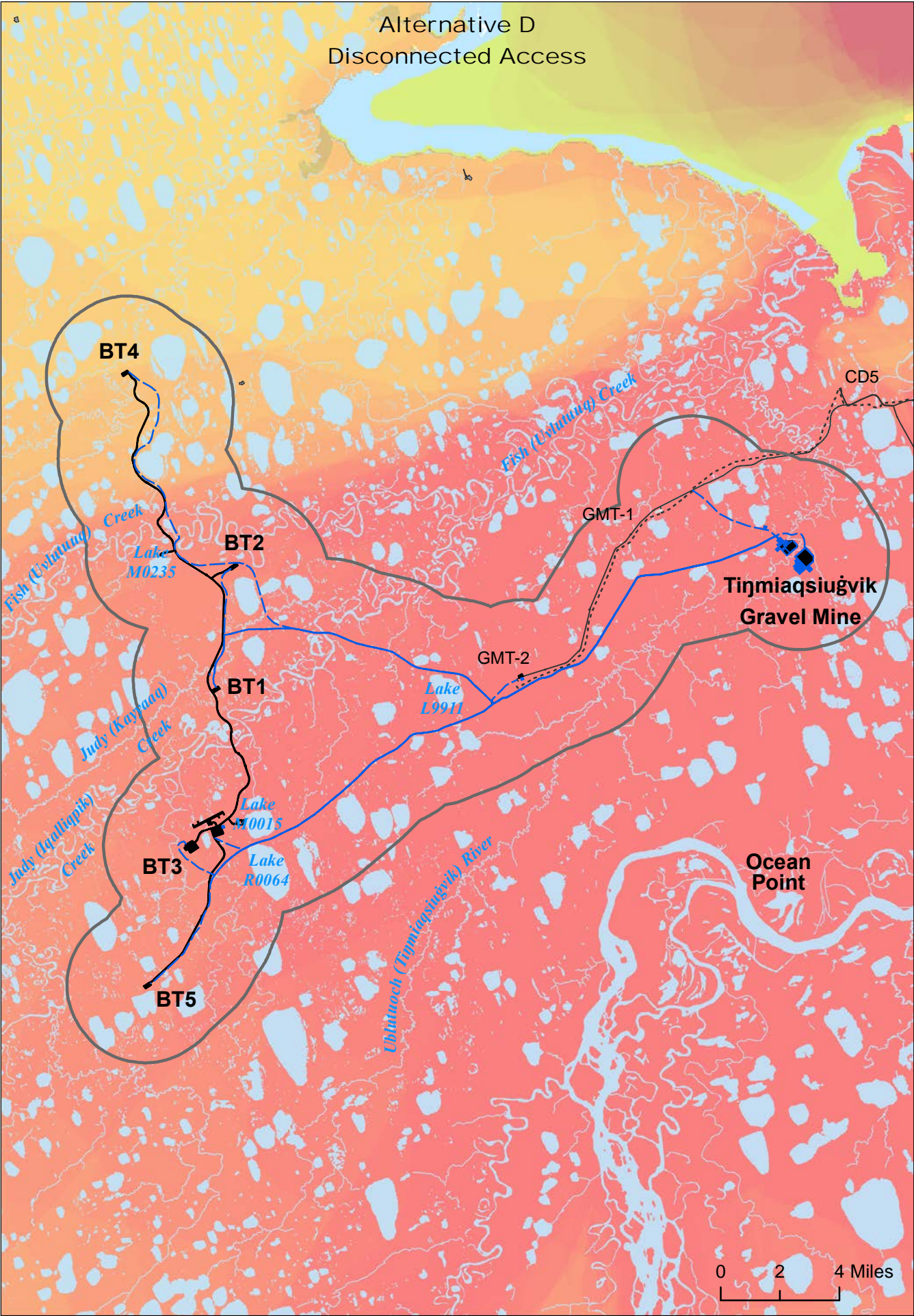
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.7



Subsistence Data

High Overlapping Subsistence Use Areas
Low All Resources, 1995-2006^a

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

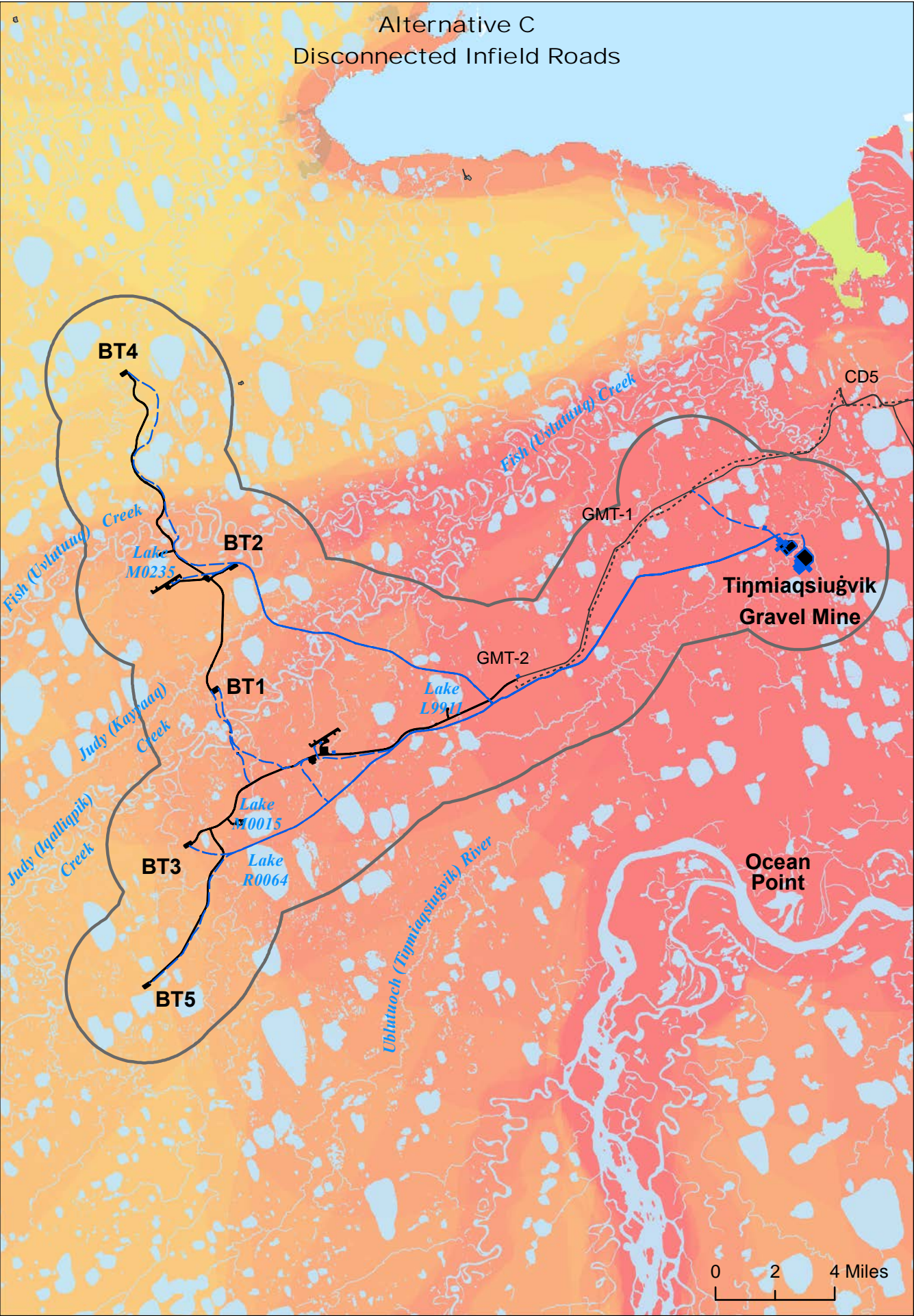
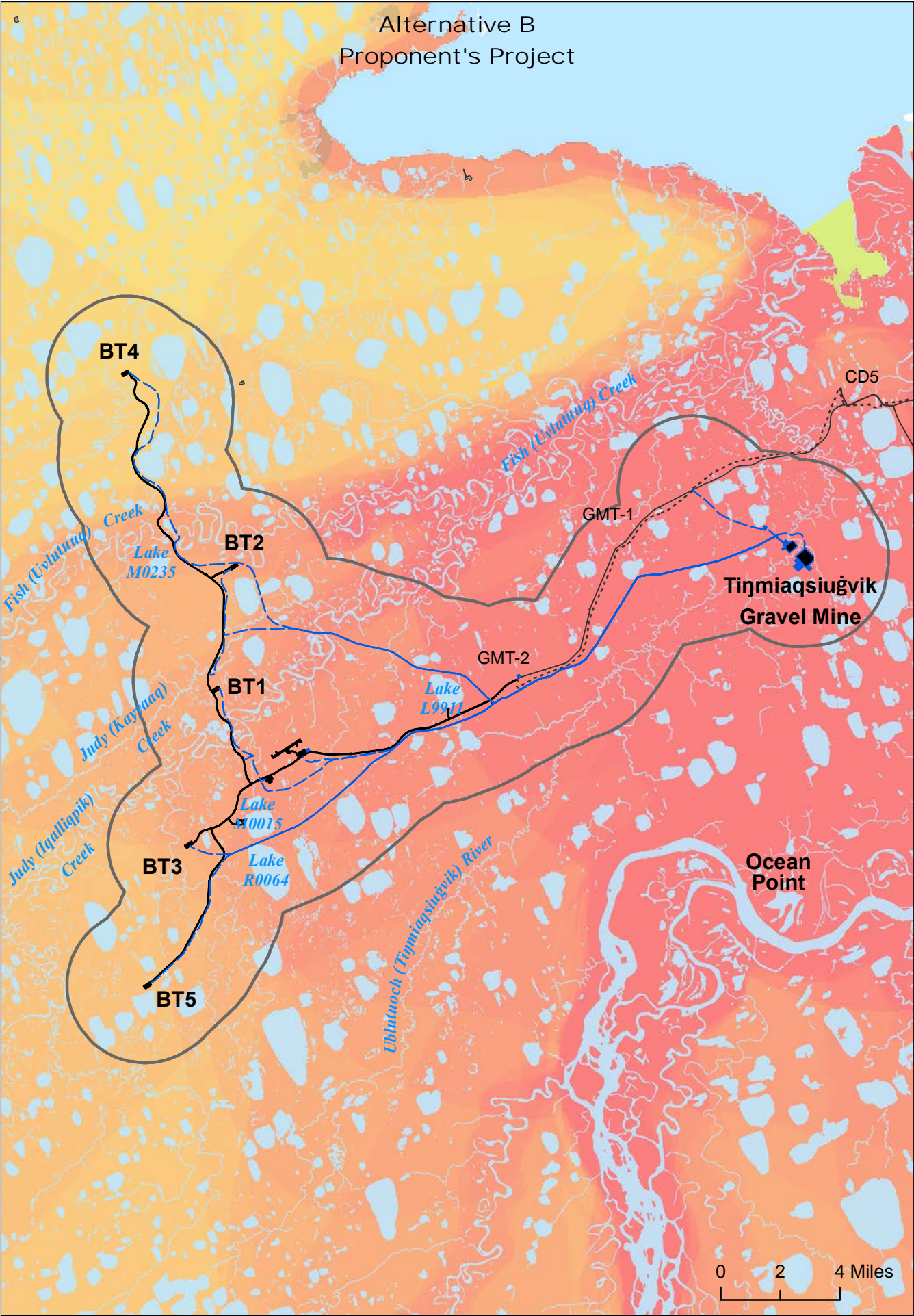
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.8



Subsistence Data

High Overlapping Subsistence Use Areas
Low Caribou, 1995-2006^a

Willow Proposed Development Features

Alternative Analysis Area *
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

Existing Road
Existing Pipeline
Existing Infrastructure

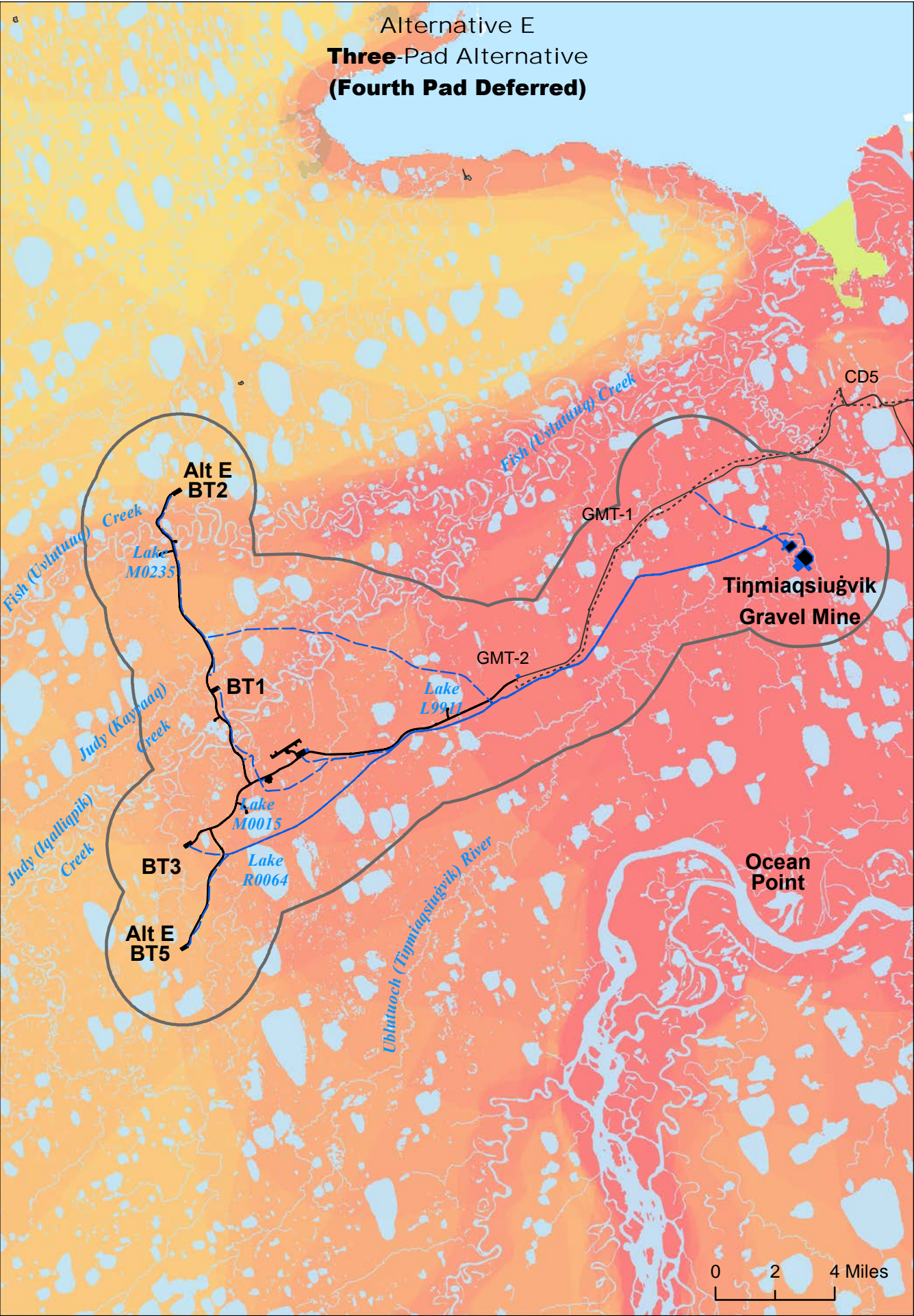
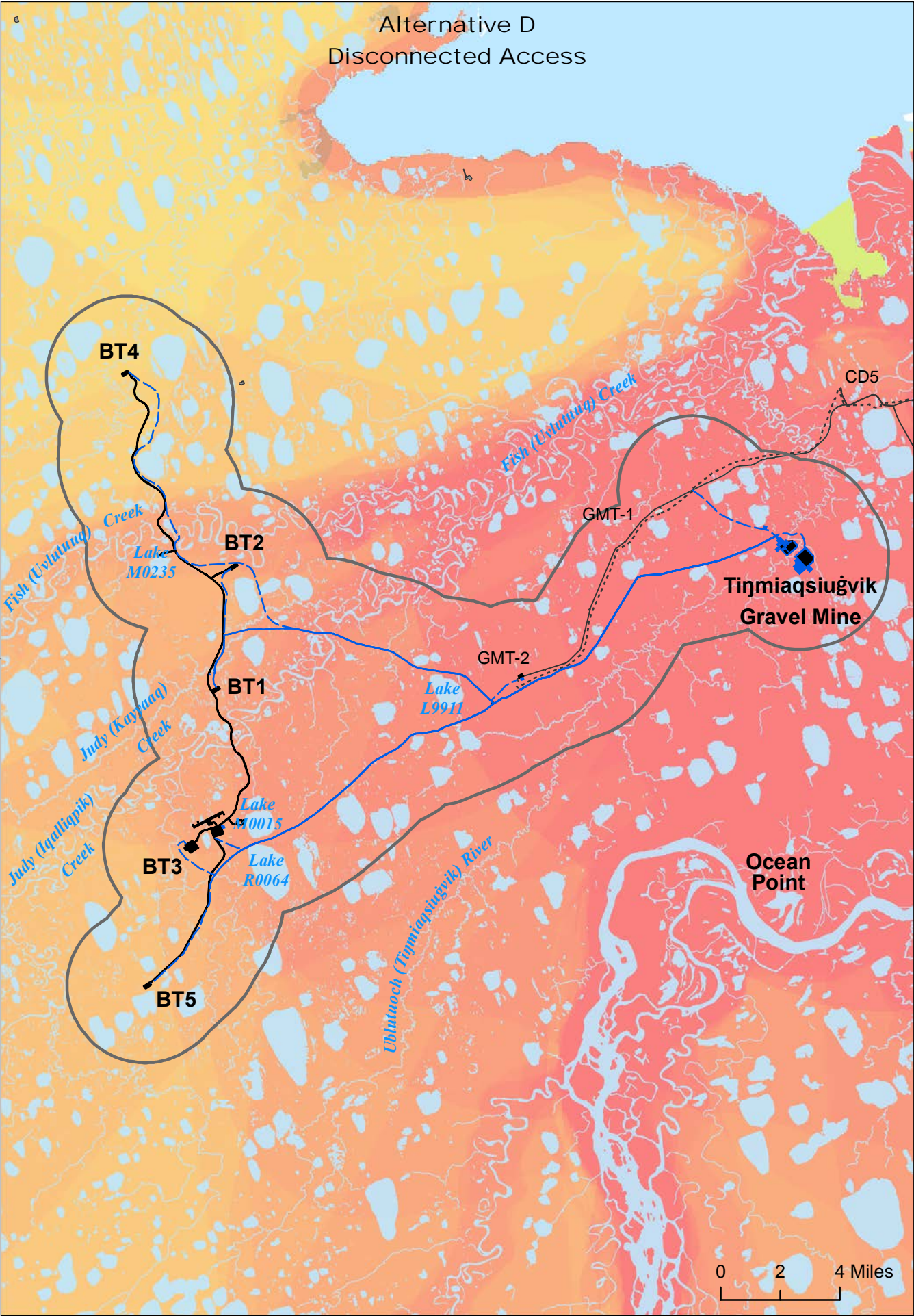
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.9



Subsistence Data

High Overlapping Subsistence Use Areas Caribou, 1995-2006^a

Low

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

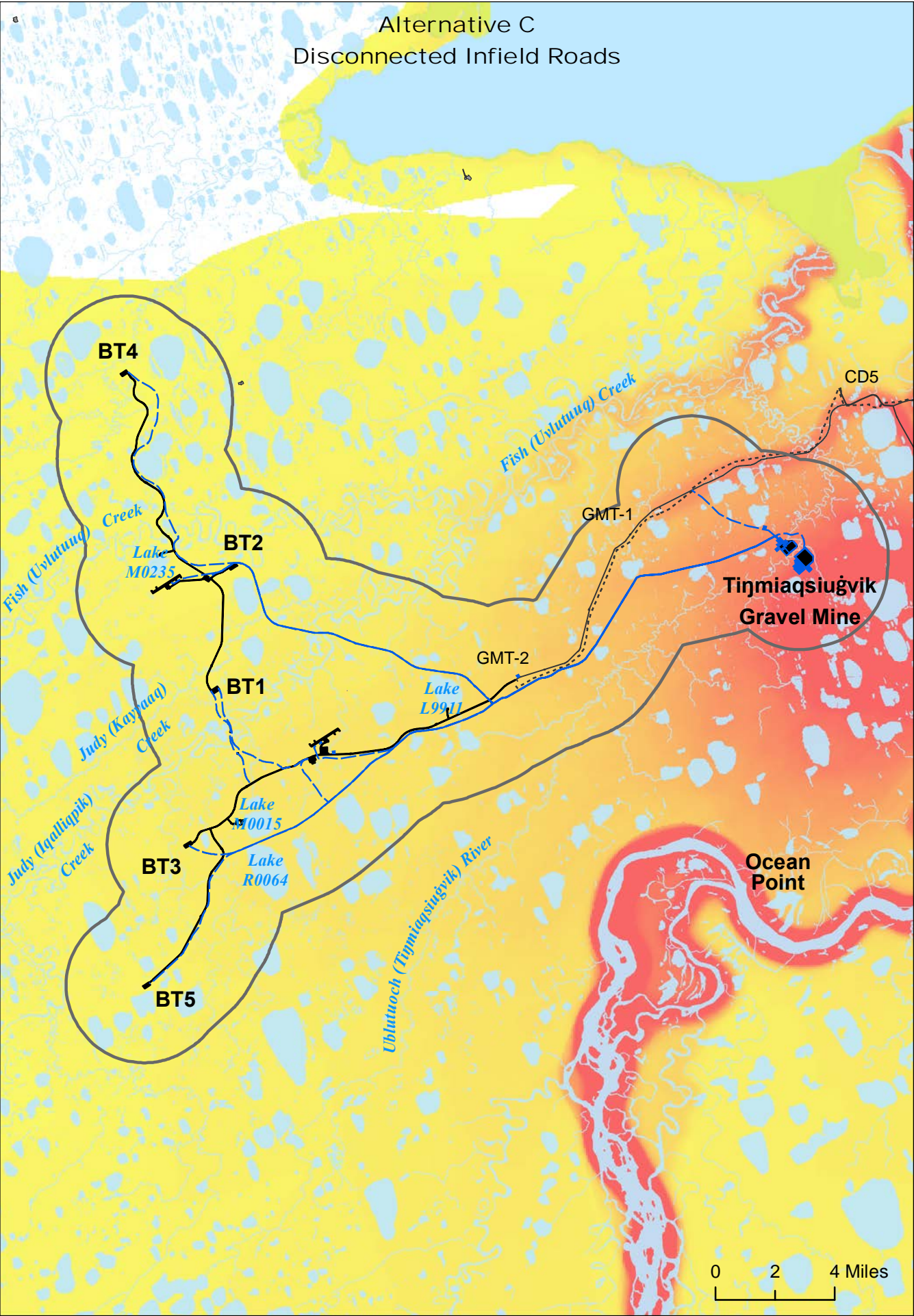
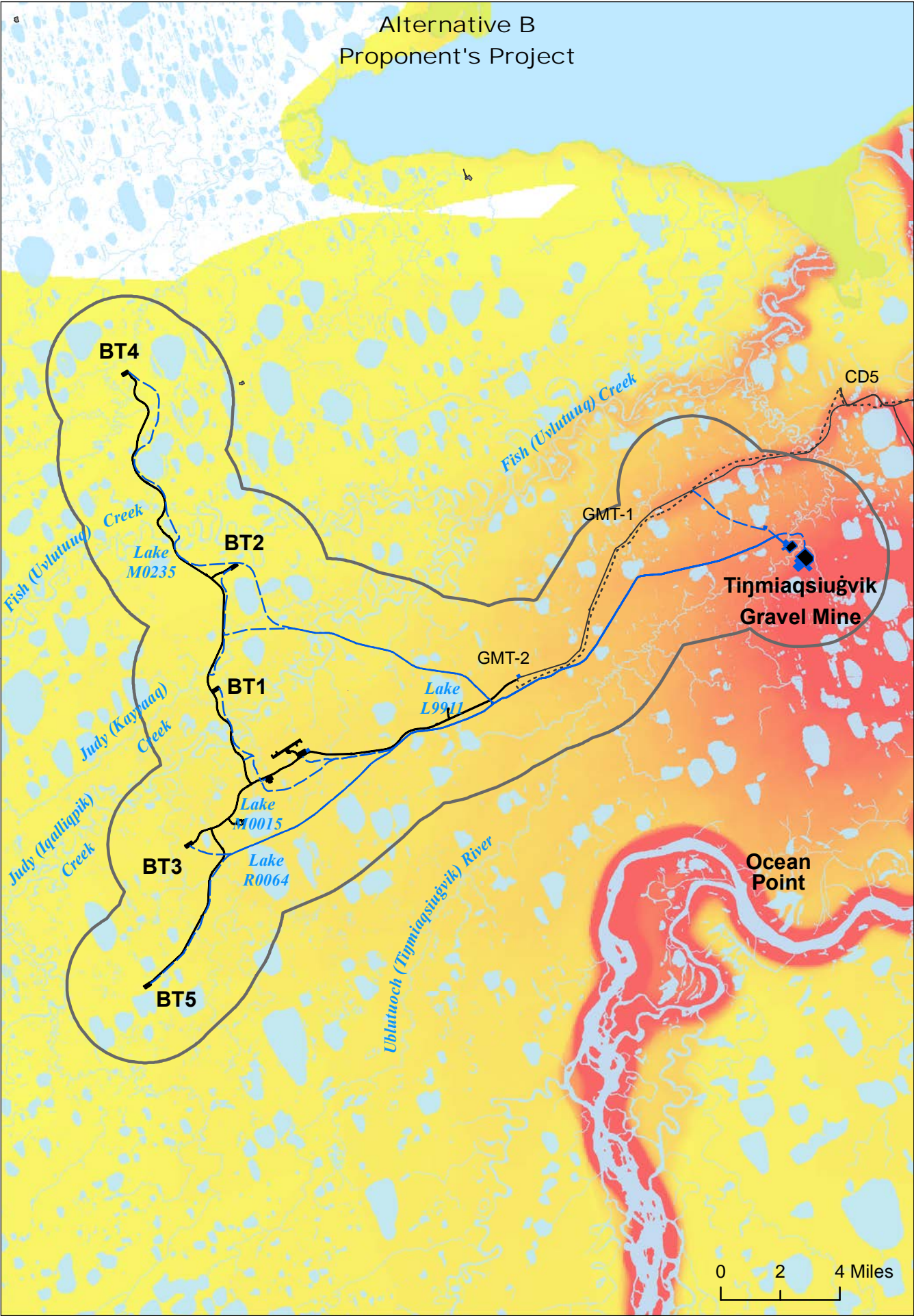
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.10



Subsistence Data

High Overlapping Subsistence Use Areas^a
Low Caribou, January 2008 through December 2019

Willow Proposed Development Features

Alternative Analysis Area *
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

Existing Road
Existing Pipeline
Existing Infrastructure

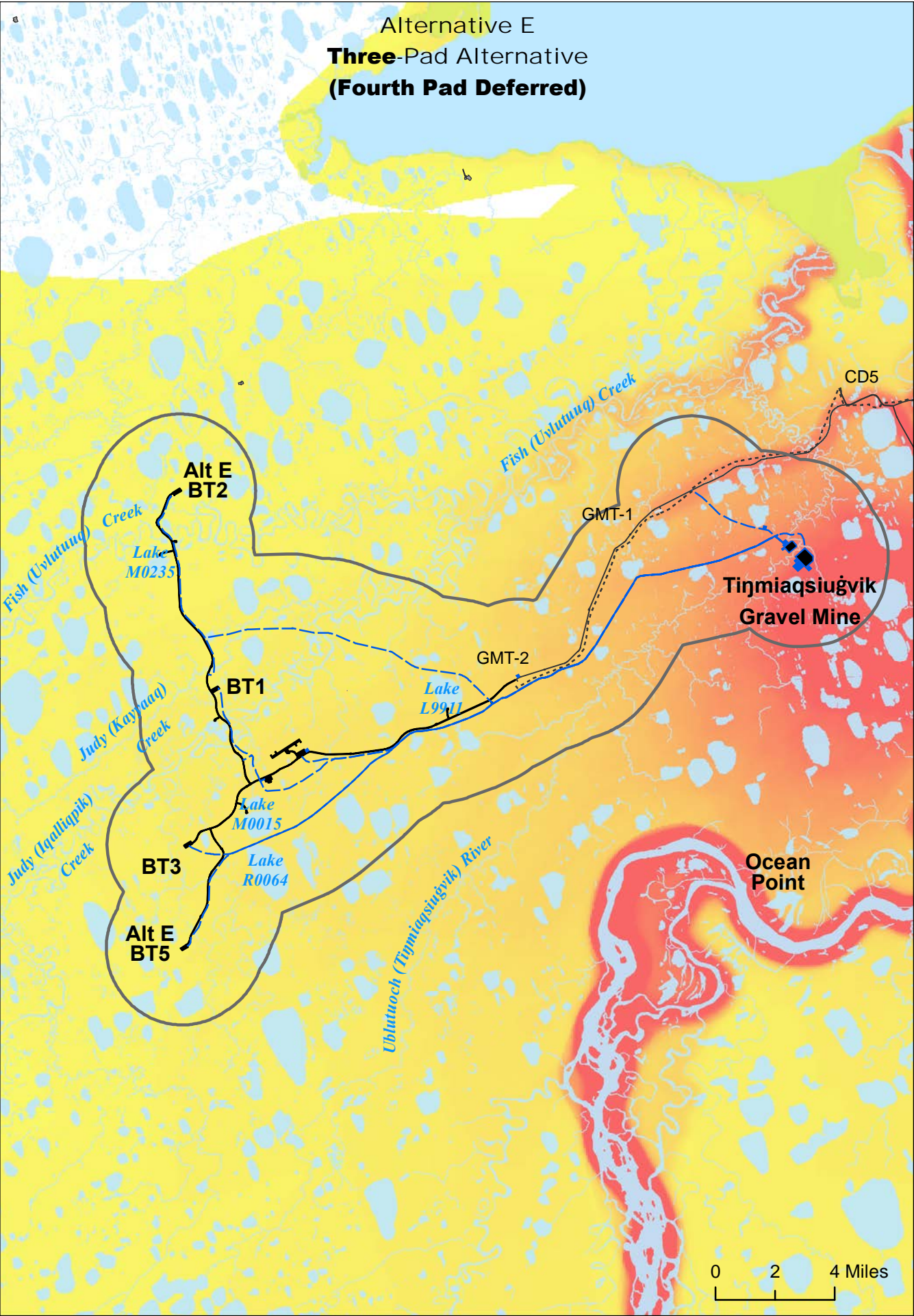
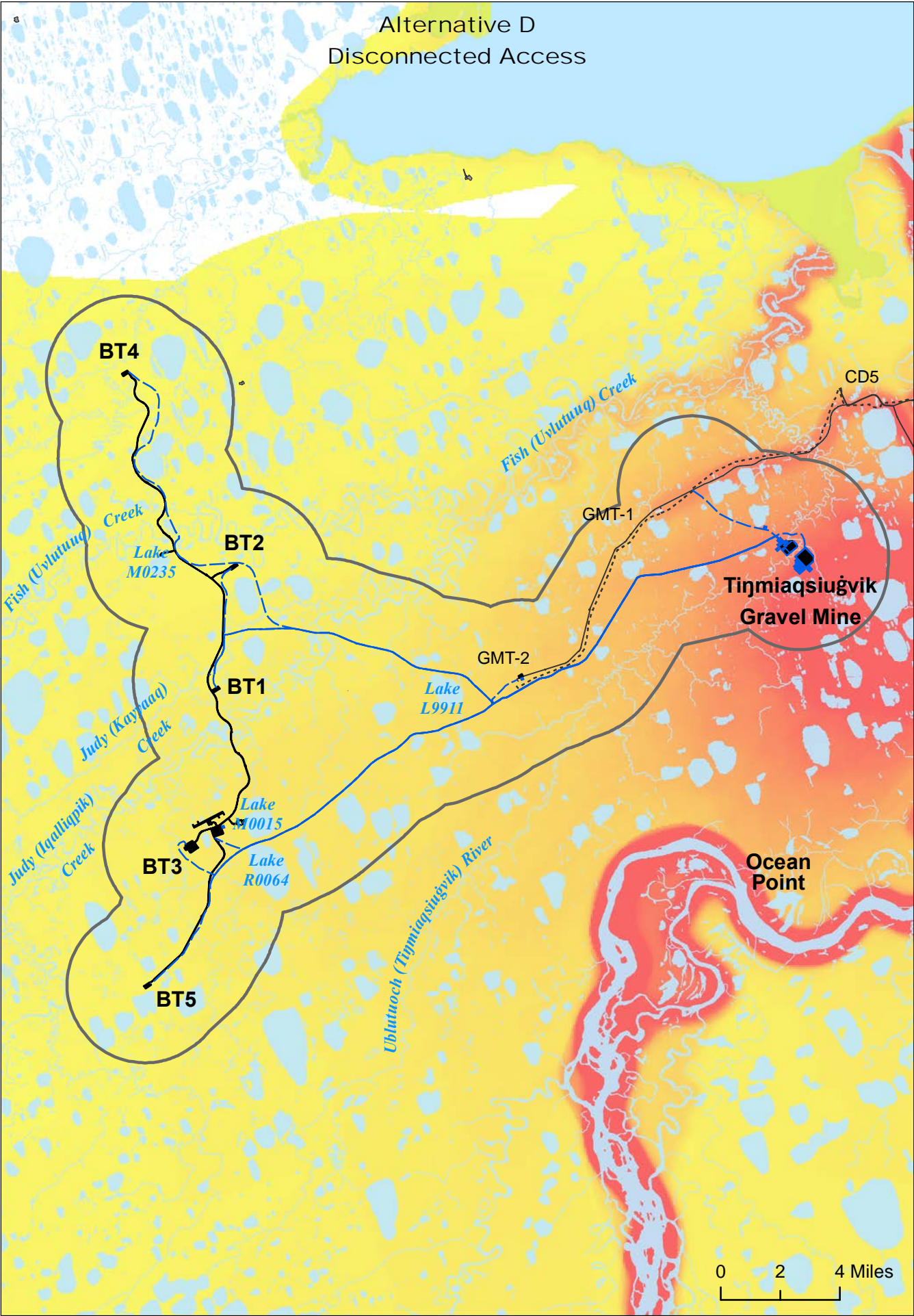
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2021

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Figure 3.16.11



Subsistence Data

High Overlapping Subsistence Use Areas^a
Low Caribou, January 2008 through December 2019

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

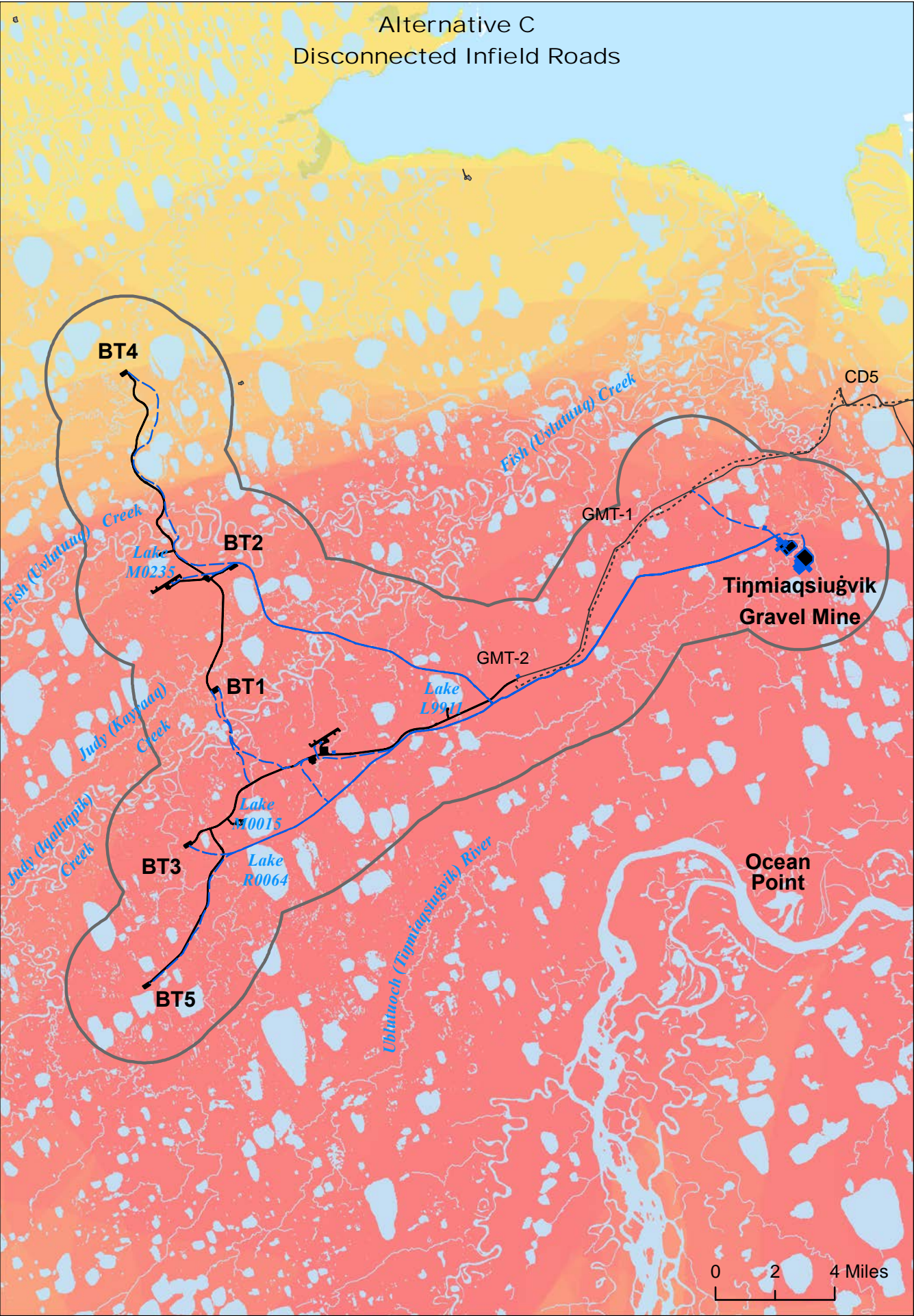
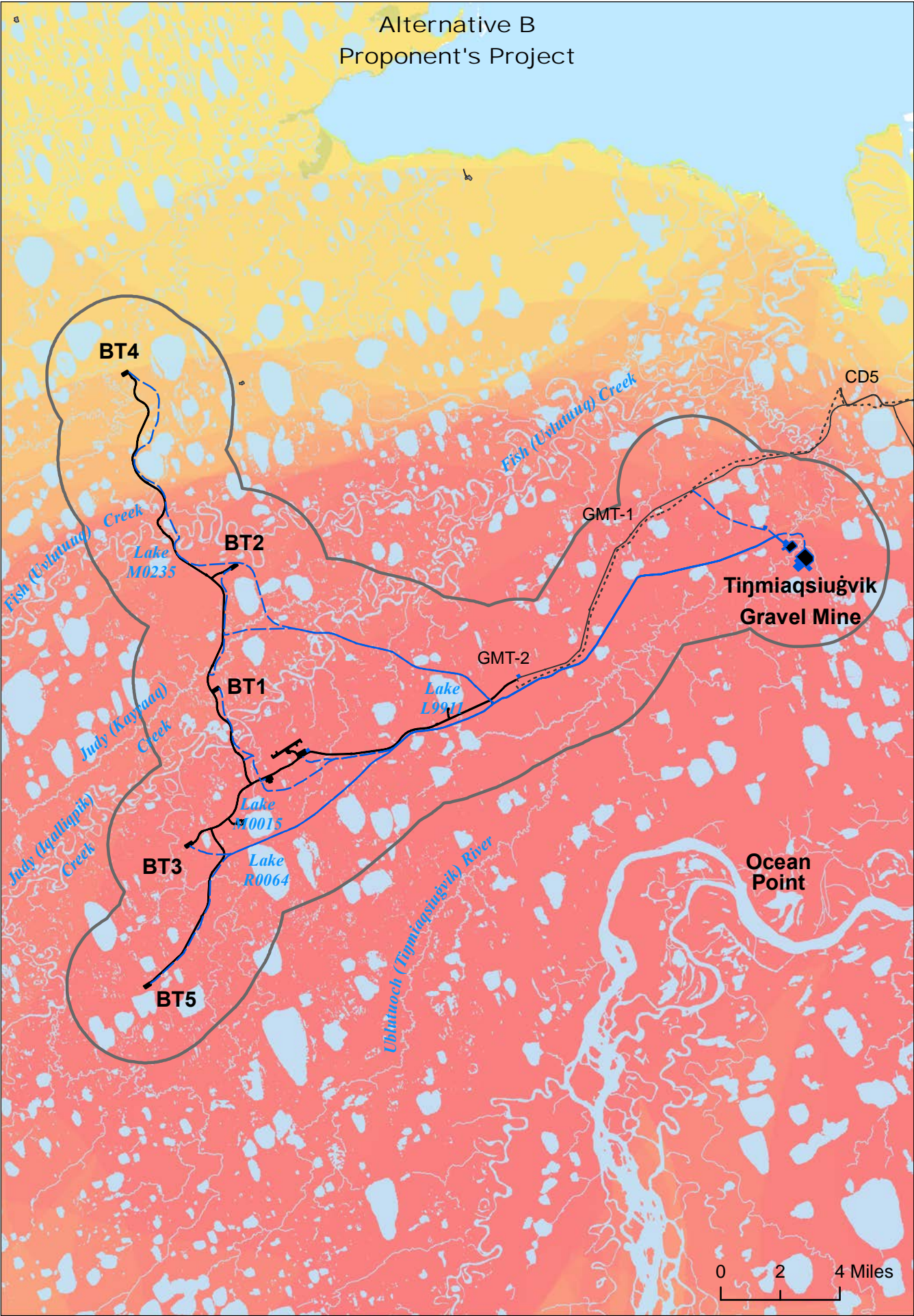
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2021

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Figure 3.16.12



Subsistence Data

High Overlapping Subsistence Use Areas Wolf and Wolverine, 1995-2006^a

Low

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

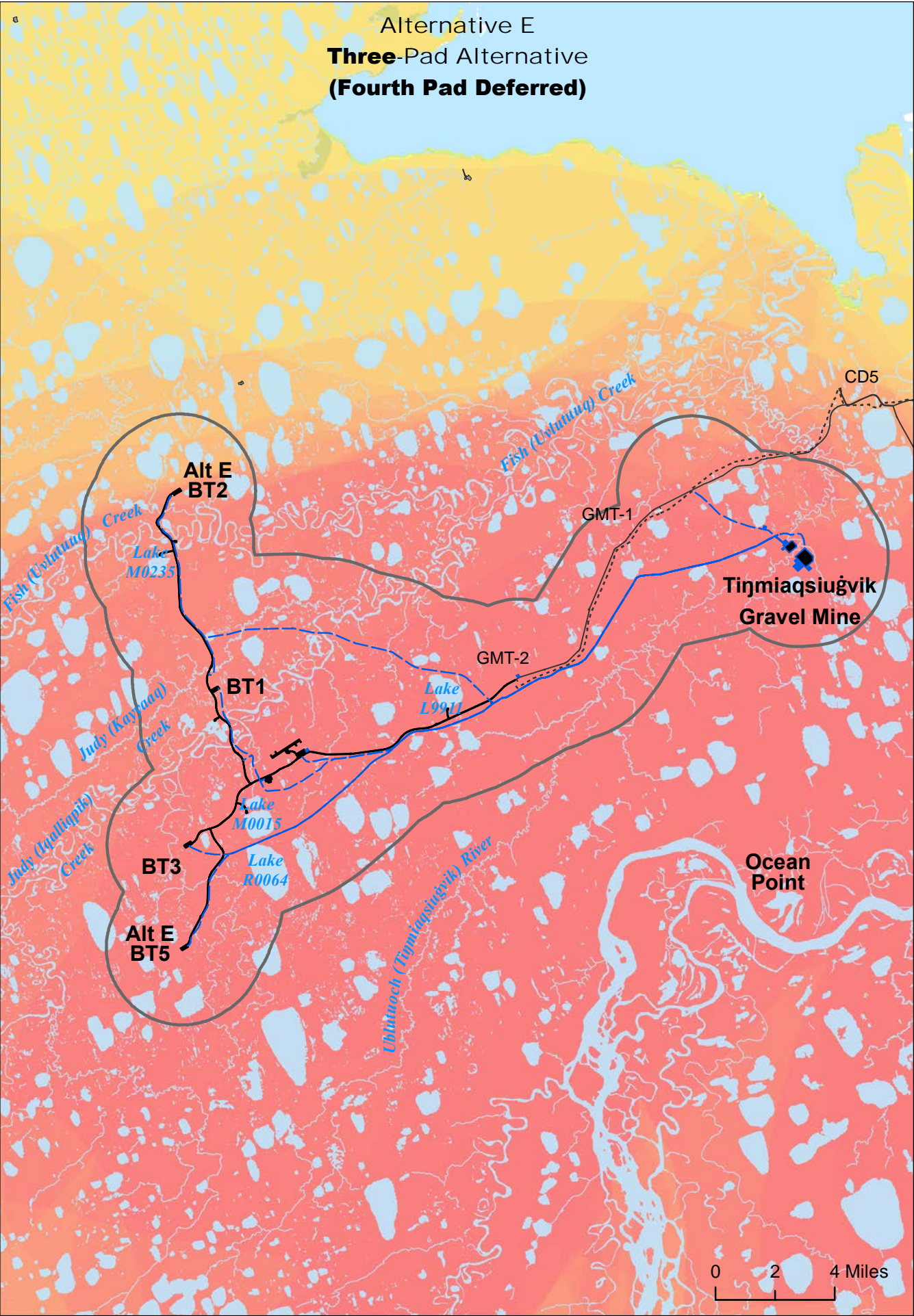
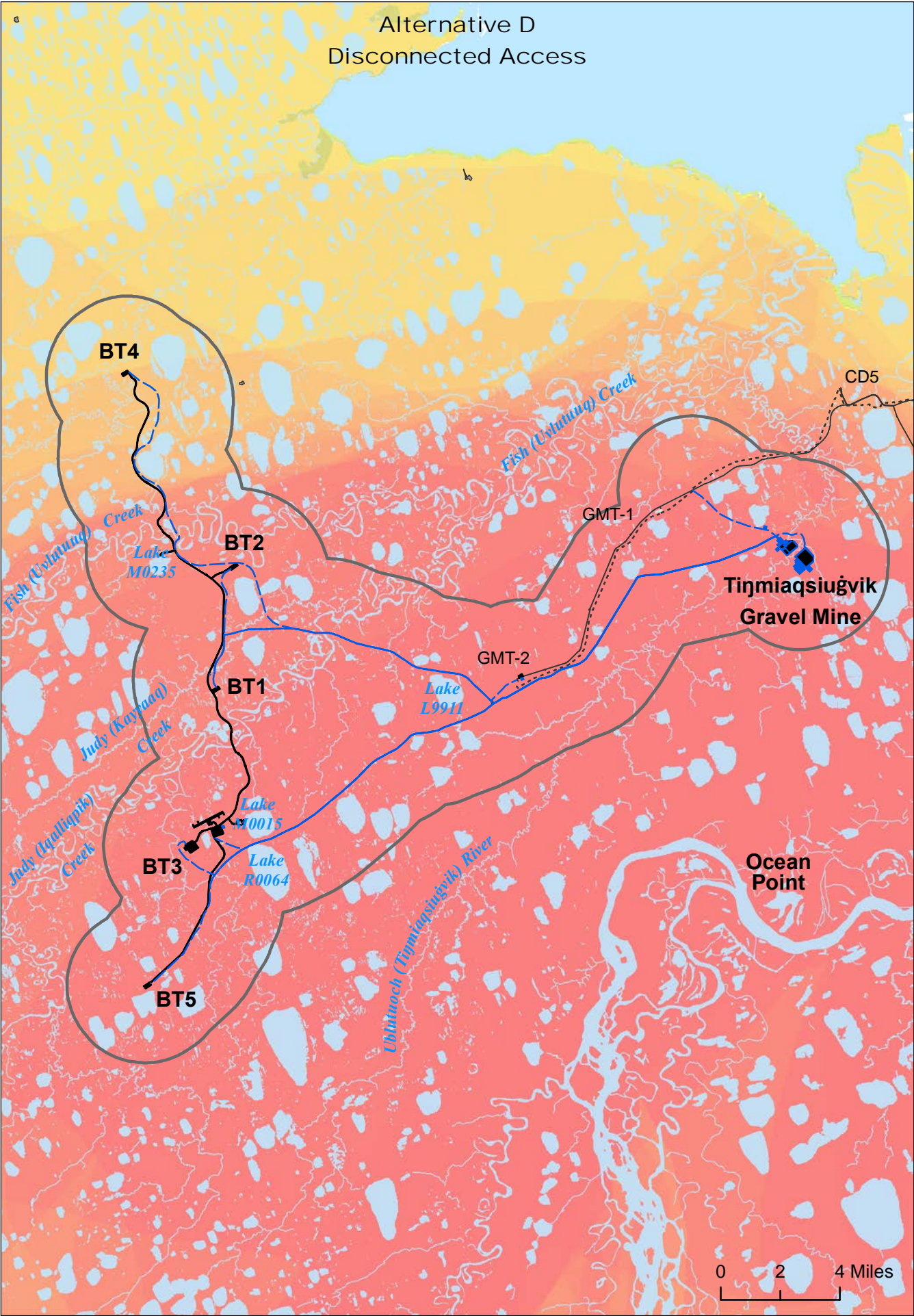
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.13



Subsistence Data

High Overlapping Subsistence Use Areas Wolf and Wolverine, 1995-2006^a

Low

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

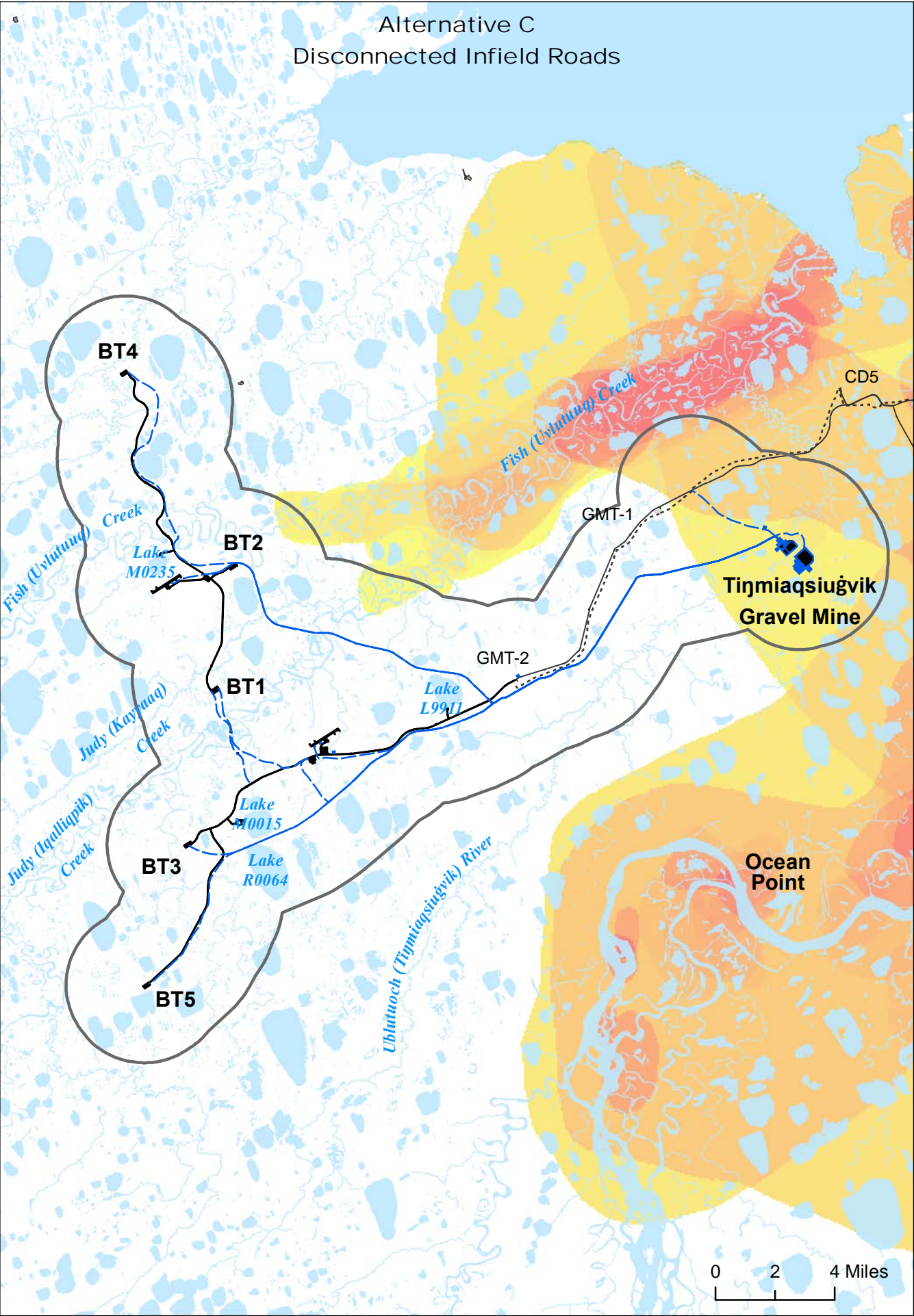
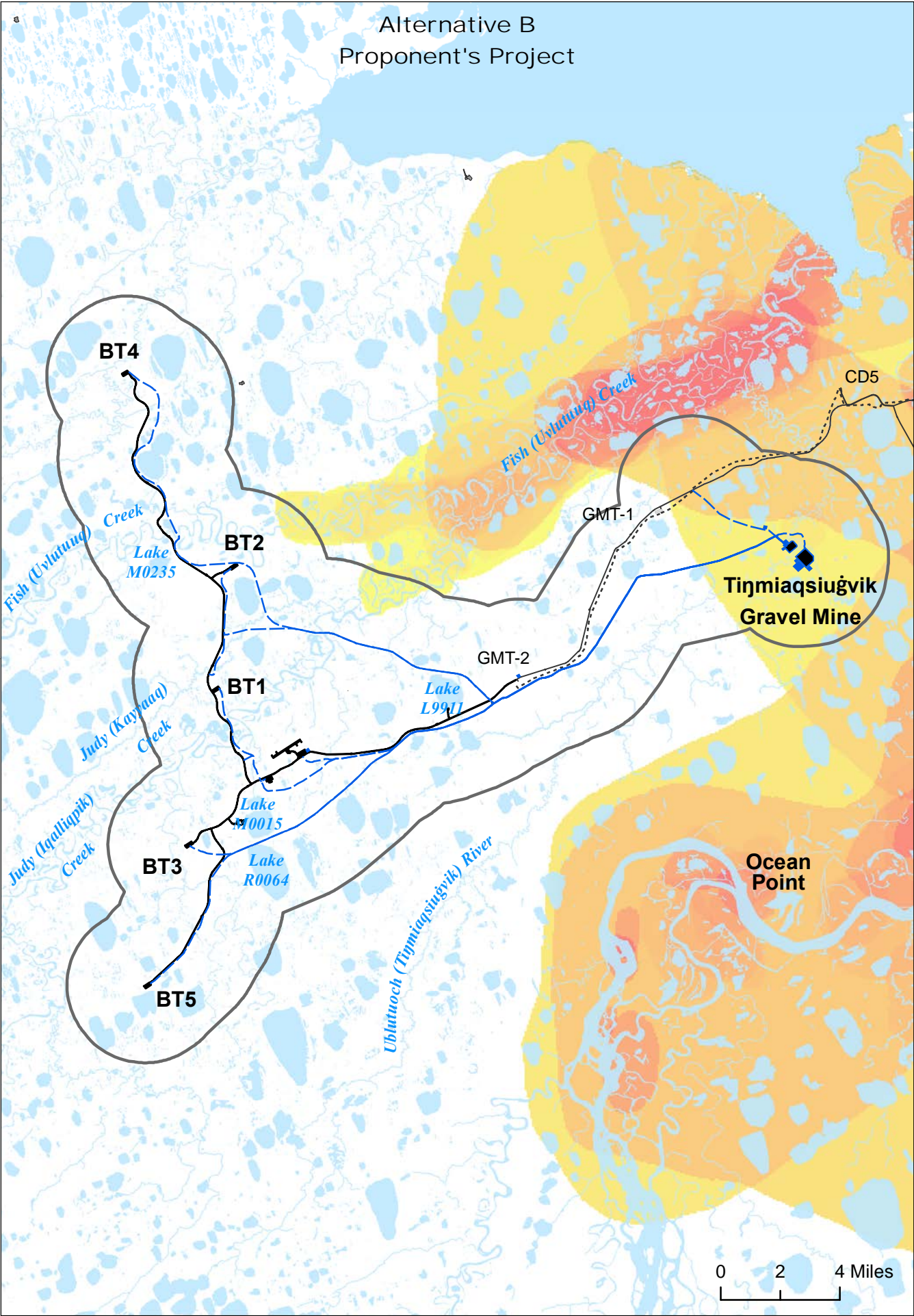
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.14



Subsistence Data

High Overlapping Subsistence Use Areas
Low Goose, 1995-2006^a

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

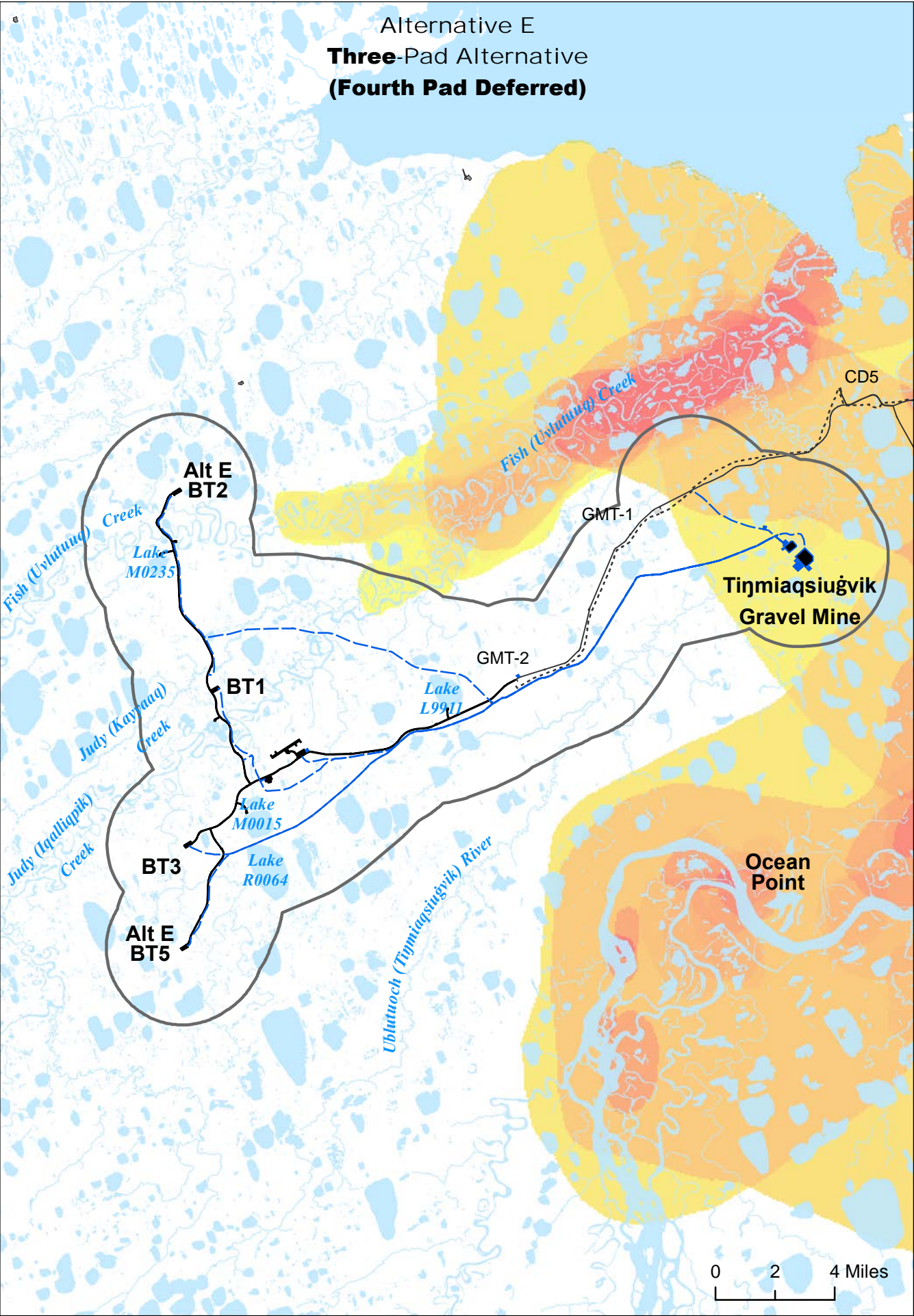
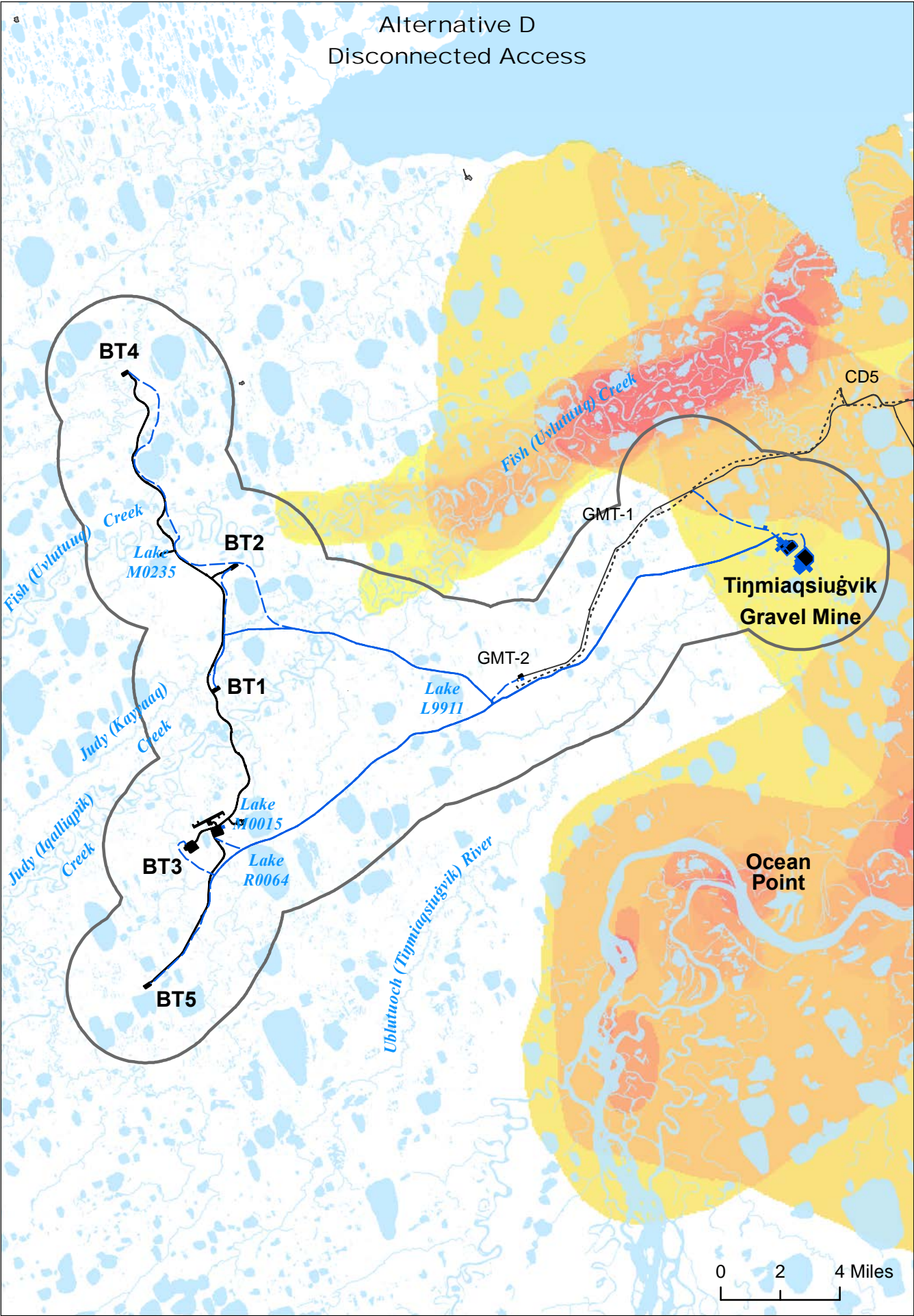
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.15



Subsistence Data

High Overlapping Subsistence Use Areas Goose, 1995-2006^a

Low

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

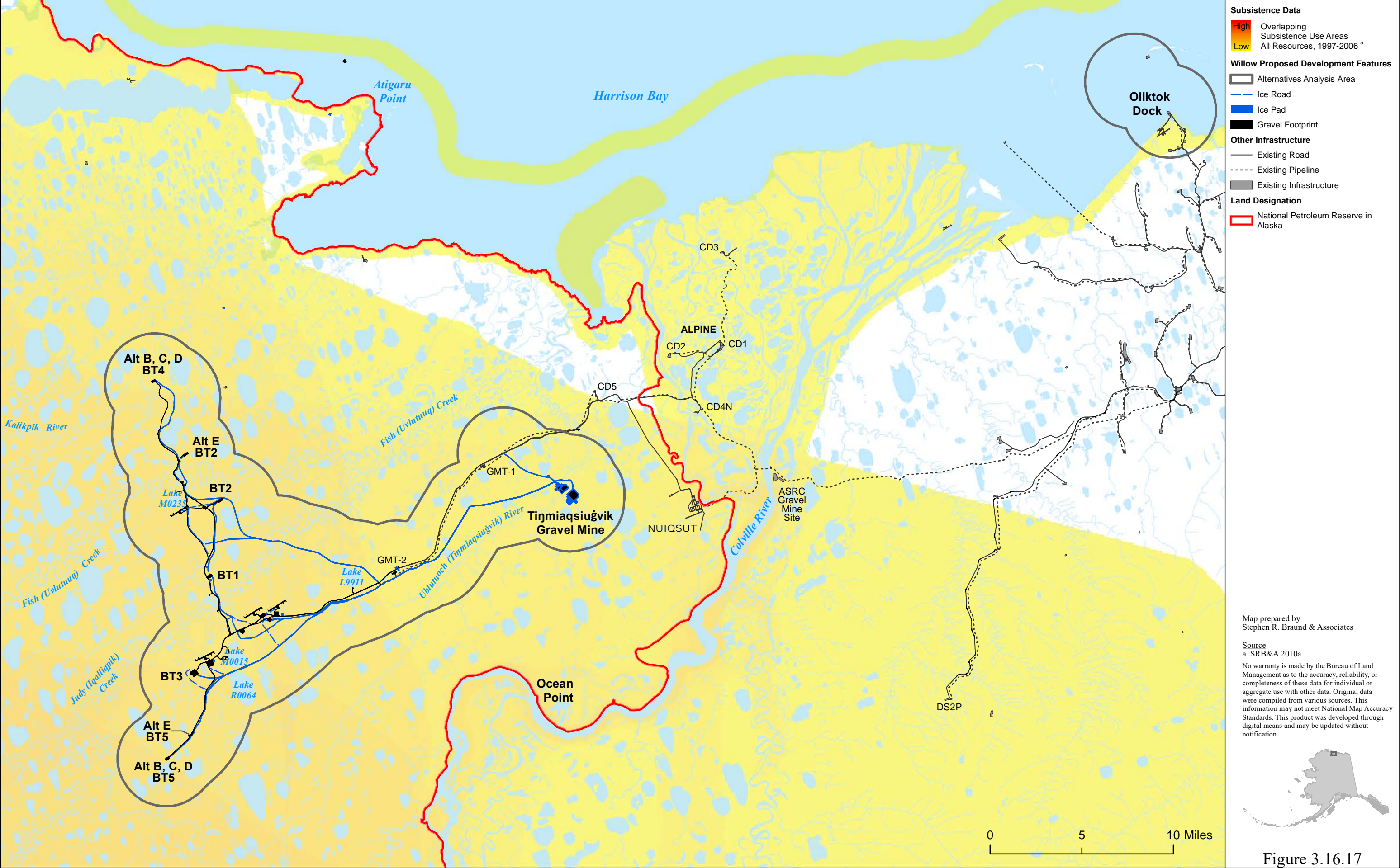
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

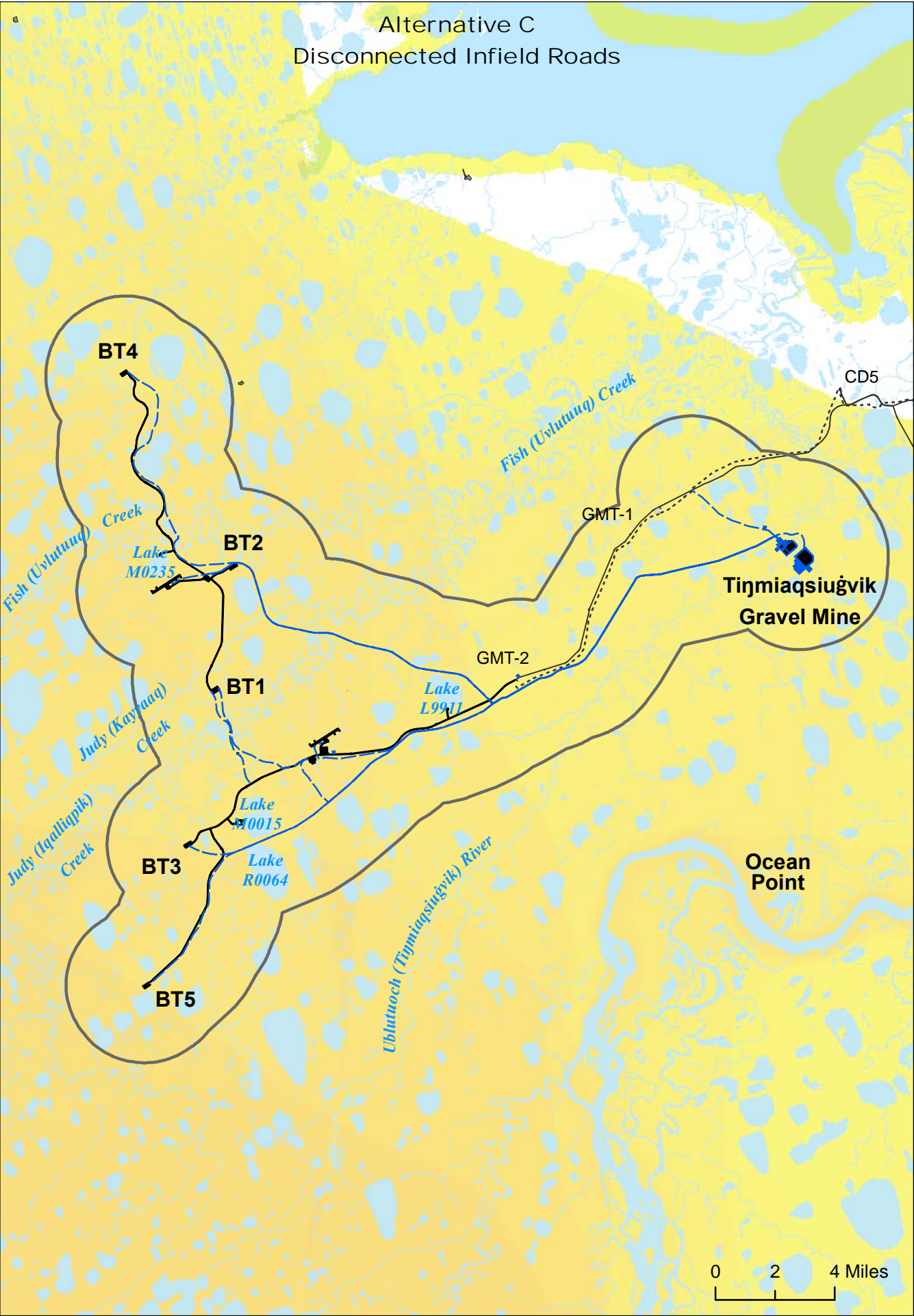
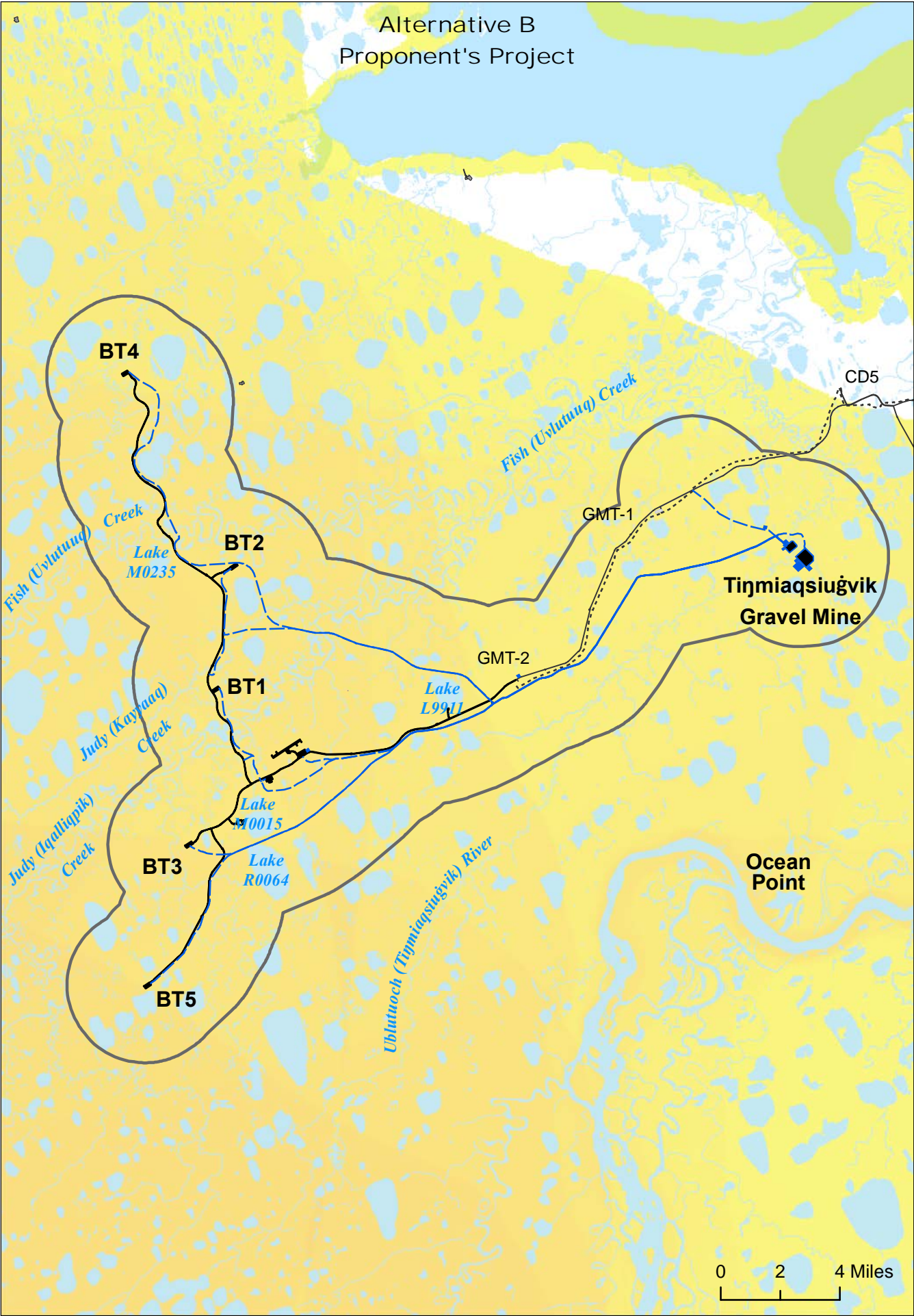
Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.16





Subsistence Data

High	Overlapping Subsistence Use Areas
Low	All Resources, 1997-2006 ^a

Willow Proposed Development Features

[Outline]	Alternative Analysis Area *
[Blue line]	Ice Road
[Blue square]	Ice Pad
[Black square]	Gravel Footprint

Other Infrastructure

[Solid line]	Existing Road
[Dashed line]	Existing Pipeline
[Grey square]	Existing Infrastructure

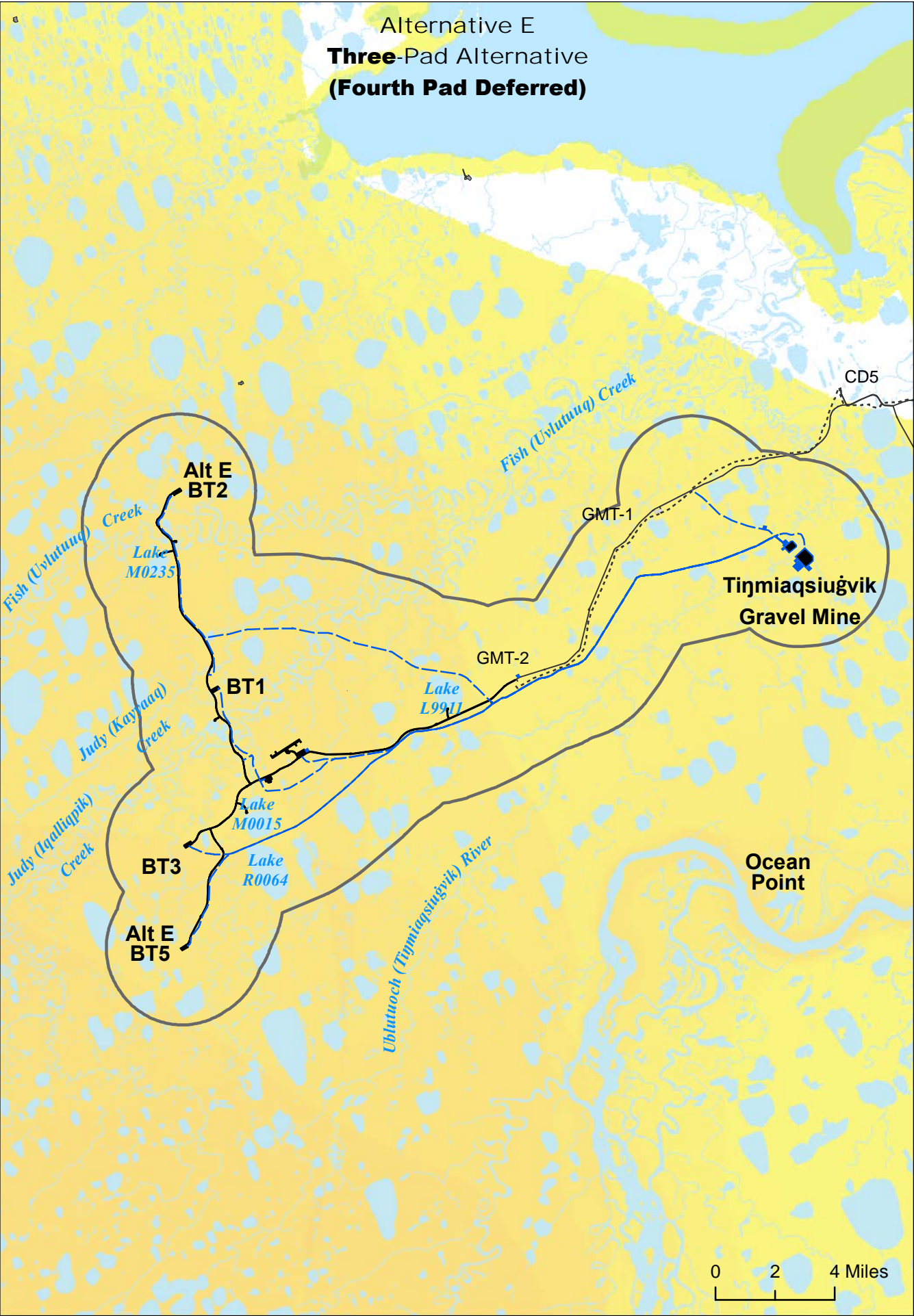
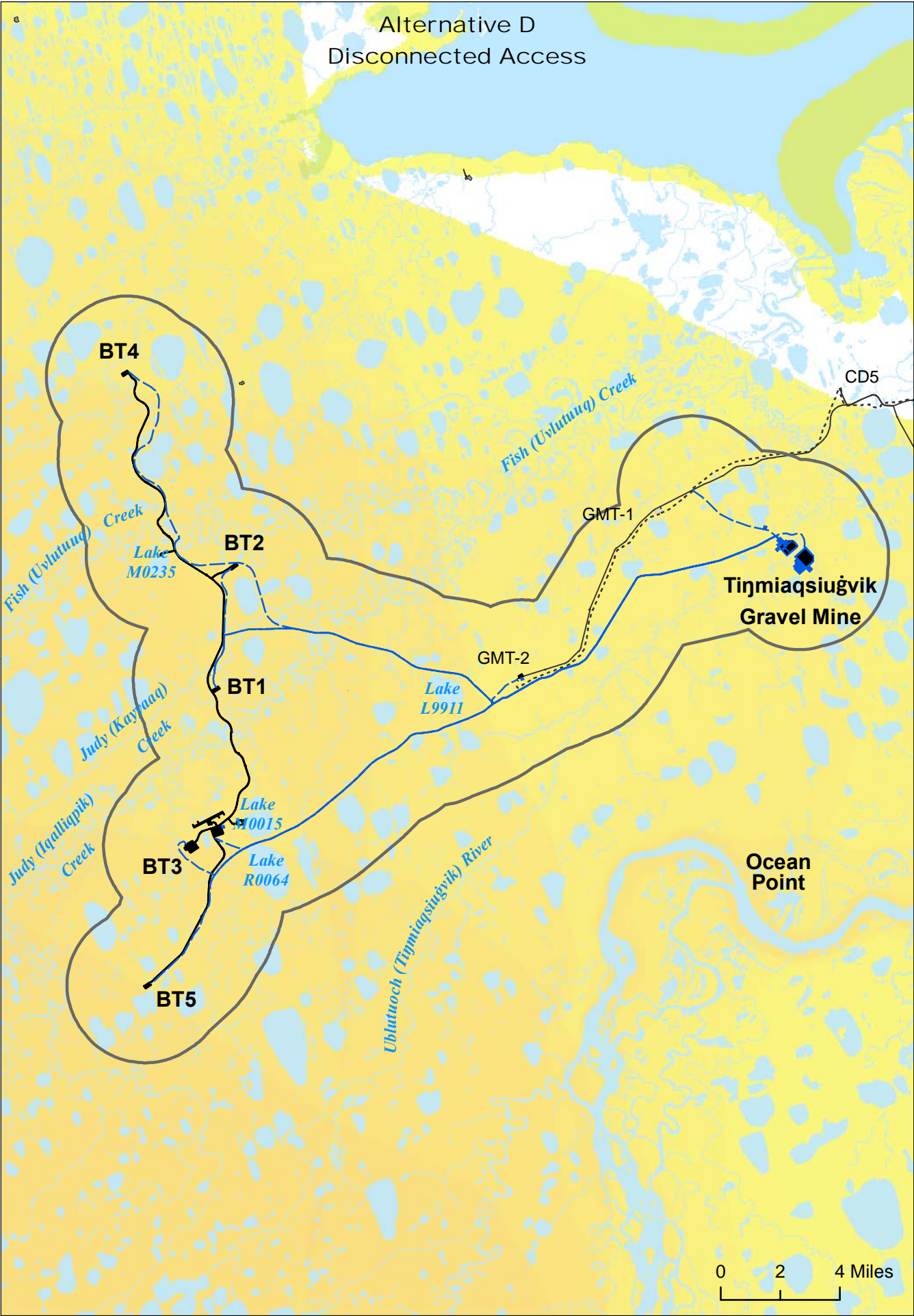
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.18



Subsistence Data

High Overlapping Subsistence Use Areas
Low All Resources, 1997-2006^a

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

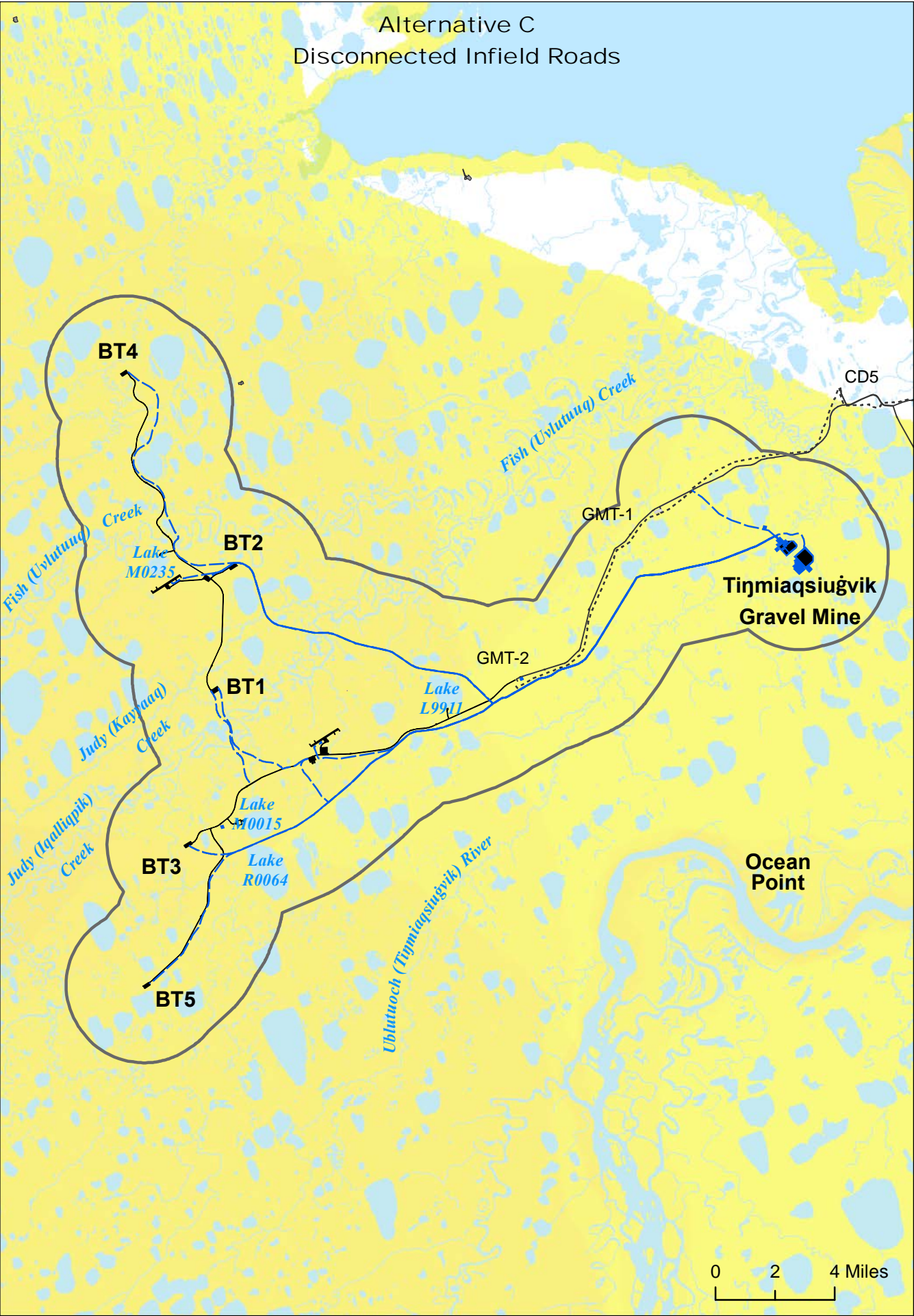
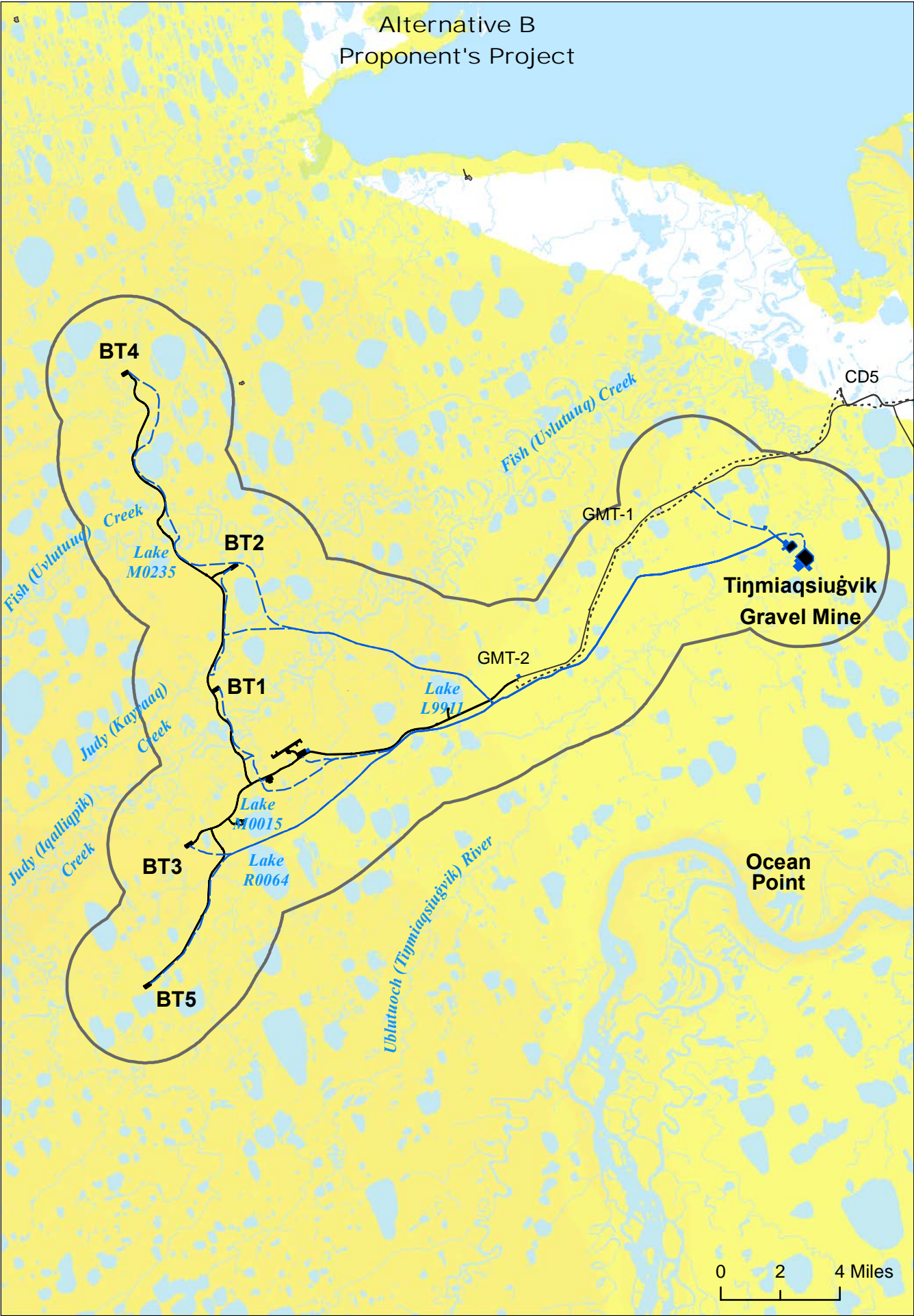
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
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Source
a. SRB&A 2010a

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Figure 3.16.19



Subsistence Data

High Overlapping Subsistence Use Areas Caribou, 1997-2006^a

Low

Willow Proposed Development Features

Alternative Analysis Area *

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

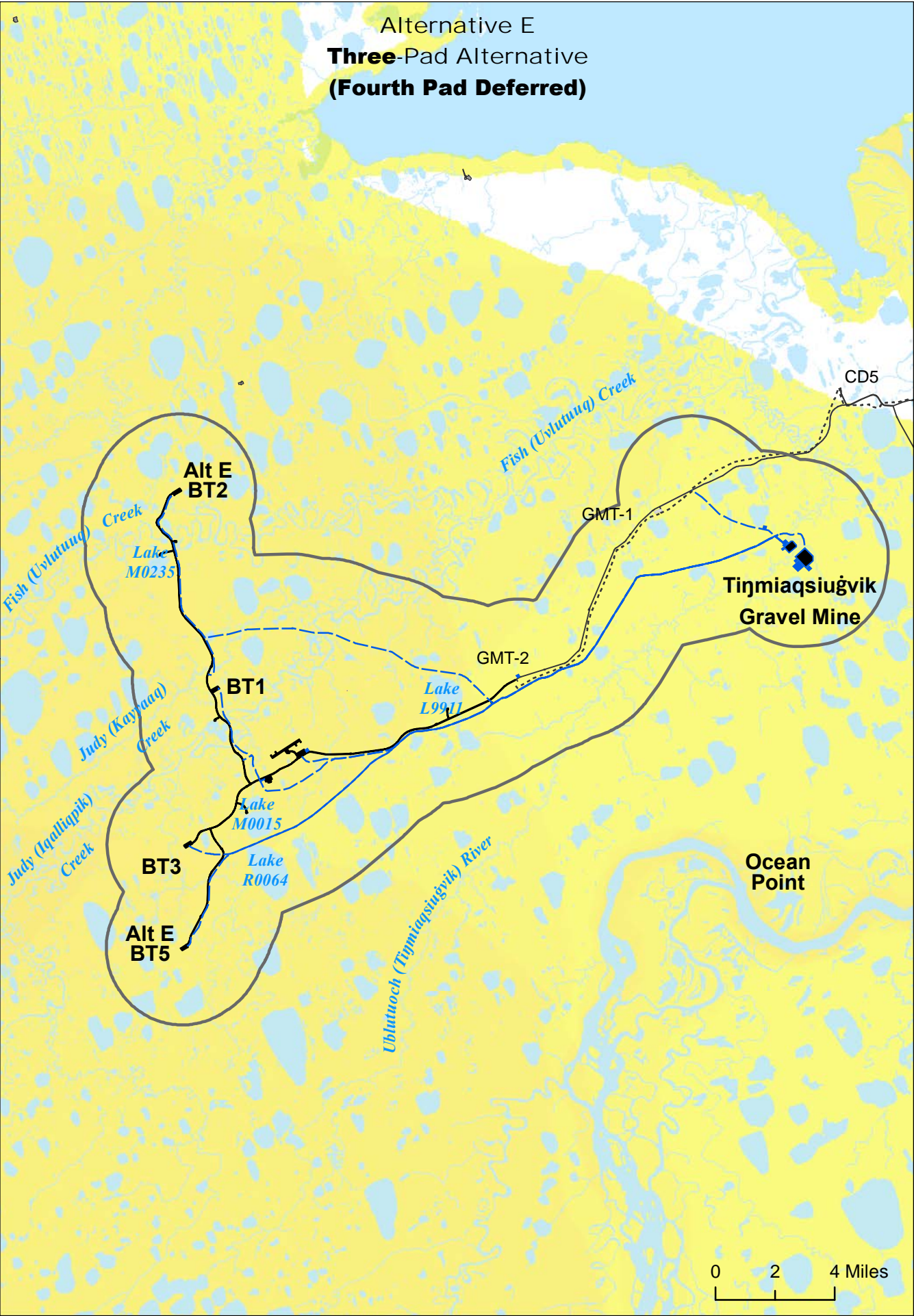
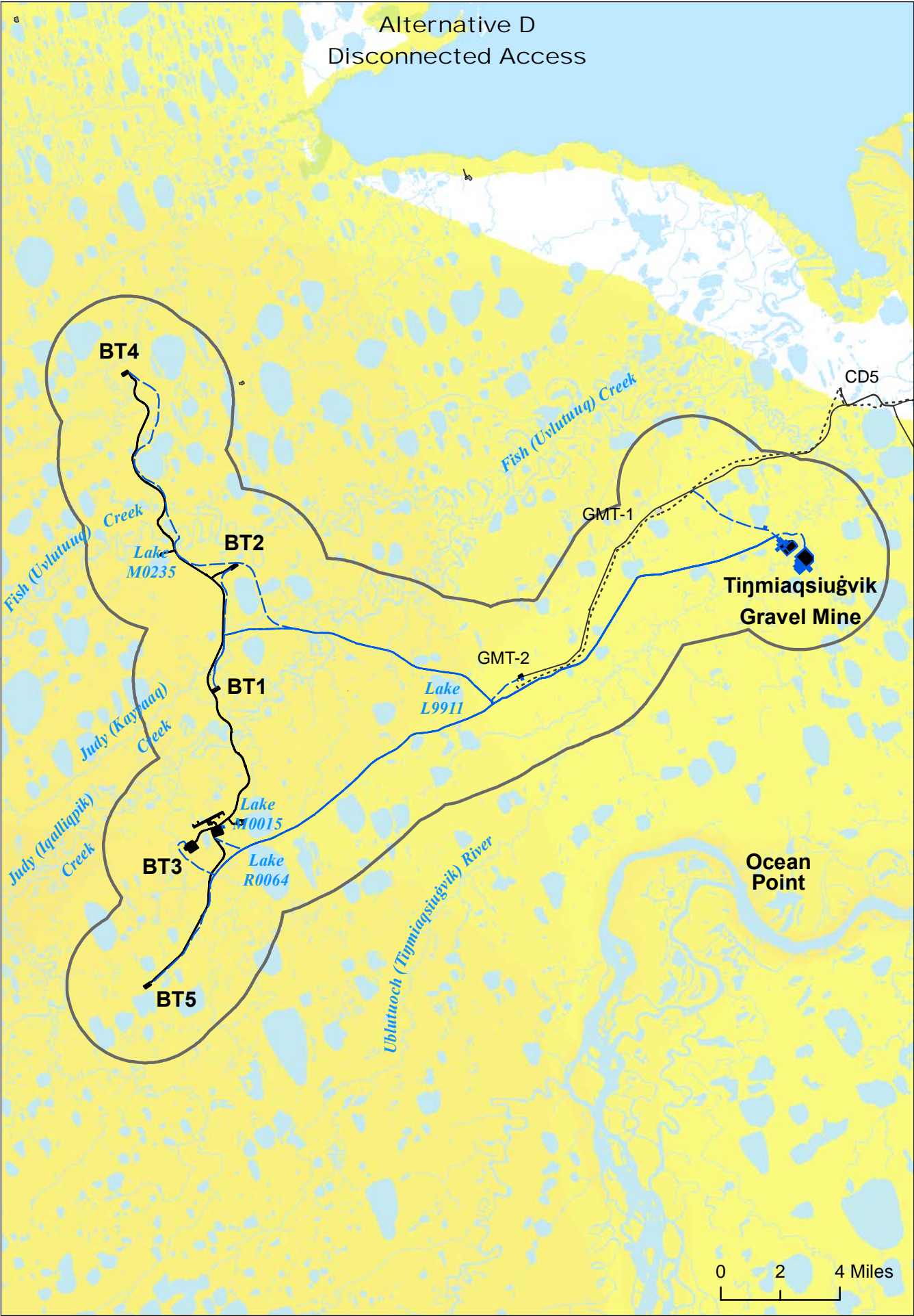
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
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Source
a. SRB&A 2010a

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Figure 3.16.20



Subsistence Data

High	Overlapping Subsistence Use Areas
Low	Caribou, 1997-2006 ^a

Willow Proposed Development Features

Alternative Analysis Area *
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

Existing Road
Existing Pipeline
Existing Infrastructure

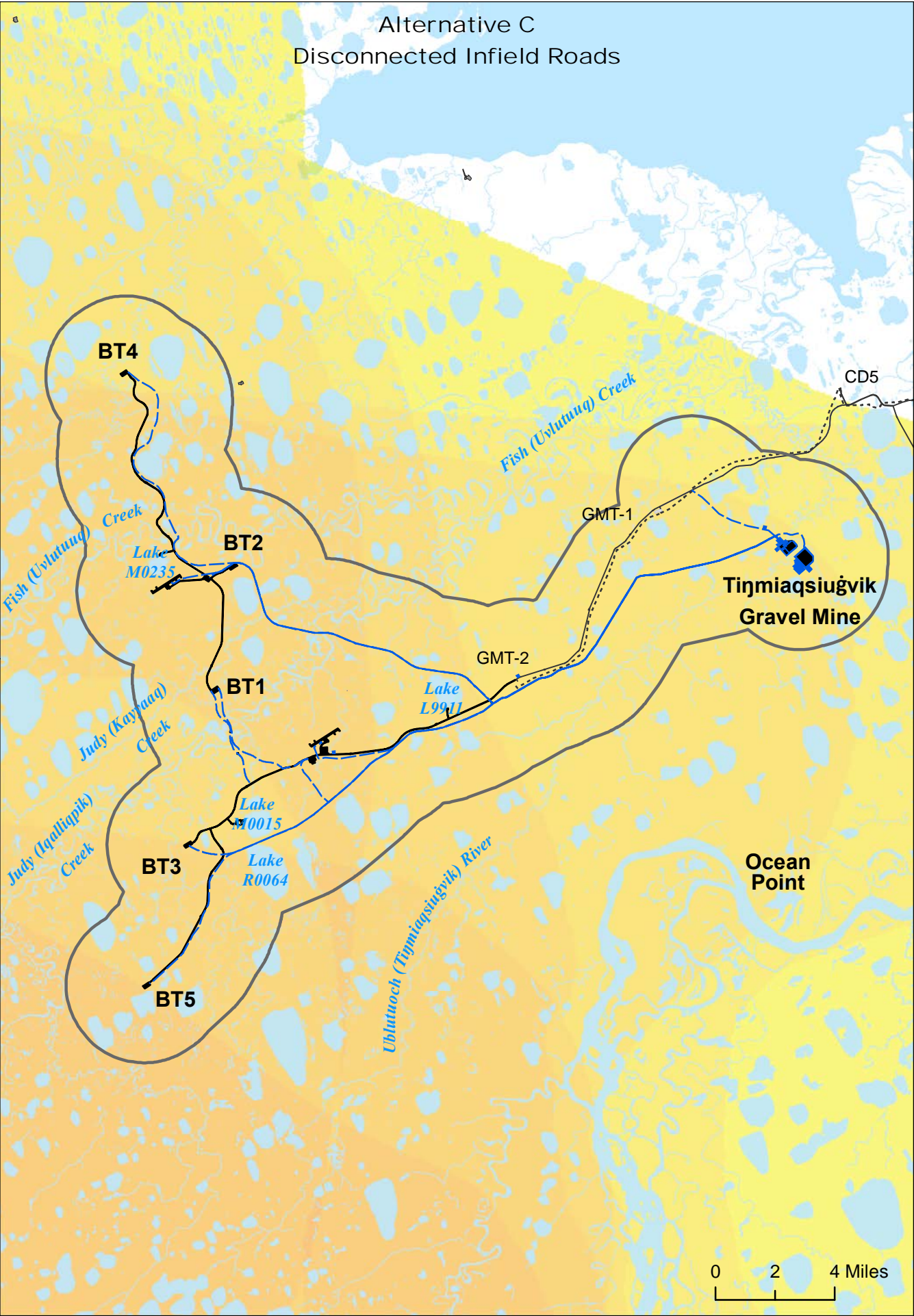
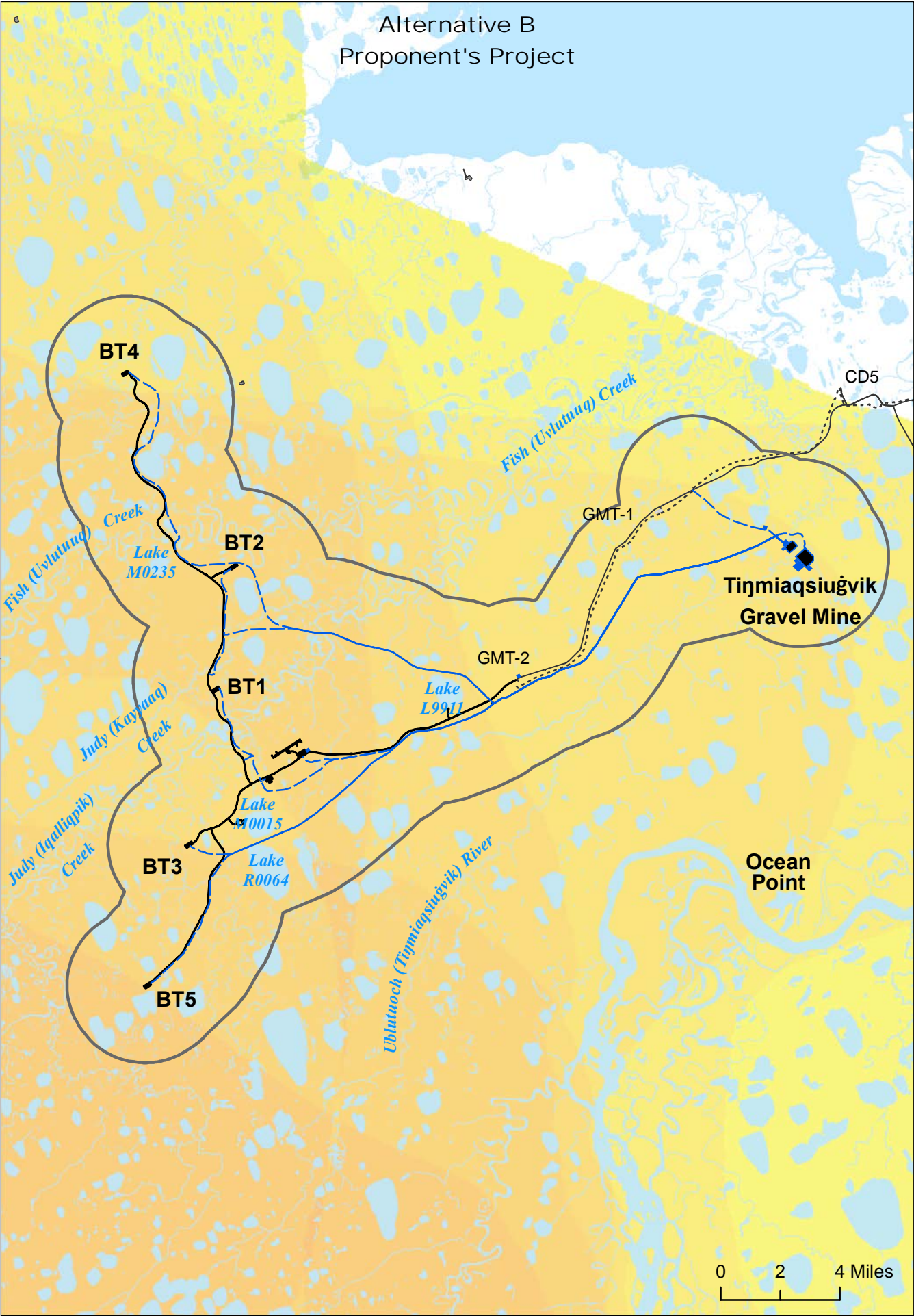
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
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Source
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Figure 3.16.21



Subsistence Data

High	Overlapping Subsistence Use Areas Wolf and Wolverine 1997-2006 ^a
Low	

Willow Proposed Development Features

Alternative Analysis Area *	
Ice Road	
Ice Pad	
Gravel Footprint	

Other Infrastructure

Existing Road	
Existing Pipeline	
Existing Infrastructure	

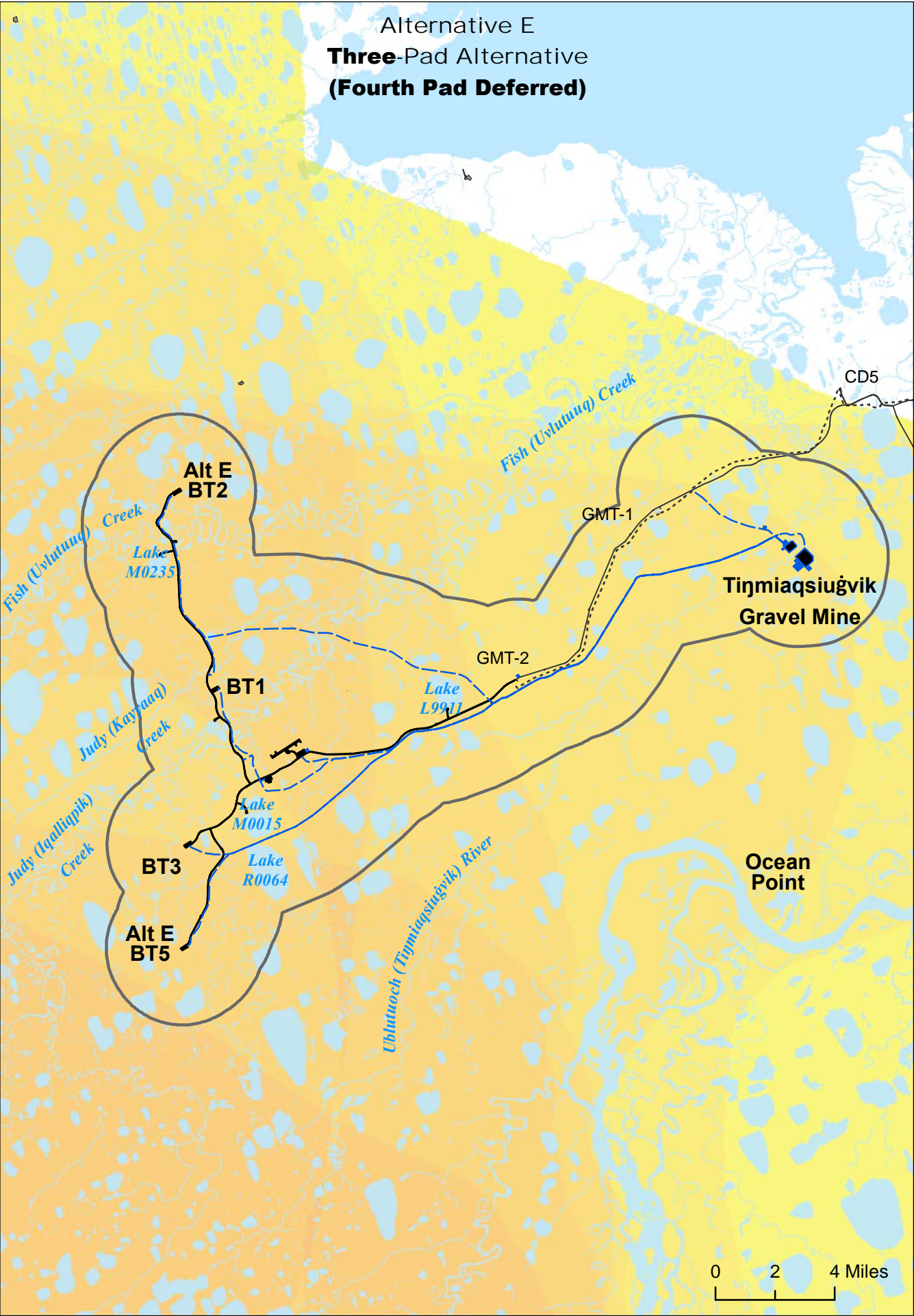
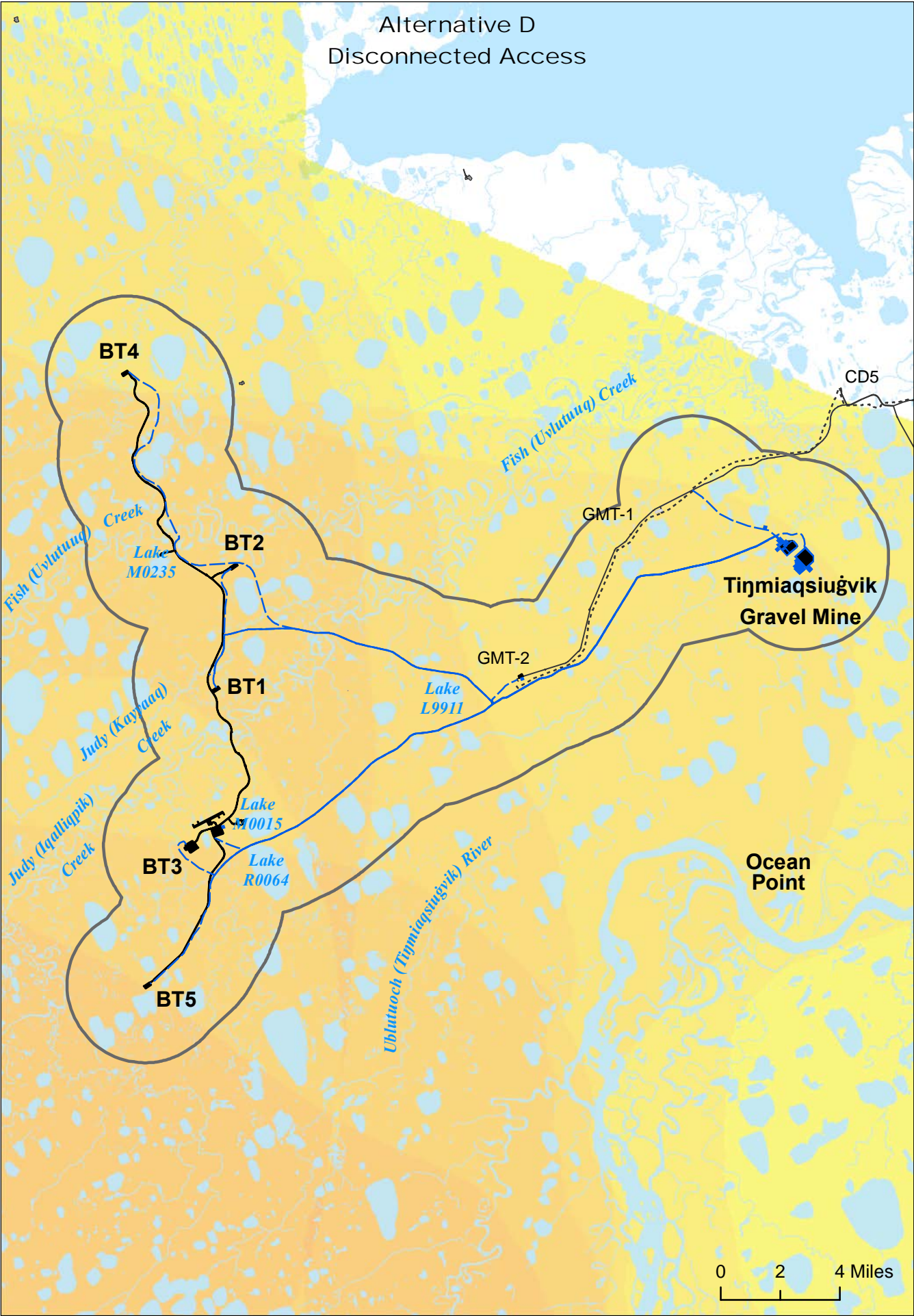
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
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Source
a. SRB&A 2010a

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Figure 3.16.22



Subsistence Data

- High Overlapping Subsistence Use Areas Wolf and Wolverine 1997-2006^a
- Low

Willow Proposed Development Features

- Alternative Analysis Area *
- Ice Road
- Ice Pad
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

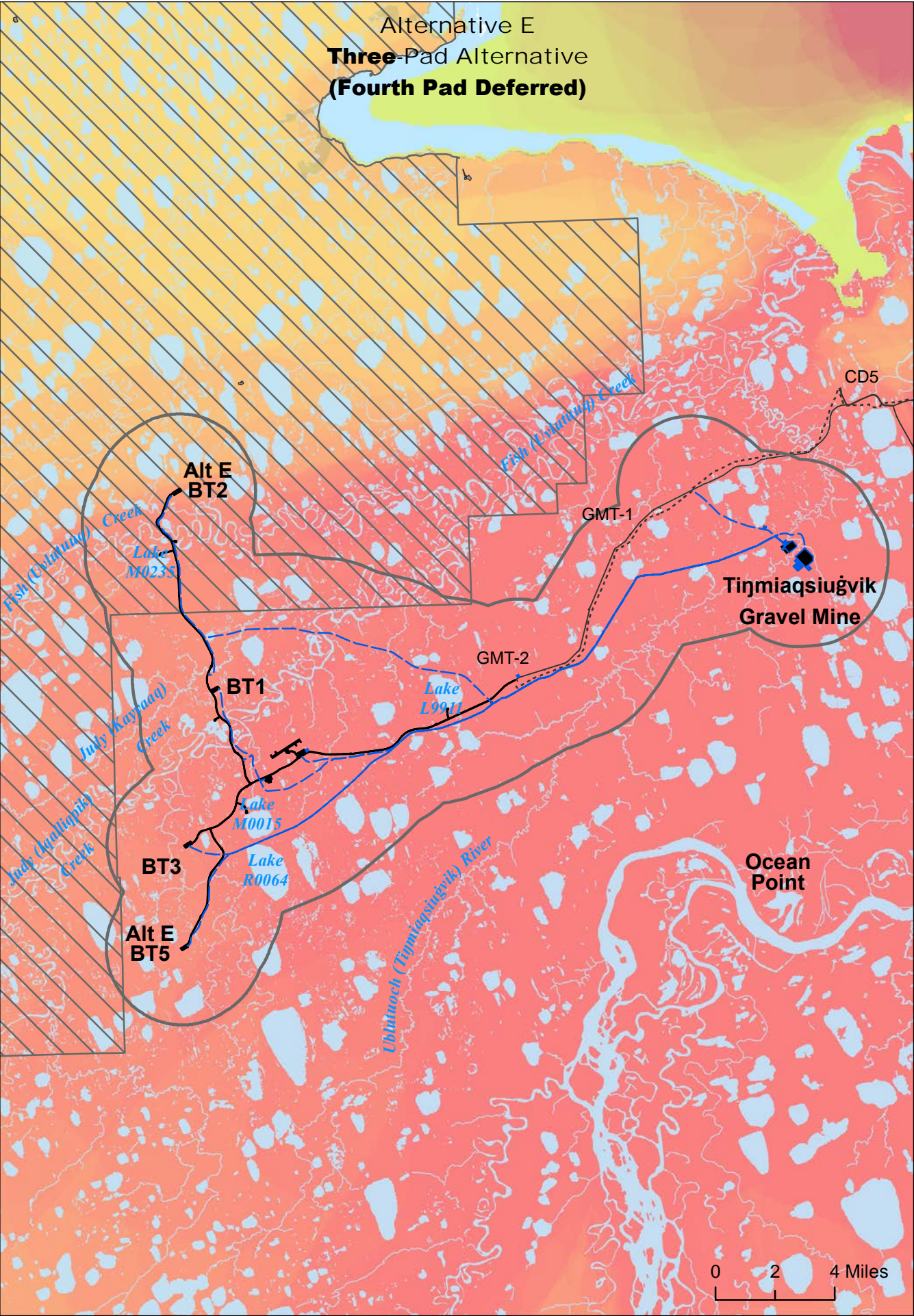
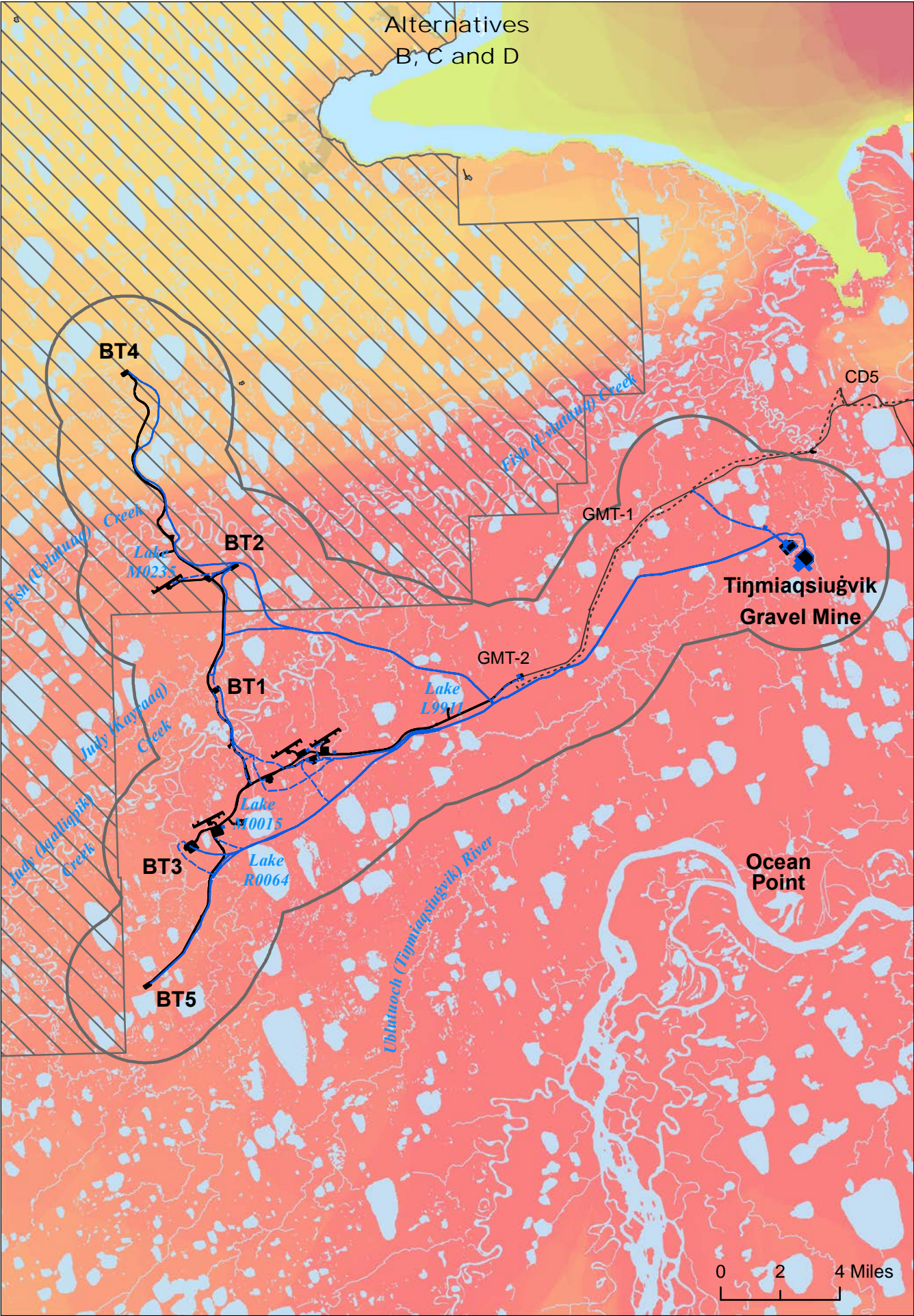
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.23



Subsistence Data

- High Overlapping Subsistence Use Areas
- Low All Resources, 1995-2006^a

Willow Proposed Development Features

- Alternative Analysis Area *
- Ice Road
- Ice Pad
- Gravel Footprint

Other Infrastructure

- Existing Road
- Existing Pipeline
- Existing Infrastructure

Best Management Practice Areas

- Teshekpuk Lake Special Area

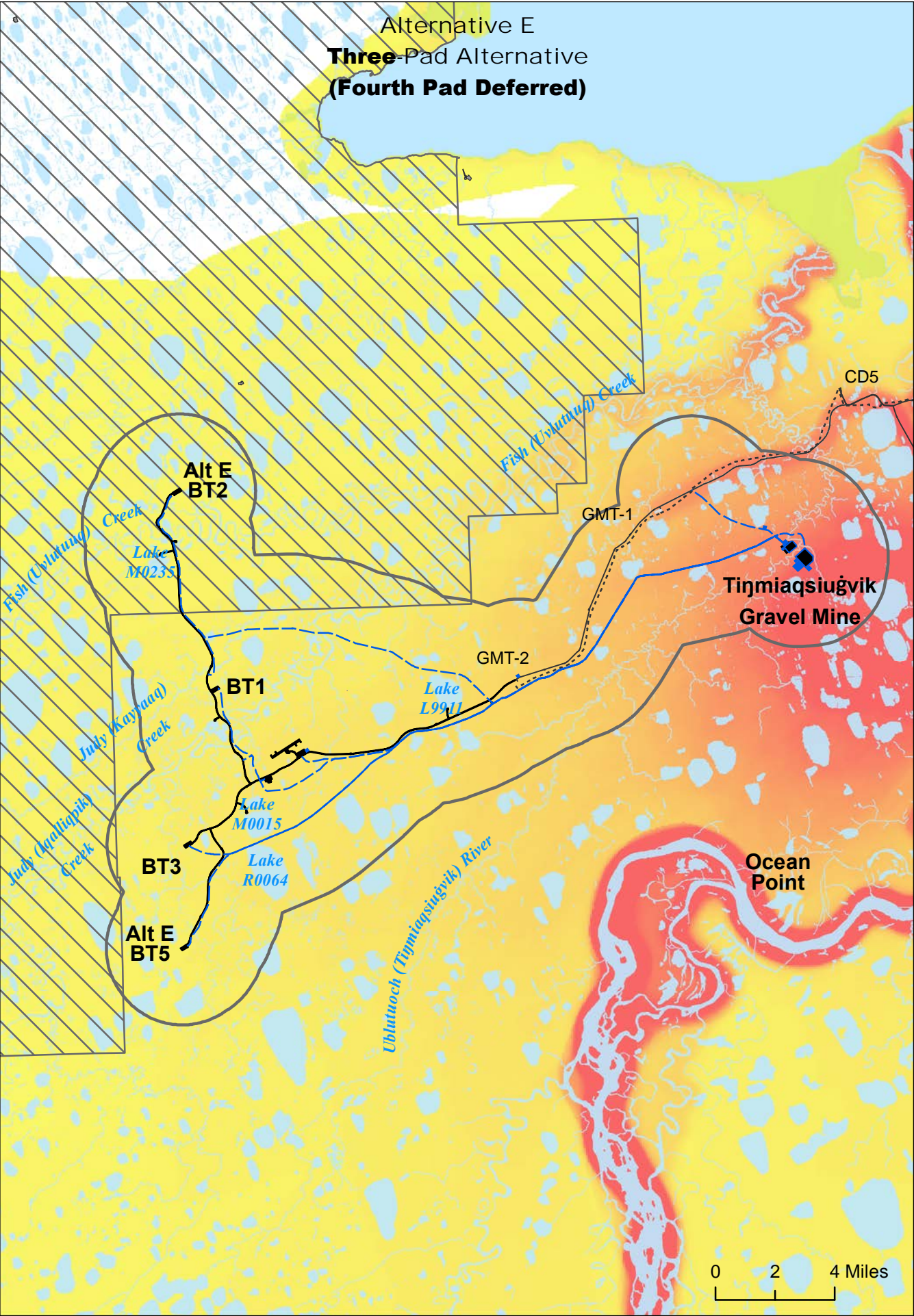
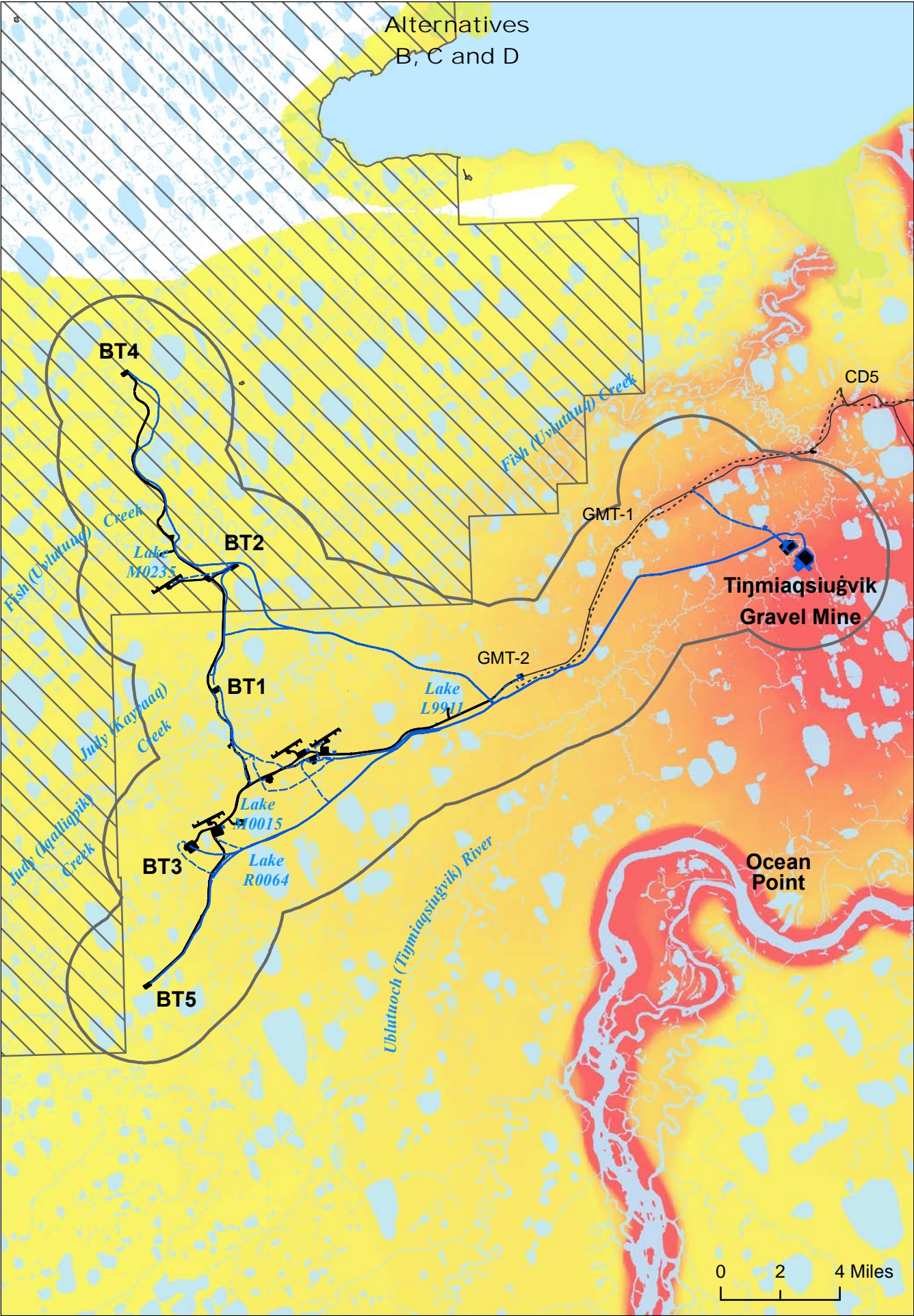
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.24



Subsistence Data
High
Low

Willow Proposed Development Features
Alternative Analysis Area *
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure
Existing Road
Existing Pipeline
Existing Infrastructure

Best Management Practice Areas
Teshekpuk Lake Special Area

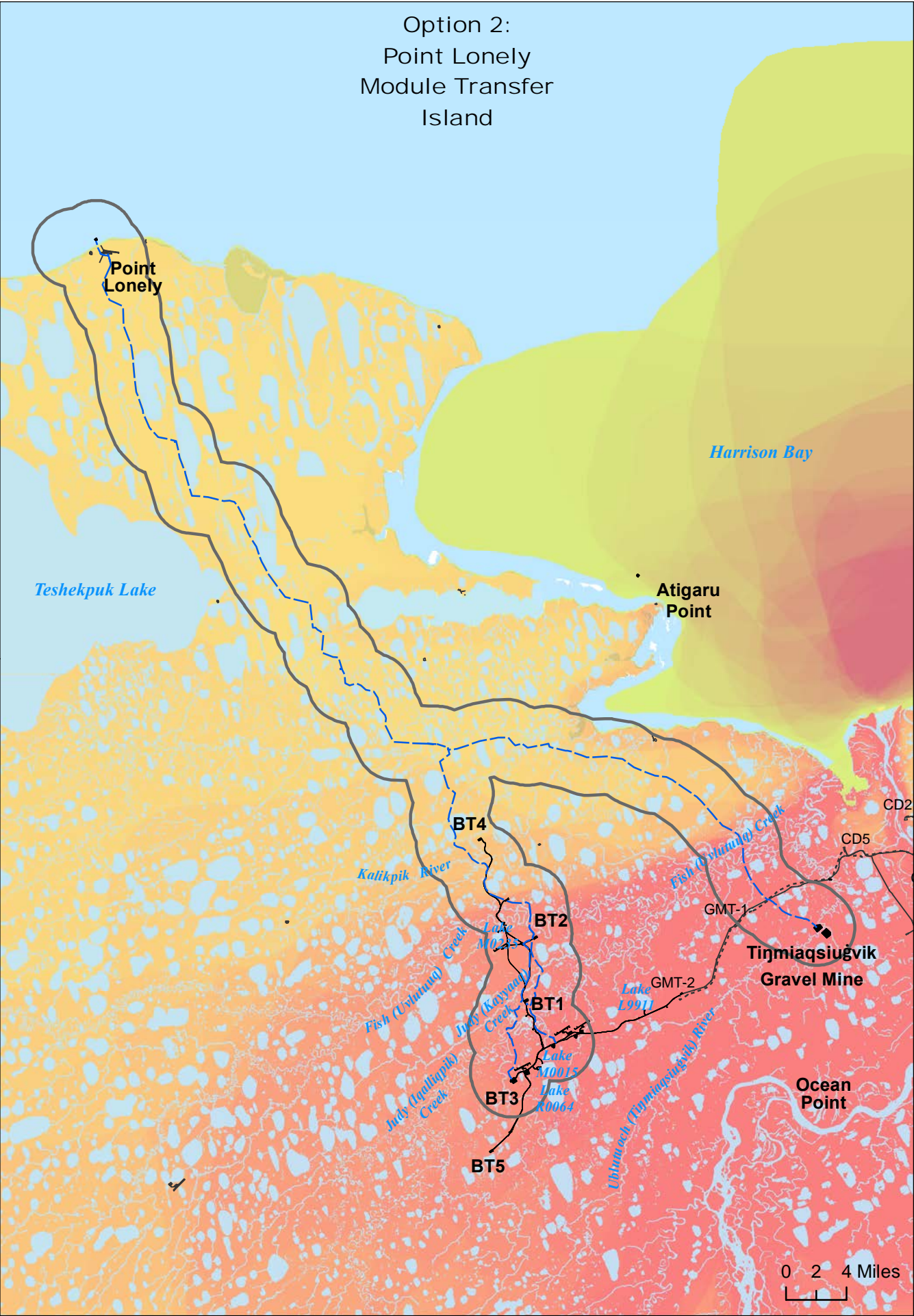
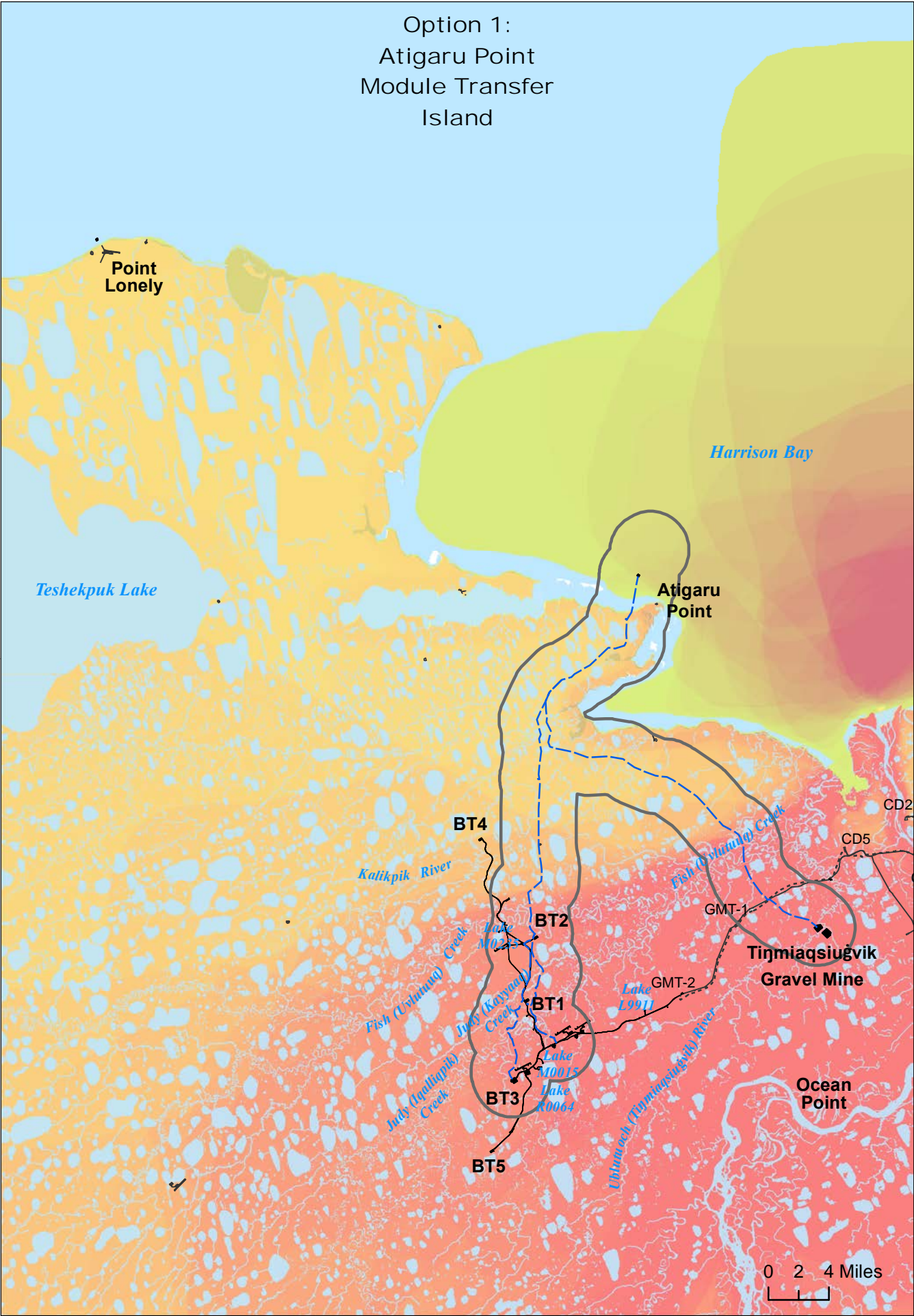
* The alternatives analysis area also includes Oliktok Dock (see Maps 3.16.6 and 3.16.17)

Map prepared by
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Source
a. SRB&A 2010a

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Figure 3.16.25



Subsistence Data

High	Overlapping Subsistence Use Areas
Low	All Resources, 1995-2006 ^a

Willow Proposed Development Features

Module Transport Analysis Area
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

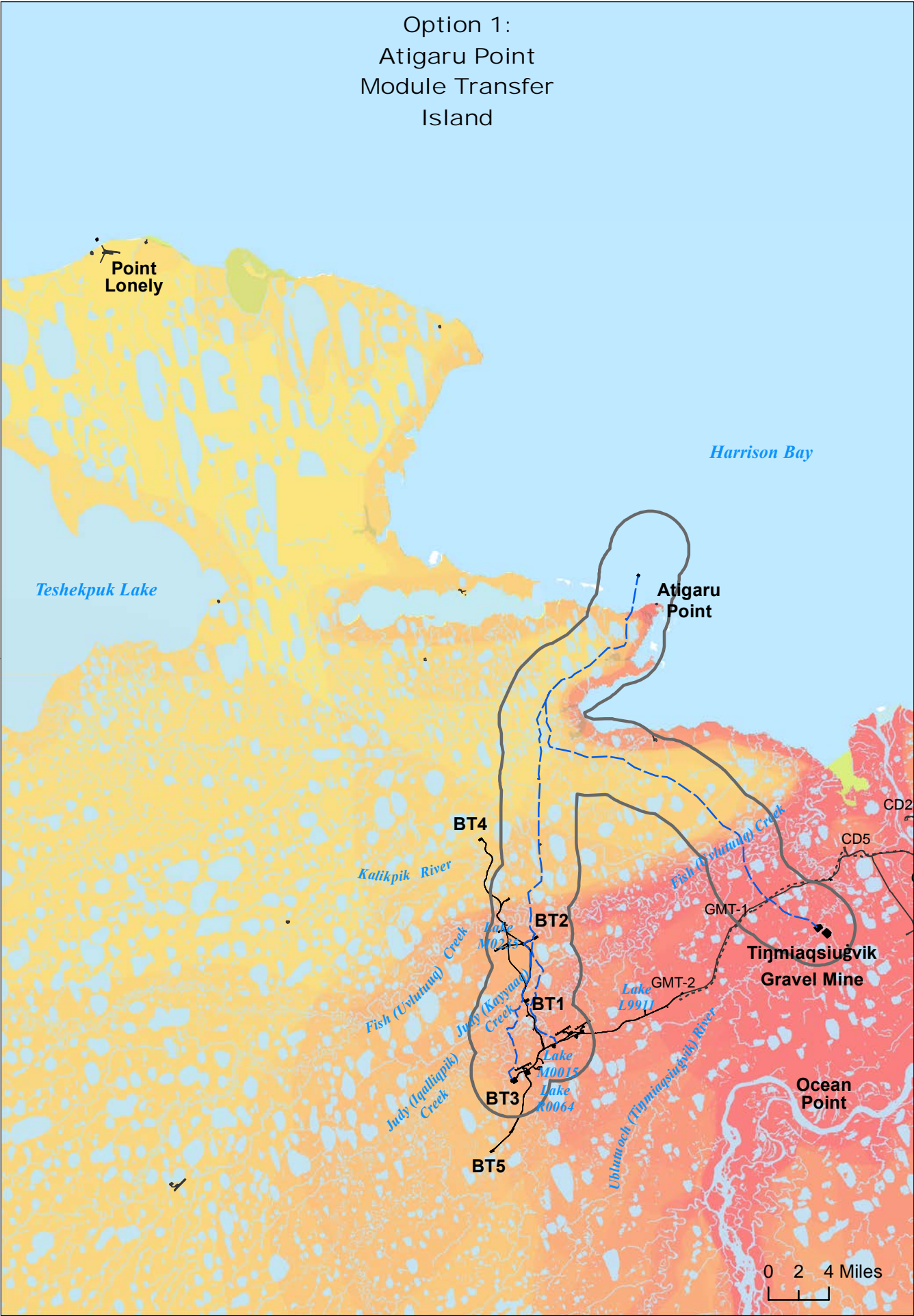
Existing Road
Existing Pipeline
Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.26



Subsistence Data

High Overlapping Subsistence Use Areas Caribou, 1995-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

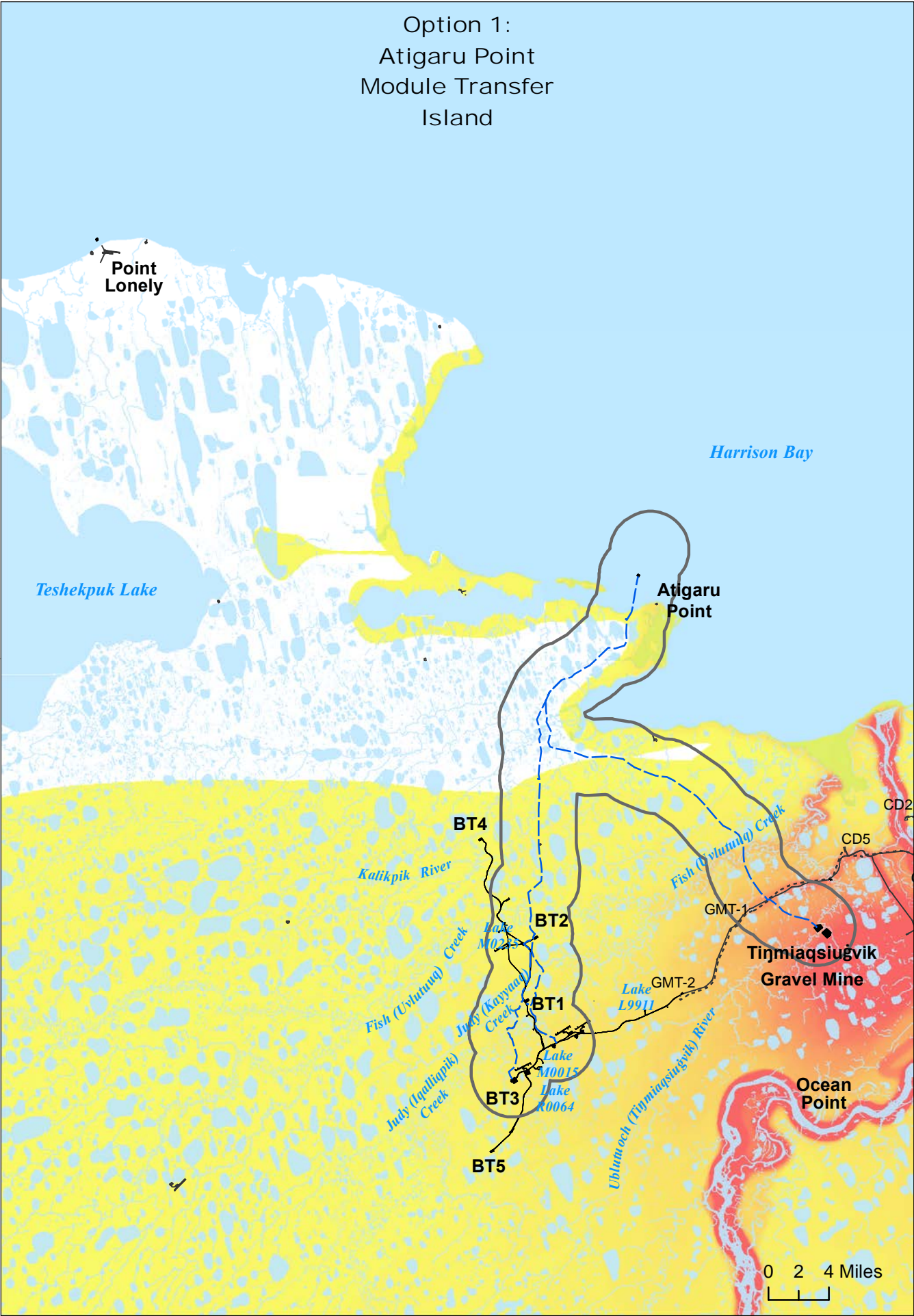
Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.27



Subsistence Data

High Overlapping Subsistence Use Areas^a
Low Caribou, January 2008 through December 2019

Willow Proposed Development Features

Module Transport Analysis Area
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

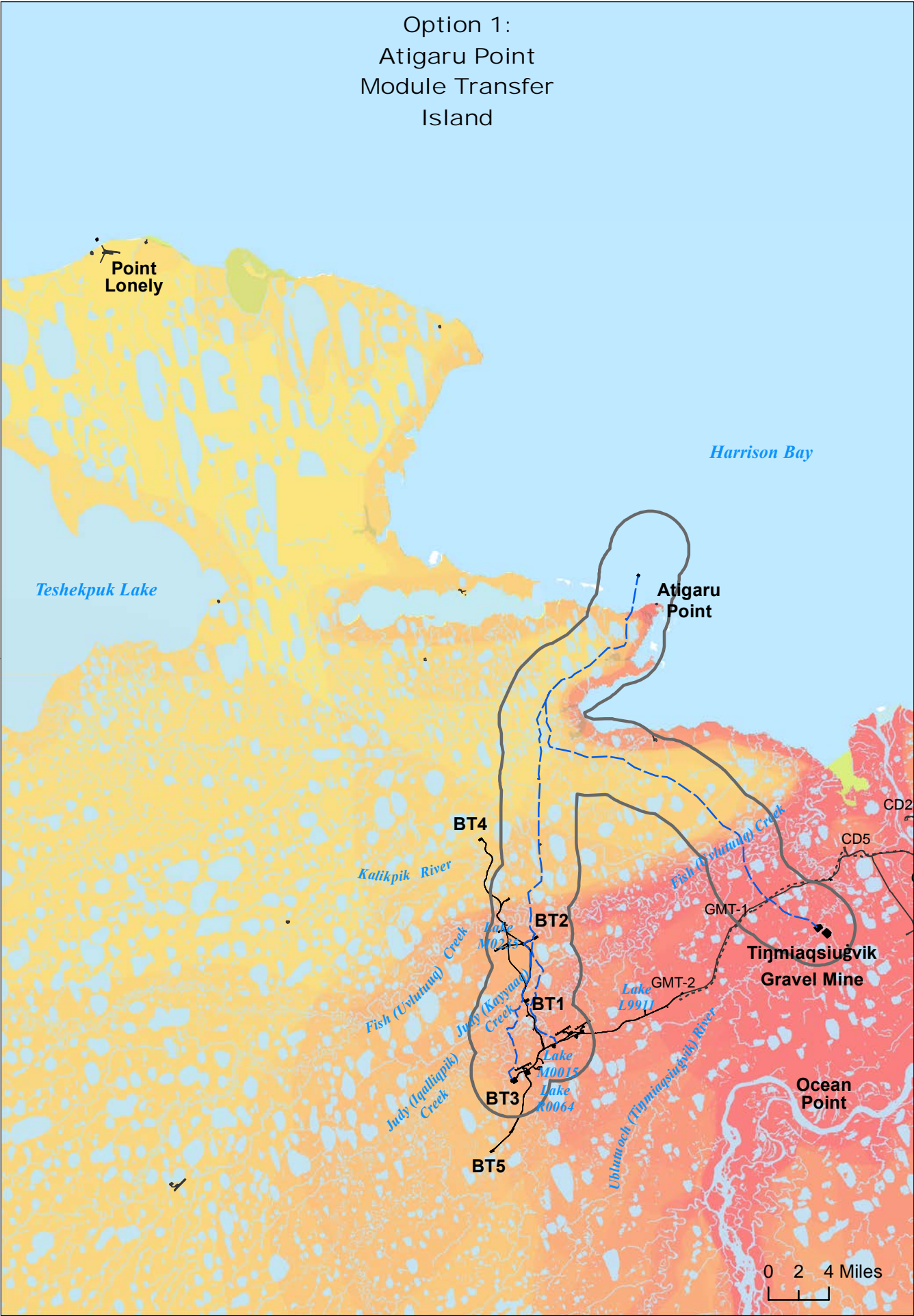
Existing Road
Existing Pipeline
Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2021

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Figure 3.16.28



Subsistence Data

High Overlapping Subsistence Use Areas Wolf and Wolverine, 1995-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

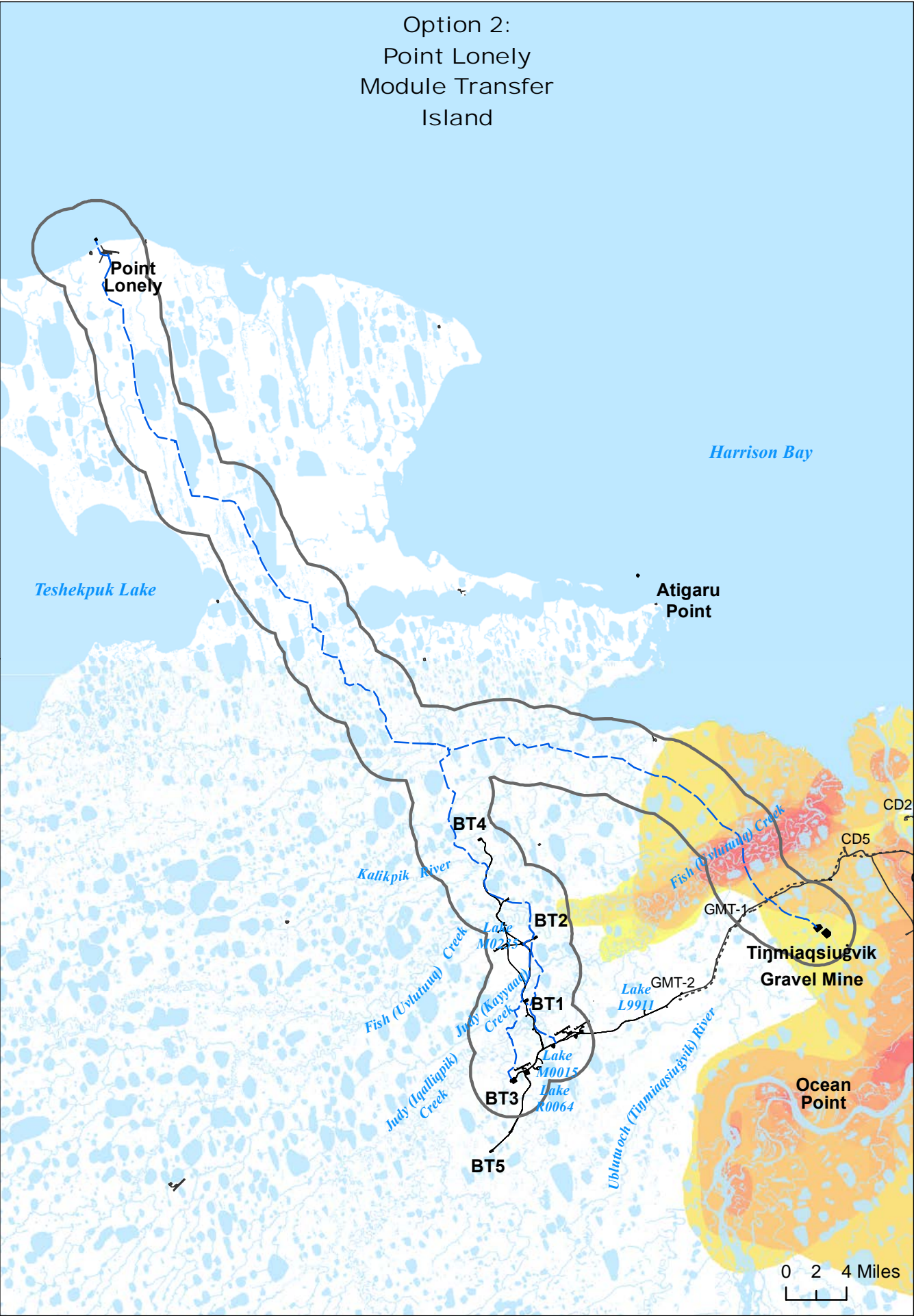
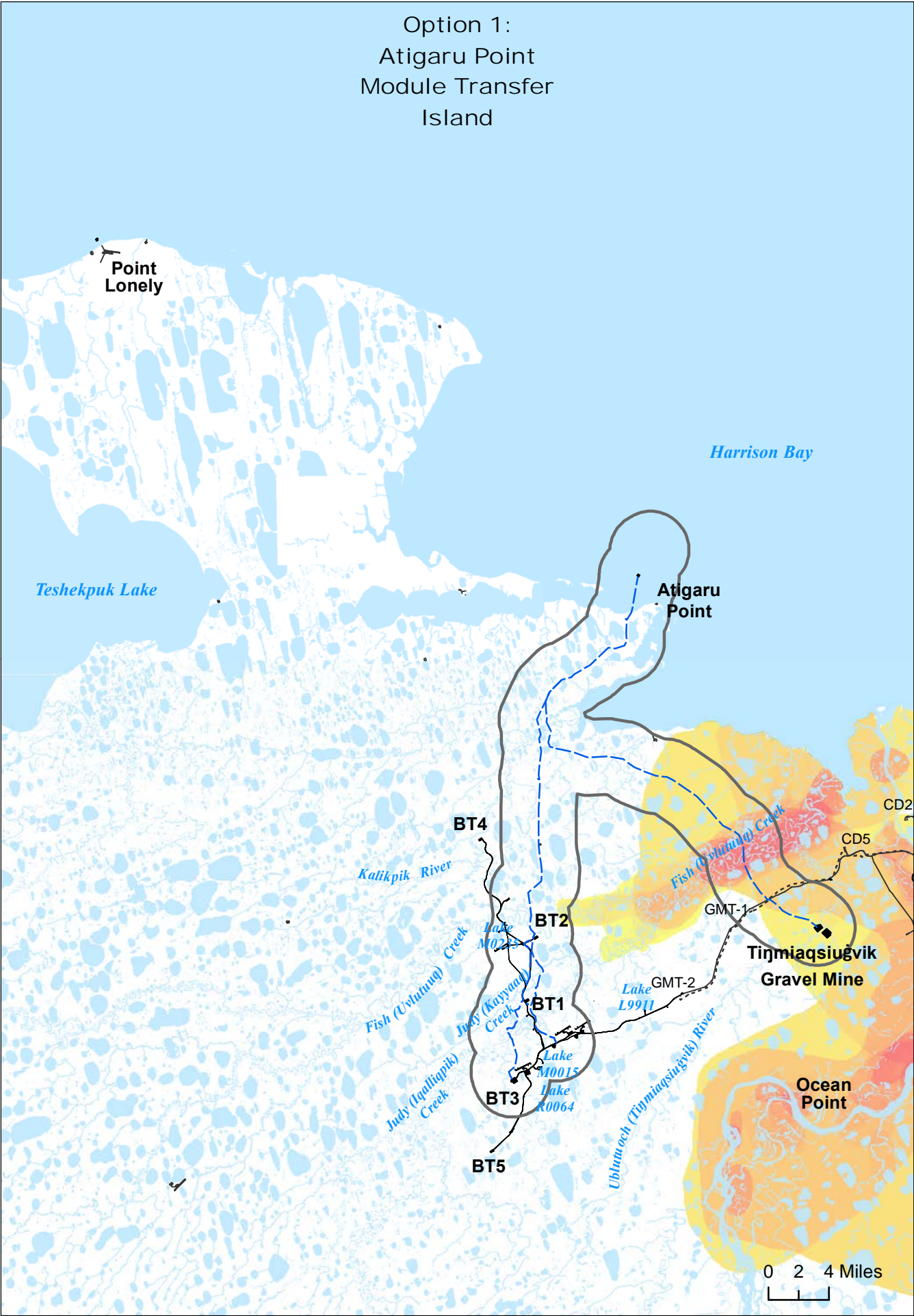
Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.29



Subsistence Data

High Overlapping Subsistence Use Areas Goose, 1995-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

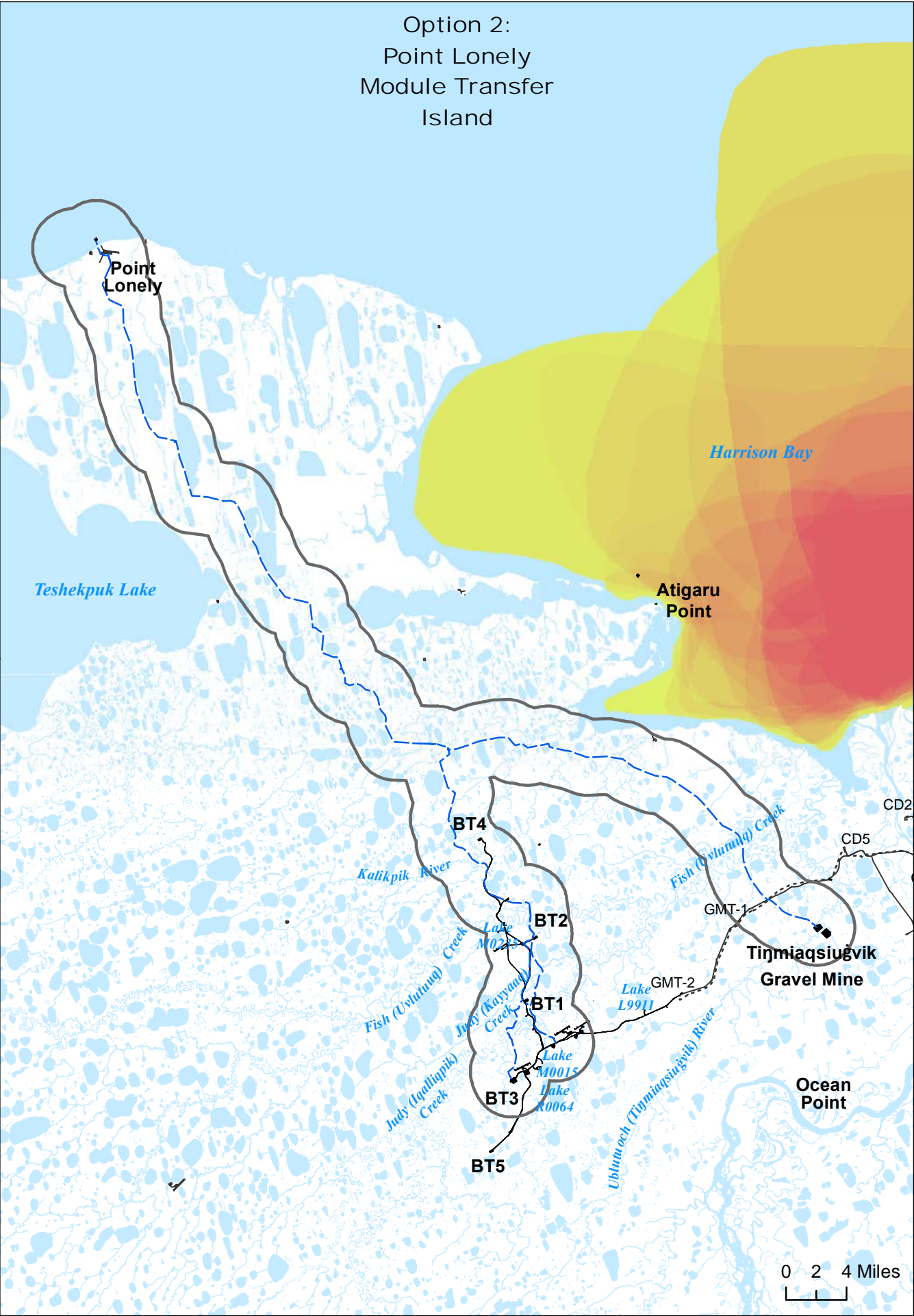
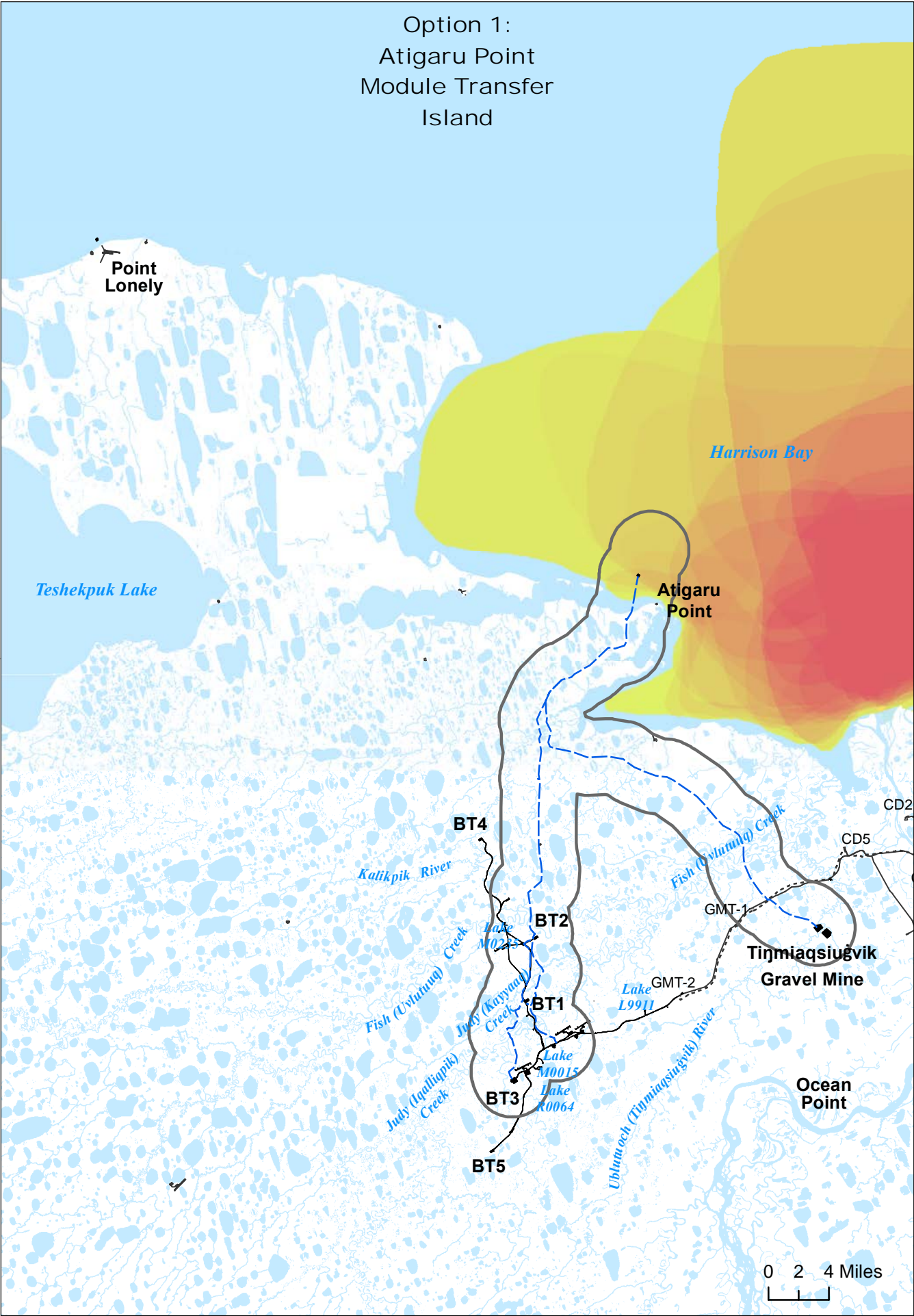
Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.30



Subsistence Data

High Overlapping Subsistence Use Areas Seal, 1995-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

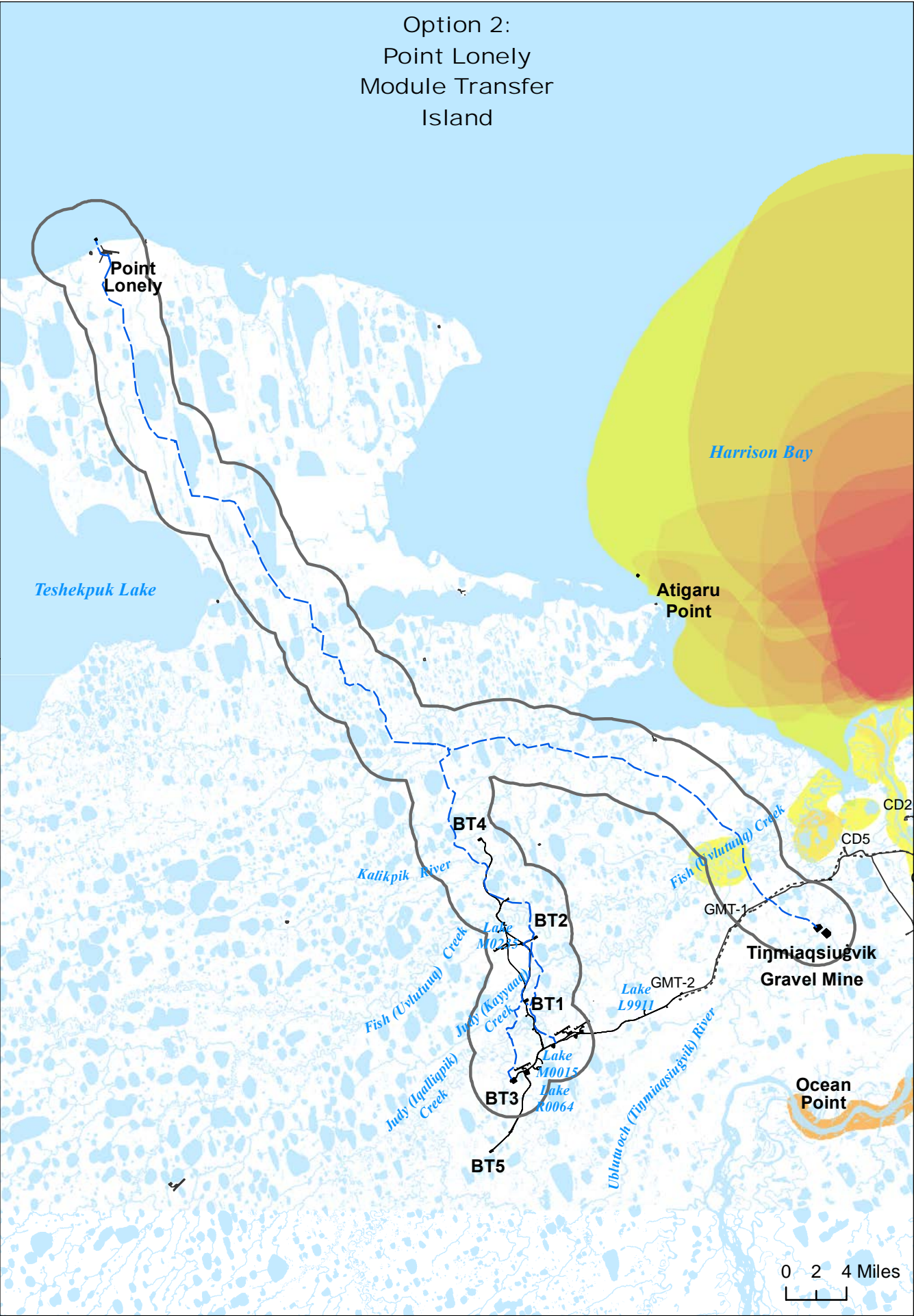
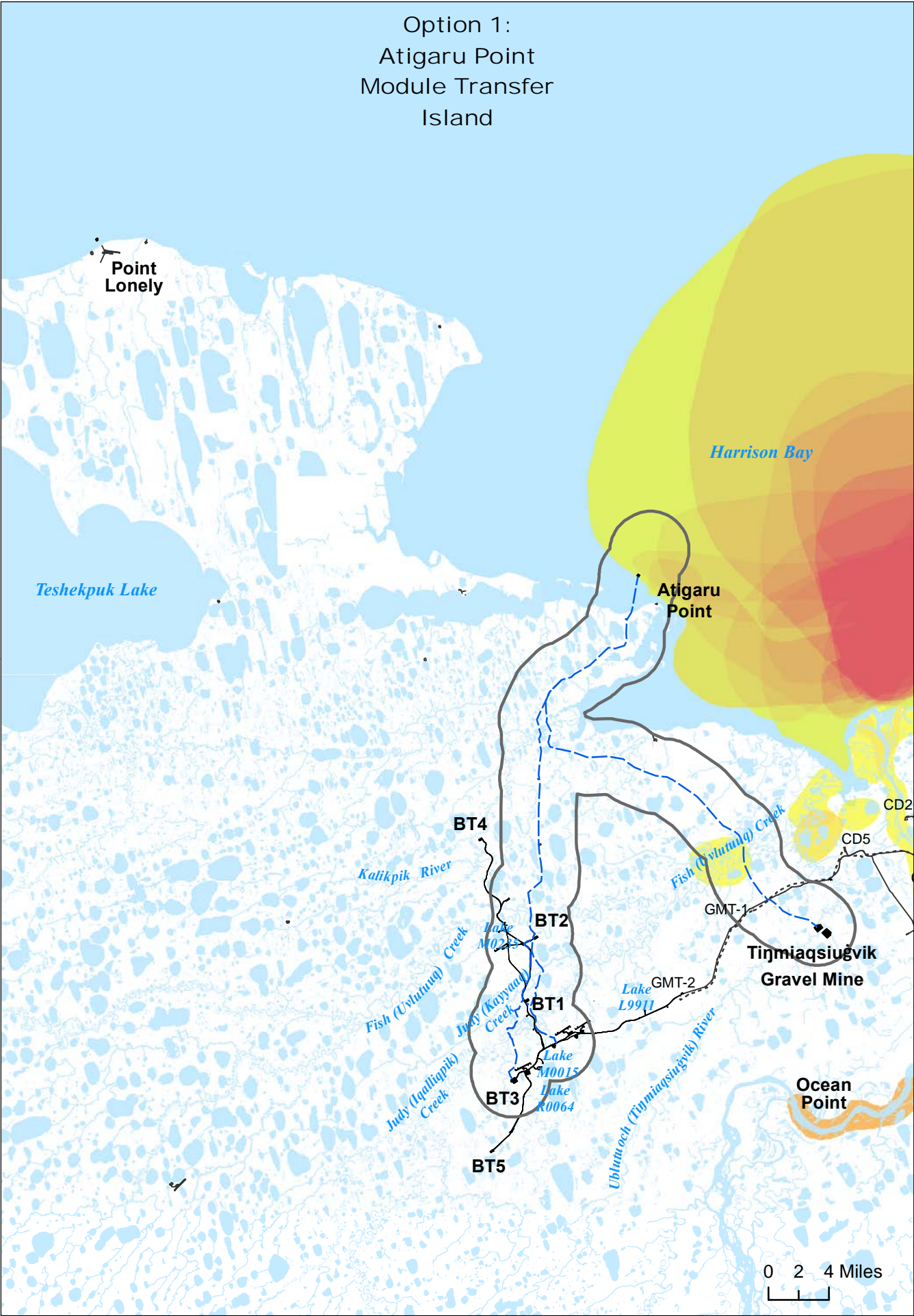
Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.31



Subsistence Data

High Overlapping Subsistence Use Areas Eider, 1995-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
a. SRB&A 2010a

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Figure 3.16.32



Subsistence Data

Fish, 1995-2006 ^a

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

Map prepared by
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Figure 3.16.33



Subsistence Data

High Overlapping Subsistence Use Areas Moose, 1995-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

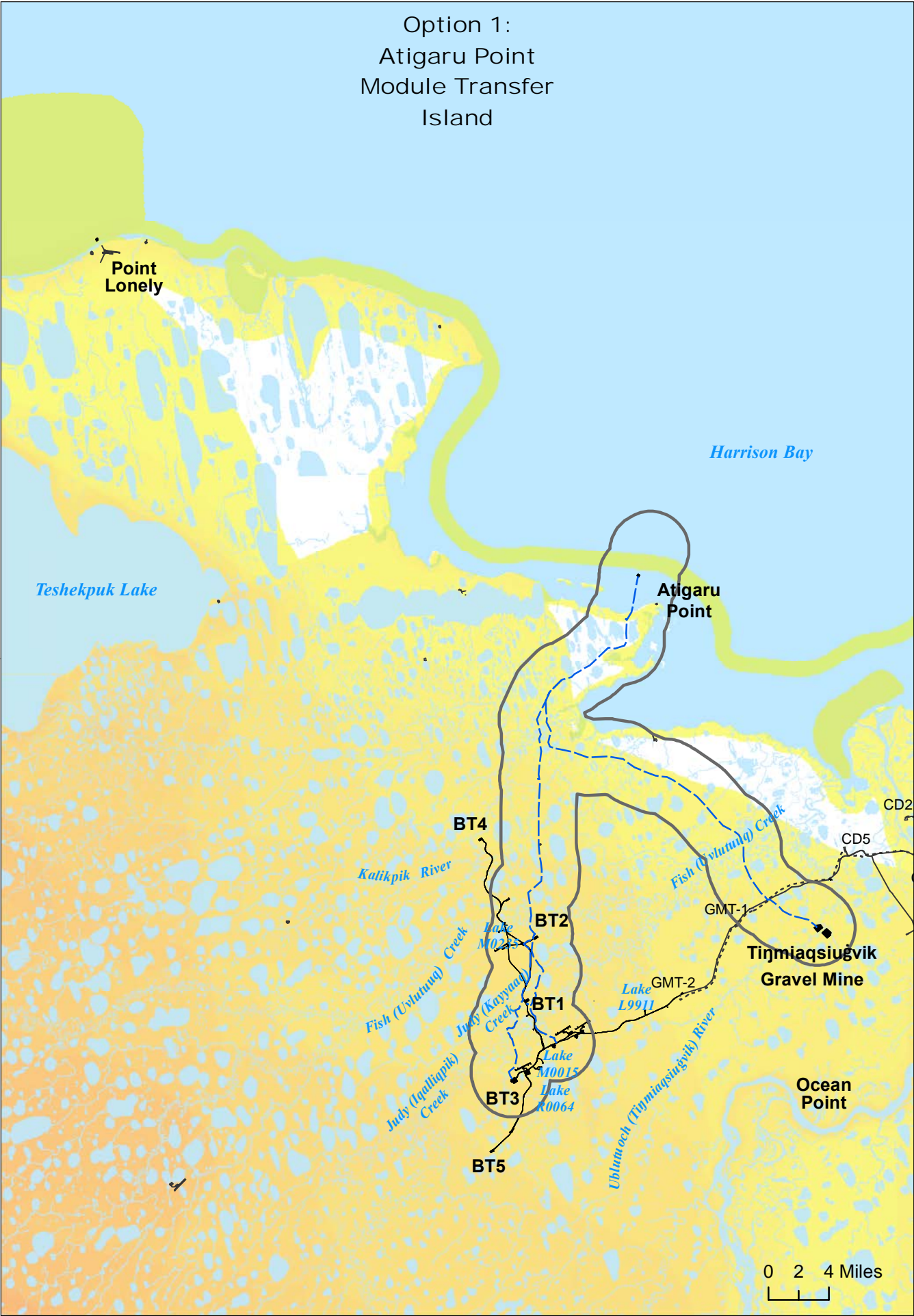
Existing Infrastructure

Map prepared by
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Figure 3.16.34



Subsistence Data

High Overlapping Subsistence Use Areas
Low All Resources, 1997-2006^a

Willow Proposed Development Features

Module Transport Analysis Area
Ice Road
Ice Pad
Gravel Footprint

Other Infrastructure

Existing Road
Existing Pipeline
Existing Infrastructure

Map prepared by
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Figure 3.16.35



Subsistence Data

High Overlapping Subsistence Use Areas Caribou, 1997-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

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Figure 3.16.36



Subsistence Data

- High Overlapping Subsistence Use Areas Wolf and Wolverine 1997-2006^a
- Low

Willow Proposed Development Features

- Module Transport Analysis Area
- Ice Road
- Ice Pad
- Gravel Footprint

Other Infrastructure

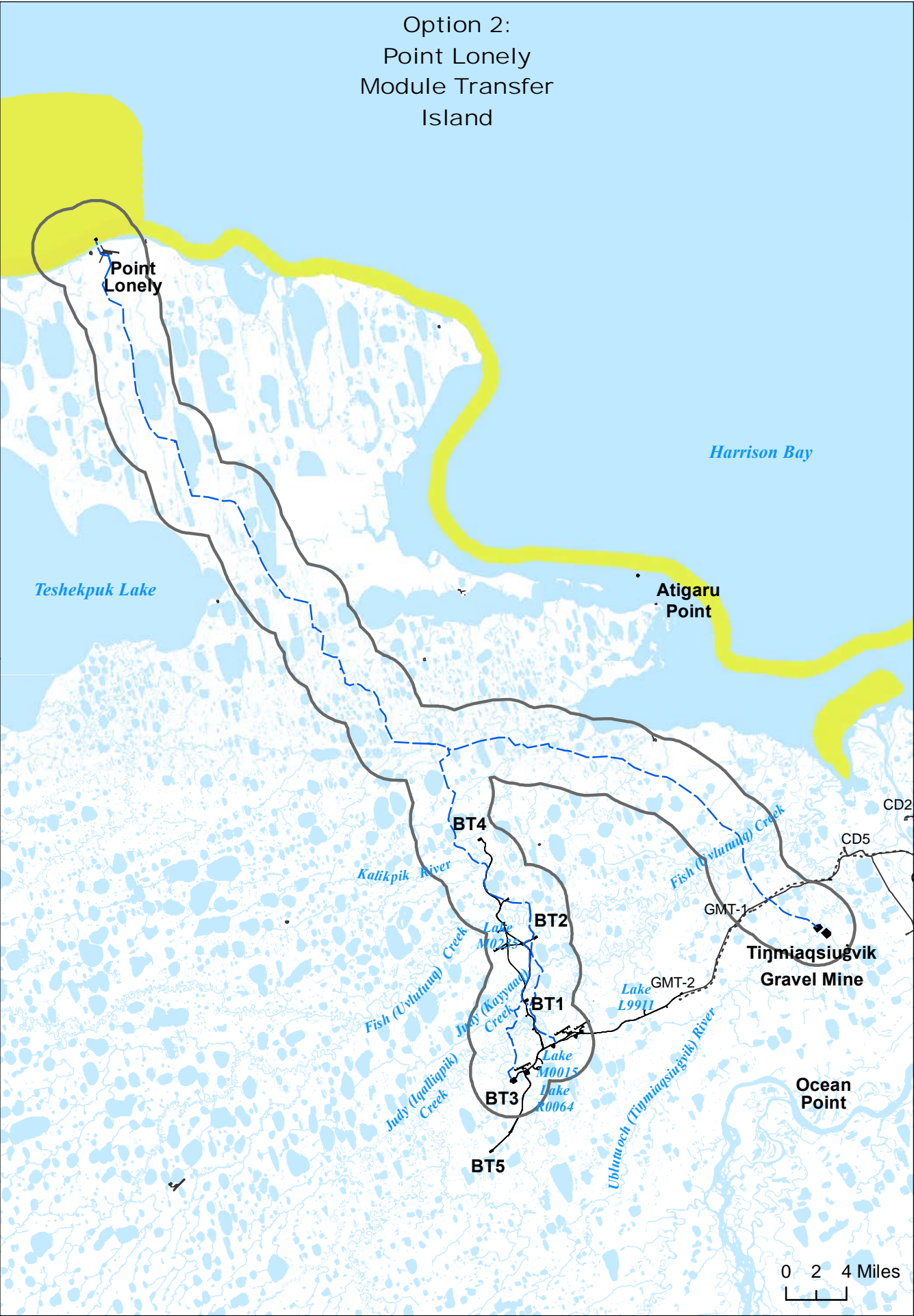
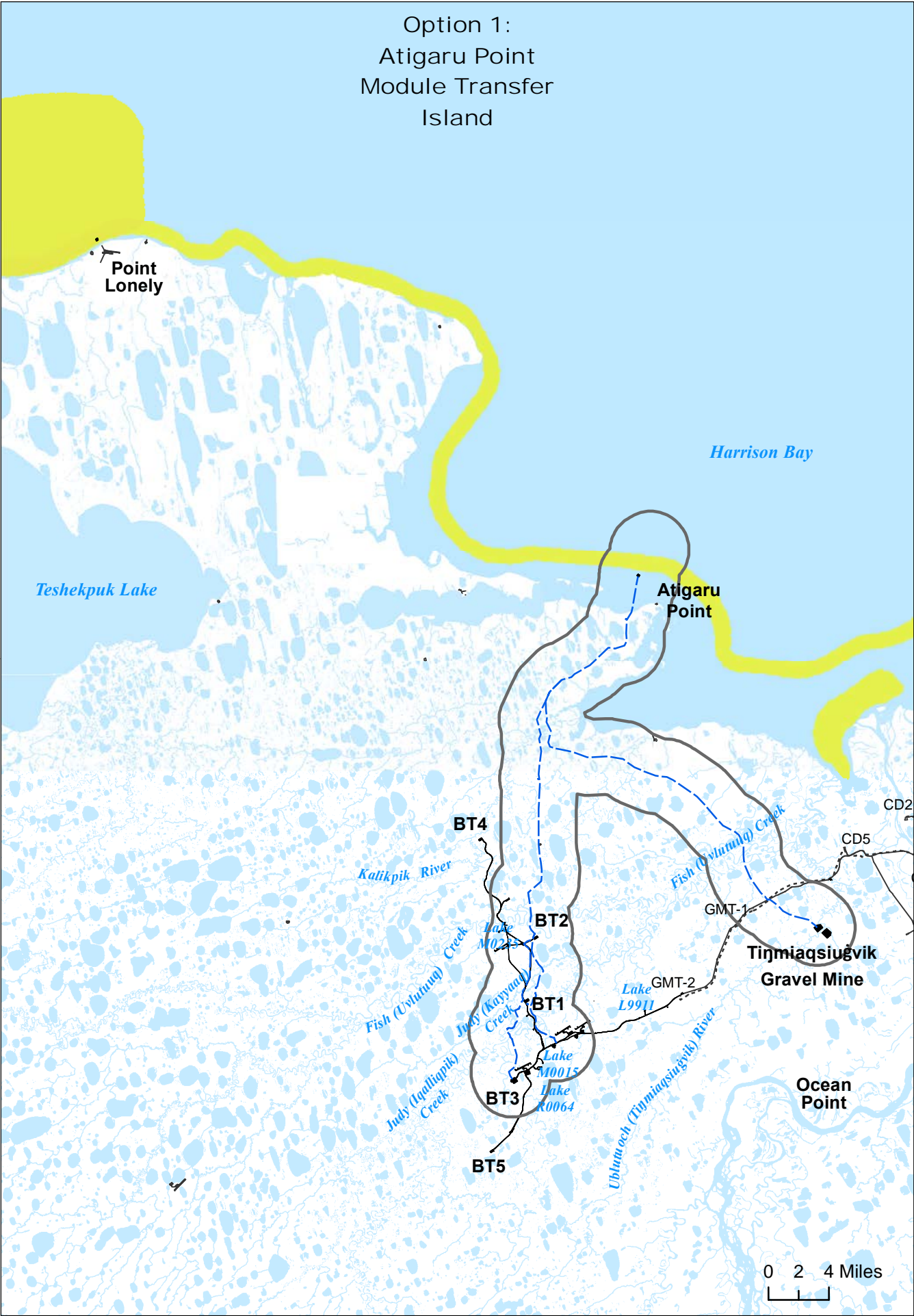
- Existing Road
- Existing Pipeline
- Existing Infrastructure

Map prepared by
Stephen R. Braund & Associates

Source
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Figure 3.16.37



Subsistence Data

High Overlapping Subsistence Use Areas Bearded and Ringed Seal, 1997-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

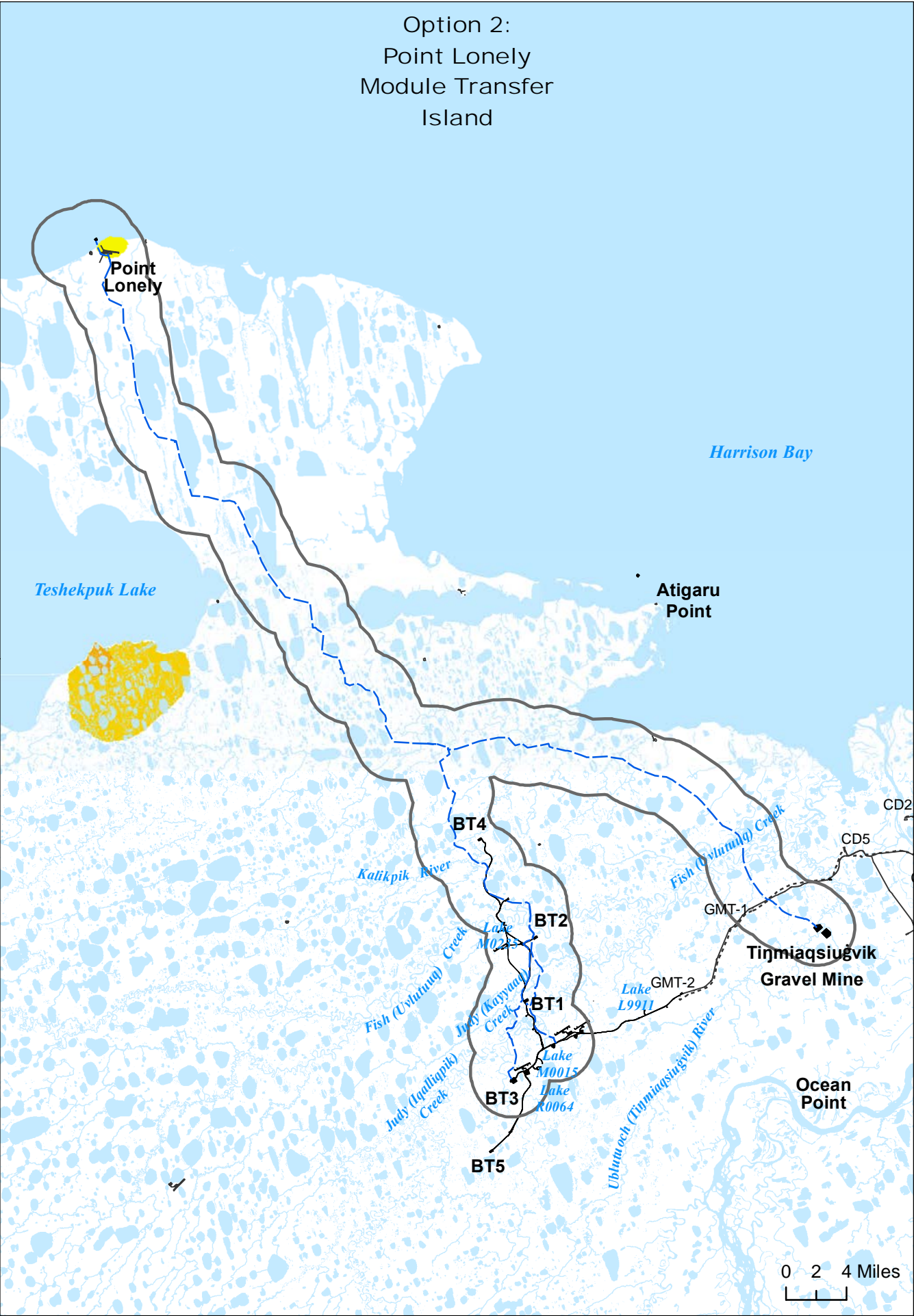
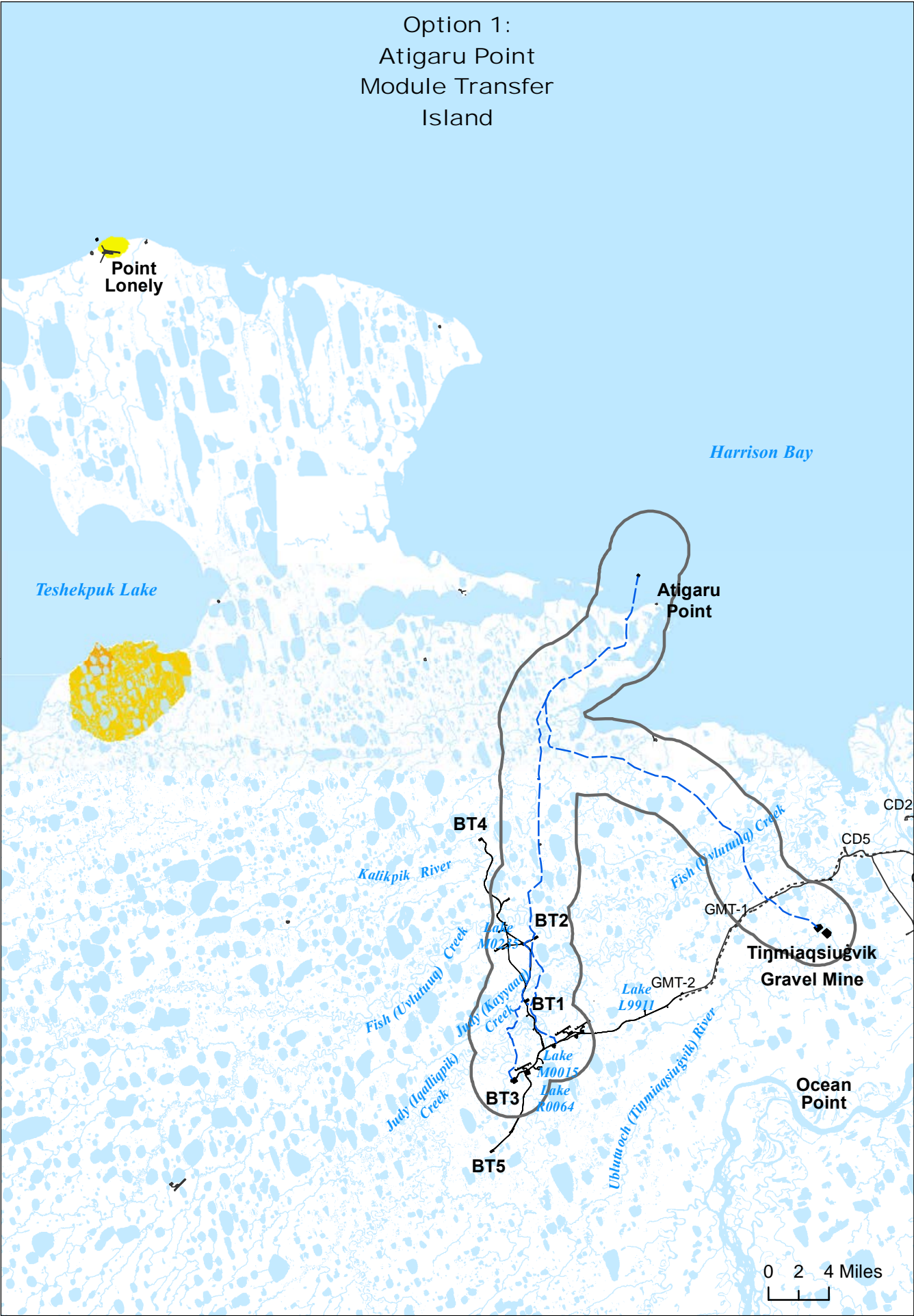
Existing Infrastructure

Map prepared by
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Source
a. SRB&A 2010a

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Figure 3.16.38



Subsistence Data

High Overlapping Subsistence Use Areas Geese, 1997-2006^a

Low

Willow Proposed Development Features

Module Transport Analysis Area

Ice Road

Ice Pad

Gravel Footprint

Other Infrastructure

Existing Road

Existing Pipeline

Existing Infrastructure

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Figure 3.16.39

