TERRA-Northwest
Broadband Telecommunications Project

Golovin Alternate Repeater Site (top); Otter Creek Repeater Site (bottom)

Prepared for

Bureau of Land Management

Prepared by

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Environmental Assessment

March 2012

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
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In Reply Refer To:
2860 (AKA010)
AA-92969
AA-92971
AA-92971-A

March 19, 2012

Dear Reader:

The Bureau of Land Management (BLM) Anchorage Field Office has prepared the enclosed Environmental Assessment of the proposed Right-of-Way grant to Unicom Incorporated (Unicom) for the TERRA Northwest (TERRA-NW) project. With community and microwave repeater towers, TERRA-NW would provide terrestrial, non-satellite broadband service to communities and more than 6,000 residents in the Norton Sound region of northwest Alaska.

The Environmental Assessment analyzes impacts to the natural and human environment from the proposed action and alternatives. The alternatives considered include the Proposed Action alternative, a no action alternative, and two alternative locations for the proposed Golovin Alternate Repeater tower site. Issues analyzed include impacts to wildlife (including birds), subsistence, recreation, lands with wilderness characteristics, noise, and visual impacts.

Public meetings were held in Golovin, Grayling, Nome, and Unakaleet on August 16 and 17, 2011. These meetings provided an introduction to the project in the four communities nearest to the affected Federal lands, and solicited input from local residents on issues and concerns associated with the project.

Following the issuance of this Environmental Assessment, the BLM will determine whether to issue a Finding of No Significant Impact (FONSI) and, if issued, the BLM will subsequently issue a Decision Record and the terms and conditions of the Right-of-Way grant. If the BLM declines a FONSI, then an Environmental Impact Statement would be required before issuing permits. In either case, the BLM will prepare and post on the BLM website a decision document providing the rationale for the agency's determination.

If you have questions, please contact Tom Sparks, Acting Lands Branch Manager, at 907-443-2177 or tsparks@blm.gov.

Sincerely,

/s/

James M. Fincher
Field Manager

Enclosure

TABLE OF CONTENTS

TABLE OF CONTENTS ..... **i**

List of Tables ..... **ix**

List of Figures ..... **x**

List of Appendices ..... **xii**

List of Acronyms and Abbreviations ..... **xiii**

Summary **ES-1**
- **Background** **ES-1**
- **Purpose and Need** **ES-2**
- **Proposed Action** **ES-2**
- **Alternatives** **ES-3**
- **No Action – Alternative 2** **ES-4**
  - Hill 2211 Repeater Site– Alternative 3 ..... ES-4
  - Kwiktalik Mountain Repeater Site – Alternative 4 ..... ES-4
- **Affected Environment** **ES-4**
- **Summary of Impacts** **ES-5**

1.0 Introduction **1-1**
- **1.1 Purpose and Need for Action** **1-3**
- **1.2 Legal and Regulatory Context** **1-3**
  - 1.2.1 National Environmental Policy Act Requirements 1-3
  - 1.2.2 BLM Laws, Regulations, and Policies 1-4
  - 1.2.3 Conformance with BLM Land Use Plans 1-4
  - 1.2.4 Other Laws and Regulatory Requirements 1-6
- **1.3 Scoping, Public Involvement, and Issue Identification** **1-7**
  - 1.3.1 Town Hall Meetings 1-7
  - 1.3.2 Government-to-Government Consultation with Federally Recognized Tribes 1-8
  - 1.3.3 Issues to be Addressed 1-8
    - 1.3.3.1 Physical Environment 1-8
    - 1.3.3.2 Biological Environment 1-9
    - 1.3.3.3 Social Environment 1-9
  - 1.3.4 Issues Dismissed 1-10

2.0 Alternatives 2-1
2.1 Proposed Action - Alternative 1 2-1
2.1.1 Repeater Tower Site Construction 2-1
2.2 No Action Alternative – Alternative 2 2-12
2.3 Hill 2211 Repeater Site – Alternative 3 2-12
2.4 Kwiktalik Mountain Repeater Site – Alternative 4 2-13
2.5 Project Design Features 2-14
2.6 Alternatives Considered, but Eliminated from Detailed Analysis 2-17
2.6.1 Buried Fiber-Optic Installation along the Nome-Council Road 2-17
2.6.2 Underwater Cable across Norton Sound 2-17
2.6.3 Alternative Power Sources to Reduce Carbon Footprint 2-18
2.6.4 Overland Fiber-Optic Cable 2-22
2.6.5 Expand the Use of the Satellite Network 2-22

3.0 Affected Environment 3-1
3.1 The Project Area 3-1
3.2 Physical Environment 3-3
3.2.1 Meteorology and Air Quality 3-3
3.2.2 Geology and Soils 3-5
3.2.2.1 Regional Physiography 3-5
3.2.2.2 Otter Creek Tower Site Geology and Soils 3-5
3.2.2.3 Golovin Alternate Tower Site Geology and Soils 3-6
3.2.2.4 Hill 2211 Tower Site Geology and Soils 3-7
3.2.2.5 Kwiktalik Mountain Tower Site Geology and Soils 3-7
3.2.3 Hydrology 3-8
3.2.3.1 Regional Hydrology Overview 3-8
3.2.3.2 Otter Creek Tower Site Hydrology 3-8
3.2.3.3 Golovin Alternate Tower Site Hydrology 3-9
3.2.3.4 Hill 2211 Hydrology 3-11
3.2.3.5 Kwiktalik Mountain Hydrology 3-11
3.2.4 Hazardous Materials and Waste Management 3-12
3.2.4.1 Hazardous Materials 3-12
3.2.4.2 Facilities Safety 3-12

3.3 Biological Environment 3-13
3.3.1 Wetlands and Vegetation 3-13
3.3.1.1 Otter Creek Tower Site 3-14
3.3.1.2 Golovin Alternate Tower Site 3-14
3.3.1.3 Hill 2211 and Kwiktalik Tower Sites 3-15
3.3.2 Invasive Plant Species 3-19
3.3.3 Rare and Sensitive Plant Species 3-21
3.3.4 Fish and Essential Fish Habitat 3-23
3.3.4.1 Otter Creek Tower Site 3-23
3.3.4.2 Golovin Alternate Tower Site 3-25
3.3.4.3 Tower Sites on Non-Federal Lands 3-25
3.3.4.4 Hill 2211 and Kwiktalik Mountain Tower Sites 3-26
3.3.4.5 Salmon Essential Fish Habitat 3-26
3.3.5 Terrestrial Mammals 3-27
3.3.5.1 Caribou 3-27
3.3.5.2 Reindeer 3-29
3.3.5.3 Moose 3-29
3.3.5.4 Brown Bear 3-31
3.3.5.5 Black Bear 3-31
3.3.5.6 Wolf 3-32
3.3.5.7 Muskoxen 3-32
3.3.5.8 Furbearers and Small Mammals 3-34
3.3.6 Birds 3-35
3.3.7 Threatened and Endangered Species 3-37
3.3.7.1 Kittlitz's Murrelet 3-37
3.3.7.2 Spectacled Eider 3-37
3.3.7.3 Steller's Eider 3-38
3.3.7.4 Yellow-Billed Loon 3-38
3.3.7.5 Polar Bear 3-39

3.4 Social Environment 3-41
3.4.1 Socioeconomic Characteristics 3-41
3.4.1.1 Regional Demographics and Economy 3-41
3.4.1.2 Community Profiles 3-44
3.4.1.3 Access to Cellular and Internet Service 3-45
3.4.2 Subsistence 3-47
3.4.2.1 Grayling Subsistence Harvest Practices 3-47
3.4.2.2 Unalakleet Subsistence Harvest Practices 3-48
3.4.2.3 Golovin Subsistence Harvest Practices 3-50
3.4.2.4 Nome Subsistence Harvest Practices 3-52
3.4.3 Land Use and Recreation 3-54
3.4.3.1 Land Ownership 3-54
3.4.3.2 Recreational Use 3-54
3.4.3.3 Iditarod National Historic Trail Use 3-54
3.4.3.4 Iditarod Trail Race Event Use 3-56
3.4.3.5 Iditarod Trail Recreational Use 3-56
3.4.4 Transportation 3-58
3.4.5 Noise 3-59
3.4.5.1 Acoustics 3-59
3.4.5.2 Applicable Laws, Ordinances, Regulations, and Standards 3-60
3.4.5.3 Existing Noise Conditions 3-60
3.4.6 Visual Resources 3-62
3.4.6.1 Introduction 3-62
3.4.6.2 Regulatory Setting 3-62
3.4.6.3 Existing Conditions 3-64
3.4.7 Cultural Resources 3-72
3.4.7.1 Methodology 3-72
3.4.7.2 Cultural Resources Survey and Literature Review Results 3-73
3.4.7.3 Proposed Actions and Alternatives on Federally Owned Lands 3-73
3.4.7.4 Connected Actions and Alternatives on Non-Federal Lands 3-74
3.4.7.5 The Iditarod National Historic Trail 3-82
3.4.7.6 Traditional Cultural Properties 3-83
3.4.8 Environmental Justice 3-84

4.0 Environmental Consequences 4-1
4.1 Introduction 4-1
4.1.1 Impact Factors and Ratings 4-1
4.1.2 Summary Impact Levels 4-2
4.1.3 Cumulative Impacts 4-2
4.1.3.1 Past Actions 4-2
4.1.3.2 Present Actions 4-3
4.1.3.3 Reasonably Foreseeable Future Actions 4-3
4.2 Physical Environment 4-7
4.2.1 Meteorology and Air Quality 4-7
4.2.1.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-7
4.2.1.2 Alternative 2 – No Action Alternative 4-11
4.2.1.3 Alternative 3 – Hill 2211 Repeater Site 4-12
4.2.1.4 Alternative 4 –Kwiktalik Mountain Repeater Site 4-12
4.2.2 Geology and Soils 4-14
4.2.2.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-14
4.2.2.2 Alternative 2 – No Action Alternative 4-15
4.2.2.3 Alternative 3 – Hill 2211 Repeater Site 4-16
4.2.2.4 Alternative 4 –Kwiktalik Mountain Repeater Site 4-16
4.2.3 Hydrology 4-18
4.2.3.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-18
4.2.3.2 Alternative 2 – No Action Alternative 4-19
4.2.3.3 Alternative 3 – Hill 2211 Repeater Site 4-20
4.2.3.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-20
4.2.4 Hazardous Materials and Waste Management 4-22
4.2.4.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-22
4.2.4.2 Alternative 2 – No Action Alternative 4-26
4.2.4.3 Alternative 3 – Hill 2211 Repeater Site 4-26
4.2.4.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-27

4.3 Biological Environment 4-29
4.3.1 Wetlands and Vegetation 4-29
4.3.1.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-29
4.3.1.2 Alternative 2 – No Action 4-32
4.3.1.3 Alternative 3 – Hill 2211 Repeater Site 4-33
4.3.1.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-33
4.3.2 Fish and Essential Fish Habitat 4-35
4.3.2.1 Alternative 1 – Microwave Towers (Proposed Action) 4-35
4.3.2.2 Alternative 2 – No Action Alternative 4-37
4.3.2.3 Alternative 3 – Hill 2211 Repeater Tower Site 4-37
4.3.2.4 Alternative 4 - Kwiktalik Mountain Repeater Site 4-38
4.3.3 Terrestrial Mammals 4-39
4.3.3.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-39
4.3.3.2 Alternative 2 – No Action Alternative 4-43
4.3.3.3 Alternative 3 – Hill 2211 Repeater Site 4-43
4.3.3.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-44
4.3.4 Birds 4-45
4.3.4.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-45
4.3.4.2 Alternative 2 – No Action Alternative 4-49
4.3.4.3 Alternative 3 – Hill 2211 Repeater Site 4-49
4.3.4.4 Alternative 4 - Kwiktalik Mountain Repeater Site 4-50
4.3.5 Threatened and Endangered Species 4-52
4.4 Social Environment 4-53
4.4.1 Socioeconomic Characteristics 4-53
4.4.1.1 Alternative 1 – Microwave Towers and with Golovin Alternate Tower (Proposed Action) 4-53
4.4.1.2 Alternative 2 – No Action Alternative 4-55
4.4.1.3 Alternative 3 – Hill 2211 Repeater Site 4-55
4.4.1.4 Alternative 4 – Kwiktalik Mountain Repeater 4-56
4.4.2 Subsistence 4-57
4.4.2.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action 4-57

4.4.2.2 Alternative 2 – No Action Alternative 4-59
4.4.2.3 Alternative 3 – Hill 2211 Repeater Site 4-60
4.4.2.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-60
4.4.3 Land Use and Recreation 4-63
4.4.3.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-63
4.4.3.2 Alternative 2 – No Action Alternative 4-66
4.4.3.3 Alternative 3 – Hill 2211 Repeater Site 4-67
4.4.3.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-67
4.4.3.5 Lands with Wilderness Characteristics 4-68
4.4.4 Transportation 4-73
4.4.4.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-73
4.4.4.2 Alternative 2 – No Action Alternative 4-74
4.4.4.3 Alternative 3 – Hill 2211 Repeater Site 4-75
4.4.4.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-75
4.4.5 Noise 4-77
4.4.5.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-77
4.4.5.2 Alternative 2 – No Action Alternative 4-79
4.4.5.3 Alternative 3 – Hill 2211 Repeater Site 4-80
4.4.5.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-80
4.4.6 Visual Resources 4-81
4.4.6.1 Methods 4-87
4.4.6.2 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action) 4-96
4.4.6.4 Alternative 2 – No Action Alternative 4-101
4.4.6.5 Alternative 3 – Hill 221 Repeater Site 4-101
4.4.6.6 Alternative 4 – Kwiktalik Mountain Repeater Site 4-102
4.4.7 Cultural Resources 4-105
4.4.7.1 Alternative 1 – Microwave Towers with Golovin Alternate Repeater (Proposed Action) 4-105
4.4.7.2 Alternative 2 – No Action Alternative 4-110
4.4.7.3 Alternative 3 - Hill 2211 Repeater 4-110
4.4.7.4 Alternative 4 - Kwiktalik Mountain Repeater 4-111

4.4.8 Environmental Justice 4-113
4.4.8.1 Alternative 1 – Microwave Towers with Golovin Alternate Repeater (Proposed Action) 4-113
4.4.8.2 Alternative 2 – No Action Alternative 4-113
4.4.8.3 Alternative 3 – Hill 2211 Repeater Site 4-114
4.4.8.4 Alternative 4 – Kwiktalik Mountain Repeater Site 4-114
4.5 Summary of Impacts 4-119

5.0 Consultation and Coordination 5-1
5.1 Agency Consultation and Coordination 5-1
5.2 List of Agencies, Organizations, and Persons Contacted 5-1
5.3 List of Preparers 5-1
5.4 Contributors/Advisors 5-1

6.0 References 6-1

APPENDICES

List of Tables

Alternatives Summary Impacts ES-6

Table 2-1 Proposed Repeater Sites for the TERRA-NW Project 2-3

Table 2-2 Alternative 1: Proposed Temporary Construction Facilities and Equipment for the Microwave Repeater Sites 2-5

Table 2-3 Alternative 1: Tower Site Lands Affected by Project Phase 2-9

Table 2-4 Alternative 1: Proposed Facilities for the Microwave Repeater Sites 2-9

Table 2-5 Alternative 1: Helicopter Construction and Operations Support – Number of Trips Summary 2-11

Table 2-6 Alternative 1: Microwave Tower Construction Schedules 2-12

Table 2-7 Project Design Features 2-14

Table 3-1 Vegetation Survey: Average Percent Cover by Species Normalized 3-13

Table 3-2 Proposed Towers and Fish Resources on Non-Federal Lands 3-25

Table 3-3 Special Status Avian Species Potentially in the Project Vicinity* (BLM, 2008c) 3-36

Table 3-4 ESA-Listed Species Potentially Present in Project Vicinity 3-37

Table 3-5 Institutions in the Project Area 3-43

Table 3-6 Demographic and Socioeconomic Characteristics 3-43

Table 3-7 Project Area Tax Regimes 3-44

Table 3-8 Grayling Community Harvest Data 3-48

Table 3-9 Golovin Community Harvest Data 3-51

Table 3-10 Proposed Project Area Transport Capabilities by Community 3-58

Table 3-11 Criteria Used to Rank Scenic Quality during the Scenic Quality Inventory of the Iditarod National Historic Trail 3-67

Table 3-12 TERRA-NW Project Towers and Scenic Quality Rating Units 3-69

Table 3-13 AHRS Sites within a Three-Mile Radius of the Golovin Alternate Repeater Tower Site 3-74

Table 3-14 AHRS Sites within Three Miles of the Unalakleet Community Tower 3-75

Table 3-15 AHRS Sites within Three Miles of the Unalakleet Repeater Tower Site 3-76

Table 3-16 AHRS Sites within Three Miles of the Shaktoolik Community Tower Site. 3-76

Table 3-17 AHRS Sites within Three Miles of the Reindeer Repeater Tower Site. 3-77

Table 3-18 AHRS Sites within Three Miles of the Kwiktalik Repeater Tower Site 3-78

Table 3-19 AHRS Sites within Three Miles of the Gill Repeater Tower Site 3-78

Table 3-20 AHRS Sites within Three Miles of the Cape Nome Repeater Tower Site 3-79
Table 3-21 AHRS Sites within Three Miles of the Nome Community Tower Site 3-80
Table 4-1 Construction Emissions for Typical Tower Site 4-8
Table 4-2 Annual Operational Emissions for Typical Tower Site 4-9
Table 4-3 Expected Change in Scenic Quality Inventory Values and Classification for the Golovin Alternate Repeater 4-99
Table 4-4 Alternatives Summary Impacts 4-121

List of Figures

Figure 1-1 Project Vicinity 1-2
Figure 2-1 Microwave Tower Sites 2-2
Figure 2-2 Alternative 1 – Proposed Otter Creek Repeater Location and Helicopter Transit Routes 2-6
Figure 2-3 Alternative 1 – Proposed Golovin Alternate Repeater and Helicopter Transit Routes 2-7
Figure 2-4 Alternative 1 – Otter Creek and Golovin Alternate Repeaters, Representative Site Plan 2-8
Figure 2-5 Alternative 1 – Example of Remote Repeater Tower Site, Caribou Saddle (TERRA-SW Project 2011) 2-11
Figure 2-6 Alternative 3 and 4 – Hill 2211 and Kwiktalik Mountain Repeater Locations and Helicopter Transit Routes 2-16
Figure 2-7 Annual Insolation Value 2-19
Figure 2-8 Wind Power Density 2-21
Figure 3-1 McKinley Creek emptying into Golovnin Bay. Rocky Point is in background. Photo by Loskutoff (URS) June 29, 2011 3-10
Figure 3-2A NWI Wetland Mapping - Golovin Alternate Repeater Site 3-16
Figure 3-2B NWI Wetland Mapping - Hill 2211 Repeater Site 3-17
Figure 3-2C NWI Wetland Mapping - Kwiktalik Mountain Repeater Site 3-18
Figure 3-3 Invasive Plant Species Occurrences 3-20
Figure 3-4 Documented Sensitive and Rare Plants 3-22
Figure 3-5 Anadromous Fish-Bearing Streams 3-24
Figure 3-6 Western Arctic Caribou Herd Seasonal Ranges 3-28

Figure 3-7 ADF&G Game Management Units 3-30
Figure 3-8 Threatened, Endangered, and Species of Concern Birds 3-40
Figure 3-9 Norton Sound Economic Development Corporation Member Communities 3-42
Figure 3-10 Unalakleet Seasonal Round 3-49
Figure 3-11 Subsistence Use by Nome Residents on the Seward Peninsula 3-53
Figure 3-12 USGS Bulletin 449 reconnaissance map from 1911 depicts routes over the Kwiktalik Mountains at Cape Darby peninsula 3-55
Figure 3-13 Iditarod Trail Alignments 3-57
Figure 3-14 Approximate Decibel Levels of Commonly Known Sound Sources. 3-60
Figure 4-1 Otter Creek Repeater Viewshed Analysis 4-82
Figure 4-2 Golovin Alternate Repeater Viewshed Analysis and Key Observation Points 4-83
Figure 4-3 Proposed Non-BLM Repeater Sites with 5-Mile Buffers 4-84
Figure 4-4 Hill 2211 Buffer Distances 4-85
Figure 4-5 Kwiktalik Mountain Buffer Distances 4-86
Figure 4-6 Golovin Alternate Repeater Simulation from KOP 1 (Distance 4.5 miles) 4-88
Figure 4-7 Golovin Alternate Repeater Simulation from KOP 2 (Distance 3.0 miles) 4-89
Figure 4-8 Golovin Alternate Repeater Simulation from KOP 3 (Distance 1.3 miles) 4-90
Figure 4-9 Golovin Alternate Repeater Simulation from KOP 5 (Distance 4.2 miles) 4-91
Figure 4-10 Golovin Alternate Repeater Simulation from KOP 6 4-92
Figure 4-11 Golovin Alternate Repeater Simulation from KOP 7 4-93

List of Appendices

Appendix A Unicom TERRA-NW Plan of Development
Appendix B Seward Peninsula Bird Check list
Appendix C Section 810 Subsistence Evaluation and Findings
Appendix D Wilderness Characteristics Inventory
Appendix E Background Information for the Analysis of Noise
Appendix F Visual Contrast Rating Report
Appendix G Cultural Resources Report Access Information
Appendix H TERRA-SW Alternative Power Sources Considered
Appendix I Required Operating Procedures
Appendix J Threatened and/or Endangered Species Evaluation

List of Acronyms and Abbreviations

µPa	micropascals
AAC	Alaska Administrative Code
ACEC	Area of Critical Environmental Concern
ADCCED	Alaska Department of Commerce, Community and Economic Development
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
ADLWD	Alaska Department of Labor and Workforce Development
ADNR	Alaska Department of Natural Resources
agl	above ground level
AKEPIC	Alaska Exotic Plants Information Clearinghouse
AKNHP	Alaska Natural Heritage Program
ANILCA	Alaska National Lands Interest Conservation Act
APE	Area of Potential Effect
bgs	below ground surface
BLM	U.S. Bureau of Land Management
CFR	Code of Federal Regulations
CMP	Comprehensive Management Plan
dB	decibel
dBA	A-weighted decibel
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
ft.	foot/feet
GHG	Greenhouse Gas
GMU	Game Management Unit
HAP	Hazardous Air Pollutant

Hz	Hertz
in.	inch/inches
IRA	Indian Reorganization Act
Km	kilometer/kilometers
KOP	Key Observation Points
Kbps	kilobytes per second
kWh	kilowatt hour
L_{dn}	day-night sound level
L_{eq}	equivalent sound level
L_{max}	maximum sound level
m.	meter/meters
MFP	Management Framework Plan
mi.	mile/miles
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NHT	National Historic Trail
NMFS	National Marine Fisheries Service
NLCS	National Lands Conservation System
NPS	National Park Service
NRHP	National Register of Historic Places
NLUR	Northern Land Use Research
NSEDC	Norton Sound Economic Development Corporation
NTSA	National Trails System Act
NWI	National Wetlands Inventory
OASIS	OASIS Environmental, Inc.
ORVs	off-road vehicles
RFFA	Reasonably Foreseeable Future Action
RMP	Resource Management Plan
ROW	right-of-way
R	Range
SHPO	State Historic Preservation Officer

SLRU	Sensitivity Level Rating Units
SPCC	Spill Prevention, Control, and Countermeasure plan
SPL	Sound Pressure Level
sq. ft.	square foot/feet
SRQU	Scenic Quality Rating Unit
T	Township
TCP	Traditional Cultural Property
TERRA-NW	TERRA Northwest
TERRA-SW	TERRA Southwest
USC	United States Code
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UUI	United Utilities, Incorporated
VRI	Visual Resource Inventory
VRM	Visual Resource Management
WACH	Western Arctic Caribou Herd
WERC	Water and Environmental Research Center
Y-K Delta	Yukon-Kuskokwim Delta

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Summary

EA number:	AK-010-2012-0002-EA
Type of project:	Right-of-Way Grant and Communication Lease
Location:	Kateel River Meridian: • T. 25 S., R. 12 W., Secs. 16 and 21 (within); (Otter Creek tower site) • T. 11 S., R. 20 W., Sec. 17 (within); (Golovin Alternate tower site)
Preparing Office:	Anchorage Field Office
Case File #:	AA-92969 (Golovin Alternate tower site), AA-92971, AA-92971-A (Otter Creek tower site)

Background

The Bureau of Land Management (BLM) is considering an application from Unicom, Incorporated (Unicom) to construct, operate, and maintain two remote microwave repeaters with associated equipment as part of a project to improve Internet telecommunications with broadband services for communities in the Norton Sound region of Alaska. The Regulatory Commission of Alaska awarded a grant to Unicom for the purpose of delivering broadband Internet service from Grayling, currently the northernmost community served by the DeltaNet project, to Nome (see Figure 1-1). Under the current proposal, the TERRA Northwest (TERRA-NW) Project would have several stages, but only the 2012 and 2013 construction activities are currently planned, funded, and proposed for permits. The currently proposed activities of TERRA-NW would include the construction, operation, and maintenance of two mountaintop microwave repeater towers and associated equipment on public land managed by BLM, five mountaintop microwave repeater towers on private lands, and three community towers on private lands in 2012 and 2013. A later phase, which could be planned for 2014 if funds become available, would include construction, operation, and maintenance of towers and associated equipment located on private lands within five additional Norton Sound communities.

The TERRA-NW Project would address the need for more reliable terrestrial broadband service from the Internet backbone currently extending from Anchorage through the Bristol Bay Region and the Yukon-Kuskokwim Delta to the communities and more than 6,000 residents in the Norton Sound region. At present, these communities are linked to the Internet backbone by private satellite networks. Although satellite infrastructure provides telecommunication services in rural Alaska, its higher delays in connectivity and lower reliability limit its capacity to expand to broadband service. The TERRA-NW Project would provide high-capacity, high-speed, and low-delay broadband connectivity, which would also improve Internet reliability. The TERRA-NW Project would provide Norton Sound communities with telecommunications infrastructure to facilitate economic development, improve services by health care providers, increase educational services, expand access to governmental, tribal, and non-profit entities, and improve Internet speed for residential users.

Purpose and Need

Unicom has filed applications with the BLM Anchorage Field Office to obtain authorization to construct, maintain, and decommission two mountaintop microwave repeater towers. BLM is required to respond to three applications filed (serial numbers AA-92969, AA-92971, and AA-92971-A). The BLM action on this proposal would be the issuance of a land use authorization for the proposed non-federal use of public lands.

The need for action is established by the BLM's responsibility under Title V of the Federal Land Policy and Management Act (FLPMA) of October 21, 1976 (90 Stat. 2776; 43 United States Code [USC] 1761), as amended, to respond to requests for rights of way across public lands. The purpose of the action is to provide access across public lands in a manner that is consistent with the provisions and objectives established for the management of resources within the respective planning areas (see Section 1.2.3) and to ensure that the public uses described herein will not cause unacceptable damage to public lands.

The decision to be made by the BLM is whether to authorize the right of way, and if so, under what terms and conditions.

Proposed Action

Under the Proposed Action, the TERRA-NW Project would construct two microwave towers and associated facilities on blocks of remote, undeveloped BLM-managed lands. The Otter Creek tower site is located approximately 36 mi. northwest of Grayling within an area of approximately 3.5 million acres of BLM-managed land in the Nulato Hills. The Golovin Alternate tower site is located approximately 10 mi. east of Golovin within an area of approximately 443,140 acres of BLM-managed land, running north of Cape Darby. See Figure 2-1 for tower locations and land status. The towers would be 60 feet (ft.) tall, with four 8-ft. microwave antennas attached. Cellular phone antennas would be attached to the Golovin Alternate tower to provide cell phone service in the tower vicinity. Power at the remote tower sites would be provided by two 9kW diesel generators, outfitted with hospital-grade silencers. (Additional details on the project components are found in Section 2.1.1).

Additional components of the TERRA-NW Project, not located on federal lands, are proposed for construction in 2012 and 2013. Eight towers (five remote repeater towers and three community towers) would be installed on private lands. These eight towers are classified as "connected actions," and reviewed as indirect effects of the proposed action on federal land. In the future, Unicom intends to construct five additional community towers; however, these are not funded. For the locations and characteristics of the TERRA-NW Project towers, see Table 2-1.Public Involvement.

Town Hall Meetings

BLM initiated public involvement for this EA with public notices for Town Hall meetings held in mid-August 2011. BLM led four Town Hall meetings in Golovin, Nome, Grayling, and Unalakleet on August 16 and 17, 2011. The Town Hall meetings provided an introduction to the project in the four communities nearest to the affected federal lands, and solicited input from local residents on issues and concerns associated with the project. The opportunity to provide comments from the Town Hall meetings extended through October 31, 2011.

Government-to-Government Consultation with Federally-Recognized Tribes

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires federal agencies to consult with federally recognized tribal governments during the NEPA process. As the lead federal agency, BLM identified tribal governments potentially affected by the project. Letters were sent to tribal governments in October 2011 inviting them to consult on this project.

The tribes contacted were:

- Nome Eskimo Community
- Chinik Eskimo Community
- Native Village of Shaktoolik
- Native Village of Koyuk
- Solomon Traditional Council
- Anvik Village
- Native Village of Unalakleet
- Elim IRA Council
- Stebbins Community Association
- Native Village of St. Michael
- Organized Village of Grayling
- Holy Cross Village
- King Island Native Community
- Native Village of White Mountain
- Shageluk Native Village

To date, there has been no response to BLM's invitations to enter into government-to-government consultation. Follow-up with all tribes is in progress.

Issues to Be Addressed

The scoping process revealed public interest in the project and potential benefits, as well as concern with a variety of issues regarding the project design, alternatives, and potential impacts. Particular interest was expressed in potential effects on scenic resources (visual impacts) and recreational uses associated with the Iditarod National Historic Trail as it crosses in the vicinity of the Golovin Alternate tower site. During scoping, issues were identified for each of the following physical, biological, and social resources:

Physical Environment: Meteorology and Air Quality, Geology and Soils, Hydrology, and Hazardous Materials and Waste Management

Biological Environment: Vegetation and Wetlands, including invasive plant species; Fish; Wildlife – Terrestrial Mammals, Birds, Marine Mammals, and Threatened and Endangered Species

Social Environment: Socioeconomic Characteristics; Subsistence; Land Use, Iditarod National Historic Trail, and Recreation; Wilderness Values; Transportation (Aircraft); Noise; Visual Resources; Cultural Resources; and Environmental Justice

A complete account of the issues identified for analysis is found in Section 1.3.3.

Alternatives

Four alternatives are analyzed in this EA. In addition to the proposed action discussed above, these include the no action alternative and two alternative locations for the Golovin Alternate Repeater tower site. (See Section 2.2 for complete descriptions and figures illustrating the alternatives.)

All action alternatives will be required to meet or exceed the required operating procedures (ROPs) identified and applicable in the Kobuk-Seward Peninsula Resource Management Plan (RMP). A detailed list of applicable required operating procedures can be found in Appendix I.

No Action – Alternative 2

Under the No Action Alternative, the federal agencies would not grant ROWs and the existing telecommunications and satellite internet service would continue.

Hill 2211 Repeater Site– Alternative 3

Under Alternative 3, the Golovin Alternate microwave tower site would be replaced by a tower on a summit approximately 12 mi. north and east of Golovin, termed Hill 2211 for its elevation (see Figure 2-3). The site is located on BLM land and is currently the site of a communications tower funded by the Norton Sound Economic Development Corporation. This offers the potential to co-locate the new microwave repeater tower with an existing communications facility. This site would not be in the viewshed of the historic or modern alignments of the Iditarod NHT.

Construction, operations, maintenance, and decommissioning activities associated with the Hill 2211 tower site would be similar to the Golovin Alternate and Otter Creek tower sites indicated in Alternative 1. The same tower design and associated equipment would be installed, if this alternative is selected.

Kwiktalik Mountain Repeater Site – Alternative 4

Alternative 4 would site a microwave repeater tower at a location south and west of Golovin on a ridge in the Kwiktalik Mountains as the ridge approaches Cape Darby. The Kwiktalik Mountain tower site would replace the Golovin Alternate tower site and would be located on land privately held by the Golovin Native Corporation. If adopted, this alternative would mean that only one tower would be constructed on BLM-managed land at Otter Creek. In addition, based on the line-of-sight and distances for this configuration, Alternative 4 would eliminate the need for the Reindeer Repeater tower site.

Affected Environment

As a basis for comparison in analyzing the environmental impacts associated with the proposed action and alternatives, NEPA requires a description of the exiting conditions with the project area. For purpose of this analysis, the project area includes two microwave repeater tower sites on BLM-managed lands at Otter Creek and at the Golovin Alternate tower site, along with the associated staging areas at the mouth of the Klikitarik Bay, Unalakleet, and Golovin, and the helicopter transit routes. The two microwave repeater tower sites would be located on the top of mountainous ridges at elevations greater than 1,000 feet, both of which are covered in tundra vegetation and absent of wetlands or free flowing streams. The tower sites would be located in sparsely populated areas of the Norton Sound region where limited recreation and subsistence activities occur. Chapter 3 describes the existing conditions of the physical, biological and social environments.

Summary of Impacts

The following table, excerpted from Chapter 4 of this EA, summarizes the direct, indirect, and cumulative impacts under each alternative for all resources. The two towers on federal lands and the eight towers sited on non-federal lands, analyzed as connected actions, generally have identical impacts; however, where there are site specific differences, these are noted in the summary table.

Alternatives Summary Impacts

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Meteorology and Air Quality	Impacts to air quality from construction and decommissioning are expected to be low in intensity, temporary in duration, local in extent, and affecting resources that are common in context. Operational impacts would be low in intensity, long term in duration (20-year life of the project), affecting resources common in context, and not likely to adversely impact the air quality of the region. The summary impact is negligible, with a negligible contribution to cumulative effects.	No impacts to air quality.	Effects similar to Alternative 1; summary impacts would be negligible, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; summary impacts would be negligible, with a negligible contribution to cumulative effects.
Geology and Soils	At the tower sites, topsoil removal/excavation and facility installation would result in direct impacts that would be high in intensity for a small localized area (i.e., for two towers 10.3 acres during construction and 1.38 acres during operations), of long-term duration (20-year life of the project). The soils affected are common in context. Indirect impacts on soils on non-federal sites would be minor. The summary impact would be negligible, with a minor contribution to cumulative effects.	No impacts to geology and soil resources.	Effects similar to Alternative 1; summary impacts would be negligible, with a minor contribution to cumulative effects.	Effects similar to Alternative 1; summary impacts would be negligible, with a minor contribution to cumulative effects.
Hydrology	Under Alternative 1, there are no expected impacts to water resources or water quality at the proposed microwave repeater sites. During construction, staged barges have the potential to increase turbidity near shore, resulting in impacts of high intensity, short term in duration, local in extent and affecting resources that are common in context. Risk of fuel spills exists during construction activities at proposed sites, however, spill prevention and response procedures can reduce risk. Barring a fuel spill scenario, summary and cumulative impacts would be minor. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.	No changes to hydrology, including water resources and water quality.	Effects similar to Alternative 1; summary impacts would be minor with a minor contribution to cumulative effects. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.	Effects similar to Alternative 1; summary impacts would be minor with a minor contribution to cumulative effects. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Hazardous Materials and Waste Management	Staging and storage of fuels and hazardous materials onsite create risks of a release. However, containment designs and an approved SPCC plan reduce the risks. Fuel transport during annual re-supply operations represents a larger risk. If such a spill were to occur on land the impact would be medium in intensity (estimated up to 500 gallons), long term in duration, local in extent and affecting resource that is common in context. If the spill were to occur in wetlands or a water body, the impact would likely be medium in intensity, temporary in duration, local to regional in extent, and affecting resources that are common to important in context. Given the limited temporal and fuel volume risks for the project activities, including the low probability risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate, and would make a minor to moderate contribution to cumulative effects.	No impacts due to hazardous materials.	Effects similar to Alternative 1. Given the limited temporal and fuel volume risks for the project activities, including the low probability risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate, and would make a minor to moderate contribution to cumulative effects.	Effects similar to Alternative 1; Given the limited temporal and fuel volume risks for the project activities, including the low probability risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate, and would make a minor to moderate contribution to cumulative effects.
Vegetation and Wetlands	No impacts to wetlands at the tower sites. The potential exists to affect wetlands nearby if a fuel spill occurred. Impacts to vegetation would include low intensity, temporary compression of common vegetation as well as long-term to permanent excavation and removal of common vegetation. Impacts to vegetation would involve small, localized areas. With invasive species prevention and mitigation measures properly implemented and without accidental fuel or chemical spills, the summary impact would be considered minor, with a negligible contribution to cumulative impacts. Impacts of a fuel spill could range from minor to moderate. Indirect impacts to wetlands from towers located on non-federal sites are not anticipated and would be considered negligible to minor.	No impacts to vegetation and wetlands resources.	Effects similar to Alternative 1; the summary impact would be considered minor with a negligible contribution to cumulative impacts. Impacts of a fuel spill could range from minor to moderate.	Effects similar to Alternative 1; the summary impact would be considered minor with a negligible contribution to cumulative impacts. Impacts of a fuel spill could range from minor to moderate.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Fish	Under Alternative 1, construction and operations of the microwave towers would have no effect on fish and fish habitat. Barring a fuel spill scenario, the effects of Alternative 1 would be of low intensity, localized in extent, temporary in duration, and affecting resources that are common to important (i.e., Essential Fish Habitat (EFH)) in context. Summary impacts would be negligible to fish and fish habitat, and would make a negligible contribution to cumulative effects. Fuel spill scenarios and impacts are comparable to those identified in Vegetation and Wetlands. Impacts of a fuel spill could range from minor to moderate. With a fuel spill scenario, the contribution to cumulative effects would be minor to moderate.	No changes to fish or EFH.	Effects similar to Alternative 1; summary impacts from routine activities would be negligible to fish and fish habitat, and would make a negligible contribution to cumulative effects. With a fuel spill scenario, the contribution to cumulative effects would be minor to moderate.	Effects similar to Alternative 1; summary impacts from routine activities would be negligible to fish and fish habitat, and would make a negligible contribution to cumulative effects. With a fuel spill scenario, the contribution to cumulative effects would be minor to moderate.
Wildlife - Terrestrial Mammals)	Under Alternative 1, impacts generally involve common wildlife resources. Habitat displacement at the two tower sites would amount to 10.3 acres during construction and 1.382 acres during operations. Impacts to terrestrial wildlife would be of low or moderate intensity, and temporary or long-term in duration. In particular, impacts resulting from helicopter flights during the construction phase have a medium intensity but would be temporary in duration, while helicopter flights during the operational phase would be low intensity to moderate intensity, local in extent and intermittent episodes over the long-term life of the project. Therefore, Alternative 1 would have a minor summary impact on wildlife and a negligible contribution to cumulative effects.	No impacts to terrestrial mammals.	Effects similar to Alternative 1; summary impacts would be minor with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; however, Alternative 4 would reduce overall direct effects with only one tower placed on federal lands. Summary impacts would be minor with a negligible contribution to cumulative effects.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Birds	Under Alternative 1, impacts to birds vary depending on location, timing, and activity. Generally, local impacts would involve common resources with some exceptions (e.g., eiders, murrelets) and would be of low or medium intensity and temporary or long-term in duration. Impacts resulting from helicopters during construction have a low to medium intensity, and could possibly have a long-term effect on seabirds, shorebirds, and waterfowl in particular, because Safety Sound, Golovnin Bay/Lagoon, and eastern Norton Sound are regionally important areas for spring/fall migration and staging birds, including the ESA-threatened spectacled eider. Indirect impacts from sites located on non-federal lands would be considered negligible to minor. The summary impact to birds would be minor, with a negligible contribution to cumulative effects.	No impacts to birds.	Effects similar to Alternative 1; the summary impact to birds would be minor, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; however, Alternative 4 would reduce overall direct effects with only one tower placed on federal lands. The summary impact to birds would be minor, with a negligible contribution to cumulative effects.
Threatened and Endangered Species	Impacts to ESA-listed birds, including candidate species, are the same as those discussed under birds above. However, for the ESA-listed and candidate species potentially affected (i.e., Kittlitz's murrelet, spectacled and Steller's eider, and the yellow-billed loon), the species would be considered resources that are important in context, and the summary rating of impact would be moderate.	No impacts to threatened and endangered species.	Effects similar to birds; the summary impact to birds would be moderate.	Effects similar to birds; the summary impact to birds would be moderate.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Socioeconomics	The socioeconomic impacts of Alternative 1 would include minor impacts on employment and income, but broadband Internet access would improve telemedicine, distance education, government services, and commerce. These would be beneficial effects of medium intensity, long-term duration, regional extent, and affecting resources that are common in context. The summary impact of Alternative 1 on socioeconomics would be beneficial and moderate, and would make a moderate contribution to cumulative effects.	No impacts to socioeconomic patterns.	Effects similar to Alternative 1; the summary impact would be beneficial and moderate, and would make a moderate contribution to cumulative effects.	Effects similar to Alternative 1; the summary impact would be beneficial and moderate, and would make a moderate contribution to cumulative effects.
Subsistence	Impacts would be of low intensity and long-term duration but in a small area (localized extent), and affecting resources that are common in context. Summary impacts would be considered negligible, with a negligible contribution to cumulative effects.	No changes to subsistence resources or users.	Effects similar to Alternative 1; the summary impact is negligible, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; the summary impact is negligible, with a negligible contribution to cumulative effects.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Land Use and Recreation	Construction activities would create noise and disturbances of medium intensity at the barge staging areas, the helicopter transit routes, and the microwave repeater tower sites but this would be limited to the construction period in localized areas that are common in context. Operational impacts would be confined to small areas, with a low to medium intensity, affecting lands and recreation uses that are common to important in context. Impacts to use of the Iditarod National Historic Trail (NHT) would involve resources that are important in context, due to the congressional designation. The towers would not be located within the Iditarod NHT corridor, but would be in close proximity near the Golovin Alternate tower site. Visual impacts on uses of the Iditarod NHT would be moderate. Effects on other recreation activities would be minimized by coordination with recreation service providers. Overall, summary impacts on land use would be considered minor to moderate, and would make a minor contribution to cumulative impacts. Alternative 1 would have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.	No impacts to land use and recreation.	Hill 2211 tower would be co-located with an existing communications tower. Implementation of Alternative 3 would be expected to have minor direct and indirect impacts on land use patterns and recreation activities, with a minor incremental contribution to cumulative impacts on these resources. Visual impacts to the uses of the Iditarod NHT would be reduced, because this alternative would substitute a tower location further north from the trail. Overall, implementation of Alternative 3 would have a minor summary impact on land use and recreation. Alternative 3 have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.	Kwiktalik Mountain tower would be located on private land. Implementation of Alternative 4 would be expected to have minor direct and indirect impacts on land use patterns and recreation activities, with a minor incremental contribution to cumulative impacts on these resources. Visual impacts to the uses of the Iditarod NHT would be reduced, because this alternative would substitute a tower location further south from the trail. Overall, implementation of Alternative 3 would have a minor summary impact on land use and recreation. Alternative 4 would have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.
Transportation	Impacts to the regional aircraft transportation system would be limited to minor potential displacement of other users of the light helicopter capacities in Nome. This would be of low intensity, intermittent episodes of long-term duration, local to regional extent, and affecting a resource common in context. The summary impacts would be negligible, with a negligible contribution to cumulative effects.	No impacts to the regional aircraft transportation system would occur.	Effects similar to Alternative 1; Impacts would be of low intensity, temporary in duration, and local in extent, and affecting a resource that is common in context. Negligible summary impacts to regional transportation are expected, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; Impacts would be of low intensity, temporary in duration, and local in extent, and affecting a resource that is common in context. Negligible summary impacts to regional transportation are expected, with a negligible contribution to cumulative effects.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Noise	Greater noise effects would occur during construction, particularly due to helicopter traffic. However, during the operations period, generator noise at the tower sites would be moderated by the silencers, and helicopter traffic for maintenance and re-fueling would be limited to 12-14 days per year for the two sites. The schedule for refueling would be in July to minimize impacts on hunting, fishing, and recreation. Over the life of the project direct impacts would be of low intensity, intermittent episodes over a long-term duration, local in geographic extent, and affecting resources that are common in context. The summary impact would be considered minor, with a minor contribution to cumulative effects.	No impacts to noise levels in the soundscape.	Effects similar to Alternative 1; impacts would be of low intensity, intermittent episodes over a long-term duration, local in geographic extent, and affecting resources that are common in context. The summary impact would be considered minor, with a minor contribution to cumulative effects.	Effects similar to Alternative 1; impacts would be of low intensity, intermittent episodes over a long-term duration, local in geographic extent, and affecting resources that are common in context. The summary impact would be considered minor, with a minor contribution to cumulative effects.
Visual Resources	Alternative 1 would be expected to result in impacts that would be of low intensity, long-term duration, local in spatial extent, and affecting common visual resources. These impacts are expected to be minimized by the expansiveness of the characteristic landscape, and thereby would not dominate the views experienced by sensitive viewer groups engaged in recreation or subsistence. The predominantly weak-moderate contrast is consistent with Visual RM Class III objectives defined by the Kobuk-Seward RMP (2006). Visual impacts to the Iditarod NHT arise from the close proximity to the Golovin Alternate tower, but are limited to a small portion of the trail, and a brief period for most users passing by. Painting the Golovin Alternate tower and modules white reduces visual contrast during winter, the predominant season of use. Indirect impacts to visual resources from sites located on non-federal lands would be considered negligible to minor. The summary impact is moderate, with a moderate contribution to cumulative impacts.	No impacts to visual resources.	Effects similar to Alternative 1; however, the Hill 2211 tower would not be expected to alter scenic quality along the Iditarod NHT. Impacts would be of low intensity, long-term duration, local in spatial extent, and affecting common visual resources. The summary impact is moderate, with a moderate contribution to cumulative impacts.	Effects similar to Alternative 1; however, the Kwiktalik Mountain tower increase visual contrast when viewed from Norton Sound. The tower would not be expected to alter scenic quality along the Iditarod NHT. Impacts would be of low intensity, long-term duration, local in spatial extent, and affecting common visual resources. The summary impact is moderate, with a moderate contribution to cumulative impacts.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alterative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Cultural Resources	Alternative 1 would have no direct effect on cultural resources eligible for listing on the NRHP. Alternative 1 would have a minor indirect visual impact on NRHP eligible cultural resources, particularly the Iditarod National Historic Trail in the vicinity of Golovin Alternate Repeater which would be low-intensity, long-term duration, local in extent, and affecting a resource that is important in context. The indirect effects of four additional project tower sites were surveyed and no direct impacts to cultural resources were estimated. Additional field surveys and documentation should be incorporated into planning and design prior to construction to avoid adverse impacts. The summary impact of Alternative 1 on cultural resources is no direct or indirect impact and therefore no contribution to cumulative impacts.	No impacts to cultural resources.	Hill 2211 Repeater Tower Site was not surveyed during the 2011 field season. The literature review identified no known cultural resources within 3 miles. Prior to ground-disturbing activity, a cultural resources survey would be completed. With mitigation, Alternative 3 would have no direct or indirect effects on cultural resources and would make no contribution to cumulative effects.	Kwiktalik Mountain Repeater Site was not surveyed during the 2011 field season. The literature review identified four known cultural resources within 3 miles, but none are within the proposed site. Prior to ground-disturbing activity, a cultural resources survey would be completed. With mitigation, Alternative 4 would have no direct or indirect effects on cultural resources and would make no contribution to cumulative effects.
Environmental Justice	Alternative 1 would have no adverse effects on human health, a moderate beneficial impact on the economy, and negligible to moderate effects on other resources, including subsistence. In terms of socioeconomic characteristics, the improvements to telecommunications infrastructure would potentially have beneficial effects in health care, education, government services, business, and household Internet use. Alternative 1 would have no disproportionately high and adverse human health or environmental effects, and no Environmental Justice concerns are identified.	No impacts to human health or environmental conditions, so no Environmental Justice concerns arise.	Effects similar to Alternative 1; implementation would have no adverse effects on human health and minor impacts to environmental conditions. Alternative 3 would have no disproportionately high and adverse human health or environmental effects, and no Environmental Justice concerns are identified.	Effects similar to Alternative 1; implementation would have no adverse effects on human health and minor impacts to environmental conditions. Alternative 4 would have no disproportionately high and adverse human health or environmental effects, and no Environmental Justice concerns are identified.

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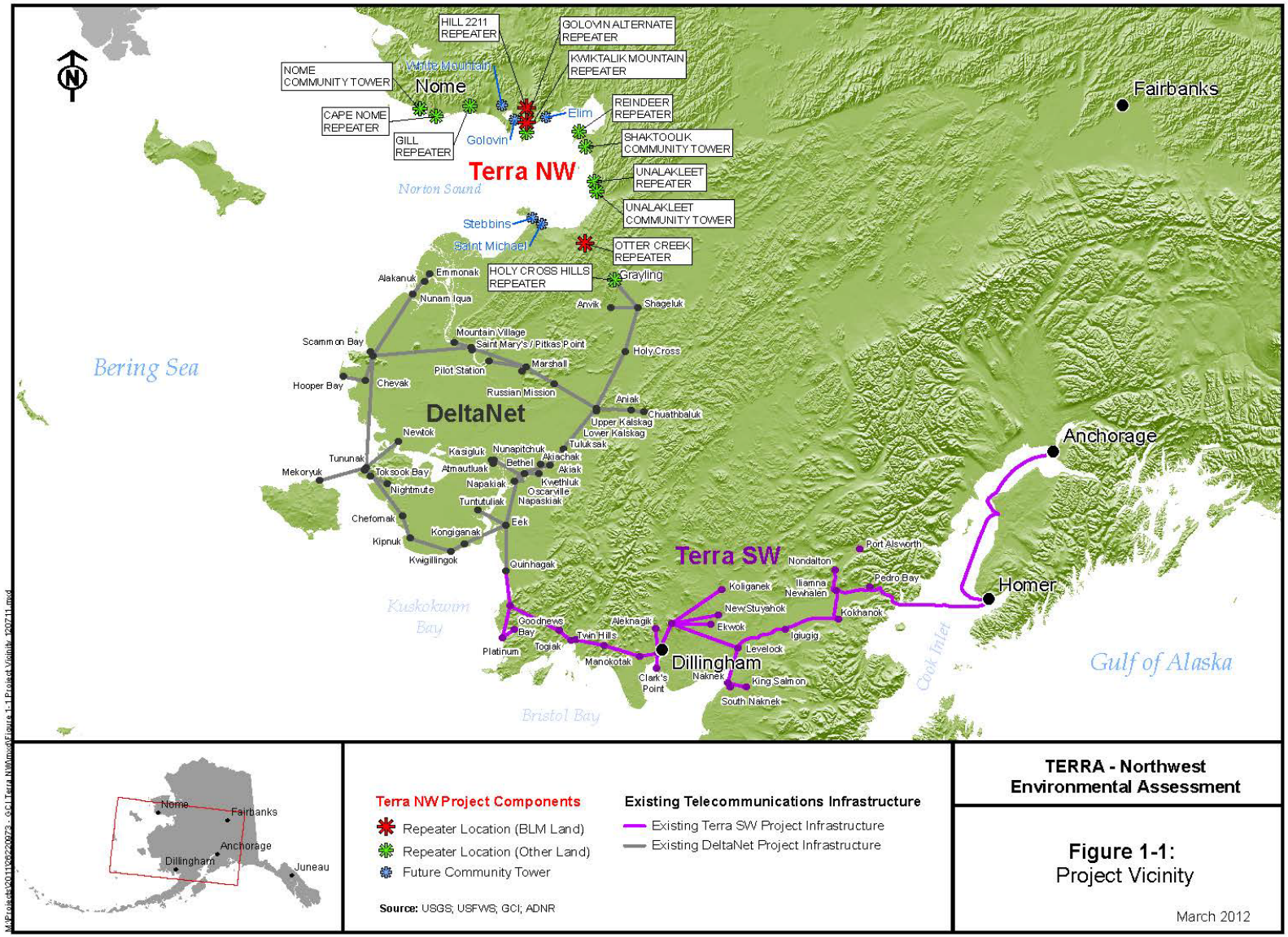
1.0 Introduction

EA number:	AK-010-2012-0002-EA
Type of project:	Right-of-Way Grant and Communication Lease
Location:	Kateel River Meridian: • T. 25 S., R. 12 W., Secs. 16 and 21 (within); (Otter Creek tower site) • T. 11 S., R. 20 W., Sec. 17 (within); (Golovin Alternate tower site)
Preparing Office:	Anchorage Field Office
Case File #:	AA-92969 (Golovin Alternate tower site), AA-92971, AA-92971-A (Otter Creek tower site)

The Bureau of Land Management (BLM) is considering an application from Unicom, Incorporated (Unicom) to construct, operate, and maintain two remote microwave repeaters with associated equipment as part of a project to improve Internet telecommunications with broadband services for communities in the Norton Sound region of Alaska. The Regulatory Commission of Alaska awarded a grant to Unicom for the purpose of delivering broadband Internet service from Grayling, currently the northernmost community served by the DeltaNet project, to Nome (see Figure 1-1). Under the current proposal, the TERRA Northwest (TERRA-NW) Project would have several stages, but only the 2012 and 2013 construction activities are currently planned, funded, and proposed for permits. The currently proposed activities of TERRA-NW would include the construction, operation, and maintenance of two mountaintop microwave repeater towers and associated equipment on public land managed by BLM, five mountaintop microwave repeater towers on private lands, and three community towers on private lands in 2012 and 2013. A later phase, which could be planned for 2014 if funds become available, would include construction, operation, and maintenance of towers and associated equipment located on private lands within five additional Norton Sound communities.

The TERRA-NW Project would address the need for more reliable terrestrial broadband service from the Internet backbone currently extending from Anchorage through the Bristol Bay Region and the Yukon-Kuskokwim Delta to the communities and more than 6,000 residents in the Norton Sound region. At present, these communities are linked to the Internet backbone by private satellite networks. Although satellite infrastructure provides telecommunication services in rural Alaska, its higher delays in connectivity and lower reliability limit its capacity to expand to broadband service. The TERRA-NW Project would provide high-capacity, high-speed, and low-delay broadband connectivity, which would also improve Internet reliability. The TERRA-NW Project would provide Norton Sound communities with telecommunications infrastructure to facilitate economic development, improve services by health care providers, increase educational services, expand access to governmental, tribal, and non-profit entities, and improve Internet speed for residential users.

Figure 1-1. Project Vicinity



1.1 Purpose and Need for Action

Unicom has filed applications with the BLM Anchorage Field Office to obtain authorization to construct, operate, maintain, and decommission two mountaintop microwave repeater towers. BLM is required to respond to three applications filed (serial numbers AA-92969, AA-92971, and AA-92971-A). BLM action on this proposal would be the issuance of a land use authorization for the proposed non-federal use of public lands.

The need for action is established by the BLM's responsibility under Title V of the Federal Land Policy and Management Act (FLPMA) of October 21, 1976 (90 Stat. 2776; 43 United States Code [USC] 1761), as amended, to respond to requests for rights of way across public lands. The purpose of the action is to provide access across public lands in a manner that is consistent with the provisions and objectives established for the management of resources within the respective planning areas (see Section 1.2.3) and to ensure that the public uses described herein will not cause unacceptable damage to public lands.

The decision to be made by BLM is whether to authorize the right of way, and if so, under what terms and conditions.

1.2 Legal and Regulatory Context

This EA is prepared to meet requirements of several statutes and regulations, including the National Environmental Policy Act of 1969 (NEPA), and the Alaska National Interest Lands Conservation Act (ANILCA). This section describes the most important laws, regulations, and policies.

1.2.1 National Environmental Policy Act Requirements

Under the NEPA (42 USC4371)and its implementing regulations (40 CFR [Code of Federal Regulations] parts 1500-1508), BLM is required to make a decision on the Proposed Action based on a competent technical analysis that clearly communicates the environmental values and impacts associated with the action. In compliance with NEPA requirements, BLM will develop the appropriate decision document for the permit applications affecting lands under its management and arrive at a final determination based on regulatory authorities, regulations, and policies they must follow. This EA provides the foundation upon which BLM will base its decision to move forward on the Proposed Action and the ensuing permitting requirements.

NEPA requires BLM to integrate environmental management and values into decision-making processes by assessing the impact of the Proposed Action and reasonable alternatives on the affected environment. As stipulated by the regulations, the analysis must identify and disclose to the public the potential environmental impacts of the Proposed Actions and reasonable alternatives to those actions. This EA analyzes the potential environmental impacts that could result from the alternatives considered, including the No Action Alternative. This EA has been prepared in accordance with the NEPA and the implementing regulations of the Council on Environmental Quality at 40 CFR 1508.9.

To assist BLM in the decision-making process, this EA provides sufficient evidence and analysis for determining whether there is potential for significant impact, thus requiring a full Environmental Impact Statement (EIS), or whether there is justification to prepare a Finding of No Significant Impact (FONSI). By providing important information on potential environmental

impacts, this EA enables BLM to decide whether to issue ROW grants or communication use leases for the construction of the proposed facilities on BLM-managed lands.

1.2.2 BLM Laws, Regulations, and Policies

As noted, BLM's decisions on a ROW grant or lease are guided by the underlying authority derived from Title V, of the FLPMA (90 Stat. 2776; 43 USC 1761), as amended in accordance with regulations found at 43 CFR §2800.

Title V provides the terms under which BLM may grant a ROW, for purposes including a communications site and includes the following conditions:

- The natural resources located on public lands administered by a government agency, where the public lands are adjacent to private or other lands, are protected;
- Undue or unnecessary environmental damage to the lands and resources is prevented;
- The utilization of a ROW in common with the respect to engineering and technological compatibility, national security, and land use plans compatibility is promoted; and
- Coordination, to the fullest extent possible, takes place with the state, local governments, interested individuals, and appropriate non-governmental entities.

In Section 102, FLPMA requires BLM to manage public lands so as to protect and preserve the quality of natural, scenic, and historic resources, archeological values, and provide for outdoor recreation and other uses. Section 203 requires BLM to manage lands which have been dedicated to specific uses according to other provisions of law in accordance with such law.

BLM's authorization for use of public lands under FLPMA is further guided by the 2009 passage of the Omnibus Public Land Management Act of 2009, (16 USC 7201-720 Sec 2002 [a]), which established the BLM National Landscape Conservation System (NLCS). The BLM Instruction Memorandum 2009-15 states in part:

> A presidential proclamation or act of Congress that designates an area within the National System of Public Lands supersedes conflicting direction by the FLPMA. These designations include…National Scenic or Historic Trails…. Specifically, the land use plan and management direction for such a designation must comply with the purposes and objectives of the proclamation or act of Congress regardless of any conflicts with the FLPMA's multiple-use mandate.

1.2.3 Conformance with BLM Land Use Plans

The Proposed Action would be located on federal lands managed under the Southwest Management Framework Plan (MFP) (BLM, 1981) and the Kobuk-Seward Peninsula Resource Management Plan (RMP) (BLM, 2008). The Iditarod National Historic Trail (Iditarod NHT) Comprehensive Management Plan (CMP) (BLM, 1986a) is also relevant because portions of the project occur in proximity to the Iditarod NHT.

The Southwest MFP was approved in 1982 and includes the southern portion of the project area beginning at Grayling and ending 3 miles (mi.) south of Shaktoolik. To the east of the proposed Otter Creek tower site, the Anvik River corridor is identified as a proposed Area of Critical Environmental Concern (ACEC) to protect spawning habitat for chum salmon and grizzly bear populations. Decision L-1.3 supports making public lands available for the development of

electronic communications facilities sites. Decision R 2.1 proposed study of several areas, including the Anvik River drainage for designation as open, restricted, or closed for off road vehicle (ORV) use. Decision R-3.1 expressed the objective to "protect the federally managed portion of the Iditarod NHT and associated historic sites from damage or disturbance due to other resources. As the Iditarod NHT CMP had not been completed, the introduction to the Southwest MFP indicates that decisions under the Southwest MFP must be consistent with the final Iditarod NHT CMP. The Southwest MFP did not adopt a visual resource classification for the area in the vicinity of the Otter Creek tower site. Instead Decision VR-2.1 required that managers:

> Evaluate all proposed management activities by using the visual resource management contrast rating system. In doing so, areas that have not been classified for visual resource can be evaluated. Allow only managed activities that are compatible with the natural landscape (BLM 1981).

The Kobuk-Seward Peninsula RMP was approved in 2008 and includes the northern portion of the project area beginning 3 mi. south of Shaktoolik and extending beyond Nome to the Kobuk River area. Several provisions are relevant to the proposed activity at the Golovin alternate tower site. In Section C, this plan establishes no ACEC in the vicinity of the proposed tower site. Under Section H on Lands and Realty, the RMP requires that "communication site ROWs shall be co-located when feasible." Under Section M on Recreation, the federal lands in the vicinity of the proposed Golovin Alternate tower site are classified as an Extensive Recreation Management Area, which is managed for dispersed recreational use. Management Action M-3 on page RMP-36 recommends implementation of the Iditarod NHT CMP. In Section P on Travel Management (OHV Use and Access), Management Action P-2 indicates that off-highway vehicle designation is classified as "limited," with a weight restriction of 1,500-pound curb weight on state-selected land. Section P on Visual Resources classifies the area in the vicinity of the Golovin Alternate tower as Visual Resource Management Class III (See Map 20 in the Kobuk-Seward Peninsula RMP). The objective of a VRM Class III designation is to:

> … partially retain the existing character of the landscape. 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 (BLM 1986).

The Kobuk-Seward Peninsula Resource Management Plan (RMP) established standard required operating procedures (ROPs) applicable to all BLM permitted activities within the boundary of the RMP.

In November 1978, Congress established the Iditarod NHT under the National Trails System Act (NTSA) to commemorate the winter gold rush trail in Alaska. The Iditarod NHT includes approximately 2,000 mi. of trail between Seward and Nome, on federal, state, and private lands. The Act designated the Secretary of Interior and BLM as the federal administrator, and charged BLM with the development and implementation of a CMP for the Iditarod NHT.

The Iditarod NHT CMP was approved in 1986. It defines general management objectives and strategies, identifies and inventories high-value segments of the trail, and makes specific land management recommendations for respective agencies. The primary trail alignment is designated for "Active Management" where existing laws and regulations are not deemed adequate to

properly manage the trail. This management category is very broad and may include anything from the placement of roadside signage, trail markers, and trail clearing, to trail reconstruction or construction of parallel trails, shelters, and visitor facilities. Within this CMP, Table 5 on page 90 identifies primary and connecting trail segments for active management with recommended corridor widths, management activities, and responsible management entities.

The CMP also identified certain trail segments for nomination to the National Register of Historic Places (NRHP), the official list of the nation's significant cultural resources. For those segments identified for both Active Management and NRHP nomination, the CMP recommends that a 1,000-foot (ft.)-wide corridor containing the trail be established. As noted on page 92, the Moses Point to Solomon segment, which is in the vicinity of the Golovin Alternate tower site, is one of sections with a recommended 1,000-ft.-wide corridor.

The Proposed Action would not install microwave repeater towers within the Iditarod NHT corridor. The trail does not pass near the proposed Otter Creek tower site. The Golovin Alternate tower site is not located on the CMP's recommended 1,000 ft. corridor for the Iditarod NHT. However, its close proximity (0.4 mi. at the closest point) requires careful evaluation of visual impacts on the trail and recreational uses (See Section 4.4.6).

1.2.4 Other Laws and Regulatory Requirements

With passage of ANILCA in 1980, Congress established or expanded over 100 million acres of federal conservation units, including the National Parks, National Wildlife Refuges, National Forests, National Wild and Scenic Rivers, and National Wilderness Areas. Important sections of ANILCA for this EA include Title VIII, which provided a priority for subsistence uses by rural residents on federal lands, and requires evaluation of impacts to subsistence uses from federal land use decisions.

Subsistence Impact Evaluation under ANILCA Section 810: The federal land managers must specifically evaluate the potential for the Proposed Action to significantly restrict subsistence uses of the federal land affected by the project. If the Proposed Action may result in a significant restriction, then the federal land manager is required to provide notice and conduct hearings with the affected communities. If the Proposed Action is found not likely to result in significant restrictions on subsistence uses, no further compliance activities are required. After the required public outreach for a Proposed Action that may significantly restrict subsistence, the federal land manager may determine that the project is necessary, that appropriate mitigation measures have been incorporated, and that the project can be approved.

The National Historic Preservation Act of 1966 (NHPA) as amended (16 USC 470 et seq.) requires in Section 106, that BLM identify and evaluate cultural and historic resources that have the potential to be eligible for listing in the NHPA. The potential to affect cultural resources will be considered for each alternative evaluated in this EA. The State Historic Preservation Officer (SHPO) must also be consulted.

As required, the U.S. Army Corps of Engineers would review the proposed TERRA-NW tower sites if placed in wetlands and tidal areas, as required by Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) and Section 404 of the Clean Water Act (33 USC 1344).

Besides the two tower sites on federal lands, the proposed TERRA-NW Project would seek to install six additional towers on private lands. These components are not located on federal lands,

and would be authorized by agreements with private land owners. The potential environmental effects of these additional project components are analyzed as "connected actions" on non-federal lands, as stipulated within the BLM NEPA Handbook (BLM, 2008).The environmental effects of the connected actions are examined as indirect effects of the two tower sites on federal lands.

1.3 Scoping, Public Involvement, and Issue Identification

The purpose of scoping and early public involvement is to ensure that the residents in the affected communities and federally recognized tribes have an opportunity to learn about the proposed project, to ask questions, and to identify concerns and issues for further analysis. The agencies conduct government-to-government consultation with the federally recognized tribes in order to understand unique tribal perspectives and concerns as appropriate. When combined with the results of internal scoping among the agency resource specialists, these public and tribal concerns help to identify the issues and alternatives to be analyzed in the EA.

1.3.1 Town Hall Meetings

BLM initiated public involvement for this EA with public notices for Town Hall meetings held in mid-August 2011. BLM led four Town Hall meetings in Golovin Nome, Grayling, and Unalakleet on August 16 and 17, 2011. The Town Hall meetings provided an introduction to the project in the four communities nearest to the affected federal lands, and solicited input from local residents on issues and concerns associated with the project. The opportunity to provide comments from the Town Hall meetings extended through October 31, 2011.

The Town Hall meetings revealed public interest in the project and potential benefits, as well as concern with a variety of issues regarding the project design, alternatives, and potential impacts. The following topics were raised in comments.

Project Description:

- Details about the staging areas selected for the construction period.

Tower Site Selection and Internet Service:

- Location of community towers and local Internet service coverage; and
- Locations for the community towers in Phase 3 (i.e., St. Michael, Stebbins, Elim, Golovin, and White Mountain).

Project Security:

- Potential for vandalism at towers located close to communities.

Public Safety Benefits:

- Use of lights on the towers to serve as beacons for lost snowmachiners.

Alternatives:

- Feasibility of submarine fiber-optic cable in Safety Sound.

Geotechnical and Hydrology Impacts:

- Road washout risks on the Nome-Council Road.

Socioeconomic Impacts:

- Local hire and local purchasing goals so that construction provides revenue for local communities; and
- Reasonable cost of Internet service to households.

1.3.2 Government-to-Government Consultation with Federally Recognized Tribes

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments, requires federal agencies to consult with federally recognized tribal governments during the NEPA process. As the lead federal agency, BLM identified tribal governments potentially affected by the project. Letters were sent to tribal governments in October 2011 inviting them to consult on this project.

The tribes contacted were:

- Nome Eskimo Community
- Chinik Eskimo Community
- Native Village of Shaktoolik
- Native Village of Koyuk
- Solomon Traditional Council
- Anvik Village
- Native Village of Unalakleet
- Elim IRA Council
- Stebbins Community Association
- Native Village of St. Michael
- Organized Village of Grayling
- Holy Cross Village
- King Island Native Community
- Native Village of White Mountain
- Shageluk Native Village

To date, there has been no response to BLM's invitations to enter into government-to-government consultation. Follow-up with all tribes is in progress.

1.3.3 Issues to be Addressed

To focus this EA, specific issues were selected for further analysis and others were eliminated from evaluation. Based upon the Town Hall meetings, tribal consultation, and review of the proposal from Unicom by BLM specialists during an internal scoping meeting on October 7, 2011, the following issues were identified for further analysis in the EA. The issues in this EA are evaluated in Section 4.0, Environmental Consequences.

1.3.3.1 Physical Environment

Meteorology and Air Quality – emissions from the proposed use of diesel generators at the tower sites could affect air quality and contribute to greenhouse gases.

Geology and Soils – installation of the microwave towers would alter or remove soils at the construction sites.

Hydrology – construction and operations could affect streams and waterbodies by introducing silt and in the case of a fuel spill impact water quality.

Hazardous Materials and Waste Management – fuels and other hazardous materials would be employed in implementing the proposed project. Stored fuels at some sites may be subject to vandalism, so appropriate project security measures should be identified. Heavy equipment

hydraulic lines also pose a risk for spill and contamination. Prevention and response measures planned must be identified and evaluated.

1.3.3.2 Biological Environment

Vegetation and Wetlands – construction and operations may affect vegetation and wetlands, including risks of impacts to wetlands from fuel transportation and refueling operations. Preventative measures to avoid introduction of invasive species must be identified and evaluated. Heavy equipment barged into the region for construction may pose a risk, unless thoroughly washed down prior to landing.

Fish – implementation of the project may affect fishery resources, including risks associated with fuel spills during refueling of the tower sites.

Wildlife (Terrestrial Mammals and Birds) – project construction and operations may result in impacts including disruption of wildlife habitats, or disturbance and displacement of wildlife species. Species to consider include the Western Arctic Caribou Herd (WACH), musk ox, moose, fur bearer species, and brown bear. Construction activities staged from coastal locations and operations of the tower sites may affect birds and waterfowl.

Marine Life and Threatened and Endangered Marine Mammals and Birds – designated Sensitive, Threatened, and Endangered species, such as the Kittlitz's murrelet, Steller's eider, and yellow-billed loon, are potentially affected by the project, including the construction and operations phases. Seasonal timing of construction could affect the intensity of impacts.

1.3.3.3 Social Environment

Socioeconomic Resources – impacts of the project may include greater economic activities in the region due to broadband Internet speed and commerce. Beneficial effects may include increased services in health, education, government, business, and households. The project may generate cumulative impacts associated with build-out in communities should be analyzed.

Transportation – impacts to regional transportation systems may include displacement of other users by use of fixed-wing aircraft and helicopters during construction, operation, and decommissioning activities. Increases in freight volume associated with the installation of broadband Internet commerce should also be evaluated.

Subsistence – evaluation of the impacts to subsistence users of wildlife, fish, and plants should include whether the project may result in displacement of important subsistence species, restrictions on subsistence users, or increases in competition for subsistence resources. Important subsistence resources in the region include caribou, moose, muskox, and migratory birds.

Land Use, Iditarod NHT, and Recreation – the project may affect the viewshed along the Iditarod NHT at the Golovin Alternate tower site. This may affect the recreation experiences of individuals using the Iditarod NHT. The project may affect the experience of some commercial recreational activity which is authorized by BLM's Special Recreation Permits. Risks to low-flying aircraft are associated with the Iditarod Trail races in the spring, as well as impacts on the undeveloped natural landscapes of the Norton Sound region should be evaluated.

Lands with Wilderness Characteristics – the project may affect BLM-managed lands with wilderness characteristics and those potential impacts must be evaluated to determine if they impact or impair the wilderness characteristics.

Noise/Soundscapes – during construction, and later during annual refueling operations, the use of helicopters would introduce new sound impacts along the transit corridors to the tower sites. Generators at the tower sites would introduce noise in the surrounding areas. Impacts of the sound levels across these distances should be evaluated.

Visual Resources – the new infrastructure (60-ft. towers and associated facilities) at two remote mountaintop sites would introduce visual impacts in an area that is otherwise undeveloped, with potential impacts to Iditarod NHT users, recreationists, and other users. Cumulative impacts associated with microwave towers on non-federal lands should be evaluated.

Cultural Resources – project construction has the potential to disturb cultural resources that are listed on, or eligible for inclusion in the NRHP. Cultural resource inventory and evaluation of proposed areas of potential effects should be undertaken and measures to avoid or otherwise mitigate impacts identified.

Environmental Justice – the project must be assessed to determine if it would result in disproportionate adverse impacts on minority and low-income populations.

1.3.4 Issues Dismissed

Local residents raised concerns about the price and reliability of the broadband Internet service to be provided by Unicom to households in the project area, however, the cost structure for service to households is not subject to direct review in this EA, as it falls outside the regulatory authorities of BLM. In addition, the cost structure for household service will be established by Unicom only after the construction is completed. As a result, this EA will not provide a detailed analysis of the cost of service to households.

2.0 Alternatives

NEPA requires review of a reasonable range of alternatives in order to provide a comparison of the environmental effects of the Proposed Action.

Four alternatives will be analyzed in this EA: 1) the Proposed Action, 2) the No Action Alternative, 3) the Hill 2211 tower site alternative, and 4) the Kwiktalik Mountain tower site alternative. Additional alternatives considered but dismissed from further analysis will also be described, including a submarine cable from Shaktoolik to Nome and alternative locations for the towers.

All action alternatives will be required to meet or exceed the required operating procedures (ROPs) identified and applicable in the Kobuk-Seward Peninsula Resource Management Plan (RMP). Section 2.5 lists project designs features that are common to all action alternatives and a detailed list of applicable required operating procedures can be found in Appendix I.

2.1 Proposed Action - Alternative 1

Under the Proposed Action, the TERRA-NW Project would construct two microwave towers and associated facilities on blocks of remote, undeveloped BLM-managed lands. The Otter Creek tower site is located approximately 36 mi. northwest of Grayling within an area of approximately 3.5 million acres of BLM-managed land in the Nulato Hills. The Golovin Alternate tower site is located approximately 10 mi. east of Golovin within an area of approximately 443,140 acres of BLM-managed land, running north of Cape Darby. See Figure 2-1 for project components and land status.

Additional components of the TERRA-NW Project, not located on federal lands, are proposed for construction in 2012 and 2013. Eight towers (five remote repeater towers and three community towers) would be installed on private lands. These eight towers are classified as "connected actions," and reviewed as indirect effects of the proposed action on federal land. In the future, Unicom intends to construct five additional community towers; however, these are not funded. For the locations and characteristics of the TERRA-NW Project towers, see Table 2-1.

2.1.1 Repeater Tower Site Construction

The location of the two towers proposed for federal lands and the helicopter transit routes for construction are shown in Figures 2-2 and 2-3. Under the leases for construction, activities would affect a temporary footprint of 225,000 square feet (sq. ft.) (5.15 acres) per site, as shown in the representative site plan in Figure 2-4. Combined, the two tower sites represent a total of 10.3 acres of land affected during the temporary (five-month) construction period in 2012 and 2013.

Figure 2-1. Microwave Tower Sites

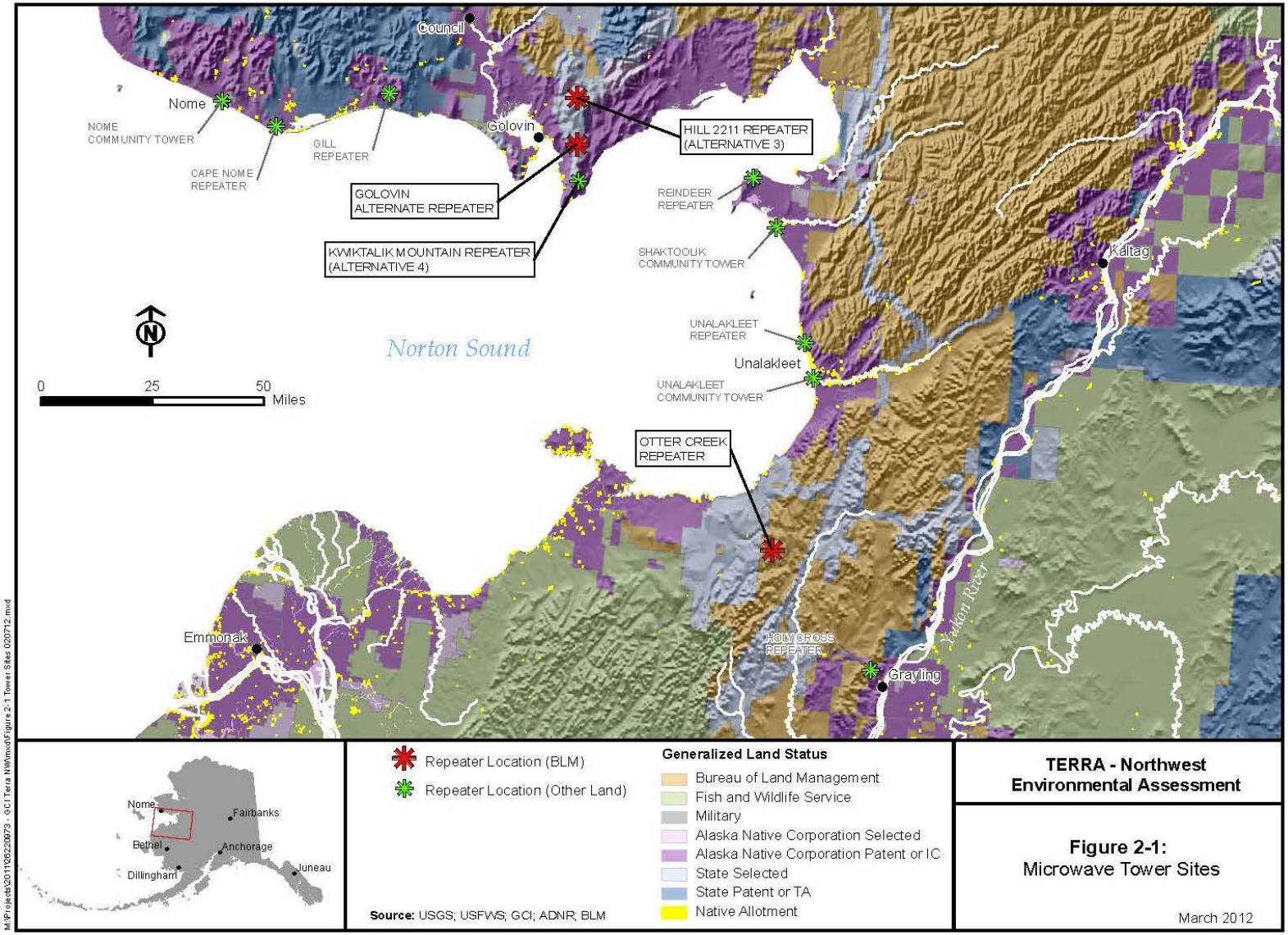


Table 2-1. Proposed Repeater Sites for the TERRA-NW Project

Tower Type	Location Name	Description	Latitude	Longitude	Elevation (ft.)	Tower Height (ft.)	Owner/Manager	Staging Area
Proposed Action on Federal Lands (2012-2013)								
Repeater	Otter Creek Repeater*	About halfway between Grayling and St. Michael	N 63° 18'50.73"	W 160°57'23.97"	1,705	60	BLM (Anchorage District)	Light-lift from Unalakleet. Heavy-lift from Klikitarik Bay.
Repeater	Golovin Alternate Repeater*	Less than 10 mi. east of Golovin	N 64° 32' 21.99"	W 162° 44' 12.11"	1,000+	60	BLM (Anchorage District)	Golovin
Connected Actions on Non-Federal Lands (2012-2013)								
Repeater	Holy Cross Hills Repeater*	A few miles northwest of Grayling	N 62° 57' 28.92"	W 160° 10' 25.07"	1,450	60	Hee-yea Lindge Corporation (surface)/Doyon Ltd (subsurface)	Grayling
Community Tower	Unalakleet Community Tower*	Corner of Main St. & Beach Rd. in town	N 63° 52' 36.45"	W 160° 47' 35.60"	7	60	Unalakleet Native Corporation (surface)/Bering Straits Native Corporation (subsurface)	Unalakleet
Repeater	Unalakleet Repeater*	Less than 10 mi. north of Unalakleet	N 63° 59' 19.32"	W 160° 53' 0.22"	750	60	Unalakleet Native Corporation (surface), Bering Straits Native Corporation (subsurface)	Unalakleet.
Community Tower	Shaktoolik Community Tower*	Southeast end of town at the GCI antenna	N 64° 20' 56.41"	W 161° 11' 3.70"	TBD	60	Shaktoolik Native Corporation (surface)	Shaktoolik
Repeater	Reindeer Repeater	Over 10 mi. northwest of Shaktoolik	N 64° 30' 3.48"	W 161° 23' 49.08"	TBD	60	Shaktoolik Native Corporation (surface)	Shaktoolik
Repeater	Gill Repeater	Near Uncle Sam Mountain	64°36'52.25"N	164°11'49.08"W	TBD	TBD	Solomon Native Corporation	Nome
Repeater	Cape Nome Repeater	Near summit of Cape Nome	64°27'5.05"N	164°59'52.49"W	TBD	TBD	Sitnasauk Native Corporation	Nome
Community Tower	Nome Community Tower	At GCI Earth Station, on Snake River	64°30'15.42"N	165°25'41.13"W	TBD	TBD	Leased from Nome Joint Utilities System	Nome

Tower Type	Location Name	Description	Latitude	Longitude	Elevation (ft.)	Tower Height (ft.)	Owner/Manager	Staging Area
Alternative Tower Locations to be Analyzed in the EA								
Repeater	Kwiktalik Mountain	Darby Peninsula, south of Golovin Alternate	64°25'11.70"N	162°41'38.96"W	1,707	TBD	Golovin Native Corporation	Golovin
Repeater	Hill 2211	North of Golovin Alternate	64°41'15"N	162°47'03"W	2,211	TBD	BLM	Golovin
Future Actions – Community Towers for Local Service (Not currently proposed for permits, nor funded. May be planned for construction as early as 2014)								
Community Tower	St. Michael Community Tower	Likely on disturbed ground within the community	TBD	TBD	TBD	TBD	Private owner	St. Michael
Community Tower	Stebbins Community Tower	Likely on disturbed ground within the community	TBD	TBD	TBD	TBD	Private owner	Stebbins
Community Tower	Elim Community Tower	Likely on disturbed ground within the community	TBD	TBD	TBD	TBD	Private owner	Elim
Community Tower	Golovin Community Tower	Likely on disturbed ground within the community	TBD	TBD	TBD	TBD	Private owner	Golovin
Community Tower	White Mountain Community Tower	Likely on disturbed ground within the community	TBD	TBD	TBD	TBD	Private owner	White Mountain

* Sites of field surveys in summer 2011 for vegetation, birds and wildlife, and cultural resources.

Temporary construction facilities planned at each remote tower site are listed in Table 2-2, and additional details are available in the Plan of Development in Appendix A, including a series of typical diagrams. During the construction period, temporary areas would provide for component preparation and assembly, lodging, food preparation, and waste management.

Table 2-2. Alternative 1: Proposed Temporary Construction Facilities and Equipment for the Microwave Repeater Sites

Facility	Dimensions	Description
Heavy tent structures	10 ft. x 20 ft.	Plywood platforms would be constructed under each tent to protect the ground and level the tent. Tents would be secured from high winds using gabion baskets (weight) and "duck bill" anchors.
Cooking facilities	N/A	These would include electric hot plates, a microwave oven, and a conventional oven.
Food Containers	55-gallon drums	Drums would contain dry goods and canned goods. These drums would also be used to contain food waste and deter wildlife from gaining access. Drums would be transported off site for disposal in an approved location and carried back empty.
Portable sanitary facility (toilet):	1 per site	This toilet is equipped with "water gel" beads for absorption and easier removal from the site. All human waste would be transported off site for disposal in an approved location.
Gray water drums	55-gallon drum	Cooking and hand-washing wastewater would be contained in one 55-gallon drum and would be transported off site for periodic emptying. This drum would be further contained using "duck pond" physical containment.
Trash bags	N/A	Commercial trash bags would be used for dry garbage (plastic, paper, etc.), and they would be secured from the wind with cargo nets while awaiting transport.
Fuel	Six 55-gallon drums and two 300-gallon fuel bladders	Six 55-gallon drums (four for low-sulfur diesel fuel and two for gasoline) at each site during site construction would have integrated containment and would be covered to prevent rain/fuel mixing and overflow. Two 300-gallon fuel bladders will also be in place, one for aviation jet-A fuel, and one for low sulfur #1 diesel fuel. The fuel bladders will be stored in temporary containment dams.
Mini backhoe	N/A	CAT 303 or equivalent for site excavation, drilling, material handling. Capstan winches attached to the excavator to support tower erection.
Air compressor	N/A	225 cubic feet per minute air compressor; used for leveling of competent rock (with jackhammer attachment) as well as drilling of rock anchor holes.
Additional Equipment	N/A	Freshwater drums, portable heating, chest freezers, miscellaneous hand tools.
Diesel Generators	N/A	2kW to 25kW portable generators will be used for camp and tool power.
Spill Response Materials	N/A	Sorbent pads, boom, granular sorbent, and spilled material containers.
Source: Unicom Microwave Repeater Development Plan, February 9, 2012.		

Figure 2-2. Alternative 1 – Proposed Otter Creek Repeater Location and Helicopter Transit Routes

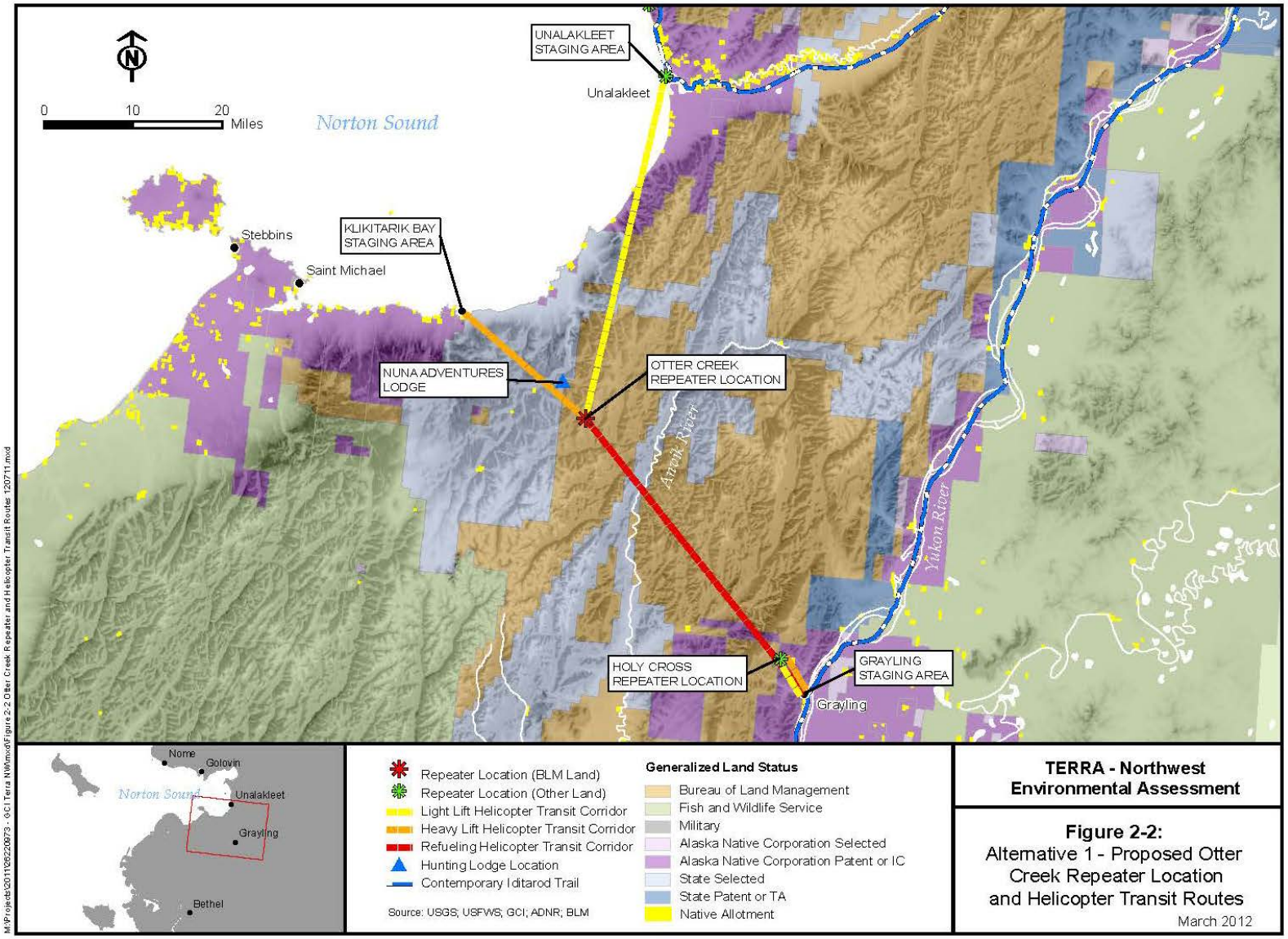


Figure 2-3. Alternative 1 – Proposed Golovin Alternate Repeater and Helicopter Transit Routes

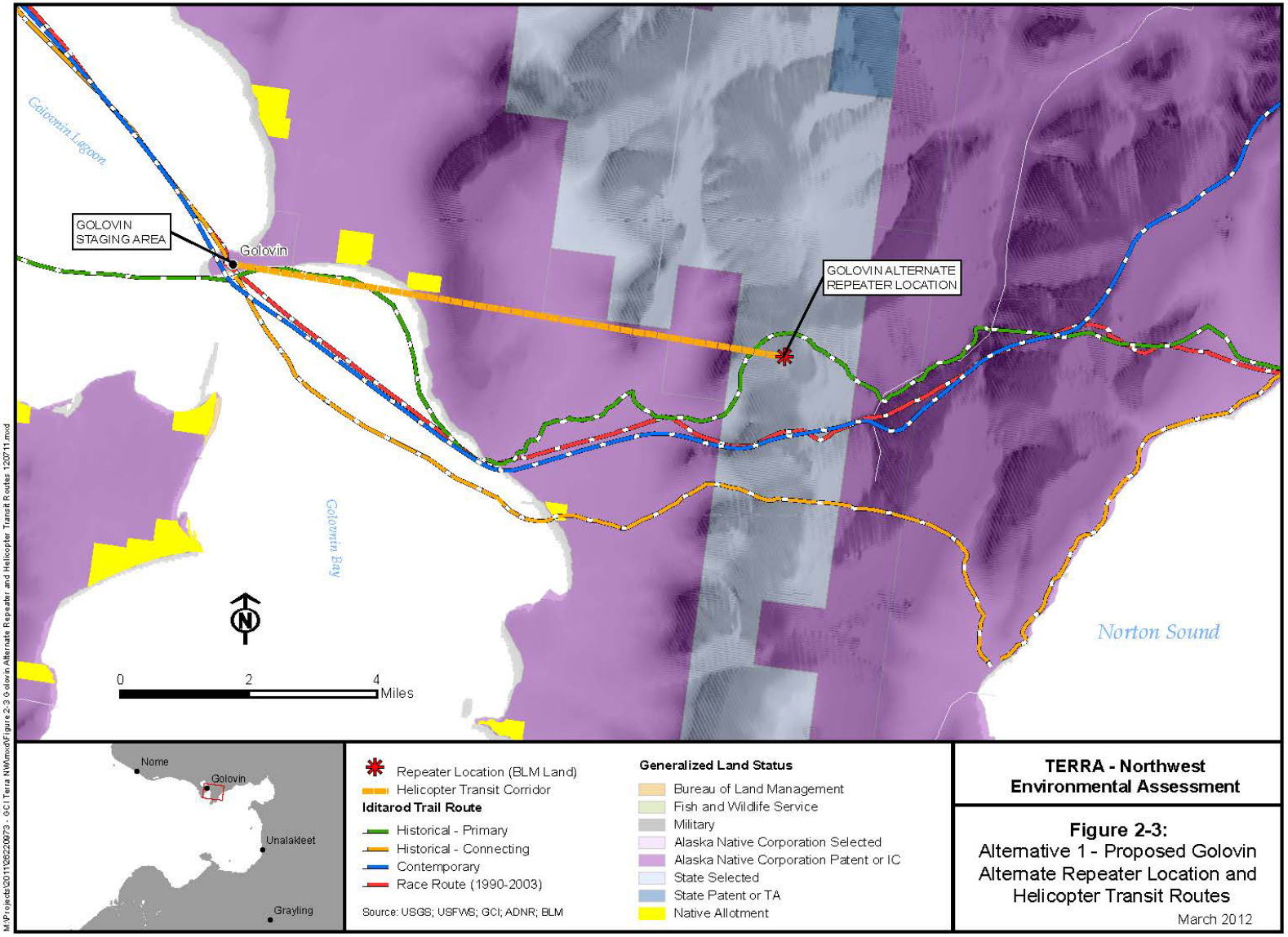
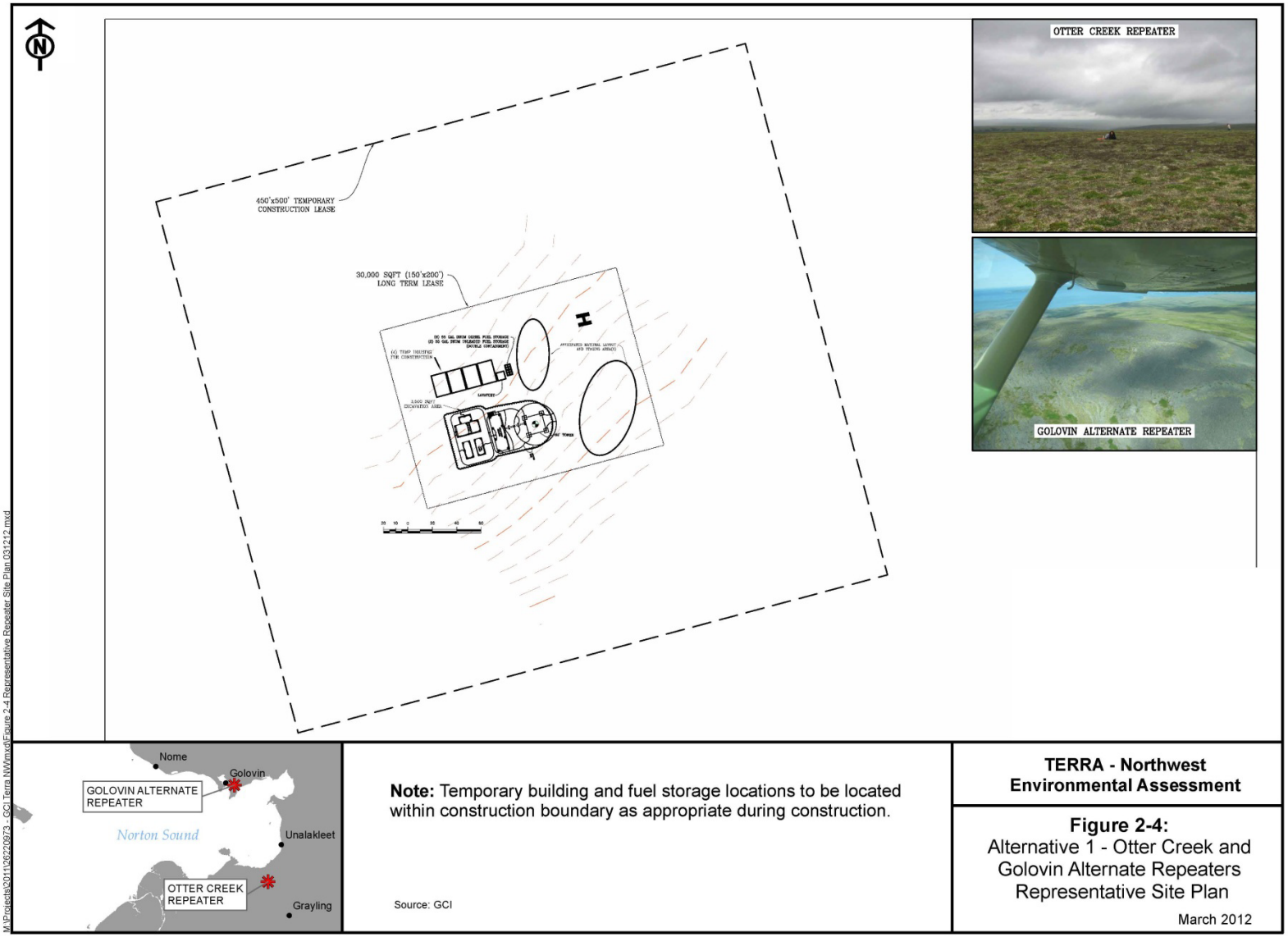


Figure 2-4. Alternative 1 – Otter Creek and Golovin Alternate Repeaters, Representative Site Plan



The project footprint at each tower site varies from 5.15 acres for the temporary construction lease to 0.69 acres for the 20 years of the long-term lease.

Table 2-3. Alternative 1: Tower Site Lands Affected by Project Phase

Project Phase	Square Feet	Acres	Term	Comment
Construction Lease	225,000	5.15	3 years	Includes area to rotate helicopter landings
Long-Term Lease	30,000	0.69	20 years	Includes are for undeveloped helipad
Excavated Area	3,500	0.08	20 years	Includes, towers, modules, and tanks, within long-term lease area

The major project facilities at the each microwave repeater site include the tower and antennas, the power module shelter, the communication equipment shelter, and the fuel tanks. For details on dimensions, characteristics, additional equipment, and staging areas, see Table 2-4. For a representative photograph of the proposed facilities, taken from the TERRA-Southwest (TERRA-SW) Project tower site at Caribou Saddle in Bristol Bay near the end of its construction period, see Figure 2-5.

Table 2-4. Alternative 1: Proposed Facilities for the Microwave Repeater Sites

Facility	Dimensions	Description
Lattice-Type Tower	60 ft. tall	This tower is free-standing and does not require guy wires. The tower would be plain, galvanized finish (steel gray) and would not be lighted.
Microwave Antennas	8 ft. diameter	Four ultra-high performance microwave-style antennas would be installed at each site.
Cellular Antennas	94.5 in (7 ft. 10.5 in) x 5.1 in x 14.8 in	Four vertical cellular antennas covered with fiberglass radome would be mounted to the lattice towers at Golovin Alternate tower site and the community tower sites. The cover on these antennas would be fiberglass which has a non-reflective quality.
Communications Equipment Shelter	10 ft. x 27 ft. x 10 ft.	The prefabricated shelter would be mounted on foundation piers, fiberglass exterior, and neutral gray in color, although the modules at Golovin Alternate will be painted white. Each shelter would contain flooded lead-calcium batteries (C&D, series LCT-1680) for 48 hours of emergency power.
Power Module Shelter	10 ft. x 20 ft. x 10 ft.	The prefabricated power module shelter would also be mounted on foundation piers. It would be metal sided and painted neutral gray, although the modules at Golovin Alternate will be painted white. The shelter would contain two Cummins D1703-M (model DSKAA – 9 kilowatt) diesel generators and each would be outfitted with a hospital-grade silencer (GTE Industries 201-5102). Arctic-grade construction standards include snow hoods to protect exhaust and ventilation systems from malfunction due to snow loads. Drip pans would be in place beneath the engine units. Additionally, any gaps in the floor would be sealed with petroleum-resistant sealant and the power module foundation itself would be installed such that the floor would be sloped, and any spills to the shelter would flow to the exhaust side of the shelter (the platform edge would be 0.5 in. higher than the opposite edge of the shelter).

Facility	Dimensions	Description
Greer Fuel Tanks	4,500 gallons	Each site would host two tanks, totaling 9,000 gallons of #1 diesel that would be neutral gray in color, but would be painted white for the Golovin Alternate site. The tanks are specified as double-wall for containment and they would be connected to the power equipment shelter via dual containment piping (with leak PermAlert Ultra series detection integrated into piping). Each site would also have one refueling platform over one tank. They would feature: • Steel Tank Institute design outer wall leak containment and leak detection sumps at each end of the tanks; • Overfill shutoff valve; • Overfill spill containment; • Overfill alarm audible to the operator; • Leak detection sensor in the sump; • Low-/high-level alarm sensor within the tank; and • Remote alarm reporting system that would report to off-site operators.
Piping	N/A	Piping between the tanks and the equipment shelter would feature the following: • All piping would be aboveground; • All piping would be spill-contained, double-wall piping; • Piping would be sloped toward the equipment shelter; • Any leaked fuel would be collected in a containment sump within the shelter; and • A liquid sensor within the sump would transmit an alarm to off-site operators.
Spill Response Kit	N/A	Spill response materials would be kept on site to support maintenance operations. These would include (at a minimum) sorbent pads, boom, granular sorbent, and disposal drum.
Staging Areas	**Staging Areas**	**Staging Areas**
For Otter Creek Tower Site	N/A	Material barge would stop at a private property at Klikitarik Bay on Norton Sound to offload shelters and fuel tanks. A heavy-lift helicopter would fly these items to the site. A light-lift helicopter would deliver some equipment and the crews to install these facilities. The remainder of equipment, fuel, and crew would be delivered from Unalakleet.
For Golovin Alternate Tower Site	N/A	Material barge would stop in Golovin and offload all materials. See Table 2-4 for helicopter and flight totals and Table 2-5 for approximate schedule.
Source: Unicom Microwave Repeater Development Plan, February 9, 2012.		

Helicopter support operations for construction, annual maintenance, and annual refueling are summarized in Table 2-5. The Erickson Air Crane is a “heavy-lift” helicopter that is utilized to transport the pre-fabricated modules and fuel tanks. In the case of the Otter Creek tower site, four heavy-lift flights and approximately four light-lift flights would occur from the Klikitarik Bay staging area on Norton Sound. The remainder of the flights would originate out of Unalakleet. For the Golovin Alternate tower site, all helicopter flights would stage from Unalakleet as noted above.

The Hughes 500-E or Robinson R-44 helicopter would be employed to move personnel and light equipment and supplies throughout the five-month construction period. The Bell UH-1H Huey would be used to ferry most of the equipment and building materials, primarily during June and July. The Erikson Air Crane would be used to lift the pre-fabricated power module shelter and communications equipment shelter during late June and early July.

Table 2-5. Alternative 1: Helicopter Construction and Operations Support – Number of Trips Summary

	Construction	Construction	Construction	Annual Maintenance[a]	Annual Refueling
	Erickson Air Crane (heavy-lift)	Bell UH-1H Huey	Hughes 500-E or R-44 helicopters	Hughes 500-E or R-44 helicopters	Bell UH-1H Huey
Otter Creek Tower Site	4	60	30-40	2	14
Golovin Alternate Tower Site	4	60	30-40	2	14

a) Additional trips may be necessary for emergency maintenance.
Source: Gill, 2011 personal communication.

Figure 2-5. Alternative 1 – Example of Remote Repeater Tower Site, Caribou Saddle (TERRA-SW Project 2011)

During the operations period, the proposed maintenance and refueling flights would occur four to five days per site per year. Taking the two microwave repeater sites together, during the operations period, a total of 48 flights would take place over a period of 12 to 15 days each year. Maintenance and refueling flights would originate from Grayling for the Otter Creek tower site and from Unalakleet for the Golovin Alternate tower site. Each trip would transport 500 gallons of diesel fuel, taking the safest direct route to the tower sites. The construction season schedule is summarized in Table 2-6.

Table 2-6. Alternative 1: Microwave Tower Construction Schedules

Timing	Activity
May	Mobilization.
Early June	Tower camp construction and foundation installation.
Late June to Early July	Tower erection and transport of prefabricated shelters and fuel tanks to the site.
July	Antenna, fuel piping (between power module and tanks), battery installation and initial startup of the site. Fuel transportation and tank filling is expected at this time.
August to September	Communications equipment installation (in the communications shelter), link commissioning (between sites) and site commissioning. Staging yards clearing, cleanup, and remediation / revegetation.
October	Final punch list and acceptance.
Source: Unicom Microwave Repeater Development Plan February 9, 2012.	

2.2 No Action Alternative – Alternative 2

Under the No Action Alternative, BLM would not grant ROWs and the existing telecommunications and satellite Internet service would continue or Unicom would have to seek other alternatives not involving federal public lands. Satellite-based service may continue for the foreseeable future, incurring higher delays in connectivity and lower reliability. The existing telecommunications infrastructure would not provide the means for proposed improvements in health care providers (telemedicine), more effective educational services (distance education), expanded access to governmental, tribal, and non-profit entities, or improved Internet speed for residential users and commerce.

2.3 Hill 2211 Repeater Site – Alternative 3

Under Alternative 3, the Golovin Alternate microwave tower site would be replaced by a tower on a summit approximately 12 mi. north and east of Golovin, termed Hill 2211 for its elevation (see Figure 2-3). The site is located on BLM land and was identified as a potential alternative location in the Unicom initial review and again in internal agency scoping. A communications tower funded by the Norton Sound Economic Development Corporation currently occupies this site, and this offers the potential to co-locate the new microwave repeater tower with an existing facility. This site would not be in the viewshed of the modern or historic alignments of the Iditarod NHT.

Construction and maintenance activities associated with the Hill 2211 tower site would be similar to the Golovin Alternate and Otter Creek tower sites indicated in Alternative 1 (Section 2.1.1). The tower location and helicopter transit routes for construction are shown in Figure 2-6. Construction activities would affect a temporary footprint of 225,000 sq. ft. (5.15 acres) as shown in the representative site plan in Figure 2-4. However, following construction, and through the operational life of the project (20 years), the footprint would consist of the 0.69-acre area under long-term lease as described in Table 2-4. This includes a helicopter landing area that would be used four to five days per year. The permanent facilities would occupy an excavated footprint of 0.08 acres.

2.4 Kwiktalik Mountain Repeater Site – Alternative 4

Alternative 4 would site a microwave repeater tower at a location south and west of Golovin on a ridge in the Kwiktalik Mountains as the ridge approaches Cape Darby. The Kwiktalik Mountain tower site would replace the Golovin Alternate tower site and would be located on land privately held by the Golovin Native Corporation (Figure 2-6). As a result, under this alternative, only one tower would be constructed on BLM-managed land, the Otter Creek repeater location. In addition, based on the line-of-sight and distances for this configuration, Alternative 4 would eliminate the need for the Reindeer Repeater tower site. In all, the resulting project would include one site on BLM-managed lands, along with four repeater towers and three community towers on non-federal lands.

As with Alternatives 1 and 3, the construction and maintenance activities for the Kwiktalik Mountain tower site would affect a temporary footprint under the construction lease of 5.15 acres, and a long-term lease area of 0.69 acres. However, since the Kwiktalik Mountain tower site is located on non-federal land, Alternative 4 would reduce by half the total of BLM-managed land affected by the project. Furthermore, the removal of the Reindeer Repeater tower site under Alternative 4 would reduce the total affected area, both federal and non-federal lands, by one tower site.

2.5 Project Design Features

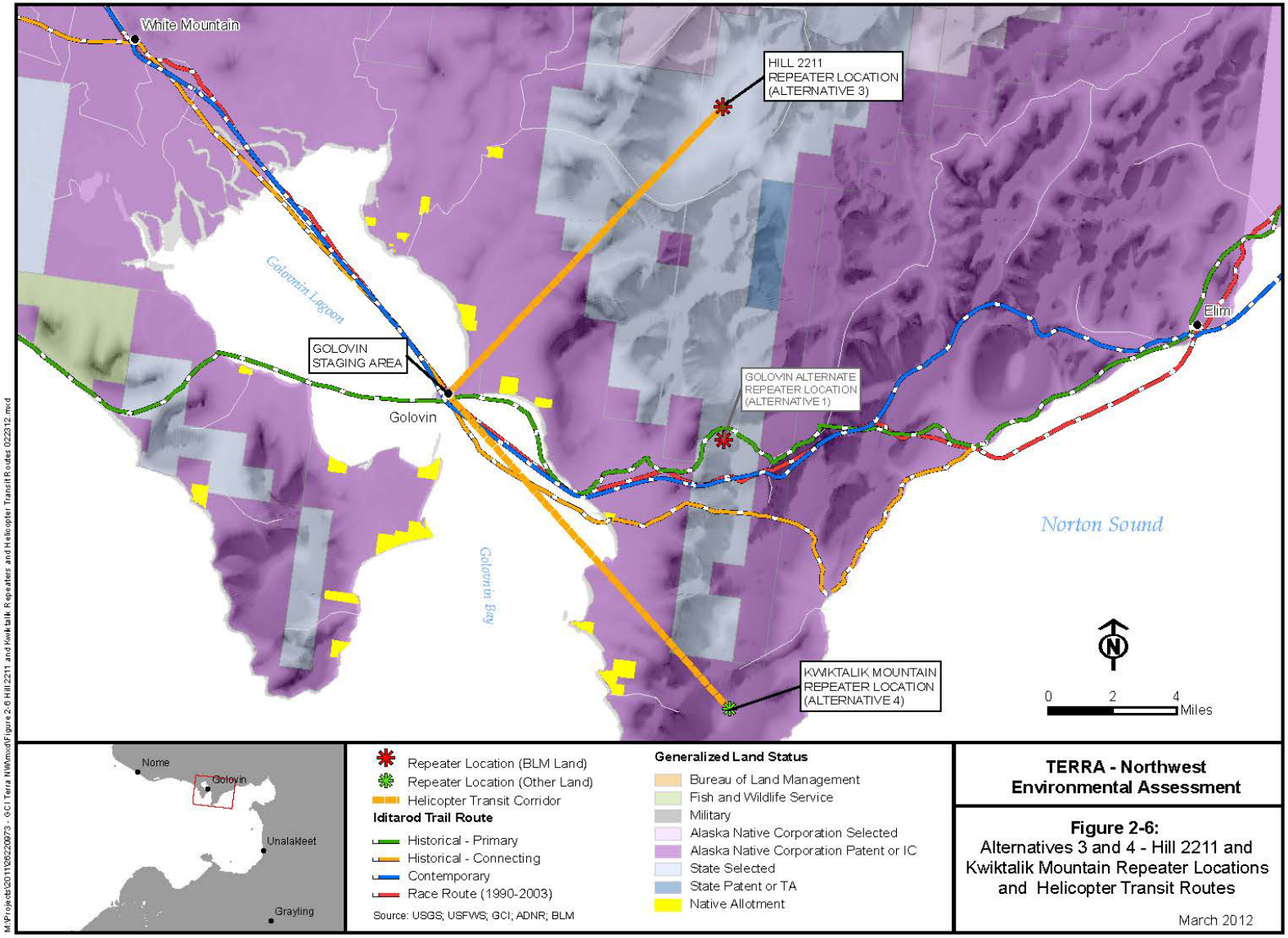
The proposed TERRA-NW Project includes many design features and operational plans to reduce impacts. The project design features summarized below are common to all action alternatives.

Table 2-7. Project Design Features

Air Quality - Fugitive Dust Control	Watering areas (as needed) to be disturbed during construction and excavation. Reduce vehicle speeds to 10 miles per hour in staging areas. Cover stockpiles of soil, sand, and other material.
Spill Prevention and Response	Project design includes secondary containment facilities. Detailed Spill Prevention, Control and Countermeasure Plan (SPCC) required as part of permit stipulations, for construction sites hazardous materials storage, helicopter fuel transportation, fueling operations.
Prevention of Invasive Plant Species	A monitoring and mitigation plan for invasive species will be developed in consultation with BLM. This plan will include: • Preventative measures in project design include power wash of materials and equipment prior to transit, along with mid-season inspection; • Use of native species in re-vegetation; and • Annual monitoring during annual site maintenance to ensure identification and rapid response to remove of invasive plants at remote tower sites, with reporting of results. The duration of the monitoring will be specified in the plan.
Erosion control	Operate under approved Storm Water Pollution Prevention Plan (SWPPP) to control erosion at tower sites.
Disturbance to Wildlife	Helicopters are to travel at altitude of 1,500 ft. During the operations period of the project, helicopter flights for refueling the microwave repeater sites will be limited to a period outside of the intensive hunting, fishing, and recreation activities, estimated at mid-May to mid-October. The seasonal window for helicopter-supported refueling will reduce the impacts on wildlife. During construction, food would be stored in 55-gallon drums and would be transported off-site for disposal, then transported back empty. All camp and construction waste would be contained in drums or large, commercial trash bags and would be removed from the site periodically. The trash bags would be used for dry garbage (plastic, wood pieces, etc.) and would be secured from the wind with cargo nets while awaiting transport. These measures would deter wildlife such as bears from accessing garbage or food at the proposed tower sites, although attraction may still occur, and would also minimize dangerous interactions or ingestion that could injure or kill wildlife.
Bird mortality	Design features, including 60 ft. height, lack of guy wires, and lack of tower lighting reduce risk of bird mortality. Lights used during construction or operational maintenance should be downturned. Conduct bird mortality surveys at tower sites, including monitoring of spectacled eider mortalities.
Disturbance to Marine Birds	Project plans call for initial mobilization of supplies in Klikitarik Bay, and Unalakleet in late May. Minimize disturbance of spectacled eider during its aggregation to molt in eastern Norton Sound near Shaktoolik between July and October. Conducting helicopter-supported refueling from Unalakleet and Grayling in July will reduce impacts on marine birds.
Disruption to Recreation	Coordinate with guided fishing and hunting operations to inform about the construction season activities, so they can consider alternate locations. Conducting helicopter-supported refueling activities in July will reduce impacts on hunting, fishing, and recreation activities.
Visual Impacts	Paint the tower, facilities, structure, and fuel tanks with a paint that is matte, non-reflective or light absorbing finish to reduce reflection. Antenna covers would also use a non-reflective color scheme. While paint would be used for the proposed Golovin Alternate repeater.

Cultural Resources Impacts	Prior to ground-disturbing construction, field surveys and documentation would be conducted on unsurveyed sites. If cultural resources are inadvertently discovered during construction, work would be stopped and the cultural resources assessed and impacts mitigated.
Impacts from Construction Camps	Construction personnel would be required to keep the camp area clean, including waste disposal and erosion control. Personnel would not be allowed to use all-terrain vehicles outside of the construction lease area.
Public Safety	The installation of a cellular tower at Golovin Alternate Repeater would provide emergency telecommunication capabilities to an area that experiences winter (snowmachine) travel.

Figure 2-6. Alternative 3 and 4 – Hill 2211 and Kwiktalik Mountain Repeater Locations and Helicopter Transit Routes



2.6 Alternatives Considered, but Eliminated from Detailed Analysis

The following alternatives were considered, but were ultimately eliminated from further analysis. The rationale for elimination is provided following the description of the alternative considered.

2.6.1 Buried Fiber-Optic Installation along the Nome-Council Road

To reduce the number of towers sites, Unicom examined a possible fiber-optic cable component of the TERRA-NW Project that would be installed along the Nome-Council Road alignment, starting with a tower at Skookum Pass on state land. The fiber-optic cable segment from Skookum Pass to Nome would have consisted of three segments:

1. From Skookum Pass to Solomon, the cable would be mounted on poles;
2. From Solomon to the western limit of Safety Sound, including BLM-managed and Alaska Maritime National Wildlife Refuge lands, the fiber-optic cable would be buried; and
3. From the western limit of Safety Sound to Nome, the cable would again be mounted on poles.

The underground portion of the fiber-optic cable would be installed underground along the Nome-Council Road, through plowing or trenching. A fiber-optic cable would be blown into the conduit after the conduit is installed underground.

Unicom submitted an application to the BLM for the proposed buried fiber-optic cable along the Nome Council Road (case file AA-093051) in July of 2011. A portion of the buried fiber-optic cable was located on lands that were withdrawn by Public Law 96-487 for inclusion in the Alaska Maritime National Wildlife Refuge (Bering Sea Unit) managed by the United States Fish and Wildlife Service (USFWS) and a portion was on lands managed by BLM. On January 27, 2012, Unicom withdrew the application for the proposed buried fiber-optic cable.

This alternative was eliminated from further analysis due to the withdrawal of Unicom's application in addition to the presence of sensitive habitat for threatened and endangered species and significant archeological sites within the Safety Sound area.

2.6.2 Underwater Cable across Norton Sound

A submarine cable route connecting Shaktoolik to Nome would avoid BLM-managed land at the Golovin Alternate tower site, however, a cable of this configuration would fail to provide broadband Internet service to all of the intermediate communities in the Norton Sound region. In order to reach intermediate communities, the marine cable would need to be a "daisy chain" design with loops to each of the intervening communities or else microwave repeater towers would still be needed to carry the signal to provide service to the communities of Golovin, Elim, and White Mountain.

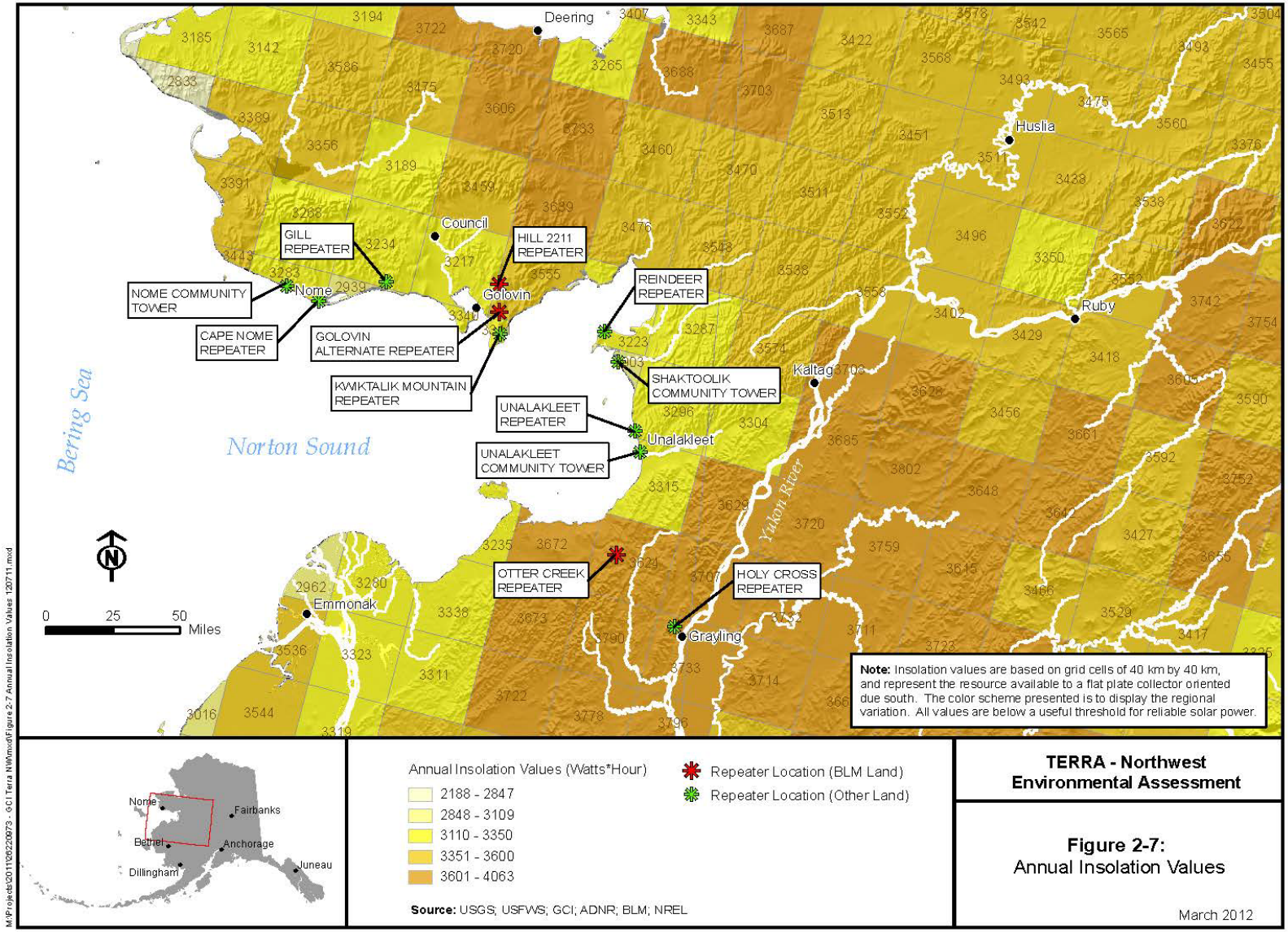
Due to the high risk of ice scouring at shoreline ingress and egress points, the high prevalence of storms and coastal erosion within Norton Sound (especially along southern coast lines), this alternative was found to be technically and economically infeasible. This alternative was eliminated from review using the same rationale presented in the TERRA SW EA (USFWS, 2011).

2.6.3 Alternative Power Sources to Reduce Carbon Footprint

The use of alternative fuels and renewable energy as a power source for the remote microwave repeaters would reduce the carbon footprint of the project, and potentially reduce the risk of spills of diesel fuel during refueling or routine operations. Alternative power sources were evaluated in detail as part of the recent environmental review of the TERRA-SW Project (USFWS, 2011). The evaluation was based upon the availability of adequate energy to meet module power needs, as well as the feasibility, reliability, and cost of installation, operations, and maintenance. The alternative power analysis in the TERRA-SW Project looked at propane, solar, and wind energy as standalone or supplemental power source alternatives to the diesel generator systems. Hydroelectric and geothermal renewable energy sources were not evaluated as they are highly site-specific and are not practical within the vicinity of the two proposed mountaintop tower sites. The major findings of the TERRA-SW Project are applicable to the TERRA-NW Project and can be summarized as follows:

- Use of propane fuel would result in some environmental benefits, including a longer shelf life, reduced emissions (particularly particulate matter and carbon monoxide), and quieter operation as compared to diesel fuel, however, a considerably greater volume of fuel would be required, necessitating a need for more storage capacity at the tower site and a correspondingly greater footprint. Otherwise, more frequent refueling trips would be necessary, and this would involve mobilizing the medium-lift capacity of the Bell UH-1B Huey helicopter from outside of the project area multiple times per year.
- Solar insolation values in the project area, as analyzed by the National Renewable Energy Laboratory, are slightly higher on the Norton Sound coast than in the an interior site like the Otter Creek tower site, as shown in Figure 2-7, however, the values are extremely low compared to the annual requirement of approximately 68,492 kilowatt hours per year to power the communications modules. The values for the Otter Creek tower site and the Golovin Alternate tower site are 5.2 percent and 5.3 percent of the annual requirements, respectively. In addition, energy storage would require significantly larger batteries. Finally, current solar panel technology is more vulnerable to damage to extreme weather and icing conditions, and more frequent maintenance trips would be needed, beyond the planned twice-yearly schedule.

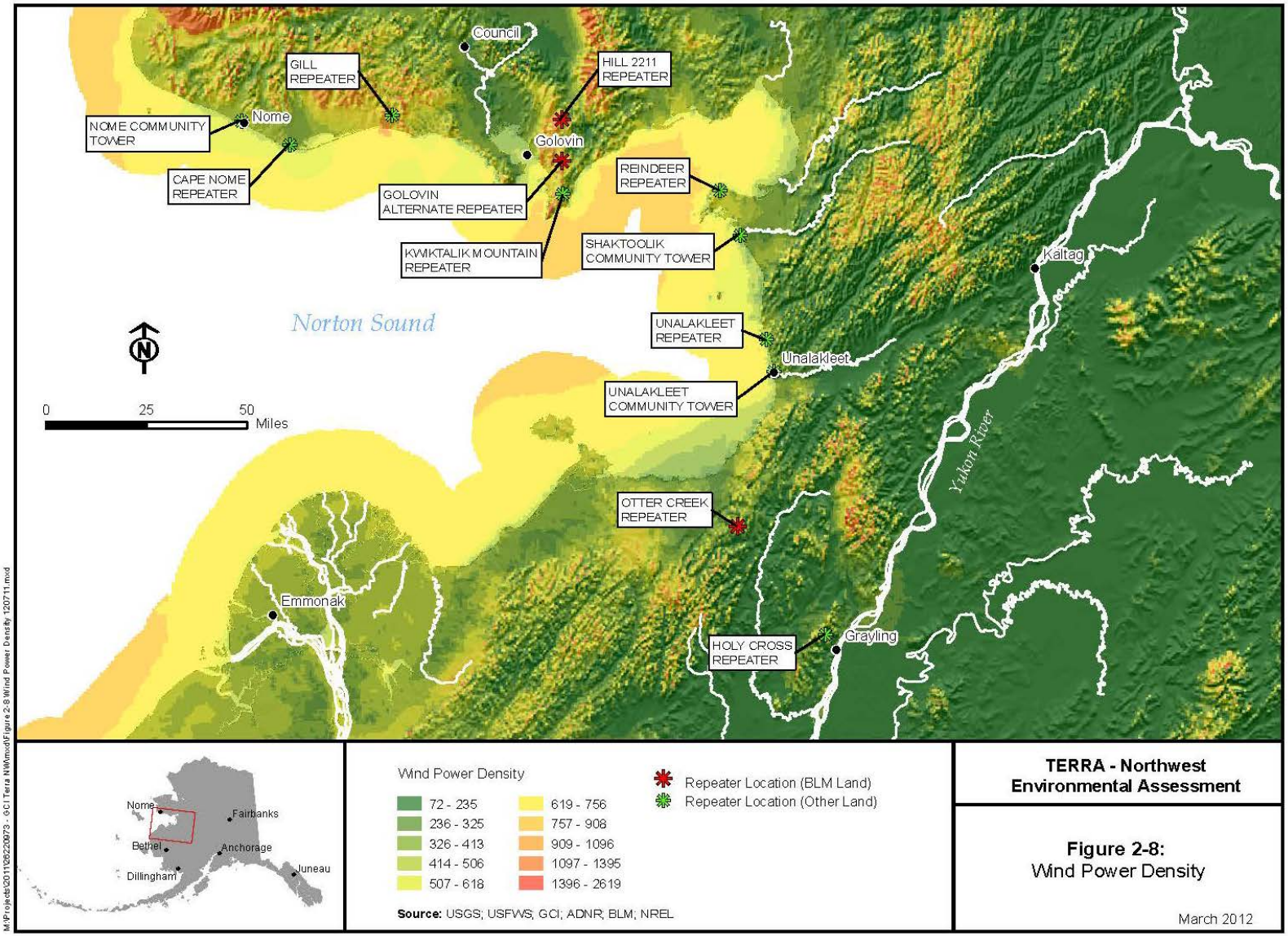
Figure 2-7. Annual Insolation Value



- Regional wind resource assessments indicated the average availability of wind as a power-generation source could provide the microwave repeater facility a power supply a majority of the time (see Figure 2-8), however, due to the requirements that telecommunications facilities operate at extremely high levels of reliability, with continuous power to meet load requirements, a backup diesel supply would be required in conjunction with wind power generation. Storage of excess power from the wind generators requires large batteries and sophisticated switching equipment to return to diesel generation during periods of low wind power production. Current technology is vulnerable to extreme weather and icing conditions, which are likely to damage equipment and to impede reliable output. Additional maintenance trips beyond the twice-yearly planned maintenance would be required. The increased cost of developing a wind power generation system, a backup diesel fuel system, and increased maintenance, could impact the affordability of the proposed telecommunications. The implementation of wind power generation would also likely increase impacts from avian collisions, and contribute to a larger degree of change to the aesthetic values of the viewshed around the towers. Therefore, this alternative was dismissed from further analysis.
- Alternative energy sources to supplement diesel, so-called hybrid systems, would also have the potential to reduce the quantity of diesel fuel required each year without degrading the reliability, or sacrificing continuous power. Hybrid solar and wind energy would introduce considerable technical complexity into synchronizing and switching the power source, in that the diesel generators would go to standby, while the alternative energy source provides power. At a remote, unstaffed site, with seasonally extreme weather, this technical complexity would result in a significant impact on stability and reliability of the power-generation system. In addition, both alternative energy sources are intermittent, and therefore significant battery storage capacity would be required. As with the use of solar power as the sole generation source, using solar power as a supplemental source poses significant risk due to wind loads at the remote mountaintop sites. Wind energy systems may be feasible at the sites although wind, weather, and icing conditions are not currently measured for the mountaintop sites.

Unicom plans to install weather stations at the two sites to measure wind speed, barometric pressure, precipitation, and air-water content. Unicom proposes to re-evaluate the potential for supplemental wind energy when sufficient site-specific data are available.

Figure 2-8. Wind Power Density



2.6.4 Overland Fiber-Optic Cable

An overland fiber-optic cable would supply service using a buried and pole-mounted fiber-optic cable between communities, without use of microwave signals transmitted through remote repeater towers and received by community towers. Over 300 mi. of cable would traverse rivers, anadromous streams, and wetlands on federal, state, and private lands instead of a few microwave repeater sites. Installation could occur in winter months for some portions to reduce environmental impacts. The overland alignment would traverse lands under many different ownership and management regimes. There is great topographic and climatic variability along the route that would make a fiber-optic cable extremely difficult to install from a technical perspective and at a current funding levels. The construction of microwave tower sites in lieu of an overland fiber system represents a sizable cost savings. At this time, an overland fiber-optic cable is economically infeasible due to the increased costs.

2.6.5 Expand the Use of the Satellite Network

Satellites provide the existing telecommunication services for the project area. In addition to voice service, satellites provide bandwidth-constrained Internet service to telemedicine and distance-learning providers, as well as residential and commercial end-users.

After analyzing the Norton Sound region's unmet and projected broadband Internet needs, Unicom determined that adequate satellite capacity is not currently available. The total satellite capacity is limited by the number of transponders built into currently operational satellites. It is not possible to add transponders to in-orbit satellites. The solution to increase capacity would be launching another satellite. This deployment is estimated at $230 million and requires a three-year construction and planning period.

In addition to high cost and limited available capacity, satellite technology generates a much greater delay or latency in the delivery of information from one place to another when compared to terrestrial options because the signal must travel to and from a geostationary satellite orbiting more than 22,300 mi. above the Earth. High-latency satellite networks require software applications, servers, and computer workstations to be specially tuned to achieve adequate performance or else data transfer suffers dramatically. Interactive applications such as telemedicine, distance education, and video conferencing suffer significantly in high-latency networks. Latency restricts data throughput speeds and limits use of bandwidth-intensive applications. Growth in telemedicine and distance learning within the project area and other rural areas of Alaska already threaten to overwhelm the existing satellite system.

Satellite latency would continue to be a problem since the latency is a product of basic physics and would deter the use of highly desired, modern applications. Therefore, enhancing the existing satellite network is not a feasible solution for providing broadband service in the Norton Sound region.

3.0 Affected Environment

This chapter defines the affected environment within the project area and the environment within a broader "region of influence" where the project may have environmental impacts. The baseline conditions of the affected environment are described, with fuller accounts of the resources identified as matters of concern by the public and agency specialists during the scoping meeting.

3.1 The Project Area

For the Proposed Action, the project area includes two microwave repeater tower sites on BLM-managed lands at Otter Creek (northwest of Grayling) and at the Golovin Alternative tower sites (northeast of Golovin), along with the associated staging areas at the mouth of the Klikitarik Bay on Norton Sound, Unalakleet, Nome, and Golovin, and the helicopter transit routes (see Figures 2-2 and 2-3). The Proposed Action would also include additional components, located on private lands, which are directly linked to the federal action, and include five repeater towers and three community towers (see Table 2-1). In the future, the TERRA-NW Project may include five additional community towers, which could be planned for construction as early as 2014, if funds become available (Table 2-1). These five additional community towers are analyzed as part of the cumulative effects.

The project area can be described in terms of the physical footprint of the project components under review in this EA, but potential impacts are not limited to the immediate vicinity of the project facilities. The term "region of influence" is used to refer to the geographic zone in which the project facilities or activities may have an influence or impact on a particular resource in the physical, biological, or social environment. The "region of influence" is not uniform across all resources. Impacts to soils (Section 3.2.2) may be limited to the area disturbed by construction, but impacts from a fuel spill (Section 3.2.4) within a wetland might extend throughout a portion of a watershed (Section 3.3.1). The affected environment is identified by resource in the individual resource discussions.

For biological resources, the effects of the project, such as helicopter and generator noise, could potentially affect a wildlife population, and the relevant "region of influence" could extend to the range of the species in question. Where the project components occupy a portion of the range of a migratory species, the impact analysis must consider the potential effect to the species across its range, and not just in the immediate vicinity of the facility. Further discussion on impacts to biological resources is found in Section 3.3 and an example of the range of the Western Arctic Caribou Herd (WACH) is provided in Figure 3-6.

Within the social environment the "region of influence" can also vary. For example, for cultural resources impacts can be defined by the Area of Potential Effect (APE), further described in Section 3.4.7.1. However, in the case visual resources management, impacts are assessed in relation to the viewshed (Figure 4-1; Figure 4-2), landscape character, and the sensitivity of the user to the visual intrusion (see Section 3.4.6). The project area can be described in compact terms, but the region of influence varies depending on the nature of the resource potentially subject to impacts. In the following sections, the region of influence is identified as appropriate to particular resources.

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3.2 Physical Environment

3.2.1 Meteorology and Air Quality

The microwave tower sites on BLM-managed lands are located within 14 mi. of the Norton Sound coastline. Other repeater tower sites, construction staging areas, and community tower sites would be installed on private land. A few of these locations extend further inland, to Grayling.

The project is located along the eastern and northern shores of Norton Sound with the northern shore lying along the Seward Peninsula. These regions experience a sub-Arctic climate with maritime influences when Norton Sound is ice-free, usually from May to October. Average summer temperatures range from 47 to 62 degrees Fahrenheit and winter temperatures average -4 to 11 degrees Fahrenheit. Extremes have been measured from -50 to 87 degrees Fahrenheit. This region is heavily impacted by storm systems which rotate northward into the Bering Sea, west of the project. Communities in this region receive between 14 and 19 in. of rainfall and approximately 40 in. of snowfall each year. These areas experience winds between 15 and 25 miles per hour throughout the year (Alaska Department of Commerce, Community and Economic Development [ADCCED], 2011; and Alaska Department of Environmental Conservation [ADEC], 2011).

The air quality in an area depends on a number of factors, including atmospheric conditions (local meteorology), the air pollutant emissions in the area (type of pollutant, rate, frequency, duration, exit conditions, and location of release), topography and size of the area, and the presence of pollutants transported from outside the area. Air quality in the project area is generally considered good due to minimal human habitation and very sparse industrial development (i.e., mining). Localized emissions include man-made sources of industrial, residential, and transportation-related emissions, as well as natural sources of windblown dust and volcanic ash, which contribute to temporary increases in air pollution. The quantity of mobile source emissions that affect air quality in a given area is a function of population density, distance to nearby traffic (primarily trucks, snowmobiles, 4-wheeler off-road vehicles (ORVs) and heavy-duty trucks), aircraft flight patterns, and the concentration of air pollutants resulting from such sources depends on weather conditions and topography. Pollution transported from Asia is a factor under certain circumstances and seasons.

Alaska's air monitoring program focuses on five of the seven criteria pollutants regulated through the National Ambient Air Quality Standards (NAAQS): Carbon monoxide, coarse particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), ozone (O_3), and lead (Pb) (ADEC, 2011). The air quality in the proposed project areas is classified as unimpaired, with no major stationary or mobile sources that affect local air quality. ADEC's Division of Air Quality does not maintain air monitoring activities in this area of Alaska.

The two microwave repeater tower sites located on BLM-managed land would be in undeveloped areas where the only potential emissions are expected to be from natural sources, temporary construction activity, and operations equipment. Construction activities would require the use of three types of helicopters for transporting materials from the staging areas for the proposed sites, as described in Table 2-4.

Operations equipment at each of the two repeater sites would consist of two generators contained in the power module shelter. Both generators would be Cummins D1703-M (model DSKAA – 9-kW) diesel generators and each would be outfitted with a hospital-grade silencer. Fuel would be supplied to the generators by two 4,500-gallon fuel tanks at each site, which would have the capacity to store up to 9,000 gallons of diesel. The generators are projected to consume 7,000 gallons of ultra-low sulfur diesel #1 per year. Annual resupply (refueling) of diesel fuel to each of the two microwave repeater sites would be by helicopter (Bell UH-1H Huey), and approximately 14 round-trip flights would be required for refueling (Table 2-4), with the refueling effort lasting 2 to 3 days per site. Annual maintenance trips would use Hughes 500-E or R-44 helicopters for two trips to each microwave repeater site (Table 2-4). Since a majority of the lands around the two microwave repeater sites are sparsely populated, low existing ambient air quality levels would be expected throughout the project area.

The project area itself is in attainment with the NAAQS and is categorized as a Class II area. Areas throughout the United States are categorized by the U.S. Environmental Protection Agency (EPA) as Class I, Class II, or Class III with these designations corresponding to the permissible degree of further air quality deterioration that will be allowed to occur after a baseline date. Areas that meet the NAAQS are designated as “attainment” areas. “Unclassifiable” areas for which measurements were not made are assumed to be in attainment and are assigned Class II status by default.

3.2.2 Geology and Soils

The following section describes the topography, geology, and soils at the four planned microwave repeater tower site locations – Otter Creek, Golovin Alternate, Hill 2211, and Kwiktalik Mountain

3.2.2.1 Regional Physiography

The Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites are located within the Seward Peninsula physiographic province (Wahrhaftig, 1965). The Otter Creek tower site is located within the Nulato Hills physiographic sub-province of the larger Western Alaska physiographic province.

The Seward Peninsula is approximately 200 mi. wide in an east-west direction, and 140 mi. long in a north-south direction and is bordered on the north by Kotzebue Sound, on the south by Norton Sound, on the east by the Kobuk-Selawik and Buckland River lowlands, to the northwest by the Chukchi Sea, and to the west by Bering Strait. The Seward Peninsula physiographic province consists of an extensive upland area with interior basins and coastal lowlands. The uplands portion ranges from mainly broad-sloping hills up to 2,000 ft. in altitude; isolated groups of glaciated peaks below 4,700 ft. in elevation are concentrated in the south (Wahrhaftig, 1965). Interior basins are drained through narrow canyons which cut the uplands, transitioning into meandering streams which cross the lowlands to the ocean. The Seward Peninsula has no glaciers and the entire peninsula is underlain by continuous to discontinuous permafrost (Ferrians, 1965). Periglacial erosional processes predominate and ice-wedge polygons are common. The lowlands have numerous thaw lakes.

The Nulato Hills are approximately 250 mi. long in a northeast-southwest direction, and 50 mi. wide in an east-west direction and are bordered on the north by the Buckland River Lowlands, on the south by the Yukon-Kuskokwim Coastal Lowlands, on the east by the Innoko Lowlands, and to the west by Norton Sound (Wahrhaftig, 1965). The Nulato Hills consist of north-east trending ridges with rounded summits and gentle slopes. The elevation of ridges ranges from 1,000 to 2,000 ft. above mean sea level (msl). Streams on the east side of the ridges flow to the Yukon River and those on the west side flow to Norton Sound. Major stream courses are eroded along northeast-trending fault zones. Thaw lakes are localized within the lower elevation valleys. The Nulato Hills have no glaciers and the entire sub-province is underlain by permafrost (Wahrhaftig, 1965; and Ferrians, 1965).

The Golovin Alternate, Hill 2211, and Kwiktalik Mountain sites are found within the U.S. Geological Survey (USGS) Solomon 1° x 2° topographic quadrangle (scale 1:250,000). The Otter Creek tower site is within the USGS Unalakleet 1° x 2° topographic quadrangle (scale 1:250,000).

3.2.2.2 Otter Creek Tower Site Geology and Soils

The Otter Creek tower site is located north of Otter Creek in the southwest portion of the USGS Unalakleet (B-4) 15-minute topographic quadrangle at the top of a ridge at an elevation of 1,721 ft. above msl. At the proposed tower site the bedrock consists of Cretaceous-age sedimentary rocks (Patton and Moll-Stalcup, 1996; and Patton and others, 2009). The sedimentary rocks are part of the Lower Yukon sub-basin of the larger Yukon-Koyukuk Sedimentary Basin. The Yukon-Koyukuk Sedimentary Basin is a broad depression that is bordered on the north by the

Brooks Range, to the south by the Kuskokwim and Yukon rivers, to the west by Kotzebue Sound, Seward Peninsula, and Norton Sound, and to the east by the Yukon-Tanana Uplands and Tanana-Kuskokwim Lowlands. The sedimentary rocks at the tower site consist of fluvial and shallow-marine deltaic facies sandstone, shale and conglomerate, and consist of well-sorted, medium to coarse-grained, light olive-colored, cross-bedded sandstone, fine- to medium-grained, dark-gray to green silty sandstone, dark-gray micaceous shale, and quartz-chert-pebble conglomerates (Patton and Moll-Stalcup, 1996).

The Cretaceous sedimentary rocks are strongly folded and broken by north-northeast trending normal faults (high-angle). North of the proposed microwave repeater station is the well-defined Kaltag Fault; a strike-slip fault that can be traced from Norton Sound eastward to the center of Alaska (Patton and Moll-Stalcup, 1996; Patton and Hoare, 1968; Patton, 1973; and Patton and others, 2009). To the east of the tower site are the Anvik Fault and the Chiroskey Fault Zone. The Chiroskey Fault Zone and Anvik Fault separate the Cretaceous sedimentary rocks with the Jurassic-age Koyukuk lithotectonic terrane that dominates the Chiroskey topographic high (Patton and Moll-Stalcup, 1996; and Patton and others, 2009) to the east.

In September 2011, Golder Associates conducted a geotechnical site investigation in support of the TERRA-NW Project. The site investigations included advancing one exploratory boring to a depth of 41 ft. below ground surface (bgs). Groundwater was not encountered during advancement of boring OTR-CRL-REP-1. A thin surface root mat underlain by organic silt and weathered and fractured sandstone bedrock was reported from 0.5 ft. to 7 ft. bgs. Competent sandstone bedrock was reported from 7 ft. to 41 ft. bgs. Ice was encountered in the borehole at a depth of 13 ft. bgs (Golder Associates, 2011a).

Soils within Otter Creek area are classified as *Pergelic Cryumbrepts – Histic Pergelic Cryaquepts*, very gravelly, hilly to steep association. *Histic Pergelic Cryaquepts* are poorly drained soils on lower hillsides and steep north-facing slopes. They formed in glacial till or colluvium deposits under a cover of sedges, mosses, and low shrubs. The soils have a thick peaty surface mat of organic matter underlain by gray, very gravelly loam or sandy loam (National Cooperative Soil Survey, 1979).

3.2.2.3 Golovin Alternate Tower Site Geology and Soils

The Golovin Alternate tower site is located east of McKinley Creek in the southern half of the USGS Solomon (C-2) 15-minute topographic quadrangle at an approximate elevation of 1,048-ft. above msl in the Kwiktalik Mountains. At the proposed tower site, Late Cretaceous-age igneous rocks of the Kachuaik pluton are exposed at the surface. The Kachauik Pluton rocks include a light-colored, medium- to coarse-grained, granodiorite and monzonite sequence, and a medium to coarse-grained monzonite and syenite sequence (Miller and others, 1972; Robinson and Stevens, 1984; and Reger, Stevens, and Smith, 2003). The Kachauik Pluton granodiorite and monzonite sequence makes up the north-south trending ridge where the planned tower site is located. Robinson and Stevens (1984) mapped several high-angle normal faults in the Darby Mountains roughly 15 mi. to the northeast from the Golovin Alternate tower site.

In September 2011, Golder Associates conducted a geotechnical site investigation in support of the TERRA-NW Project. Cobbles and boulders up to 4 ft. in diameter were reported as dense clusters on the surface around the proposed tower area. The site investigation included advancing two exploratory borings to depths of 41 and 35 ft. bgs. Groundwater was encountered at 13.5 ft.

bgs and 12.5 ft. bgs upon completion of borings GLV-ALT-REP-1 and GLV-ALT-REP-2, respectively. Weathered and frost-fractured granitic bedrock rubble/boulders were reported from 0.5 to 5 ft. bgs in both boreholes. Moderately fractured granitic bedrock was reported from 5 ft. to the total depth of each boring (Golder Associates, 2011b).

Soils within the Golovin Alternate tower site are classified as *Pergelic Cryaquepts-Pergelic Cryorthents* very gravelly, hilly to steep land association. *Pergelic Cryaquepts-Pergelic Cryorthents* consist of well-drained soils formed in colluvial material derived from local rock on high ridges and rocky peaks (National Cooperative Soil Survey, 1979). Within each of the two borings advanced by Golder Associates in September 2011, a thin organic mat overlaid the weathered and frost-fractured granitic rubble (Golder Associates, 2011b).

3.2.2.4 Hill 2211 Tower Site Geology and Soils

The Hill 2211 tower site is located east of the Kachauik River and Eagle Creek in the northern half of the USGS Solomon (C-2) 15-minute topographic quadrangle at an approximate elevation of 2,211-ft. above msl. At the proposed tower site, Late Cretaceous-age igneous rocks of the Kachuaik pluton are exposed at the surface. The Kachauik Pluton rocks at this location include a dark-colored, medium to coarse-grained monzonite and syenite sequence (Miller and others, 1972; Robinson and Stevens, 1984; and Till and others, 1986). The Kachauik Pluton monzonite-syenite sequence makes up the north-south trending ridge where the planned tower site is located.

Soils within the Hill 2211 tower site are classified as Rough mountainous land-*Lithic Cryorthents* very gravelly, hilly to steep land association. *Lithic Cryorthents* consist of well-drained, gray soils that are shallow over bedrock and occur on steep side slopes and low ridges (National Cooperative Soil Survey, 1979).

3.2.2.5 Kwiktalik Mountain Tower Site Geology and Soils

The Kwiktalik Mountain tower site is located east of Golovin Mission in the southern half of the USGS Solomon (B-2) 15-minute topographic quadrangle at an approximate elevation of 1,707-ft. above msl in the Kwiktalik Mountains. At the proposed tower site, Precambrian to Mesozoic-age migmatite rocks are exposed at the surface. The migmatite rocks are lithologically similar to pelitic schist and gneiss and are intermixed and partially assimilated by granitic rock (Miller and others, 1972; Robinson and Stevens, 1984; and Till and others, 1986). The migmatite rocks makes up the southern portions of the north-south trending ridge of Cape Darby where the planned tower site is located.

Soils within the Kwiktalik Mountain tower site are classified as *Pergelic Cryaquepts-Pergelic Cryorthents* very gravelly, hilly to steep land association. *Pergelic Cryaquepts-Pergelic Cryorthents* consist of well-drained soils formed in colluvial material derived from local rock on high ridges and rocky peaks (National Cooperative Soil Survey, 1979).

3.2.3 Hydrology

The following section presents the data available regarding the surface and groundwater hydrology, and water quality at the four proposed microwave repeater site locations – Otter Creek, Golovin Alternate, Hill 2211, and Kwiktalik Mountain

3.2.3.1 Regional Hydrology Overview

The Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites are located within the Seward Peninsula region of northwest Alaska. The Otter Creek tower site is located within the Nulato Hills of west central Alaska.

Water resources of the Seward Peninsula consist largely of surface water streams, lakes, and ponds, while groundwater and springs are generally limited. Climate and permafrost are the dominant factors limiting water availability. Because winters are long, most streams and lakes are frozen for much of the year. Generally the region is snow covered from October to May. A little less than half of the total annual precipitation occurs as snow during the winter months. Snowmelt is a dominant factor in Arctic hydrology because it contributes the majority of the annual runoff from lakes and streams. The occurrence of groundwater in Alaska is allied to the geologic and physiographic framework and is influenced by the presence or absence of permafrost. The thickness of permafrost on the Seward Peninsula has been reported to depths of 300-ft. bgs (Dorava, 1995a). The lack of significant groundwater development within the Seward Peninsula is due largely to the presence of permafrost.

While hydrologic data for the Seward Peninsula is sparse, all streams share somewhat unique stream flow characteristics. Flow is generally limited to nonexistent most of the winter. Stream flow begins in late May or early June as a rapid flood event termed “breakup,” which combined with ice and snow-damming, can inundate extremely large areas in a matter of days. More than half of the annual discharge for a stream can occur during a period of several days to a few weeks (BLM, 2008a). Most streams continue to flow throughout the summer but at relatively low discharges. Runoff is confined to the upper organic layer of soil. Rainstorms sufficient to cause flooding are generally limited to rivers that originate in the foothills of higher altitude peaks.

The Nulato Hills consist of northeast-trending ridges, and streams on the east side of the ridges flow to the Yukon River and those on the west side flow to Norton Sound. Major stream courses are eroded along northeast-trending fault zones and valley heads are generally connected by low passes along the faults (Wahrhaftig, 1965). Snowmelt and rainfall runoff supply most of the water in the streams of the region. During late May or early June, discharge increases in local streams and increases again during heavy rainfall in late summer or early fall (Dorava, 1995b).

3.2.3.2 Otter Creek Tower Site Hydrology

The Otter Creek tower site would be located north of Otter Creek at the top of a ridge at an elevation of 1,721-ft. above msl. The Otter Creek tower site would lie west of the Anvik River and east of the Golsovia River. Otter Creek flows into the Anvik River to the east. The Anvik River empties into the Yukon River to the southeast, and the Golsovia River empties into Norton Sound to the north. Otter Creek lies approximately 2.5 mi. south of the Otter Creek repeater tower site.

The Anvik River, Golsovia River, and Otter Creek are identified as anadromous streams by the Alaska Department of Fish and Game (ADFG) (2011a). The unnamed streams east and west of the ridge where the proposed Otter Creek tower site would be located are also identified as anadromous streams. This tower site would lie at the top of a ridge that hosts the northernmost reaches of the Otter Creek watershed. The Otter Creek tower site would lie within the USGS Anvik River Hydrologic Unit-19040801. Flow discharge rates for Otter Creek were not available for review. The annual mean flow discharge rate for the Anvik River is 2,294 cubic feet per second (USGS, 2011a). There are no real-time discharge stations within Hydrologic Unit 19040801 in the area of the Otter Creek tower site (USGS, 2011a).

In September 2011, Golder Associates conducted a geotechnical site investigation in support of the TERRA-NW Project. Groundwater was not encountered during advancement of an exploratory boring to a depth of 41 ft. bgs at the site (Golder Associates, 2011a). Water quality information for the Anvik River Hydrologic Unit 19040801 in the area of Otter Creek was not available for review.

3.2.3.3 Golovin Alternate Tower Site Hydrology

The Golovin Alternate tower site would be located east of Golovnin Bay in the Kwiktalik Mountains at an approximate elevation of 1,048 ft. above msl. The primary surface waterbodies near the Golovin Alternate tower site are Golovnin Bay, McKinley Creek, and the Kwiniuk River. The Golovin Alternate tower site would lie between McKinley Creek to the west and Kwiniuk River to the east and northeast. McKinley Creek empties into Golovnin Bay and the Kwiniuk River empties into Norton Bay at Moses Point. The confluence of Bryan Creek with McKinley Creek is approximately 1-mi. upstream from the mouth of McKinley Creek where it enters into Golovnin Bay. The mouth of McKinley Creek is identified as an anadromous entry. The Kwiniuk River and all of its tributaries are identified as anadromous streams (ADFG, 2011a).

Figure 3-1. McKinley Creek emptying into Golovnin Bay. Rocky Point is in background.
Photo by Loskutoff (URS) June 29, 2011

The Golovin Alternate tower site would lie among a topographic divide trending roughly north-south that hosts the uppermost reaches of both the Kwiniuk River and McKinley Creek watersheds. The Golovin Alternate tower site would lie on the boundary of two identified USGS Hydrologic Units: Nome Hydrologic Unit-19050104 to the west and Norton Bay Hydrologic Unit-19050103 to the east. Flow discharge rates for McKinley Creek and the Kwiniuk River were not available for review. There are no real-time discharge stations within Hydrologic Units 19050104/19050103 in the area of the Golovin Alternate tower site (USGS, 2011b/c).

In 1970, the USGS Water Resources Division-Alaska District conducted a study of water resources of the Golovin Area (Weeks, 1970). At that time, most of the water used by the village was obtained from Cheenik Creek at a point above the tide-affected reach of the creek. An inventory of wells, pits, and depressions was made to determine the availability of groundwater at Golovin. Five groundwater samples were collected for chemical water-quality analysis and biological contamination. The results of the inorganic anion and cation analysis indicated either calcium- or sodium bicarbonate-type water, however, the biological analysis indicated that the water required boiling or treatment before drinking (Weeks, 1970).

In 2004, the Water and Environmental Research Center (WERC) at the Institute of Northern Engineering of the University of Alaska-Fairbanks began several multi-year and multi-village water resource and water quality studies throughout the Seward Peninsula (WERC, 2004). The City of Golovin municipal water supply comes from an infiltration gallery on Cheenik Creek that is piped 5 mi. south to the community (WERC, 2006). The city has nearly one million gallons of storage between the school storage tank (350,000-gallons) and the city's main storage tank (600,000-gallons). Some Golovin residents have piped water, some have water delivered, and some collect their own water.

In September 2011, Golder Associates conducted a geotechnical site investigation in support of the TERRA-NW Project. Groundwater was encountered during advancement of two exploratory borings at a depth of 12.5 and 13.5 ft. bgs. Ice was observed in each borehole approximately 2.5 ft. lower than the groundwater depth intervals reported (Golder Associates, 2011b). Water quality information for the Hydrologic Units 19050103/19050104 in the area of the Golovin Alternate was not available for review.

3.2.3.4 Hill 2211 Hydrology

The Hill 2211 tower site would be located east of the Kachauik River at an approximate elevation of 2,211 ft. above msl. The primary surface waterbodies near the Hill 2211 tower site are Eagle Creek and the Kachauik River. The Hill 2211 tower site would lie between Eagle Creek to the west and headwaters of the Kwiniuk River to the east. Eagle Creek and the Kachauik River empty into Golovnin Bay and the Kwiniuk River empties into Norton Bay at Moses Point. The confluence of Eagle Creek with the Kachauik River is approximately 7-mi. upstream from the mouth of Kachauik River where it enters into Golovnin Lagoon. The Kachauik River and Eagle Creek are identified as an anadromous streams. The Kwiniuk River and all of its tributaries are identified as anadromous streams (ADFG, 2011a).

The Hill 2211 tower site would lie among a topographic divide trending roughly north-south that hosts the uppermost reaches of the Kachauik River and Eagle Creek watershed on the west and the Kwiniuk River watershed to the east. The Hill 2211 tower site would lie just west of the boundary of two identified USGS Hydrologic Units: Nome Hydrologic Unit-19050104 to the west and Norton Bay Hydrologic Unit-19050103 to the east. Flow discharge rates for Eagle Creek and the Kachauik River were not available for review. There are no real-time discharge stations within Hydrologic Units 19050104/19050103 in the area of the Hill 2211 tower site (USGS, 2011b/c). Water quality information for Hydrologic Units 19050103/19050104 in the area of the Hill 2211 was not available for review.

3.2.3.5 Kwiktalik Mountain Hydrology

The Kwiktalik Mountain tower site would be located east of Golovnin Bay in the Kwiktalik Mountains at an approximate elevation of 1,707 ft. above msl. The primary surface waterbodies near the Kwiktalik Mountain tower site are Golovnin Bay, Norton Bay, and Norton Sound. The Kwiktalik Mountain tower site would lie between Golovnin Bay to the west and Norton Bay to the east. Four unnamed streams and Portage Creek empty into Golovnin Bay just west and northwest of the Kwiktalik Mountain tower site and Carson Creek empties into Norton Bay at the Portage Roadhouse northeast of the Kwiktalik Mountain tower site. The mouth of Carson Creek is identified as an anadromous entry (ADFG, 2011a).

The Kwiktalik Mountain tower site would lie among a topographic divide trending roughly northeast-southwest that hosts the uppermost reaches of both the Portage Creek and Carson Creek watersheds. The Kwiktalik Mountain tower site would lie on the boundary of two identified USGS Hydrologic Units: Nome Hydrologic Unit-19050104 to the west and Norton Bay Hydrologic Unit-19050103 to the east. Flow discharge rates for Portage Creek and Carson Creek were not available for review. There are no real-time discharge stations within Hydrologic Units 19050104/19050103 in the area of the Kwiktalik Mountain tower site (USGS, 2011b/c). Water quality information for Hydrologic Units 19050103/19050104 in the area of the Kwiktalik Mountain tower site was not available for review.

3.2.4 Hazardous Materials and Waste Management

3.2.4.1 Hazardous Materials

The microwave repeater sites have not been developed previously and encountering hazardous materials during construction is not likely. Items such as batteries, gasoline, and diesel fuel are considered potentially hazardous and need to be properly managed in both their use and disposal. Though not common in remote areas, these items are used in project area communities and are also found occasionally in campsites, emergency response camps and equipment, or recreation vehicles (snowmobiles, etc.).

The hazardous materials and facilities employed in implementation of the TERRA-NW Project are described in Section 2.1. Once built, these microwave repeater sites would be un-manned and resupply would occur only once per year under normal planned operations. Periodic aerial surveillance would visually inspect each microwave repeater site for potential problems or necessary unscheduled servicing. Each of the two mountaintop microwave repeater towers on BLM-managed lands would require the use of batteries and diesel fuel for continued operations. Annual refueling operations at each of the remote tower sites would involve helicopter transportation of 7,000 gallons of diesel fuel in an estimated 14 loads (500 gallons per load) over a period of 2 to 3 days. A similar schedule of helicopter flights would occur for the four remote repeater towers proposed for construction on private lands.

Extensive spill prevention, detection, and containment elements are included in the design of the fuel tanks and piping (see Table 2-3). In addition, detailed preventive measures, outlined in a Spill Prevention, Control, and Countermeasure (SPCC) plan would be prepared for each site. The plans would include procedures for containment of stored fuels, procedures and temporary containment for refueling equipment, transferring fuels, and moving fuels to and from storage locations. Spill response materials would be stored on site. All non-consumable materials such as batteries or petroleum products and lubricants would be collected and removed off site for proper disposal or recycling.

3.2.4.2 Facilities Safety

For construction at a remote site in Northwest Alaska, helicopter transport of equipment, materials, and the workforce will be necessary. Aircraft use incurs operational risks, and the Alaska accident risk is much higher than the national average. Rapid changes in weather patterns plus extremely rugged terrain are major contributors to the high Alaska accident rates. The Aircraft Owners and Pilots Association’s Air Safety Foundation determined that the national rate for general aviation aircraft accidents between 2004 and 2008 was 5.8 accidents per 100,000 flight hours. In Alaska, the accident rate was more than twice the national rate at 13.59 mishaps per 100,000 flight hours between 2004 and 2008. Not all accidents resulted in fatalities (Anchorage Daily News, 2010).

Helicopters have a higher incident rate. In 2004, the U.S. civil helicopter accident rate was 8.09 accidents per 100,000 flight hours. This compares to a general aviation accident rate of 6.22 accidents per 100,000 flight hours in 2004 (International Helicopter Safety Team, 2006). A query of the National Transportation Safety Board's aviation accident database identified 31 reported helicopter accidents in Alaska between January 1, 2006 and October 4, 2011, four included fatalities (National Transportation Safety Board, 2011).

3.3 Biological Environment

The discussion of the affected environment includes a description of the existing conditions at each tower site, in the vicinity of the sites. This section describes the wide variety of biological resources that are found adjacent to and in the vicinity of the proposed project facilities.

3.3.1 Wetlands and Vegetation

The Otter Creek and Golovin Alternative tower sites were visited during August of 2011 by OASIS Environmental, Inc. (OASIS) biologists who conducted vegetation and wetlands surveys. The objective of the survey was to create a baseline understanding of the vegetation present, identify and delineate wetlands if present, and document the occurrence of any invasive plant species within the project areas. Details on invasive and rare or sensitive species within the project area are provided in Sections 3.3.2 and 3.3.3, respectively.

Vegetation surveys and wetland determinations were conducted concurrently at the sites. The wetland determinations were performed according to the 1987 Corps of Engineers Wetland Delineation Manual (U.S. Army Corps of Engineers [USACE], 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region Version 2.0 (USACE, 2007). Vegetation surveys were conducted by establishing a representative 30-ft. (9-meter [m]) plot at each site and then identifying and documenting 80 percent or more of the plant species within the plot. Cover estimates, by species, were also documented. The entirety of each tower site was walked and surveyed for invasive and/or rare plant species, while select sites and areas directly adjacent to the roadway were surveyed for invasive or rare plants along the Nome-Council Road BLM tracts. A summary of the vegetation survey results can be found in Table 3-1.

Table 3-1. Vegetation Survey: Average Percent Cover by Species Normalized

Site	Otter Creek (OC1)	Golovin Alternate (GOL1)
Tree Stratum	absent	absent
Sapling/Shrub Stratum	Details below	Details below
Arctostaphylos alpina	absent	4
Dryas octopetala	22	absent
Empetrum nigrum	3	6
Ledum decumbens	absent	4
Loiseleuria procumbens	16	5
Salix planifolia	absent	absent
Salix phlebophylla	14	6
Spiraea Beauverdiana	absent	1
Vaccinium vitis-idaea	3	4

Site	Otter Creek (OC1)	Golovin Alternate (GOL1)
Herb Stratum	Details below	Details below
Carex Bigelówii	6	absent
Carex nesophila	absent	10
Juncus arcticus	absent	absent
Oxytropis nigrescens	8	absent
Poa glauca	absent	absent
Potentilla anserìna	absent	absent
Bare Ground	17	50
Other (e.g. mosses, lichen)	11	10

3.3.1.1 Otter Creek Tower Site

The Otter Creek tower site is located on a rounded ridge top at 1,705 ft. above sea level and approximately 14 mi. from Norton Sound (Figure 2-2). The site is located in the Nulato Hills Ecoregion of Alaska and the climate is best classified as moist polar. Permafrost is continuous and ranges from thin to moderately thick (Nowacki et. al., 2001).

The tundra rises gently from the coast to the site. The ridges in the area are relatively rounded, trending in a southwest/northeast orientation, and separated by broad shoulders or small drainages. The site itself is relatively flat with little to no micro-relief with a slope of one percent (approximate). The site is characterized by nearly continuous alpine dwarf-scrub vegetation or alpine tundra. Alternating patches of alders and open dwarf-scrub vegetation occupy the slopes below the site with alder thickets dominating the upper drainages of the area.

The site is dominated by dwarf shrubs (*Salix phlebophylla*, *Vaccinium vitis-idaea*, *Loiseleuria procumbens*, *Dryas octopetalis*, and *Empetrum nigrum*) and herbs (*Carex bigilowii* and *Oxytropis nigrescens*) with bryophytes (10 percent cover), lichen (*Cladina* sp.) (15 percent cover), and bare ground (10 percent cover) completing the ground cover composition. There are a few exposed cobbles and gravels (angular), but no bedrock features or scree slopes.

The site is relatively homogenous. A wetland determination point was established at the Otter Creek tower site. The site does not contain hydrophytic vegetation, hydric soils, or wetland hydrology and therefore does not meet USACE criteria as a wetland and no wetlands were observed in the immediate vicinity. No data is available from the USFWS National Wetlands Inventory (NWI) for the area of concern (USFWS, 2011b).

3.3.1.2 Golovin Alternate Tower Site

The proposed Golovin Alternate tower site is located 8 mi. east of the village of Golovin on a rounded ridge that is part of the Kwiktalik Mountains (Figure 2-3). The ridge roughly divides a large peninsula that extends into Norton Sound, with the repeater site approximately 5 mi. from the marine environment to both the east (Norton Bay) and to the west (Golovin Bay). The site itself is located on a rounded ridge that rises slightly from the surrounding ridge aspects. It is located at roughly 1,000 ft. above sea level with some of the surrounding mountains rising to more than 1,500 ft. The site is located in the Seward Peninsula Ecoregion of Alaska and the

climate is best classified as moist polar. Permafrost is continuous and ranges from thin to moderately thick (Nowacki et. al, 2000).

From the coasts, the tundra rises gradually to the site with willow and alder occupying the drainages and a mix of wet tundra, dwarf-scrub vegetation, and thickets of willow and alder in between. The site itself is a mix of dwarf-scrub tundra vegetation and angular cobbles and gravels (50 percent) and although the area is surrounded by wet tundra and sedge vegetation with shallow ponds (beneath the slopes of repeater site), the site is well-drained. The site slope is estimated to be between two to three percent. The vegetation is sparse (30 to 40 percent total ground cover) and is dominated by *Salix phlebophylla*, *Vaccinium vitis-idaea*, *Loiseleuria procumbens*, *Ledum decumbens*, *Arcostaphylos alpina*, *Carex nesophilia* and crust and fruticose lichens.

One wetland determination point was established at the Golovin Alternate tower site and the site passes the dominance test for hydrophytic vegetation, however, it does not contain indicators of hydric soils or wetland hydrology and therefore does not meet USACE criteria for wetlands. Although the proposed tower site is not located in wetlands, the site is located on top of a rounded ridge top that is surrounded by emergent and shrubby vegetation wetlands that exist in flat areas at the base of the slope. A mix of saturated freshwater scrub/shrub type wetlands exist to the south and west of the site and saturated to seasonally flooded freshwater emergent type wetlands exist to the north and east, based on review of the USFWS NWI (USFWS, 2011b) (Figure 3-2A) and field observations. The emergent wetlands are characterized by erect, rooted, herbaceous hydrophytes (e.g., sedges), usually dominated by perennial plants, while the scrub/shrub wetlands include areas dominated by woody vegetation less than 20-ft (6 m) tall, mostly broad-leaved deciduous species including willow and alder species. Based on available NWI data, wetlands occur beneath the flight paths for construction, maintenance, and fuel operations in valley bottoms and lowlands between tower sites.

3.3.1.3 Hill 2211 and Kwiktalik Tower Sites

The Hill 2211 tower site is located approximately 7 mi. north of the Golovin Alternate tower site on federal land and the Kwiktalik tower site is located approximately 6 mi. south of the Golovin Alternate tower site on non-federal land. As these alternatives were selected during the 2011/2012 winter, they were not included in the 2011 field program. Both tower sites are located in the Seward Peninsula ecoregion, described by Nowacki et al. (2001) as a landscape mosaic of coastal lowlands, expansive convex hills with scattered broad valleys, and small groups of isolated, rugged mountains with continuous permafrost and a moist polar climate. Vegetation within this region is predominantly low-stature tundra. Barrens mixed with alpine *Dryas*-lichen communities dominate high elevations, while moist sedge-tussock tundra dominates lower elevations with scattered patches of low-stature ericaceous and willow-birch shrubs in better-drained areas (Nowacki et al., 2001).

Review of digital NWI data (Figure 3-2B, Figure 3-2C), USGS topographic maps, and aerial photographs indicate that there are no wetlands within the Hill 2211 tower site or the Kwiktalik tower site. The sites appear to be located on rounded hills, to be partially barren, and likely to contain alpine tundra vegetation.

Figure 3-2A. NWI Wetland Mapping - Golovin Alternate Repeater Site

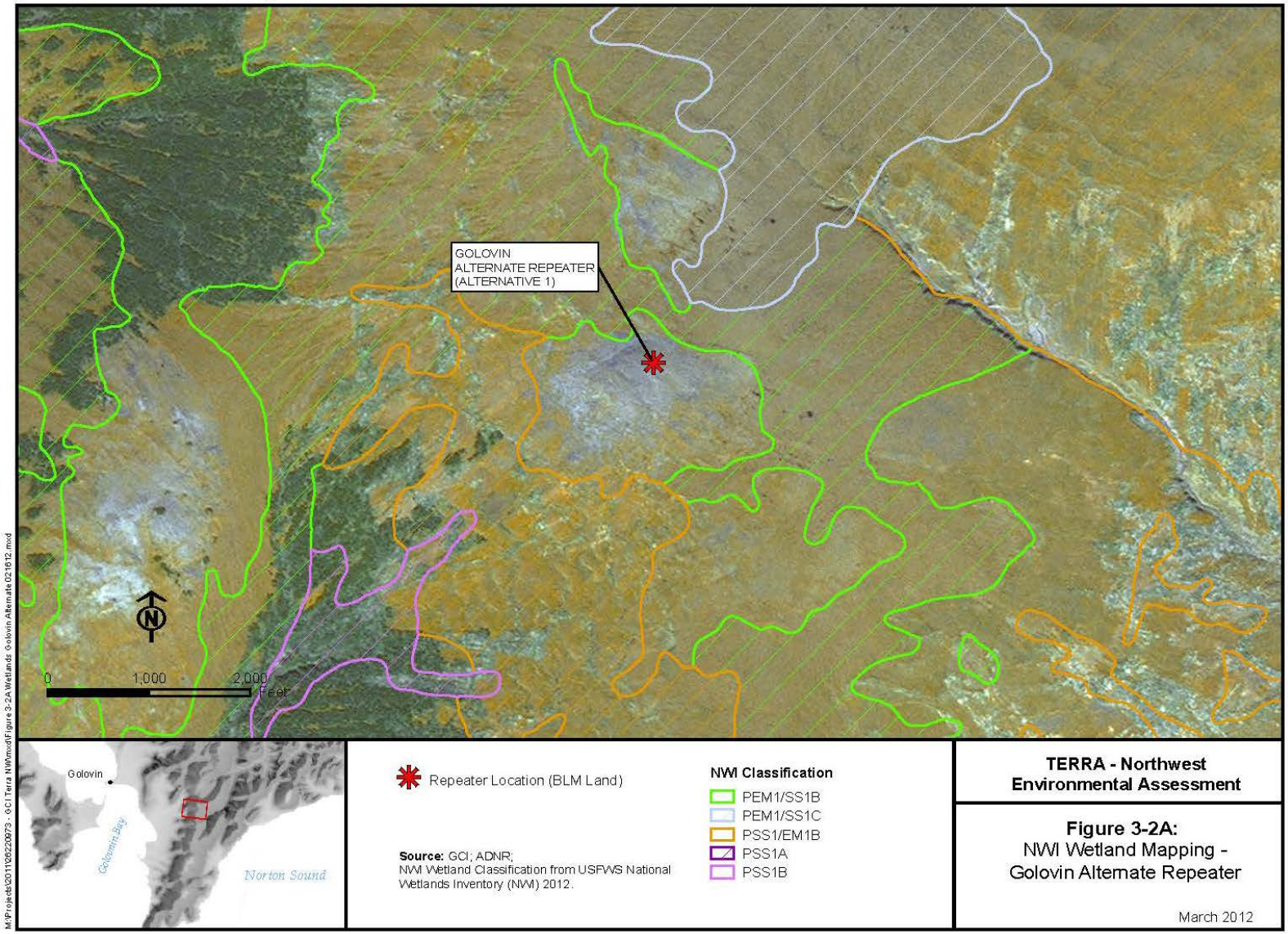


Figure 3-2B. NWI Wetland Mapping - Hill 2211 Repeater Site

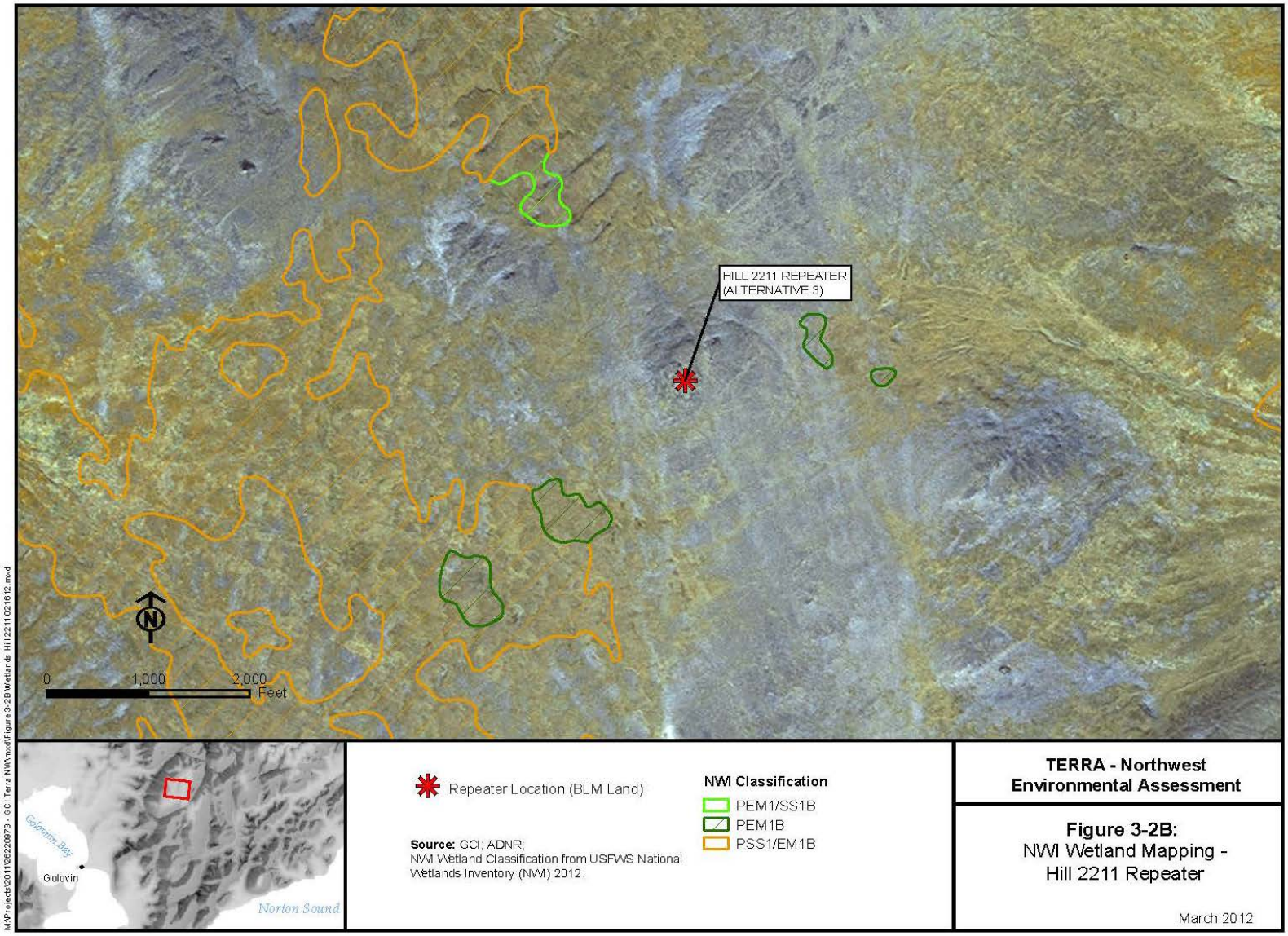
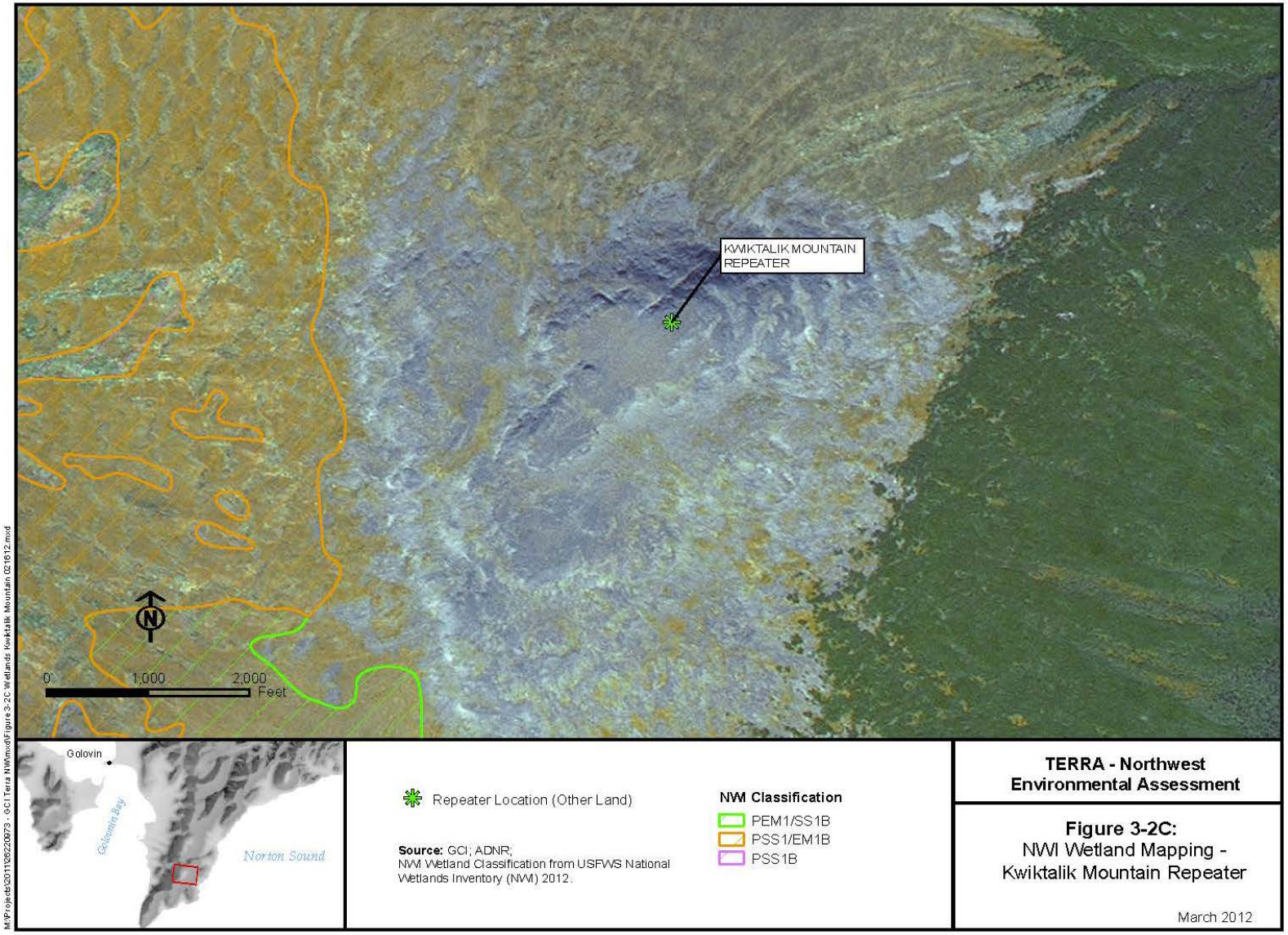


Figure 3-2C. NWI Wetland Mapping - Kwiktalik Mountain Repeater Site

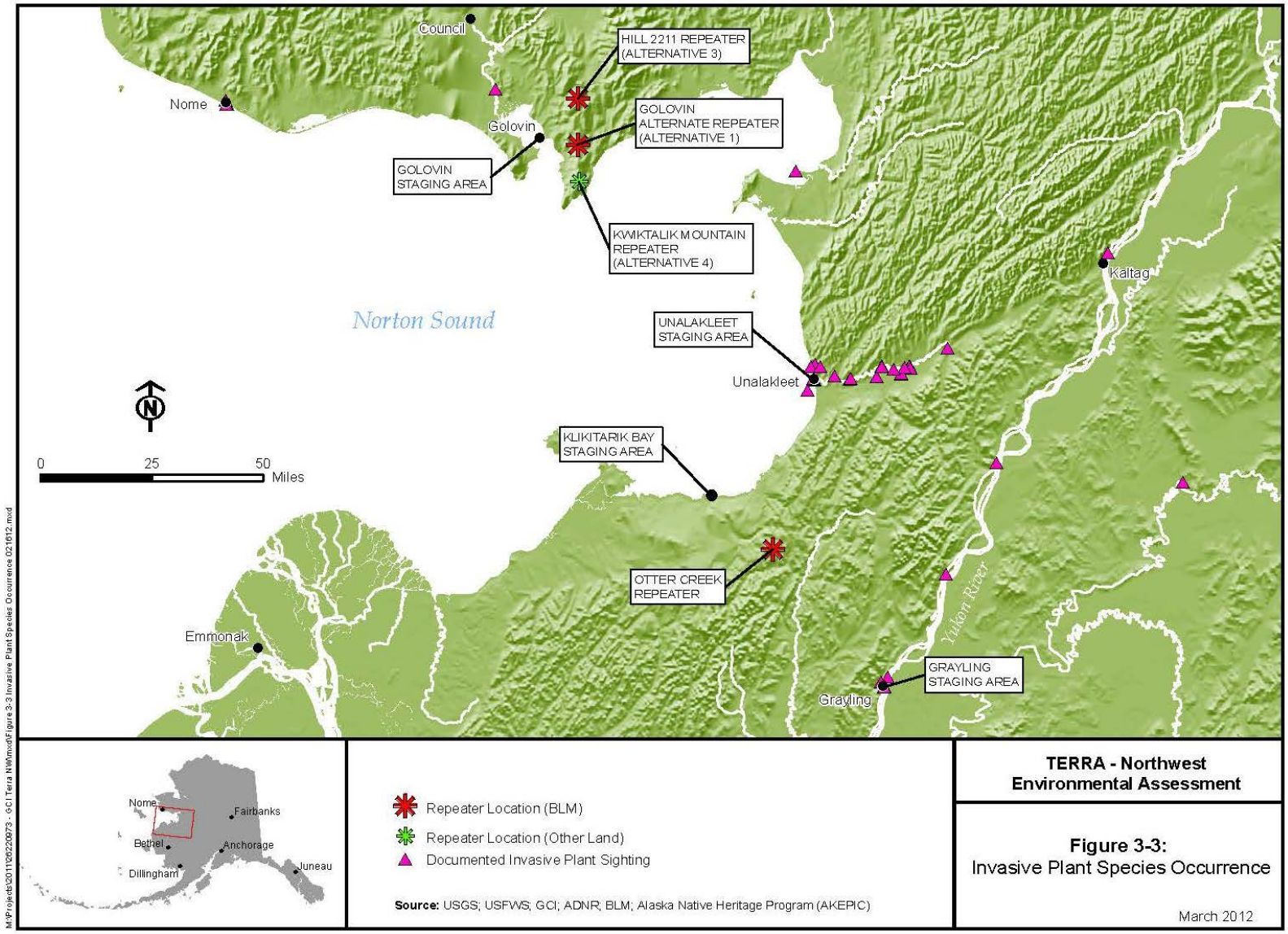


3.3.2 Invasive Plant Species

No invasive plant species were observed at the surveyed tower sites during field surveys in August 2011, conducted for the TERRA-NW Project. However, invasive plant species have been documented in the area (Figure 3-3). Although the staging areas on non-federal lands were not visited as part of the vegetation survey, analysts conducted a database search for invasive plant species that could inhabit these areas as summarized below.

According to the Alaska Exotic Plants Information Clearinghouse (AKEPIC), several species of invasive plant species have been documented at/near Unalakleet, which would be used as a light-lift staging area for the Otter Creek tower site. Invasive plants documented near Unalakleet include shepherd's purse (*Capsella bursa-pastoris*), narrowleaf hawksbeard (*Crepis tectorum*), common groundsel (*Senecio vulgaris*), foxtail barley, prostrate knotweed (*Polygonum aviculare*), common chickweed, common dandelion, pineappleweed, common plantain, annual bluegrass (*Poa annua*), lambsquarters, and Kentucky bluegrass (*Poa pratensis*). Klikitarik Bay would be used as a staging area for heavy-lift to the Otter Creek Tower site; however, there are no known records of invasive plant surveys at this site. As a result, the presence or absence of invasive species cannot be verified. The AKEPIC database, utilizing data from the Iditarod Trail Area survey conducted in 2009, does not indicate any invasive plant species at Golovin, which would also be used as a staging area for multiple tower sites during construction.

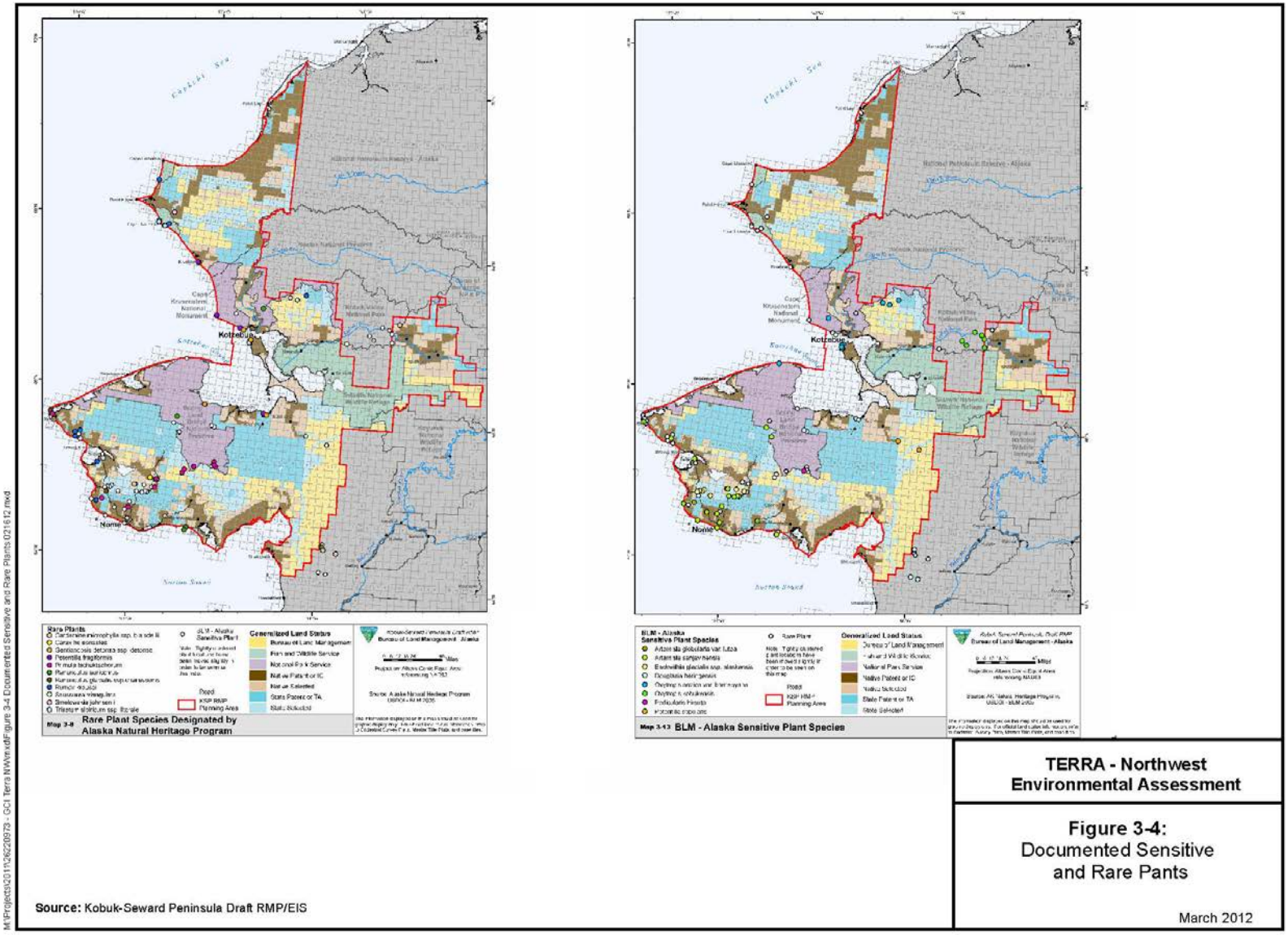
Figure 3-3. Invasive Plant Species Occurrences



3.3.3 Rare and Sensitive Plant Species

The rare and sensitive species list for BLM-Alaska is created from the Alaska Natural Heritage Program (AKNHP) vascular plant tracking list, comprising 32 species ranked S1, S2, or S2S3 by the AKNHP. Of the 32 species on the BLM-Alaska sensitive plant list, eight have been documented in the planning area for the Kobuk-Seward Peninsula Resource Management Plan (RMP), and two occur in relative proximity to the tower sites. Bering Sea douglasia (*Douglasia beringensis*) has been located in the Nulato Hills north of the Otter Creek tower site and Bering Sea wormwood (*Artemisia senjavinensis*) has been documented west of the Golovin Alternate tower site (BLM, 2006). Additionally, two species of plants designated as Rare Plant Species by the AKNHP have been documented in similar locations: *Ranunculus auricomus* and *Cardamine microphylla* ssp. *blaisdellii* have been documented in the Nulato Hills north of the Otter Creek tower site and *Ranunculus auricomus* has been documented west of the Golovin Alternate tower site half-way between Golovin and Solomon (Figure 3-4). Neither these, nor other BLM-Alaska Sensitive Plant Species, were observed at any proposed tower site during vegetation field surveys conducted in August 2011 for the TERRA-NW Project.

Figure 3-4. Documented Sensitive and Rare Plants



3.3.4 Fish and Essential Fish Habitat

Resident and anadromous fish species present in the project area include Arctic grayling (*Thymallus arcticus*), northern pike (*Esox lucius*), burbot (*Lota lota*), round whitefish (*Prosopium cylindraceum*), humpback whitefish (*Coregonus oidschian*), Dolly Varden (*Salvelinus malma*), and all five species of Pacific salmon of the genus Oncorynchus: Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), pink (*O. gorbuscha*), sockeye (*O. nerka*), and chum salmon (*O. keta*) (ADFG, 1998 and 2011a; Norton Sound Economic Development Corporation, 2010).

Resident fish species such as round whitefish, grayling, and burbot spend their entire lives within the lake and stream systems (see Figure 3-5). Anadromous species, like salmon and humpback whitefish, spawn in freshwater lakes and streams. The resulting young grow for a time in fresh water before migrating to the ocean where they remain until returning to spawn. Dolly Varden and some species of whitefish have both resident and anadromous forms within each population.

Nearshore and coastal waters are well-populated with marine, estuarine, and anadromous fish. These may include salmon (all species previously mentioned), whitefish (genera *Prosopium* and *Coregonus*), Pacific halibut (*Hippoglossus stenolepis*), starry flounder (*Platichthys stellatus*), saffron cod (*Eleginus gracilis*), Pacific herring (*Clupea pallasii*), capelin (*Mallotus villosus*), rainbow smelt (*Osmerus mordax*), slimy sculpin (*Cottus cognatus*), as well as king crab (*Paralithodes camtschaticus*) and other shellfish.

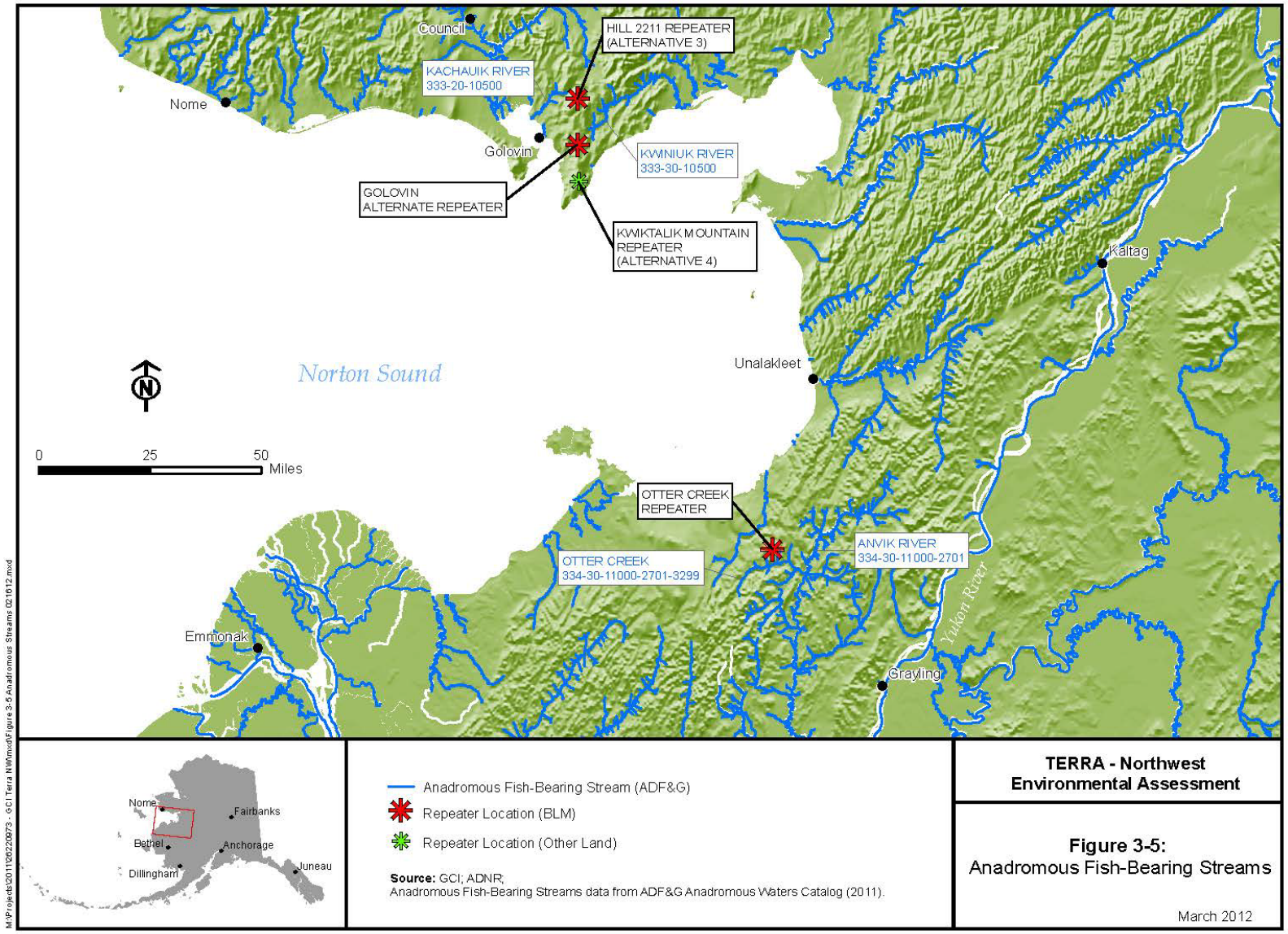
The Otter Creek and Golovin Alternate tower sites are atop mountains or along ridgelines uphill from fish-bearing waters. The Otter Creek tower site is over 1 mi. from the nearest tributary of Otter Creek and approximately 3.2-mi. straight-line distance from Otter Creek. The Golovin Alternate tower site is over 1 mi. from the headwaters of the nearest anadromous stream.

In addition to the two tower sites on BLM-managed land in the Proposed Action, Alternative 1 would include eight additional towers, located on private lands. This would include five remote microwave repeater towers at Holy Cross Hills, Unalakleet, Reindeer, Gill, and Cape Nome, as well as three community towers at Unalakleet, Shaktoolik, and Nome. These are classified as "connected actions" on non-federal land, and the environmental effects are considered indirect effects of the Proposed Action on federal lands. Alternative 3 at Hill 2211 is located on BLM-managed land, while Alternative 4, at Kwiktalik Mountain, is located on private land.

3.3.4.1 Otter Creek Tower Site

The proposed Otter Creek tower site is located in the southeastern portion of the Nulato Hills above the Otter Creek drainage. It is surrounded by four, small, south-flowing unnamed tributaries, one each to the west and east of the site and two to the south of the site. All four streams drain into the north side of Otter Creek as it flows east to join the Anvik River. Further downstream, the Yellow River also joins the Anvik from the east. The northern slopes of the Nulato Hills drain into the Golsovia River, which flows into the eastern side of Norton Sound at the historic place name Golsovia. Juvenile coho and Chinook salmon have been documented in both Otter Creek and Golsovia River (ADFG, 1998), suggesting that the area in general is valuable rearing habitat for juvenile salmon.

Figure 3-5. Anadromous Fish-Bearing Streams



3.3.4.2 Golovin Alternate Tower Site

The Golovin Alternate tower site is on a ridge in the Kwiktalik Mountains. To the west of this ridge McKinley Creek contains chum, coho, and pink salmon (ADFG, 1998) and Portage Creek drains into Golovnin Bay. Anadromous fish species have only been documented at the mouths of these streams, well away from the proposed tower locations. To the east of the ridge, streams drain either to the north into Kwiniuk River or to the south into Carson Creek (contains pink salmon; ADFG, 1998) before both streams flow into Norton Bay. The Kwiniuk is a large river system and a salmon spawning stream. Chinook, coho, chum, and pink salmon are documented in the drainage as well as Dolly Varden and whitefish (ADFG, 1998). The proposed tower location is well away from the headwaters of the Kwiniuk River (> 1 mi.) and most of the anadromous fish habitat is far downstream.

3.3.4.3 Tower Sites on Non-Federal Lands

Anadromous streams that are intersected by helicopter flight paths between staging areas and proposed tower sites on non-federal lands are presented in Table 3-2.

Table 3-2. Proposed Towers and Fish Resources on Non-Federal Lands

Tower Type	Location Name	Staging Area	Anadromous Streams Crossed by Helicopter Flight Path	*Anadromous Fish Species Present
Repeater	Holy Cross Hills Repeater	Grayling	Grayling Creek	Pink salmon, chum salmon
Community Tower	Unalakleet Community Tower	Unalakleet	none	Not applicable
Repeater	Unalakleet Repeater	Unalakleet	Unalakleet River	All five species of Pacific salmon, Whitefish, Dolly Varden
			Powers Creek	Pink salmon, chum salmon, Dolly Varden
Community Tower	Shaktoolik Community Tower	Shaktoolik	none	Not applicable
Repeater	Reindeer Repeater	Shaktoolik	Shaktoolik River	Chum, coho, Chinook, and pink salmon and Dolly Varden
Repeater	Gill Repeater	Nome	Nome River	All five species of Pacific salmon, Whitefish, Dolly Varden
			Hastings Creek	Pink salmon, Dolly Varden
			Solomon River	Pink, chum, and coho salmon and Dolly Varden
			Bonanza River	All five species of Pacific salmon, Whitefish, Dolly Varden
			Eldorado River	All five species of Pacific salmon, Whitefish, Dolly Varden
			Flambeau River	All five species of Pacific salmon, Whitefish, Dolly Varden
Repeater	Cape Nome	Nome	Nome River	All five species of Pacific salmon, Whitefish, Dolly Varden
			Hastings Creek	Pink salmon, Dolly Varden
Community	Nome	Nome	none	Not applicable

*Source: ADFG 1998.

3.3.4.4 Hill 2211 and Kwiktalik Mountain Tower Sites

The Darby Peninsula extends southward from the Seward Peninsula east of Nome into Norton Sound and separates Golovnin Bay from Norton Bay.

Hill 2211 (elevation 2,211 ft.; BLM-managed land) is approximately 19 mi. to the north of Kwiktalik Mountain and is situated atop the drainage divide of the Kwiktalik Mountain Range that bisects the Darby Peninsula in a north-south direction. The tower site at Hill 2211 is 3 mi. from the nearest anadromous stream, Eagle Creek, to the west. The presence of chum and pink salmon and Dolly Varden has been documented in Eagle Creek, which flows into Kachauik River (another anadromous stream containing chum and pink salmon and Dolly Varden; ADFG 1998) which enters Golovnin Bay on the west side of the Darby Peninsula and north of the town of Golovnin. To the east of Hill 2211, there are three south- and southeast-flowing tributaries to the headwaters of Kwiniuk River. These tributaries are classified as anadromous streams based upon the observation of juvenile Chinook salmon habitat use (ADFG, 1998); however, all three of the tributaries are over 5 mi. away to the east of Hill 2211.

Kwiktalik Mountain (elevation 1,707 ft.) is at the southern end of the Darby Peninsula and overlooks Norton Bay to the east. The mountain slopes to the east, draining directly into Norton Sound. There are no anadromous fish streams or perennial streams that drain the slopes of Kwiktalik Mountain (ADFG, 1998). Kwiktalik Mountain is on non-federal land owned by the Golovin Native Corporation.

The proposed staging area for both of these potential tower sites is the village of Golovin. The only anadromous streams likely to be crossed by helicopter flight paths are Cheenik Creek (pink salmon; ADFG 1998), which flows into Golovnin Bay at the village of Golovin, and McKinley Creek, which was previously described in Section 3.3.4.2 Golovin Alternate Site.

3.3.4.5 Salmon Essential Fish Habitat

Freshwater Essential Fish Habitat (EFH) for the salmon fisheries in Alaska includes all streams, lakes, ponds, wetlands, and other waterbodies currently or historically accessible to salmon in the state (National Marine Fisheries Service [NMFS], 2005). Marine EFH for the salmon fisheries in Alaska includes all estuarine and marine areas utilized by Pacific salmon of Alaska origin, extending from the influence of tidewater and tidally submerged habitats to the limits of the U.S. Exclusive Economic Zone (NMFS, 2005). Marine EFH for Saffron cod has only been designated for Arctic waters and not Norton Sound or any locations south of the Bering Strait (NMFS, 2005).

Any anadromous stream occurring in the project area, from the headwaters to the mouth, and any estuarine or marine habitat should be considered EFH.

For more specific locations of EFH, NMFS refers to ADFG's "Catalog of Waters Important for the Spawning, Rearing, or Migration of Anadromous Fishes" (ADFG, 1998). NMFS recognizes the limitations of the Catalog and the accompanying "Atlas to the Catalog of Waters Important for Spawning, Returning or Migration of Anadromous Fishes" (ADFG, 1998). Not all streams in Alaska have been surveyed or have entries in the Catalog and not all streams in the Catalog have been surveyed all the way upstream to their source or point of origin.

3.3.5 Terrestrial Mammals

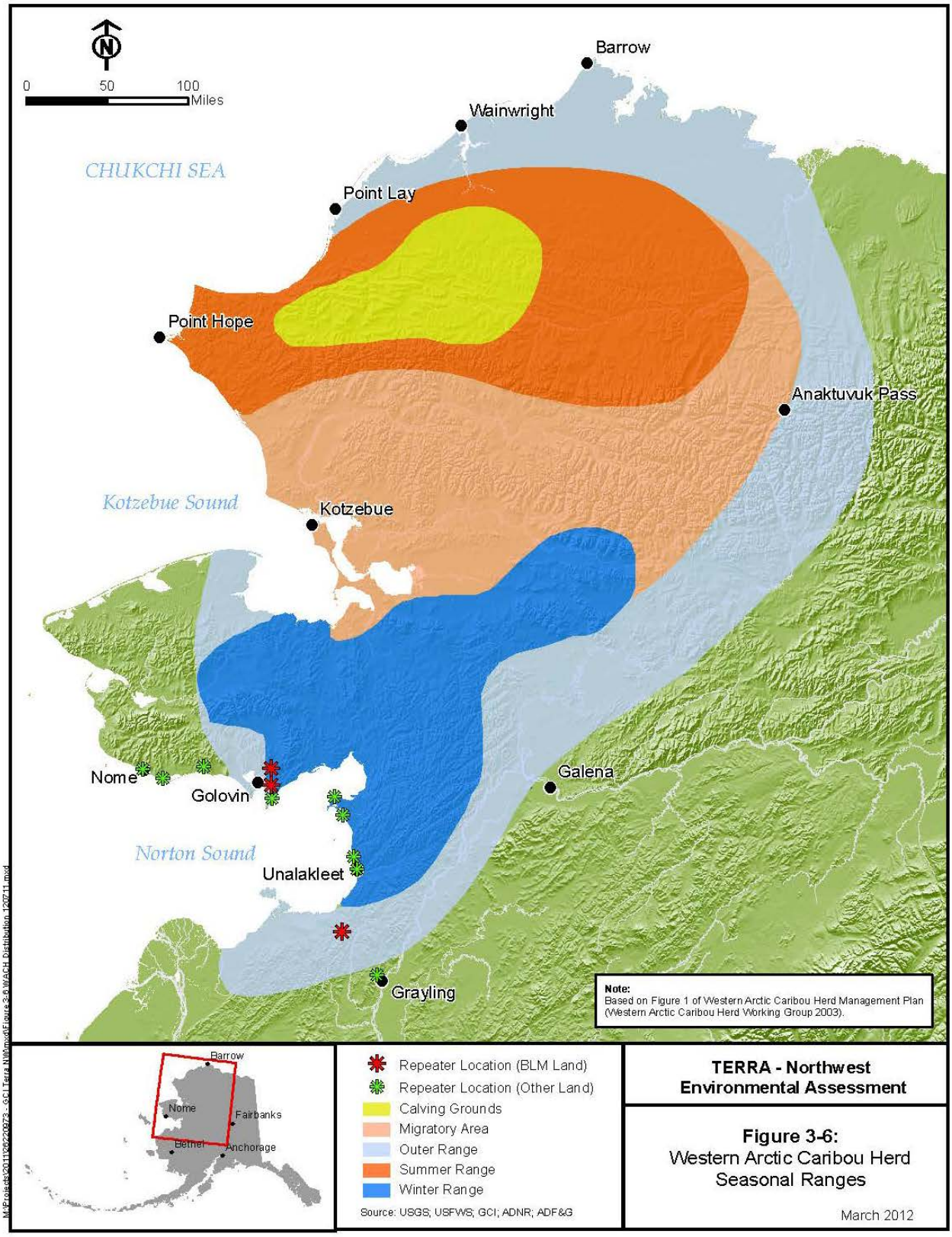
3.3.5.1 Caribou

Caribou (*Rangifer tarandus)* occurred throughout northern and western Alaska until the mid-nineteenth century when they disappeared from areas south of the Brooks Range. During the 1930s, caribou began to repopulate Kotzebue Sound and spread south to the Seward Peninsula. By 1970, the WACH was estimated at 243,000 individuals. Since then, populations have fluctuated from 75,000 in 1976, to 463,000 in 1996 (Dau, 2000). In 2003, the WACH was estimated at 490,000 caribou, and by 2009, had decreased to 401,000. Peak densities during 2003 were 3.5 caribou per square mile (sq. mi.) or 1.3 caribou per square kilometer (ADFG, 2009).

The WACH has a range that extends over 140,000 sq. mi. (363,000 square kilometers) of northwestern Alaska. The range overlaps with the project area to the south, extending nearly to Grayling and west to nearly Skookum Pass (Figure 3-6). In the spring, caribou travel north toward calving grounds and summer range, near the National Petroleum Reserve-Alaska, north of the town of Kivalina. In the summer, the herd moves west toward the Lisburne Hills and then eastward again through the Brooks Range. During the fall, these caribou disperse to some degree and move south and west toward wintering grounds. The Otter Creek tower site is within the outer extent of their winter habitat. The Golovin Alternate and Hill 2211 tower sites are located on the margin of winter habitat (Figure 3-6). It should be noted that winter range is difficult to delineate due to substantial variability in caribou overwintering habits, and during the winter, the herd could occur throughout most of their annual range (ADFG, 2005). The Otter Creek tower site is near the Nulato Hills wintering grounds, which has increasingly become one of the most important wintering grounds for WACH, although extreme variability in use occurs year to year (ADFG, 2003 and 2005). In 7 of the 10 years between 1985 and 1995, greater than 50 percent of the herd wintered in this area. During these years, densities were greater than 15 to 20 caribou per sq. mi. (6 to 8 caribou per square kilometer), however, between 2001 and 2002, only 5 percent of radio-collared WACH wintered in the Nulato Hills, and none wintered there between 2002 and 2003 (ADFG, 2003). Then, during the winter of 2004, caribou use in the area increased to just over 16 caribou per sq. mi. (6 caribou per square kilometer). Wintering densities on the Seward Peninsula fluctuate as well, peaking in 1996 at 17.53 per sq. mi. (7 caribou per square kilometer), and falling to less than 1.24 caribou per sq. mi. (0.5 caribou per square kilometer) in the winter of 2005. In the winter of 2008, Seward Peninsula caribou increased to 9.30 caribou per sq. mi. (3.7 caribou per square kilometer; ADFG, 2009).

Caribou occupy treeless tundra and high mountain habitats year-round. Calving habitat is typically located in mountains or open, coastal tundra while winter range may comprise boreal forests when available. Summer diet typically consists of the leaves of willows, sedges, flowering tundra plants, and mushrooms. In the fall their diet shifts to lichens, dried sedges, and small shrubs, such as blueberry (ADFG, 2008a). Breeding begins in the fall, with the peak rut occurring in late September and early October. Calving typically occurs during late May to early June (ADFG, 2008a). Fall migration begins in mid-August and extends until mid- to late November (BLM, 2007). Caribou could occur in the vicinity of the Otter Creek and Golovin Alternate tower sites from November to May.

Figure 3-6. Western Arctic Caribou Herd Seasonal Ranges



3.3.5.2 Reindeer

Domesticated caribou, reindeer *(Rangifer tarandus tarandus)*, have been herded on the Seward Peninsula since 1891, when they were imported from Russia as a means for Alaska Natives to produce a predictable food supply (Stern et al., 1980). Herders organized into the Kawerak Reindeer Herders Association and divided the Seward Peninsula into 19 ranges, or reindeer herder grazing allotments; the ranges on average are 400,000 hectares (Finstad, 2007). The tower sites Golovin Alternate, Kwiktalik Mountain, and Hill 2211 are located in the Gray grazing allotment (Natural Resource Conservation Service, as cited in Finstad, 2007). Otter Creek tower site is not in a grazing allotment, as it is not located on the Seward Peninsula.

Reindeer occur on most of the Seward Peninsula, but are most prevalent in ADFG Game Management Unit (GMU) 22B in the tundra landscapes (Gorn, 2012) (See Figure 3-7 for depiction of the ADFG GMUs). Additionally, they do occur in the vicinity of Golovin Alternate and Hill 2211 tower sites. Reindeer may use ridgetops such as the tower sites for insect relief in the summer (Gorn, 2012).

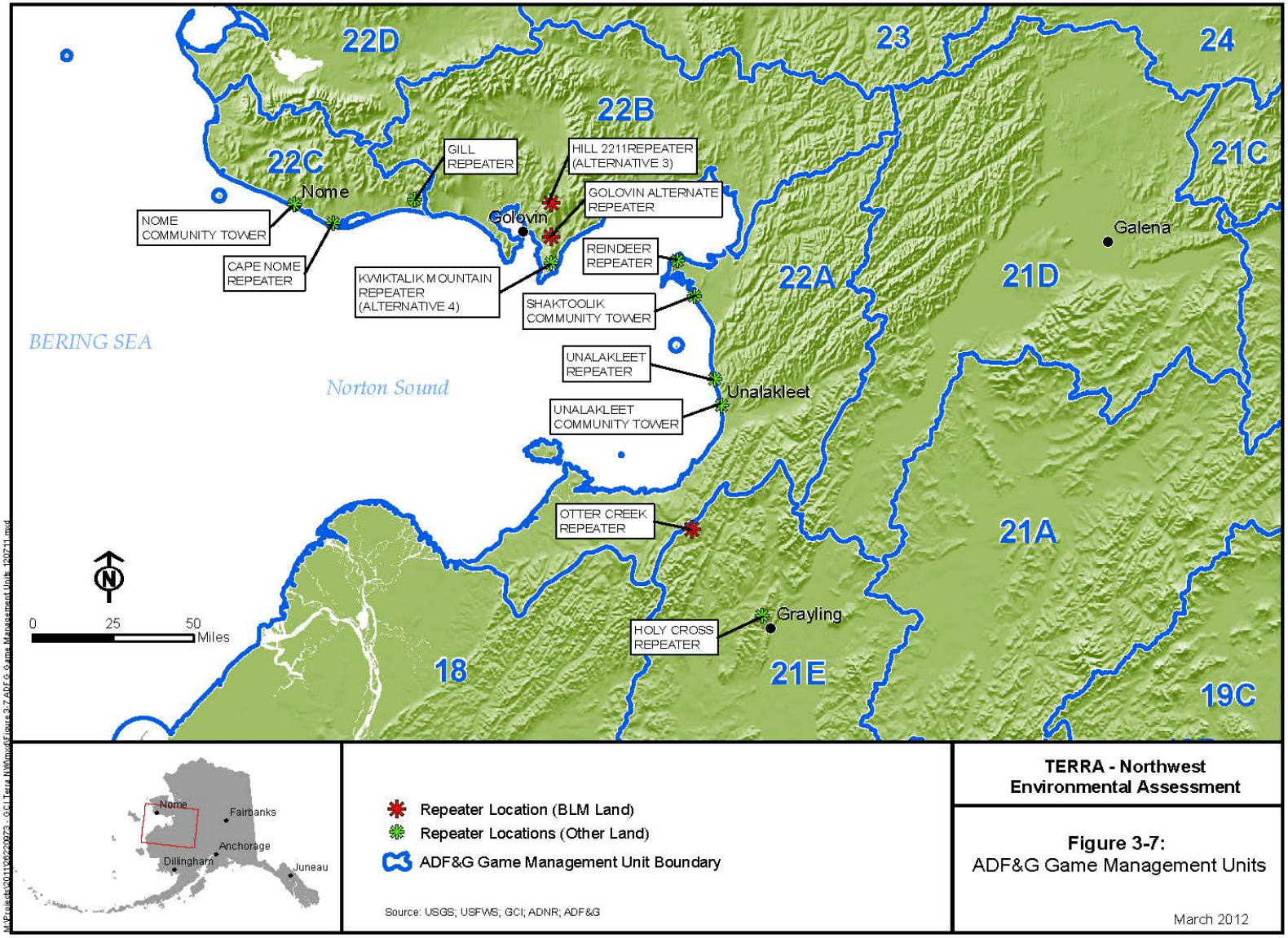
3.3.5.3 Moose

Moose (*Alces alces*) are found most abundantly in recently burned areas with dense stands of willow, aspen, and birch shrubs, on timberline plateaus, and along major rivers. Diet during the spring includes grasses and sedges, while in the summer moose will feed on sedges, horsetail (*Equisetum* spp.), aquatic plants, and grasses. In the fall and winter, green vegetation is hard to come by, leading moose to browse willow, birch, and aspen branches. Moose make seasonal movements up to 60 mi. between calving, rutting, and wintering areas. Breeding begins in late September or early October and calving occurs from mid-May to early June (ADFG, 2008a). Moose are not known to use ridgetops in the project area for specific purposes, but may transit over them (Gorn, 2012).

Prior to the 1930s, very few moose were observed on the Seward Peninsula, but since the 1960s, most areas of suitable habitat contain moose. Moose populations on the Seward Peninsula peaked in the mid-1980s at a maximum size of 7,000 to 10,000 individuals. Populations then declined as a result of severe winters in 1989 and the early 1990s that depleted winter range browse. Brown bear are believed to be the major factor in suppressing GMU 22 moose populations, particularly brown bear predation on moose calves, and to a lesser extent predation on adults (ADFG, 2009b). Wolf populations have also increased in size over the last decade due to the establishment of wintering caribou herds, and are also believed to be a major factor in moose population size (ADFG, 2008b).

A moose population census in 2010 estimated 512 animals with a density of 0.24 moose per sq. mi. (0.64 moose per square kilometer) in GMU 22B, and 342 animals with a density of 0.14 moose per sq. mi. (0.36 moose per square kilometer) in GMU 22A (Gorn, 2012).

Figure 3-7. ADF&G Game Management Units



3.3.5.4 Brown Bear

Brown bears (*Ursus arctos*) occur throughout most of Alaska and are widely distributed throughout the project area. Habitat for the brown bear is more a product of prey availability rather than a specific assemblage of vegetation and/or terrain features. Consequently, brown bears are seasonally aggregated around sites with abundant prey. Prey species of brown bear primarily include caribou and moose calves during the spring and salmon during the summer (BLM, 2008a and 2007; ADFG, 2008d). Brown bear predation on adult moose, particularly in the spring, may also be common (ADFG, 2009b). During the summer, upon emergence from torpor, brown bears will also graze on sedges and grasses. Berries are foraged upon widely during the fall (ADFG, 2008d). Brown bear den sites in Alaska vary greatly. They may be natural caves, excavated at the bases of large-diameter trees (Schoen et al. 1994) or above treeline on a sparsely vegetated hillside (Miller, 1990). The ridgetop landscapes of tower sites could be used by brown bear for den sites.

Brown bear winter torpor is triggered by decreasing temperatures and forage availability. Cubs are born in the den during January and February, emerging in May to June. The breeding season ranges from May to July (ADFG, 2008d).

ADFG does not have a current and reliable population estimate for brown bears in GMU 22, because a proven and cost-effective technique has not been available (Gorn, 2012). The last census was conducted in the early 1990s, which estimated one bear per 27 sq. mi. (70 square kilometers) in the area around the Golovin Alternate tower site. ADFG plans to conduct a brown bear survey for GMU 22 in 2012. Population estimates are not known in the area near the Otter Creek tower site, and because nonresident drawing permits are not required, hunting success is difficult to evaluate. Reported harvest for GMU 22 for recent years is as follows: 96 bears in 2010, 86 bears in 2009, 105 bears in 2008, 86 bears in 2007, and 101 bears in 2006 (Gorn, 2012). Reports of bear encounters and complaints about nuisance bears indicates that there is a productive bear population, and that the population depends on the bear harvest regulations along with fluctuations of moose and other prey populations. These same reports of complaints and nuisance bears indicate that brown bear populations increased during the 1990s and early 2000s, but due to liberalized hunting regulations have since been in a decline (ADFG, 2009b).

During vegetation survey site visits for this project, researchers observed eight brown bears during helicopter flights, two of which were between Koyuk and Golovin, and the other six were between Golovin and Council. Brown bears occur in all habitats throughout the entire project area vicinity, but none were observed at the tower sites during vegetation site visits, although suitable habitat is present (Sexson, 2011).

3.3.5.5 Black Bear

Black bears (*Ursus americanus*) occur throughout most of the forested areas of Alaska. This species is not known to occur on the Seward Peninsula or north of the Brooks Range. Suitable habitat for black bears includes lower elevation riparian areas and forested uplands. Black bears depend on berries during the fall, and are opportunistic omnivores. Diet consists of vegetation, winter-killed carrion, grubs, ants, berries, and salmon if available. Occasionally, newborn moose calves are preyed upon. As with brown bears, black bear winter torpor is triggered by decreasing temperatures and forage availability. Cubs are born in the den during January and February, emerging in May to June. The breeding season ranges from June to July (ADFG, 2008e, f).

Black bear den sites in Interior Alaska are usually located 330 to 980 feet (100 to 300 meters) from wetlands in mature and well-drained forests at the bases of live or dead trees (Bertram and Vivion, 2002). Where available, bears in Alaska and Canada use natural den sites such as rock piles, caves, and trees (Schwartz et al., 1986).

Georgette (2004) reports that no black bears were harvested during 2001 to 2003 in the community of Golovin, and only 0.4 percent of the people censused in Unalakleet were reported to harvest black bear from 1998 to 2003. This limited black bear harvest is likely due to the limited number of black bears in these areas. In fact, GMU 22 is not survey-inventoried by ADFG because of the lack of black bears and resultant limited harvest (ADFG, 2007).

During the 2011 summer field studies for this project, researchers observed three black bears foraging on berries in tundra habitat, approximately 5 mi. west of the proposed Otter Creek tower site. While only marginal habitat exists in the project area footprint proper, these observations indicate that bears are in the project vicinity (Sexson, 2011). Black bears in the project vicinity would likely occur in the black spruce forest habitat within the river valleys of Nulato Hills, and in the surrounding boreal forests. Black bear numbers are expected to be low in the region of the Golovin Alternate and Hill 2211 tower sites due to the limited amount of suitable habitat, but common in the area surrounding the Otter Creek tower site.

3.3.5.6 Wolf

Gray wolves (*Canis lupus*) occur throughout the project area, distributed according to prey species availability (BLM, 2007). Moose and caribou comprise primary prey for the wolf. During the summer, small mammals are relied on for food, including beaver, voles, lemmings, ground squirrels, snowshoe hare, and occasionally birds and fish (ADFG, 2008g). During late fall, winter, and spring, prey species include large ungulates and their newborn lambs or calves (BLM, 2008a).

Wolves occur in packs that include parents and pups from that year. Pack size typically ranges from 2 to 12 animals, but can be as large as 20 to 30 animals. Wolves generally remain in non-overlapping territories, but wolves that rely on caribou may travel long distances if necessary. Alaska wolves have territories ranging from 200 to 1,000 sq. mi. (518 to 2,590 square kilometers) of habitat. Wolves normally breed between February and March, with litters being born in May or early June. By early winter, pups become mobile (ADFG, 2008g).

Wolf numbers in the project area have fluctuated over the past century as a result of availability of prey species, predator control programs, and bounties intended to protect reindeer. In the 1960s, abolishment of predator control programs allowed wolf numbers to generally increase and expand their range across the Seward Peninsula. By 1980, 100 wolves were estimated to occur in GMU 22, however, inventory surveys have not been conducted, so quantitative data is lacking on wolf populations in GMU 22. Sightings have increased since then, and populations are thought to be higher (ADFG, 2009a). Wolf populations and distribution within GMU 22, in particular, are influenced according to seasonal abundance of wintering caribou.

3.3.5.7 Muskoxen

Muskoxen (*Ovibos moschatus)* formerly ranged across northern Europe, Asia, Greenland, and North America, including Alaska. By the late 1800s, though, muskoxen were extirpated from Alaska and Asia (ADFG, 2010). In 1929, an Alaska reintroduction program was established.

Beginning in 1935, 31 muskoxen were brought from Greenland to Nunivak Island. Then, in 1970, 36 muskoxen were reintroduced to the southern portion of the Seward Peninsula from Nunivak Island. Since then, the muskoxen population has grown steadily and have extended their range into suitable habitat throughout the Seward Peninsula and as far east as Ruby (ADFG, 2009c).

Muskoxen are gregarious, typically occurring in groups of up to 75 animals, but can also occur in groups of 5 to 15, which are often comprised of 1 dominant bull among females and subadults. Bulls may also be solitary prior to joining mixed-sex herds in the winter, or may reside with other bull-only groups during the spring and summer. Breeding begins in August, lasting until October, and calves are born between April and June (ADFG, 2010).

Muskoxen are conservative in their movements, both between and within seasons, in response to availability of forage and energy budgets. Reynolds (1998) found that daily movements were limited to 3.1 mi. (5 km) or less per day. During the summer, Reynolds (1998) found that the minimum size of core areas was four times larger than in winter or the calving season. These greater summer movements are likely related to peaking of plant biomass, taking advantage of high-quality forage (Chapin, 1983). In winter, forage availability and quality is low, so muskoxen conserve energy by reducing their movements and activity, including home range size, and remain in habitats where forage is not covered with deep snow (Reynolds et al., 2002).

Muskoxen forage on a variety of grasses, sedges, forbs, and woody plants (ADFG, 2008h). Summer habitat for the muskox includes streams and vegetated valleys, whereas winter range is similar but restricted to areas with shallow snow accumulation or blown free of snow (ADFG, 2010). Winter sites, in particular, often include narrow windblown bluffs adjacent to rivers where snow accumulation is low and vegetation cover is relatively high (Nellemann and Reynolds, 1997). Reynolds (1998) found that in the Arctic National Wildlife Refuge, muskoxen used riparian cover along river corridors, floodplains, and foothills during all seasons; similarly, bare cover (bare ground, water, and ice) was selected in all seasons except for spring. Moist sedge was selected in late winter and during calving, and tussock tundra was avoided in late winter. Muskoxen with young calves also may avoid flooded riparian areas during calving and post-calving periods. Wet sedge was used in summer and early winter when available, but avoided in other seasons. Upland shrub was selected only during the calving season and avoided in other seasons. Mountain terrain was avoided in all seasons.

As of 2010, approximately 5,300 muskoxen were estimated to occur in Alaska (ADFG, 2010). The 2007 census found 2,688 muskoxen in GMU 22. During this census, eastward emigration on the Seward Peninsula was first detected. The majority of the animals were found on the eastern-half of the Seward Peninsula. The 2007 census represented a 12.6 percent total increase since the 2005 census and a 14 percent annual rate of increase since the 1970 introductions. The Golovin Alternate and Hill 2211 tower sites are located in GMU 22B, which included a census count of 329 muskoxen, and an annual growth rate of 24 percent. The Otter Creek tower site, on the other hand, is located in GMU 22A, which was not surveyed as part of the 2007 census, however, new mixed-sex and age groups were documented in this GMU during the 2007 reporting period, which indicates muskoxen are successfully establishing a presence in this location (ADFG, 2009c). Muskoxen were not observed at the Golovin or Otter Creek tower sites during vegetation surveys, but one was observed at the Unalakleet tower site, showing their use of the ridgetops (Sexson, 2011).

The northern region of GMU 22A (north of Unalakleet River) was censused in 2010, generating an estimate of 86 muskoxen. The western portion of 22B (west of Darby Mountains) was censused in 2010, generating an estimate of 364 muskoxen (Gorn, 2012). Muskoxen are present throughout the Seward Peninsula, but are most concentrated west of the Darby Mountains where terrain is level and less forested (Gorn, 2012). The eastern side of GMU 22B is a transitional area for muskoxen, during their transit to the Nulato Hills region (22A).

3.3.5.8 Furbearers and Small Mammals

Furbearers found in the project area include beaver, red fox, Arctic fox, lynx, mink, muskrat, river otter, and wolverine. Mink, beaver, muskrat, and river otter inhabit ponds, lakes, rivers, marshes, and/or adjacent aquatic areas (ADFG, 2008i, j, n, and k).

Wolverines occur in taiga and boreal habitats and require large expanses of wild lands. This species is opportunistic, feeding on carrion, and small and medium-sized animals such as voles, squirrels, snowshoe hares, and birds (ADFG, 2008a). No quantitative population estimates exist for wolverines in GMU 22 (Gorn, 2012).

Lynx occupy a variety of habitats, including spruce and hardwood forests, and both subalpine and successional communities. Early successional growth following fire is particularly important, as this mosaic of habitat types provides suitable habitat for the main prey species, the snowshoe hare. Prey includes other small mammals when snowshoe hare are scarce (ADFG, 2008l).

The Arctic fox is found in treeless coastal areas. This species is omnivorous, and will feed on berries, eggs, and carrion. In summer, Arctic foxes feed primarily on small mammals, including lemmings and tundra voles as well as seabirds. Dens are excavated in sandy, well-drained soils of low mounds and river cutbanks (ADFG, 2008m). The red fox, on the other hand, inhabits broken country, extensive lowland marshes, crisscrossed hills, draws, and occasionally tundra. The red fox sometimes occurs in tundra habitat along with the Arctic fox, although red fox populations are greatest south of the Arctic tundra (ADFG, 2008o).

Survey inventories have not been conducted and most furbearer harvests go unreported; as a result quantitative information is not available, however, observations and trapper survey information indicates that furbearer populations in the project area are relatively stable. The following presents population information from reporting years 2003 through 2006 (ADFG, 2007):

- Beaver numbers are believed to be stable or increasing in the project area but unlikely to occur at the tower sites;
- Lynx are abundant in the area surrounding the Otter Creek tower site, but reported as scarce in the other parts of the project area, although this could be in response to fluctuating snowshoe hare numbers;
- River otters occur in the project area but are unlikely to be present at tower sites;
- Wolverines occur in the project area and may use tower sites during transit (Gorn, 2012);
- Red and Arctic fox are also common, and between 2003 and 2004 there were three reports of rabies, although the animals were not tested; and
- Mink were noted by trappers to be abundant, although they are unlikely to occur at the tower sites.

3.3.6 Birds

Many migrant sensitive species could occur in the project vicinity, including some species listed under the Endangered Species Act's (ESA) Section 1.1.7 Threatened and Endangered Species, and BLM-sensitive species (see Table 3-3). The habitat in the vicinity of the project is a valuable nesting, staging, and molting area for many of these bird species, with nearly 200 bird species documented on the Seward Peninsula (Harris, 1996), including some rare western Alaska species and Asian accidentals (Appendix B). Migratory and resident birds are known to occupy every habitat type within the project area, including riparian, wetland, shoreline, forest, shrub, and tundra (BLM, 2006).

The tower sites contain mostly alpine tundra habitat or bare ground with shrub habitats nearby, and provide nesting and foraging habitat for a number of alpine, sub-alpine, Arctic tundra, and scrub/shrub habitat bird species, both resident and migrant (OASIS, 2011). No birds or nests were observed during OASIS site visits in August 2011 (OASIS, 2011). The Golovin Alternate and Hill 2211 tower sites are roughly 15 mi. (24 kilometers) and 22 mi. (35.4 kilometers) north, respectively, of Cape Darby, which contains an active seabird colony of pelagic cormorant (*Phalacrocorax pelagicus*), glaucous gull (*Larus hyperboreus*), tufted puffin (*Fratercula cirrhata*), and horned puffin (*Fratercula corniculata*) species (Seabird Colony Catalog, 2011). The National Audubon Society lists nearby Golovnin Lagoon as an Important Bird Area, with extensive intertidal mudflat, vegetated intertidal, and estuary habitats used by nearly 10,000 shorebirds during post-breeding periods (Audubon, 2011).

Table 3-3. Special Status Avian Species Potentially in the Project Vicinity* (BLM, 2008c)

Common Name	Scientific Name	Occurrence in Planning Area
Emperor goose	*Anser canagica*	Uncommon
Golden eagle	*Aquila chrysaetos*	Common breeder
Short-eared owl	*Asio flammeus*	Common breeder
Kittlitz's murrelet	*Brachyramphus brevirostris*	Rare breeder
Red knot	*Calidris canutus*	Uncommon/common
Bering Sea rock sandpiper	*Calidris ptilocnemis tschuktschor*	Uncommon
Gray-cheeked thrush	*Catharus minimus*	Common breeder
Olive-sided flycatcher	*Contopus cooperi*	Rare breeder
Trumpeter swan	*Cygnus buccinator*	Casual
Blackpoll warbler	*Dendroica striata*	Common breeder
Rusty blackbird	*Euphagus carolinus*	Uncommon
Yellow-billed loon	*Gavia adamsii*	Uncommon
Red-throated loon	*Gavia stellata*	Common to abundant
Hudsonian godwit	*Limosa haemastica*	Uncommon
Black-tailed godwit	*Limosa limosa*	Casual/accidental
Bristle-thighed curlew	*Numenius tahitensis*	Rare breeder
McKay's bunting	*Plectrophenax hyperboreus*	Uncommon/rare
Buff-breasted sandpiper	*Tryngites subruficollis*	Very rare migrant

* Table includes species potentially within or migrating through project area. ESA listed species are discussed in Section 3.3.7 and are not presented here.

3.3.7 Threatened and Endangered Species

Several species listed under the ESA have the potential to occur at the tower sites and/or staging areas. Species that have the potential to occur in the project vicinity and their status are listed in Table 3-4.

Table 3-4. ESA-Listed Species Potentially Present in Project Vicinity

Common Name	Scientific Name	Jurisdiction	Status
Kittlitz's murrelet	*Brachyramphus brevirostris*	USFWS	Candidate
Spectacled eider	*Somateria fischeri*	USFWS	Threatened
Steller's eider	*Polysticta stelleri*	USFWS	Threatened
Yellow-billed loon	*Gavia adamsii*	USFWS	Candidate
Polar Bear	*Ursus maritimus*	USFWS	Threatened

3.3.7.1 Kittlitz's Murrelet

Kittlitz's murrelets are year-round residents along the Alaska coast from Point Lay in the Arctic and south to LeConte Bay in Southeast Alaska. The Kittlitz's murrelet is a rare seabird that nests in alpine terrain (Van Pelt et al., 2003). Kittlitz's murrelets are known to nest on stable, unvegetated scree slopes or steep rocky slopes or, more rarely, small crevices in cliff faces, especially when these sites are near the coast (Day et al., 1999). Less than a dozen Kittlitz's murrelets nests have been found in northern Alaska (Day et al., 2011). Kittlitz's murrelet nests have been found on the Seward Peninsula and likely occur as far north as the Cape Lisburne area (Day et al., 2011). Although no nests have been documented on the eastern portion of the Seward Peninsula or in the immediate area surrounding the proposed tower sites, suitable nesting habitat is found in the area from the Nulato Hills north to the Wainwright area (Day et al., 2011), and marginal to suitable nesting habitat was found to be present at the Otter Creek and Golovin Alternate tower sites (OASIS, 2011), respectively.

3.3.7.2 Spectacled Eider

Spectacled eiders were listed as Threatened in 1993 under the ESA. Spectacled eiders historically nested along the coast of Alaska from the Nushagak Peninsula to Barrow and the Yukon. Current breeding distribution is restricted to the Yukon-Kuskokwim Delta (Y-K Delta) and the north coast of Alaska (BLM, 2008a). Spectacled eiders migrate between wintering habitats and breeding grounds along the Bering and Chukchi shorelines. Molting areas include the eastern portion of Norton Sound and Ledyard Bay, and wintering occurs in the central Bering Sea south and southwest of St. Lawrence Island. Telemetry data suggests that Norton Sound is primarily used by molting females; most males migrate to Russia to molt (Sexson, 2012). After breeding in northern Alaska and Russia (Sexson, 2012) in the late summer and fall, eiders gather in flocks in coastal waters to molt. This occurs in four principle areas of Alaska and Russia, one of which is Eastern Norton Sound, which appears to be the primary molting area for females nesting on the Y-K Delta. Matt Sexson (2012) of USGS conservatively estimated that at least 4,000 eiders from western Alaska molt in the eastern Norton Sound. Flightless eiders are present in molting areas from July to October (USFWS, 2002). Because of its importance for molting, a

portion of Eastern Norton Sound has been designated as critical habitat for spectacled eiders. The Eastern Norton Sound Unit of critical habitat designation for spectacled eider encompasses the coastal and offshore waters on the eastern side of Cape Darby (where Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites are located) and the Golsovia River and Klikitarik Bay staging areas' coastal and offshore waters (Figure 3-8).

3.3.7.3 Steller's Eider

The Alaska population of the Steller's eider breeds along the Arctic Coastal Plain, with a small subset breeding on the Y-K Delta, and overwinter in coastal areas of the Alaska Peninsula, outside the project vicinity (USFWS, 2011c). Critical habitat for the Alaska breeding population of the Steller's eider includes breeding habitat on the Y-K Delta and four units in the marine waters of Southwest Alaska (66 FR8850). No critical habitat occurs in the project vicinity.

After breeding, birds leave for molting areas between late July and late October, in which the birds remain flightless for approximately three weeks. Molting habitat is characterized by extensive marine shallow areas with eelgrass beds and intertidal sand flats and mudflats. During the molt, Steller's eiders forage on marine invertebrates such as mollusks and crustaceans. Wintering habitat includes marine waters less than 35 ft. (10 m) deep, typically within 0.25 mi. (400 m) of shoreline. Prior to spring migration, the eiders stage in estuaries and small bays prior to continuing northward to nesting grounds (USFWS, 2011c). Steller's eiders likely occur in the project area only as a migrant or rare summer visitor (BLM, 2006). There is no estimate of the number of Steller's eiders using eastern Norton Sound (Sexson, 2012).

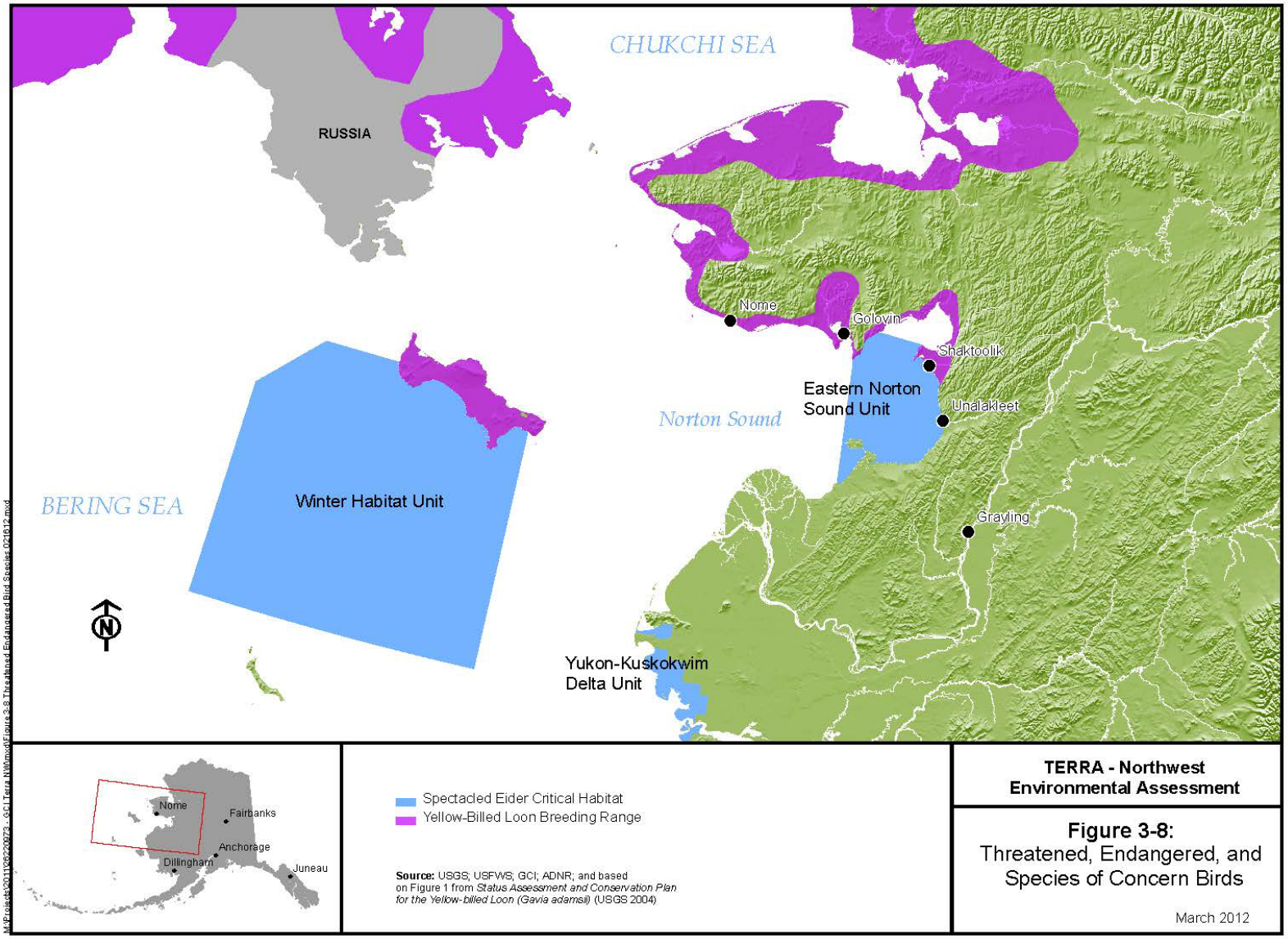
3.3.7.4 Yellow-Billed Loon

Yellow-billed loons nest near freshwater lakes in the Arctic tundra of northern Alaska, northwestern Alaska (including Norton Sound), St. Lawrence Island, and in Canada and Russia. Within Norton Sound, yellow-billed loons primarily use the northern regions, specifically Golovnin Lagoon, Golovnin Bay, Cape Darby, and Norton Bay (USFWS, 2009) (Figure 3-8). The wintering range includes nearshore/coastal waters of southern Alaska (USFWS, 2009). The loons nest exclusively in coastal and inland low-lying tundra with large, permanent, vegetated, fish-bearing lakes. Non-breeding habitat includes large rivers, and nearshore marine environments. Breeding begins in late May, and nests are located typically at the shoreline on islands or points of land. Loons dive for small fish, but also feed on aquatic vegetation, insects, mollusks, and frogs (ADFG, 2008a). Yellow-billed loons could potentially occur in the project vicinity during spring, summer, and fall.

3.3.7.5 Polar Bear

On May 15, 2008, the polar bear was listed as Threatened throughout its range under the ESA. The polar bear lives in association with the Arctic ice cap and spends most of its time in coastal areas. Some bears may make extensive north-south migrations with the seasonal movements of the pack ice. In winter, bears can be found as far south as St. Lawrence Island and occasionally as far south as the Kuskokwim Delta. In summer, the bears are most abundant around the edge of the pack ice in the Chukchi Sea and Arctic Ocean. Ringed seals are the primary prey of polar bears (USFWS, 2006). Polar bears are observed in GMU 22A and 22B and Gorn (2012) considered sightings to be common; approximately one sighting is made per year. Mr. Gorn confirmed that the project area is not polar bear habitat and bear sightings in the area are infrequent.

Figure 3-8. Threatened, Endangered, and Species of Concern Birds



3.4 Social Environment

3.4.1 Socioeconomic Characteristics

For socioeconomic resources, the geographic scope for the proposed project area includes communities that would potentially receive broadband service through early phases of the TERRA-NW Project. From south to north they include: Grayling, Unalakleet, Shaktoolik, Golovin, and Nome. There are no residents in the immediate vicinity of the proposed Otter Creek and Golovin Alternate tower site. The following discussion focuses on population, employment, income, and characteristics of the affected communities.

3.4.1.1 Regional Demographics and Economy

The communities within the area of influence organize regionally in a number of ways by language and culture, Alaska Native regional corporations and non-profit tribal associations, healthcare providers, or school districts. An example of regional organization constituency is shown in Figure 3-9 and a summary of key institutions is provided in Table 3-5. Unalakleet and Nome are regional population hubs that provide support transportation, government services, organizational headquarters, and freight distribution. Most communities in the project area are small and the trade and service sectors are not well-developed. The regional economy depends on the governmental sector (employment and funding for programs and infrastructure), utilities and trade, commercial fisheries, mining, and the visitor industry.

The population of the affected communities is 4,893 residents, distributed in the two hubs of Nome and Unalakleet, along with three smaller communities. Nome accounts for 54 percent of the regional population, followed by Unalakleet at 10 percent (Table 3-6). Alaska Natives make up the majority of the regional population at 67 percent, although in Nome, the ethnic composition is different, with Alaska Natives making up just 49 percent of the population. The regional population is young, as seen in the relatively low median age, particularly in the smaller communities, where the range is from 21.5 years in Stebbins to 27.2 years in White Mountain. For Unalakleet and Nome, the median ages are 33.1 years and 31.4 years respectively, which are closer to the Alaska statewide median age of 33.8 years.

Figure 3-9. Norton Sound Economic Development Corporation Member Communities

Other socioeconomic characteristics include low median family income, and high unemployment rates in the traditional cash economy. Family incomes are generally lower in the smaller villages, ranging from $26,750 in Grayling to $57,500 in Shaktoolik. Households in Nome enjoy larger median incomes, at $71,250, which is closer to the Alaska average of $75,493. Unemployment rates and poverty rates are more severe in the smaller villages, ranging as high as 18.2 percent unemployment in Grayling and 18.6 percent of families below the poverty level in Unalakleet. Nome shows just 4.9 percent unemployment and 1.9 percent of families below the poverty level, compared to Alaska rates of 6.0 percent unemployment and 6.9 percent of families below the poverty level.

The regional economy is dominated by state and local governments as the major employers in the project area. The subsistence (non-cash) economy is also of critical importance for every community. As shown in Table 3-7, the communities in the project area have limited mechanisms to capture tax revenue associated with the economic activities, such as construction of new infrastructure.

Table 3-5. Institutions in the Project Area

City Government	Regional Government[a]	ANSCA Regional Corporation	Regional Tribal Association	Tribal Government	Village Corporation	Health Care	Housing Authority	Economic Dev. CDQ Group	Utilities	School District	Internet	Cellular
Grayling	Unorganized	Doyon, Ltd.	Tanana Chiefs Conference	Organized Village of Grayling (aka Holikachuk)	Hee Yea Lingde Corp	Yukon Kuskokwim Health Corporation	Interior Regional Housing Authority	N/A	AK Village Electric Coop (AVEC)	Iditarod Area School District	GCI only in the school	GCI in 2012
Unalakleet	Unorganized	Bering Straits Native Corporation	Kawerak, Inc.	Native Village of Unalakleet	Unalakleet Native Corporation	Norton Sound Health Corp	Bering Straits Regional Housing Authority	Norton Sound Economic Development Corporation	Unalakleet Valley Electric Coop	Bering Strait School District	GCI, Nome.net	AT&T, GCI/UUI
Shaktoolik	Unorganized	Bering Straits Native Corporation	Kawerak, Inc.	Shaktoolik IRA[b] Council	Shaktoolik Native Corporation	Norton Sound Health Corp	Bering Straits Regional Housing Authority	Norton Sound Economic Development Corporation	AVEC	Bering Strait School District	GCI	GCI
Golovin	Unorganized	Bering Straits Native Corporation	Kawerak, Inc.	Chinik Eskimo Community	Golovin Native Corporation	Norton Sound Health Corp	Bering Straits Regional Housing Authority	Norton Sound Economic Development Corporation	Golovin Power Utilities	Bering Strait School District	GCI	AT&T, GCI Mulkluk Telephone
Nome	Unorganized	Bering Straits Native Corporation	Kawerak, Inc.	Nome Eskimo Community	Sitnasuak Native Corporation	Norton Sound Health Corp	Bering Straits Regional Housing Authority	Norton Sound Economic Development Corporation	Nome Joint Utility Systems	Nome Public Schools	GCI, Nome.net	GCI, TelAlaska, AT&T

Sources: ADCCED, 2011; ADLWDa; and Boyd, 2011.
a) Definitions of city and borough powers and responsibilities are defined in the Alaska Constitution, Article X, Section 3, 5 and 7 and AS 29.04.020
b) Indian Reorganization Act (IRA)

Table 3-6. Demographic and Socioeconomic Characteristics

	Grayling	Unalakleet	Shaktoolik	Golovin	Nome	Project Area Total	State of Alaska	United States
Population [a]	194	688	251	156	3,604	4,893	683,142	301 million
Percent Alaska Native [ab]	87%	77%	96%	93%	49%		13%	1%[c]
Median Age [a]	23.4	33.1	25.8	25	31.4	-	33.8	37.9
Unemployment Rate[c]	18.2%	7.9%	8.1%	12.7%	4.9%	-	6.0%	4.7%
Median Family Income[c]	$26,750	$41,250	$57,500	$38,214	$71,250	-	$75,493	$51,425
Family Poverty Rate[c]	16.7%	18.6%	13.5%	11.5%	1.9%	-	6.9%	9.9%

a) U.S. Census, 2010.
b) Alaska Native or Native American
c) **2005-2009 American Community Survey**

Table 3-7. Project Area Tax Regimes

Community	Borough[a]	Type[a]	Sales Tax	Property Tax	Special Tax
Grayling	Unorganized	2nd Class City	None	None	None
Unalakleet	Unorganized	2nd Class City	None	None	5% Bed 5% Alcohol
Shaktoolik	Unorganized	2nd Class City	4%	None	None
Golovin	Unorganized	2nd Class City	None	None	None
Nome	Unorganized	1st Class City	5%	10 mills	6% Bed

Sources: ADCCED

a) Definitions of city and borough powers and responsibilities are defined in the Alaska Constitution, Article X, Section 3, 5 and 7 and AS 29.04.020.

3.4.1.2 Community Profiles

The following section provides a brief overview for each community including economic drivers and major employers. A population, race, income, and employment summary can be found in Table 3-6.

Grayling

Grayling is a predominantly Athabascan community located on the west bank of the Yukon River, 18 mi. north of Anvik. In the 1960s, 25 families from former settlement of Holikachuk on the Innoko River moved to Grayling.

Grayling's economy is heavily dependent on subsistence activities and employment is primarily seasonal (e.g., 25 residents held commercial fishing permits in 2009 and an estimated 46 residents are employed) (ADCCED, 2011a; and US Census, 2009). The largest employer is local government, including the Iditarod Area School District, City of Grayling, and Interior Regional Housing Authority (Alaska Department of Labor and Workforce Development [ADLWD], 2011a).

Unalakleet

Unalakleet is located at the mouth of the Unalakleet River, 148 mi. southeast of Nome. It is a regional hub for Norton Sound, with a history of diverse cultures and active trade as well as a traditional Eskimo subsistence lifestyle (ADCCED, 2011b). Unalakleet has long been part of an important winter travel route connecting to the Yukon River. Historically, the village hosted the Russian-American Company trading post, Sami reindeer herders (formerly referred to as Laplanders), and the Army Signal Corps' telegraph line to St. Michael (ADCCED, 2011b).

The Unalakleet economy has a stronger mix of local government, and trades including a fish processing plant operated by the Norton Sound Economic Development Corporation. Typical of communities in this region, the largest employers are local government, including the administrative offices of the Bering Strait School District. The Unalakleet Native Corporation – Kawerak, Inc., the regional tribal association, and several private companies are in the list of top employers (ADLWD, 2011b).

Shaktoolik

Shaktoolik is located on the east shore of Norton Sound, 33 mi. north of Unalakleet. Shaktoolik was the first Malemiut Eskimo settlement on Norton Sound. It was originally located 6 mi. up the Shaktoolik River, but moved to the mouth in 1933 (ADCCED, 2011d).

Shaktoolik's economy is based on subsistence with limited employment in local government/school (Bering Strait School District and Shaktoolik Indian Reorganization Act [IRA] Council) and commercial fishing (ADLWD, 2011). Commercial fishing permits were held by 44 residents in 2009 (ADCCED, 2011d).

Golovin

Golovin is the smallest of the project area communities, located between Golovnin Bay and Golovnin Lagoon on the Seward Peninsula, 70 mi. east of Nome. The present site of Golovin was originally the Iñupiat Eskimo village of Chinik. The Mission Covenant of Sweden established a church and school south of the site in 1887; then Golovin became a supply point for gold mining, and later a reindeer herding site (ADCCED, 2011b).

Golovin's Iñupiat Eskimo economy is based on subsistence. The top employers are all local government or school entities: Bering Strait School District, City of Golovin, and Kawerak, Inc. (ADLWD, 2011b).

Nome

The City of Nome is the largest community in the project area and serves as the supply, service, and transportation center of the Bering Strait region. Malemiut, Kauweramiut, and Unalikmiut Eskimos occupied the Seward Peninsula historically, but a gold strike in 1898 brought thousands of miners to an isolated stretch of tundra and beach. The depletion of gold, an influenza epidemic, and the fire of 1934 gradually reduced Nome's population (ADCCED, 2011c).

The private sector provides the majority of employment for Nome residents, including year-round opportunities in retail services, transportation, mining, and other businesses. In 2009, 42 residents held commercial fishing permits (ADCCED, 2011c). The top employers in Nome are in the government sector, including the Norton Sound Health Corporation, the State of Alaska, and Kawerak Inc. (ADLWD, 2011a). Tourism is a growing industry in Nome in summer months including new cruise visitors as well as an increasing popularity of the Iditarod Trail Sled Dog Race finish in March (Cavin, 2011).

3.4.1.3 Access to Cellular and Internet Service

All project area villages except Nome utilize Wireless Internet Service Provider, a public wireless network service or "Fixed Point to Multipoint Wireless service," with speeds up to 256 kilobytes per second (kbps)-download/56 kbps-upload. In Nome, TelAlaska provides DSL Internet service at speed up to 512kbps (upload and download). GCI currently provide cable modem Internet service in Nome with speeds up to 2 Mbps download 512 kbps-upload. Grayling will continue with uneven cellular service until 2012, when GCI will install a tower within the community. The only Internet access is at the school (Huff, 2011; and ADCCED, 2011). A list of Internet and cellular providers is a part of Table 3-5.

The average cost per month per household is $50 plus any over-usage cap fees. There are other fees associated with residential Internet service including customer premises, equipment, and installation (Fleming, 2011).

3.4.2 Subsistence

Subsistence in Alaska is the traditional way of life through which communities, most of which are majority Alaska Native, secure a significant portion of their food through hunting, trapping, and fishing. Subsistence practices generally focus harvesting on several species of fish, land mammals, marine mammals, birds, and vegetation throughout the year in a regular cycle, timed for availability, access, and resource quality. While serving as a vital source of food, the subsistence livelihood is also essential to maintaining the social organizations and traditional beliefs and culture of a community – with harvest techniques, cooperative labor, and sharing practices serving as unifying elements. Thus, subsistence activities are the central connection for local communities with the land and resources provided by that land. As a result, protecting traditional subsistence rights has been a significant issue in Alaska Native political efforts and was a major impetus behind the Alaska Native land claims movement of the 1960s.

As a result of these efforts, a complex regulatory framework governs contemporary subsistence activities in Alaska based on federal and state statues, land ownership, and the effect of federal and state court decisions.

Section 803 of the Alaska National Interest Lands Conservation Act (ANILCA) defines subsistence uses as:

> *The customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of inedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter or sharing for personal or family consumption; and for customary trade (16 USC § 3113).*

The following sections summarize subsistence harvest patterns for communities within the affected Otter Creek and Norton Sound areas. Each of the communities in the project area actively participates in subsistence hunting, trapping, and fishing activities, both on federal and state lands, however, the documentation of subsistence activities is uneven, so that different forms of documentation exist for the four communities of Grayling, Unalakleet, Golovin, and Nome. These communities are selected for discussion in this section, based on availability of data and their proximity to the federal and non-federal lands affected by the TERRA-NW Project. The sections that follow will characterize the subsistence use patterns, and depending on the documentation available for each community, will emphasize seasonal harvest cycles, species pursued, rates of participation, harvest levels, and subsistence use areas.

3.4.2.1 Grayling Subsistence Harvest Practices

The predominantly Holikachuk Athabascan residents of Grayling pursue a subsistence way of life based on the riverine ecosystem of the middle Yukon River. This includes high reliance on salmon, other fish species and moose, high rates of participation in subsistence harvest activities, and high annual rates of production of subsistence foods. The community baseline study for Grayling, conducted by the ADFG Division of Subsistence in 1990, provides participation and harvest amounts for the major resource categories utilized by the community (ADFG, 1990).

High levels of subsistence harvest participation indicate the importance of subsistence resources to the community. Of the households surveyed, all households (100 percent) reported engaging

in salmon harvests and non-salmon harvests, while 56 percent also participated in large land mammal harvests, predominantly moose (Table 3-8). In total, the community of Grayling harvested approximately 180,000 pounds of subsistence foods, representing an estimated 894 pounds of subsistence food per person within the community over the year.

Table 3-8. Grayling Community Harvest Data

Study Year	Resource	Percent of Households Harvesting	Reported Pounds Harvested	Estimated Pounds Harvested	Average Pounds Harvested per Household	Per Capita Pounds Harvested
1990	**All Resources**	100	159,066	182,343	3,880	894
1990	**Salmon**	100	66,610	76,358	1,625	374
1990	**Non-Salmon Fish**	100	26,889	30,824	656	151
1990	**Large Land Mammals**	78	52,215	59,856	1,274	293
1990	**Small Land Mammals**	56	6,582	7,545	161	37
1990	**Birds and Eggs**	85	5,265	6,035	128	30
1990	**Vegetation**	100	1,505	1,725	37	8

These subsistence harvest activities display the primary dependence on the Yukon River riverine ecosystem. Salmon, large land mammals, and non-salmon fish represented 92 percent of the total resources harvested by the community. Of the 894 pounds of subsistence resources estimated as the annual harvest per person for the community, 59 percent are from salmon and other fish resources, while an additional 33 percent are derived from large land mammals, predominantly moose harvested within the riparian corridors.

3.4.2.2 Unalakleet Subsistence Harvest Practices

Located at the mouth of the Unalakleet River on Norton Sound, the community of Unalakleet relies on coastal resources, including salmon, other fish, and marine mammals, as well as land mammals, particularly from the Unalakleet River drainage. Residents have access to a wide variety of subsistence resources year-round, which they harvest in large quantities (Jorgensen, 1990). The seasonal subsistence harvest patterns for Unalakleet highlights the diversity and seasonality of the resources harvested, as characterized in Figure 3-10.

Figure 3-10. Unalakleet Seasonal Round

Species	Winter	Winter	Winter	Spring	Spring	Summer	Summer	Summer	Fall	Fall	Winter	Winter
	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Whale (beluga)					▬▬	▬▬	▬▬		▬▬			
Seal	▬▬▬	▬▬▬	▬▬▬	▬▬	▬▬					▬▬▬	▬▬▬	▬▬▬
Walrus					▪▪▪	▪▪▪						
Waterfowl				▬▬▬	▬▬▬				▬▬▬			
Land Birds	▬▬▬	▬▬▬	▬▬▬							▬▬▬	▬▬▬	▬▬▬
Roots/Berries				▬▬▬	▬▬▬	▬▬▬	▬▬	▬▬	▬▬	▬▬		
Salmon Roe						▬▬	▬▬▬	▬▬▬	▬▬	▬▬		
Salmon	▬▬▬					▪▪▪	▪▪▪	▪▪▪	▪▪▪	▬▬▬	▬▬▬	▬▬▬
Freshwater Fish	▬▬	▬▬			▬▬▬	▬▬▬	▬▬▬	▬▬▬	▬▬▬	▬▬	▬▬	▬▬
Saltwater Fish	▬▬	▬▬▬	▬▬▬	▬▬▬						▬▬▬	▬▬▬	▬▬
Hares	▬▬▬	▬▬▬	▬▬▬							▬▬▬	▬▬▬	▬▬▬
Caribou	▬▬▬	▬▬▬	▬▬▬							▬▬▬	▬▬▬	▬▬▬
Moose								▬▬▬	▬▬▬	▬▬	▬▬	▬▬▬
Bear				▬▬▬				▬▬▬	▬▬▬	▬▬▬	▬▬▬	▬▬▬
Small Mammals				▬▬▬								
Fur-Bearing Animals	▬▬▬	▬▬▬	▬▬▬	▬▬▬						▬▬▬	▬▬▬	▬▬▬

Key: ▬▬▬ High Intensity; ▬▬ Medium Intensity; ▪▪▪ Low Intensity

The seasonal round represents a set of harvest strategies to efficiently utilize subsistence resources, based on the seasonal availability and abundance, and the quality of the resource. For the community of Unalakleet, the bulk of the food stored and eaten is acquired during the summer, with a heavy reliance on salmon (Jorgensen, 1990). In addition to these concentrated and highly productive seasonal activities, each of the harvest activities throughout the year plays an important role in the annual cycle. In late winter, spring, and fall, hunting for seals is common. During the winter and spring season, fishing, both for fresh and saltwater fish, provides an important fresh food source, complementing the salmon harvesting during summer. Throughout the fall season, large land mammals are targeted, such as caribou, moose, bear, and various small mammals. The prevalence of subsistence harvest activities throughout the year highlights the importance of subsistence in the livelihood of the community.

3.4.2.3 Golovin Subsistence Harvest Practices

The Iñupiat residents of Golovin also rely predominantly in the marine resources of Norton Sound, with salmon, other fish, and marine mammals accounting for 71 percent of total subsistence harvests. The community harvest data available for Golovin, as shown in Table 3-9, provides information on the harvesting, giving, and receiving of subsistence resources within the community, based on a community baseline study conducted in 1989. The community of Golovin shows very high rates of participation in subsistence harvest activities, with 88 percent to 90 percent of households harvesting salmon and other fish, 60 percent of households taking land mammals, and 58 percent taking marine mammals. In total, the community of Golovin shows very high rates of food production, amounting to 102,000 pounds of subsistence food, representing 604 pounds of subsistence harvest per person for the community.

Table 3-9. Golovin Community Harvest Data

Study Year	Resource	Percent Using	Percent Attempting to Harvest	Percent Harvesting	Percent Giving Away	Percent Receiving	Estimated Pounds Harvested	Avg. Pounds Harvested per Household	Per Capita Pounds Harvested
1989	**All Resources**	100	100	100	87.9	100	102,143	2,491	605
1989	**Salmon**	100	87.9	87.9	45.5	69.7	27,235	664	161
1989	**Non-Salmon Fish**	93.9	90.9	90.9	66.7	69.7	13,803	337	85
1989	**Large Land Mammals**	97	63.6	60.6	54.5	90.9	17,133	418	101
1989	**Small Land Mammals**	60.6	63.6	51.5	18.2	27.3	690	17	4.
1989	**Marine Mammals**	87.9	57.6	57.6	51.5	75.8	32,332	786	191
1989	**Birds and Eggs**	100	90.9	90.9	63.6	60.6	4,158	101	25
1989	**Vegetation**	97	93.9	93.9	45.5	48.5	4,979	121	29

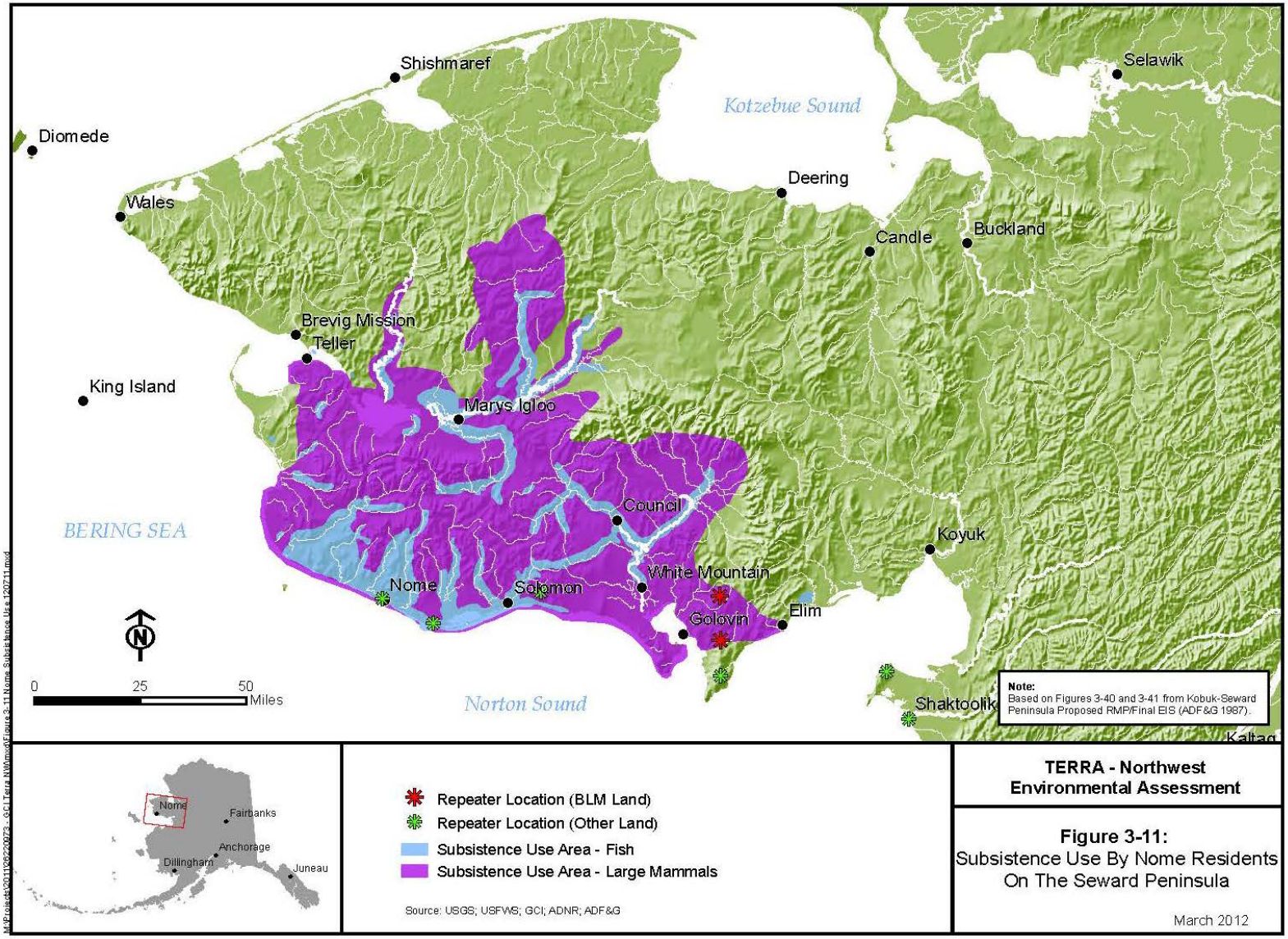
Highlighted within the household participation data is the importance of sharing subsistence resources within the community, particularly in relation to resources that provided major food energy sources; salmon, large land mammals, and marine mammals. Within the community, approximately 50 percent of those harvesting salmon, large land mammals, and marine mammals reported giving away subsistence resources, with 70 to 90 percent receiving subsistence resources from within the community. For the community, sharing subsistence resources represents an essential element of the local culture, as well as an important process for distributing food among the households.

3.4.2.4 Nome Subsistence Harvest Practices

The community of Nome is more ethnically diverse than the smaller communities in Norton Sound, yet the Iñupiat and non-Native residents participate in subsistence activities, focused on fish and marine resources, as well as land mammals like moose, caribou and muskoxen. The best available indicator of the subsistence harvest practices for Nome is the subsistence use area maps developed by the ADFG Subsistence Division in 1987 (ADFG, 1987). These areas are represented by the subsistence use areas for large mammals and fish (Figure 3-11).

The map figure indicates that subsistence harvest practices extend across the lands and waters near Nome, including large distances covered by community members to harvest large land mammals (moose, caribou, and bear) and to collect salmon and other fish. The subsistence use area for large mammals encompasses the towers from Nome to the Golovin Alternate tower site, while fish harvests occur along the coast, as well as within many freshwater drainages.

Figure 3-11. Subsistence Use by Nome Residents on the Seward Peninsula



3.4.3 Land Use and Recreation

This section provides an overview of land ownership and use patterns associated with recreation and special use activities within the proposed project area. The predominant land uses include subsistence and recreational uses. Recreation activities include snowmachining, dog mushing, long-distance winter racing events, hunting, fishing, wildlife viewing, camping, and hiking. Subsistence uses such as hunting, fishing, and gathering may appear similar to recreational activities, but because they have different legal rights and privileges, they are discussed separately and in greater detail in Section 3.4.2. Commercial reindeer grazing also occurs.

3.4.3.1 Land Ownership

Ownership patterns in the project vicinity include a mixture of federal, state, and private lands. Under the Alaska Statehood Act, federal lands within the project area were made available for selection and transfer to the State of Alaska. The proposed site of the Golovin Alternate tower site is located on state-selected land that has not been approved for transfer. Consequently, the site is BLM-managed and subject to all federal laws and management plans.

Private land owners in the region include Alaska Native regional and village corporations and Alaska Native allotment owners. The Alaska Native corporation land holdings are generally centered on the communities, and beyond the immediate vicinity of the community most of the Alaska Native corporation lands are not extensively developed. Individual Alaska Native allotments are frequently in areas accessible by water, such as along rivers and coastlines. Figure 2-1 displays the land status surrounding the two tower sites on BLM-managed lands, as well as the eight microwave towers on private lands.

3.4.3.2 Recreational Use

BLM issues Special Recreation Permits for activities involving commercial recreation, competitive events, vending, use of special areas, and organized group activities on federal lands. In the vicinity of the Otter Creek tower site, permits authorize guide-outfitter activities on federal land. On nearby state-selected land an undeveloped airplane access site and base camp for guide-outfitting is located about 5 mi. to the northwest. The Golsovia River area trails occur on nearby federal and state lands. A commercial dog mushing operation is permitted (during March) near the coast between Saint Michael and Unalakleet on an existing winter trail. (See Map 1 in Appendix D for locations of authorized commercial recreational activities in the vicinity of the Otter Creek tower site.) Commercial filming permits have been issued during racing events using the Iditarod race route.

The project would occur on lands within GMUs 21 and 22 where ADFG regulates the seasons, licenses, and bag limits for sport fishing and hunting activities (ADFG, 2011b). Big game hunting in the area includes moose, caribou, bear and muskoxen. Private recreational lodges in the area include the Anvik River Lodge, located about 32 mi. south of the Otter Creek tower site, and the Alaska Fishing Lodge, located at the mouth of the Golsovia River, north of the proposed staging area at Klikitarik Bay.

3.4.3.3 Iditarod National Historic Trail Use

Historically, gold seekers opening the route around Norton Sound in 1899 chose to develop a route over the high inland ridges of the Kwiktalik Mountains because the high cliffs of Cape

Darby and dangerous nearshore ice flows made for an otherwise risky passage around the peninsula. Although not as challenging as a coastal route, the summit of the inland route was dubbed "Little McKinley" because it was the second-biggest "climb" on the trail and posed potential hazards to trail travelers. For this reason, the trail was maintained by the Alaska Road Commission (and later the Alaska Department of Transportation) almost continuously between 1913 and 1965, and historic road houses and contemporary safety cabins were established on either side of the summit, one of which is still in use. The historic trail segment between Walla Walla Road House (Walla RH in Figure 3-12) and McKinley Creek is designated as the Primary Route of the Iditarod NHT.

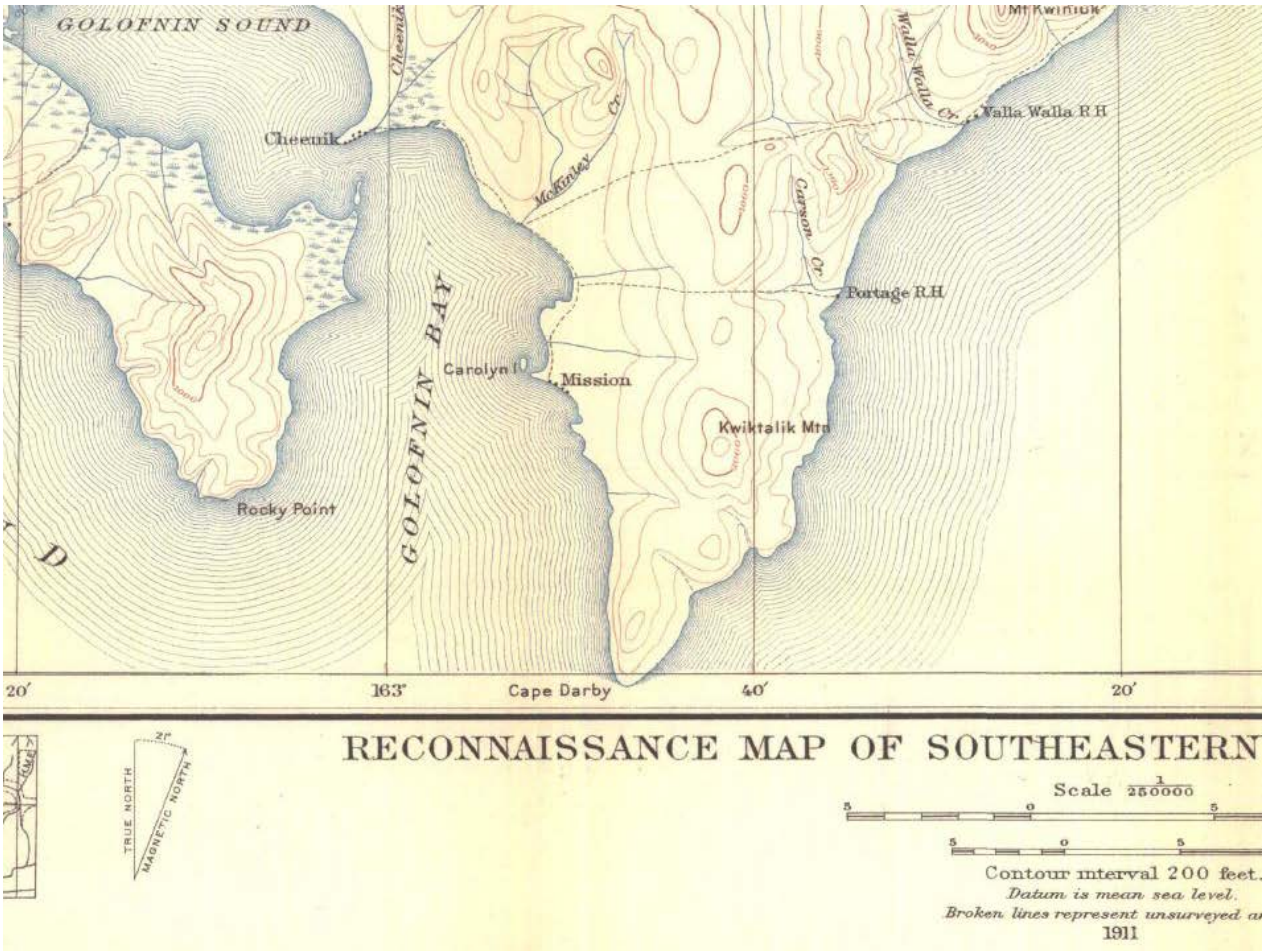


Figure 3-12. USGS Bulletin 449 reconnaissance map from 1911 depicts routes over the Kwiktalik Mountains at Cape Darby peninsula

3.4.3.4 Iditarod Trail Race Event Use

The Iditarod Trail Sled Dog Race attracts spectators and race volunteers from throughout the state, along with national and international visitors, during the three-week event that occurs in March of each year. The modern race trail differs from the Iditarod historic-primary route alignments in the segment crossing the Kwiktalik Mountains north of Cape Darby (see Figure 3-13). The portion of the race trail that parallels the TERRA-NW Project contains numerous checkpoints, including Unalakleet, Shaktoolik, Koyuk, Elim, Golovin, White Mountain, and Safety Sound Roadhouse, before finishing in Nome.

Other regularly scheduled races that use the Iditarod race route include the Iron Dog snowmobile race, the Nome Golovin Snowmobile Race, the Norman Vaughn Serum Run, the Paul Johnson Memorial 400, and the Iditarod Trail Invitational. Some events are supported by aircraft, including the so-called Iditarod Air Force that drops musher supplies and provisions and others that use aircraft for filming from the air. All of these events are held in February or March.

The winter route for these events follows the Iditarod race route between Elim and Golovin, and is generally located between the historic-primary route and the historic-connecting route of the Iditarod NHT. All events on BLM lands are normally required to receive a Special Recreation Permit that identifies terms and conditions for the protection of public land resources.

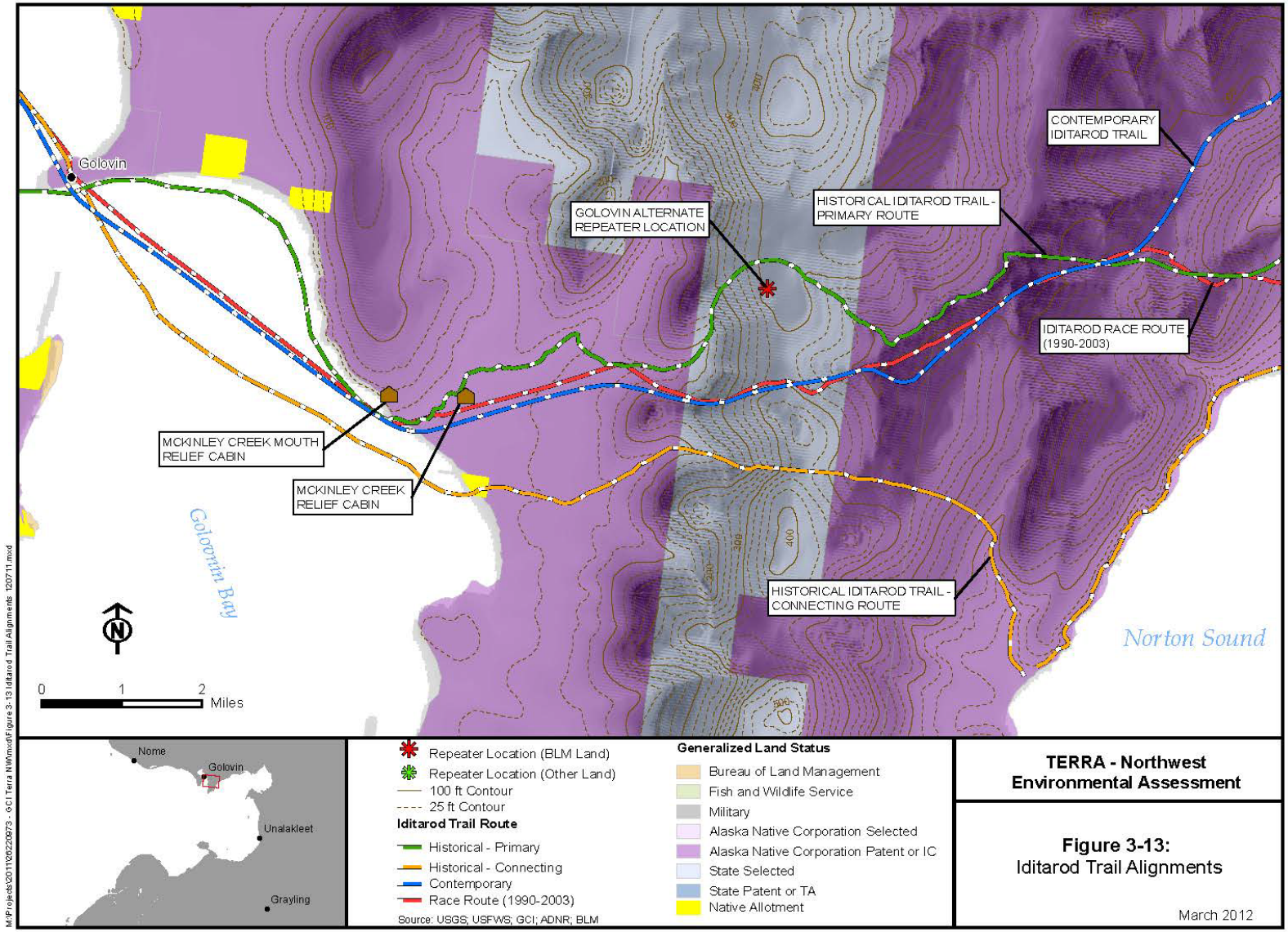
3.4.3.5 Iditarod Trail Recreational Use

Casual use of the Iditarod race route occurs primarily in winter months, although it is frequently associated with subsistence, trapping, hunting or fishing activities. Another subset of users accesses the trail primarily for transportation between villages, although it is sometimes difficult to distinguish use patterns as relating strictly to transportation or recreation. The final and smallest subset of casual trail users are those who are traveling strictly for recreation purposes, such as long-distance skiing. The majority of casual trail use is with snowmachines.

Conflicts between motorized and non-motorized trail users relates mostly to the safe and sober use of snowmachines around pedestrian trail users. Otherwise, mixed trail use is a commonplace and accepted practice due to the predominance of snowmachines as the primary mode of winter travel.

A small amount of casual and commercial recreational flight-seeing is associated with the Iditarod Trail Sled Dog Race, although some occurs at other times of the year. In these cases, individuals will either pilot their own aircraft or rent a charter to make a relatively-low level sightseeing trip along the Iditarod race route, stopping at towns along the trail as necessary or desired.

Figure 3-13. Iditarod Trail Alignments



3.4.4 Transportation

The communities within the proposed project area are arrayed across a vast landscape, often located on coastlines and rivers, reflecting the regional history of traditional Alaska Native settlement and historic mining. Limited road access and mountainous terrain within the proposed project area has led to reliance on aviation services as the predominant means of inter-community transportation, particularly in the summer season. During the winter months there is extensive use of snowmachines and regional trail networks, which provide an important means of inter-village travel (Alaska Department of Transportation and Public Facilities [ADOTPF] 2004).

The project area has a robust and well-developed air transportation services network based primarily out of Nome, and to a lesser extent Unalakleet. As regional transportation hubs, these two communities have a well-developed aviation infrastructure, with airstrips greater than 5,000 ft., and in Nome, a state-owned heliport (Table 3-10). This infrastructure allows for daily, year-round air transportation and services to Anchorage, which at the time of writing was provided by Peninsula Airways, Alaska Airlines, and Era Aviation. Smaller communities within the region have airstrips averaging between 3,000 and 4,000 ft., shown in Table 3-10, which enables daily and weekly commercial passenger and cargo flights to Nome or Unalakleet, connecting the communities in the region. In addition, many small bush airlines fly scheduled and charter flights out of Nome and Unalakleet to the surrounding communities and remote locations. From Nome, Bering Air provides helicopter charter services using a fleet of three Robinson R-44 Raven II helicopters, which provide limited personnel and light-lift cargo transport to remote sites inaccessible by small bush planes. The medium- and heavy-lift helicopter capacity required for the proposed project, which necessitate use of Bell UH-1H Huey and Erickson Air Crane helicopters, are not available locally, and therefore would be chartered externally and brought to the region for this project.

Table 3-10. Proposed Project Area Transport Capabilities by Community

Community	Aviation Facilities	Based Helicopters
Grayling	2,315 ft. state-owned airport, gravel airstrip	0
Unalakleet	5,900 ft. state-owned gravel airstrip	0
Shaktoolik	4,001 ft. state-owned gravel airstrip	0
Golovin	4,000 ft. state-owned gravel airstrip	0
Nome[a]	5,576/6,001 ft. two state-owned paved runways	0
Nome[a]	1,950 ft. state-owned gravel airstrip for general aviation	0
Nome[a]	State-owned heliport	5

Source: ADCCED 2011

a) The only certified Part 139 Airport that is authorized by the Federal Aviation Administration for scheduled air carrier operations for aircraft larger than 9 passengers.

3.4.5 Noise

Existing noise levels in the environs of the proposed microwave repeater tower sites are low, while ambient noise levels in the vicinity of nearby population centers (see Table 3-5) are influenced by man-made (anthropogenic) noise sources, being higher than ambient noise levels in undeveloped areas. The following sections provide information on acoustics and noise measurement, relevant laws, ordinances, regulations, and standards related to environmental noise, and the existing noise environment in the vicinity of the proposed project.

3.4.5.1 Acoustics

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that is typically associated with human activity and interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to typical environmental noise exposure levels is annoyance. The responses of individuals to similar noise events are diverse and influenced by many factors including the type of noise, the perceived importance of the noise, its appropriateness to the setting, the time of day, and the type of activity during which the noise occurs, and noise sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and amplitude. Frequency describes the sound's pitch (tone) and is measured in cycles per second (Hertz [Hz]), while amplitude describes the sound's pressure (loudness). Because the range of sound pressures that occur in the environment is extremely large, it is convenient to express these pressures on a logarithmic scale that compresses the wide range of pressures into a more useful range of numbers. The standard unit of sound measurement is the decibel (dB).

Typical sound levels of familiar settings are depicted in Figure 3-14 and include the approximate decibel levels of commonly known sound sources (National Park Service [NPS], 2007). It should be noted that the decibels are logarithmic and a difference of 10 dBs is perceived as a doubling or halving of loudness. The range of audible sound levels for humans is generally considered from 0 to 130 A-weighted decibels (dBA). Sound sources in Figure 3-14 that have no associated distance listed are at typical operational distances. More information on sound and sound measurements is found in Appendix E: Background Material for Analysis of Noise.

dBA	Perception	Outdoor Sounds	Indoor Sounds
130	Painful		
120	Intolerable	Jet aircraft at 50 ft.	Oxygen torch
110	Uncomfortable	Turbo-prop at 50 ft.	Rock Band
100		Jet fly over at 1,000 ft.	Blood-curdling scream
90	Very noisy	Lawn mower/nearby Thunder	Hair dryer
80		Diesel truck 50 mph at 50 ft.	Food blender
70	Noisy	2-stoke snowmobile 30 mph at 50 ft.	Vacuum cleaner
60		4-stroke snowmobile 30 mph at 50 ft.	Conversation
50	Moderate	Croaking raven flyover at 100 ft.	Office
40		Snake River at 100 ft.	Living room
30	Quiet	Summer backcountry	Quiet bedroom
20	Very quiet	Winter backcountry	Recording studio
10	Barely audible	Below Standard noise floor	
0	Limit of audibility	Quiet winter wilderness	

Figure 3-14. Approximate Decibel Levels of Commonly Known Sound Sources.

Source: NPS, 2007.

3.4.5.2 Applicable Laws, Ordinances, Regulations, and Standards

There are a number of laws and guidelines at the federal level that direct the consideration of a broad range of noise issues, including the Noise Control Act of 1972 and EPA recommendations regarding environmental noise levels. Because the project does not fall within the purview of the Federal Energy Regulatory Commission, the project is not directly subject to federal noise regulations other than the Occupational Safety and Health Administration. More information on applicable laws, regulations, and standards is located in Appendix E.

3.4.5.3 Existing Noise Conditions

Two proposed microwave repeater tower sites would be located on lands managed by BLM and five additional microwave towers would be located on remote private lands as part of the project. Ambient noise levels vary throughout the project area that would be used for project equipment staging, construction, and operation. Noise levels vary based on population density, distance to nearby traffic (trucks, snowmachines, 4-wheelers, off-road vehicles, aircraft flight patterns, nearby wildlife (e.g., passing waterfowl), natural features (water), weather, and other various conditions. The six proposed microwave repeater tower sites (on federally-managed and private lands) are located in undeveloped areas where the only sources of noise would be expected to occur from natural sources or occasional aircraft. The three proposed community towers (Unalakleet, Shaktoolik, and Nome) and the staging areas associated with all towers are located on private lands. Since a majority of the lands around the staging areas and tower sites are scarcely populated, low ambient noise levels can be expected along much of the project. No empirical data are available to definitively document ambient noise levels at the site affected by the project, however, given the remote character of the landscape and expected low ambient

noise levels, the effect of this data gap would be minimal. In an Environmental Impact Statement (EIS) prepared by BLM (2002), it is stated that typical ambient noise levels in sparsely populated rural areas can range from 15 dBA to 45 dBA equivalent sound level (L_{eq}) (21 dBA to 51 dBA day-night sound level ($L_{dn]}$) (BLM, 2002). These measures take into account changes in sound levels over a 24-hour period, and not just minimum or maximum sound levels (See Appendix E for explanation of the dBA L_{eq} measurement). Other research has provided empirical measures of sound levels in remote backcountry locations, including 30 dBA in summer backcountry and 20 dBA in winter backcountry (NPS, 2007), as shown in Figure 3-14.

3.4.6 Visual Resources

3.4.6.1 Introduction

The analysis area for visual resources was defined by a 15-mi.-radius surrounding the four tower sites under review: Otter Creek, Golovin Alternate, Hill 2211, and Kwiktalik Mountain). In addition, five remote repeaters and three community towers sited on private lands are analyzed as connected actions. The analysis area also included portions of the Iditarod race route and the Iditarod historic-primary route located within the Kaltag to Nome segment of the Iditarod NHT.

3.4.6.2 Regulatory Setting

Regulation and management of visual resources within the analysis area is directed by the federal laws identified in Section 1.2, including NEPA and FLPMA. :

The BLM's visual resource management (VRM) policy identifies a basic stewardship responsibility to identify and protect visual values on all BLM lands. This policy is described in the Land Use Planning Handbook (BLM, 2005) and VRM System (BLM, 1986b), described below.

- ***Land Use Planning Handbook*** – the BLM Land Use Planning Handbook (BLM, 2005) states that VRM classes shall be designated for all BLM land based on consideration of visual resource inventory (VRI) data and management considerations for other land uses. Resource use and management activities shall be managed according to the VRM objectives established in the land use plan.
- ***VRM System*** – visual resources on BLM-administered lands are managed per the VRM System (BLM, 1986). The VRM System is composed of three parts: The VRI, planning for VRM through assignment of VRM Classes, and Plan implementation/project analyses using the Visual Resource Contrast Rating System.

The VRI involves identifying the visual resources of an area and assigning them to inventory class using BLM's VRI process. The process involves rating the visual appeal of a tract of land (Scenic Quality), measuring public concern for scenic quality (Sensitivity Level), and determining whether the tract of land is visible from travel routes or observation points (Distance Zones). The BLM-administered lands are placed into one of four VRI classes based on the interrelationships among the three inventoried values. The values are mapped independently, then overlaid and assigned the appropriate class in accordance with the VRI Class placement matrix. The VRI Classes represent the existing visual value at the time of the inventory.

- **Class I** – assigned to all special areas where the current management situation requires maintaining a natural environment essentially unaltered by man, such as Wilderness Areas or Wilderness Study Areas.
- **Class II** – highest visual value assigned through the inventory process and based on the combination of Scenic Quality, Visual Sensitivity Levels, and Distance Zones.
- **Class III** – moderate visual value based on the combination of Scenic Quality, Visual Sensitivity Levels, and Distance Zones.

- **Class IV** – low visual value based on the combination of Scenic Quality, Visual Sensitivity Levels, and Distance Zones.

In the Visual Resource Planning phase, the results of the VRI become an important component of BLM's RMP for an area. The RMP establishes how the public lands will be used and allocated for different purposes, and it is developed through public participation and collaboration. During the land use planning process, visual values are considered in relation to other resource values, and impacts are analyzed under each alternative to best ascertain the most appropriate VRM Class designation, factoring in protection of visual values, other resource management priorities, and desired outcomes. These VRM Classes establish the following management objectives:

- **Class I Objective** – to preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- **Class II Objective** – to retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- **Class III Objective** – to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- **Class IV Objective** – to provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

The Visual Resource Contrast Rating System provides a powerful project-level planning and design tool, which also works to achieve BLM's environmental impact analysis responsibility under the NEPA. This tool helps to identify contrast in the landscape to determine whether the potential visual impacts from proposed surface-disturbing activities will meet the management objectives established for an area, or whether design adjustments will be required. The visual contrast rating process compares the project features with the major features in the existing landscape using the basic design elements of form, line, color, and texture, and evaluates the detectability by the casual observer. The analysis can then be used as a guide for resolving visual impacts. Once every reasonable attempt is made to reduce visual contrast, BLM managers can reach the most appropriate decision based on VRM Class conformance.

1. Accept the project proposal based on conformance with VRM Class Objectives.
2. Deny the project based on non-conformance with VRM Class Objectives.
3. Attach additional mitigation stipulations to bring the proposal into conformance with established objectives.
4. Choose to revise the VRM Class designation through a land use plan amendment in order to proceed with an otherwise non-conforming project.

The Contrast Rating System can also inform reasonable mitigation of visual contrasts even if the project is in conformance with VRM Class Objectives. The VRM designations for portions of the proposed project located on BLM-administered lands are described below.

- ***Otter Creek tower site*** – the Otter Creek tower site is located near the Anvik River on BLM-managed lands managed per the Management Framework Plan for the Southwest Planning Area (BLM, 1981). A VRM designation is not provided for the proposed

project area; however, the interim VRM classification designation for the Otter Creek project site is Class III.

- ***Golovin Alternate and Hill 2211 tower sites*** – the proposed Golovin Alternate and Hill 2211 tower sites are located on BLM-administered lands managed under the terms of the Kobuk-Seward Peninsula RMP (BLM, 2006). Per the Kobuk-Seward Peninsula RMP, the proposed Golovin tower site is located on lands managed per VRM Class III guidelines.
- ***National Landscape Conservation System (NLCS)*** – as noted in Section 1.2.3, the NLCS was established under the *Omnibus Public Land Management Act of 2009* (Act). The act protects public lands characterized by outstanding cultural, ecological, and scientific importance. The Iditarod NHT is designated as a unit of the NLCS. BLM policy requires management to protect the values for which NLCS lands were designated. If consistent with such protection, appropriate multiple uses may be allowed. The act requires inventorying each unit of the NLCS. Lands should be managed to VRM Class I or II standards throughout the unit in order to preserve the existing character of the natural and cultural landscape.
- ***The Iditarod NHT Comprehensive Management Plan (CMP) (BLM, 1986a)*** – Section 1.2.3 provided a summary of the establishing legislation and management plan for the Iditarod NHT. No VRM objectives are provided in the Iditarod NHT CMP.

3.4.6.3 Existing Conditions

Landscape Character

Landscape character is defined as the overall impression created by an area's unique combination of features, such as land, vegetation, water, and existing structures (cultural modification). The landscape character of the Otter Creek tower site and the Golovin Alternate, Hill 2211 and Kwiktalik Mountain tower sites is discussed below.

- ***Otter Creek tower site*** – the Otter Creek tower site is located in the Nulato Hills, situated between Norton Sound and the Yukon River Valley. This topographic feature, described as the Nulato Hills physiographic region, is composed of numerous distinct peaks and ridges extending in a northeast trajectory. Peaks are rounded and slopes are described as gentle, with "fine-textured" topography (Wahrhaftig, 1965). The topography, though prominent against the surrounding lowlands, measures only 3,411 ft. at its highest elevation, and runs approximately 30 mi. across. The area is remote, with no structures or settlements present.
- ***Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites*** – the Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites are located in the Darby Mountains, due north of Cape Darby in the Seward Peninsula physiographic region (Wahrhaftig, 1965). Cape Darby is bordered by Golovnin Bay on the west side, Norton Bay on the east side, and Norton Sound on the south side. The landscape character of the analysis area appears natural and remote. The southern portion of the Darby Mountains is characterized by broad, gently rolling topography. Views are expansive from hilltops, including Cape Darby and surrounding waterbodies. Winter conditions are characterized by heavy snowpack. The bays are covered with contiguous ice and snow during winter months, appearing as extensions of the surrounding valleys; however, views are

condensed and enclosed when situated in small valleys and drainage areas. The western portion of this Darby Mountains is generally void of shrubs and trees. Vegetation appears green-yellow with a soft texture during the summer months. Winter months are characterized by contiguous snow cover. Patches of scattered dark grey, blocky and angular rock are common on hilltops, and may be exposed during winter months where winds have blown snow from exposed hilltops. The west side of Cape Darby is characterized by a broad valley leading to Golovnin Bay. The valley is covered in low-growing vegetation such as shrubs, grasses and forbs, and marsh land areas (BLM, 2006). Shrubs are confined to drainages, and create distinct curvilinear lines in the landscape. The east side of Cape Darby includes the northeast-trending Kwiniuk River, and the broad, forested Kwik River Valley. Areas located east of the project site differ from the west due to the marked increase in forested areas. These areas appear dark green and stippled against the surrounding lighter green vegetation apparent during summer months, and the white snow of the winter months. The lower portion of Cape Darby is characterized by steep topography and cliffs that drop precipitously in places into Norton Sound.

The area is largely undeveloped. The community of Golovin (population 144) is located approximately 8 mi. away. The town is contained within a small area located on the north side of Golovnin Bay. A single remnant wooden structure is located in the valley on the west side of Cape Darby (see Section 3.4.7). Several trail systems cross the analysis area of the proposed repeaters: 1) The Iditarod historic primary route, 2) the Iditarod historic connecting route, 3) the Iditarod contemporary route, and 4) the Iditarod race route from 1990-2003 (see Figure 3-13). The Iditarod Trail Race route appears as an approximately 10-foot-wide irregular line during snow-free months due to repeated compaction of snow and underlying vegetation. The trail is marked periodically by wooden "tripods." The Iditarod NHT is discussed further in Section 3.4.7.

Visual Resource Inventory Class

The VRI value describes the relative value of scenic resources based on the interrelationship between scenic quality, visual sensitivity, and visual distance zones. Complete VRI data is not available for lands within the analysis area. Available data are summarized as follows:

- ***Otter Creek tower site (Southwest Planning Area)*** – no scenic quality inventory or VRI has been completed for BLM-administered lands within the Southwest Planning Area (BLM, 1981); consequently, no VRI or component scenic quality data are available for the Otter Creek tower site analysis area.
- ***Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites*** – the VRI value for Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites analysis areas is defined as Class III, however, no component data for scenic quality, visual sensitivity, or distance zones are available (BLM, 2006).
- ***Proposed Towers and Connected Actions (Iditarod NHT)*** – although no VRI value is established for the Iditarod NHT, a scenic quality inventory was completed for this 1000-ft. corridor (BLM, 1986b). Scenic quality was assessed within Scenic Quality Rating Units (SQRUs) measuring between 15 to 35 linear mi. along the trail and portions of the overlapping The Iditarod Race route. Groups of SQRU were grouped into analysis units

based on the predominant physiography of a segment. The project and connected actions are located within the Norton Sound analysis unit.

Baseline VRI data for scenic quality, visual sensitivity, and visual distance zones is presented below. Scenic quality data is based on that obtained from the Iditarod NHT CMP (BLM, 1986b). Information on visual sensitivity and visual distance zones is based on information gleaned through BLM planning documents, agency coordination, and scoping.

Scenic Quality

Scenic quality was classified by ranking seven key factors, including: Landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. The resulting classification was derived by totaling scores of each key factor, and assigning an A, B, or C based on the following convention: A (19 or more), B (12 to 18), and C (11 or less). Ranking of key factors was based on criteria presented in Table 3-11.

Table 3-11. Criteria Used to Rank Scenic Quality during the Scenic Quality Inventory of the Iditarod National Historic Trail

Rating Criteria and Score			
Landform	**5** - High vertical relief as expressed in prominent rock cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detailed features dominant and exceptionally striking and intriguing such as glaciers.	**3** - Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional.	**1** - Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features.
Vegetation	**5** - A variety of vegetation types as expressed in interesting forms, textures, and patterns.	**3** - Some variety of vegetation, but only one or two major types.	**1** - Little or no variety or contrast in vegetation.
Water	**5** - Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape.	**3** - Flowing, or still, but not dominant in the landscape.	**0** - Absent, or present, but not noticeable.
Color	**5** - Rich color combinations, variety or vivid color, or pleasing contrasts in soils, rock, vegetation, water, or snow fields.	**3** - Some intensity or variety in colors and contrast of the soil, rock, and vegetation, but not a dominant scenic element.	**1** - Subtle color variations contrast or interest; generally mute tones.
Influence of Adjacent Scenery	**5** - Adjacent scenery greatly enhances visual quality.	**3** - Adjacent scenery moderately enhances overall visual quality.	**0** - Adjacent scenery has little or no influence on overall visual quality.
Scarcity	**5+** - One of a kind; or unusually memorable, or very rare within a region. Consistent chance for exceptional wildlife or wildflower viewing, etc.	**3** - Distinctive, though somewhat similar to others within the region.	**1** - Interesting within its setting, but fairly common within the region.
Cultural Modification	**2** - Modifications add favorably to visual variety while promoting visual harmony.	**0** - Modifications add little or no visual variety to the area, and introduce no discordant elements.	**-4** -Modifications add variety but are very discordant and promote strong disharmony.

Source: (BLM, 1981)

A total of 13 SQRUs were established in the Norton Sound analysis unit, and a total of 5 SQRUs were established in the Nulato Hills Analysis Area. Maps of each SQRU are provided in the Nome, Solomon, Norton Bay, and Nulato Quads in the Iditarod NHT CMP (BLM, 1986b). The analysis area for the Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites overlapped three SQRUs: NS-07, NS-08, and NS-09. SQRU locations are described as follows:

- **SQRU NS-07** – this SQRU measures approximately 10 linear mi., and extends across the east side of Cape Darby, on the edge of Norton Bay. Scenic quality was classified as Class B. Cultural modification was scored at a level of 2, indicating that any modifications present during the time of the evaluation added favorably to visual variety while promoting visual harmony. No specific cultural modification is identified.

- ***SQRU NS-08*** – this SQRU measures approximately 10 mi., and extends across Cape Darby, in the southern portion of the Darby Mountains. A "Significant Viewpoint" is identified on the west side of Cape Darby, and is assumed to include views of the lowlands, Golovnin Bay, and Iknutak Mountain. Scenic quality was classified as Class B. Cultural modification was scored at a level of 2, indicating that any modifications present during the time of the evaluation added favorably to visual variety while promoting visual harmony. Inventory data indicate that the cultural modification score is a result of the presence of the relief cabin at McKinley Creek and roadhouse at Portage Creek.
- ***SQRU NS-09*** – this SQRU measures approximately 15 mi., and includes portions of the Iditarod NHT located on the east edge of Golovnin Bay, and the bay during periods of contiguous ice cover. Scenic quality was classified as Class A. Cultural modification was scored at a level of zero, indicating that modifications add little or no visual variety to the area, and introduce no discordant elements. Cultural modification was identified as the Town of Golovin.

The analysis area of repeaters and community towers proposed on private lands overlapped three SQRUs: NS-07, NS-08, and NS-09. The analysis area for the proposed Skookum Pass, Reindeer, and Holy Cross repeaters are located greater than 15 mi. from the Iditarod NHT, and are therefore not addressed in this section. SQRU locations are described as follows:

- ***SQRU NH-05*** – this SQRU measures approximately 10 mi., and includes portions of the Iditarod NHT surrounding the Town of Unalakleet. Scenic quality within NH-05 is classified as B (BLM, 1986b). No inventory data are available.
- ***SQRU NS-01*** – this SQRU measures approximately 25 mi., and includes portions of the Iditarod NHT located on the east side of Norton Bay. Scenic quality was classified as Class C. Cultural modification was scored at a level of zero, indicating that modifications add little or no visual variety to the area, and introduce no discordant elements. Cultural modification was identified as numerous isolated cabins.
- ***SQRU NS-11*** – this SQRU measures approximately 15 mi. and is located on the north side of Norton Sound, west of the City of Nome. Scenic quality was ranked as B. Cultural modification was scored at a level of 2, indicating that any modifications present during the time of the evaluation added favorably to visual variety while promoting visual harmony. Inventory data indicate that the cultural modification score is a result of the Village of Solomon.
- ***SQRU NS-12*** – this SQRU measures approximately 35 mi. and is located on the north side of Norton Sound, west of the City of Nome. Scenic quality was ranked as B. Cultural modification was scored at a level of 2, indicating that any modifications present during the time of the evaluation added favorably to visual variety while promoting visual harmony. Inventory data indicate that the cultural modification score is a result of the Old Safety Roadhouse.

Table 3-12. TERRA-NW Project Towers and Scenic Quality Rating Units

SQRU	Associated Towers	Approximate Miles	Existing Scenic Quality Rating
NH-05	Unalakleet Repeater and Unalakleet Community Tower	10	B
NS-01	Shaktoolik Repeater	25	C
NS-07	Golovin Alternate, Hill 2211, and Kwiktalik Mountain Repeaters	10	B
NS-08	Golovin Alternate, Hill 2211, and Kwiktalik Mountain Repeaters	10	B
NS-09	Golovin Alternate, Hill 2211, and Kwiktalik Mountain Repeaters	15	A
NS-11	Gill Repeater	15	B
NS-12	Cape Nome Repeater, Nome Community Tower	35	B

Viewer Sensitivity

Visual sensitivity is defined as a measure of public concern for scenic quality (BLM, 1986a). The Sensitivity Level Analysis (SLA) is completed in two steps: 1) Delineation of Sensitivity Level Rating Units (SLRUs), and 2) rating visual sensitivity within each SLRU. SLRUs represent a geographic area where public sensitivity to change of the visual resources is shared amongst constituents. The unit boundaries may be defined by a single factor driving the sensitivity consideration, or factors driving sensitivity may extend across numerous SLRUs. Units are thus derived, in part, by the consideration of factors analyzed in the SLA. For example, constituents of a residential area are assumed to share a high sensitivity to change in visual resources of views from their homes. In such an example, an SLRU defining the general viewshed of this community would be established based on knowledge and assumptions of shared sensitivity of this area. Visual sensitivity within each SLRU is estimated as high, medium, or low based on criteria described below.

- ***Type of Users*** – visual sensitivity is expected to vary by type of user. For example, recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- ***Amount of Use*** – visual sensitivity is expected to vary by amount of use. For example, areas seen and used by large numbers of people are potentially more sensitive. Protection of visual values usually becomes more important as the number of viewers increase.
- ***Public Interest*** – the visual quality of an area may be of concern to national, state, or local groups. Indicators of this concern are usually expressed in public meetings, letters, newspaper or magazine articles, newsletters, land-use plans, or public controversy created in response to proposed activities that is perceived to result in change to the landscape character.
- ***Adjacent Land Uses*** – the interrelationship with land uses in adjacent lands can affect the visual sensitivity of an area. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be visually sensitive.

- ***Special Areas*** – management objectives for special areas such as Natural Areas, Wilderness Areas, or Wilderness Study Areas frequently require special consideration for the protection of the visual values. This designation does not necessarily indicate high scenic quality, but rather the potential for management objectives to be aimed at preservation of the natural landscape setting.
- ***Other Factors*** – additional information, such as research or studies that includes indicators of visual sensitivity, should be included in the SLA when available.

No areas of high visual sensitivity were located within the analysis area of the Otter Creek tower site. The area is remote; however, it may be accessed by local outfitters leading hunting expeditions during snow-free months. For this reason, sensitivity in the analysis area of the Otter Creek tower site is assumed to be moderate.

Areas of high visual sensitivity within the analysis area of the Golovin Alternate, Hill 2211, and Kwiktalik Mountain microwave repeater tower sites, and portions of the project analyzed as connected actions, were identified in the Kobuk-Seward Peninsula RMP (BLM, 2006). Sensitive areas include the road system out of Nome, areas with short-term periods of high levels of recreational use, Alaska Native allotments, and villages. Also included were air travelers who access public lands via small fixed-wing aircraft. Recreational visitors are described as primarily Alaskan residents; however, the area is cited as drawing an increasing number of visitors from out of state and abroad. The majority of visitor use, particularly from out-of-state and abroad visitors, occurs during the early summer and fall months from May through the end of September (BLM, 2006). Areas of high recreational use are primarily limited to the Iditarod race route, located approximately 1.25 mi. from the proposed Golovin Alternate tower site at its closest point. The Iditarod race route is used for casual recreational use, inter-village travel, and a variety of commercial events and group activities. Norton Bay was identified as an important local and state-wide subsistence area.

Viewer sensitivity within the Golovin Alternate, Hill 2211, and Kwiktalik Mountain tower sites analysis areas is assumed to be high based on the following rationale:

- The area is a highly valued recreational destination due to the Iditarod historic-primary route and Iditarod race route;
- The area is used by state and local residents for traditional subsistence purposes.

Distance Zones

Distance zones represent the distance from which the landscape is most commonly viewed, and are established by buffering common travel routes and viewer locations at distances of 3 mi., 5 mi., and 15 mi. Because of the relationship between distance and viewer perception, distance zones can also be used to estimate visual thresholds, as a viewer's ability to detect attributes of form, line, color, and texture is expected to decreases with distance. Distance zones are defined as follows (BLM, 1986b).

- ***Foreground-Middleground*** – this is the area that can be seen from a particular location to a distance of 5 mi. The outer boundary of this distance zone is described as the point where the texture and form of individual plants are no longer apparent in the landscape. In some areas, atmospheric conditions can reduce visibility and shorten the distance normally covered by each zone.

- Background – the background includes locations that can be seen between a distance of 5 and 15 mi. The background zone does not include areas in the background which are so far distant that the only thing discernible is the form or outline. In order to be included within this distance zone, vegetation should be visible at least as patterns of light and dark.
- Seldom-Seen Zone – these are areas that are generally not visible within the foreground-middleground and background, or portions which are visible but beyond the background distance of 15 mi.

No distance zones are established for the analysis area of the project. For the purposes of this assessment, it is assumed that common viewers are situated on Norton Sound (i.e., boaters), the Iditarod race route, Iditarod historic-primary route, and the residential areas of Nome, Golovin, and Unalakleet. Based on this assumption, visual distance for all analysis areas, except Hill 2211, are included in the foreground-middleground distance zone. The Hill 2211 tower site is located in the background distance.

3.4.7 Cultural Resources

Under the NEPA, EAs and EISs must address possible adverse and beneficial effects of a proposed project on "historic and cultural" resources (43 Code of Federal Regulations [CFR] Part 46 and 40 CFR Part 1500). In addition to and compatible with NEPA requirements, Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, requires a similar assessment of the potential for adverse effects on historic properties as a result of completing a project. Any project receiving federal funding or involving federal lands, licensing, or permitting is an undertaking subject to Section 106 review. The two processes may be integrated, but do not replace one another. The following sections examine known cultural properties in the vicinity of proposed TERRA-NW Project tower locations.

3.4.7.1 Methodology

Literature Review

A literature review was conducted to identify known cultural properties in the vicinity of the proposed Holy Cross Hills Repeater, Otter Creek Repeater, Unalakleet Community tower, Unalakleet Repeater, Shaktoolik Community tower and Golovin Alternate Repeater. The review included an examination of previous cultural resource reports and searches in relevant databases; including the Alaska Heritage Resource Survey (AHRS) IBS, the National Register of Historic Places (NRHP) database, and the National Historic Landmark (NHL) Database. The information gathered was used to create the cultural chronology, ethnohistory, and history sections of the cultural resource survey permit report for BLM Archaeological Resources Protection Act (ARPA) permits (Blanchard, 2011). The BLM ARPA report contains restricted information and is available to persons with authorized access (see Appendix G for information regarding access to this confidential report).

Six sites (Reindeer Repeater, Hill 2211 Repeater, Kwiktalik Mountain Repeater, Gill Repeater, Cape Nome Repeater, and Nome Community) were identified as project components after the fieldwork for the 2011 cultural resources survey was complete. Only a literature review has been conducted for these sites. The BLM as the lead federal agency will consult with the Alaska State Historic Preservation Office (SHPO) to analyze and address potential impacts to cultural resources prior to the BLM signing a FONSI for the components of the project located on federally managed lands.

Archaeological Survey

Field surveys were carried out between August 23 and 28, 2011, by Northern Land Use Research, Inc. (NLUR) Project Archaeologist, Morgan Blanchard, Ph.D., RPA, and NLUR Archaeological Technician, Adam Russell. Surveys were carried out at six proposed tower sites using standard archaeological field methods for a Level II or "Evaluation" survey as defined by the Alaska Office of History and Archaeology in Historic Preservation Series No. 11, revised 2003 (Alaska Department of Natural Resources [ADNR], 2003). Two ARPA permits (AA-092968 and AA-093059) were obtained from BLM for surveys on lands managed by BLM. Surveys on Alaska Native Corporation lands were carried out with the permission of the land owners.

Because of different project designs, three different scales of archaeological survey were conducted on 2011. A 300-ft.-radius pedestrian survey was conducted from the center point of the proposed towers at the Holy Cross Hills, Otter Creek, Unalakleet, and Golovin Alternate tower sites. A 300-ft. by 300-ft. block survey, centered on the proposed tower location, was completed at the proposed Shaktoolik Community tower site. A 150-ft. by 125-ft. block survey was completed at the proposed Unalakleet tower site (covering the entire lot). These areas define the direct APE for each survey. Subsurface testing was conducted at five of the sites (Holy Cross Hills, Otter Creek, Unalakleet repeater, Shaktoolik and Golovin Alternate repeater). Subsurface testing was not carried out at the Unalakleet community tower due to previous ground disturbance.

The sites surveyed were also subject to helicopter reconnaissance in an effort to identify cultural resources not visible from the ground. Where appropriate, observations were made from the helicopter to determine the visibility of the tower sites from known cultural properties and assess the potential for indirect effects. The information gathered during the archaeological field investigations is detailed in the cultural resource survey permit report for BLM ARPA Permits AA-092968 and AA-093059 (Blanchard, 2011). This report includes information on the six tower sites (Holy Cross Hills Repeater, Otter Creek Repeater, Unalakleet Community Tower, Unalakleet Repeater, Shaktoolik Community Tower and Golovin Alternate Repeater) surveyed in August of 2011.

No field survey was conducted at six additional sites (Reindeer Repeater, Hill 2211, Kwiktalik Mountain Repeater, Gill Repeater, Cape Nome Repeater, and Nome Community) which were identified as possible tower locations after the fieldwork for the 2011 cultural resources survey was complete. As noted above, only a literature review has been conducted for these six sites.

3.4.7.2 Cultural Resources Survey and Literature Review Results

The following summary lists the known cultural properties identified during the archaeological survey and/or literature review for the 12 proposed tower locations included in this EA. They are organized by land ownership. Actions on federally owned lands are listed first; connected actions on non-federally owned lands are listed second. Within these categories, the sites are listed from the eastern portion of the project area at Grayling to the northwestern portion of the project area at Nome.

3.4.7.3 Proposed Actions and Alternatives on Federally Owned Lands

Otter Creek Repeater Tower Site

The proposed Otter Creek Repeater tower site is located on a hilltop covered with rock and low, surface vegetation. The site is on BLM-managed land. The literature review identified no AHRS sites within 3 mi. of the location. No new sites, features, or artifacts were identified during the archaeological survey.

Golovin Alternate Repeater Tower Site

The proposed Golovin Alternate Repeater tower site is located on a low promontory in a saddle between two hills covered with rock and low, surface vegetation. The site is on BLM-managed land. The literature review identified four AHRS sites within 3 mi. of the proposed Golovin Alternate Repeater tower site location. Three of the sites (the Portage Roadhouse Trail [SOL-

00090], the Historic Relief Cabin [SOL-00092] and the Unalakleet-Nome Trail [SOL-00127]) are eligible for listing on the NRHP through their association with the Iditarod NHT (discussed below). The Unalakleet-Nome Trail, the primary route of the Iditarod NHT, passes within 0.5 mi. from the direct APE boundary. No AHRS sites are located within the direct APE. No new sites, features or artifacts were identified during the archaeological survey.

Table 3-13. AHRS Sites within a Three-Mile Radius of the Golovin Alternate Repeater Tower Site

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
SOL-00090	Portage Roadhouse Trail: Connecting trail of the Iditarod NHT	Two to three mi.	Eligible for listing on the NRHP**
SOL-00092	Historic Relief Cabin	One to two mi.	Eligible for listing on the NRHP**
SOL-00094	Douglas A-20G aircraft, WWII.	One to two mi.	NDE
SOL-00127	Unalakleet Nome Trail: The primary route of the Iditarod NHT.	One mi. or less	Eligible for listing on the NRHP**

** Treated as eligible for listing on the NRHP as part of the Iditarod NHT. NDE= No determination of eligibility completed. NRHP= National Register of Historic Places (ADNR 2011).

Hill 2211 Repeater Tower Site

The proposed Hill 2211 Repeater tower site, reviewed as Alternative 3 in this EA, an alternative to the Golovin Alternate Repeater site discussed above, is located on BLM-managed land, north of Cape Darby. A literature review identified no AHRS sites within 3 mi. of the proposed Hill 2211 Repeater tower site. This site was not surveyed in 2011.

3.4.7.4 Connected Actions and Alternatives on Non-Federal Lands

Holy Cross Hills Repeater Tower Site

The proposed Holy Cross Hills Repeater tower site is located on a hilltop covered with rock and low, surface vegetation. The site is owned by the Hee-yea Lindge Corporation. The literature review identified no AHRS sites within 3 mi. of the proposed Holy Cross Hills Repeater tower site. No new archaeological sites, features, or artifacts were identified during the archaeological survey.

Unalakleet Community Tower

The proposed Unalakleet Community tower site is located in Unalakleet, at the northwest corner of Beach Road West and Main Road, adjacent to an existing communication structure. The site is owned by the Unalakleet Native Corporation.

Twenty-one AHRS sites are located within 3 mi. of the proposed Unalakleet Community tower location. Of these, five, the Airport Village Site (UKT-00007), the Bridge Site (UKT-00009), the Tacan Site (UKT-00010), the Unalakleet-Nome Trail (UKT-00030), and the Kaltag-Portage Winter Trail (UKT-00044) are eligible for listing on the NRHP. The Unalakleet-Nome Trail

(UKT-00030) and the Kaltag-Portage Trail (UKT-00044) are sections of the Iditarod NHT (discussed below). No AHRS sites are within the direct APE and no new archaeological sites, features, or artifacts were identified during the archaeological survey. Because of the previously disturbed nature of the APE, no subsurface testing was conducted at this location.

Table 3-14. AHRS Sites within Three Miles of the Unalakleet Community Tower

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
UKT-00004	Unalakleet	One mi. or less	NDE
UKT-00007	Airport Village Site	One mi. or less	Eligible for listing on NRHP
UKT-00008	Crosswind Site	One mi. or less	NDE
UKT-00009	Bridge Site	One mi. or less	Eligible for listing on NRHP
UKT-00010	Tacan Site	One to two mi.	Eligible for listing on NRHP
UKT-00011	Epidemic Site	One mi. or less	NDE
UKT-00012	Cranberry Slough	One mi. or less	NDE
UKT-00025	Mary Bahr's Cabin	One mi. or less	NDE
UKT-00030	Unalakleet-Nome Trail	One mi. or less	Eligible for listing on NRHP
UKT-00044	Kaltag-Portage Winter Trail: Primary route of the Iditarod NHT.	One mi. or less	Eligible for listing on NRHP**
UKT-00054	FAA Building 401	Two to three mi.	Not eligible for listing on NRHP
UKT-00055	Bureau of Indian Affairs Unalakleet School	One mi. or less	Listed on the NRHP
UKT-00056	Light Plant Associated with BIA School (UKT-00055)	One mi. or less	NDE
UKT-00057	Warehouse Associated With BIA School (UKT-00055)	One mi. or less	NDE
UKT-00058	Mound and Box	Two to three mi.	NDE
UKT-00060	FAA Towers	Two to three mi.	Not Eligible for NRHP
UKT-00062	Army Hill Observation Post	Two to three mi.	Not eligible for NRHP
UKT-00064	WWII Machinery Dump	Two to three mi.	NDE
UKT-00065	FAA Building 205 – Aerial Navigation	One mi. or less	Not Eligible for NRHP
UKT-00066	Structural Remains	One mi. or less	NDE
UKT-00070	Snow Removal and Equipment Building Unalakleet	One mi. or less	Not Eligible for NRHP

NDE = No determination of eligibility completed. NRHP= National Register of Historic Places (ADNR 2011).

Unalakleet Repeater Tower Site

The proposed Unalakleet Repeater tower site is located on Unalakleet Native Corporation land, on Blueberry Point, approximately 10 mi. north of Unalakleet. The site is on a hilltop covered with rock and low, surface vegetation. There are three AHRS sites within 3 mi. of the proposed Unalakleet Repeater tower site. One, (UKT-00064) appears to be a duplicate of the Unalakleet-Nome Trail (UKT-00030), which has been determined by the Alaska State Historic Preservation Office (SHPO) to be eligible for listing on the NRHP. The Unalakleet-Nome Trail is the main route of the Iditarod NHT (discussed below). No AHRS sites are within the direct APE. No new archaeological sites, features, or artifacts were identified during the archaeological survey.

Table 3-15. AHRS Sites within Three Miles of the Unalakleet Repeater Tower Site

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
UKT-00014	Blueberry Creek	Two to three mi.	NDE
UKT-00030	Unalakleet-Nome Trail	One to two mi.	Eligible for listing on NRHP
UKT-00064	Unalakleet Nome Trail	One to two mi.	Eligible for listing on NRHP*

* Appears to be a duplicate of UKT-00030. NDE= No determination of eligibility completed. NRHP= National Register of Historic Places (ADNR 2011).

Shaktoolik Community Tower

The Shaktoolik Community tower site is located at the southern end of the Village of Shaktoolik, on land owned by the Shaktoolik Native Corporation. The location is adjacent to an existing GCI communications building and communication tower near two wind power generation towers.

There are 17 AHRS sites within 3 mi. of the proposed Shaktoolik Community tower location; none have been determined eligible for listing on the NRHP. No AHRS sites are within the direct APE. No new archaeological sites, features, or artifacts were identified during the archaeological survey.

Table 3-16. AHRS Sites within Three Miles of the Shaktoolik Community Tower Site.

AHRS Number	Site Name	Approximate Distance from APE	NRHP Eligibility Status
NOB-00028	Shaktoolik Roadhouse	Two to three mi.	NDE
NOB-00059	Shaktoolik Runway Site	One to two mi.	NDE
NOB-00060	Old Shaktoolik	One to two mi.	NDE
NOB-00067	NOB-00067	One mi. or less	NDE
NOB-00068	NOB-00068	One mi. or less	NDE
NOB-00069	NOB-00069	One mi. or less	NDE
NOB-00070	NOB-00070	One mi. or less	NDE

AHRS Number	Site Name	Approximate Distance from APE	NRHP Eligibility Status
NOB-00071	NOB-00071	One mi. or less	NDE
NOB-00072	NOB-00072	One to two mi.	NDE
NOB-00073	NOB-00073	One to two mi.	NDE
NOB-00074	NOB-00074	One to two mi.	NDE
NOB-00075	NOB-00075	One to two mi.	NDE
NOB-00076	NOB-00076	Two to three mi.	NDE
NOB-00077	Historic Pit Features	One to two mi.	NDE
NOB-00078	Historic Building Ruins	Two to three mi.	NDE
NOB-00079	Historic Building Ruins	One to two mi.	NDE
NOB-00090	Historic Cribbed Well	One to two mi.	NDE

NDE = No determination of eligibility completed (ADNR 2011).

Reindeer Repeater Tower Site

The proposed Reindeer Repeater tower site is located on Shaktoolik Native Corporation land, on Cape Denbigh. There are three AHRS sites within 3 mi. of the proposed Reindeer Repeater tower site. One of these sites, Iyatayet (NOB-00002) is listed on the NRHP and is a National Historic Landmark (NHL). No AHRS sites are located within the direct APE. The Reindeer tower site was not surveyed in 2011.

Table 3-17. AHRS Sites within Three Miles of the Reindeer Repeater Tower Site.

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
NOB-00002	Iyatayet, Prehistoric Site	Two to three mi.	Listed on the NRHP, NHL
NOB-00008	Madjujuinuk, Prehistoric Site	Two to three mi.	NDE
NOB-00084	Utkusinnaq, Prehistoric Site	One to two mi.	NDE

NDE = No determination of eligibility completed. NRHP= National Register of Historic Places (National Register of Historic Places 2011; ADNR 2011)

Kwiktalik Mountain Repeater Tower Site

The proposed Kwiktalik Mountain Repeater tower site, analyzed as Alternative 4 in this EA, is located on Golovin Native Corporation land, on Cape Darby. There are four AHRS sites within 3 mi. of the proposed Kwiktalik Mountain Repeater tower site location; none have been determined eligible for listing on the NRHP. No AHRS sites are located within the direct APE. This site was not surveyed in 2011.

Table 3-18. AHRS Sites within Three Miles of the Kwiktalik Repeater Tower Site

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
SOL-00042	Tivithluk, Prehistoric Site	Two to three mi.	NDE
SOL-00043	Kukuktaoluk, Prehistoric Site	One to two mi.	NDE
SOL-00044	Kangekachakpuk Prehistoric Site	Two to three mi.	NDE
SOL-00045	Ichet, Prehistoric Site	Two to three mi.	NDE

NDE = No determination of eligibility completed (ADNR 2011).

Gill Repeater Tower Site

The proposed Gill Repeater tower site is located on Solomon Native Corporation land, near Uncle Sam Mountain, north and east of Nome. The literature review identified 17 AHRS sites within 3 mi. of the proposed Gill Repeater tower site. Sixteen of these sites are contributing elements of the Big Hurrah Mine Historic District (SOL-00136), which is eligible for listing on the NRHP. No AHRS sites are located within the direct APE. The proposed Gill Repeater tower site was not surveyed in 2011.

Table 3-19. AHRS Sites within Three Miles of the Gill Repeater Tower Site

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
SOL-00136	Big Hurrah Mine Historic District	Two to three mi.	Eligible for listing on NRHP
SOL-00153	Short Ditch	Two to three mi.	Contributing element of SOL-00136
SOL-00154	Collapsed Structure and Vehicle	Two to three mi.	Contributing element of SOL-00136
SOL-00155	Parallel Ditches	Two to three mi.	Contributing element of SOL-00136
SOL-00156	Stamp Mill Building	Two to three mi.	Contributing element of SOL-00136
SOL-00157	Charles D. Lane House	Two to three mi.	Contributing element of SOL-00136
SOL-00158	Powerhouse	Two to three mi.	Contributing element of SOL-00136
SOL-00159	Collapsed Shaft Building	Two to three mi.	Contributing element of SOL-00136
SOL-00160	Dozers	Two to three mi.	Contributing element of SOL-00136
SOL-00161	Driller	Two to three mi.	Contributing element of SOL-00136
SOL-00162	Collapse Remains	Two to three mi.	Contributing element of SOL-00136
SOL-00163	Trucks	Two to three mi.	Contributing element of SOL-00136
SOL-00164	Dump	Two to three mi.	Contributing element of SOL-00136
SOL-00165	Settling Pond Gate	Two to three mi.	Contributing element of SOL-00136

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
SOL-00166	Adit	Two to three mi.	Contributing element of SOL-00136
SOL-00167	B/Foot Tube Mill	Two to three mi.	Contributing element of SOL-00136
SOL-00168	Collapsed Structure	Two to three mi.	Contributing element of SOL-00136

NDE = No determination of eligibility completed. NRHP= National Register of Historic Places (ADNR 2011).

Cape Nome Tower Site

The proposed Cape Nome Repeater tower site is located on Sitnasauk Native Corporation Land, on Cape Nome. There are 15 AHRS sites within 3 mi. of the proposed Cape Nome Tower site. The Cape Nome Roadhouse (SOL-00069) is listed on the NRHP. The Old Beach Site (SOL-00001) and two others, represented by four AHRS numbers, the Unalakleet-Nome Trail (NOM-00074 and SOL-00127) and the Nome-Council Road (NOM-00242 and SOL-00172) are eligible for listing on the NRHP. No AHRS sites are located within the direct APE. The proposed Cape Nome Repeater tower site was not surveyed in 2011.

Table 3-20. AHRS Sites within Three Miles of the Cape Nome Repeater Tower Site

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
SOL-00001	Old Beach Site	One to two mi.	Eligible for NRHP
SOL-00004	Cape Nome Mining Camp	One to two mi.	NDE
SOL-00022	Cape Nome Army Listening Post	One to two mi.	NDE
SOL-00069	Cape Nome Roadhouse	One mi. or less	On NRHP
SOL-00070	Setuk, Prehistoric/Historic Site	One mi. or less	NDE
SOL-00127	Unalakleet-Nome Trail	One mi. or less	Eligible for NRHP
SOL-00172	Nome Council Road	One mi. or less	Eligible for NRHP
NOM-00009	Ayasayuk, Prehistoric Site	One to two mi.	NDE
NOM-00048	Lookout Site	One mi. or less	NDE
NOM-00049	WWII Post	One to two mi.	NDE
NOM-00062	NOM-00062 (Graves)	One to two mi.	NDE
NOM-00064	Milepost 10 Reindeer Camp	Two to three mi.	NDE
NOM-00065	Goldengate Reindeer Camp	One to two mi.	Not eligible for NRHP
NOM-00074	Unalakleet Nome Trail	One to two mi.	Eligible for NRHP
NOM-000242	Nome Council Road	One to two mi.	Eligible for NRHP

NDE = No determination of eligibility completed. NRHP= National Register of Historic Places (National Register of Historic Places 2011; ADNR 2011).

Nome Community Tower

The proposed Nome Community tower site is located at the western end of Nome, on land owned by the Nome Joint Utilities System. The proposed location is adjacent to an existing GCI communications building and communication tower.

There are 54 AHRS sites within 3 mi. of the proposed Nome Community tower site. Five of these are listed on the NRHP: The Sally Carrighar House (NOM-00018), Old St. Joseph's Catholic Church (NOM-00040), the Discovery Saloon (NOM-00042), the Nome Beach Site (NOM-00085), and the Swanberg Dredge (NOM-00114). The Nome beach site (NOM-00085) is also part of the Cape Nome Mining District Discovery Sites National Landmark. SHPO has determined that seven other sites (NOM-00146, NOM-00156, NOM-00168, NOM-00169, NOM-00171, NOM-00175, and NOM-00242) are eligible for listing on the NRHP. No AHRS sites are located within the direct APE. The proposed Nome community tower site was not surveyed in 2011.

Table 3-21. AHRS Sites within Three Miles of the Nome Community Tower Site

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
NOM-00017	Little Creek	Two to three mi.	NDE
NOM-00018	Sally Carrighar House (Jacob Berger House)	One mi. or less	Listed on NRHP
NOM-00025	Sitnasuak	One mi. or less	NDE
NOM-00031	Wien Aircraft Hanger	One mi. or less	Not eligible for NRHP
NOM-00032	Carrie Mclain Home	One mi. or less	Not eligible for NRHP (revoked)
NOM-00034	Erik O. Lindblom Cabin (Nome's Oldest Building	One mi. or less	NDE
NOM-00035	Methodist Church	One mi. or less	NDE (destroyed)
NOM-00036	M/V Donaldson	NA	Not eligible for NRHP (revoked / destroyed)
NOM-00037	WWII Aircraft Hanger	One mi. or less	NDE
NOM-00040	Old St. Joseph's Catholic Church	One mi. or less	On NRHP
NOM-00042	Discovery Saloon	One mi. or less	On NRHP
NOM-00068	King Islander Site	Two to three mi.	NDE
NOM-00083	Fort Davis Guard House	One mi. or less	Not Eligible for NRHP
NOM-00085	Nome Beach Site	One to two mi.	On NRHP (part of the Cape Nome Mining District Discovery Sites National Landmark)
NOM-00102	Birchwood T Hanger	Two to three mi.	NDE
NOM-00103	NOM-00103(Drift Mine)	Two to three mi.	NDE

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
NOM-00104	NOM-00104(type unknown)	Two to three mi.	NDE
NOM-00105	Marks Field	One mi. or less	Not Eligible for NRHP
NOM-00109	Icy View	Two to three mi.	Not Eligible for NRHP
NOM-00114	Swanberg Dredge	Two to three mi.	On NRHP
NOM-00119	NWS Nome Upper Air Facility	One mi. or less	Not Eligible for NRHP
NOM-00120	NWS Nome Residence B2	One mi. or less	Not Eligible for NRHP
NOM-00121	NWS Nome Residence B1	One mi. or less	Not Eligible for NRHP
NOM-00131	Cabin	One to two mi.	Not Eligible for NRHP
NOM-00141	Seward Peninsula Railroad	One to two mi.	NDE
NOM-00143	500 Lomen Avenue	One mi. or less	Not Eligible for NRHP
NOM-00144	Detention Hospital Building	One mi. or less	Not Eligible for NRHP
NOM-00146	Snake River Spit Site	One mi. or less	Eligible for NRHP
NOM-00152	Cripple River Bridge	One mi. or less	Not Eligible for NRHP
NOM-00156	Reindeer House	One mi. or less	Eligible for NRHP
NOM-00158	Nom-00158 (Archaeological Site)	One mi. or less	NDE
NOM-00167	Nome Historic District	One mi. or less	NDE
NOM-00168	Nome Federal Building	One mi. or less	Eligible for NRHP
NOM-00169	Our Savior Lutheran Church	One mi. or less	Eligible for NRHP
NOM-00170	T, Parson House	One mi. or less	Not eligible for NRHP
NOM-00171	Nogozruk House	One mi. or less	Eligible for NRHP
NOM-00172	Alaska Airlines Old Building	One to two mi.	Not eligible for NRHP
NOM-00173	Apok Building	One to two mi.	Not eligible for NRHP
NOM-00174	Brock House	One to two mi.	Not eligible for NRHP
NOM-00175	Shoemaker House	One to two mi.	Eligible for NRHP
NOM-00176	Nome Cemetery	One mi. or less	NDE
NOM-00177	Cowin Hut North Example	One mi. or less	NDE
NOM-00178	Cowin Hut South Example	One mi. or less	NDE
NOM-00179	Valve / Pump house	One mi. or less	NDE
NOM-00180	Snake River Bridge ADOTPF Bridge 881	One mi. or less	NDE
NOM-00224	Old Nome Power Plant	One mi. or less	NDE
NOM-00225	10030 Seppala Drive	One mi. or less	NDE

AHRS Number	Site Description	Approximate Distance from APE	NRHP Eligibility Status
NOM-00226	NOM-00226 (Garage)	One mi. or less	NDE
NOM-00227	Blue-Green House	One mi. or less	NDE
NOM-00228	308 Belmont Street	One mi. or less	NDE
NOM-00229	312 Belmont Street	One mi. or less	NDE
NOM-00230	Belmont Apartments	One mi. or less	NDE
NOM-00231	NOM-00231 (House)	One mi. or less	NDE
NOM-00242	Nome Council Road (MP0 to 71.9)	One to two mi.	Eligible for NRHP

NDE = No determination of eligibility completed. NRHP= National Register of Historic Places (National Register of Historic Places 2011; ADNR 2011).

3.4.7.5 The Iditarod National Historic Trail

The Iditarod NHT passes within 3 mi. of three sites surveyed for this project in 2011 (the Unalakleet Community tower site, the Unalakleet Repeater tower site, and the Golovin Alternate Repeater tower site). The Iditarod NHT Comprehensive Management Plan (CMP), (BLM, 1986a:57) states that the entire trail has been considered "potentially eligible" for inclusion onto the NRHP; however, according to the plan, "only certain segments probably deserve National Register status." The plan states that NRHP nominations should be made for "those specific Trail sites and segments that best represent the historic values of the Trail." These would include sites and segments where physical remains associated with the trail still exist. The CMP describes two possible mechanisms for listing sites associated with the trail to the NRHP: individual nomination of sites and a thematic Iditarod NHT nomination.

A thematic group format nomination to the NRHP would include a finite group of resources related to one another in a clearly distinguishable way. According to the CMP (BLM, 1986a), "a thematic Iditarod NHT nomination would include those sites or Trail segments (including physical segments of the Trail tread) which relate to the Trail's significance for the period 1880 to the 1920's" (57). At the time the CMP was written, both BLM and SHPO recommended that a thematic nomination for the Iditarod NHT be undertaken, since it offered the most flexible and open-ended process for applying NRHP designations.

A Multiple Property Documentation Form organizes the themes, trends, and patterns of history shared by properties into historic contexts, and defines those properties that represent those historic contexts. It serves as the basis for evaluating NRHP eligibility of related properties. A Multiple Property Documentation Form is a cover document and not a nomination in its own right. When nominated and listed on the NRHP, the Multiple Property Documentation Form, together with registration forms for individual properties, constitute a multiple property submission (NPS, 1991).

According to BLM Archaeologist Jenny Blanchard (personal communication 2011), a Multiple Property Documentation Form for the Iditarod NHT has been completed and is currently under revision after review by the Keeper of the NRHP. In recognition of the "potential eligibility" recognized in the Iditarod NHT CMP, (BLM, 1986a), the impending Multiple Property Listing,

and the desire to ensure an adequate level of protection for cultural resources, this report assumes that sites and features identified by the Office of History and Archaeology in the AHRS as having an association with the Iditarod NHT, including physical segments of the trail that retain integrity would be eligible for listing on the NRHP. All assessments of effect on such properties discussed in this report are based upon this assumption.

3.4.7.6 Traditional Cultural Properties

Traditional Cultural Properties (TCPs) are properties whose significance is derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. TCPs can reflect both Euro-American and Native American cultural practices. TCPs are often hard to recognize and their presence may not come to light through archaeological, historical, or architectural surveys. The existence and significance of TCPs are often only ascertainable through interviews with knowledgeable people in the area or through other ethnographic research (NPS, 1998). No such interviews were carried out as part of this project; however, the government-to-government consultation being conducted as a part of this project may provide some information on TCPs in the vicinity of the APE.

No formally designated TCPs were identified during the literature review. There is a strong potential for the existence of both Euro-American and Native American TCPs in the vicinity of the proposed TERRA-NW towers. Elements of the project are located in areas of significant historical activity, including mining, transportation, and settlement. All the sites are in areas that have been inhabited and utilized by Alaska Natives for thousands of years. There is ample evidence of Native associations with the land in the form of Native language place names. For example, the name *Nuuk*, *Nook*, or *Nuksok* refers to a number of fish camps along the western end of the western sand spit separating Safety Sound from Norton Sound (Koutsky, 1981). William Sheppard (1982) identifies five Alaska Native sites and place names in the immediate vicinity of Unalakleet. In addition to the village of Unalakleet (*Un,alaqiq*), these include sites for berry picking, reindeer herding, drift netting, and summer fishing. Mountains in Alaska have a high potential to be TCPs. Some mountains have religious significance to Alaska Natives (Pratt, 2009) and prominent landforms may also be important as lookout posts for hunting, both historically and in modern times.

Historically, small areas for fishing and sometimes hunting were claimed by Native families along the Norton Sound and Seward Peninsula and could be passed down through many generations. Caribou hunting sites were usually not controlled this way, since caribou hunting was primarily a communal activity. Resource areas were also divided among different tribal groups. Although formal boundaries were established, individuals frequently crossed them in pursuit of resources. Such transgressions sometimes resulted in individual and tribal conflicts (Ray, 1967).

3.4.8 Environmental Justice

Under Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies are to develop strategies to address environmental justice concerns in their approach to their regular operations. Federal agencies:

> *…shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.*

Under EPA implementing policies, the intention is to ensure fair treatment, which means that no group of people, including racial, ethnic, or low-income groups, 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 or policies. This requires identifying whether disproportionately high and adverse effects to human health or environmental effects would fall upon minority or low-income populations, which includes Native American or Alaska Native communities (EPA, 1998).

Section 3.4.1 (Socioeconomics) provides an overview of the nearest communities to the project area. The communities potentially affected by the Proposed Action are predominantly Alaska Native, with lower incomes and higher poverty rates than Alaska and U.S. averages, except for the City of Nome. As a result of these socioeconomic characteristics, the analysis of environmental consequences of the Proposed Action and alternatives in Section 4.4.8 (Environmental Justice) will determine whether there are disproportionate adverse impacts on these communities as a result of the project.

4.0 Environmental Consequences

This chapter evaluates the potential effects or impacts of the proposed action and alternatives on the resources presented in Chapter 3, Affected Environment.

4.1 Introduction

The direct, indirect, and cumulative impacts are described for each issue (impact topic) and where applicable by project phase (construction, operation, and decommissioning). The impacts for each issue are based on the intensity (magnitude), duration, and context (extent) of the impact. Summary impact levels (negligible, minor, moderate, or major) are given for each issue. Definitions are provided below.

4.1.1 Impact Factors and Ratings

Intensity

Low: A change in a resource condition is perceptible, but it does not noticeably alter the resource's function in the federal lands ecosystems, cultural context, or visitor experience.

Medium: A change in a resource condition is measurable or observable, and an alteration to the resource's function in the federal lands ecosystems, cultural context, or visitor experience is detectable.

High: A change in a resource condition is measurable or observable, and an alteration to the resource's function in the federal lands ecosystems, cultural context, or visitor experience is clearly and consistently observable.

Duration

Temporary: Impacts would last only a single season or for the duration of discreet activity, such as construction of a trail (generally less than two years).

Long-term: Impacts would extend from several years up to the life of the plan.

Permanent: Impacts are a permanent change in the resource that would last beyond the life of the plan even if the actions that caused the impacts were to cease.

Extent

Local: Impact would occur only at a limited site or immediate surroundings and would not extend into the region.

Regional Impact would affect the resource at a regional level, extending beyond the initial impact site.

Extended Impact would affect the resource on a state-wide or national level, extending well beyond the region.

Context

Common	The affected resource is not rare and not protected by legislation. The portion of the resource affected does not fill a unique role.
Important	The affected resource is protected by legislation or is rare within the locality or region. The portion of the resource affected does not fill a unique role within the locality or region.
Unique	The affected resource is protected by legislation and the portion of the resource affected uniquely fills a role within the locality or the region.

4.1.2 Summary Impact Levels

Summaries about the impacts on the resource synthesize information about context, intensity, and duration, which are weighed against each other to produce a final assessment. While each summary reflects a judgment call about the relative importance of the various factors involved, the following descriptors provide a general guide for how summaries are reached.

Negligible:	Impacts are generally extremely low in intensity (often they cannot be measured or observed), are temporary, and do not affect unique resources.
Minor:	Impacts tend to be low intensity or of short duration, although common resources may have more intense, longer-term impacts.
Moderate:	Impacts can be of any intensity or duration, although common resources are affected by higher intensity, longer impacts while unique resources are affected by medium or low intensity, shorter-duration impacts.
Major:	Impacts are generally medium or high intensity, long-term or permanent in duration, and affect important or unique resources.

4.1.3 Cumulative Impacts

Cumulative impacts are the additive or interactive effects that would result from the incremental impact of the proposed action or alternatives when added to other past, present, and reasonably foreseeable future actions (RFFAs) regardless of what agency (federal or non-federal) or person undertakes such other actions (40 Code of Federal Regulations 1508.7). Cumulative impacts were assessed by combining the potential environmental impacts of the alternatives with the impacts that have occurred in the past, are currently occurring, or are proposed in the future within the TERRA-NW Project area.

4.1.3.1 Past Actions

The recent history of the region is reflected in the rise of many regional governmental institutions and organizations, including the Alaska Native regional corporations formed under the Alaska Native Claims Settlement Act and non-profit tribal associations, Alaska Native healthcare providers, and state-sponsored school districts. A summary of key institutions is provided in Table 3-4. Unalakleet and Nome are regional population hubs that provide support transportation, government services, organizational headquarters, and freight distribution. Most communities in the project area are small and the trade and service sectors are not well-

developed. The regional economy depends on the governmental sector (employment and funding for programs and infrastructure), utilities and trade, commercial fisheries, mining, and the visitor industry.

As described in the Socioeconomics discussion, Section 3.4.1, the region is remote from the larger population centers of Alaska. Local communities are not connected by roads; therefore the region relies on aircraft year-round or snowmachine for winter inter-village travel. RCA Alascom installed satellite-based telecommunication systems throughout the region in the late 1970s. Earth-stations and satellite dishes brought telephone and television services to most regional communities.

4.1.3.2 Present Actions

The current dynamics of population and economy in the project area include stable or slightly declining population levels and expenditures in the public sector, including the federal, state, and local government employment and project spending, with the partial exception of the significant investment by the Indian Health Service in the new hospital in Nome. In private sector activities, Unalakleet and Nome are regional population hubs that provide transportation, freight distribution, and commercial services. While the Norton Sound area participates in commercial fisheries, the northern region, defined as the North Slope Borough, Northwest Arctic Borough, and the City of Nome, has the smallest workforce numbers in fisheries in the state (Alaska Department of Labor and Workforce Development [ADLWD], 2010a). The mining sector, while historically important, is not currently a large employer, as exploration involves a small workforce (ADLWD, 2010b), and no mines are currently in production in the direct project area. Rock Creek Mine in Nome has been under “care and maintenance” status since 2008 and currently is in closure status (Alaska Gold Company, 2010). Big Hurrah was permitted jointly with Rock Creek Mine, but only minor surface water sampling has been conducted.

In the telecommunication sector, GCI and its subsidiary UUI, completed the first construction season of the TERRA-SW Project in 2011 to provide broadband Internet across southwest Alaska. At completion, the TERRA-SW Project will extend broadband Internet to 65 communities and over 9,000 households in the Bristol Bay and Yukon-Kuskokwim (Y-K) Delta regions (GCI, 2011).

4.1.3.3 Reasonably Foreseeable Future Actions

For this analysis, RFFAs are those actions that are likely or reasonably certain to occur. Often, they are based on publicly available documents such as existing plans, permit applications, or announcements. Potential actions which are considered speculative or are not likely to occur are not considered an RFFA.

The population of communities in the Norton Sound region is not projected to grow at a rate higher than state averages in coming decades. Capital project funding in the affected villages is expected to be modest. The visitor industry in Nome may grow slightly due to the introduction of cruise ships to Nome and increasing popularity of the Iditarod Ski Race (Cavin, 2011). Statewide, mining is expected to grow 17 percent by the year 2018, but specific projects in the region have not reached the production phase which would result in large local employment (ADLWD, 2010b). Government employment, the largest source of employment in the region, is expected to grow 7.5 to 10 percent over the same 10-year period, or less than 1 percent per year.

Federal expenditures may drop as the nation deals with its deficit (ADLWD, 2009; and ADLWD, 2011b).

As a regional organization implementing the Bering Sea community development quota, Norton Sound Economic Development Corporation (NSEDC) supports an array of fisheries-related training and development projects, including a monetary distribution to each member community for local projects (NSEDC, 2010). The 2010 Community Benefit Share for 2010 was $100,000 for each community. Other NSEDC programs include: Consolidated bulk fuel, business initiative (several grants in Nome), and Community Energy Fund (no proposals submitted yet).

The mining sector has a long history and potential for future growth in the project area. The Seward Peninsula/Norton Sound region is endowed with both base and precious metal mineral deposits that have attracted prospectors over the past 100 years. From the placer gold deposits discovered on the beaches of Nome, to the placer and lode tin and iron prospects of the western Seward Peninsula, to the most northerly known sandstone-hosted uranium prospect of the Death Valley basin northeast of Golovin, the region has a strong history connected to mining. Today, most mineral exploration activity in the region focuses on silver and gold precious metal and molybdenum and copper base metal deposits. The recent Alaska Department of Natural Resources (ADNR) offshore gold lease sale is expected to increase mining activity and gold production offshore in Norton Sound (ADNR, 2011).

As recently as 2007, the uranium deposits in the southeastern Seward Peninsula attracted interest from junior explorers (Full Metal Minerals Ltd/Triex Minerals Corporation) at the Boulder Creek prospect. The community of Elim championed a strong opposition to any mine development. Based on the lack of continued drilling and recent inactivity at the Boulder Creek prospect it cannot be classified as reasonably foreseeable. Current exploration on the Seward Peninsula includes Cedar Mountain Exploration's Kelly Creek gold property located approximately 90 mi. north of Nome. The permitted drilling program released the most recent results on September 26, 2011, from 18 diamond-core boreholes. The Kelly Creek project represents an early stage property and cannot be classified as reasonably foreseeable. BSNC also holds title to several known gold prospects in the region, including a site at Bluff, approximately 50 mi. east of Nome, and another at Mount Distin, however, these projects are exploratory in nature and cannot be classified as RFFAs.

Up until late 2008, NovaGold's Rock Creek mine/mill complex was the only operational hard rock gold mine within the Seward Peninsula. The Rock Creek mine/mill complex is located approximately 6 mi. north of Nome in the Snake River watershed. The Rock Creek mine/mill complex processed ore from both Rock Creek and NovaGold's Big Hurrah project located approximately 42 mi. east of Nome in the Solomon River basin. Rock Creek mine is currently operating under a Temporary Closure/Care and Maintenance Plan while a Mine Reclamation Plan is developed by NovaGold. The Rock Creek mine/mill complex closure activities can be classified as an RFFA.

In the telecommunication sector, the TERRA-NW Project has identified five community towers in Norton Sound as a future action, although these are not currently funded, nor proposed for permits (see Table 2-1 for details). Telecommunication service providers have developed proposals for projects to expand rural broadband service. The Kodiak Kenai Cable Company has developed a proposal for a fiber-optic cable service it terms the Northern Fiber Optic Link. This proposal has not secured funding, but is designed to extend submarine fiber-optic cables from

Kodiak Island to the Aleutian Islands, Western Alaska, and the Arctic (Southwest Alaska Municipal Conference, 2010). GCI has developed the TERRA project to create a broadband ring connecting into an existing fiber-optic cable along the Dalton Highway, to Anchorage. The TERRA-SW Project, currently under construction, will link Anchorage to Homer and Southwestern Alaska, connecting to the DeltaNet system in the Y-K Delta, and then to the proposed TERRA-NW Project linking Grayling to Nome. In later phases, the TERRA-NW Project would extend to Kotzebue then join an existing fiber-optic cable along the Dalton Highway and then back to Anchorage. Neither the Northern Fiber Optic Link, proposed by the Kodiak Kenai Cable Company, nor the late phases of the TERRA-NW Project proposed by GCI, have secured funding. As a result, they must be characterized as speculative rather than as RFFASs.

The TERRA-NW microwave repeater towers would be candidates for additional antenna systems, including meteorological stations, cellular service, and similar remote systems. The installation of these options would be reviewed under separate permit applications. The applicant is aware of the potential for these add-on features and has designed the facilities to accommodate them, if new permits are approved. These actions would not change the footprint or design of the facilities. Methods used to install these features cannot be forecasted at this time. It is unknown whether or not each additional antenna would be installed separately or if the permit stipulations would require them to be bundled and installed during annual maintenance, thereby mitigating potential impacts from additional helicopter flights. As no additional components are proposed or funded currently, they must be characterized as speculative rather than as RFFAs.

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4.2 Physical Environment

4.2.1 Meteorology and Air Quality

4.2.1.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Construction

A direct impact to air quality would occur from mobile emission sources, which would include the heavy equipment used during the 150-day construction period. Construction activities at Otter Creek and Golovin Alternate tower sites would temporarily require the use of fueled equipment such as helicopters, backhoe, and small off-road vehicles (ORVs) for placement of the towers, communication equipment shelters, power module shelters, and fuel tanks; these towers are scheduled for installation in 2012. The construction footprint is 225,000 square feet (5.17 acres) per tower site. Two crews of approximately four to five workers would be required to construct the towers.

The required helicopters and number of trips for each during construction of each tower is provided in Table 2-4. In addition to this mobile equipment, the following construction equipment would also be required:

- Mini Backhoe – CAT 303 or equivalent: Used for site excavation and material handling. In addition, capstan winches can be attached to the backhoe to support tower erection;
- 225 cubic feet per minute air compressor: Used for leveling of competent rock (with jackhammer attachment) as well as drilling of rock anchor holes (with 60-pound drill attachment);
- Diesel generators(s): 2kW - 25 kW portable generators will be used for camp and tool power; and
- Six 55-gallon drums of fuel per site, consisting of four diesel drums and two gasoline drums, along with two 300-gallon fuel bladders for aviation fuel and gasoline.

Construction at each tower is expected to occur over a 150-day construction period. Development plans for each tower site call for 4 trips using an Erickson Air Crane helicopter, 60 flights for construction supplies and construction camp removal utilizing a UH-1H “Huey” helicopter, and 30 to 40 flights for the Hughes 500-E or Robinson R-44 helicopter for crew rotation and resupply. All site equipment would be transported by barge to staging sites in late May and all camp and foundation materials would be transported to the sites via helicopter (Bell UH-1H). Figure 2-2 and Figure 2-3 indicate the locations of staging sites for federal components analyzed as direct effects, whereas information on staging sites for connected action of towers on non-federal lands can be found in Table 2-1.

Also during the construction phase, trucks and ORVs (four wheelers) would be utilized to transport materials and crews at the staging areas and at construction sites a backhoe and ORVs would be used to install the towers. Equipment and materials would be shipped to the project sites in consecutive stages during construction of each tower site. The diesel 2kW - 25 kW

generators would be used for camp facilities during construction. The primary mobile emission sources during construction would be exhaust emissions associated with vehicles, including helicopters, and fugitive dust resulting from grading, excavating, constructing the towers, backfilling, and restoring disturbed areas (see Table 4-1). The construction activities would be the same at each tower site and include rock drilling (as needed), and excavation, delivery and installation of concrete at the pads, installation of the towers, and placement of associated infrastructure (shelters and fuel tanks).

The proposed construction emissions and the corresponding impacts to air quality are expected to be relatively constant over a construction period of 150 days. Installation of the three tower sites between Grayling and Unalakleet is planned for the 2012 construction season, while the installation of the six towers connecting Unalakleet to Nome is planned for 2013. Construction areas for the project components proposed for federal lands, i.e., the Otter Creek and Golovin Alternate tower sites, are located a considerable distance from one another.

The installation of tower sites on non-federal lands would have indirect impacts on emissions and air quality similar to those of tower sites on BLM-managed lands. Because the project is not expected to significantly affect aircraft traffic or road transportation by other parties, the project is not considered to have indirect impacts on emissions or air quality.

Table 4-1. Construction Emissions for Typical Tower Site

Equipment / Activity	Quantity	Hours per day	Number of days	Trips per site	Emissions, by Pollutant (tons during construction)						
					PM_{10}	$PM_{2.5}$	CO	VOC	NO_X	SO_X	CO_2
CAT 303 backhoe	1	12	150	-	0.00	0.00	0.00	0.00	0.01	0.00	1.6
225 CFM air compressor	1	12	150	-	0.01	0.01	0.03	0.01	0.07	0.00	10.6
2kW-25 kW Generator	2	24	150	-	0.02	0.02	0.10	0.03	0.27	0.00	35.3
R-44 or Hughes 500-E helicopters	1	-	-	40	0.00	0.00	0.95	0.04	0.00	0.00	2.8
Erickson Air Crane (heavy lift)	1	-	-	4	0.00	0.00	0.05	0.02	0.00	0.00	3.0
Bell UH-1B Huey helicopter	1	-	-	60	0.00	0.00	0.01	0.00	0.06	0.01	26.3
Fugitive Dust Sources (grading, excavating, etc.)	N/A	-	150	-	1.37	-	-	-	-	-	-
				Total	**1.40**	**0.03**	**1.14**	**0.09**	**0.42**	**0.01**	**79.7**

Notes:

- Portable 2 kW - 25 kW generators were assumed for use during construction; also assumed these units will have 50 horsepower engines and both will run 24 hours per day for purposes of estimating emissions.
- Emission factors used in estimating the emissions from fuel combustion were obtained using the EPA's NONROAD2008a model (EPA, 2009), except those for aircraft, which were obtained using the Emissions and Dispersion Modeling System (EDMS) of the Federal Aviation Administration (FAA) (FAA, 2010).
- An uncontrolled PM_{10} emission factor for disturbed soil (i.e. grading and excavation) of 26.4 pounds of PM_{10} per day per acre was used (South Coast Air Quality Management District, California Environmental Quality Act Air Quality Handbook, 2003, page 9-3).
- All $PM_{2.5}$ is assumed to result from fuel combustion sources.
- Since O_3 is not directly emitted, its precursors, oxides of nitrogen (NO_X) and volatile organic compounds (VOC), are instead provided. This is common practice.
- Total emissions shown may not agree with above values due to rounding.
- Decommissioning activities are not included in the above table; however, they would be similar to construction impacts.

Impacts from construction activities are expected to be low in intensity, temporary in duration, local in extent, and common in context. The air quality summary impacts associated with construction activities are negligible.

Operations and Decommissioning

Operation of the two tower sites would result in a direct impact of emissions from mobile and stationary sources. Stationary source emissions would result from the operation of two diesel generators located at each of the sites. The generators would be contained in a power module shelter and are planned to be Cummins D1703-M (model DSKAA – 9-kW) diesel generators, each outfitted with a hospital-grade silencer. Fuel would be supplied to the generators by two 4,500-gallon fuel tanks at each site. The generators are projected to consume 7,000 gallons of low-sulfur diesel #1 per year, per site and produce the emission presented in Table 4-2.

Mobile emissions would result from helicopters during the transport of fuel to resupply the generators, 14 round-trips over 2 to 3 days per site per year, and the transport of crews to perform maintenance visits approximately twice per year (spring and fall). The Helicopter planned to be used for this purpose is a Bell UH1B. Annually, approximately 14 round-trip helicopter flights would be required for refueling, with the refueling effort lasting 2 to 3 days per site.

Impacts to air quality from operations phase, shown in Table 4-X, are expected to be low in intensity, long-term in duration (20-year life of the project), local in extent, and common in context. Decommissioning activities would be similar to construction impacts. The air quality summary impacts associated with operations and decommissioning activities are negligible.

Table 4-2. Annual Operational Emissions for Typical Tower Site

Equipment	Quantity	Hours per day	Number of days	Trips per site	Emissions, by Pollutant (tons per year)						
					PM10	PM2.5	CO	VOC	NOx	SOx	CO2
10 kW Cummins Generator	1	24	365	-	0.02	0.02	0.10	0.03	0.27	0.00	35.3
R-44 helicopters	1	-	-	2	0.00	0.00	0.05	0.00	0.00	0.00	0.1
Bell UH-1B Huey helicopter	1	-	-	14	0.00	0.00	0.00	0.00	0.01	0.00	6.1
				Total	**0.02**	**0.02**	**0.15**	**0.03**	**0.29**	**0.00**	**41.6**

Notes:

- Only one 10 kW Cummins generator is assumed to be used at any given time, during operations. Assumed unit has a 25 hp engine for purpose of estimating emissions.
- Emission factors used in estimating the emissions from fuel combustion were obtained using the EPA's NONROAD2008a model, except those for aircraft, which were obtained using the FAA's EDMS.
- Since O_3 is not directly emitted, its precursors, NO_X and VOCs, are instead provided. This is common practice.
- Total emissions shown may not agree with above values due to rounding.

Hazardous air pollutants

Hazardous air pollutants (HAPs) are created as a byproduct when fuel is burned through combustion. The amount of HAPs emitted depends on the type and quantity of fuel consumed. Diesel fuels typically result in more HAPs than natural gas, but the rates of HAP emissions are typically very small when compared to the criteria pollutant emissions. There would be a very

small amount of HAPs emitted for all construction, operations, and decommissioning activities associated with the project, including emissions from the vehicles and equipment (e.g., generators, tractor) used during construction and decommissioning, generators used during tower operation, and by helicopters used during construction, routine maintenance, and annual refueling operations. There are currently no state-operated HAP monitoring stations in Alaska. Given the low levels of anticipated HAP emission from the project, this lack of quantifiable data should not affect this analysis. Impacts from the fuel-burning activities that might create HAPs are expected to be low in intensity, temporary to long-term (life of project) in duration, local in extent, and common in context. The impacts associated with HAP-emitting activities would be minor.

Greenhouse gases

Some gases in the atmosphere affect the Earth's heat balance by absorbing infrared radiation. This layer of gases in the atmosphere functions much the same as glass in a greenhouse (i.e., both prevent the escape of heat); this is why this is known as the "greenhouse effect." Increased emissions of these gases due to combustion of fossil fuels and other activities have increased the greenhouse effect, leading to global warming and other climate changes. The most common and abundant greenhouse gases (GHGs) are carbon dioxide (CO_2), chlorofluorocarbons (CFCs), methane (CH_4), and nitrous oxide (N_2O) (Intergovernmental Panel on Climate Change [IPCC], 2007). It is widely accepted that continued increases in GHGs will contribute to global climate change, although there is uncertainty concerning the magnitude and timing of future emissions and the resultant warming trend (IPCC, 2007). Human activities associated with industrial manufacturing, utilities, transportation, residential, and agricultural sectors contribute to these GHGs. Emissions of CO_2 and nitrous oxide are byproducts of fossil fuel combustion. Methane, a highly potent GHG, results from off-gassing associated with agricultural practices, landfills, and wastewater treatment.

Unlike criteria air pollutants and HAPs, which are pollutants of regional and local concern, climate change is a global problem and GHGs are global pollutants. Impacts of GHG emissions are a function of their total atmospheric concentration and most GHGs are globally well-mixed atmospheric constituents. This means that the location of a particular GHG emission does not change its local environmental impact.

Construction of this project is expected to last 150 days in 2012 and 2013, and GHG emissions from construction of the Otter Creek and Golovin Alternate tower sites are estimated to result in approximately 160 tons CO_2, based upon equipment-specific emission factors from EPA and FAA (see Table 4-1). The two emission factor sources used, the EPA NONROAD model and the FAA EDMS model, provide only CO_2 factors; other GHGs were not calculated.

Annual operating emissions of CO_2 were calculated for the diesel engines and the scheduled annual fuel delivery and maintenance trips at the two tower sites combined. The calculated CO_2 emissions from this activity (total for both sites) equals approximately 84 tons per year (2,000 tons CO_2 over the 20-year operational life of the project, including 320 tons CO_2 from construction and decommissioning), which is very low for fuel combustion sources. Emissions of GHG during construction would likely result in a higher rate based upon the larger equipment fleet, but this would occur over a relatively short period of time (i.e., a few months).

Impacts from the activities that would emit GHG are expected to be low in intensity, temporary to long-term (life of project) in duration, extended in extent, and common in context. The impacts associated with GHG emitting activities would be minor.

Cumulative Impacts

In addition to the aforementioned impacts to air quality, other airborne pollutant sources may result from RFFAs in the vicinity of the project. Such actions include:

- Additional components of the larger TERRA-NW Project occurring on non-federal lands (installation and operation of four community towers); and
- Additional submarine fiber-optic cable or terrestrial microwave-fiber-optic cable telecommunications projects that may occur in the future. Additional mining development may occur within or on the periphery of the project area. No specific projects are classified as RFAAs at this time.

Based on the approximately 84 tons per year (2,000 tons CO_2 over the 20-year operational life of the project, including 320 tons CO_2 from construction and decommissioning) and low HAP emissions, the cumulative effects of Alternative 1are anticipated to be low in intensity, temporary to long-term (life of project) in duration, local to extended in extent, and common in context. Air quality impacts from the cumulative effects of anticipated actions in the vicinity of project areas should be considered negligible.

Summary

Based on low criteria pollutant and HAP emissions and the estimated 20-year lifetime GHG emission of 2,000 CO_2, emissions from construction and operation of the two towers on BLM-managed land (Otter Creek and Golovin Alternate) and the eight tower sites on non-federal parcels are expected to be low in intensity. Impacts would be temporary to long-term (20-year life of project) in duration and given the limited affected area, impacts would be local to regional in extent, and affecting resources that are common in context. Based on these criteria, impacts on air quality in the project areas would be negligible.

4.2.1.2 Alternative 2 – No Action Alternative

Under Alternative 2 (No Action), the two tower sites (Otter Creek and Golovin Alternate) would not be built or installed; thus, there would not be an increase in pollutant emissions from project-related construction or operational equipment.

Direct and Indirect Impacts

There would be no direct or indirect emissions impacts to air quality as a result of Alternative 2.

Cumulative Impacts

With no direct or indirect emissions impacts under Alternative 2, there would be no contribution to cumulative impacts to air quality.

Summary

As there are no foreseeable pollutant emissions associated with Alternative 2, there would be no impacts to air quality from implementation of this alternative.

4.2.1.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Construction

Emissions resulting from construction of the two towers on BLM land and the installation of eight towers on non-federal sites would be the same as Alternative 1.

As outlined in Alternative 1, the impacts from construction activities are expected to be low in intensity, temporary in duration, local in extent, and affecting a resource that is common in context. The air quality impacts associated with construction activities would be negligible.

Operations and Decommissioning

There would be no impact as a result of operation of a microwave repeater tower at Hill 2211, other than those outlined in Alternative 1, unless repairs require the temporary use of equipment similar to that used during construction. Impacts from operation are expected to be low in intensity, long-term in duration (life of the project), local in extent, and common in context. Decommissioning activities would be similar to construction impacts. The air quality summary impacts associated with operations and decommissioning activities would be negligible.

Cumulative Impacts

The same RFFAs evaluated for Alternative 1 are applicable to this alternative; similarly, the cumulative effects of those actions should be considered negligible.

Summary

Based on low criteria pollutant and HAP emissions and the estimated 20-year lifetime GHG emission of 2,000 CO_2 for Alternative 3, emissions from construction and operation of two towers on BLM-managed land (Hill 2211 and Otter Creek) and the eight tower sites on non-federal parcels are expected to be low in intensity. Impacts would be temporary to long-term (20-year life of project) in duration and given the limited affect area, impacts would be local to regional in extent, and affecting a resource that is common in context. Based on these criteria, impacts on air quality in the project areas are negligible.

4.2.1.4 Alternative 4 –Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Construction

Emissions resulting from construction of one microwave repeater towers on BLM land and the installation of eight microwave repeater towers on non-federal sites remain unchanged in Alternative 4. Removal of the Reindeer tower site would lessen overall construction and operational impacts in comparison to Alternative 1. Impacts from construction activities are

expected to be low in intensity, temporary in duration, local in extent, and common in context. The air quality impacts associated with construction activities would be negligible.

Operations and Decommissioning

There would be no impact as a result of operation of a tower at Kwiktalik Mountain, other than those outlined in Alternative 1; however, in comparison to Alternative 1, overall emissions would be less due to the removal of the Reindeer tower site from the project configuration. Impacts from operation are expected to be low in intensity, long-term in duration (life of the project), local in extent, and common in context. Decommissioning activities would be similar to construction impacts. The air quality summary impacts associated with operations and decommissioning activities would be negligible.

Cumulative Impacts

The same RFFAs evaluated for Alternative 1 are applicable to this alternative; similarly, the cumulative effects of those actions should be considered negligible.

Summary

Based on low criteria pollutant and HAP emission and the estimated 20-year lifetime GHG emission of 1,080 tons CO_2 (including 20 years of annual operations for one tower, plus emissions associated with removal of Reindeer Repeater [assumed similar to that for construction] and construction/decommissioning of Kwiktalik Mountain Repeater) for Alternative 4, emissions from construction and operation of one tower on BLM-managed land (Kwiktalik Mountain tower) and the eight tower sites on non-federal parcels are expected to be low in intensity. Impacts would be temporary to long-term (20-year life of project) in duration and given the limited affect area, impacts would be local to regional in extent, and common in context. Based on these criteria, impacts on air quality in the project areas would be negligible.

4.2.2 Geology and Soils

4.2.2.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Construction

Implementation of Alternative 1 would disturb a total of less than 1.38 acres of shallow subsurface soil for the Otter Creek and Golovin Alternate tower sites and at the construction staging areas at Klikitarik Bay, Unalakleet, and Golovin. Of that total, 0.16 acres would be affected by project excavation and installation of facilities, with 10.3 acres affected by the construction area including the helicopter landing areas. This is significantly less than 0.01% of the 3.5 million acres managed by the BLM in the vicinity of the Otter Creek site and the 443,140 acres in the vicinity of the Golovin Alternate site. Direct impacts on soils as a result of Alternative 1 would be of high intensity in a small, localized area and would include excavation, grading, and compaction, and direct loss of soil cover by exposure in the area of the new facilities, and exposure of soils to localized runoff and erosion.

Another potential impact to soil could arise from an uncontained release of fuel or other hazardous materials. Alaska lands are regulated by the Alaska Department of Environmental Conservation (ADEC) in accordance with Alaska Administrative Code, Title 18, Chapter 75 – Oil and Other Hazardous Substances Pollution Control (18 Alaska Administrative Code 75) (ADEC, 2008). The risk and impact of an uncontained release, both at the construction site and by helicopter operations, is reviewed in the Hazardous Materials and Waste Management Section 4.2.4, as are the measures to reduce this risk.

Operations and Decommissioning

Direct impacts from the initial project activities would be highest during construction, but would be reduced in the period following the installation, during annual refueling, and operation and maintenance activities. Direct impact from construction activities and disturbance of vegetation would expose new soil and rock and may cause soil erosion due to potential channelization of runoff. Re-vegetation is extremely slow in cold environments so the impact is of long duration, possibly the life of the project. The disturbance impacts would be repeated with decommissioning.

Indirect impacts on soils would occur at non-federal sites under this alternative, and would include excavation, grading and compaction; however, these impacts would be similar to direct impacts at federal tower sites. Other indirect impacts occurring at all sites would be considered minor. Examples of other indirect impacts at all federal and non-federal sites could be the subsequent or longer-term alteration of permafrost characteristics, if present, in the local areas following construction of the towers. Direct and indirect impacts at the staging areas in Grayling, Golovin, Klikitarik Bay, Unalakleet, and Nome, in the form of erosion from soil and vegetation disturbance, would be highest during construction, but would be reduced in the period following the installation and during annual refueling, and operation and maintenance activities, during which Grayling and Golovin would be the staging sites.

Cumulative Impacts

Actions that may have impacted soils at the two tower sites and staging areas include past, present, and future helicopter-supported resource exploration activities involving drilling rig placement, operation, fueling, and demobilization. Present activities also include drilled soil exploration boring advancements conducted in support of the TERRA-NW Project in September 2011. Cumulative impacts related to these activities include the mobilization of equipment, fuel, and supplies, advancement of exploratory borings, and erosion of soil due to potential channelization of runoff.

The implementation of Alternative 1 could directly result in disturbance of ground cover on a total for the two sites of up to 1.38 acres of regionally common soils. The area subject to excavation for installing project components would total 0.16 acres for both sites. The project components under direct review in this Environmental Assessment (EA) would make a negligible contribution to cumulative effects for geology and soils from the TERRA-NW Project components installed on state and private lands, since all components would be small in footprint and widely dispersed across a large area.

The cumulative adverse impacts attributable to implementation of this alternative would be considered minor.

Summary

Topsoil removal/excavation and facility installation would result in direct and indirect impacts to soils that would be high in intensity, permanent in duration, but would be localized in extent and affect resources that are common in context. The permanent direct impact to soils at the two federal tower sites would fall within the excavation area for a total of 0.16 acres. The indirect impacts to soils at the eight tower sites on non-federal lands would amount to 0.64 acres. For perspective, BLM manages 3.5 million acres of land in the vicinity of the Otter Creek tower site and 443,140 acres in the vicinity of the Golovin Alternative tower site. The summary impact to soils would be negligible.

4.2.2.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under implementation of Alternative 2, no direct or indirect impacts to soils would occur since no excavation or ground disturbance would occur at the tower sites or through annual fueling activities staged from Golovin and Grayling. Under Alternative 2, no disturbance would occur at the staging areas at Grayling, Golovin, Klikitarik Bay, Unalakleet, and Nome for facility construction activities.

Cumulative Impacts

With no direct or indirect effects to soils expected under Alternative 2, there would not be a contribution to cumulative impacts on these resources.

Summary

Implementation of Alternative 2 would have no direct or indirect impact to soils.

4.2.2.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Construction

Direct impacts on soils as a result of Alternative 3 would be similar to Alternative 1, high intensity to a localized area, and would include excavation, grading, and compaction, and exposure of soils to localized runoff and erosion. Direct impacts from the initial project activities at federal tower sites would be highest during construction, but would be minimal to low following the installation. Indirect impacts on soils would occur at non-federal sites under this alternative, and would include excavation, grading and compaction; however, these impacts would be similar to direct impacts at federal tower sites.

Operations and Decommissioning

As with Alternative 1, direct impacts from the initial project activities would be highest during construction, but would be reduced in the period following the installation, during annual refueling, and operation and maintenance activities. The disturbance impacts would be repeated with decommissioning. Indirect impacts on soils would occur at non-federal sites under this alternative, and would include excavation, grading, and compaction, however, these impacts would be similar to direct impacts at federal tower sites. Other indirect impacts occurring at all sites would be considered minor. Examples of other indirect impacts could be the subsequent or longer-term alteration of permafrost characteristics in the local areas following construction of the tower sites, if those areas contain permafrost.

Cumulative Impacts

The same RFFAs evaluated for Alternative 1 are applicable to this alternative; similarly, the contribution to cumulative impacts attributable to implementation of this alternative would be considered minor.

Summary

Topsoil removal/excavation and facility installation would result in direct and indirect impacts to soils that would be high in intensity, permanent in duration, but would be localized in extent and affect resources that are common in context. The permanent direct impact to soils at the two federal tower sites would fall within the excavation area for a total of 0.16 acres. The indirect impacts to soils at the eight tower sites on non-federal lands would amount to 0.64 acres. For perspective, BLM managed 3.5 million acres of land in the vicinity of the Otter Creek tower site and 443,140 acres in the vicinity of the Hill 2211 tower site. The summary impact to soils would be negligible.

4.2.2.4 Alternative 4 –Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Construction

As with Alternatives 1 and 3, direct impacts on soils would be high intensity to a localized area and would include excavation, grading, and compaction, and exposure of soils to localized runoff

and erosion. Direct impacts from the initial project activities at federal tower sites would be highest during construction, but would be minimal to low following the installation. Direct impacts on soils from the Otter Creek tower site, the only site located on federal lands, would consist of an excavated area of 0.08 acres. Under this alternative, indirect impacts on soils would occur at the eight repeater and community sites located on non-federal land and would include excavation, grading, and compaction; however, these impacts would be similar to direct impacts at federal tower sites. Examples of other indirect impacts could be the subsequent or longer-term alteration of permafrost characteristics in the local areas following construction of the towers. These types of indirect impacts would be considered minor.

Operations and Decommissioning

As with Alternatives 1 and 3, direct impacts from the initial project activities at the Otter Creek tower site, would be highest during construction, but would be reduced in the period following the installation, during annual refueling, and operation and maintenance activities. The disturbance impacts would be repeated with decommissioning. Indirect impacts on soils would occur at non-federal sites under this alternative, and would include excavation, grading, and compaction, however, these impacts would be similar to direct impacts at federal tower sites. Other indirect impacts occurring at all sites would be considered minor.

Cumulative Impacts

The same RFFAs evaluated for Alternative 1 are applicable to this alternative; similarly, the contribution to cumulative impacts attributable to implementation of this alternative would be considered minor.

Summary

Topsoil removal/excavation and facility installation would result in direct and indirect impacts to soils that would be high in intensity, permanent in duration, but would be localized in extent and affect resources that are common in context. The permanent direct impact to soils at the Otter Creek tower site, the only federal component under Alternative 4, would fall within the excavation area for a total of 0.08 acres. The indirect impacts to soils at the eight tower sites on non-federal lands would amount to 0.64 acres. For perspective, BLM managed 3.5 million acres of land in the vicinity of the Otter Creek tower site and 443,140 acres in the vicinity of the Kwiktalik Mountain tower site. The summary impact to soils would be negligible.

4.2.3 Hydrology

4.2.3.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Construction

Under Alternative 1, no direct or indirect impacts to water resources or water quality would occur at the proposed repeater sites since there is no standing water at, or waterbody immediately adjacent to, the Otter Creek or Golovin Alternate tower sites. The staging areas at the mouth of the Klikitarik Bay, Unalakleet, Golovin, and Nome would include barge anchorage sites off-shore, and lightering of materials to a coastal beach location, or landing at existing docking facilities. Barges would be stationed at the staging areas, but only temporarily and with no substantial change to water quality or water resources. Increases in turbidity nearshore would increase during mobilization of the barge in shallow areas, but would likely be of very short duration. Supplies would be offloaded from barges using methods to prevent fuel spills.

Direct impacts on water resources and water quality as a result of Alternative 1 would be of high intensity to a localized area and would include the off-loading of equipment and supplies from barges near shore or at existing docking facilities at the staging areas for the tower sites. Direct impacts from the initial project activities would be highest during construction, but would be reduced in years following the installation, during which the operations would require annual refueling and maintenance activities.

Indirect impacts on water quality would occur at non-federal sites under this alternative, and would include increased water turbidity and barge staging sites and the risk of potential fuel spills; however, these impacts would be similar to direct impacts at federal tower sites. Examples of indirect impacts could be the alteration of water quality in the local areas where the staging areas would be located, if those areas experienced increased turbidity over time. Direct and indirect impacts at the staging areas at Klikitarik Bay, Unalakleet, Golovin, and Nome would be highest during construction, but would be reduced during annual refueling and operation and maintenance activities.

Operations and Decommissioning

No impacts would be expected to water resources and water quality as a result of operations. Direct and indirect impacts to water quality from decommissioning activities would be similar to those occurring during construction.

Cumulative Impacts

Actions that may affect water resources and water quality at the two tower sites on federal lands, the non-federal components, and staging areas include past, present, and future helicopter-supported resource exploration activities. The Rock Creek mine/mill complex closure activities is the only mining activity that can be classified as an RFFA, with a negligible impact to hydrological processes within the project region. Increased barge and offshore activities resulting from the recent sale of offshore ANDR leases has the potential to increase turbidity within Norton Sound, particularly in the waters near Nome.

The implementation of Alternative 1 could directly result in the increase of turbidity at nearshore locations of the staging areas at Klikitarik Bay (marine), Unalakleet (marine), Golovin (marine), and Nome (marine). The water resources that would be impacted as a result of past, present, and RFFAs are a small fraction of the existing waterbodies within the project area. The cumulative negative impacts attributable to implementation of this alternative would be minor and long-term.

Summary

Under Alternative 1 there are no expected impacts to water resources or water quality at the tower sites. Barges would likely be staged during construction at coastal areas that may increase turbidity near shore in a localized area, however, this would be a temporary, localized impact that would be short-term in duration (during construction activities), high in intensity, but affecting resources common in context. The summary impact would be considered minor.

The potential release of fuel and/or lubricants would exist during construction activities at the coastal barge staging sites and from an in-flight jettison of sling loads for safety of aircraft and crew. Safety management, spill prevention, and spill response practices can reduce risk and impact. As described in Section 4.2.4, fueling or refueling operations occur during an estimated total of 150 days during construction for both tower sites, and on an annual basis for 12 to 14 days per year for the 20-year life of the project. In addition, the fueling and refueling operations employs a Fuel Easy 500-gallon container, which represents the volume of a spill incident risk. If such a spill were to occur on land, the impact would be short-term in duration, local in extent, and high in intensity to a common resource. If the spill were to occur in a wetland or a waterbody, the impact would likely be longer-term (exceeding two years), and larger in extent, and high in intensity. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.

4.2.3.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under implementation of Alternative 2, no direct or indirect impacts to water resources or water quality would occur since there is no standing water at, or waterbody near the Otter Creek or Golovin Alternate tower sites. Under Alternative 2 no staging areas would be utilized for off-loading equipment from barges and subsequent ferrying of equipment and supplies by helicopter to the sites.

Cumulative Impacts

With no direct or indirect effects to water resources or water quality expected under Alternative 2, there would not be a contribution to cumulative impacts on these resources.

Summary

Implementation of Alternative 2 would have no direct or indirect impacts to water resources and water quality.

4.2.3.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Construction

Under Alternative 3, similar to Alternative 1, no direct or indirect impacts to water resources or water quality would occur at the tower sites since there is no standing water at, or waterbody immediately adjacent to the Otter Creek or Hill 2211 tower sites. The staging areas and impacts would be the same as described for Alternative 1. Indirect impacts on water quality would occur at non-federal staging sites under this alternative and would include increased water turbidity and the risk of potential fuel spills.

Operations and Decommissioning

Limited impacts would be expected to water resources and water quality as a result of operations. Direct and indirect impacts to water quality from decommissioning activities would be similar to those occurring during construction.

Cumulative Impacts

Past, ongoing, and future actions that have had and would continue to have minor impacts to water resources and water quality at the project areas are described above under Alternative 1. The water resources that would be impacted as a result of past, ongoing, and RFFAs are a small fraction of the existing waterbodies within the project area. The implementation of Alternative 3 would contribute a relatively small, temporary increase to the already low amount of turbid waters in northwest Alaska. The cumulative negative impacts attributable to implementation of this alternative would be minor.

Summary

Under Alternative 3, similar to Alternative 1, there are no expected impacts to water resources or water quality at the tower repeater sites. Direct and indirect impacts at barge staging areas would be localized and short-term in duration (during construction activities), high in intensity, but affecting resources common in context. The summary impact would be considered minor. If a fuel spill were to occur in a wetland or a waterbody, the impact would likely be longer-term (exceeding two years), and larger in extent, and high in intensity. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.

4.2.3.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Construction

Under Alternative 4, similar to Alternatives 1 and 3, no direct or indirect impacts to water resources or water quality would occur at the proposed repeater sites since there is no standing water at, or waterbody immediately adjacent to the Otter Creek tower site, the only site on BLM-managed land. The staging areas and impacts would be the same as described for Alternatives 1

and 3. Indirect impacts on water quality would occur at non-federal staging sites under this alternative and would include increased water turbidity and the risk of potential fuel spills.

Operations and Decommissioning

Limited impacts would be expected to water resources and water quality as a result of operations. Direct and indirect impacts to water quality from decommissioning activities would be similar to those occurring during construction.

Cumulative Impacts

Past, ongoing, and future actions that have had and would continue to have minor impacts to water resources and water quality at the project areas are described above under Alternative 1. The water resources that would be impacted as a result of past, ongoing, and RFFAs are a small fraction of the existing waterbodies within the project area. The implementation of Alternative 4 would contribute a relatively small, temporary increase to the already low amount of turbid waters in northwest Alaska. The cumulative contribution to adverse impacts attributable to implementation of this alternative would be minor.

Summary

Under Alternative 4, similar to Alternative 1, there are no expected impacts to water resources or water quality at the tower sites. Direct and indirect impacts at barge staging areas would be localized and short-term in duration (during construction activities), high in intensity, but affecting resources common in context. The summary impact would be considered minor. If a fuel spill were to occur in a wetland or a waterbody, the impact would likely be longer-term (exceeding two years), larger in extent, and high in intensity. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.

4.2.4 Hazardous Materials and Waste Management

4.2.4.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Construction

Under Alternative 1, helicopter flights for each of the two tower sites would occur during the construction phase. Construction activities rely on helicopters for transport of equipment, supplies, fuel, and personnel. The reliance on helicopters for remote construction activities poses operational safety risks. Development plans for each tower site call for 4 trips using an Erickson Air Crane helicopter, 60 flights for construction supplies and construction camp removal utilizing a UH-1H "Huey" helicopter, and 30 to 40 flights for the Hughes 500-E or Robinson R-44 helicopter for crew rotation and resupply. Together, this would represent just over 200 flights during the five-month construction period. Each of the two construction sites would require six 55-gallon drums (four for diesel and two for gas) at each site with integrated containment and covers to prevent rain/fuel mixing and overflow. Two 300-gallon fuel bladders would also be in place, one for aviation jet-A fuel, and one for low sulfur #1 diesel fuel. The fuel bladders would be stored in temporary containment dams (Table 2-2).

The quantity of fuel required for construction is limited and would be stored on site during only one construction season. Because spill prevention procedures would be followed, the risk of a reportable oil spill is low. With limited volumes of fuel on site and appropriate prevention procedures and response capabilities, the intensity of this activity would be considered medium. Since the effects of this activity would occur over the five-month construction period, the duration would be considered temporary. The risks of spills during construction would be confined to localized areas, and affect resources that are common in context. It is not likely that construction crews would encounter hazardous materials that would delay construction of the project.

The eight towers proposed for private lands under Alternative 1 are connected actions, and the environmental consequences are considered indirect effects (see Table 2-1 for details). The five repeater tower sites on private land would require helicopter-supported construction similar to the plans for the BLM-managed tower sites. The indirect effect of construction at these sites would be comparable as well. The three community towers would be installed in currently developed areas with the host communities. No helicopter support would be required for construction.

Operations

The operational phase of the tower sites would require annual maintenance and fuel resupply via helicopter. Each site would require roughly 14 trips annually utilizing a medium-lift UH-1H Huey helicopter to transport the 7,000 gallons of fuel, continuing over the life of the project. Two annual trips to each tower site for annual maintenance would use Hughes 500-E or R-44 helicopters (Table 2-4). Combined, the two tower sites together would necessitate 28 trips and 4 to 5 days of helicopter activity for refueling each year, plus 4 trips each year for annual maintenance. During the operational phase of this project, the activity associated with annual

fuel resupply would be considered a low intensity impact, with 14 flights per site occurring only once annually. Duration would be temporary, taking place in a four to five day period. These impacts would affect resources that would be considered common in context.

The fueling and refueling operations would employ a Fuel Easy (or similar), 500-gallon container, which represents the volume of a spill incident risk. The Fuel Easy system consists of high-strength urethane-coated nylon fuel bladders contained within an external high-strength metal frame. The rigid frame helps ensure the bladder maintains a symmetrical configuration in flight. When flying partial loads, the bladder collapses into itself, which would create the specific amount of aerodynamic drag necessary to fully stabilize the unit in flight. The unit has simple filling and emptying camlock fittings with fittings on top for top-filling and bottom-emptying. This system minimizes handling on site, eliminates vapor space, and would reduce the risk of fuel contamination by eliminating transfer between drums. The storage tanks would be enclosed within a "duck pond" portable berm and secondary containment device. During refueling, the fuel bladder would be placed within a temporary "duck pond" secondary containment device, next to the main on-site fuel tanks, and fuel would be transferred using on-site pumps.

During the operations phase of the project the 48-hour backup power supply would generate electricity using lead-calcium batteries containing battery acid. The dry battery jars require five gallons of acid per cell (total 72 cells per site) and would also be contained in a "duck pond" style containment system. Once filled, the batteries would be secured with straps in storage racks inside the communications shelter. This provides the power supply with a covered, enclosed facility to protect the batteries from inclement weather. Secondary containment systems minimize potential for a release of hazardous materials to the environment.

Through the operations phase, i.e., the 20-year life of the project, hazardous materials on site include stored fuel and battery acid. Secondary containment systems, including double-walled tanks and alarms, promote secure storage. An increased risk is found in resupply operations, including helicopter transportation and refueling operations at the sites. A Spill Prevention, Control, and Countermeasure (SPCC) plan would be prepared and approved prior to the start of operations, providing detailed mandatory standards and procedures to prevent and respond to any release. Reporting and response procedures would be specified in the SPCC plan, including participation by Unicom in a spill response consortium with trained personnel and pre-staged spill response assets near the project area. Immediate response supplies would be stored on site.

It is anticipated that the SPCC plan would describe potential fuel spill scenarios and response actions; four of which are discussed below. These scenarios would cover the range of spills that could occur during refueling.

A formal calculation of spill risk probabilities was not feasible, so the scenario based analysis is offered. In addition, vegetation data from the National Wetlands inventory for the helicopter refueling transect from Golovin to Golovin Alternate tower site were analyzed and showed that 15% of the route is over uplands, 58% is over wetlands, and 27% is over marine waters. Two steams are crossed. Comparable vegetation data were not available for the refueling transit route to the Otter Creek tower site.

The first scenario is a small spill at the areas used to fill or empty the Fuel Easy bladder. These spills could occur from overfilling the bladder, a transfer hose rupture, or failure of fittings and valves. The best management practices requiring continuous attendance by personnel during

transfer and use of duck ponds and secondary containment on the fuel ports of the storage tanks at the tower sites would reduce the potential volume of these spills and decrease the amount of the spill that escapes into the environment. Furthermore, these areas would be easy to access and cleanup actions could be initiated quickly. The impact of these spills would be low in intensity, temporary in duration, local in extent, and affecting a common resource. The overall impact would be negligible.

The other three scenarios would involve the unlikely event of a dropped sling-load (500 gallons) of fuel during a refueling helicopter flight. The resulting spill could affect uplands, wetlands (including ponds and lakes with little current), or streams and rivers. It is not necessary for the fuel to be transported over marine waters so there is no risk of a spill into the ocean.

1. If the fuel bladder were to fall on uplands and rupture, up to 500 gallons could be released. The fuel would coat plants and be absorbed into the soil, potentially affecting as much as a few acres. Cleanup crews would respond and the most impacted soil and plants would be collected and removed for disposal. Some residual fuel would remain, but would naturally attenuate over time. Plant regrowth would be expected within a growing season or two. Few impacts to wildlife and fish would be expected because of the cleanup, and that any residual fuel would be absorbed into the soil and not be available for contact or ingestion. The impact of upland spills and associated response actions would be medium in intensity because it would be perceptible, but would not noticeably alter the function of upland ecosystems in the area and would not affect visitor experiences. The impact would be long-term in duration, local in extent, and affecting a common resource. The overall impact would be moderate.
2. If the fuel bladder fell into standing water such as wetlands, ponds, or lakes and the bladder ruptured, the spilled fuel (up to 500 gallons) would likely spread rapidly until it reached vegetation or the shoreline. Cleanup crews would respond and would use containment boom and skimmers as well as absorbents to recover as much fuel as is practicable. The sun and wind would also act to dissipate any remaining sheen, although residual sheen may persist in areas for a season or two. The presence of sheen is considered a violation of State Water Quality Criteria. It is likely that some wetland and shoreline vegetation would be killed, but regrowth within a two seasons would be expected. Because the volume of fuel is limited and the cleanup would remove any thick concentrations of fuel, impacts to wildlife and fish would be expected to affect individual animals and not have population-level effects. The impact of these spills and associated response actions would be medium in intensity (because of the potential for exceeding water quality criteria), temporary in duration, local in extent, and affecting an important resource. The overall impact would be moderate.
3. If the fuel bladder fell into flowing water such as a stream or river and the bladder ruptured, the spilled fuel (up to 500 gallons) would move downstream with the current. Cleanup crews would respond by installing a deflection boom ahead of the plume, trapping the fuel against the bank where it could be collected using skimmers or absorbents. The continual flushing action would minimize the duration the fuel would remain in any one location, and the following breakup flood would likely flush any residual sheen from the river or stream system. Because the volume of fuel is limited, the cleanup would remove any thick concentrations of fuel, and the current, wind, and sun would dissipate fuel not recovered. Impacts to wildlife and fish would be expected to

affect individual animals and not have population-level effects. The impact of these spills and associated response actions would be medium in intensity, temporary in duration, regional in extent, and affecting an important resource. The overall impact would be moderate.

Overall, given the limited temporal and fuel volume risks, and effective prevention procedures and spill response capacities, the summary impact of a fuel spill risk would be considered negligible to moderate.

For the eight towers that make up the connected actions on non-federal lands, the helicopter-supported refueling operations for the five repeater towers would result in indirect effects and risks of fuel spills comparable to the two towers on BLM-managed lands. The three community towers making up part of the connected actions would not require helicopter-supported refueling, so the indirect effects and spill risks are smaller.

Decommissioning

Decommissioning of the microwave repeater sites would likely result in impacts similar to construction activities; total impacts would be minor. Indirect effects of decommissioning the eight towers that are connected actions on non-federal lands would also be comparable to the effects of construction.

In summary, the project's potential impact to resources during decommissioning would be considered negligible due to the low intensity of impacts, short duration of activities, common context of affected resources, and the limited quantities of hazardous materials involved. Utilization of the proposed safety devices and practices (properly designed secondary containment systems and development of a project-specific SPCC plan) would further reduce the potential impacts of hazardous materials from the decommissioning phase of the project.

Cumulative Impacts

Past, ongoing, and RFFAs that would contribute impacts to cumulative effects in the project area are discussed in Section 4.1.3.3. Past and present actions have not resulted in any known spills of hazardous materials in the vicinity of the tower sites on BLM-managed lands. These are planned for remote, sparsely populated, undeveloped areas. Staging activities would occur at an undeveloped site on private land at Klikitarik Bay, as well as within the communities of Unalakleet and Golovin. These include the future components of the TERRA-NW Project, which would involve five additional community towers on non-federal land in Norton Sound communities, one of the connected actions planned in Alternative 1 for private lands. In 1990, a Boeing 737 airplane crashed approximately 3 mi. from the Unalakleet tower site (NTSB, 2011). It is unlikely that hazardous materials from the crash would affect the proposed Alternative 1 Unalakleet tower site.

Under Alternative 1, the direct and indirect impacts of routine operations would be negligible to minor. These direct and indirect effects would make negligible contributions to cumulative effects for hazardous materials from project components installed on BLM-managed lands. The project, including the fuel spill scenarios, would make a minor to moderate contribution to cumulative effects as the project only adds a minor to moderate degree of additional risk to existing activities in the region.

Summary

With the containment designs and operational response measures included as features of the project, potential impacts from hazardous materials at the tower sites would be expected to be of low intensity, long-term duration (for the 20-year life of the project), localized in extent, and affecting resources that are common in context. The greater risk comes in annual refueling transportation from staging areas in Grayling and Golovin to the tower sites. The risk of spills during fuel transportation could occur during an estimated total of 28 days during construction for the 2 tower sites together, and on an annual basis during 4 to 6 days per year for refueling operations for the life of the project. The fueling and refueling operations would employ a Fuel Easy 500-gallon container, which represents the maximum volume of a spill incident risk. If such a spill were to occur on land the impact would be of medium intensity, long-term duration, local extent, and affecting a common resource. If the spill were to occur in wetlands or a waterbody, the impact would likely be of medium intensity, temporary in duration (up to two years), local to regional in extent, and affecting a common to important resource. Given the limited temporal and fuel volume risks for the project activities, including the risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate.

4.2.4.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under Alternative 2, the microwave towers would not be built or installed; thus there would be no direct or indirect impacts to hazardous materials and waste management.

Cumulative Impacts

With no direct or indirect impacts under Alternative 2 there would be no contribution to cumulative impacts to this resource

Summary

Implementation of Alternative 2 would have no direct or indirect impacts to hazardous materials and waste management.

4.2.4.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Construction, Operations and Decommissioning

Under Alternative 3, direct and indirect impacts from risks of hazardous materials and fuel spills would be the same as those for the tower sites on BLM-managed lands in Alternative 1. There are no connected actions on non-federal lands for Alternative 3.

Cumulative Impacts

In the recent past, Hill 2211 was the site of a communications facility installation by NSEDC. Alternative 3 would represent a larger communication tower facility, and would introduce negligible to moderate new risks for fuel spills during the fueling flights. This would represent a negligible to moderate contribution to cumulative effects.

Summary

Considering the fuel spill risks at the tower site and during helicopter-supported refueling, Alternative 3 would result in direct and indirect impacts of minor to moderate intensity (depending on the whether a spill affects uplands; lakes, ponds, or wetlands; or streams and rivers). The extent would generally be local, and the duration temporary (up to two years). Resources affected would be common for upland sites, but important for wetlands and river systems. Based upon the risk of a fuel spill, the contribution to cumulative effects would range from minor to moderate. The summary impact of this alternative is rated minor to moderate.

4.2.4.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Construction, Operations and Decommissioning

Under Alternative 4, direct and indirect impacts from risks of hazardous materials and fuel spills would be the same as those for the tower sites on BLM-managed lands in Alternative 1. There are no connected actions on non-federal lands for Alternative 4.

Cumulative Impacts

There are no known past or present actions that have resulted in hazardous materials releases at Kwiktalik Mountain. Alternative 4 would represent a larger communication tower facility, and would introduce negligible to moderate new risks for oil spills during the fueling and refueling flights. This would represent a negligible to moderate contribution to cumulative effects.

Summary

Considering the fuel spill risks at the tower site and during helicopter-supported refueling, Alternative 4 would result in direct and indirect impacts of minor to moderate intensity (depending on the whether a spill affects uplands; lakes, ponds, and wetlands; or streams and rivers). The extent would generally be local, and the duration temporary (up to two years). Resources affected would be common for upland sites, but important for wetlands and river systems. Based upon the risk of a fuel spill, the contribution to cumulative effects would range from negligible to moderate. The summary impact of this alternative is rated negligible to moderate.

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4.3 Biological Environment

4.3.1 Wetlands and Vegetation

4.3.1.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

There are no wetlands either within or in the immediate vicinity of the two tower sites considered under Alternative 1. The alpine vegetation at both tower sites is dominated by dwarf shrubs and herbs, with additional cover by lichens, moss, and bare ground.

Direct and Indirect Impacts

Construction

As there are no wetlands either at or in the immediate vicinity of the Otter Creek and Golovin Alternate tower sites, no direct or indirect impacts to wetlands are anticipated.

Direct impacts to vegetation are anticipated on BLM-managed lands at the Otter Creek and Golovin Alternate tower sites. Direct impacts of a temporary duration include disturbance related to placing and driving over rig mats, multiple helicopter landing zones (required for safety purposes), construction camp installation, and all associated staging areas necessary for tower construction. All temporary duration direct impacts would be confined to the temporary construction lease footprint, which totals 10.3 acres for both construction leases (5.15 acres per site) on BLM-managed land (see Table 2-3 for details on acreage of land affected during the project phases). Actual excavation of the vegetation layer would be confined to 0.16 acres at the two sites, in which the tower, the power and communication equipment shelters, and the fuel tanks would be located (0.08 acres per site).

Direct impacts of long-term to permanent duration would be confined to the long-term lease footprint, which would include permanent structures, excavation areas, and a helipad for use during future maintenance activities. Impacts from construction of tower sites and associated infrastructure is considered permanent due to the long time-frame required for revegetation in alpine environments, thus the effects would last beyond the life of the project, even after the facilities have been removed.

All direct impacts to vegetation associated with construction of the preferred alternative are anticipated to be of high intensity where excavation occurs, but affecting a very small area (local in extent). For the two sites together, this represents 10.3 acres of vegetation impacted within the temporary construction lease, and 1.4 acres affected within the long-term lease, and 0.16 acres affected by excavation. Considered in the context of 3.9 million acres of BLM-managed land in the vicinity of the two tower sites, the long-term lease area represents an impact on 0.0003 percent (three ten-thousandths of one percent) of the BLM-managed land.

Indirect impacts to vegetation are anticipated on BLM-managed lands at the Otter Creek and Golovin Alternate tower sites, as well as the associated towers sites proposed for private lands. Connected actions on non-federal lands associated with this alternative include eight additional tower sites, and staging areas in Grayling, Klikitarik Bay, Unalakleet, Golovin, Shaktoolik, and Nome (see Table 2-1). Indirect effects likely associated with the project include potential soil

erosion, the introduction of invasive species, and damage to or loss of vegetation on non-federal lands similar to that described above.

Damaged vegetation may increase the risk of soil erosion. Almost all sub-Arctic and alpine tundra plants are perennials with seedlings that grow very slowly, with most early growth concentrated in the roots. Re-vegetation that provides surface erosion control and natural visual quality can take decades in sub-Arctic/alpine environments such as ridgetops in the Nulato Hills and on the Seward Peninsula where the tower sites are proposed. Following construction, the disturbed areas will be restored to the original contour of the land, with any salvaged organic material placed at the surface. Site-specific seed mixes would be used for re-vegetation, to reduce the potential for soil erosion and invasive plant establishment.

Soil disturbance and using off-site equipment and materials that may contain non-native invasive species propagules increase the risk of introducing invasive species. Mitigation measures to prevent the introduction or spread of invasive species include thoroughly washing and cleaning all materials, bundles, and construction equipment before transportation to the project sites to remove any invasive species' propagules. Early detection and rapid response to any introduced invasive species are key to reducing the risk of a new infestation, and such monitoring would help control and quickly address potential damage to a site if an invasive species did become established. Rocky soils, a short growing season, and windy conditions make growing conditions at the tower sites difficult for plants to establish themselves; however, conditions do not preclude the introduction of invasive species. Permit stipulations may be used to reduce this possibility, and to require a site- and project-specific monitoring and mitigation plan to address and prevent the introduction and spread of invasive plant species. Permit stipulations may also include requirements for eradicating known infestations of non-native invasive species, particularly the species that are highly aggressive and have potential to cause long-term adverse effects to otherwise intact and weed-free ecosystems. Required monitoring for the life of the permit can help identify new infestations and prevent adverse impacts through early detection and rapid response.

Indirect effects associated with construction of the preferred alternative are likely of a long-term to permanent duration, given the difficulty of eradicating an invasive species infestation, the slow growth of native vegetation, and the permanent infrastructure associated with connected actions on non-federal lands. Given the requirements for washing equipment prior to site visits and annual monitoring for invasive species, it is reasonable to assume that any invasive species would be detected and rapidly responded to, prior to spreading to an extent that they would affect ecosystem services. Thus, a low intensity effect is likely. As all tower sites and staging areas are relatively confined in extent, and permit stipulations requiring invasive species monitoring to allow rapid response would presumably confine any introduced species to the immediate area, all indirect effects are considered to be of a local extent.

In addition to the direct and indirect effects of excavation and introduction of invasives, vegetation and wetlands could be affected by a fuel spill at the construction site. With limited volumes of fuel on site and appropriate prevention procedures and response capabilities, the intensity of this activity would be considered medium. Since the effects of this activity would occur over the five-month construction period, the duration would be considered temporary. The risks of spills during construction would be confined to localized areas, and affect resources that are common in context. Potential effects to both wetlands and vegetation associated with a fuel spill during fueling and refueling activities are reviewed for the operations phase below.

Operations

A tower, two equipment shelters, and two fuel tanks would be permanent components of each of the two tower sites. The long-term lease footprint, which includes the permanent structures, excavation area, and helipad, encompasses a total of 1.4 acres of BLM-managed land (0.69 acres per each of two sites). Operational impacts for the tower sites would comprise maintenance and refueling, including the associated helicopter landings. Two maintenance flights would be conducted per year, and refueling operations would involve an estimated 14 helicopter trips annually over a two to three day period in July at each remote tower site. The permanent loss of vegetation associated with placement of fill and structures is addressed under construction above, and is not repeated here. Potential effects to both wetlands and vegetation associated with a fuel spill during aerial transport to the site would be very event specific, varying based on the presence or absence of wetlands, dominant vegetation, landscape position, and the magnitude of spill. This is discussed further in Section 4.2.4, Hazardous Materials and Waste Management.

Direct effects associated with operations include low-intensity disturbance to vegetation from helicopter landings and work on site. These direct effects would be of a temporary nature, as minimal vegetation crushing or soil disturbance is anticipated to occur, and vegetation would likely recover between trips. The small area and minor anticipated disturbance warrant a rating of, localized extent and common context.

Indirect effects associated with operations include potential introduction of invasive species, as well as all connected actions at eight tower sites on non-federal lands. As discussed for construction above, site visits carry the potential to introduce invasive plant species. During operations, the potential for introduction is reduced as no ground-disturbance is planned, and only one piece of equipment (helicopter) would be on site. As discussed under construction, proper wash-down procedures before the helicopters travel to the remote tower sites, and ongoing monitoring and response, are required in order to mitigate the risk. Annual monitoring of the vegetation throughout the project area for the life of the permit will help mitigate potential adverse impacts from non-native invasive species using the early detection and rapid response approach to any new occurrences or infestations observed. Given the requirements for washing equipment prior to site visits and annual monitoring for invasive species, it is reasonable to assume that any invasive species would be detected and rapidly responded to, prior to spreading to an extent that they would affect ecosystem services. Thus, a low intensity impact is likely.

The impact of a fuel spill during helicopter-supported fueling and refueling would be very event specific, varying based on the presence or absence of wetlands, dominant vegetation, landscape position, and the magnitude of spill. This discussion in Section 4.2.4 notes three scenarios involving spills of up to 500 gallons of diesel fuel: An upland fuel spill, a spill into standing water (lakes, ponds, and wetlands), and a spill in flowing water (streams and rivers). With effective prevention and response measures, the effects on wetland and vegetation are rated as follows. If such a spill were to occur on land the impact would be short-term in duration and low in intensity to a common resource. If the spill were to occur in wetlands or a waterbody, the impact would likely be temporary in duration (up to two years) and medium in intensity to an important resource. Given the limited temporal and fuel volume risks for the project activities, including the risk of a fuel spill, the summary impact in regard to hazardous materials would be considered negligible to moderate.

Decommissioning

The microwave repeater sites would be decommissioned at the end of the life of the facility by removing all fuel and batteries from the site along with all aboveground structures.

Direct and indirect effects associated with decommissioning are presumed to be identical to those during construction, as heavy equipment, ground-disturbance, and staging areas on non-federal lands would be required.

Cumulative Impacts

Past, ongoing, and future actions that have and may continue to effect wetlands and vegetation in the project area are primarily confined to areas adjacent to population centers and infrastructure, such as roads and trails, small airstrips and helicopter pads, including scientific research facilities and private property. In addition, to the towers and connected actions on non-federal lands, the TERRA-NW Project may in the future seek to install five additional community towers on non-federal land in Norton Sound communities.

The project components under direct review in this EA would make a negligible contribution to cumulative effects for vegetation and wetlands due to the local extent, low to medium intensity, and very small area of permanent duration effects. When the low-probability event of a fuel spill is considered, the effects would be negligible to moderate.

Summary

No direct impacts to wetlands would occur at tower sites on BLM-managed land under Alternative 1.

For both the construction and decommissioning phases of the preferred alternative, all direct impacts to vegetation are anticipated to be of low to high intensity (temporary compression versus excavation), affecting a very small area (local extent), and with long-term to permanent duration affecting common vegetation resources. Indirect effects associated with construction of the preferred alternative, include the same levels of effect at construction sites for eight towers on non-federal lands. For the operations phase of the preferred alternative, very little new impact is introduced by the helicopter-supported maintenance and refueling flights, however, the impacts of a low-probability fuel spill event along the helicopter transit routes to the tower sites could range from minor to moderate.

The likely effects to vegetation and wetlands would be minor in the construction, operations, and decommissioning phases, in conjunction with other regional development.

4.3.1.2 Alternative 2 – No Action

Direct and Indirect Impacts

Under Alternative 2, no development would occur and there would be no direct or indirect impacts to vegetation or wetlands.

Cumulative Impacts

With no direct or indirect effects to vegetation or wetlands under Alternative 2, there would be no contribution to cumulative impacts to these resources.

Summary

Implementation of Alternative 2 would have no impacts to wetlands or vegetation.

4.3.1.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Both direct and indirect effects to wetlands and vegetation associated with the construction, operations, and decommissioning of Alternative 3 would be very similar to those described for Alternative 1. While Alternative 3 replaces the Golovin Alternate tower site with the Hill 2211 tower site, both are on BLM-managed lands, contain no wetlands, and have very similar alpine vegetation. Identical structures and construction techniques are proposed, and Alternative 3 would be staged from Golovin.

Cumulative Impacts

The cumulative impacts of Alternative 3 to vegetation and wetlands would be very similar to those of Alternative 1, and are likely negligible to moderate.

Summary

No direct impacts to wetlands would occur at tower sites on BLM-managed land under Alternative 3.

For both the construction and decommissioning phases of Alternative 3,direct impacts to vegetation are anticipated to be of low to high intensity (temporary compression versus excavation), affecting a very small area (local extent), and long-term to permanent duration. Indirect effects associated with construction of Alternative 3 are likely of low intensity, long-term to permanent duration, and local extent, and affecting resources that are common in context.

For the operations phase of Alternative 3, direct effects associated with operations would be of a low intensity, temporary duration, and local extent. Indirect effects would be of a low intensity, long-term duration, and local extent.

The likely effects to vegetation and wetlands would be minor in the construction, operations, and decommissioning phases, in conjunction with other regional development.

4.3.1.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Both direct and indirect effects to wetlands and vegetation associated with the construction, operations, and decommissioning of Alternative 4 at Kwiktalik Mountain would be very similar to those described for Alternatives 1 and 3, however, Alternative 4 is proposed for installation on private land, so this reduces the direct effects to federal wetlands and vegetation to the Otter Creek tower site. The overall extent of direct effects on federal land for Alternative 4 would be half of those for either Alternative 1 or 3.

Cumulative Impacts

As with Alternatives 1 and 3, the cumulative impacts to wetlands and vegetation from Alternative 4 would be inconsequential.

Summary

No direct impacts to wetlands would occur at tower sites on BLM-managed land under Alternative 4.

Direct impacts to vegetation at the Kwiktalik Mountain site would be similar to as those for Alternative 3 at Hill 2211. However, the effects on federal vegetation and wetlands for Alternative 4 would be half those of Alternative 3, as only the Otter Creek tower site, is located on federal lands in Alternative 4.

For both the construction and decommissioning phases of Alternative 4, direct impacts to vegetation are anticipated to be of low intensity, local extent, and long-term to permanent duration. Indirect effects associated with construction of Alternative 4 are likely to be of low intensity, a long-term to permanent duration, local extent, and affecting resources that are common in context.

For the operations phase of Alternative 4, direct effects associated with operations would be of a low intensity, temporary duration, and local extent. Indirect effects would be of a low intensity, long-term duration, and local extent.

The likely effects to vegetation and wetlands would be minor in the construction, operations, and decommissioning phases, in conjunction with other regional development.

4.3.2 Fish and Essential Fish Habitat

Potential environmental consequences of the project to fish and Essential Fish Habitat (EFH) would be damage to or loss of fishery and aquatic habitats if a fuel spill were to occur, increased erosion of adjacent landforms possibly leading to sedimentation of local waterbodies, thus decreasing water quality, and disturbance to human uses of fish, namely subsistence, commercial, and recreational (sport) fishing. Fuel spills are a possibility under any of the three action alternatives, and could occur if a sling-load is jettisoned for aircraft safety. The total volume of a spill is not likely to exceed 500 gallons, however, and would only affect fish habitat or water quality if it landed in or immediately adjacent to a waterbody. This volume could be greater in the event of an aircraft crash into water and the potential for an additional spill of aviation fuel. Section 4.2.4 Hazardous Materials and Waste Management contains more detailed information on potential fuel spills and containment measures.

4.3.2.1 Alternative 1 – Microwave Towers (Proposed Action)

Direct and Indirect Impacts

The routine actions for construction, operation, and decommissioning of the Otter Creek and Golovin Alternate tower sites would not cause direct or indirect impacts to fish and fish habitat in the project area as the sites are distant from fish-bearing streams, and no in-water work would be necessary. Direct effects are possible, however, if fuel is spilled directly into, or onto lands immediately adjacent to fish-bearing waterbodies, streams, or rivers near the tower sites and along helicopter flight paths.

Construction and decommissioning phases and impacts are expected to be similar in intensity because both actions would require excavation by, and mobilization of, heavy equipment and construction personnel. Operational impacts are expected to be less intense because project actions would focus on maintaining the towers (fuel and battery deliveries by helicopter).

The proposed locations for the towers are at the tops of peaks or ridges and it would be unlikely that fuel or battery acid would spill in a quantity sufficient to contaminate fish streams. Double-walled fuel tanks and the use of best management practices while refueling would further reduce spill risks at the tower sites, however, a jettisoned sling-load (500 gallons) during the refueling helicopter flights could affect uplands, standing waterbodies, or streams and rivers, with varying levels of magnitude. As described in Section 4.2.4, for an upland spill, little impact to fish would be expected because of the cleanup and the assessment that any residual fuel would be absorbed into the soil and not available for contact or ingestion. For a spill in standing water, because the volume of fuel would be limited and the cleanup would remove any thick concentrations of fuel, impacts to fish would be expected to affect individual fish and not have population-level effects. The impact of these spills and associated response actions would be medium in intensity (because of the potential for exceeding water quality criteria), temporary in duration, local in extent, and affecting an important resource. For a spill into flowing water, because the volume of fuel would be limited, the cleanup would remove any thick concentrations of fuel, and the current, wind, and sun would dissipate fuel not recovered, impacts to wildlife and fish would be expected to affect individual animals and not have population-level effects. The impact of these spills and associated response actions would be medium in intensity, temporary in duration, local in extent, and affecting an important resource.

For the connected action of the five towers on non-federal lands, the indirect effects would be similar to those associated with tower site fuel and helicopter-supported refueling at the two microwave towers on BLM-managed lands. The indirect effect at the three community towers on non-federal lands would be significantly lower, as no helicopter-supported refuel would be required.

Indirect impacts due to disturbance of soils to the extent of causing sedimentation of adjacent waterbodies are unlikely. Soil disturbance caused by constructing and maintaining the sites may increase erosion in the immediate area. The likelihood of potential erosion being of a magnitude sufficient to cause indirect effects to fish or fish habitat would be low due to the overland distance between tower sites and fish streams, which is generally greater than 1 mi. in each case. The potential for changes in water quality that could affect fish and EFH are described in more detail in Section 4.2 Physical Environment.

Cumulative Impacts

Past actions that have impacted fish and fish habitat in the project area include limited development of transportation infrastructure, such as roads and trails, small airstrips, and helicopter pads; the installation of scientific research facilities, such as weather and seismic stations; mining industry activity, and the development of private property.

RFFAs include the installation of project components that are not on federally managed lands. These installations include six additional towers between Grayling and Shaktoolik slated for the 2012 and 2013 construction seasons, and towers for spur links in five Norton Sound communities that are scheduled to be built in 2014. The project components under direct review in this EA would make a negligible contribution to cumulative effects on fisheries from the future TERRA-NW Project components installed on state and private lands because the potential effects are low in intensity and of short-term, temporary duration.

The contribution of Alternative 1 to cumulative effects on fish and fish habitat would be minor and short-term (local, temporary increase in turbidity due to excavation) unless a fuel spill were to occur. In the event of a small fuel spill at any of the microwave repeater sites, impacts to fish or fish habitat would be expected to be negligible because the sites are relatively far away from fish habitat, unless the spill occurred during transport of the fuel to the site due to an accident.

A spill scenario that occurs directly into anadromous fish habitat would constitute a low probability/high consequence event. The potential impacts from such an event, however, would be partially ameliorated due to the relatively small volumes of fuel that are proposed to be transported. In the event of a small fuel spill in the freshwater environment, moderate, long-term impacts to fish and fish habitat are expected that could contribute to other cumulative impacts previously stated.

Summary

Under Alternative 1, the risk of fuel spills exists but can be managed and mitigated. Barring a fuel spill scenario, the effects of implementing Alternative 1 would be expected to be of low intensity, temporary in duration, localized in extent, and affecting resources ranging from common to important (in the case of EFH). Taking into account the consequence of a fuel spill, the implementation of Alternative 1 would be expected to have minorto moderate summary

impacts to fish and fish habitat. The summary impact of Alternative 1 is negligible, but a low-probability spill event would result in moderate effects.

4.3.2.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under the No Action Alternative, no modification of any project sites would take place and no new impacts to fish and fish habitat would occur.

Cumulative Impacts

With no direct or indirect impacts to fish or fish habitat under Alternative 2, there would be no contribution to cumulative impacts on this resource.

Summary

Implementation of Alternative 2 would have no impact on fish or fish habitat.

4.3.2.3 Alternative 3 – Hill 2211 Repeater Tower Site

Direct and Indirect Impacts

The construction, operation, and decommissioning of a tower on Hill 2211 could cause direct or indirect impacts to fish and fish habitat in the project area, however, no in-water work would be necessary for the construction of the tower so impacts to fish or fish habitats are less likely to occur. There are no streams immediately adjacent to the proposed site, thus there is little risk of direct or indirect impacts on fish or fish habitat from spills at the Hill 2211 tower site. As with Alternative 1, however, direct effects of medium intensity, temporary duration, local extent, and affecting resources that are important in context are possible if fuel is spilled directly into Golovin Bay or area streams crossed by helicopter flight paths.

Cumulative Impacts

Past, ongoing, and future actions that have had or may have impacts on freshwater or marine fish include commercial, sport, and subsistence fishing, oil spills, mining industry activity, and the development of private property. The cumulative effects attributable to implementation of Alternative 3 would be minor and temporary unless a fuel spill was to occur. The likelihood of a fuel spill large enough to cause measurable harm to fish or fish habitats would be considered low because helicopter refueling flights would only transport a maximum of 500 gallons of fuel per flight. A small fuel spill into an anadromous stream would be characterized as a low probability/high consequence event that would precipitate moderate, temporary impacts to fish and fish habitat and could contribute to other cumulative impacts previously stated. Alternative 3 impacts would be additive in nature to those activities mentioned previously, but considered negligible to moderate.

Summary

Under Alternative 3, the risk of fuel spills exists but can be managed and mitigated. Barring a fuel spill scenario, implementation of Alternative 3 would be expected to have low-intensity temporary effects in relatively small areas. Thus, this alternative would have negligible effects

to anadromous fish and minor effects to anadromous fish habitat. The summary impact of Alternative 3 is minor, but a low probability spill event would result in moderate effects.

4.3.2.4 Alternative 4 - Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

The proposed Kwiktalik Mountain tower site would be constructed on land owned by the Golovin Native Corporation. The direct and indirect impacts are very similar in terms of intensity (magnitude), duration, and context (extent) to the impacts ascribed to the other action alternatives. Tower construction and refueling flights to Kwiktalik Mountain are subject to the risks of small fuel spills as were described for Alternatives 1 and 3.

Cumulative Impacts

Past, ongoing, and future actions that have had or may have impacts on freshwater or marine fish include commercial, sport, and subsistence fishing, oil spills, mining industry activity, and the development of private property. The contribution to cumulative effects attributable to implementation of Alternative 4 would be minor and temporary unless a fuel spill was to occur. The likelihood of a fuel spill large enough to cause measurable harm to fish or fish habitats would be considered low because helicopter refueling flights would only transport a maximum of 500 gallons of fuel per flight. A small fuel spill into an anadromous stream would be characterized as a low probability/high consequence event that would precipitate moderate, temporary impacts to fish and fish habitat and could contribute to other cumulative impacts previously stated. Alternative 4 impacts would be additive in nature to those activities mentioned previously, but considered negligible to moderate.

Summary

Under Alternative 4, the risk of fuel spills exists but can be managed and mitigated. Barring a fuel spill scenario, implementation of Alternative 4 would be expected to have low intensity temporary effects in relatively small areas. Thus, this alternative would have negligible effects to anadromous fish and minor effects to anadromous fish habitat. The summary impact of Alternative 4 is minor, but a low-probability spill event would result in moderate effects.

4.3.3 Terrestrial Mammals

4.3.3.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Terrestrial mammal habitat at the tower sites includes general range for wolves and brown bears; shelter, denning, or foraging habitat for some furbearers; and winter foraging habitat for caribou, particularly the Nulato Hills region near the Otter Creek tower site. However, the ridgetop habitat at the repeater sites is generally common and abundant, and loss of habitat is minimal compared to the amount of existing ridgetop habitat in the area.

Direct and Indirect Impacts

Construction

Direct and indirect impacts to wildlife resulting from construction of the preferred alternative are anticipated on BLM-managed lands at the Otter Creek and Golovin Alternate tower site. Additional indirect impacts to wildlife are anticipated at the tower sites proposed for non-federal lands under Alternative 1. Connected actions on non-federal lands associated with this alternative include eight additional tower sites, and staging areas in Grayling, Klikitarik Bay, Unalakleet, Golovin, Grayling, Shaktoolik, and Nome (see Table 2-1).

Construction of the two tower sites would temporarily disturb a total of 10.3 acres under the temporary construction leases at the two sites. The facilities would be installed within long-term lease areas, totaling 1.37 acres at the two sites.

The construction period would occur between May and October during 2012 and 2013, corresponding to the reproductive and rearing season for most terrestrial wildlife species. Construction at the sites would result in noise and visual disturbance from equipment such as generators and jackhammers, as well as helicopters and other human activity. This noise and activity, although temporary, would occur in an otherwise quiet and remote area. Noise from construction equipment at each proposed tower site would be expected to attenuate to a level of 30 A-weighted decibels (dBA) sound level (L_{eq}) at a distance of 6,585 ft. in each direction, over soft, partially vegetated terrain. Noise levels from generators used during construction would be expected to attenuate to a level of 30 dBA L_{eq} at a distance of 6,700 ft. in each direction (see Table 4-1). Noise from construction could temporarily displace wildlife, and could result in disturbance of wildlife engaged in breeding, rearing, or foraging activities. Transient brown bears or wolves may be in the exposed habitat of the project area, but other large mammals such as muskoxen, black bear, and moose would likely be in the more complex vegetation contained within the valleys and river bottoms in the vicinity. Most caribou would not be in the vicinity of construction during this timeframe, as calving grounds are located outside of the project area, but a few transient non-breeders may be found. Due to the relatively confined area likely to be disturbed, the few species likely to use ridgetop habitat at the sites, and the fact that construction noise would be limited to one season, impacts to wildlife from disturbance during the construction phase of the preferred alternative would be of low intensity, temporary duration, local extent, and affecting resources that are common in context.

The tower sites would be accessed during construction by helicopters using established flight paths (see Figure 2-2 and Figure 2-3). Flight paths originate at Unalakleet and Klikitarik Bay for

travel to the Otter Creek tower site, and Golovin for travel to the Golovin Alternate tower site. The estimated numbers of trips for mobilization, demobilization, and supply and personnel movements are described in Table 2-4. Of these trips, approximately 60 trips would utilize a Bell UH-1H helicopter, 4 trips would utilize an Erikson Air Crane, and 30 to 40 trips would utilize a Hughes 500-E or Robinson R-44 helicopter. Helicopters would travel at an altitude of 1,500 ft. above ground level (agl).

Flights originate from staging areas, which are generally located in previously disturbed habitats near existing airports (with the exception of the Klikitarik Bay staging area); therefore, it is unlikely that wildlife would be affected at staging/landing areas. The temporary barge landing at Klikitarik Bay is an undisturbed area, and would be used mid-season to stage the large project components (communications module shelter, power module shelter, and fuel tanks) for lift by the Erikson Air Crane to the Otter Creek tower site. Habitats within the helicopter flight paths include deciduous riparian; scrub shrub and emergent wetland; tundra; boreal forest; wind-swept ridges; intertidal; marine; and rocky-outcrops. These habitats are potentially inhabited by furbearers and large mammals that would be foraging, breeding, or rearing young during this time period.

Wildlife disturbed by helicopter noise generally show signs of stress, ranging from mild annoyance to severe stress, which could contribute to panic and escape behavior. These responses could lead to displacement from habitat and preferred range; accidental injury; reproductive losses such as separation of adults from young and disrupted parental attendance; and energy losses that could affect food intake, growth, rearing, migration, and reproduction (National Park Service [NPS], 1994).

Response to helicopter noise depends upon the species and individuals of a population, and responses may be greater in remote areas that are typically quiet. For instance, brown bears are known to react strongly to overflights, although response is highly variable and not consistently related to overflight altitude. Brown bears have been noted to abandon areas in response to small aircraft overflights, even when infrequent (McCourt et al., 1974). Harding and Nagy (1980) also noted that grizzly bears never became tolerant of aircraft, despite very frequent exposure. Wolves, on the other hand, after initial reaction, can become completely habituated to aircraft (G. Haber, personal communication, 1972 in Calef et al., 1976; and Klein, 1973 in BLM, 1976). Studies show that moose react to overflights at altitudes less than 600 ft. by running, trotting, or discontinuing the activity that they are involved in. Reaction frequency is inversely related to the overflight altitude (McCourt et al., 1974). Moose are also known to increase their home range sizes substantially during helicopter disturbance, but return to normal size within one week after the disturbance (Andersen et al., 1996). Muskoxen reactions vary depending, in part, on the overflight altitude, distance of the helicopter landing, terrain, and climate. Sex, group size and content, and number of calves/group are also factors. Black bear response includes running from flying aircraft at altitudes less than 1,000 ft. (Doll et al., 1974).

Given the potential for aircraft noise to generate a range of stress reactions, from mild to severe, in terrestrial wildlife, impacts would likely be medium intensity. Aircraft noise disturbance would be of temporary duration (i.e., during the five month construction period), local extent, and affecting resources that are common in context.

Predators, such as bears, wolves, and fox, may be killed in defense of human life. To minimize the chances of such an encounter, attractants such as food and food waste would be stored in 55-

gallon drums or similar bear-proof containers, to be transported off site for disposal. All camp and construction waste would be contained in drums or large, commercial trash bags and would be removed from the site periodically. The trash bags would be used for dry garbage (plastic, wood pieces, etc.) and would be secured from the wind with cargo nets while awaiting transport. These measures would deter wildlife such as bears from accessing garbage or food at the tower sites (although attraction may still occur) and would also minimize dangerous interactions or ingestion that could injure or kill wildlife. Increased potential for mortality associated with human presence on the site would be of low intensity, temporary duration, local extent, and affecting resources that are common in context.

Indirect effects from the connected actions would include the same types and levels of disturbance at the eight tower sites located on non-federal lands (see Table 2-1 for locations). Three of these are community towers, proposed for installation in the already disturbed areas of Unalakleet, Shaktoolik, and Nome.

Operations

The physical presence of the towers could result in avoidance of habitat by wildlife, but habitat within the project area is generally abundant and common throughout the Norton Sound Region of the Seward Peninsula and Nulato Hills. As seen in Figure 3-6, the Western Arctic Caribou Herd winter range extends to the Golovin Alternate tower site and south of Unalakleet, nearly to the Otter Creek tower site in the outer limits of the winter range. Due to the variable nature of caribou range and lack of surveys in the project area, the exact use by caribou during winter is unknown. Assuming that caribou did winter at this location, it is also unknown whether habitat would be avoided as tower sites are a relatively new phenomenon in this region and related studies have not been conducted. Studies of the Trans-Alaska Pipeline System report that caribou do not avoid the pipeline infrastructure, which is much more pervasive than the tower site infrastructure (Carruthers, Jakimchuk, and Ferguson, 1984). Given that wildlife have not been shown to avoid existing infrastructure such as Trans-Alaska Pipeline System, impacts from physical presence are likely to be low intensity, long-term in duration, and local in extent to a generally common resource.

Generator noise would be constant during the operation phase, and thus a long-term effect. Noise from generators would attenuate to a level of 20 dBA L_{eq} at a distance of 4,590 ft. in each direction of each of the towers, which would represent an area of 2.37 sq. mi. for each site. Taking the two sites together, there would be a permanent disturbance of over approximately 4.74 sq. mi. of common wildlife habitat (caribou and muskox wintering range, as well as bear, moose, muskox, wolf, and furbearer foraging, escape, birthing, rearing, and/or denning habitat), extending beyond the area of the project. Should black or brown bear dens occur within this range, dens may be abandoned, however, den surveys have not been conducted. Brown and black bear are known to use a variety of habitats for denning, but neither species will den in a wetland (see Sections 3.3.4.3 and 3.3.4.4). Bear denning habitat is prevalent on the Seward Peninsula and surrounding area. Denning habitat in the area is not likely a factor limiting bear populations, and impacts to the population would be minimal if a bear was displaced from its den site. Because noise would be constant, impacts to wildlife would result in long-term displacement rather than expenditures of energy. Therefore, impacts from generator noise would be low intensity but long-term in duration, and localized extent, affecting common resources.

The tower sites would be visited twice per year for maintenance, using helicopters for access. In addition, annual helicopter-supported refueling operations for the generators would require 14 round-trip flights per site in July. Wildlife may be temporarily displaced and may exhibit physiological and behavioral responses similar to helicopter noise impacts described in the construction section, but would be short-term in duration. Maier et al. (1998) noted that ungulates tend to respond more strongly to overflights by helicopters than those by light or jet aircraft, although Calef et al. (1976) detected the opposite, however, the frequency and duration of these visits would be limited enough that impacts would be low intensity, temporary in duration, and localized in extent to generally common resources.

Wildlife species which would not normally occur at the tower sites could be attracted to them once towers are built, potentially impacting other species in the area. For example, increased predation opportunities may be created for raptors that may perch on the towers for hunting. The potential for attracting scavenging wildlife such as bears, foxes, and ravens would be minimized because food and garbage would not be stored on location following the construction period, and human presence would be minimal. Attracted wildlife could potentially compete with native birds or prey upon them, their nests, or their young.

Potential effects to wildlife associated with a fuel spill during helicopter transport to the site would be very event specific, varying based on the season, habitat disturbed, and the magnitude of spill. This is discussed further in Section 4.2.4, Hazardous Materials and Waste Management.

Indirect effects from the connected actions would include the same types and levels of disturbance at the eight tower sites located on non-federal lands (see Table 2-1 for locations). Three of these are community towers, proposed for installation in the already disturbed areas of Unalakleet, Shaktoolik, and Nome.

Decommissioning

Decommissioning impacts to wildlife would be virtually identical to construction, including those such as noise from helicopters at sites and along flight paths, and visual disturbance.

Cumulative Impacts

Past actions that have affected terrestrial wildlife in the project area are recreational hunting, subsistence activities, mining, and the introduction of non-native species. The Norton Sound area has and may continue to experience some industrial growth (mining), although most future projects would be considered speculative due to a lack of secured funding. Recreational and visitor growth has also been on a recent upward trend, and some non-industrial capital projects are expected to occur in the near future. Introducing and/or upgrading broadband communications in the area could lead to a rise in economic activity. The project components under direct review in this EA would make a negligible contribution to cumulative effects for terrestrial wildlife, because the effects are generally localized, and the various components are dispersed across a wide array of bio-geographic systems.

Summary

Under implementation of Alternative 1, impacts generally involve common resources. Impacts to terrestrial wildlife would be of low or moderate intensity, and temporary or long-term in duration. In particular, impacts resulting from helicopter flights during the construction phase

would have a medium intensity but would be temporary in duration, while helicopter flights during the operational phase would be low to moderate intensity, local in extent, and intermittent and long-term (i.e., several days per year during the operations period). The summary impact of Alternative 1 on wildlife would be minor.

4.3.3.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under implementation of the No Action Alternative, no direct or indirect impacts to terrestrial wildlife would be expected to occur since there would be no disturbances beyond existing conditions.

Cumulative Impacts

Under implementation of the No Action Alternative, there would be no contribution to cumulative impacts to wildlife.

Summary

Implementation of Alterative 2 would have no direct or indirect effects and would make no contribution to cumulative effects on wildlife.

4.3.3.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Both direct and indirect effects to wildlife associated with the construction, operations, and decommissioning of Alternative 3 would be very similar to those described for Alternative 1. While Alternative 3 replaces the Golovin Alternate tower site with the Hill 2211 tower site, both are on BLM-managed lands and affect very similar habitat. Identical structures and construction techniques are proposed, and Alternative 3 would be staged in Golovin, rather than the undeveloped area at Klikitarik Bay.

Cumulative Impacts

Cumulative impacts associated with Alternative 3 would be similar to cumulative impacts associated with Alternative 1. The contribution of Alternative 3 to cumulative effects on wildlife in the region would be negligible.

Summary

Under implementation of Alternative 3, impacts generally would involve common resources. Impacts to terrestrial wildlife would be of low or moderate intensity, and temporary to long-term duration with a local geographic extent. In particular, impacts resulting from helicopter flights during the construction phase have a medium intensity but would be temporary in duration, while helicopter flights during the operational phase would be low intensity and limited to several days per year, thus also considered intermittent and long-term as the impacts would occur several days per year for the operations phase. The summary impact of Alternative 3 on wildlife would be minor.

4.3.3.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Both direct and indirect effects to wildlife associated with the construction, operations, and decommissioning of Alternative 4 at Kwiktalik Mountain would be similar to those described for Alternative 3, however, Alternative 4 would reduce the overall direct effects to wildlife from actions on federal lands as only the Otter Creek tower site would be placed on federal lands. Thus, the overall extent of direct effects on wildlife due to action on federal lands under Alternative 4 would be half that of either Alternative 1 or 3.

Cumulative Impacts

As with Alternative 3, the contribution to cumulative impacts to wildlife from Alternative 4 would be negligible.

Summary

Under implementation of Alternative 4, impacts would generally involve common resources. Impacts to terrestrial wildlife would be of low or moderate intensity, and temporary to long-term in duration affecting common resources. In particular, impacts resulting from helicopter flights during the construction phase have a medium intensity but would be temporary in duration, while helicopter flights during the operational phase would be low intensity and limited to several days per year, thus also considered intermittent and long-term (i.e. throughout the project life of 20-years). The summary impact of Alternative 4 on wildlife would be minor.

4.3.4 Birds

4.3.4.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

The habitat in the vicinity of the project is a valuable nesting, staging, and molting area for many bird species, with nearly 200 bird species documented on the Seward Peninsula (Harris, 1996), including some rare western Alaska species and Asian accidentals (Appendix B). Migratory and resident birds are known to occupy every habitat type within the project area including riparian, wetland, shoreline, forest, shrub, and tundra (BLM, 2006).

Direct and Indirect Impacts

Construction

Direct and indirect impacts to birds resulting from construction of the preferred alternative are anticipated on BLM-managed lands at the Otter Creek and Golovin Alternate tower sites. Additional indirect impacts to birds are anticipated on non-federal land associated with the preferred alternative. Connected actions on non-federal lands associated with this alternative include eight additional tower sites, and staging areas in Unalakleet, Klikitarik Bay, Golovin, Grayling, Shaktoolik, and Nome (see Table 2-1).

Construction of the two tower sites would temporarily disturb a total of 10.3 acres (5.15 at each site) under the construction leases, and permanently disturb 1.37 acres (0.69 acres at each site) through facility installation and helipad use under the long-term leases. Indirect effects from the connected actions would include the same types and levels of disturbance at the eight tower sites located on non-federal lands (see Table 2-1 for locations). Three of these are community towers, proposed for installation in the already disturbed areas of Unalakleet, Shaktoolik, and Nome.

Construction is scheduled to occur between June and October, corresponding to the reproductive and rearing season for birds in the region. Bird habitat within the project area is potentially used as nesting and/or foraging habitat for a number of species, including Kittlitz's murrelet (*Brachyramphus brevirostris*), ptarmigan (*Lagous muta* and *Lagopus lagopus*), horned lark (*Eremophila alpestris*), American robin (*Turdus migratorius*), redpoll species (*Carduelis* sp.), dark-eyed junco (*Junco hyemalis*), golden-crowned sparrow (*Zonotrichia atricapilla*), white-crowned sparrow (*Zonotrichia leucophrys*), savannah sparrow (*Passerculus sandwichensis*), fox sparrow (*Passerella iliaca*), American tree sparrow (*Spizella arborea*), rosy finch (*Leucosticte arctoa*), American pipit (*Anthus rubescens*), Lapland longspur (*Calcarius lapponicus*), snow bunting (*Plectrophenax nivalis*), surfbird (*Aphriza virgata*), bristle-thighed curlew (*Numenius tahitiensis*), red knot (*Calidris canutus*), western sandpiper (*Calidris mauri*), lesser yellowlegs (*Tringa flavipes*), least sandpiper (*Calidris minutilla*), semipalmated plover (*Charadrius semipalmatus*), lesser golden-plover (*Pluvialis dominica*), black-billed magpie (*Pica pica*), gray jay (*Perisoreus canadensis*), common raven (*Corvus corax*), northern shrike (*Lanius excubitor*), jaeger species (*Stercorarius* sp.), rough-legged hawk (*Buteo lagopus*), northern harrier (*Circus cyaneus*), golden eagle (*Aquila chrisaetos*), and gyrfalcon (*Falco rusticolus*) (OASIS Environmental, Inc., 2011).

Construction at the tower sites would result in noise and visual disturbance from equipment, helicopter access, and human activity. These disturbances could displace birds, potentially

resulting in abandonment of breeding or nesting activities. While nesting habitat is present within the project sites, no nests were observed during August 2011 site visits (Josh Brekken, personal communication, October 12, 2011).

The sites would be accessed during construction by helicopters using established flight paths (Figure 2-2 and Figure 2-3). Flight paths originate at staging areas in nearby towns and continue to both tower sites directly (with the exception Klikitarik Bay). Habitats within the helicopter flight paths include riparian, wetland, tundra, ridges, scrub/shrub, and rocky outcrops potentially utilized by passerines and other birds that would be breeding or rearing young during this time period. Response to helicopter noise ultimately depends upon the species and individuals of a population, and responses may be greater in remote areas that are typically quiet (beyond staging areas). Potential noise disturbance from helicopters may directly cause stress, ranging from mild annoyance to severe stress, which could contribute to panic and escape behavior. These responses could lead to accidental injury; reproductive losses such as nest flushing, separation of adults from their young, and disrupted parental attendance; and energy losses that could affect food intake, growth, rearing, migration, and reproduction. The frequent number of helicopter trips over the 150-day construction period may ultimately lead to habitat avoidance and abandonment (NPS, 1994), and there would also be potential for bird collisions. Habitat avoidance during construction would be a temporary duration, as construction will be completed during one season. Given the range of reactions, magnitude of effect may range from low to medium over a localized extent.

Impacts of helicopter noise would be similar to those effects described for flight paths, but would be more acute in the vicinity of the staging areas because helicopters would be departing, arriving, and landing. During construction, the project plans about 115 flights per site are planned to mobilize, conduct crew rotations, and commission the site. Bird habitats affected for the tower sites' staging areas of Golovin and Klikitarik Bay include scrub/shrub, estuarine, and marine/shoreline habitats. Golovnin Lagoon, which surrounds Golovin, is used by thousands of shorebirds during post-breeding periods (Audubon, 2011). Norton Sound (connected to Golovnin Lagoon) is used by most sea duck species (including spectacled and Steller's eiders) during fall molt migration and spring staging migration (Sexson, 2011) using marine and coastal habitat. Spectacled eiders (Threatened species under the Endangered Species Act [ESA]) in particular aggregate in eastern Norton Sound near Shaktoolik to molt between July and October each year (Sexson, 2011). In addition to these responses, waterbirds may also fly, dive, or swim away from the noise. The high energy requirements of waterbirds during the molting season, particularly fall staging in preparation for long-distance migrations, may not be met if these birds continuously expend energy to avoid from aircraft (NPS, 1994).

Towers sites would be pre-assembled at the staging areas. Noise associated with pre-assembling the towers is expected to be lower level than the noise associated with helicopter landings and take-offs, but would likely be consistent and nearly constant. Birds would likely maintain distance from the activities, resulting in habitat displacement for the duration of construction rather than numerous energy expenditures described above. The staging area at Klikitarik Bay is in a previously undisturbed location; however, the staging area for Golovin is located at a disturbed site near an existing airport and town.

Overall, impacts to birds and bird resources would be reduced if construction occurred after the nesting season or outside of the USFWS Vegetation Clearing Windows (outside of May 20 to July 20 in shrub or open habitat [present at Safety Sound]; May 20 to September 15 near seabird

colonies; and April 15 to August 15 near raptor and raven nesting cliffs). An additional mitigation measure to prevent disturbance would be to fly at higher altitude (1,500 ft.).

Operations

The operations phase footprint for the two tower sites together, with excavation areas and permanent project structures, would be 1.4 acres on BLM-managed land (0.69 acres per tower site), which would no longer be available as potential bird habitat. Although this would be a long-term duration, given the lack of development and the prevalence of similar ridges throughout the area, this does not appear to be a particularly limited habitat in the vicinity of the project and the localized effect is considered low intensity. Indirect effects from the connected actions would include the same types and levels of disturbance at the eight tower sites located on non-federal lands (see Table 2-1 for locations). Three of these are community towers, proposed for installation in the already disturbed areas of Unalakleet, Shaktoolik, and Nome.

The physical presence of the towers could cause mortalities to birds from collision during flight, including the ESA threatened spectacled eider or the candidate species Kittlitz's murrelet. The towers would be located on ridges at 1,705 ft. elevation for the Otter Creek site, and 1,000 ft. elevation for the Golovin Alternate site, near major migratory bird staging areas such as eastern Norton Sound, Golovnin Lagoon, and Golovnin Bay. These areas are also used for molting, wintering, breeding, and nesting. Shorebirds, waterfowl, raptors, and songbirds could be affected by tower collisions.

The immediate trajectories of migrating birds are species-specific and depend on varying environmental factors (e.g., wind, weather, visual cues, others). Some birds could encounter the towers when their flight paths intersect (e.g., birds flying to the coast from breeding areas in the highlands of the Seward Peninsula) with the proposed sites. The ridgelines and associated towers would not represent a barrier for migrating birds, but could pose a strike hazard. Studies show that large numbers of migrating birds fly over the crests of ridges and passes rather than following mountain fronts, and migrants flying near ridges and in passes may be flying at lower elevations than broad-front migration (Kerlinger, 1995). Most sea duck species (including spectacled and Steller's eiders) use marine areas of Norton Sound during fall molt migration and spring staging migration, with most traveling at sea or near the coast. Some may fly overland, most likely over the Seward Peninsula or through the Y-K Delta, but few fly to or from inland sites east of Norton Sound (Sexson, 2011).

Birds may be migrating in a trajectory aligned with the tower sites, but the expected rate of collisions is unknown because flight pattern field work specific to the tower sites has not been conducted. Studies elsewhere show that most migrants fly at 180 ft. or more under clear weather conditions and flight paths are typically at heights between 656 ft. and 2,461 ft. agl (Longcore et al., 2008; Able, 1970; Bellrose, 1971; and Mabee et al., 2006), with notable exceptions, for example, eiders have a tendency to fly directly and low over the water (McCaffery et. al., 1999; and Day et. al, 2003) and tend to follow the shoreline (Day et. al., 2003). Additionally, birds that are nesting near the tower sites and other non-migrants would be flying much lower to the ground. Mabee and Cooper (2004) found that only 2 to 15 percent of migrants flew below 300 ft. (91 m) agl during clear weather, but inclement weather is common at the sites, and higher winds and lower cloud layers or fog may contribute to lower altitude flights and increase the risk of mortality (Able, 1970; and Erickson et. al., 2005).

Collisions at the proposed towers would be reduced significantly relative to most towers, because guy wires and lights would not be used (Longcore et al., 2008). From a collision perspective, the towers that cause the most problems are tall (especially those exceeding 1,000 ft.), illuminated, guyed, near wetlands, in migration corridors, and with a history of inclement weather, and further still, a greater proportion of bird attraction to red flashing incandescent lights exists compared to white strobes, which still attracted some birds compared to unlit controls that attracted none (Manville, 2005). Relatively few strikes are anticipated due to the low level of the towers and no operational light, thus this would be a low intensity, long-term duration effect with a local extent, affecting common resources.

Noise from generators would be constant during operations and would be a long-term affect as a result of the project. Noise from generators would attenuate during the winter to a level of 20 dBA Leq at a distance of 4,590 ft. in each direction, which would represent an area of 2.37 sq. mi. for each tower site (4.74 sq. mi. total of common bird habitat). Because noise would be constant, impacts to birds would result in long-term displacement and avoidance rather than repetitive expenditures of energy. It could also be expected that some individuals would become habituated to the noise and remain within the sound's impacted area. This long-term effect would be of low intensity and local extent.

The tower sites would be visited twice per year (spring and fall) for maintenance using helicopters for access. In addition, annual refueling operations for the generators at each site would be accessed by helicopter over a period of four to five days. The annual refueling operation would require 14 round-trip flights by helicopter. Refueling operations would occur during July, so birds may be temporarily displaced by helicopter noise or directly impacted through bird/helicopter collisions. However, the frequency, duration, and seasonal timing of these visits would be limited. Due to timing restriction on refueling and maintenance, this temporary effect would be of low intensity and local extent.

Wildlife species which would not normally occur at the tower sites could be attracted to them once towers are built, potentially impacting other species in the area. For example, increased predation opportunities may be created for raptors that may perch on the towers for hunting. These individuals could potentially compete with other birds or prey upon them, their nests, or their young.

The potential for attracting scavenging wildlife such as bears, foxes, and ravens would be minimized because food and garbage would not be stored on location following the construction period, and human presence would be minimal.

Decommissioning

Impacts to birds from decommissioning activities would be similar to construction, including those such as noise from helicopters, visual disturbances, and potential fuel spills at tower sites, along flight paths, and at staging areas.

Cumulative Impacts

The Norton Sound area has and may continue to experience some industrial growth (mining), although most future projects are speculative and dependent on many factors (e.g., economic conditions, price of gold, government funding). Recreational and visitor growth has also been on an upward trend and some non-industrial capital projects are expected to occur in the near future.

Introducing and/or upgrading broadband communications in the area could lead to a rise in economic activity, particularly if jobs are created from growth in the industrial sector. Visitor and residential growth may contribute to an increase in air traffic and development, increased recreation use, and increased hunting pressure resulting in greater disturbance to current bird resources in remote areas.

The project components under direct review in this EA would make a negligible contribution to cumulative effects for birds because the effects would be generally localized, and the various components are dispersed across a wide array of bio-geographic systems.

Summary

Under implementation of Alternative 1, impacts to birds vary depending on location, timing, and activity. Generally, local impacts would involve common resources with some exceptions (e.g., murrelets) and would be of low or medium intensity and temporary or long-term in duration. In particular, given the locations and tower configuration, bird strikes are a concern that cannot be accurately estimated without additional work or monitoring. Impacts resulting from helicopters during construction have a low to medium intensity, and could possibly have a long-term effect on seabirds, shorebirds, and waterfowl in particular, because Safety Sound, Golovnin Bay/Lagoon, and eastern Norton Sound are regionally important areas for spring/fall migration and staging birds, including the ESA threatened spectacled eider. The absence of tower guy wires or lighting would reduce the overall impact to birds. Therefore, Alternative 1 would have impacts on birds that are low to medium in intensity, temporary to long-term in duration, local in extent, and affecting common resources. Thus, the summary impacts to birds would be minor.

4.3.4.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under the Alternative 2, no development would occur and there would be no direct or indirect impacts to birds or bird habitat.

Cumulative Impacts

With no direct or indirect effects to birds or bird habitat under Alternative 1, there would be no contribution to cumulative impacts on these resources.

Summary

Implementation of Alternative 2 would have no impacts to birds or bird habitat.

4.3.4.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Both direct and indirect effects to birds associated with the construction, operations, and decommissioning of Alternative 3 would be very similar to those described for a tower under Alternative 1. While Alternative 3 replaces the Golovin Alternate tower site with the Hill 2211 tower site, both are on BLM-managed lands and cover very similar habitat. Identical structures and construction techniques are proposed, and Alternative 3 would be staged from Golovin,

rather than the undeveloped area at Klikitarik Bay. The potential for seabird strikes would be lessened, as the Hill 2211 tower would be further inland than the Golovin Alternate tower.

Cumulative Impacts

The contribution to cumulative impacts associated with Alternative 3 would be similar to those of Alternative 1, and would be considered negligible.

Summary

As with Alternative 1, implementation of Alternative 3 would result in impacts to birds that vary depending on location, timing, and activity. Generally, impacts involve common resources with some exceptions (e.g., murrelets) and would be of low or medium intensity and temporary or long-term in duration. In particular, given the locations and tower configuration, bird strikes are a concern that cannot be accurately estimated without additional work or monitoring. Impacts resulting from helicopters during construction (and taking into account activities at the eight tower sites on non-federal lands) would have a low to medium intensity, but could possibly have a long-term effect on seabirds, shorebirds, and waterfowl in particular, because Safety Sound, Golovnin Bay/Lagoon, and eastern Norton Sound are regionally important areas for spring/fall migration and staging birds, including the ESA threatened spectacled eider. Potential for seabird strikes would be lessened, as the Hill 2211 tower would be further inland than the Golovin Alternate tower. The absence of tower guy wires or lighting would reduce the overall impact to birds. Therefore, Alternative 3 would have impacts on birds that are low to medium in intensity, temporary to long-term in duration, local in extent, and affecting common resources. Thus, the overall impacts to birds would be minor.

4.3.4.4 Alternative 4 - Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Both direct and indirect effects to birds associated with the construction, operations, and decommissioning of Alternative 4 at Kwiktalik Mountain would be similar to those described for Alternative 3, however, Alternative 4 would involve a tower on non-federal land, and so reduce the direct effects to birds from actions on federal lands. Only the Otter Creek tower site would be placed on federal lands. Thus, the overall extent of direct effects for Alternative 4 would be half that of Alternative 3. The potential for seabird strikes would be somewhat greater, as the Kwiktalik Mountain tower would be closer to the coast than the Golovin Alternate tower.

Cumulative Impacts

The contribution to cumulative impacts associated with Alternative 4 would be similar to those of Alternative 3, and would be considered negligible.

Summary

As with Alternative 3, implementation of Alternative 4 would result in impacts to birds that vary depending on location, timing, and activity. Generally, impacts would involve common resources with some exceptions (e.g., murrelets) and would be of low or medium intensity and temporary or long-term in duration. In particular, given the locations and tower configuration, bird strikes are a concern that cannot be accurately estimated without additional work or

monitoring. Impacts resulting from helicopters during construction would have a low to medium intensity, and could possibly have a long-term effect on seabirds, shorebirds, and waterfowl in particular, because Safety Sound, Golovnin Bay/Lagoon, and eastern Norton Sound are regionally important areas for spring/fall migration and staging birds, including the Threatened spectacled eider. The potential for seabird strikes would be somewhat greater, as the Kwiktalik Mountain repeater would be closer to the coast than the Golovin Alternate Repeater. The absence of tower guy wires or lighting would reduce the overall impact to birds. Therefore, Alternative 4 would have impacts on birds that are low to medium in intensity, temporary to long-term in duration, local in extent, and affecting common resources. Thus, the overall impacts to birds under Alternative 4 would be minor.

4.3.5 Threatened and Endangered Species

As discussed in Section 3.3.7, ESA-listed and candidate species potentially affected by the project are Kittlitz's murrelet, spectacled and Steller's eider, and the yellow-billed loon. The project does not occupy Steller's eider critical habitat (Figure 3-8), Kittlitz's murrelet and yellow-billed loon nesting habitat, or spectacled eider staging areas (Figure 3-8). However, staging areas are located on in coastal communities, adjacent to habitat areas. Impacts to these avian species from project alternatives are similar to those impacts expected for all birds with the following exception: As these are ESA-listed or Candidate species, effects have the potential to be of a medium intensity. Due to the unique resources under consideration, the overall effects would be moderate.

4.4 Social Environment

4.4.1 Socioeconomic Characteristics

The following section describes the potential impacts on socioeconomics by each of the alternatives. These sections analyze the potential positive and negative impacts on population, employment, personal income, revenue, and lifestyle experienced in the region of influence.

4.4.1.1 Alternative 1 – Microwave Towers and with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Implementation of Alternative 1 would strengthen the telecommunications infrastructure of the region, with the potential for long-term improvements to the region's economy, population, income, and businesses. Health services relying on telemedicine and education programs relying on distance education would see improved services and efficiencies due to the increased speeds and decreased latency of the new broadband service. Government agencies, businesses, and local residents would also experience improvements in telecommunications as well as receive new services that utilize high-speed broadband Internet.

Construction

Direct impacts to employment and income would be modest during construction for the two tower sites on BLM-managed lands, because the total workforce required would be small. Indirect impacts on employment and income would arise from the connected action of construction of eight towers on private lands. Unicom would contract the construction work out to contractors that have worked in rural villages previously and would train local laborers who can operate equipment and support the project. Therefore, new employment opportunities may go to specialized engineers from Nome or outside of the project area during construction, but general labor employment opportunities could be created locally during construction and maintenance. The remote tower sites are not within popular recreational guide areas, therefore the direct, temporary effects of construction would not displace activity in the recreation sector of the regional economy (see Section 4.4.3 for additional discussion of impacts on recreation).

Indirect economic impacts during construction include a small increase in the sale of local goods and services, such as lodging and restaurants at the staging and tower site communities of Grayling, Unalakleet, Shaktoolik, Golovin, and Nome. The short-term nature of the project would not result in a demographic change for any of the communities.

Operations

The regional direct and indirect impacts from the operations phase of Alternative 1 would include increased bandwidth to support telemedicine (and other healthcare programs), distance education, and numerous business and government agency functions in the region as well as increased telecommunication capacity for public safety and other governmental functions. The addition of cell phone service in the vicinity of the towers would add a margin of safety to travelers and/or hunters to be able to use cell phones in the event of an emergency. Increased opportunities for a web presence and improved advertisement would arise for regional businesses.

An indication of local perspectives on the urgency of improvement to telecommunications infrastructure was seen in comments on the earlier TERRA-SW Project from the City of Unalakleet, NSEDC, and the senator and two representatives representing the Norton Sound region in the Alaska Legislature. These commenters urged that the TERRA-SW Project proceed, so that broadband Internet service could then be extended to the Norton Sound region.

Cumulative Impacts

Past actions and present actions affecting the regional economy include the existing satellite telecommunications services and current levels of government investment in schools and health and safety. Other economic sectors, such as trade/transportation/utilities, natural resources and mining, and the visitor industry have emerged and developed in response to market opportunities.

Most communities in the project area are experiencing modest population growth, but larger economic forces are straining local households. These dynamics include rising energy costs and reduction of government funding for the public sector infrastructure and services. Future infrastructure activities in the project region may include additional expansion projects for rural broadband service, however, these are at the proposal stage, and do not have secure funding. The implementation of Alternative 1 could lay foundations for economic growth in the region, particularly when seen in the context of a future build-out to include five additional community towers (See Table 2-1). By improving connections among villages and the larger economy via broadband access, health, education, and governmental services would be improved and business opportunities would extend beyond the region. The constraints on public and private business functions related to remote locations would be reduced.

The communities continue to seek capital improvement project appropriations. Communities in the region of influence that secured funding for capital improvement projects in 2011 include: Unalakleet (erosion control), Shaktoolik (heavy equipment), and Nome (bridge replacement, Nome-Council Road repair, museum building, school generator) (ADCCED, 2011). These infrastructure upgrades improve quality of life and help retain and attract residents to the communities.

Alternative 1 would make a medium-intensity, moderate beneficial contribution to cumulative effects on economic development in the region. Alternative 1 would not contribute to changes in population trends in the region.

Summary

The proposed addition of cell phone antennas to the microwave repeater towers would extend or improve cell phone services to the vicinity of the tower sites. There are no quantitative models to characterize the economic benefit or potential economic growth likely to result from increased efficiencies in telecommunication, but qualitatively, these would be beneficial impacts, of medium to high intensity, occurring over the life of the project (long-term duration), regional in geographic extent (i.e. throughout the project area), and affecting a resource that is common in context. The summary impact of Alternative 1 on socioeconomics would be beneficial and moderate.

4.4.1.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under Alternative 2 (No Action Alternative) there would be no construction or operation of the two microwave repeaters towers on BLM-managed land. The connected action of installation of eight microwave towers on private lands would not go forward either. Telecommunications and Internet connectivity in the area would continue with existing technology. Healthcare, education, government, and private businesses may find existing Internet infrastructure a limitation on improving and expanding services. There would be no change to the non-cash (subsistence) economy of the effected communities.

Under Alternative 2, there would be no disturbance to existing economic activities occurring at the proposed Klikitarik Bay, Unalakleet, Grayling, Golovin, and Nome staging areas. There would be a small number of lost short-term employment opportunities and lost revenue generation associated with no construction of facilities.

Socioeconomic impacts resulting from implementation of Alternative 2 may be seen as a continuation of current conditions, without addressing the need for modernization in broadband infrastructure to improve services and efficiency in healthcare, education, government, and private business. No new impacts attributable to the TERRA-NW Project would result and baseline conditions would continue.

Cumulative Impacts

Past, ongoing, and future actions that have had, and would continue to have, minor overall impacts to socioeconomics at the project areas are described above under Alternative 1. The completion of the GCI broadband circle would depend on construction of the TERRA-NW Project, so under the No Action Alternative, the backbone would become less likely to proceed. Alternative 2 would not contribute to socioeconomic conditions or cumulative economic development activities in the region.

Summary

The need for improved telecommunications infrastructure and service would not be addressed, and no new impacts would be generated under the implementation of Alternative 2. Alternative 2 would perpetuate the existing conditions and would not contribute to cumulative impacts to socioeconomic conditions; therefore the summary impact would be negligible.

4.4.1.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

The construction and operation of Alternative 3 would have the similar impacts on socioeconomic conditions as those identified under Alternative 1, since the Hill 2211 tower site would substitute for the Golovin Alternate location. The amount of employment related to the maintenance of Alternative 3 would be the same as that described in Alternative 1, a medium beneficial contribution to economic development in the region.

Cumulative Impacts

Past, ongoing, and future actions associated with Alternative 3 are the same as those described for Alternative 1. The contribution to cumulative effects would be the same as Alternative 1, a medium intensity, beneficial contribution to economic development activities in the region.

Summary

The socioeconomic impacts of Alternative 3 would be beneficial and of medium intensity, due to a noticeable improvement in healthcare services, education, government services, and commerce. These effects would be long-term in duration, regional in extent, and affecting resources that are common in context. In summary, the impact of Alternative 3 on socioeconomics would be beneficial and moderate.

4.4.1.4 Alternative 4 – Kwiktalik Mountain Repeater

Direct and Indirect Impacts

The construction and operation of Alternative 4 would have the similar impacts on socioeconomic conditions as those identified under Alternative 1, since the Kwiktalik Mountain tower site would substitute for the Golovin Alternate. The amount of employment related to the maintenance of Alternative 4 would be the same as that described in Alternative 1.

Cumulative Impacts

Past, ongoing, and future actions associated with Alternative 4 are the same as those described for Alternative 1. The contribution to cumulative effects would be the same as Alternative 1, a medium beneficial contribution to economic development in the region.

Summary

The socioeconomic impacts of Alternative 4 would be beneficial and of medium intensity, due to a noticeable improvement in healthcare services, education, government services, and commerce. These effects would be long-term in duration, regional in extent, and affecting resources that are common in context. In summary, the impact of Alternative 4 on socioeconomics would be beneficial and moderate.

4.4.2 Subsistence

As noted in scoping, the residents of the affected communities value the subsistence way of life, and want to ensure that no adverse effects would come from implementation of the TERRA-NW Project. The subsistence traditions of rural Alaskan residents are recognized and protected in the Alaska National Interest Lands Claim Act (ANILCA), including the specific requirement in Section 810 for an analysis of subsistence impacts from a federal land use decisions (See Appendix C, the Section 810 analysis).

Section 3.4.3 describes several dimensions of the subsistence harvest practices of Grayling, Unalakleet, Golovin, and Nome. These data establish that each of the communities relies on a wide variety of fish and wildlife resources, and that some harvest practices are likely in the vicinity of the tower sites on BLM-managed lands, or in the transit corridors affected by the annual refueling sites. However, the data are not sufficient to identify the portion of the subsistence use area for each community likely to be affected for the project. The analysis that follows builds on the assessments in Section 4.3 regarding the impacts of the project on fish and wildlife resources.

The types of impacts to subsistence to be considered include:

- A reduction in the **abundance** of harvestable resources used for subsistence purposes, including reductions due to increased competition from non-subsistence harvesters;
- Reductions in the **availability** of subsistence resources due to project impacts on their distribution, migration, or location; and
- Reductions in **access** to subsistence harvest areas (due to physical or legal barriers associated with the proposed project).

4.4.2.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action

Direct and Indirect Impacts

The implementation of Alternative 1 would strengthen regional telecommunications capacities through installation of repeater towers at two remote BLM-managed locations and through the connected action of eight additional microwave towers on private lands. These project components are within areas utilized by regional subsistence users.

Effects on Subsistence Resources

During the 150-day construction period, from May to June, the proposed project would introduce noise disturbance that may temporarily displace land mammals and birds from the affected areas. The proposed project would have no impact on fish populations and fish habitat (Section 4.3.3), provided that appropriate measures are taken to prevent a spill of fuels during construction at the sites. Section 4.3.4 and Section 4.3.6 examine potential impacts on important subsistence resources including caribou, moose, and waterfowl. This analysis noted that the construction period overlaps with reproductive and rearing seasons for some terrestrial wildlife species, however, the affected areas do not include known caribou calving grounds and only a few non-breeding transient caribou would likely be affected. Moose, bear, and wolf habitats are largely outside the affected area. Other habitats affected by the microwave repeater sites would include

shelter and foraging habitat for small mammals, and nesting, foraging, and/or shelter habitat for birds. The helicopter transit corridors would result in impacts of medium intensity, but for only a short duration. Helicopter noise impacts would be more intense in the staging areas, and these are adjacent to important habitats for seabirds, shorebirds, and waterfowl. The analysis of impacts to the biological environment concluded that summary impacts would be moderate, based on low intensity (i.e., noticeable, but without major alteration to resource availability) and temporary duration, local in extent, and affecting resources that are common in context.

In the operational phase, there would likely be noise impacts in the area adjacent to the tower sites and along helicopter flight paths during the estimated total of 12 to 15 days per year of helicopter refueling and maintenance flights for both sites on federal lands. The same indirect effect would arise from the connected action of eight additional towers on non-federal land. As a mitigation measure, helicopter-supported refueling would occur during July, a period that minimizes impacts on hunting, fishing, and recreational activity. This would also reduce impacts to subsistence users during the late spring and summer period. During decommissioning, when facilities are removed to bare ground, the disturbance from removal activities and helicopters would be similar to that of the construction period. As a result, direct and indirect impacts from the operational phase of Alternative 1 would be of medium intensity, localized to the area surrounding sites, and only for a short duration.

The proposed project would not be expected to adversely affect important subsistence wildlife populations and their abundance, however, the staging activities at the Klikitarik Bay and Golovin should be concluded early in the construction season, (currently scheduled to conclude by the end of July) to avoid impacts to waterfowl and to subsistence hunters.

Effects on Access to Subsistence Resources

During the 150-day construction period, the immediate area around the staging activities in Klikitarik Bay, Unalakleet, and Golovin would not be conducive to subsistence harvests. Over the 20-year operation of the project the immediate areas of the tower sites would be unavailable to subsistence users. Noise from the generators would be expected to dissipate to very low levels (20 dBA) at a distance of 4,590 ft. from the sites during the winter. Thus, subsistence resources and subsistence users may avoid an area approximating a 1-mi. radius, or 3.14 sq. mi. per site or a total of 6.28 sq. mi. for the two remote sites together. This would be equal to about 4,000 acres, or 0.1 percent (one-tenth of one percent) of the 3.9 million acres of BLM-managed land in the vicinity of the two towers. As an indirect effect of the connected actions on non-federal lands, the five remote towers would affect a comparable area per site.

The proposed project may lead subsistence users to avoid subsistence use areas only in the local extent or near vicinity of the tower sites, which would be considered a negligible part of the total subsistence use area. As a result, the summary impact on access to subsistence resources would be negligible, based on low intensity and long-term duration, affecting resources that are common in context.

Increased Competition for Subsistence Resources

The proposed project would use helicopters to transport materials, equipment, and personnel to the construction sites. There are no new roads or trails associated with construction of the tower sites. The scale of the proposed project would be such that a small workforce, including local hires as possible, would be expected to complete construction during a single season. The

project would not be expected to bring a new permanent workforce to the region. For these reasons, the proposed project would not be expected to increase competition for subsistence resources in the project area.

Cumulative Impacts

Past, present, and RFFAs include trends of economic strains and population declines in some regional communities. A number of regional organizations are attempting to promote economic development and to develop public infrastructure and services through capital improvement appropriations. Alternative 1 would bring improvements in the regional communication infrastructure that may improve the efficiency and web-presence of the visitor industry, resulting in minor increases in visitor levels across the region, however, the effects of this increased recreation usage would be minor to moderate intensity, and of long-term duration spread over the region's recreational areas, specifically the BLM-managed lands in the region. Implementation of Alternative 1 would contribute little to cumulative effects on subsistence resources, access to subsistence resources, or competition for subsistence resources. As a result, the project components under direct review in this EA would make a negligible contribution to cumulative effects on subsistence from the TERRA-NW Project components installed on state and private lands.

Summary

Implementation of Alternative 1 would have effects on subsistence uses of low intensity (i.e., perceptible but not noticeably alternating conditions) and long-term in duration but in a very small area (localized extent), and affecting resources that are common in context. The summary impact of Alternative 1 on subsistence would be considered negligible.

4.4.2.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Implementation of Alternative 2 would have no direct or indirect impacts on subsistence uses in the proposed project area.

Cumulative Impacts

With no direct or indirect impacts to subsistence, Alternative 2 would not contribute to cumulative effects on these resources or uses.

Summary

Implementation of Alternative 2 would have no direct or indirect impacts on subsistence and would make no contribution to cumulative impacts.

4.4.2.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Effects on Subsistence Resources

Under Alternative 3, the installation of the Hill 2211 tower would substitute for the proposed Golovin Alternate tower. The direct and indirect effects on subsistence resources would be the same as those of Alternative 1.

Effects on Access to Subsistence Resources

The effects on access to subsistence resources under Alternative 3 would be the same as those of Alternative 1.

Increased Competition for Subsistence Resources

Alternative 3 would involve a similar workforce during installation to that for Alternative 1, and would not be expected to contribute to an increase in competition for subsistence resources.

Cumulative Impacts

Past, ongoing, and RFFAs are estimated to have minor impact on subsistence resources and use patterns. As with Alternative 1, Alternative 3 would bring improvements in the regional communication infrastructure that may improve the efficiency and web presence of the visitor industry, resulting in minor increases in visitor levels across the region, however, the effects of this increased recreation usage would be of minor intensity, and long-term in duration spread over the region's recreational areas, specifically BLM-managed lands. Implementation of Alternative 3 would have a negligible contribution to cumulative effects on subsistence resources, access to subsistence resources, or competition for subsistence resources.

Summary

Implementation of Alternative 3 would have negligible direct and indirect effects on subsistence uses, and a negligible contribution to cumulative effects on these resources and uses.

4.4.2.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Effects on Subsistence Resources

Under Alternative 3, the installation of the Kwiktalik Mountain tower would substitute for the Golovin Alternate proposed tower. The direct and indirect effects on subsistence resources would be the same as those of Alternative 1.

Effects on Access to Subsistence Resources

The effects on access to subsistence resources under Alternative 4 would be the same as those of Alternative 1.

Increased Competition for Subsistence Resources

Alternative 4 would involve a similar workforce during installation to that of Alternative 1, and would not be expected to contribute to an increase in competition for subsistence resources.

Cumulative Impacts

Past, ongoing, and RFFAs are estimated to have minor impact on subsistence resources and use patterns. As with Alternative 1, Alternative 4 would bring improvements in the regional communication infrastructure that may improve the efficiency and web presence of the visitor industry, resulting in minor increases in visitor levels across the region, however, the effects of this increased recreation usage would be of minor intensity, and long-term in duration spread over the region's recreational areas, specifically BLM-managed lands. Implementation of Alternative 3 would have a negligible contribution to cumulative effects on subsistence resources, access to subsistence resources, or competition for subsistence resources.

Summary

Implementation of Alternative 4 would have negligible direct and indirect effects on subsistence uses, and a negligible contribution to cumulative effects on these resources and uses.

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4.4.3 Land Use and Recreation

4.4.3.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

The two microwave repeater towers proposed under Alternative 1 are located on remote mountain tops and directly affect very small areas. Potential effects during the five-month construction period include noise and disturbance from the construction activities, including the helicopters transporting equipment, materials, and personnel to the sites. Potential effects during the 20-year project life include a smaller area affected by the noise of the generator, and visual impacts to recreation amenities within sight of the towers, notably in the case of the Iditarod National Historic Trail (NHT) and the Golovin Alternate tower site.

Direct and Indirect Impacts

Construction

Direct and indirect impacts of Alternative 1 on land use patterns would include displacement from the immediate sites of the construction activity (10.5 acres total for the two tower sites), and indirect disturbance in the vicinity of the construction staging areas at Klikitarik Bay, Unalakleet, and Golovin, on non-federal lands. Noise disturbance may also affect existing land uses along the helicopter transit routes during the construction period. The connected action of tower construction at eight locations on private land would result in similar effects of displacement and disturbance for the five remote towers, with less impact at the three community towers, since no helicopter transportation support would be required at these sites within the communities of Unalakleet, Shaktoolik, and Nome.

Construction staging activities at the Otter Creek tower site and Klikitarik Bay would not conflict with BLM authorized recreation activities. The temporary period of staging activities, particularly helicopter use to move equipment, supplies, and personnel, would be expected to result in little physical displacement of existing land uses, but the presence of helicopters and their associated noise would be noticeable. This may cause guide-outfitters and individuals to avoid the affected areas during the construction season. One guide-outfitter reported that with notification about helicopter transit routes and period of activity, he can adjust his activities to avoid displacement (Halverson, 2012).

As noted in Chapter 3, the BLM issues special recreation permits for various winter race events that use Iditarod NHT segments that cross federal land, including the Iditarod Trail Sled Dog Race, Irondog Snowmachine Race, Norman Vaughan Serum Run, and the Iditarod Trail Invitational. Participants include racers, spectators, and film crews. Because construction activities at the Golovin Alternate site would occur in summer, they would not overlap with the primary periods of use for the Iditarod race route for winter racing events and recreation use.

Operations

Following construction, direct and indirect impacts would be limited to activities associated with operating, maintaining, and refueling the two tower sites. In addition, the connected action of operation of the eight additional towers on private lands, particularly the five remote sites, would have comparable indirect effects to those of the two towers on BLM-managed lands. The installed infrastructure would remain for the long-term, and would result in negligible direct

displacement of other land uses, due to the small acreage affected. The noise and visual disturbance from operating the towers would include noise from generators, and visual effects within sight of the towers. These are discussed briefly below, but a full discussion of noise impacts is found in Section 4.4.5, while visual impacts are addressed in Section 4.4.6.

Generator noise from the Otter Creek Repeater tower site would be expected to dissipate to very low levels (20 dBA) at a distance of 4,590 ft. from the sites during winter. Thus, any existing land uses may be affected in approximately a 1-mi. radius, or 3.14 sq. mi. Thus, the generator noise during operations would not be detectible at the BLM-permitted guide-outfitter camp, 5 mi. to the northwest. Helicopters supporting fuel deliveries and maintenance activities would operate intermittently during the summer, and flights would occur over short periods of time. Although helicopter activities may lead recreational users and hunting and fishing guide-outfitters to temporarily adjust their operations, they are not expected to have a significant negative effect on hunting or fishing activities in the area.

The Golovin Alternate tower would not directly displace any activities associated with the Iditarod historic-primary route, located 0.4 mi, away at its closest point, nor the Iditarod race route, approximately 1.25 mi. at its closest point. However, the tower would be visible from the Iditarod historic-primary route and the Iditarod race route, with moderate impacts, as analyzed in detail in Section 4.4.5. Generator noise from the Golovin Alternate tower site would be perceptible on the Iditarod historic-primary route at its closest point, but this noise would dissipate to a very low level (20 dBA) well before reaching the Iditarod race route.

The implementation of Alternative 1 would strengthen telecommunications infrastructure, which would be likely to improve healthcare (through tele-medicine) and government services. Through better search and rescue and emergency response capabilities, the project would benefit residents traveling between communities, guide-outfitters engaged in remote hunting/fishing activities, and participants/spectators at winter recreational events on the modern Iditarod race route.

The project components under direct review in this EA occur on federal land and impacts to recreational resources there would be minor and limited to a small area. The connected actions on non-federal lands, particularly the five remote towers, would have similar effects. These impacts are unlikely to permanently displace recreational uses, except that visual and noise impacts would be perceptible within close vicinity of the towers, generally out to a radius of 1 mi.

Decommissioning

When the sites are decommissioned, all physically visible structures would be removed, eliminating visual and operational noise impacts to recreation activities and adjacent land uses. Displacement of existing land uses would be confined to the small project footprint, and the noise and visual impacts created by decommissioning activities would be similar to those during the construction period. Because decommissioning of the towers would occur during the summer months, these activities would not impact winter recreation activities or racing events.

Conformance Analysis

As described in Section 1.2.3, three BLM land management plans are relevant to this project: the Southwest Management Framework Plan (MFP), the Kobuk Seward Peninsula RMP, and the Iditarod NHT Comprehensive Management Plan (CMP).

Relevant management policies found in the Southwest MFP include: 1) support for making public lands available for the development of electronic communications facilities sites; 2) identification of a possible "Area of Critical Concern" along the Anvik River corridor; and 3) consistency with the Iditarod NHT CMP. As a communications facility, the project conforms with the first policy. Since no Area of Critical Concern was approved for the Anvik River, conformance with the second policy is not relevant. The project conforms with the Iditarod NHT CMP as described below. Consequently, the project is in conformance with management policies for the Southwest MFP.

Relevant management policies found in the Kobuk-Seward Peninsula RMP include: 1) classification of federal lands in the vicinity of the Golovin Alternate tower site as an "Extensive Recreation Management Area;" 2) designation of management and weight restrictions for off-highway vehicles (comparable to off-road vehicles) as "limited;" 3) availability of federal lands along the project alignment for reindeer grazing; and 4) implementation of the Iditarod NHT CMP. The installation of repeater sites would not impact visitor use patterns, increase OHV use, or affect OHV weight restrictions. Neither would the project preclude commercial reindeer herding or limit the recreational use on surrounding federal lands. The project also conforms with the Iditarod NHT CMP as described below. Consequently, the project is in conformance with all management policies for the Kobuk-Seward Peninsula RMP.

Relevant management policies found in the Iditarod NHT CMP include: 1) a recommended 1,000-ft.-wide corridor for the Iditarod historic-primary route between Moses Point and Solomon with active management opportunities for trail marking, highway signing, trail maintenance, and trail shelter; and 2) a recommended 100-ft.-wide corridor for connecting routes between Kaltag to Nome with active management opportunities for trail marking and trail maintenance. The Golovin Alternate Repeater tower is not located within the Iditarod historic-primary route corridor, but would be located about 0.4 mi. (2,100 ft.) south of the centerline of the Iditarod historic-primary route at its closest point. As described on page 92, the Iditarod NHT CMP recommends a 1,000-ft.-wide active management corridor at this location, or 500-ft. on either side of the trail centerline. In addition, the tower site would lie about 2.3 mi. (12,144 ft.) north of an Iditarod historic connecting route. Alternative 1 would not install towers within either corridor, nor would it preclude active management opportunities there. Consequently, Alternative 1 would not substantially interfere with the nature and purpose of the Iditarod NHT, and the project is considered in conformance with management policies of the Iditarod NHT CMP.

Cumulative Impacts

Past, present, and future actions that have had and would continue to have minor impacts to land use and recreation in the proposed project area include ongoing capital improvement projects, generally in the immediate vicinity of the communities of Norton Sound. The TERRA-NW Project expands the TERRA-SW Project to Norton Sound. By doing so, it would contribute to improved telecommunications, and associated enhancements in search and rescue and emergency response efforts throughout the region, with potential benefits to guide-outfitters and recreationists using the project area.

The cumulative effect of past, present, and future actions and the TERRA-NW Project may encourage increased recreational activity dispersed throughout the region. Since the physical project components are located in remote areas (microwave repeaters), they would not combine

with capital improvement projects located near communities to cause cumulative changes in land use patterns. Recreational users, competitive event users, and all users of the Iditarod NHT would see moderate impacts to visual aesthetics and may be displaced from areas along the helicopter fuel transport route. Alternative 1 would make a minor contribution to cumulative impacts on land use and recreation.

Summary

In summary, the direct and indirect impacts of this alternative on land use and recreation would be of low to moderate intensity, due to displacement and noise disturbance in small areas and visual effects in the vicinity of the towers, including where the Iditarod NHT comes closest to the Golovin Alternate tower site. These effects would be permanent for the 20-year life of the project; however, the noise disturbance associated with annual helicopter refueling trips would be intermittent, limited to 2-4 days per site. The effects would be of local extent, not affecting the entire regional pattern of land use. The land use and recreation patterns affected would generally be considered resources that are common in context, except that the Iditarod NHT would be important in context, due to its Congressional designation.

Regarding BLM management plans, the placement of tower facilities proposed under Alternative 1 would be consistent with the policies and management designations contained in the Southwest MFP, the Kobuk-Seward Peninsula RMP and the Iditarod NHT CMP. Consequently, Alternative 1 is found to be in conformance with BLM management plans. The contribution to cumulative effects on recreation activities would be minor in general, and moderate in relation to the Iditarod NHT. Overall, the implementation of Alternative 1 would have a minor to moderate summary impact on land use and recreation.

4.4.3.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under implementation of Alternative 2, land use and recreation would remain the same. There would be no direct or indirect impacts to subsistence and recreational uses, mining claims, Alaska Native corporation land holdings, or Alaska Native allotments.

Cumulative Impacts

Since Alternative 2 would have no direct or indirect effects on land use or recreation, it would not contribute to the cumulative effects on these resources.

Conformance

Alternative 2 would not result in any change in management activities and is, therefore, considered consistent with BLM management plans.

Summary

Implementation of Alternative 2 would have no direct or indirect impacts on land use or recreation and would not contribute to cumulative effects on these resources.

4.4.3.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Under implementation of Alternative 3, the Golovin Alternate tower site would be replaced by a repeater tower on Hill 2211. The tower would be located on BLM land, but would be co-located with an existing communications tower.

Direct and indirect impacts of Alternative 3 on recreation activities would be less than Alternative 1 since the repeater site would be outside the viewshed of the Iditarod trail routes. In addition, the Hill 2211 tower site would be co-located with an existing communication facility, as BLM policies recommend when possible. There are no known guide services operating directly in this area.

Direct and indirect impacts of Alternative 3 during construction and maintenance activities would be similar to Alternative 1. The level of displacement during construction would be expected to be low because of the short timeframe of construction, which would last only one season.

Regarding BLM management plans, the placement of a tower site under Alternative 3 is deemed consistent with BLM management plans for the same reasons as Alternative 1. Though not a determining factor in its conformance, Alternative 3 would lie outside the viewshed of the Iditarod routes, resulting in a reduction in visual impact when compared to Alternative 1.

Conformance

The Iditarod routes do not pass near Hill 2211, and Alternative 3 is considered consistent with BLM land use plans for the reasons described under Alternative 1.

Cumulative Impacts

Cumulative impacts for Alternative 3 would be similar to those described under Alternative 1. Although the location of the repeater station would change, the incremental effect of completing and extending the telecommunications system in the area would be identical. Consequently, Alternative 3 would also make a minor contribution to cumulative impacts on land use and recreation.

Summary

Alternative 3 would be expected to have low intensity direct and indirect impacts on land use patterns and recreation activities, with a minor incremental contribution to cumulative impacts on these resources. Overall, implementation of Alternative 3 would have a minor impact on land use and recreation.

4.4.3.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Under implementation of Alternative 4, the Golovin Alternate tower site would be replaced by a tower on Kwiktalik Mountain. The repeater would be located on private land owned by the Golovin Native Corporation and would not be under BLM management authority.

Direct and indirect impacts of Alternative 4 on recreation activities would be less than Alternative 1 since the site would be over 10 mi. away from the Iditarod routes and perceived visual contract would be weak at this distance. There are no known guide services operating directly in this area.

Direct and indirect impacts of Alternative 4 during construction and maintenance activities would be similar to Alternative 1. The level of displacement during construction would be expected to be low because of the short timeframe of construction, which would last only one season.

Conformance

Regarding BLM management plans, the placement of a tower site under Alternative 4 would make consistency with BLM management plans unnecessary since the site would be not located on BLM land.

The Iditarod routes do not pass near Kwiktalik Mountain, and Alternative 4 is considered consistent with BLM land use plans for the reasons described under Alternative 1.

Cumulative Impacts

Cumulative impacts for Alternative 4 would be similar to those described under Alternative 1. Although the location of the repeater station would change, the incremental effect of completing and extending the telecommunications system in the area would be identical. Consequently, Alternative 4 would also have a minor contribution to cumulative impacts on land use and recreation.

Summary

Implementation of Alternative 4 would be expected to have minor direct and indirect impacts on land use patterns and recreation activities, with a minor incremental contribution to cumulative impacts on these resources. Overall, implementation of Alternative 4 would have a minor summary impact on land use and recreation.

4.4.3.5 Lands with Wilderness Characteristics

As required under the Washington Office Instruction Memorandum No. 2011-154, the effects of the project on BLM-managed lands with wilderness characteristics must be analyzed. For an inventory of these lands, see Appendix D.

The BLM-managed and administered lands within the Otter Creek/Golsovia River area consist of approximately 3.5 million acres, while the Golovin/Darby Mountains area consist of 443,140 acres. Within each area, approximately 5.15 acres would be temporarily impacted during the construction phase and 0.69 acres during the long-term operation of each tower.

The criteria for of wilderness characteristics are:

- A roadless area with over 5,000 acres of contiguous BLM lands; or
- A roadless of less than 5,000 acres of contiguous BLM lands, with additional qualifying characteristics; and
- Generally appear to have been affected primarily by the forces of nature, and any work of human beings must be substantially unnoticeable; and
- Have outstanding opportunities for solitude or a primitive and unconfined type of recreation.

The following information was used in determining whether the Proposed Action would impair the wilderness characteristics of each area:

- The Proposed Action would not do anything to diminish the size of the roadless area to less than 5,000 acres, especially given that the construction/infrastructure support would all be done via helicopter;
- At the Otter Creek site, a tower and associated facilities affecting 5.15 acres (at maximum extent) within 3.5 million acres would not constitute substantially noticeable works of humans;
- At the Golovin Alternate site, a tower and associated facilities at the affecting 5.15 acres (at maximum extent) within 443,140 acres would not constitute substantially noticeable works of humans; and
- Solitude in the immediate area may be temporarily *impacted*, but once construction is completed, this would not permanently *impair* this wilderness characteristic. As a result, opportunities for primitive recreation would not be impacted.

Direct and Indirect Impacts

Alternatives 1, 3, and 4 include towers on, with the Hill 2211 location substituting for the Golovin Alternate tower site in Alternative 3, and Kwiktalik Mountain as the site in Alternative 4. The construction, operations, and maintenance of this communications infrastructure in remote undeveloped areas would have an effect on wilderness characteristics. However, the intensity, duration, extent and context must be considered in order to reach a summary impact conclusion.

Construction

The analysis of noise impacts (Section 4.4.7) indicates that during the 150-day construction period, helicopters and construction activity would cause increased noise levels within an irregular corridor along the helicopter flight paths at distances of 5 to 10 mi. from the centerline. During the subsequent operations and maintenance period, a comparable level of helicopter transit would occur for 4 to 5 days a year (about 1 percent of days in the year). At the tower sites, the sound of construction equipment and the generators used during the summer construction period would diminish within about 1 mi. During the winter period, the sound of generators at the remote sites would be slightly audible at a little over .75 mi. Thus the noise disturbance can be characterized as high intensity for a temporary period within a limited geographic extent, during construction, and of lesser intensity and confined to a smaller area during operations. Impacts to wilderness characteristics would be greatest during construction due to the numerous helicopter flights and construction activity. During operations the

generators would operate full-time, but would disturb a small area, even when a lower sound threshold for winter is taken into account.

There would be a continuing visual impact due to towers and structures in addition to transitory impact caused by the noise and visual impact of helicopter inspection and refueling flights for an estimated 4 to 5 days each year during the operational life of the project. If approved, the Proposed Action would fulfill an important need of the communities in the region by providing needed broadband service, which would enhance public health and safety and provide for potential economic development benefits. In addition, all of the impacts could be mitigated and removed by decommissioning the site at the conclusion of the lease.

The analysis of visual impacts in Section 4.4.6 modeled the location and visibility of the tower as affected by the surrounding topography. While the tower would be visible from locations up to 10 mi. away, it would not be a high-contrast feature in relation to the surrounding topography.

Thus the construction phase of implementing Alternative 1, 3, or 4 would adversely affect the undeveloped, untrammeled, and natural qualities of lands within 10 mi. of the Otter Creek and Golovin Alternate tower sites and their respective helicopter transit routes. This effect, however, would be of low to medium intensity, temporary duration (i.e., five months during the summer construction season), and local in extent. The towers would affect lands with wilderness characteristics that are common in context, except that the Iditarod NHT would be important in context, due to its Congressional designation.

Operations

For the operations and maintenance period, noise impacts from generators would be of low intensity, long-term duration, and affecting resources that are considered common in context. Annual maintenance and refueling flights by helicopters would be of medium intensity, over a larger area, but would occur intermittently for up to 5 days per year over the 20-year life of the project. Visual impacts following construction are based on the long-term duration of the project life. Given the weak contrast characteristic when taking into account the topography of the area surrounding each repeater, this impact would be of medium intensity, long-term duration, local extent, and affecting resources that are common in context.

The characteristics of opportunity for solitude and ability to participate in primitive and unconfined recreation are related to the analysis of impacts to recreation addressed earlier in this section. These characteristics are highly desired by backcountry recreation visitors, whether they use the services of fishing lodges and regional air taxis, or rely more on hiking and floating a river. These characteristics also reflect the perception of visitors and the expectation they bring to their backcountry experience. As described in the discussion of noise and visual impacts, long-term impacts from the tower are expected to be of low to medium intensity and confined to a relatively small geographic extent. Recreation service providers and recreational visitors seeking solitude and primitive recreation would be disturbed along the helicopter flight paths and from close proximity to the tower site during the life of the project.

Decommissioning

When the site is decommissioned all physically visible structures would be removed and the noise and visual impacts to other land uses during decommissioning would be similar to those of the construction period. When the site decommissioning is completed, all physically visible structures would be removed.

Cumulative Impacts

Past, present, and RFFAs with effects on socioeconomics, subsistence, and recreation are discussed in Sections 4.4.1, 4.4.2, and 4.4.6, respectively. To the extent that these resources rely on the health of the visitor industry and the perception of visitors that the region still provides a quality wild land experience, these have an influence on the trends and effects on wilderness characteristics. General trends indicate the potential for increases in the visitor industry, based on continuing economic development efforts.

Visitors may experience more overflights, and if recreation activities were to grow, more evidence of human presence in some high-use areas. The implementation of Alternatives 1, 3, and 4 would contribute to cumulative effects on wilderness characteristics in the project area. The project would introduce the towers and associated infrastructure at new locations in the remote undeveloped areas. Some recreation users place particular value on the undeveloped character of the landscape they observe. The impacts would be considered to be long-term but of low to moderate intensity and limited geographic extent. Recreation service providers and backcountry visitors may perceive a loss in the wilderness characteristics and may redirect their activities to areas where the towers are not noticeable. The resources affected, namely lands with wilderness characteristics, are common in context in the project area.

Summary

Under Alternatives 1, 3, and 4, the construction impacts at all sites would be limited to one season. During the operations phase, impacts would include noise disturbance from the Otter Creek and either the Golovin Alternate, Hill 2211, or Kwiktalik Mountain tower site generators in a 1-mi. radius, visual intrusion of the towers, and noise disturbance from helicopter-supported refueling operations. In all, the impact on wilderness characteristics on BLM-managed lands in the vicinity would be minor. Implementation of Alternatives 1, 3 or 4 would contribute a minor additive or synergistic effect to the cumulative effects of other trends affecting the visitor industry and lands with wilderness characteristics in the project area. In summary, the Proposed Action and alternatives would have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.

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4.4.4 Transportation

Section 3.4.4 described the inventory of the project area air transportation services network. This section analyzes whether the Proposed Action and alternatives would adversely affect the regional air transportation system.

4.4.4.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Construction

During the construction period, there would be increased helicopter traffic from the staging areas to the tower sites. Figures 2-2 and 2-3 display the routes traveled by the helicopters during construction and operations. As detailed in Table 2-5, the Erikson Air Crane is scheduled for heavy-lift activities, while the Bell UH-1H Huey provides medium-lift capacity for project materials, equipment, and supplies. The Hughes 500-E or Robinson-44 is a light-lift helicopter which would transport personnel and light equipment and supplies. The proposed helicopter transit route for each site would experience an average of 94 to 104 trips total, with a division between 2 staging sites for the heavy- and medium-lift staging areas for the Otter Creek tower site, as described in Section 2.2.1. Transportation of materials, equipment, and personnel for the implementation of Alternative 1 would represent a low to medium intensity, but short-term duration, increase in demand on the regional aircraft transportation system. Project-related transportation would be concentrated along specific corridors and would be temporary, lasting for the 150-day construction season. The project workforce would draw upon the existing scheduled fixed-wing transportation capacities for access to the region, at a scale that will not displace other travelers. The project would secure medium- and heavy-lift helicopters outside of the region, without displacing transportation uses in the region. For the Hughes 500-E or Robinson-44, light-lift helicopter, the project would charter from providers in Nome, or secure additional assets from outside of the region as necessary. This would not be expected to displace other users of the existing Nome-based helicopter services in the region.

Operations

The annual maintenance trips to each of the two tower sites via helicopter would follow the same routes taken during the construction period. The annual maintenance and refueling transportation by helicopter would involve a combined total of 8 to 10 days per year for the 2 sites, but occurring on an annual basis for the life of the project. The impacts would be of low intensity, brief intermittent periods over a long-term duration, regional in extent, and affecting resources that are common in context.

Decommissioning

As with construction, the use of helicopters for decommissioning would represent a low to medium intensity, but short-term increase in regional transportation. The impacts would be localized, affecting resources that are common in context.

Cumulative Impacts

Aircraft transportation is a major regional mode of travel in the project area. As a result, a robust and well-developed air transportation network exists between communities affected by the proposed project. There are no capital improvement projects currently funded for inter-community road projects; thus, the regional air transportation patterns are expected to remain the same.

RFFAs affecting the major economic sectors of the government sector, mining, commercial fishing, and the visitor industry are expected to help stabilize and potentially contribute to small growth in the regional population and economic activity. While population growth and improved economic development in the region would increase the demand for additional air transportation services, there are no quantitative data with which to project air transportation demands. An increase in population and economic activity, including in the visitor industry, may result in growth in regional aviation transportation services.

The implementation of Alternative 1 could result in an increase in air transportation activity, particularly during the construction period and in the vicinity of the staging areas and helicopter transit corridors to the tower sites. These contributions to trends in regional air transportation would be negligible, as impacts would be limited to a short duration (150 days for the construction period) and to a confined set of corridors, followed by intermittent activity over the 20-year life of the project. The proposed project would not be expected to strain regional fixed-wing passenger and freight air service capacity based on the small workforce required for project implementation, and the use of externally chartered helicopter services. The impact on regional transportation service capacity would be low in intensity, short-term in duration, and affecting local resources that are common in context. The contribution to cumulative effects on air passenger and freight transportation services would be negligible.

The project components under direct review in this EA would make a negligible contribution to cumulative effects to air transportation systems from the TERRA-NW Project, including components installed on state and private lands.

Summary

Although impacts would be greater during construction, over the life of the project, impacts to the regional air transportation system from implementation of Alternative 1 would be of low intensity, long-term in duration, local to regional in extent, and affecting resources that are common in context. The summary impact of Alternative 1 air transportation services would be negligible.

4.4.4.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under implementation of Alternative 2, local and regional air transportation methods would remain the same. There would be no direct or indirect impacts to air transportation services.

Cumulative Impacts

With no direct or indirect impacts to air transportation, Alternative 2 would have no contribution to cumulative impacts, and no contribution to cumulative effects on these resources.

Summary

Implementation of Alternative 2 would be expected to have no direct or indirect impacts on air transportation.

4.4.4.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Direct impacts of Alternative 3 on existing air transportation patterns would be consistent with those described in Alternative 1.

Cumulative Impacts

As with Alternative 1, the project would be expected to have a negligible contribution to cumulative effects on air regional transportation patterns.

Summary

Implementation of Alternative 3 would be expected to be of low intensity, temporary in duration, local in extent, and common in context. Alternative 3 would be expected have a negligible summary impact to regional air transportation.

4.4.4.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Direct impacts of Alternative 4 on existing air transportation patterns would be consistent with those described in Alternative 1.

Cumulative Impacts

As with Alternative 1, past, ongoing, and RFFAs would likely have minor impacts to regional air transportation near the proposed project areas. Implementation of Alternative 4 would not contribute additional air transportation to the region during marine cable placement. The project would be expected to have a negligible contribution to cumulative effects on regional air transportation patterns.

Summary

Implementation of Alternative 4 would be expected to be of low intensity, temporary in duration, and local and common in context. Alternative 4 would be expected have a negligible summary impact to regional air transportation.

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4.4.5 Noise

4.4.5.1 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Direct and Indirect Impacts

Construction

There are three sources of noise associated with Alternative 1: 1) helicopter flights to and from both of the tower sites for construction and site maintenance; 2) construction equipment during site set up; and 3) diesel generators used to power the tower sites during normal operation. The helicopter flights for the Otter Creek tower site would originate from two staging areas: An undeveloped barge landing at Klikitarik Bay for the estimated four trips by the heavy-lift Erickson Air Crane, and an estimated four trips by the medium-lift Bell H-1H Huey. The remainder of the staging for the Otter Creek tower site would be based out of Unalakleet. The helicopter flights for the Golovin Alternate tower site would originate from the staging site located in the community of Golovin. The staging site would be located approximately 8.8 mi. west of the Golovin Alternate tower site on the north end of Golovnin Bay in the community of Golovin. There would be a total of approximately 104 helicopter flights to each of the tower sites during the construction period. A Hughes 500-E or Robinson R-44 helicopter would be used for crew transport and light freight. A Bell UH-1H Huey helicopter would be used for medium-lifts and initial material supply transportation to the sites. An Erikson Air Crane would be used for the transport of shelters and fuel tanks from the project staging areas. The Bell UH-1H Huey helicopter is known for the low frequency rumble which is due to blade slap against the air, and it is predominantly heard when the helicopter is approaching.

The loudest areas of helicopter noise would occur at the staging/departure sites and at the tower sites because the helicopters would be at lower elevations. Project construction at each site would be expected to take approximately 150 days, and the construction of the two sites is proposed to occur in different years. Of these trips, approximately 60 trips would utilize a Bell UH-1H helicopter to and from the staging sites, 4 trips would utilize an Erikson Air Crane helicopter to and from the staging area, and 30 to 40 trips would utilize a Hughes 500-E or Robinson R-44 helicopter to and from nearby communities. Helicopters would travel at an altitude of 1,500 ft. (450 m). With a total of up to 104 flights projected for each site during construction, the average number of flights during this period would be less than one per day.

The distances to the 45 dBA maximum sound level (L_{max}) noise contour were estimated along the individual flight tracks and at the two staging/departure areas and two repeater sites using the projected helicopter operations. The maximum noise levels generated by each of the three helicopter types for a single event to and from each of the microwave repeater tower sites were used for noise modeling purposes. The helicopter noise modeling results for the projected operations along the flight tracks generated approximate distances to the 45 dBA L_{max} noise contour that ranged from 2 to 3 mi. from the flight path. Helicopter noise modeling results for the projected operations near staging/departure sites and both microwave repeater sites generated approximate distances to the 45 dBA L_{max} noise contour that ranged from 2 to 5 mi. Noise generated by project helicopter operations would propagate over greater distances over water.

On-site construction of the tower sites would involve the use of a small backhoe (CAT 303 or equivalent), an air compressor, two portable generators, a jackhammer, and various electrically and pneumatically driven power tools. Each of these tools is expected to generate a substantial level of noise as each tower site is constructed. The sound levels would be higher than the existing ambient levels at each site; however, these noises would be temporary. These levels would attenuate to a noise level of 60 dBA L_{eq} at a distance of 820 ft., and would attenuate to a level of 45 dBA L_{eq} at a distance of 4,612 ft. Noise levels from construction equipment alone during the summer construction period would attenuate to a level of 30 dBA L_{eq} at a distance of 6,585 ft. Summertime noise levels from the combined construction equipment and generators for construction would attenuate to a level of 30 dBA L_{eq} at a distance of 6,700 ft.

Under implementation of Alternative 1, there would be direct impacts to the soundscape at the Otter Creek and Golovin Alternate tower sites, as well as direct impacts at the staging areas in Klikitarik Bay, Unalakleet, and Golovin. During the construction phase, the effects near the repeater sites and staging areas are expected to be of high intensity, temporary in duration (five months), local in extent, and affecting resources that are common in context. The maximum noise levels at the tower sites or the staging sites would be loud (greater than 90 dBA L_{max}) during an individual landing or departure, however, frequency of helicopter flights, particularly for the louder heavy- and medium-lift helicopter would be concentrated during June to early July. The overall burden is approximately 104 trips over the 150-day construction period, or a numerical average of less than 1 trip per day, during the single season of construction at each remote tower site. The duration of the construction activities would be limited to a single season at each site; therefore the duration would be temporary.

Operations

During normal operations at each of the tower sites, a power source is required for operation of the repeaters. The microwave repeaters for the sites have been designed to utilize two 9 kW diesel generators. One generator would be used as a primary power source and the other would be used as a backup. These generators would be the dominant noise source at each of the repeater sites during normal operation. The Cummins D1703-M diesel generators proposed for each site are expected to generate a noise level of 78 dBA L_{eq} at a distance of 23 ft. These generators would use hospital-grade silencers (GTE Industries 201-5102) which would be expected to decrease the levels of noise. These levels would attenuate to a noise level of 60 dBA L_{eq} at a distance of 183 ft., and would attenuate to a level of 45 dBA L_{eq} at a distance of 1,027 ft. The generators at each site are expected to consume approximately 7,000 gallons of diesel fuel per year, and each site would be serviced to replenish the fuel supply. During the winter the generators are expected to attenuate to a noise level of 20 dBA L_{eq} at a distance of 4,590 ft. It is anticipated that 14 round-trip flights of a Bell UH-1H helicopter each year would be required to deliver the fuel, and it is anticipated that this effort would take four to five days per site. Maintenance flights are expected to take place once a year, with two trips per site and using a Hughes 500-E or Robinson-44 helicopter. The maximum noise levels from the individual helicopter operations expected to occur during typical site maintenance would be the same as the maximum noise levels presented for construction.

During normal operations, the number of individual helicopter flights would drop significantly to a total of 32 flights over 12 to 14 days per year for the two sites combined. As a mitigation measure, helicopter-supported refueling would occur during July to minimize impacts on hunting, fishing and recreation activities. In this case, the intensity would be low to medium, but

the duration would be increased to intermittent and long-term as the flights would occur during the 20-year life of the project. Also during normal operations, the generators at each repeater site would be operating on a continuous basis. The source would have a 20 dBA L_{eq} noise footprint extending to approximately 4,590 ft. from the site. The intensity would be expected to be low but the duration would be long-term.

Decommissioning

Decommissioning impacts would be expected to be similar to construction activities.

Cumulative Impacts

All of the ongoing activities within the region establish a baseline acoustic environment that has remained relatively unchanged as in the recent decade, population and economic growth has slowed. Fixed-wing aircraft flights occur daily throughout the project area. As a result, residents are somewhat acclimated to noise from flight events. All of the RFFAs for this area are not expected to have any substantial impact on the overall noise environment. Any possible major projects are still in the conceptual stages and cannot be classified as RFFAs. . For a community that currently experiences daily flights within the environment, this project would not contribute significantly to the existing and reasonably foreseeable future noise environment. The project components under direct review in this EA are not expected to significantly contribute to cumulative effects for noise in the project area.

Summary

Impacts from noise associated with helicopters could be minimized through the development and implementation of site-specific mitigation plans developed in consultation with BLM. Helicopter overflights and landings would cause a degree of disturbance, but the effect would be temporary in nature. The helicopter flights would be dispersed over multiple flight paths and the aircraft are required to fly at or above a relatively high altitude of 1,500 ft., which would lessen the magnitude of sound at ground level and thereby minimize noise impacts. The mitigation measure establishing a seasonal window for helicopter-supported refueling activities would considerably reduce noise impacts to recreation users during the time of year when they are most active. Impacts from noise associated with the generators at the tower sites are of low intensity and confined to a small area. Implementation of Alternative 1 with mitigation measures would result in summary effects to the acoustic environment that would be minor. These effects would be of low intensity, long-term in duration, and affecting resources that are local in extent, and common in context.

4.4.5.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under the No Action Alternative, there would be no direct or indirect effects to the acoustic environment as there would not be any flight, construction, or operational activities.

Cumulative Impacts

With no direct or indirect impacts on the ambient noise environment within any of these communities under Alternative 2, there would be no contribution to cumulative effects on this resource.

Summary

Implementation of Alternative 2 would not result in the generation of any noise impact on any of the existing communities within the area. There would be no direct or indirect impacts to the acoustic environment and no contribution to cumulative impacts on this resource.

4.4.5.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Under Alternative 3, a tower site at Hill 2211 would substitute for the Golovin Alternate tower site. The direct and indirect impacts of the construction and operations would be the same as those in Alternative 1.

Cumulative Impacts

The cumulative effects for Alternative 3 would also be the same as Alternative 1.

Summary

Implementation of Alternative 3 with mitigation measures would result in minor effects to the acoustic environment. These effects would be of low intensity, with brief intermittent episodes over the long-term duration, and affecting resources that are local in extent, and common in context.

4.4.5.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Under Alternative 4, a tower site at Kwiktalik Mountain would substitute for the Golovin Alternate tower. The direct and indirect impacts of the construction and operations would be the same as those in Alternative 1.

Cumulative Impacts

The cumulative effects for Alternative 4 would also be the same as Alternative 1.

Summary

Implementation of Alternative 4 with mitigation measures would result in minor effects to the acoustic environment. These effects would be of low intensity over the long-term duration, and affecting resources that are local in extent, and common in context.

4.4.6 Visual Resources

This section addresses direct and indirect effects expected to result from the Proposed Action, the No Action Alternative and two additional action alternatives. The analysis also included connected actions at eight microwave towers on private lands, five at remote sites, and three within communities (see Table 2-1). Potential impacts to visual resources that may result from connected actions are presented as indirect effects of the Proposed Action.

The analysis area for visual resources was defined by a 15 mi. radius surrounding the four tower sites under review: Otter Creek (Figure 4-1), Golovin Alternate (Figure 4-2), five additional repeaters and three community towers sited on private lands (Figure 4-3), Hill 2211 (Figure 4-4), and Kwiktalik Mountain (Figure 4-5). The analysis area also included portions of the Iditarod NHT located within the Kaltag to Nome segment of the Iditarod NHT.

The impact analysis for the proposed towers was restricted to within 15 mi. of the project area based on the assumption that the visual contrast between project features (i.e., towers and associated project components) and natural landscape declined beyond this distance. This assumption was confirmed following construction and operation of the similar TERRA-SW Project, located in the Bristol Bay region. The analysis areas included lands where the proposed project would be expected to be visible ("Seen Area") and areas where topography would be expected to shield views of the proposed project ("Unseen Area"). The Seen Area was calculated using a Geographic Information System viewshed analysis tool using a 60-meter DEM and a tower height of 60 ft.

The visual impact analysis focused on the assessment of three primary indicators of change to visual resources:

1. Compatibility of the proposed project with the existing landscape character, measured by the level of visual contrast created by the project;
2. Change in scenic quality within the Kaltag to Nome portion of the Iditarod NHT, measured by shift in inventory values that may result from operation of the proposed project; and
3. Consistency with goals and objectives contained in relevant land resource management plans, measured by the combined effects of visual contrast, duration of view, and predominant angle of observation.

Additional qualitative indicators included the expected level of change to the existing landscape aesthetic, such as light and glare, movement, activity (measured in terms of change in vehicular traffic and amount of people), or naturalness.

Figure 4-1 Otter Creek Repeater Viewshed Analysis

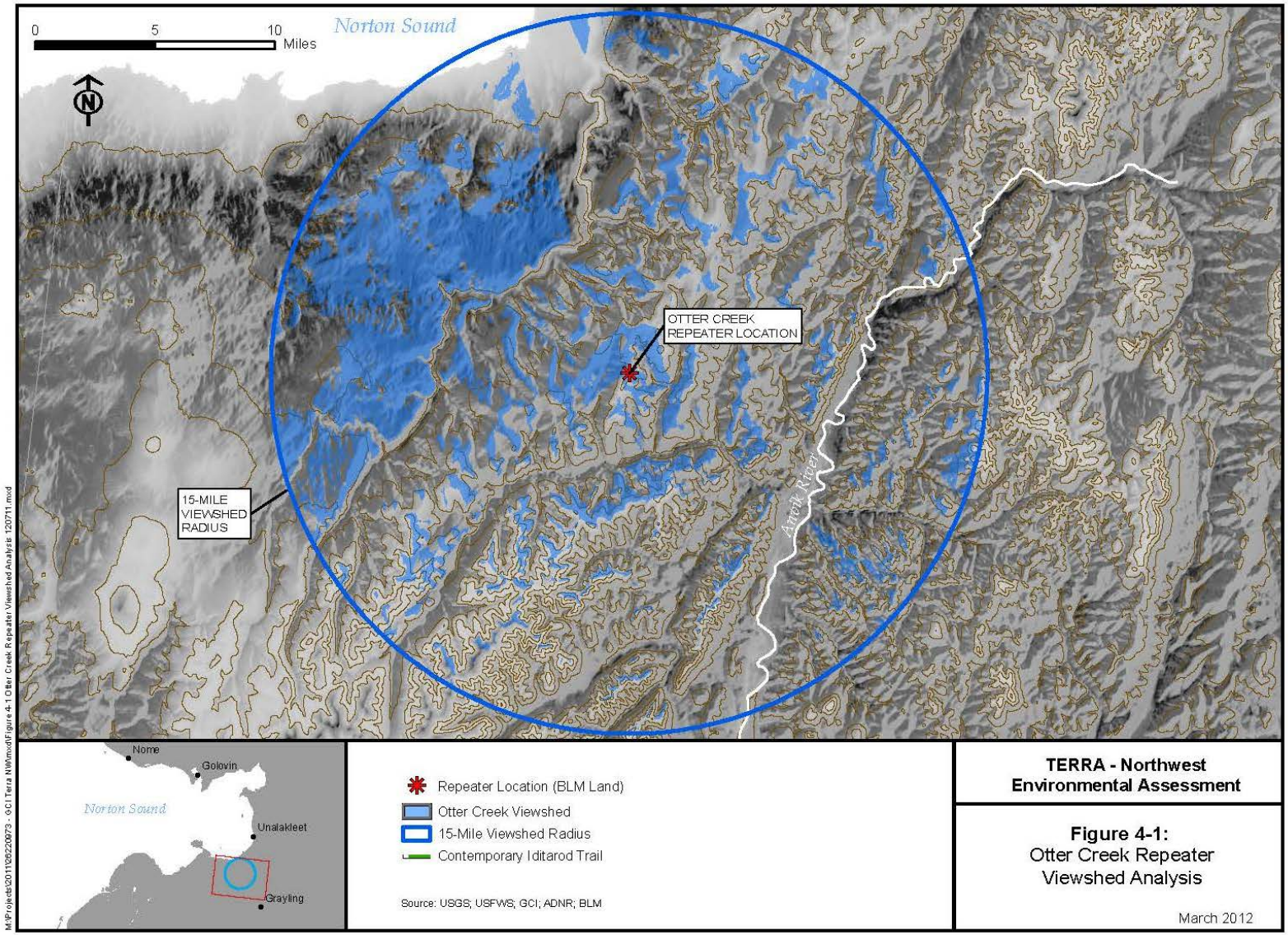


Figure 4-2 Golovin Alternate Repeater Viewshed Analysis and Key Observation Points

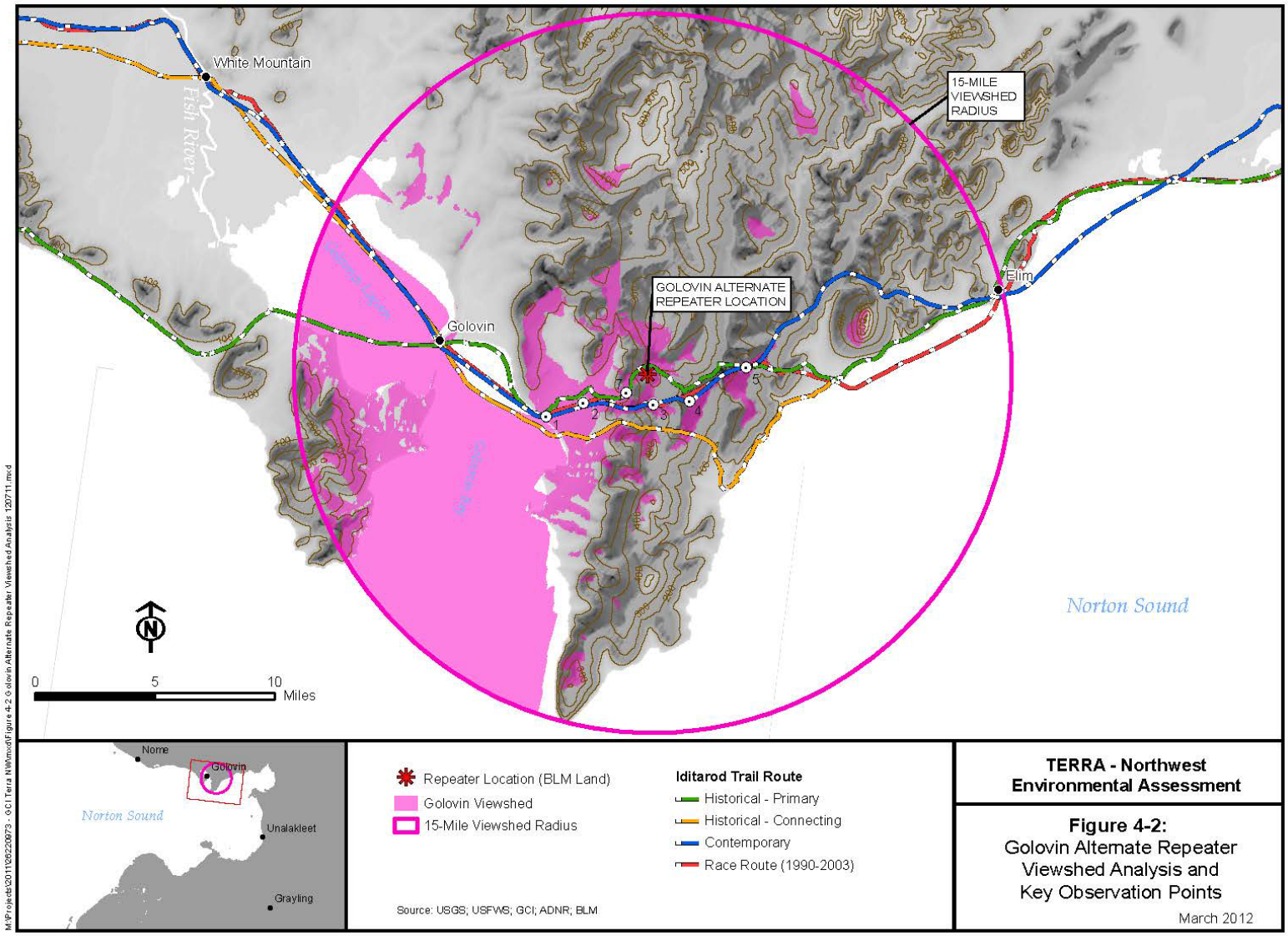


Figure 4-3 Proposed Non-BLM Repeater Sites with 5-Mile Buffers

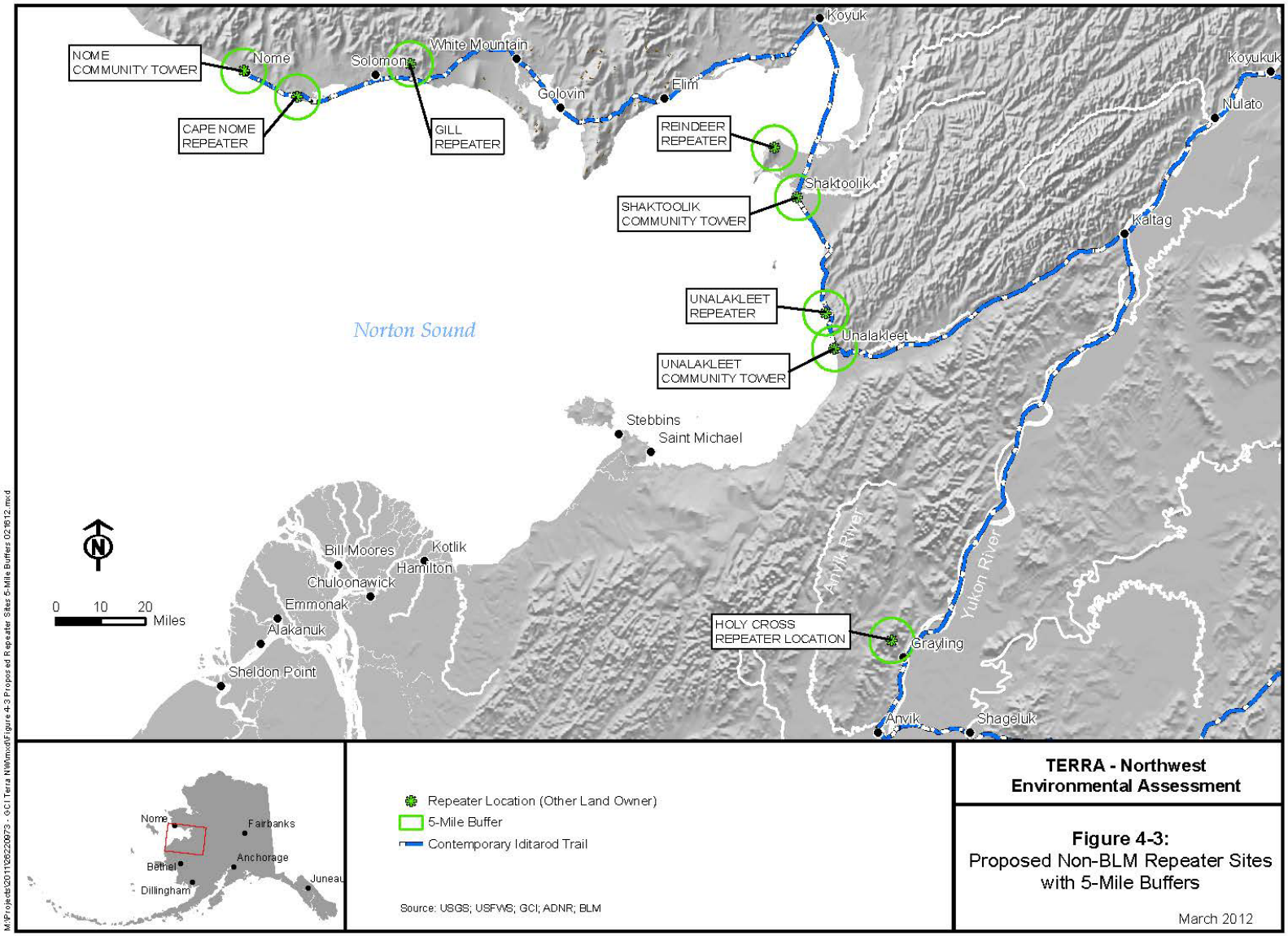


Figure 4-4 Hill 2211 Buffer Distances

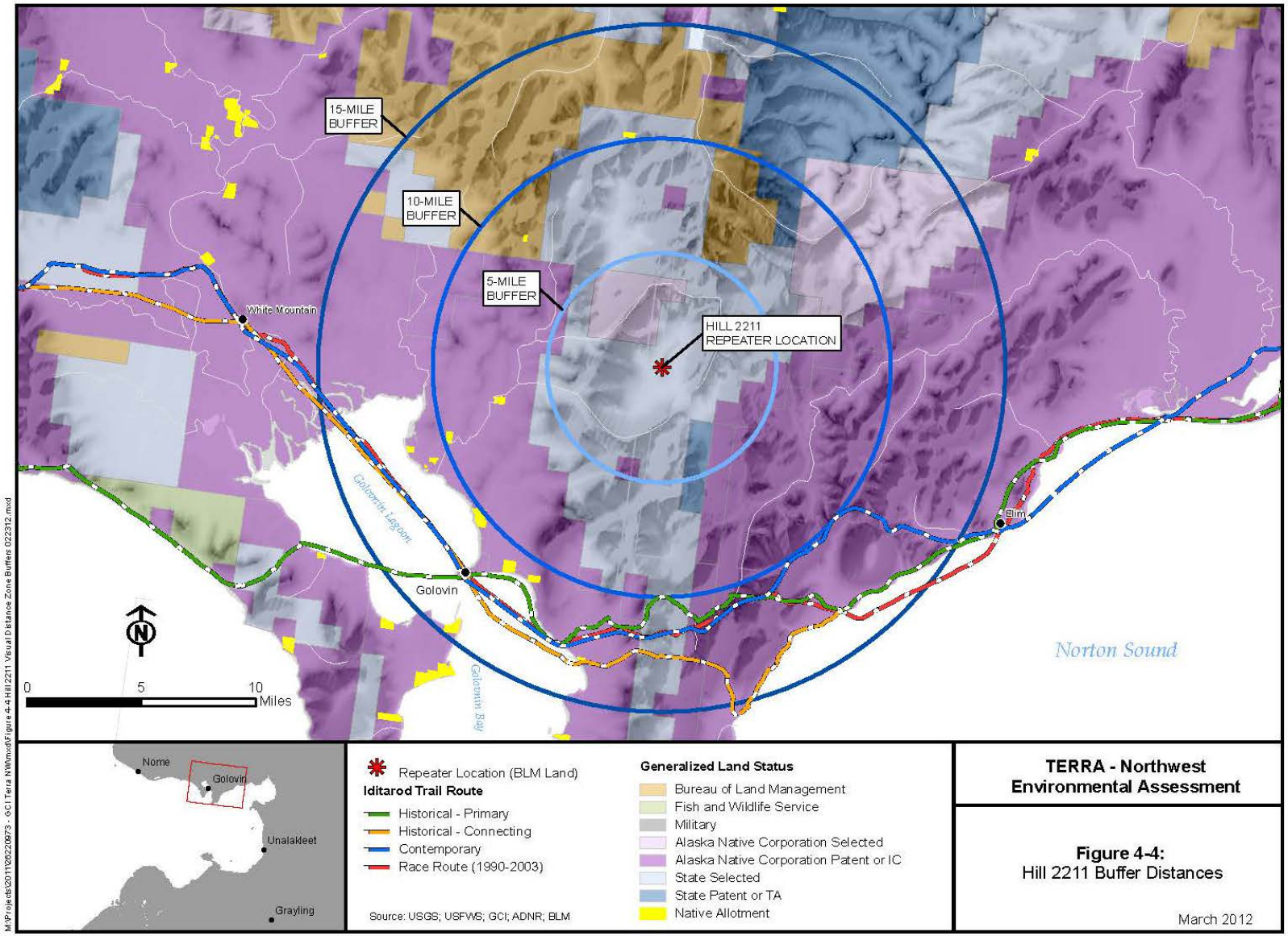
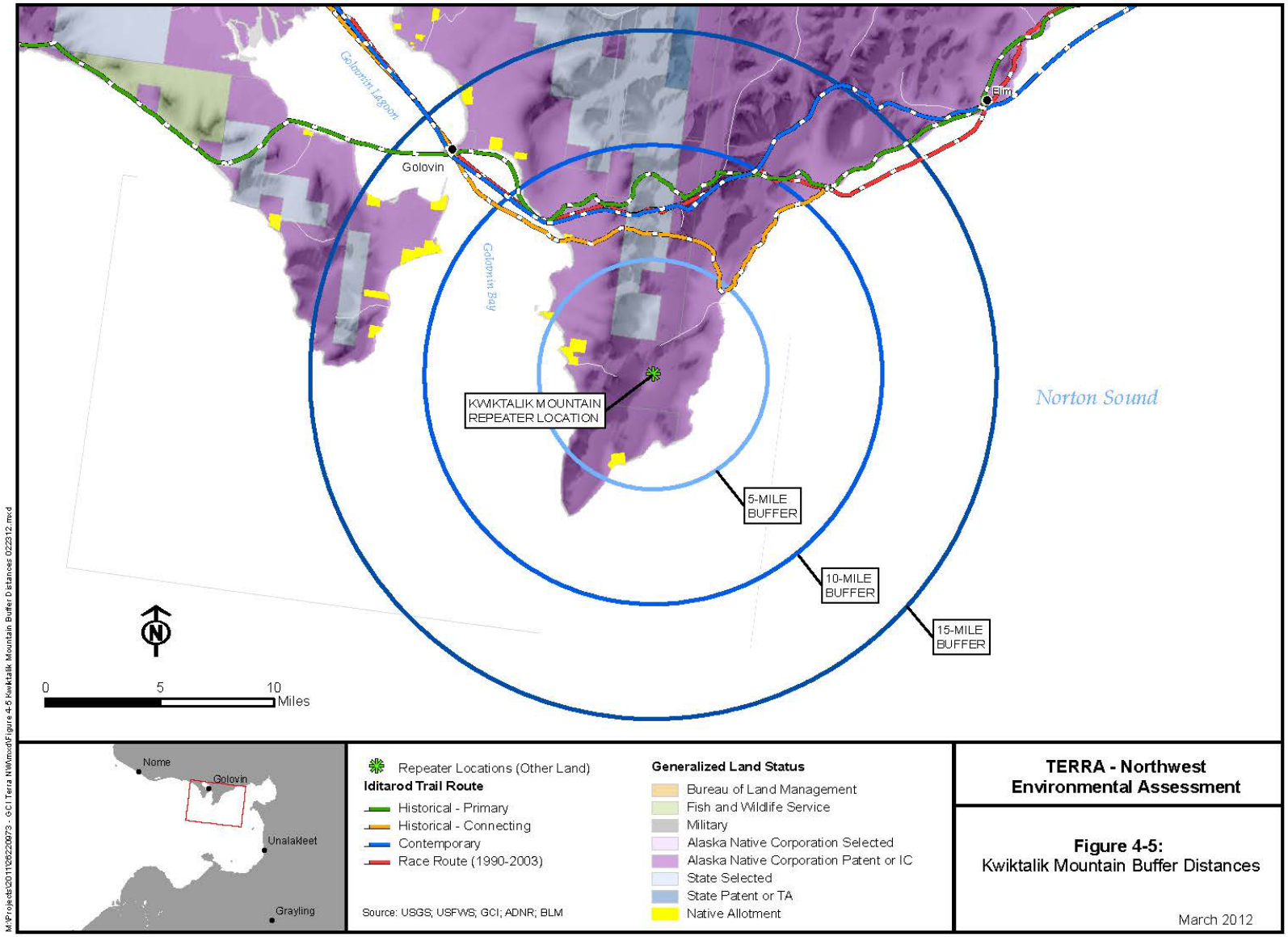


Figure 4-5 Kwiktalik Mountain Buffer Distances



4.4.6.1 Methods

The visual resources impact analysis was completed using simulations of the project under Alterative 1. Simulations were used to identify the expected level of change in indicators listed above. Methods used to develop simulations and to analyze indicators of change in visual resources are presented below.

Photosimulations

To support the visual resource impact analysis, and to disclose expected visibility of project components from various locations on the Iditarod routes, photographic simulations were prepared for five Key Observation Points (KOPs) established for Alternative 1, the Golovin Alternate repeater tower. Appendix F, the Visual Contrast Rating Report, provides details on the visual assessment results. Simulations were produced by rendering project components (repeater towers and auxiliary buildings) using 3D computer models, and super-imposing these images onto photographs taken from KOPs. Model parameters accounted for environmental factors, such as viewing angle and light conditions, thereby resulting in an accurate virtual representation of the appearance of the proposed project. The project was rendered in two ways: 1) as a galvanized steel tower with auxiliary structures painted white; and 2) as a galvanized steel tower with auxiliary structures painted gray. Because the white towers are expected to result in reduced visual contrast during winter months, this color scheme is carried forward as a mitigation measure.

Visual Contrast Rating Analysis

The BLM Contrast Rating procedure was used to determine visual contrast that may result from the construction and operation of the project (BLM, 1986b). This method assumes that the extent to which the project results in adverse effects to visual resources would be a function of the visual contrast between the project and the existing landscape character. The results of the contrast rating were used to address Indicator #1: Compatibility of the proposed project with the existing landscape character. Although no formal contrast rating was completed for construction or decommissioning related actions, the expected level of contrast was estimated based on knowledge of anticipated actions and equipment.

The expected level of contrast was defined by the following classifications (BLM, 1986b).

- *Strong*: The contrast demands attention, would not be overlooked by the average observer, and it is dominant in the landscape.
- *Moderate*: The contrast begins to attract attention and begins to dominate the characteristic landscape.
- *Weak*: The contrast can be seen but does not attract attention.
- *None*: The contrast is not visible or not perceived.

Contrast ratings were competed using simulations prepared for the Golovin Alternate tower site using photographs obtained at six KOPs. An additional simulation was developed to represent views of the proposed project within 0.4 mi. Visual simulations are presented in Figures 4-6 through 4-11.

Figure 4-6 Golovin Alternate Repeater Simulation from KOP 1 (Distance 4.5 miles)

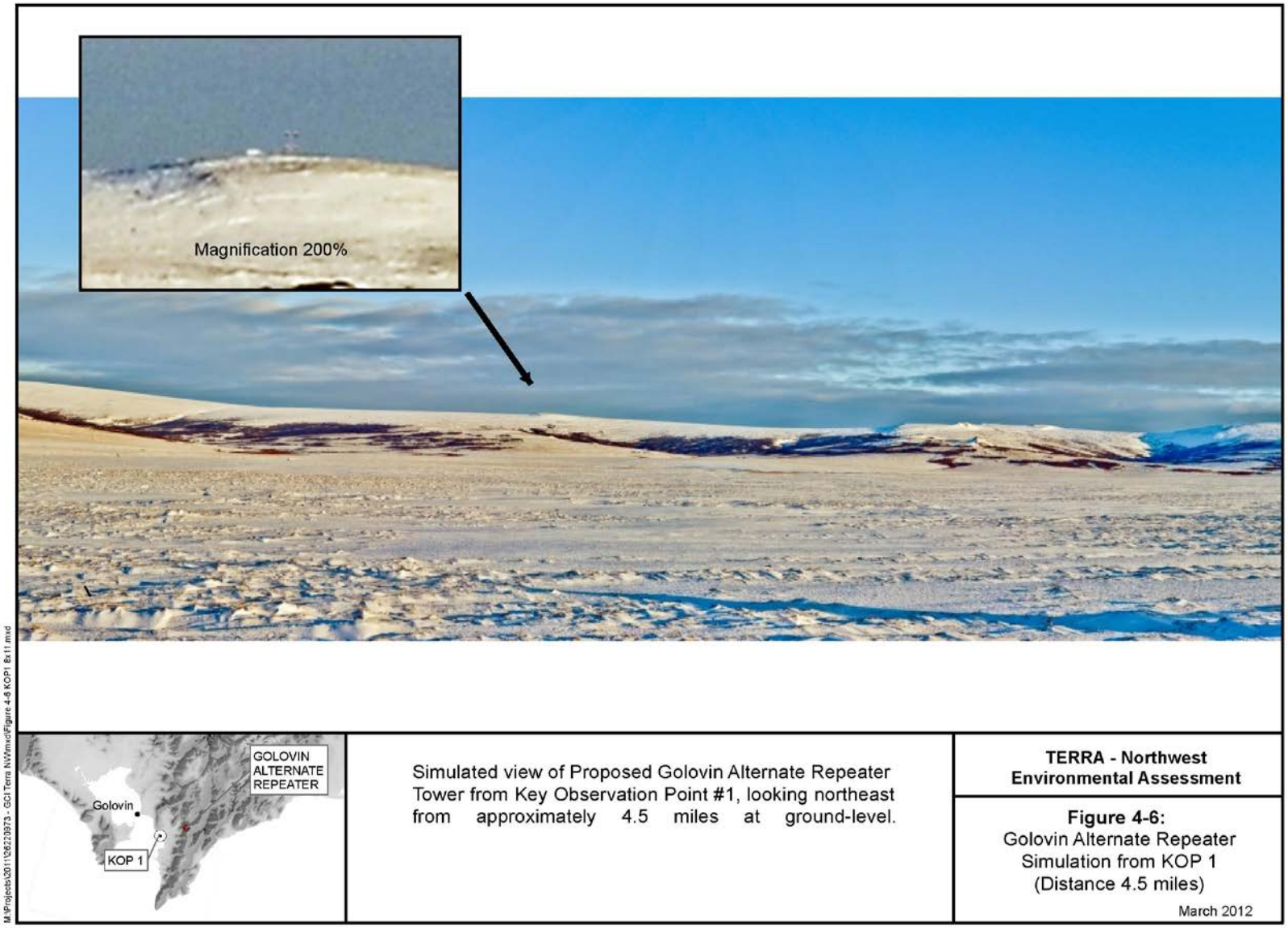


Figure 4-7 Golovin Alternate Repeater Simulation from KOP 2 (Distance 3.0 miles)

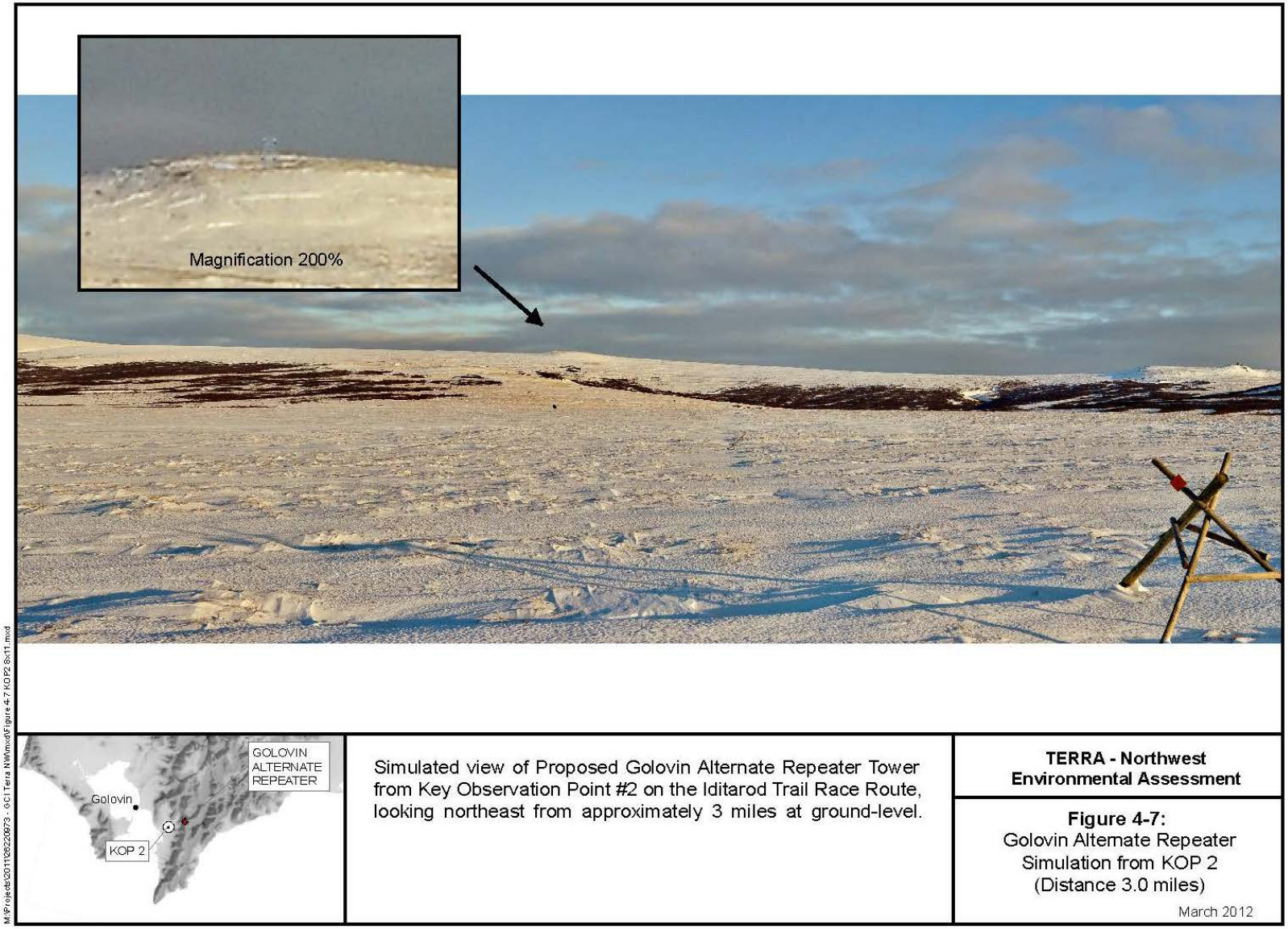


Figure 4-8 Golovin Alternate Repeater Simulation from KOP 3 (Distance 1.3 miles)

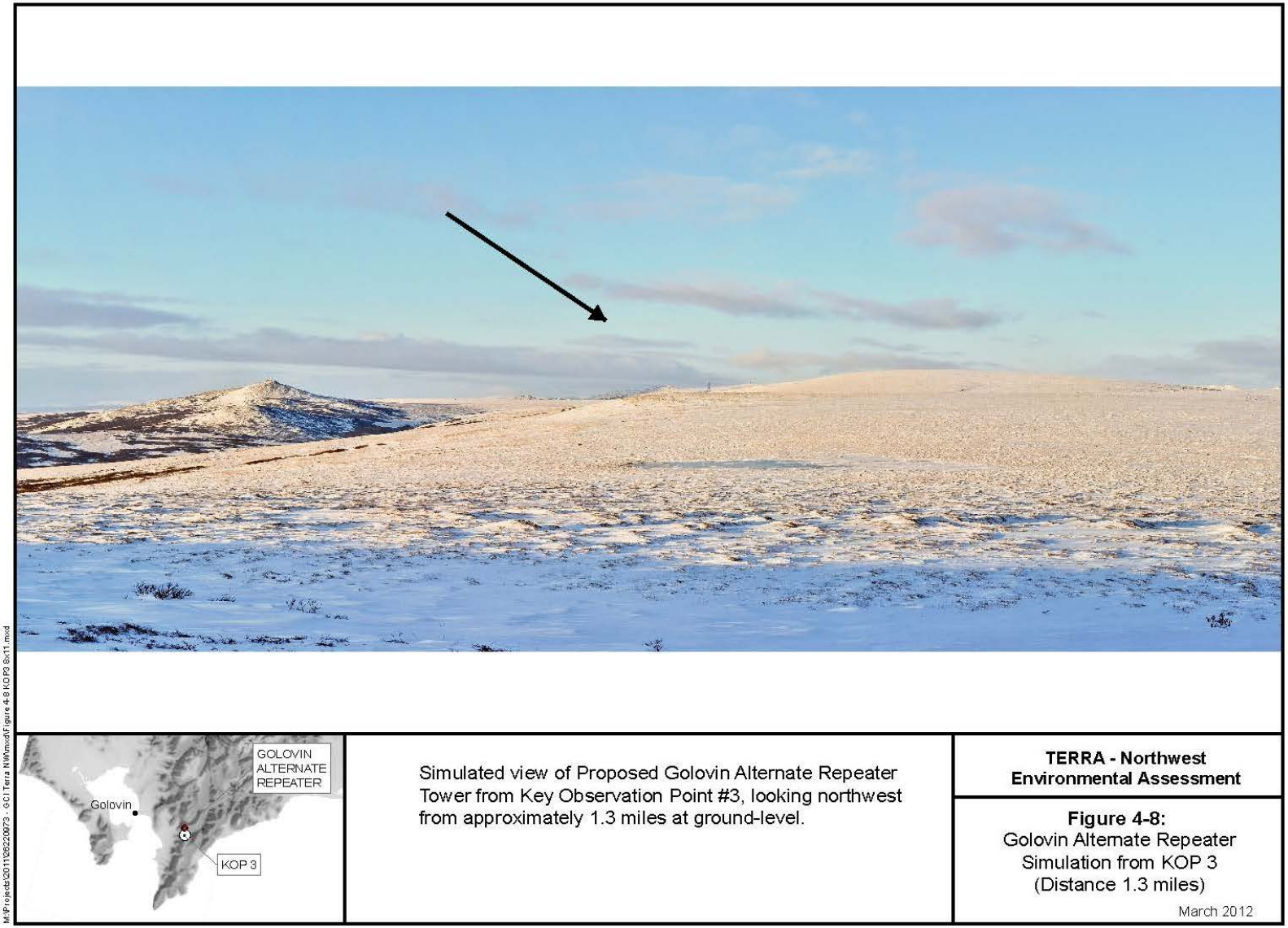


Figure 4-9 Golovin Alternate Repeater Simulation from KOP 5 (Distance 4.2 miles)

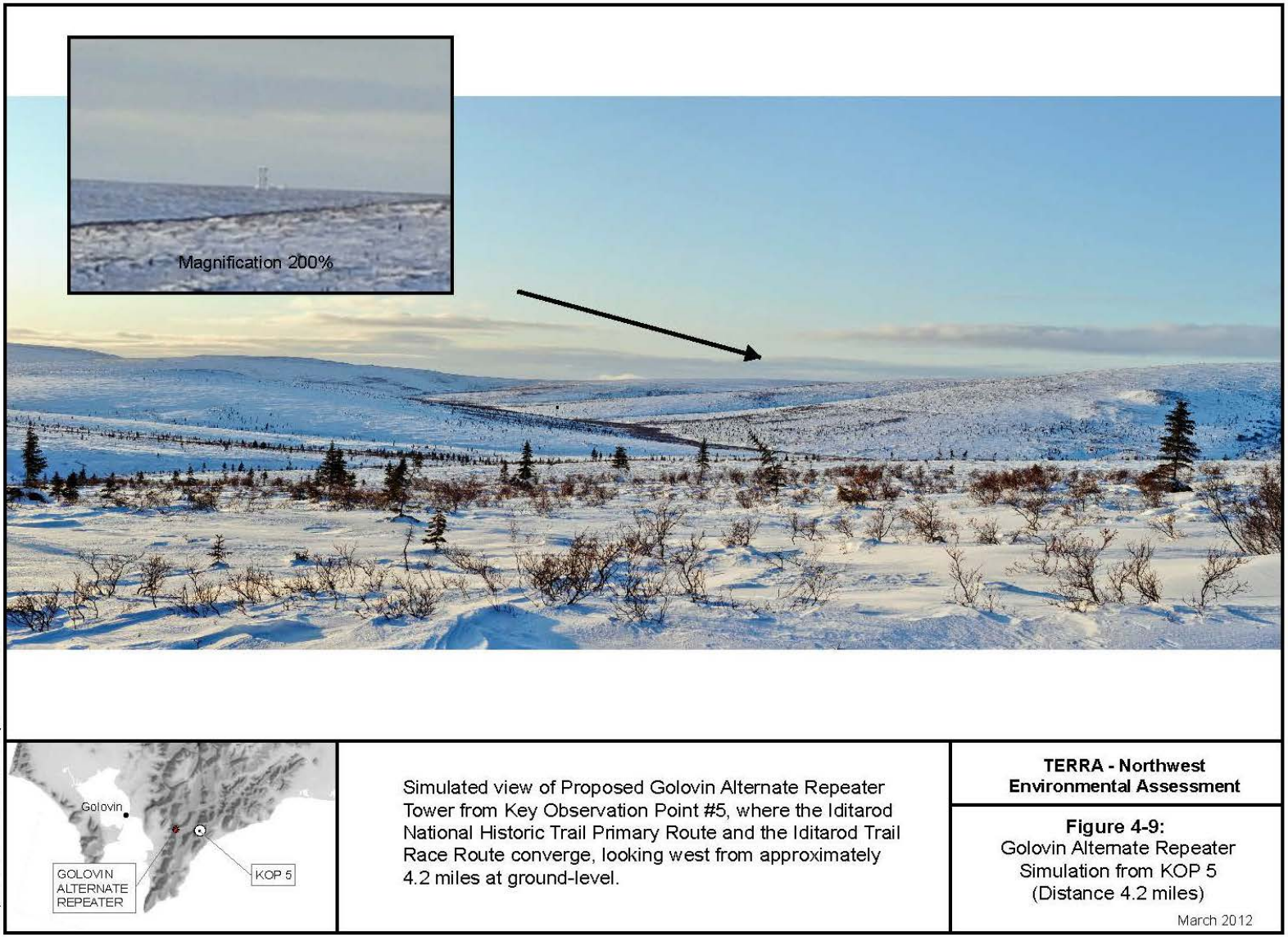


Figure 4-10 Golovin Alternate Repeater Simulation from KOP 6

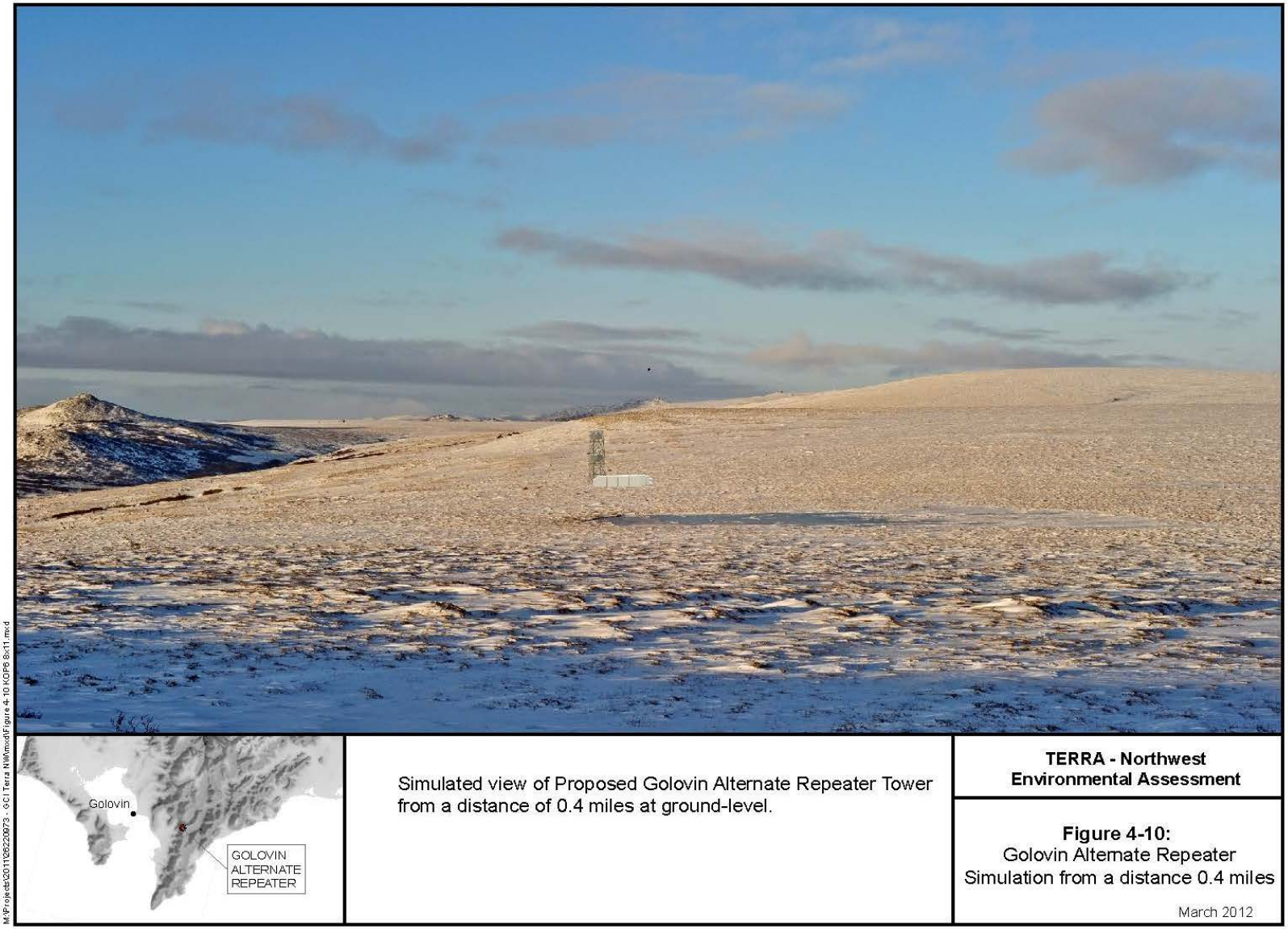
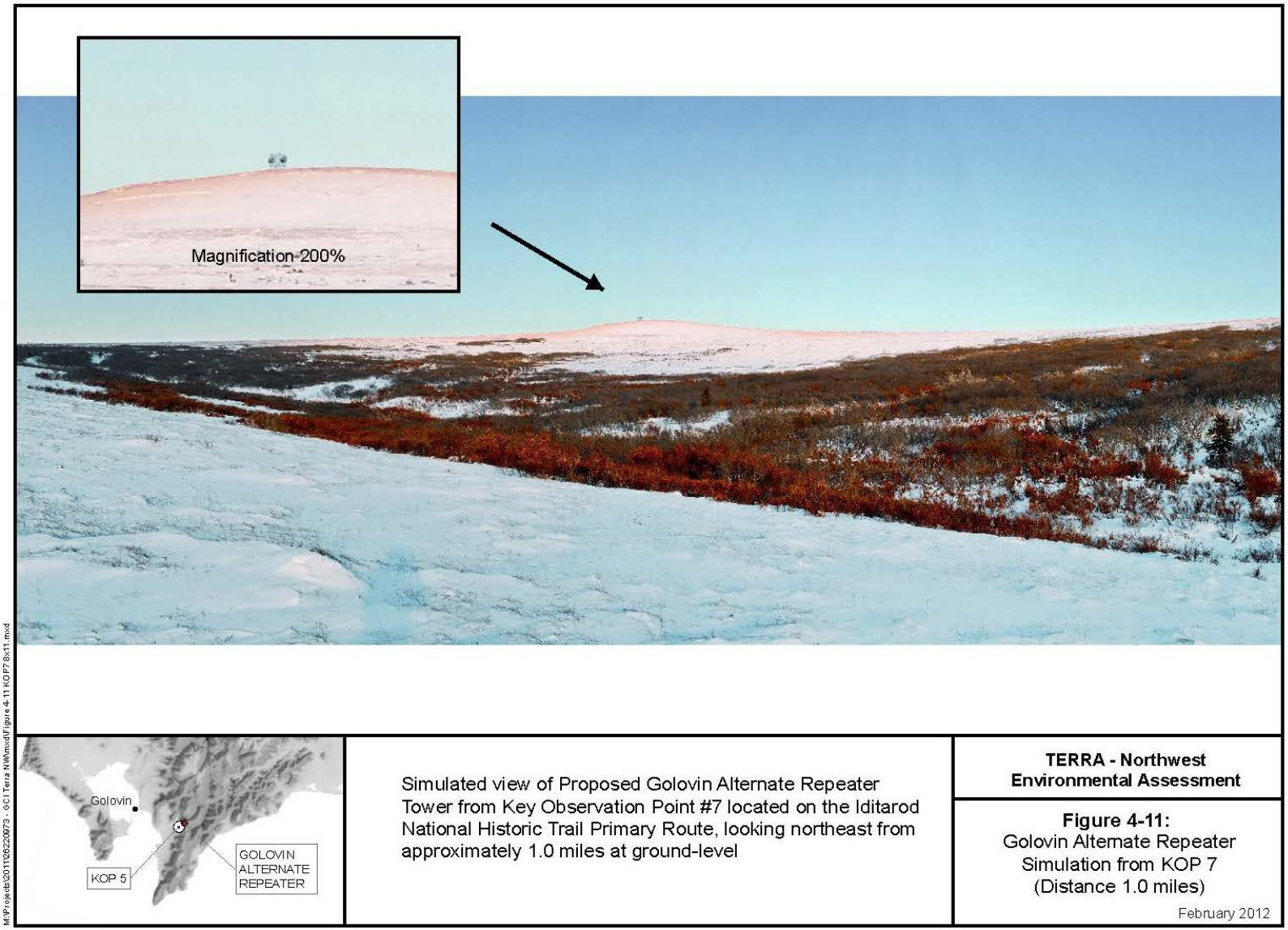


Figure 4-11 Golovin Alternate Repeater Simulation from KOP 7



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The contrast rating was applied to all project components, including the proposed towers and auxiliary structures. This analysis assumes the towers would remain galvanized steel, and associated structures would be painted white/off-white or gray color, using non-reflective, matte, or light-absorbing finish. Based on the contrast ratings completed using simulations of the Golovin Alternate tower from five identified KOPs, general assumptions regarding the level of visual contrast expected to result from operation of repeaters towers were established. Assumptions were used to guide impact determinations for the Otter Creek, Hill 2211, and Kwiktalik Mountain repeaters. This information was also used to inform the assessment of indirect effects expected to result from connected actions, including construction and operation of tower sites on private lands. Assumptions are described as follows:

- Associated structures painted white/off-white would be better suited for sites located adjacent to the Iditarod NHT, where views of the project would be experienced primarily during periods of contiguous snow cover;
- Associated structures painted gray or another neutral color would be better suited for the Otter Creek or Holy Cross tower site, where views of the project would be experienced primarily during summer months;
- The degree of contrast is generally a function of distance, with the greatest contrast expected to be perceived from areas located within the immediate foreground distance zone (less than 3 mi.);
- Visual contrast was perceived as moderate to strong in areas situated less than 3 mi. of a proposed repeater site, and weak beyond this distance; and
- Topography contributed to the level of perceived contrast, as portions of the tower – and all auxiliary structures – could be shielded by existing terrain. Likewise, variable topography could limit the duration of view of the proposed structures, as viewers would move in and out of the viewshed of the structure(s).

Visual Resource Inventory Analysis

The Visual Resource Inventory (VRI) analysis presented in this section addressed Indicator #2: Change in scenic quality within the Norton Sound portion of the Iditarod NHT, measured by shift in visual resource values of scenic quality, visual sensitivity, and/or distance zones that may result from operation of the proposed project. Expected change in scenic quality was evaluated by comparing scenic quality classifications expected following construction and operation of the proposed project to that are presented in the Iditarod NHT CMP (BLM, 1986b).

The analysis was restricted to the Norton Sound and Nulato Hills Analysis Units of the Kaltag to Nome segment of the Iditarod NHT. This analysis was completed at the scale of designated Scenic Quality Rating Unit (SQRUs), with the goal of understanding how visual resource values and resulting VRI Class may shift at the planning level based on operation of the proposed project.

Conformance with Visual Resource Management Objectives

The assessment of consistency with existing land use plans addressed Indicator #3: Consistency with goals and objectives contained in relevant land RMPs. This analysis pertained only to the

propose Golovin Alternate and Otter Creek tower sites, as actions proposed on private lands (i.e., Holy Cross tower site) are not subject to Visual Resource Management (VRM) standards.

The proposed Otter Creek tower site did not receive a VRM classification in the Southwest MFP (BLM, 1981). The proposed Golovin Alternate tower site would be located on BLM-administered lands managed by the Kobuk Seward Peninsula RMP (BLM, 2008), and is managed according to the VRM Class III guidelines. The objective of a VRM Class III designation is to:

> *partially retain the existing character of the landscape. 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 (BLM, 1986b).*

Acceptable levels of visual contrast for VRM Class III include visual contrast that may attract attention but should not dominate the view of the casual observer (BLM, 1986b). Conformance with the existing VRM class was based roughly on the correspondence of expected contrast with the designated VRM class. Additional factors such as topography, angle of observation, length of time the project would be in view, relativity to size or scale, season of use, and light conditions were also factored into the determination of conformance. The determination of conformance with VRM class is based on long-term, operations-related conditions.

4.4.6.2 Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)

Construction

Construction of the proposed Otter Creek tower would result in temporary direct impacts to visual resources. Direct effects would likely result from increased activity on land and movement overhead as a result of air transport of materials and personnel. Direct effects would be evident at the barge landing in Klikitarik Bay, and Unalakleet, where materials would be staged for helicopter transport to the repeater site. Overall visual contrast is expected to be weak, as contrast would be seen but would not attract attention.

Construction of the proposed Golovin Alternate tower site would result in similar direct effects to visual resources as described for the Otter Creek tower site. Direct effects would likely result from the increased activity on land and movement overhead as a result of air transport of materials and personnel. Direct effects would be most evident at the barge landing in Golovin, where materials would be stockpiled for helicopter air transport to the repeater site. Overall visual contrast resulting from construction-related impacts is expected to be weak, as contrast would be seen but would not attract attention. Direct impacts are expected to increase incrementally as structures are developed. Indirect effects from construction activities could include a change in perception by people engaged in subsistence activities within the analysis area. Such viewer groups are considered to have high visual sensitivity, and may avoid areas where construction activities are detectable. Construction-related impacts would be limited to summer months, so winter or spring recreational users on the Iditarod race route would not be affected.

Indirect impacts to visual resources would result from connected actions, including construction of the eight additional towers on non-federal land. Similar construction-related impacts would occur at the five remote tower sites. Construction of the Holy Cross tower site would result in weak visual contrast. Construction of the Gill tower, Cape Nome tower, and Nome community tower would introduce moderate visual contrast when viewed from Norton Sound and portions of the Iditarod NHT.

Localized impacts from staging would include barge landings located at the City of Nome, and the communities of Shaktoolik and Unalakleet.

Direct and indirect effects expected to result from construction of the proposed Otter Creek tower, and connected action of the Holy Cross tower, would occur during snow-free summer months, and may result in avoidance of the area by local outfitters and recreational travelers. Such viewer groups are considered to have high visual sensitivity, and consequently are expected to select against areas where construction activities are detectable.

Direct and indirect effects expected to result from construction of the proposed Golovin Alternate tower, and all connected actions, would occur during snow-free summer months. Recreational visitors traveling along the coastline of Norton Sound or portions of the Iditarod NHT during this time may experience construction-related direct and indirect impacts for a single season. Recreational users engaged in remote experiences near Skookum Pass may experience impacts from construction of the Gill Repeater, located greater than 15 mi. from the Iditarod NHT and Norton Sound.

Construction-related direct and indirect impacts resulting from the proposed Otter Creek tower and the Holy Cross tower are expected to be of low intensity, temporary in duration, local in context and affecting a common resource. Construction-related impacts resulting from the proposed Golovin Alternate tower and connected actions on Norton Sound are expected to be of medium intensity, temporary in duration, local in context, and affecting an important resource.

Operation

The proposed tower and auxiliary structures are characterized by distinct vertical lines and smooth texture that would contrast with the existing landscape to varying degrees based on the location of the viewer. Although direct impacts to visual resources would result from the introduction of moderate-strong visual contrast when viewed from locations within 3 mi.; the ability of a viewer to perceive the structures is expected to attenuate with distance. The perceived contrast would be further minimized by the high degree of absorption provided by the expansive scale of the characteristic landscape and the intermittent views of the project due to topographic variability within the analysis areas. Further reduction in visual contrast could be achieved by painting structures associated with the repeater (generator, fuel tank, and buildings) with non-reflective gray or brown paint that would blend with the surrounding landscape during summer months. Weak to no visual contrast is expected to occur at a distance of 3 mi. and beyond.

At the Otter Creek tower site, the proposed project would achieve VRM Class III management objectives. The proposed project could be seen at close proximity (i.e., within 3 mi.), however the structure would not dominate views due to scale of the surrounding landscape, and potential for topographic screening.

Visual Contrast – the proposed Golovin Alternate tower and auxiliary structures are characterized by distinct vertical lines and smooth texture that would contrast the existing landscape to varying degrees based on the location of the viewer (distance and vantage point) (Appendix F). Although direct impacts to visual resources would result from the introduction of structures with moderate-strong visual contrast when viewed from locations within 3 mi.; the ability of viewers to perceive structures is expected to attenuate with distance. The proposed Golovin Alternate tower would be located approximately 0.4 mi. from the Iditarod NHT at its closest point, and approximately 3.2 mi. from the Iditarod Trail Race Contemporary Route. Consequently, high visual contrast could be perceived from both locations. The perceived contrast would be minimized by the high degree of absorption provided by the expansive scale of the characteristic landscape and the intermittent views of the project due to topographic variability within the analysis areas – particularly when traveling in an east-west trajectory. Further reduction in visual contrast could be achieved by painting structures associated with the Golovin Alternate tower (generator, fuel tank, and buildings) with non-reflective white paint that would blend with the surrounding landscape during winter months. Weak to no visual contrast is expected to occur at a distance of 3 mi. and beyond.

Indirect impacts to visual resources in the project area are expected to result from connected actions occurring on non-federal lands. Towers located on private lands would introduce moderate-strong visual contrast when viewed within 3 mi. Visual contrast from the Cape Nome and Reindeer Repeater towers are expected to result in the strongest contrast, as these sites are not situated in areas characterized by existing development.

VRI Analysis – operation of the proposed project would be expected to change the Scenic Quality Classification for the NS-08 SQRU within the Golovin Alternate Repeater Analysis Area from a B to C (Table 4-3). Moderate-strong visual contrast would be apparent within a 6 mi. radius, thereby affecting over half of this SQRU. The contrast in form, line, and texture would introduce modifications to the landscape that are expected to be discordant with the existing landscape character of the SQRU. The proposed project would not affect the "Significant Viewpoint" located within this unit, as the views are assumed to be directed to the northwest, across Golovnin Bay. Operation of the proposed project is not expected to affect the Scenic Quality Classification for the NS-07 or NS-09, as project features would not be seen from this portion of the analysis area (Table 4-3). Indirect effects to visual resources from connected actions are not expected to chance Scenic Quality Classifications of SQRU NH-05, NS-01, and NS-12 (Table 4-3).

In summary, operation of the proposed Golovin Alternate tower would result in a change in scenic quality classification of approximately 10.5 percent the Norton Bay analysis unit of the Iditarod NHT scenic quality inventory (BLM, 1986b). No change would occur within the Nulato Hills SRQU.

Table 4-3. Expected Change in Scenic Quality Inventory Values and Classification for the Golovin Alternate Repeater

	Associated Towers	Approx. Miles	Existing Scenic Quality Classifi-cation	Post-Project Scenic Quality Classifi-cation	Rationale
NH-05	Unalakleet Repeater and Unalakleet Community Tower (Connected Action)	10	B	UNK	No scenic quality data is provided for SQRU NH-05; consequently, it is not possible to determine if a reduction in the score for cultural; modification would result from the Proposed Action.
NS-01	Shaktoolik Community (Connected Action)	25	C	C	No reduction in value for cultural modification is expected. The proposed tower would be situated within an area containing other structures, and would therefore not introduce visual contrast sufficient to change value of the approximately 25-mi. segment.
NS-12	Cape Nome Repeater, Nome Community Tower (Connected Action)	35	B	B	No reduction in value for Cultural Modification is expected. The Nome Community tower would be situated within an area containing other structures, and would therefore not introduce visual contrast. The Cape Nome Repeater would introduce moderate/strong visual contrast, would be discordant, and promote moderate/strong disharmony in a localized area (approximately 6-mi. radius). Because impacts would be localized across an approximately 35-mi. SQRU, the value for cultural modification is expected to be reduced to -1. This reduction would change the total scenic quality score to 13, thereby remaining a Class B.
NS-07	Golovin Alternate, Hill 2211, and Kwiktalik Mountain Repeaters	10	B	B	Operation of the proposed project is not expected to change the Scenic Quality Classification for the NS-07, as project features would not be seen from this portion of the analysis area.
NS-08	Golovin Alternate, Hill 2211, and Kwiktalik Mountain Repeaters	10	B	C	Operation of the proposed project is expected to change the Scenic Quality Classification for the NS-08 SQRU within the Golovin Alternate Repeater Analysis Area from B to C. The contrast in form, line, and texture would introduce modifications to the landscape that are expected to be discordant with the existing landscape character of the SQRU. Impacts to visual resources along the NS-08 portion of the trail would be greatest where viewed within 3 mi. The score for "Cultural Modification" would be reduced to a value of -1, thereby reducing the total score to a value of 10. It is not expected that the "Significant Viewpoint" would be affected by the proposed project, as the views are assumed to be directed to the northwest, across Golovnin Bay.
NS-09	Golovin Alternate, Hill 2211, and Kwiktalik Mountain Repeaters	15	A	A	Operation of the proposed project is not expected to change the Scenic Quality Classification for the NS-09, as project features would not be seen from this portion of the analysis area.

Views experienced by marine travelers, or individuals engaged in subsistence or recreation on the Iditarod race route would be affected by the proposed project and connected actions. Indirect effects may occur as a result of recreational boaters selecting against portions of Norton Sound where towers are in currently undeveloped portions the shoreline (i.e., Reindeer and Cape Nome repeaters), where sustained views of the project would be experienced. The majority of viewers

along the Iditarod race route would be exposed to the proposed project during periods of snow cover, and would access the analysis area by snowmachine or dog sled. Using a conservative estimated travel speed of 5 miles per hour, the duration of exposure to the Golovin Alternate tower at a moderate-high contrast (approximately 3 mi.), and assuming no topographic shielding, is estimated at approximately 40 minutes. Actual exposure to the proposed structure – particularly when traveling via dog sled or snowmachine (and in an east-west trajectory) is expected to be less given the degree of the topographic shielding ("unseen area") present in the analysis area. Similar duration of exposure is expected to result from the Unalakleet Community tower, Unalakleet Repeater tower, and Shaktoolik Repeater tower, and the Cape Nome Repeater tower, as each are located within 3 mi. of the Iditarod NHT.

Collectively, operation and maintenance of the proposed towers and connected actions may result in exposure to microwave towers for approximately 200 minutes (approximately 3 hours), or approximately 43 percent of the journey when traveling between Unalakleet and Nome (approximately 420 minutes, or 7 hours). This combined impact could indirectly result in change in the perception of the affected landscape by sensitive viewers. Such impacts are considered a medium-intensity action, as a change in visual resources would be measurable, and could alter visitor experience.

Conformance with VRM Objectives – based on the analysis of contrast and duration of view, the proposed Golovin Alternate Repeater tower is expected to meet the objectives of the VRM Class III designation. Visual contrast expected to result from the proposed project is expected to attract attention, but would not dominate the view of the casual observer.

Decommissioning

Decommissioning of the proposed towers is expected to result in moderate, short-term direct effects to visual resources. Direct effects would likely result from the level of activity at each project site, and the increased movement overhead as a result of air transport of materials and personnel. Moderate temporary indirect effects may result from changes in perception of the landscape character of the viewshed areas, as recreational visitors, or individuals engaged in subsistence may avoid areas where impacts could be detected.

Cumulative Impacts

Few past actions have altered visual resources within the analysis areas. The communities of Nome, Golovin, and Unalakleet are considered a part of the existing characteristic landscape of the Nome area, and therefore are not considered an impact to visual resources. Likewise, the Iditarod race route, visible due to depression and scarring of the ground plane, is considered part of the characteristic landscape, and not considered a past action affecting visual resources. Collectively, direct and indirect effects are expected to result in moderate effects to visual resources. RFFAs include construction and operation of four community towers in towns situated on Norton Sound. Such actions would introduce additional visual contrast to the existing landscape that could alter the scenic quality within portions of the Iditarod NHT.

Summary

The combined direct and indirect impacts expected to result from the proposed Otter Creek tower and the connected action of the Holy Cross tower would be low intensity, long term and affecting common resources. Change in visual resources would be perceptible; however visual

resources would not be noticeably altered beyond a localized area. For the Golovin Alternate site, overall direct and indirect effects to visual resource are expected to be medium intensity, long-term in duration, localized in extent, and affecting an important resource.

The Proposed Action, connected actions and RFFAs could result in high-intensity impacts when viewed from Norton Sound or the Iditarod historic-primary route. The change in visual resources along the shoreline of Norton Sound could alter scenic quality in a manner that is clearly and consistently observable. Impacts would be long-term, regional in extent, and affecting an important resource. The summary impact of Alternative 1 on visual resources would be moderate.

4.4.6.4 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

No direct or indirect effects would result from the implementation of Alternative 2, as there would be no change to the visual character of the analysis area.

Cumulative Impacts

With no direct or indirect impacts to visual resources, Alternative 2 would make no contribution to cumulative impacts on visual resources.

Summary

Implementation of Alternative 2 would have no direct or indirect visual impacts, and would make no contribution to cumulative effects.

4.4.6.5 Alternative 3 – Hill 221 Repeater Site

Direct and Indirect Impacts

Construction

Direct and indirect impacts to visual resource during construction of the proposed Hill 2211 tower would be similar to those described for Alternative 1, in that the Hill 2211 location would substitute for the Golovin Alternate tower. Direct effects would likely result from the increased activity on land and movement overhead as a result of helicopter transport of materials and personnel. Direct effects would be most evident at the barge landing in Golovin, where materials would be stockpiled for helicopter transport to the tower site. Low-intensity direct impacts are expected to result from on-site construction of the tower. Visual contrast would be weak, as project actions would be situated approximately 10 mi. from residential viewers in Golovin, marine recreational users in Norton Sound, and the Iditarod NHT.

Operations

Direct impacts expected to result from the proposed Hill 2211 tower would be similar to that described for the Golovin Alternate tower (Alternative 1), however the expected level of contrast from primary viewer positions (community of Golovin, Norton Sound, and the Iditarod NHT) would be weak due to the location of the facility approximately 10 mi. or greater from these receptors. Direct effects would be low intensity, extremely localized, long-term and affecting a common resource. Operation of the Hill 2211 site would be not expected to alter scenic quality

along the inventoried portion of the Iditarod NHT, as the tower would be located approximately 10 mi. from this resource.

Overall direct and indirect effects from the Hill 2211 tower would be considered low intensity, long-term in duration, localized in extent, and affecting an important resource, due to the Congressional designation of the Iditarod NHT. Based on the analysis of contrast, the proposed Hill 2211 tower is expected to meet the objectives of the VRM Class III designation. Visual contrast expected to result from the proposed project is not expected to attract attention, and would not dominate the view of the casual observer.

Decommissioning

Decommissioning of the proposed towers is expected to result in similar moderate, short-term direct effects to visual resources as described in Alternative 1.

Cumulative Impacts

Cumulative impacts that may affect visual resources within the analysis area are identical to those discussed in relation to Alternative 1; however the contribution of the Hill 2211 tower to cumulative impacts would be negligible.

Summary

Implementation of Alternative 3 would have lower direct effects than those of the Golovin Alternate site, for which it is a substitute location. In particular, because of its distance from the Iditarod routes, the direct effect would be of low intensity, long-term duration, localized extent, and affecting resources that are common in context. The summary rating for Alternative 3 would be minor.

4.4.6.6 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Construction

Direct and indirect impacts to visual resource during construction of the proposed Kwiktalik Mountain tower would be similar to that described for Alternatives 1 and 3; however visual contrast would increase when viewed from Norton Sound. Perceived visual contrast viewed from the Iditarod routes would be weak based on the distance (approximately 10 mi.) of the tower and associated structures from the Iditarod NHT.

Similar short-term indirect impacts to visual resources would result from connected actions as described for Alternatives 1 and 3, however, because construction of the Reindeer tower is not included in Alternative 3, a reduction in construction-related visual contrast would be experienced in this localized and undeveloped area within Norton Sound.

The combined direct and indirect effects to visual resources expected to result from construction-related action is expected to be of medium intensity, temporary in duration, local in context, and affecting an important resource.

Operations

Direct impacts expected to result from operation of the Kwiktalik Mountain tower site would be similar to that described for the Golovin Alternate tower site (Alternative 1). However, the expected level of contrast from the Iditarod routes would be weak due to the location of the facility – approximately 10 mi. or greater from these receptors. Perceived visual contrast from locations on Norton Sound could be moderate to strong, depending on viewer position. Direct effects would be moderate intensity, localized, long-term, and affecting a common resource, although the Iditarod NHT would be important in context, due to the Congressional designation. Operation of the Kwiktalik Mountain tower is not expected to alter scenic quality along the inventoried portion of the Iditarod routes, as the tower would be located approximately 10 mi. from this resource.

Overall direct and indirect effects from the proposed Kwiktalik Mountain tower and connected actions would be considered medium intensity, long-term in duration, localized in extent, and affecting an important resource.

Decommissioning

Decommissioning of the proposed towers is expected to result in similar moderate, short-term direct effects to visual resources as described in Alternative 1.

Cumulative Impacts

Cumulative impacts that may affect visual resources within the analysis area are identical to those discussed in relation to Alternative 1. When viewed from Norton Sound, operation of Kwiktalik Mountain tower would be considered a medium-intensity action, thereby contributing to the combined impacts to visual resources when viewed from Norton Sound.

Summary

Implementation of Alternative 4 would have lower direct effects than those of the Golovin Alternate site on the Iditarod routes, due to a greater distance; however, perceived visual contrast of this tower from locations on Norton Sound could be moderate to strong, depending on viewer position. Visual impacts from the tower at Kwiktalik Mountain would be of moderate intensity, long-term duration, localized extent, and affecting resources that are common in context. The summary rating for Alternative 4 would be moderate.

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4.4.7 Cultural Resources

This section summarizes the potential effects of the proposed alternatives on cultural resources. For the purposes of the National Environmental Policy Act (NEPA) requirements in the EA, review of the Proposed Action in Alternative 1 focuses on the towers to be installed on BLM-managed land at the Otter Creek and Golovin Alternate sites; as well as the connected action consisting of eight towers to be installed on non-federal lands. Alternative 3 and Alternative 4 review the potential to install a tower at Hill 2211 or Kwiktalik Mountain, respectively, instead of using the Golovin Alternate site. The analysis presented here is also structured to meet the requirements of Section 106 of the National Historic Preservation Act (NHPA).

Both of the tower sites are on BLM-managed lands and four of the connected action sites are on private lands were subjected to a literature review and an archaeological survey (the Otter Creek tower, the Golovin Alternate tower, the Holy Cross tower, the Unalakleet community tower, the Unalakleet tower, and the Shaktoolik tower). The survey was conducted in August 2011 under BLM Archeological Resources Protection Act Permits Numbers AA-092968 and AA-093059. An extensive technical report of field survey results has been completed as required under the Archeological Resources Protection Act permits (Blanchard, 2011). This contains restricted information and is available to persons with authorized access as outlined in Appendix G. In terms of the criteria established in Section 106, the field study technical report recommended a finding of No Adverse Effect for the tower sites surveyed. Additional steps under the Section 106 process must be completed and an Alaska State Historic Preservation Office (SHPO) concurrence letter must be obtained before a Finding of No Significant Impact (FONSI) can be signed for these sites. Ground-disturbing activities at these sites cannot commence until the Section 106 process is completed.

Six additional sites were identified as connected actions and alternative tower sites to be reviewed in the EA after the 2011 field season concluded. These have been subjected to a literature review, without field survey. These sites include the connected actions at the Reindeer tower, the Gill tower, the Cape Nome tower and the Nome community tower, as well as the sites for Alternative 3 and Alternative 4 at Hill 2211, and Kwiktalik Mountain, respectively.

As conditions of any permit issued by the BLM, Required Operating Procedures (ROPs) and permit stipulations will require that archaeological surveys and a formal assessment of the selected action's effect on cultural properties will be conducted at the sites not surveyed in 2011, prior to ground-disturbing activities (details provided in Appendix I).

4.4.7.1 Alternative 1 – Microwave Towers with Golovin Alternate Repeater (Proposed Action)

Alternative 1 consists of two towers on BLM-managed lands (Otter Creek tower and Golovin Alternate tower) and connected actions on private lands, consisting of eight additional towers (Holy Cross, Unalakleet community, Unalakleet, Shaktoolik community, Reindeer, Gill, Cape Nome, and the Nome community towers).

Direct and Indirect Effect of Actions on Federal Lands

Otter Creek Tower Site

There are no known cultural resources within 3 mi. of the proposed Otter Creek tower site. No new cultural resources were identified during the archaeological survey conducted in August 2011. There are no expected direct or indirect effects to cultural resources at the Otter Creek site from the construction, operation, or decommissioning of Alternative 1.

Golovin Alternate Tower Site

There are four Alaska Heritage Resources Survey (AHRS) sites within 3 mi. of the proposed Golovin Alternate tower site. Three are associated with the Iditarod NHT and are eligible for listing on the National Register of Historic Places (NRHP) (see Table 3-13). No new cultural resources were identified during the cultural resources survey conducted in August 2011. There are no expected direct effects to cultural resources at the Golovin Alternate tower site from the construction, operation, or decommissioning of Alternative 1 (Blanchard, 2011).

Construction and operation of Alternative 1 would have indirect visual effects on three NRHP-eligible sites in the vicinity of the Golovin Alternate tower. The tower and associated structures would be visible from the west for approximately 5 mi. of the Unalakleet-Nome Trail (SOL-00127; labeled as "Historical Iditarod Trail – Primary Route" on Figure 3-13), which passes less than 0.5 mi. from the proposed Golovin Alternate tower site. The tower and associated structures would be visible for approximately .5 mi. from the east along the Unalakleet-Nome Trail. The Unalakleet-Nome Trail was not clearly visible on the ground at the time of the 2011 cultural resources survey and is considered not to have integrity in the vicinity of the proposed Golovin Alternate tower. The tower and associated structures would be visible from the Portage Roadhouse Trail (SOL-00090; labeled as "Historical Iditarod Trail – Connecting Route" on Figure 3-13), located on the ice of Golovnin Bay more than 5 mi. to the west of the proposed Golovin tower site. The tower and associated structures would be visible from the Historic Relief Cabin (SOL-00092), located one to 2 mi. from the Area of Potential Effect (APE), but not shown in Figure 3-13. This cabin was collapsed at the time of the survey and appeared to have low integrity.

Summary

Using the criteria established under Section 106 of the NHPA, the contract archeologist from Northern Land Use Research (NLUR), reached the professional opinion that the indirect visual effects of Alternative 1 on NRHP-eligible cultural resources in the vicinity of the Golovin Alternate Repeater tower would not constitute an Adverse Effect as defined in 800.5 of 36 Code of Federal Regulations Part 800 (Blanchard, 2011). BLM will consult with SHPO regarding this recommendation.

There would be no direct effects to cultural resources from the tower construction at the Otter Creek and Golovin Alternate sites, because the sites do not overlap with any cultural resources. Indirect effects would include visual impacts at three NRHP-eligible sites in the vicinity of the Golovin Alternate Repeater tower. These would be low in intensity, local in extent, long-term in duration (i.e., for the life of the project), and affecting resources that are important in context, due to their NRHP eligibility.

Indirect Effects of Connected Actions on Non Federal Lands

Holy Cross Hills Repeater Tower Site

There are no known cultural resources within 3 mi. of the proposed Holy Cross Hills tower site. No new cultural resources were identified during the cultural resources survey. There are no expected direct or indirect impacts to NRHP-eligible cultural resources at the Holy Cross Hills site from any phase of Alternative 1 (Blanchard, 2011).

Unalakleet Community Tower Site

There are 21 AHRS sites within 3 mi. of the proposed Unalakleet Community tower. Four are eligible for listing on the NRHP and one is listed on the NRHP (see Table 3-14). No new cultural resources were identified during the cultural resources survey. There are no expected direct or indirect impacts to NRHP-eligible cultural resources at the Unalakleet Tower site from any phase of Alternative 1 (Blanchard, 2011).

Unalakleet Repeater Tower Site

There are three AHRS sites within 3 mi. of the proposed Unalakleet Repeater tower site. Two of these sites are eligible for listing on the NRHP (see Table 3-15). No new NRHP-eligible cultural resources were identified during the cultural resources survey. There are no expected direct impacts to NRHP-eligible cultural resources at the Unalakleet Repeater tower site from any phase of Alternative 1. There would be an indirect effect on the visual landscape of the Iditarod NHT during the construction and operation phases of Alternative 1. During the operational phase, the Unalakleet Repeater tower buildings and tower would be visible from the Iditarod NHT to the south, in the vicinity of Unalakleet. Using the criteria established under Section 106 of the NHPA, the contract archeologist from NLUR reached the professional opinion that the indirect visual effects of Alternative1 on cultural resources in the vicinity of the Unalakleet tower would not constitute an Adverse Effect (Blanchard, 2011). BLM will consult with SHPO regarding this recommendation.

Shaktoolik Community Tower Site

There are 17 AHRS sites within 3 mi. of the proposed Shaktoolik Community tower. None are on or have been determined eligible for listing on the NRHP (see Table 3-16). There are no expected direct or indirect impacts to NRHP-eligible cultural resources at the Shaktoolik Community tower site from any phase of Alternative 1 (Blanchard, 2011).

Reindeer Repeater Tower Site

The proposed Reindeer Repeater tower site was not surveyed during the 2011 cultural resources survey. The literature review identified no known cultural resources within the direct APE. There are three AHRS sites within 3 mi. of the proposed Reindeer Repeater tower site (see Table 3-17). One site, Iyatayet (NOB-00002), is listed on the NRHP and is a National Historic Landmark. According to Section 110 (F) of the NHPA (as amended 1992):

> *Prior to the approval of any federal undertaking which may directly and adversely affect any National Historic Landmark, the head of the responsible Federal agency shall, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to such landmark, and shall afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking.*

The Iyatayet site (NOB-00002) is 2 to 3 mi. away from the proposed Reindeer Repeater tower. Based on an examination of the project maps, the Reindeer Repeater tower would not have a direct effect on Iyatayet. An assessment of direct and indirect effects caused by the construction, operation, and decommissioning of the Reindeer Repeater tower on known and unknown cultural resources in the vicinity will be completed as part of the Section 106 process for this site, through consultation with the SHPO, ROPs and stipulations attached to the BLM permits, if these are approved for the proposed action.

Gill Repeater Tower Site

The proposed Gill Repeater tower site was not surveyed during the 2011 cultural resources survey. There are no known cultural resources within the direct APE. There are 17 AHRS sites within 3 mi. of the Gill Repeater proposed site (see Table 3-19). Sixteen of them are eligible for listing on the NRHP as contributing elements to the nineteenth, the Big Hurrah Mine Historic District (SOL-000136), which is between 2 and 3 mi. away from the proposed Gill Repeater site. Based on an examination of the project maps, the Gill Repeater tower would not have a direct effect on the Big Hurrah Mine Historic District or any of its component parts. A field survey to identify and avoid impacts to cultural resources caused by the construction, operation, and decommissioning of the Gill Repeater tower will be completed as part of the Section 106 process for this site through ROPs and stipulations attached to the BLM permits, if these are approved for the proposed action.

Cape Nome Repeater Tower Site

The proposed Cape Nome Repeater tower site was not surveyed during the 2011 cultural resources survey. There are 15 AHRS sites within 3 mi. of the proposed Nome Repeater site (see Table 3-20). One, the Cape Nome Roadhouse (SOL-00069) is listed on the NRHP. The Old Beach Site (SOL-00001), the Nome-Council Road (SOL-00172 and NOM-00242), and the Unalakleet-Nome Trail (SOL-00127 and NOM-00074) are eligible for listing on the NRHP.

The literature review identified no known cultural resources within the direct APE; however, Cape Nome is a prominent landform near significant historic and prehistoric cultural resources. It must be considered a high-probability area for archeological remains. An assessment of potential direct and indirect effects caused by the construction, operation, and decommissioning of the Cape Nome Repeater tower on known and unknown cultural resources in the vicinity will be completed as part of the Section 106 process for this site, through SHPO consultation, ROPs and stipulations attached to the BLM permits, if these are approved for the proposed action.

Nome Community Tower Site

The proposed Nome Community tower was not surveyed during the 2011 cultural resources survey. There are 54 AHRS sites with 3 mi. of the proposed Nome Community tower site (see Table 3-20). Five of these sites, the Sally Carrighar House (NOM-00018), Old St. Joseph's Church (NOM-00040), the Discovery Saloon (NOM-00042), the Nome Beach Site (NOM-00085), and the Swanberg Dredge (NOM-00114) are listed on the NRHP. The Nome Beach site is part of the Nome Mining District Discovery Sites National Historic Landmark and is subject to Section 110 (F) of the NHPA (see above). Seven sites, the Snake River Spit Site (NOM-00146), the Reindeer House (NOM-00156), the Nome Federal Building (NOM-00168), Our Savior Lutheran Church (NOM-00169), the Nogozruk House (NOM-00171), the Shoemaker House (NOM-00175), and the Nome-Council Road (NOM-00242) are eligible for listing on the NRHP.

There are no known cultural resources within the direct APE and the site is in a previously disturbed industrial area in the community of Nome; however, the site is located in a high-probability area for both historic and prehistoric archeological remains. A field survey to identify and avoid potential direct and indirect effects caused by the construction, operation, and decommissioning of the Nome Community tower on known and unknown cultural resources in the vicinity will be completed as part of the Section 106 process for this site, through SHPO consultation, ROPs and stipulations attached to the BLM permits, if these are approved for the proposed action.

Cumulative Effects

Past and present activities have affected several important cultural resources in the project area. Of note, the Nome-Council Road traversed many important archeological sites (see Blanchard 2011). As noted above, the current facilities at the proposed Nome Community tower are likely to have disturbed archeological sites. RFFAs identified in Section 4.1 include capital works projects in the communities, as well as possible growth in the mining industry. If these are federal undertakings, then the protective measures of Section 106 of the NHPA would assess and mitigate effects. This section considers the extent to which the proposed action, connected actions, and alternatives would make additive or synergistic contributions to cumulative effects on cultural resources in the project area.

The construction phase of Alternative 1 would have no direct effect on known cultural properties at the two proposed tower sites on BLM-managed lands. Of the connected actions comprising eight microwave towers on non-federal lands, four were surveyed in 2011. No cultural properties were identified within the direct APE of these sites during the literature review or cultural resources field survey. The construction phase would have a temporary visual effect on cultural properties due to the presence of equipment, housing, personnel, and helicopter movement during construction.

Four additional tower sites on private lands, connected actions, were not surveyed in 2011. The effect of construction on cultural properties within or near the APE of these four proposed tower locations included in Alternative 1 has not been empirically determined. The literature review showed no known cultural properties within the direct APE of these sites. For purposes of the NEPA analysis, the potential effects from these sites depends on the nature of mitigation measures established in the BLM permit conditions. As noted above, before ground-disturbing activities commence, Unicom will be required to conduct archeological surveys at these four sites, after which the SHPO will be consulted regarding these project areas. In addition, strict procedures governing inadvertent discovery of cultural resources will be required in the permit. These mitigation measures reduce the likelihood of adverse effect on cultural resources.

With mitigation measures taken into account, the likely contribution of the proposed action to cumulative effects on cultural resources in the project area would be low.

Following construction, the operation of the tower sites would introduce no new additional contributions to cumulative effects on cultural resources in the project area, whether on federal land, or at the connected action sites on non-federal land.

In the decommissioning phase, all project structures and equipment must be removed. These activities would re-introduce the potential for effects similar to those during the construction phase, for the proposed action on BLM-managed lands and the connected actions on non-federal

lands. At the time of decommissioning, all construction sites will have been surveyed as required in the permit conditions. As a result, the presence of archeological resources in proximity to the towers will have been documented. Decommissioning activities can then be planned and carried out to avoid damage to archeological resources.

If the TERRA-NW facilities remain in operation for 50 years, they may become eligible for listing on the NRHP in their own right. In this case, a NRHP eligibility evaluation may need to be completed prior to decommissioning.

Summary

Based upon the current level of analysis for the six project sites surveyed in 2011 (two on federal land, four connected actions on non-federal lands), no direct or indirect impacts on cultural resources are anticipated. The Section 106 process will be completed and SHPO concurrence obtained that there will be no adverse effect to cultural resources from the proposed action. The special case of visual impacts from the Golovin Alternative tower on the Iditarod NHT is reviewed in Section 4.4.6, and moderate summary impacts are identified. When mitigation measures are taken into account, the remaining connected actions (four tower sites on non-federal lands) would also have no direct or indirect effects on cultural resources. The summary impact of Alternative 1 and connected actions on cultural resources would be minor.

4.4.7.2 Alternative 2 – No Action Alternative

Direct and Indirect Effect of Actions on Federal Lands

The implementation of Alternative 2 would have no direct or indirect effect on cultural resources on federal lands.

Direct and Indirect Effects of Connected Actions on Non-Federal Lands

The implementation of Alternative 2 would have no direct or indirect effect on cultural resources on non-federal lands.

Cumulative Effects

With no direct or indirect impact on cultural resources, there would be no contribution to cumulative effects as a result of Alternative 2.

Summary

Alternative 2 would authorize no ground-disturbing activity, and therefore would have no direct or indirect effects, and would make no contribution to cumulative effects on cultural resources.

4.4.7.3 Alternative 3 - Hill 2211 Repeater

Alternative 3 consists of a microwave repeater tower at Hill 2211 as a substitute for the Golovin Alternate tower. The microwave repeater components and construction procedures would be the same as those in Alternative 1. The connected actions on non-federal lands would be identical to those discussed in Alternative 1.

Direct and Indirect Effects

Hill 2211 Repeater Tower Site

The proposed Hill 2211 Repeater tower site was not surveyed during the 2011 cultural resources survey. The literature review identified no known cultural resources within 3 mi. of the Hill 2211 tower site. Prior to any ground-disturbing activity, a cultural resources survey and assessment of direct and indirect effects caused by the construction, operation, and decommissioning of the Hill 2211 tower on cultural resources would be completed as part of the BLM permit conditions and in compliance with Section 106 of the NHPA. Strict procedures regarding inadvertent discovery of cultural resources would also apply, in order to avoid adverse effects.

With the mitigation measures established in permit conditions, the direct and indirect effects of construction of the proposed microwave repeater tower at Hill 2211 would be negligible.

Following construction, operation of the microwave repeater tower would introduce no new effects on cultural resources. Similarly, the decommissioning activities would be designed on the basis of field surveys prior to construction, and so would introduce no new adverse impacts.

Cumulative Impacts

The cumulative effects of past, present, and RFFAs are the same as discussed in Alternative 1. With mitigation measures required under a BLM-permit, Alternative 3 would make no contribution to cumulative effects on cultural resources in the region.

If the TERRA-NW facilities remain in operation for 50 years, they may become eligible for listing on the NRHP in their own right. In this case, a NRHP eligibility evaluation may need to be completed prior to decommissioning.

Summary

When mitigation measures are taken into account, Alternative 3 would have no direct or indirect effects on cultural resources and would make no contribution to cumulative effects on cultural resources. The summary impact of Alternative 3 would be negligible.

4.4.7.4 Alternative 4 - Kwiktalik Mountain Repeater

Alternative 4 consists of a tower at Kwiktalik Mountain as a substitute for the Golovin Alternate tower. The microwave repeater components and construction procedures would be the same as those in Alternative 1. The connected actions on non-federal lands would be nearly identical to those discussed in Alternative 1, except that the Reindeer tower would be unnecessary and would not be built under this project configuration.

Direct and Indirect Effects

The Kwiktalik Mountain Repeater site was not surveyed during the 2011 cultural resources survey. The literature review identified four known cultural resources within 3 mi. of the Kwiktalik Mountain tower site (see Table 3-18). None of these properties have had a formal determination of eligibility for inclusion on the NRHP. None are located within the direct APE. Prior to any ground-disturbing activity, a cultural resources survey and assessment of direct and indirect effects caused by the construction, operation, and decommissioning of the Kwiktalik Mountain tower on cultural resources would be completed as part of the BLM permit conditions

and in compliance with Section 106 of NHPA. Strict procedures regarding inadvertent discovery of cultural resources would also apply, in order to avoid adverse effects.

Cumulative Impacts

The cumulative effects of past, present, and RFFAs are the same as discussed in Alternative 1. With mitigation measures required under a BLM-permit, Alternative 4 would make no contribution to cumulative effects on cultural resources in the region.

If the TERRA-NW facilities remain in operation for 50 years, they may become eligible for listing on the NRHP in their own right. In this case, a NRHP eligibility evaluation may need to be completed prior to decommissioning.

Summary

When mitigation measures are taken into account, Alternative 4 would have no direct or indirect effects, and would make no contribution to cumulative effects on cultural resources. The summary impact would be negligible.

4.4.8 Environmental Justice

As described in Section 3.4.8, the evaluation of Environmental Justice examines whether disproportionate and adverse impact to human health and environmental impacts would fall upon minority or low-income populations. Section 3.4.8 demonstrated that the potentially affected communities of Grayling, St. Michael, Stebbins, Unalakleet, Shaktoolik, Elim, Golovin, and White Mountain are predominantly Alaska Native, with lower incomes and higher poverty rates compared to the rest of Alaska and the United States. This section examines whether the proposed action or the alternatives would result in disproportionately high adverse human health or environmental impacts.

4.4.8.1 Alternative 1 – Microwave Towers with Golovin Alternate Repeater (Proposed Action)

Direct and Indirect Impacts

The review of the environmental impacts of implementing Alternative 1 and connected actions on non-federal lands on four categories of physical resources and five categories of biological resources (Sections 4.2 and 4.3) concluded with findings of negligible, minor, and potentially moderate direct and indirect impacts when taking into account intensity, duration, extent, and context. Section 4.4 analyzed environmental impacts of implementing Alternative 1 on resources within the social environment and concluded that implementation of Alternative 1 would have negligible to moderate impacts on the social environment, including negligible impacts on subsistence. The analysis of socioeconomic environmental consequences in Section 4.4.1 concluded that implementation of Alternative 1 would have a moderate beneficial summary impact due to improvement to the telecommunications infrastructure and resulting improvement in quality of life and increased efficiency of health, education, government, and business services.

Cumulative Impacts

As described in the Socioeconomics Section 4.4.1, implementation of Alternative 1 would make a moderate and beneficial contribution to past, present, and RFFAs toward improved telecommunication infrastructure and improved economic foundations in the region, including the future TERRA-NW Project community towers in five Norton Sound communities.

Summary

Implementation of Alternative 1 would have a moderate beneficial impact on the economy of the region and negligible to moderate impacts on other resources, including subsistence. Implementation of Alternative 1 raises no Environmental Justice concerns, as it would result in no disproportionately high adverse human health or environmental effects on minority or low-income populations

4.4.8.2 Alternative 2 – No Action Alternative

Direct and Indirect Impacts

Under Alternative 2, the proposed project would not be constructed; thus, it would have no direct or indirect human health, subsistence, or environmental effects on the communities.

Cumulative Impacts

With no action, Alternative 2 would not contribute to adverse human health, or environmental effects on the communities.

Summary

Implementation of Alternative 2 would not result in impacts to human health or the environment; therefore there would not be a disproportionately high and adverse impact to the affected communities. As a result, with Alternative 2 there are no Environmental Justice concerns.

4.4.8.3 Alternative 3 – Hill 2211 Repeater Site

Direct and Indirect Impacts

Under Alternative 3, a microwave repeater tower would be installed at Hill 2211 instead of the Golovin Alternate site. The microwave repeater components and construction procedures would be the same as those in Alternative 1. The direct and indirect effects of Alternative 3 would be the same of those of Alternative 1.

Cumulative Impacts

Alternative 3 would make a moderate beneficial contribution to the cumulative effects of past, present, and RFFAs on improved telecommunication infrastructure and improved economic foundations in the region as described in the Section 4.4.1. Alternative 3 would have a negligible contribution to adverse cumulative effects on subsistence resources, access to subsistence resources, or competition for subsistence resources.

Summary

No disproportionately high adverse human health or environmental impacts are associated with implementation of Alternative 3. Instead, implementation of Alternative 3 would have moderate beneficial impacts on the socioeconomic characteristics of the region, negligible impacts on subsistence resources and uses of resources, and negligible to minor impacts on other resources. Implementation of Alternative 3 raises no Environmental Justice concerns.

4.4.8.4 Alternative 4 – Kwiktalik Mountain Repeater Site

Direct and Indirect Impacts

Alternative 4 consists of a tower at Kwiktalik Mountain as a substitute for the Golovin Alternate site. The microwave repeater components and construction procedures would be the same as those in Alternative 1. The direct and indirect effects of Alternative 4 would be the same of those of Alternative 1.

Cumulative Impacts

Alternative 4 would make a moderate beneficial contribution to past, present, and RFFAs toward improved telecommunication infrastructure and improved economic foundations in the region, as described in Section 4.4.1. Alternative 4 would have a negligible contribution to adverse

cumulative effects on subsistence resources, access to subsistence resources, or competition for subsistence resources.

Summary

No disproportionately high adverse human health or environmental impacts are associated with implementation of Alternative 4. Instead, implementation of Alternative 4 would have moderate beneficial impacts on the socioeconomic characteristics of the region, negligible impacts on subsistence resources and uses of resources, and negligible to minor impacts on other resources. Implementation of Alternative 4 raises no Environmental Justice concerns.

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4.5 Mitigation Measures

The proposed TERRA-NW Project includes many design features and operational plans to reduce impacts. These required operating procedures and project design features are listed in detail in Appendix I and in Section 2.5. One mitigation measure is proposed to monitor air quality and assess the potential for alternative energy. In order to evaluate the feasibility of a supplemental power from wind generators, wind and climate data will be collected for three years at the microwave repeater sites. A feasibility analysis of wind potential, icing conditions, and appropriate wind generator technologies (i.e., vertical axis wind generators) will be reviewed with the federal agencies.

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4.6 Summary of Impacts

A summary of impacts is found in Table 4-4.

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Table 4-4 Alternatives Summary Impacts

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Meteorology and Air Quality	Impacts to air quality from construction and decommissioning are expected to be low in intensity, temporary in duration, local in extent, and affecting resources that are common in context. Operational impacts would be low in intensity, long term in duration (20-year life of the project), affecting resources common in context, and not likely to adversely impact the air quality of the region. The summary impact is negligible, with a negligible contribution to cumulative effects.	No impacts to air quality.	Effects similar to Alternative 1; summary impacts would be negligible, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; summary impacts would be negligible, with a negligible contribution to cumulative effects.
Geology and Soils	At the tower sites, topsoil removal/excavation and facility installation would result in direct impacts that would be high in intensity for a small localized area (i.e., for two towers 10.3 acres during construction and 1.38 acres during operations), of long-term duration (20-year life of the project). The soils affected are common in context. Indirect impacts on soils on non-federal sites would be minor. The summary impact would be negligible, with a minor contribution to cumulative effects.	No impacts to geology and soil resources.	Effects similar to Alternative 1; summary impacts would be negligible, with a minor contribution to cumulative effects.	Effects similar to Alternative 1; summary impacts would be negligible, with a minor contribution to cumulative effects.
Hydrology	Under Alternative 1, there are no expected impacts to water resources or water quality at the proposed microwave repeater sites. During construction, staged barges have the potential to increase turbidity near shore, resulting in impacts of high intensity, short term in duration, local in extent and affecting resources that are common in context. Risk of fuel spills exists during construction activities at proposed sites, however, spill prevention and response procedures can reduce risk. Barring a fuel spill scenario, summary and cumulative impacts would be minor. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.	No changes to hydrology, including water resources and water quality.	Effects similar to Alternative 1; summary impacts would be minor with a minor contribution to cumulative effects. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.	Effects similar to Alternative 1; summary impacts would be minor with a minor contribution to cumulative effects. Given the limited temporal and fuel volume risks, the summary impact of a fuel spill would be considered minor to moderate.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Hazardous Materials and Waste Management	Staging and storage of fuels and hazardous materials onsite create risks of a release. However, containment designs and an approved SPCC plan reduce the risks. Fuel transport during annual re-supply operations represents a larger risk. If such a spill were to occur on land the impact would be medium in intensity (estimated up to 500 gallons), long term in duration, local in extent and affecting resource that is common in context. If the spill were to occur in wetlands or a water body, the impact would likely be medium in intensity, temporary in duration, local to regional in extent, and affecting resources that are common to important in context. Given the limited temporal and fuel volume risks for the project activities, including the low probability risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate, and would make a minor to moderate contribution to cumulative effects.	No impacts due to hazardous materials.	Effects similar to Alternative 1. Given the limited temporal and fuel volume risks for the project activities, including the low probability risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate, and would make a minor to moderate contribution to cumulative effects.	Effects similar to Alternative 1; Given the limited temporal and fuel volume risks for the project activities, including the low probability risk of a fuel spill, the summary impact in regard to hazardous materials would be considered minor to moderate, and would make a minor to moderate contribution to cumulative effects.
Vegetation and Wetlands	No impacts to wetlands at the tower sites. The potential exists to affect wetlands nearby if a fuel spill occurred. Impacts to vegetation would include low intensity, temporary compression of common vegetation as well as long-term to permanent excavation and removal of common vegetation. Impacts to vegetation would involve small, localized areas. With invasive species prevention and mitigation measures properly implemented and without accidental fuel or chemical spills, the summary impact would be considered minor, with a negligible contribution to cumulative impacts. Impacts of a fuel spill could range from minor to moderate. Indirect impacts to wetlands from towers located on non-federal sites are not anticipated and would be considered negligible to minor.	No impacts to vegetation and wetlands resources.	Effects similar to Alternative 1; the summary impact would be considered minor with a negligible contribution to cumulative impacts. Impacts of a fuel spill could range from minor to moderate.	Effects similar to Alternative 1; the summary impact would be considered minor with a negligible contribution to cumulative impacts. Impacts of a fuel spill could range from minor to moderate.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Fish	Under Alternative 1, construction and operations of the microwave towers would have no effect on fish and fish habitat. Barring a fuel spill scenario, the effects of Alternative 1 would be of low intensity, localized in extent, temporary in duration, and affecting resources that are common to important (i.e., Essential Fish Habitat (EFH)) in context. Summary impacts would be negligible to fish and fish habitat, and would make a negligible contribution to cumulative effects. Fuel spill scenarios and impacts are comparable to those identified in Vegetation and Wetlands. Impacts of a fuel spill could range from minor to moderate. With a fuel spill scenario, the contribution to cumulative effects would be minor to moderate.	No changes to fish or EFH.	Effects similar to Alternative 1; summary impacts from routine activities would be negligible to fish and fish habitat, and would make a negligible contribution to cumulative effects. With a fuel spill scenario, the contribution to cumulative effects would be minor to moderate.	Effects similar to Alternative 1; summary impacts from routine activities would be negligible to fish and fish habitat, and would make a negligible contribution to cumulative effects. With a fuel spill scenario, the contribution to cumulative effects would be minor to moderate.
Wildlife - Terrestrial Mammals)	Under Alternative 1, impacts generally involve common wildlife resources. Habitat displacement at the two tower sites would amount to 10.3 acres during construction and 1.382 acres during operations. Impacts to terrestrial wildlife would be of low or moderate intensity, and temporary or long-term in duration. In particular, impacts resulting from helicopter flights during the construction phase have a medium intensity but would be temporary in duration, while helicopter flights during the operational phase would be low intensity to moderate intensity, local in extent and intermittent episodes over the long-term life of the project. Therefore, Alternative 1 would have a minor summary impact on wildlife and a negligible contribution to cumulative effects.	No impacts to terrestrial mammals.	Effects similar to Alternative 1; summary impacts would be minor with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; however, Alternative 4 would reduce overall direct effects with only one tower placed on federal lands. Summary impacts would be minor with a negligible contribution to cumulative effects.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Birds	Under Alternative 1, impacts to birds vary depending on location, timing, and activity. Generally, local impacts would involve common resources with some exceptions (e.g., eiders, murrelets) and would be of low or medium intensity and temporary or long-term in duration. Impacts resulting from helicopters during construction have a low to medium intensity, and could possibly have a long-term effect on seabirds, shorebirds, and waterfowl in particular, because Safety Sound, Golovnin Bay/Lagoon, and eastern Norton Sound are regionally important areas for spring/fall migration and staging birds, including the ESA-threatened spectacled eider. Indirect impacts from sites located on non-federal lands would be considered negligible to minor. The summary impact to birds would be minor, with a negligible contribution to cumulative effects.	No impacts to birds.	Effects similar to Alternative 1; the summary impact to birds would be minor, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; however, Alternative 4 would reduce overall direct effects with only one tower placed on federal lands. The summary impact to birds would be minor, with a negligible contribution to cumulative effects.
Threatened and Endangered Species	Impacts to ESA-listed birds, including candidate species, are the same as those discussed under birds above. However, for the ESA-listed and candidate species potentially affected (i.e., Kittlitz's murrelet, spectacled and Steller's eider, and the yellow-billed loon), the species would be considered resources that are important in context, and the summary rating of impact would be moderate.	No impacts to threatened and endangered species.	Effects similar to birds; the summary impact to birds would be moderate.	Effects similar to birds; the summary impact to birds would be moderate.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Socioeconomics	The socioeconomic impacts of Alternative 1 would include minor impacts on employment and income, but broadband Internet access would improve telemedicine, distance education, government services, and commerce. These would be beneficial effects of medium intensity, long-term duration, regional extent, and affecting resources that are common in context. The summary impact of Alternative 1 on socioeconomics would be beneficial and moderate, and would make a moderate contribution to cumulative effects.	No impacts to socioeconomic patterns.	Effects similar to Alternative 1; the summary impact would be beneficial and moderate, and would make a moderate contribution to cumulative effects.	Effects similar to Alternative 1; the summary impact would be beneficial and moderate, and would make a moderate contribution to cumulative effects.
Subsistence	Impacts would be of low intensity and long-term duration but in a small area (localized extent), and affecting resources that are common in context. Summary impacts would be considered negligible, with a negligible contribution to cumulative effects.	No changes to subsistence resources or users.	Effects similar to Alternative 1; the summary impact is negligible, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; the summary impact is negligible, with a negligible contribution to cumulative effects.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Land Use and Recreation	Construction activities would create noise and disturbances of medium intensity at the barge staging areas, the helicopter transit routes, and the microwave repeater tower sites but this would be limited to the construction period in localized areas that are common in context. Operational impacts would be confined to small areas, with a low to medium intensity, affecting lands and recreation uses that are common to important in context. Impacts to use of the Iditarod National Historic Trail (NHT) would involve resources that are important in context, due to the congressional designation. The towers would not be located within the Iditarod NHT corridor, but would be in close proximity near the Golovin Alternate tower site. Visual impacts on uses of the Iditarod NHT would be moderate. Effects on other recreation activities would be minimized by coordination with recreation service providers. Overall, summary impacts on land use would be considered minor to moderate, and would make a minor contribution to cumulative impacts. Alternative 1 would have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.	No impacts to land use and recreation.	Hill 2211 tower would be co-located with an existing communications tower. Implementation of Alternative 3 would be expected to have minor direct and indirect impacts on land use patterns and recreation activities, with a minor incremental contribution to cumulative impacts on these resources. Visual impacts to the uses of the Iditarod NHT would be reduced, because this alternative would substitute a tower location further north from the trail. Overall, implementation of Alternative 3 would have a minor summary impact on land use and recreation. Alternative 3 have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.	Kwiktalik Mountain tower would be located on private land. Implementation of Alternative 4 would be expected to have minor direct and indirect impacts on land use patterns and recreation activities, with a minor incremental contribution to cumulative impacts on these resources. Visual impacts to the uses of the Iditarod NHT would be reduced, because this alternative would substitute a tower location further south from the trail. Overall, implementation of Alternative 3 would have a minor summary impact on land use and recreation. Alternative 4 would have a negligible impact to the wilderness characteristics of the BLM-managed lands in the vicinity.
Transportation	Impacts to the regional aircraft transportation system would be limited to minor potential displacement of other users of the light helicopter capacities in Nome. This would be of low intensity, intermittent episodes of long-term duration, local to regional extent, and affecting a resource common in context. The summary impacts would be negligible, with a negligible contribution to cumulative effects.	No impacts to the regional aircraft transportation system would occur.	Effects similar to Alternative 1; Impacts would be of low intensity, temporary in duration, and local in extent, and affecting a resource that is common in context. Negligible summary impacts to regional transportation are expected, with a negligible contribution to cumulative effects.	Effects similar to Alternative 1; Impacts would be of low intensity, temporary in duration, and local in extent, and affecting a resource that is common in context. Negligible summary impacts to regional transportation are expected, with a negligible contribution to cumulative effects.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Noise	Greater noise effects would occur during construction, particularly due to helicopter traffic. However, during the operations period, generator noise at the tower sites would be moderated by the silencers, and helicopter traffic for maintenance and re-fueling would be limited to 12-14 days per year for the two sites. The schedule for refueling would be in July to minimize impacts on hunting, fishing, and recreation. Over the life of the project direct impacts would be of low intensity, intermittent episodes over a long-term duration, local in geographic extent, and affecting resources that are common in context. The summary impact would be considered minor, with a minor contribution to cumulative effects.	No impacts to noise levels in the soundscape.	Effects similar to Alternative 1; impacts would be of low intensity, intermittent episodes over a long-term duration, local in geographic extent, and affecting resources that are common in context. The summary impact would be considered minor, with a minor contribution to cumulative effects.	Effects similar to Alternative 1; impacts would be of low intensity, intermittent episodes over a long-term duration, local in geographic extent, and affecting resources that are common in context. The summary impact would be considered minor, with a minor contribution to cumulative effects.
Visual Resources	Alternative 1 would be expected to result in impacts that would be of low intensity, long-term duration, local in spatial extent, and affecting common visual resources. These impacts are expected to be minimized by the expansiveness of the characteristic landscape, and thereby would not dominate the views experienced by sensitive viewer groups engaged in recreation or subsistence. The predominantly weak-moderate contrast is consistent with Visual RM Class III objectives defined by the Kobuk-Seward RMP (2006). Visual impacts to the Iditarod NHT arise from the close proximity to the Golovin Alternate tower, but are limited to a small portion of the trail, and a brief period for most users passing by. Painting the Golovin Alternate tower and modules white reduces visual contrast during winter, the predominant season of use. Indirect impacts to visual resources from sites located on non-federal lands would be considered negligible to minor. The summary impact is moderate, with a moderate contribution to cumulative impacts.	No impacts to visual resources.	Effects similar to Alternative 1; however, the Hill 2211 tower would not be expected to alter scenic quality along the Iditarod NHT. Impacts would be of low intensity, long-term duration, local in spatial extent, and affecting common visual resources. The summary impact is moderate, with a moderate contribution to cumulative impacts.	Effects similar to Alternative 1; however, the Kwiktalik Mountain tower increase visual contrast when viewed from Norton Sound. The tower would not be expected to alter scenic quality along the Iditarod NHT. Impacts would be of low intensity, long-term duration, local in spatial extent, and affecting common visual resources. The summary impact is moderate, with a moderate contribution to cumulative impacts.

Impact Topic	Alternative 1 – Microwave Towers with Golovin Alternate Tower (Proposed Action)	Alternative 2 – No Action Alternative	Alternative 3 – Hill 2211 Repeater Site	Alternative 4 – Kwiktalik Mountain Repeater Site
Cultural Resources	Alternative 1 would have no direct effect on cultural resources eligible for listing on the NRHP. Alternative 1 would have a minor indirect visual impact on NRHP eligible cultural resources, particularly the Iditarod National Historic Trail in the vicinity of Golovin Alternate Repeater which would be low-intensity, long-term duration, local in extent, and affecting a resource that is important in context. The indirect effects of four additional project tower sites were surveyed and no direct impacts to cultural resources were estimated. Additional field surveys and documentation should be incorporated into planning and design prior to construction to avoid adverse impacts. The summary impact of Alternative 1 on cultural resources is no direct or indirect impact and therefore no contribution to cumulative impacts.	No impacts to cultural resources.	Hill 2211 Repeater Tower Site was not surveyed during the 2011 field season. The literature review identified no known cultural resources within 3 miles. Prior to ground-disturbing activity, a cultural resources survey would be completed. With mitigation, Alternative 3 would have no direct or indirect effects on cultural resources and would make no contribution to cumulative effects.	Kwiktalik Mountain Repeater Site was not surveyed during the 2011 field season. The literature review identified four known cultural resources within 3 miles, but none are within the proposed site. Prior to ground-disturbing activity, a cultural resources survey would be completed. With mitigation, Alternative 4 would have no direct or indirect effects on cultural resources and would make no contribution to cumulative effects.
Environmental Justice	Alternative 1 would have no adverse effects on human health, a moderate beneficial impact on the economy, and negligible to moderate effects on other resources, including subsistence. In terms of socioeconomic characteristics, the improvements to telecommunications infrastructure would potentially have beneficial effects in health care, education, government services, business, and household Internet use. Alternative 1 would have no disproportionately high and adverse human health or environmental effects, and no Environmental Justice concerns are identified.	No impacts to human health or environmental conditions, so no Environmental Justice concerns arise.	Effects similar to Alternative 1; implementation would have no adverse effects on human health and minor impacts to environmental conditions. Alternative 3 would have no disproportionately high and adverse human health or environmental effects, and no Environmental Justice concerns are identified.	Effects similar to Alternative 1; implementation would have no adverse effects on human health and minor impacts to environmental conditions. Alternative 4 would have no disproportionately high and adverse human health or environmental effects, and no Environmental Justice concerns are identified.

5.0 Consultation and Coordination

5.1 Agency Consultation and Coordination

The BLM is the lead agency in the development of this EA, with the USFWS contributing as a cooperating agency. Participation in public scoping and the identification of issues is described in Section 1.3.

Each agency will reach a final decision and provide a decision record for publication. This may come in the form of a Finding of No Significant Impact (FONSI), which would take into account any new information and public comment. If an agency concludes with a FONSI, then a decision document would select an alternative to implement, make additional agency findings, and identify mitigation measures and stipulations. If a Finding of No Significant Impact is approved, it would be available on the BLM website (http://www.blm.gov/ak/st/en/fo/ado.html) and the Alaska Maritime Refuge website (http://alaskamaritime.fws.gov/).

5.2 List of Agencies, Organizations, and Persons Contacted

The lead and cooperating federal agencies have undertaken an extensive effort to provide information and invite the comments of communities and organizations potentially affected by the proposed action. Federal, State and local governments were contacted as were Alaska Native Tribes, Corporations, and Regional Tribal organizations.

5.3 List of Preparers

This EA was developed by URS Group, Inc.; OASIS Environmental, Inc. of Anchorage, Alaska; Northern Land Use Research; and Willow Environmental under a contract with Unicom, Inc. The BLM holds final responsibility for all content.

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Bill Luskotoff – Geology and Hydrology

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Paul DePalatis – Land Use and Recreation, including the Iditarod National Historic Trail

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APPENDIX A

Unicom Plan of Development

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February 9th, 2012

Unicom, Inc. – TERRA Northwest Project
Phase 1 & Phase 2
Microwave Repeater Development Plan

The TERRA Northwest Project, Phase 1, requires the installation of three mountain top, microwave repeater sites between Grayling and Unalakleet, AK and village microwave sites in Unalakleet and Shaktoolik. Phase 1 construction will begin and end in 2012. One of the repeater sites, Otter Creek Repeater, is proposed on federal lands. Additionally, Phase 2 of the TERRA Northwest Project (future construction) which will connect Unalakleet to Nome includes Golovin Alternate Repeater as a potential site, also proposed on federal lands. However, the current preferred option is to build on Kwiktalik Mountain on Native Corporation Lands. Golovin Alternate Repeater is included as an optional site in the event Kwiktalik is found to be unacceptable due to geotechnical or lease related issues. This second phase will begin and end in 2013. The following Plan of Development details the installation of a typical mountain top microwave repeater facility along with the attached, site maps, site plans and details. This document contains the following sections:

- Part 1 – Site components and fuel requirements
- Part 2 – Construction description
- Part 3 – Operations description

Part 1 – Site Components and Fuel Requirements

Site Requirements: A typical vicinity map is attached which details the overall right of way (ROW) necessary for the communications facilities, and a larger ROW necessary for construction. The larger construction area is required to allow for helicopter landings from any direction as dictated by changes in wind direction. This larger area will also allow for landing and staging in different areas to minimize the impact on ground vegetation. The sites in consideration are all larger, open areas without significant topographic variations in the immediate build area. Each site requires the following components:

1) 60' lattice type tower: tower is free standing and does NOT require guy wires. The tower will be galvanized (steel grey) and will NOT be lighted as this is not required by the FAA. The antenna covers will be grey or white.
    a. Microwave Antennas will be 8' or 10' diameter Ultra-High performance microwave style (manufactured by RFS). Each site requires four antennas for repeater communications; Space will also be reserved for four 94.5 inch tall by 5.1 inch wide future directional cellular antennas. They will be mounted as pairs on two separate legs of the tower.

2) 10’ x 27’ Communications Equipment shelter (prefabricated): the shelter will be mounted on foundation piers, metal exterior, 8’ tall and neutral grey or white in color. (Grey at Otter Creek and White at Golovin Alternate site). Each shelter will contain flooded lead-calcium batteries (C&D, series LCT-1680 or equivalent) for 48 hours of emergency power.
3) 10’ x 20’ Power Module shelter (prefabricated): the shelter will also be mounted on foundation piers and will be 10’ tall. It will be metal sided and painted neutral grey. The shelter will contain two (2) Cummins D1703-M (model DSKAA – 9-kW) diesel generators (or similar equipment) and each will be outfitted with a hospital grade silencer (GTE Industries 201-5102). Drip pans will be in place beneath the engine units themselves. Additionally, any gaps in the floor will be sealed with petroleum resistant sealant and the power module foundation itself will be installed such that floor will be sloped, and any spills to the shelter will flow to the exhaust side of the shelter (the platform edge will be ½” higher than the opposite edge of the shelter).
4) 2 – Greer 4500 gallon fuel tanks (total 9000 gallons of ultra-low sulfur #1 diesel per site): The two tanks are specified as double wall for leak containment. They will feature:
    a. Steel Tank Institute design outer wall leak containment and leak detection sumps at each end of the tanks.
    b. Overfill shut-off valve
    c. Overfill spill containment
    d. Overfill alarm audible to the operator.
    e. Leak detection sensor in the sump.
    f. Low/high level alarm sensor within the tank
    g. Remote alarm reporting system that will report to off-site operators.
5) Piping between the tanks and the equipment shelter will feature the following:
    a. All piping will be above ground.
    b. All piping will be spill-contained, double wall piping.
    c. Piping will be sloped towards the equipment shelter.
    d. Any leaked fuel will be collected in a containment sump of the outdoor bulk fuel tanks.
    e. A liquid sensor within the sump will transmit an alarm to off-site operators.
6) Spill response materials will be kept on site to support maintenance operations. These will include (at a minimum) sorbent pads, boom, granular sorbent, and disposal drum.
7) A detailed Spill Prevention Control & Countermeasures (SPCC) plan will be developed, submitted and approved prior to operational fueling of the tanks.

Part 2 - Construction

Project Schedule: Mobilization for Phase 1 to Unalakleet and Shaktoolik is scheduled to begin when the mountain sites are mostly snow-free and barges begin spring operations. This is expected to occur in the May to early June time frame of 2012. Construction is expected to end in October, 2012 after approximately 150 days. (Mobilization for Phase 2, Unalakleet to Nome, is expected to begin in May 2013 with construction wrapping up in October 2013.) All sites will be constructed concurrently with a more detailed description of each activity following this section. The following is the anticipated timetable for construction and commissioning:

- May 2012: Primary Mobilization.
- Early – mid June: Camp construction and foundation installation.
- Late June – early July: Tower erection and transport of prefabricated shelters and fuel tanks to the site.
- July: Antenna, fuel piping (between power module and tanks), battery installation and initial start-up of the site. Fuel transportation and tank filling is expected at this time.
- August – September: Communications equipment installation (in the communications shelter), link commissioning (between sites) and site commissioning.
- October 2012: Final punch list and acceptance.
- Summer 2013: Extension of the microwave system to Nome.
- October 2013: Final punch list and acceptance.

Equipment List:

- Mini Backhoe – CAT 303 or equivalent: used for site excavation, drilling and material handling. In addition, capstan winches can be attached to the excavator to support tower erection.
- 225 CFM air compressor: used for leveling of competent rock (with jackhammer attachment) as well as drilling of rock anchor holes.
- Diesel generators(s): 2kW - 25 kW portable generators will be used for camp and tool power.
- Hughes 500-E helicopter: crew transport and light freight. 500-E may also be used for tower erection support if weather permits.
- Bell UH-1H “Huey” helicopter: used for medium sized lifts and initial material / supply transportation to the sites (including tower steel). The UH-1H may also be used for tower erection support if weather permits. This helicopter will also be used when camps are taken down upon completion.

- Boeing Chinook 234 or Erikson Sky Crane S-64: heavy lift, twin rotor helicopter will be used for the transport of both shelters, fuel tanks and batteries from staging areas noted below.
- Misc. hand tools

Mobilization: Site equipment will be transported by barge to staging areas in late May, 2012 for the 2012 build season, and in May of 2013 for the 2013 build season. The existing barge landings at Nome, Unalakleet, Grayling, and Shaktoolik will be utilized for unloading of materials in the communities. It is anticipated materials will be staged in both Grayling and Unalakleet. Materials will then be flown to the sites via helicopter out of the staging areas at the local airports. Specifically:

- Otter Creek Repeater materials will be transported from Klikitarik Bay (private land) or from a Native allotment at the mouth of the Golsolvia River.
- Golovin Alternate Repeater materials will be staged out of Golovin for the 2013 build to Nome.
- Note: Approximately 60 flights are expected per site for the UH-1H during the construction season. Paths will be as straight line as possible between staging areas and sites. Exceptions will be made as necessary to avoid overflying cabins and hunting camps.

Note: Helicopter flights are planned to land in designated areas but pilot discretion may dictate a landing outside of the designated areas if weather or other safety related conditions dictate such landing. In addition, direct flights between sites will be required for personnel with small tools and equipment packages throughout the project duration.

Invasive Species mitigation: All vehicles and transport equipment used in access, construction, maintenance and operations of the project will be thoroughly cleaned prior to moving equipment and gear across or onto BLM managed lands. Washing and/or brushing equipment and gear to remove material that can contain weed seeds or other propagates will help to ensure it is being transported across or onto BLM managed lands weed and seed free. High pressure washing will be performed where required to treat the insides of bumpers, wheel wells, undercarriages, inside belly plates, excavating blades, buckets, tracks, rollers, drills, buckets, shovels, any digging tools, etc., to remove potential weeds, seeds, and soil carrying weed propagules and vegetative material. All gear, tool bags and accessories will be free of all plant debris, mud and materials that can be the source of non-native invasive plants and pathogens.

Camp construction and operation: Crews will be housed on site in 4 - 10’ x 20’ heavy tent structures as indicated on the attached site plans. Plywood platforms will be constructed under

each tent to protect the ground and level the tent. Tents will be secured from high winds using gabion baskets (weight) and "duck bill" anchors. Camps will require the following:

- Crew strength of up to nine (9) construction personnel (at maximum levels). Normal construction operations are expected to require fewer personnel and commissioning activities (August – September) will generally require 2 – 3 construction workers plus a camp cook.
- Fuel (noted in detail below).
- Portable heating.
- Cooking facilities: electric hot plates, microwave oven, conventional oven.
- Chest freezers.
- Food containers (with dry goods, canned goods, etc.).
    - 55 gallon drums will be employed to contain food waste and deter wildlife from gaining access. Drums will be transported off site for disposal in approved location and carried back empty.
- Fresh water drums.
- Portable sanitary facility (toilet): toilet(s) will either be a waterless mechanical 'self-bagging' system manufactured by pacto, or an electric powered flameless incinerator provided by Incinolet.
    - All human waste will be transported off site for disposal in approved location.

All camp and construction waste will be contained in drums or large, commercial trash bags and will be removed from the site periodically. The trash bags will be used for dry garbage (plastic, paper, etc.) and they will be secured from the wind with cargo nets or waste drums while awaiting transport.

Crew rotation and re-supply will be accomplished by the 500-E helicopter as needed. It is estimated that approx. 30-40 flights with the 500-E will be required for camp and crew at each location. Flights will occur during the June to September construction season in 2012 and 2013. Flights to Otter Creek will originate out of Unalakleet. Flights to Golovin Alternate Repeater will originate out of Golovin.

- No pets, no alcohol, no burning, no hunting / fishing and no 4-wheeler (ATV) or any motorized vehicles outside of the permitted (staked) area will be allowed.
- Crews will have firearms as a last resort for protection from wildlife. First line of defense consists of air horns and bear mace.
    - Site representative(s) will have Bear Avoidance and Hazing training.
    - There will be at least one firearm (shotgun) on site loaded with buckshot or slugs.
    - There will be no bear fencing.

- All operational and construction activities will be performed within the areas marked on each site map, respectively.

Camp Fuel: Unicom, Inc. (and its contractors) will be transporting fuel to the site during construction by means of flyable 300 gallon fuel bladders. These will be transported from the staging area to site via helicopter. The drum storage units will have integrated containment and are covered to prevent rain/fuel mixing and overflow.

The fuel will be transferred to temporary storage and containment bladders for helicopter refueling operations. Fuel to be used for construction needs will be stored in 55 gallon drums (4 diesel and 2 gas) within a containment area and covered for protection from the weather.

- Note: Fuel consumption is expected to average approx. 20 gallons of diesel and 10 gallons LL-100 of unleaded per day. Consequently, these sites will require refueling during construction approx. every 15 days (average). Peak construction will be higher with consumption tailing off significantly as the site is commissioned.
    - Cumulative estimated consumption is approx. ≤ 2,000 gallons of diesel and ≤ 700 gallons of LL-100 during construction and commissioning.
    - Refueling will be accomplished with the either the 500-E or the UH-1H using 55 gallon drums and 300 gallon bladders respectfully. There will be two fuel bladders at the mountain top sites; one for aviation jet-A fuel and one for low sulphur #1 diesel fuel. The full drums will be set on "duck pond" containment next to the empty drums that they are to replace. The empty drum will be removed from containment and the replacement will be set in its place. The empty drum will then be hauled off site. The fuel bladders will be stored in a temporary containment dams for the duration of helicopter operations.
- A site-specific Spill Prevention, Control & Countermeasures (SPCC) plan will be generated for each site. The plans will be generated and approved prior to mobilization to a site: The plans will include:
    - Procedures and facilities for containment for stored fuels specific to that site.
    - Procedures and temporary containment for refueling of equipment, transfer of fuels to and from the site, and movement of fuels between storage locations on the site.
    - Spill response materials to be kept on the site to include (at a minimum) sorbent pads, boom, granular sorbent, and spilled material containers)

Foundation installation: The tower, power module, communications shelter and fuel tanks noted above will require two different types of foundation installation:

- Tower foundations will consist of a rock-anchor and welded pile extension system. See attached detail.
    - Excavation will take place at each individual tower leg location. Excavation is expected to consist of approximately a 6'x 6' sloped opening down to competent bedrock. Bedrock will be blown clean with forced air, and four each, 3" diameter holes will be drilled into the rock at each tower leg, for a total of 16 drilled rock anchors. The bedrock surface will be leveled with a grout or concrete pad that will provide the platform for the tower leg extension. The leg extension will arrive pre-fabricated, with only one bevel cut to be made to achieve final elevation. Rock anchors will then be grouted, tensioned, and locked off. Once subsurface construction is complete, the excavated holes will be backfilled with the native materials that were extracted (saving as much of the organic mat as possible for the final coverage).
- Shelter and tank foundations will be "micropile" types. See attached detail – Mountain Top Shelter and Fuel Tank Foundation.
    - First, the 3 ½" steel pipes will be installed vertically through the top soil. Once stabilized, the hole for the #9 rebar will be drilled and the rebar will be inserted into the hole. Finally, the entire assembly will be filled with structural grout and the piling will be leveled for the buildings and tanks.
- The ground ring (as indicated on the attached site plans) will be installed shortly after the foundations and it will be installed approx. 6" below grade for grounding / bonding of all structures.

Note: Excavation and significant ground disturbance is expected throughout the installation area from the ground ring as indicated on the attached site plans. After construction is complete the ground will be re-graded back to original grade and recommended fertilization or replanting, if any, of native species and/or vegetation will be done.

<u>Structure installation:</u>

- The shelters and the fuel tanks will be prefabricated and installed directly onto the foundations using the heavy lift helicopter.
    - Once the heavy lift leaves the area, on site personnel will bolt or weld the structure skids to the foundation piers.
- The tower will be erected on site using winches, gin poles and the 500-E helicopter if the weather allows.
    - The gin pole and winch will be used to stand the legs of the tower using the small backhoe-dozer as the winch base with a pulley at the top of the structure (after the first leg is set on the foundation). The legs and structural sections will be manipulated into place by hand.

    - The antennas will be installed in a similar fashion (i.e. a pulley will be placed on the top of the tower and a rope pulled by the winch will pull the antenna up to installation level).

After the structures are in place, field installation of fuel piping, waveguide connection (between antennas and the communications shelter) and the electrical connection between the power module and the communications shelter will occur. Contractor will transport battery cells "wet" to the mountain sites. The cells will be unpackaged and lifted directly into the shelter from the containment area.

Site Commissioning: Commissioning will consist of power system start-up and testing, radio testing and antenna alignment between sites and communications system testing.

- For planning purposes, it is expected that each site will have approx. 1 week of commissioning activity with the majority of the activity contained within the shelters and on the tower (for antenna alignment).
    - Note: This activity will use site generated power intermittently as the systems are brought on line.
- These activities require the use of the 500-E or the R-44 helicopter, to transport technicians and their equipment to and from each site. Technical crews may fly in and out each day. In addition, direct flights between sites will be required for personnel with small tools and equipment packages.

Part 3 – Operations

Site maintenance: The sites will be un-manned with scheduled maintenance visits expected twice a year (in July and in the late September/early October depending on weather) in addition to any emergency maintenance trips. During those visits, the generator lubricant and coolant systems will be inspected and any additional fluids required will be flown in and pumped into the storage tanks located in the power shelter. Over the life of the facility, it is expected that batteries will be replaced once and that both generators will be replaced every five to seven years.

Refueling: The fuel tanks will be filled up once per year. It is expected that a 500 gallon fuel container will be employed for that purpose ("Fuel Easy" system or equivalent). The system contains a fuel bladder housed in a protective spherical shell for rigidity. Unicom, Inc. assumes that the generators will consume approx. 7000 gallons of diesel fuel during a one year period. This equates to approx. 14 round trip helicopter flights (using a Bell UH1B helicopter) and it is expected that the re-fueling effort will last 2-3 days per site during the month of July. For refueling:

- The Fuel Easy bladder system will be set directly onto secondary containment ("duck ponds") and additional (temporary) containment will be erected between the fuel bladder and the main refueling aperture on the tank. This second containment pond will mitigate the impact of any fuel that may spill as the nozzle nears the tank aperture.
- Spill prevention, control, and countermeasures (SPCC) plans that are specific to each site will be developed and approved prior to operational fueling of the tanks. These will include a detailed description of procedures to be followed and equipment to be used. Refueling efforts will likely be based out of Grayling for Otter Creek and Unalakleet for the other locations
    - In the site specific SPCC Plan, contingency and emergency clean-up procedures will be detailed for events as significant as a bladder dropped from a helicopter to a relatively minor release while fueling on the ground.

Site Monitoring and protection: Leak detection is installed in the fuel tanks, fuel piping, and the power module. Battery status will be visually inspected on every technician's visit as well as monitored remotely via webcam. A fire alarm control system with FM-200 fire suppression agent is employed in both the power module and communications module. These systems are continuously monitored as a function of Unicom, Inc.'s network management and system status (alerts in particular) are routed to human monitors in real time, 24 hours a day.

Decommissioning: Removal of the site will essentially be the reverse of the installation process noted above though with a shorter timeframe. The same equipment and crew facilities would also be required.

- Remaining fuel would be pumped out of the tanks, into containers, and removed from the site via helicopter. Batteries would be removed from the site via helicopter. The cells will remain filled at the time of removal.
- Connections between modules and towers would be removed (with fuel containment underneath the equipment for the supply piping removal). Antennas would be taken down and waveguide runs would be removed from the tower and coiled up.
- Welds for the tanks and shelters would be broken / cut and the equipment would be removed with the heavy lift helicopter. The tower would be taken down piece by piece and removed via helicopter.
- Once down to the foundation level, the grout in the pile foundations would be broken up (to a level 6" below grade) and the pilings and caissons themselves would be cut off approx. 6" below grade.
    - Note: this approach leaves the majority of the foundation itself below grade but it is the minimum disturbance to any re-growth that would occur over the life of the facility. However, final reclamation will be coordinated with the appropriate authority having jurisdiction to determine what, if

any, elements of the foundation will be left in place as future land management decisions might require the full removal of all foundation items.

- As above, after the removal is complete, the ground will be re-graded back to original grade and recommended fertilization or replanting, if any, of native species and/or vegetation will be done.

Attachments

- **Site Plan with staging area and ground ring detail**
- **Foundation Drawings**

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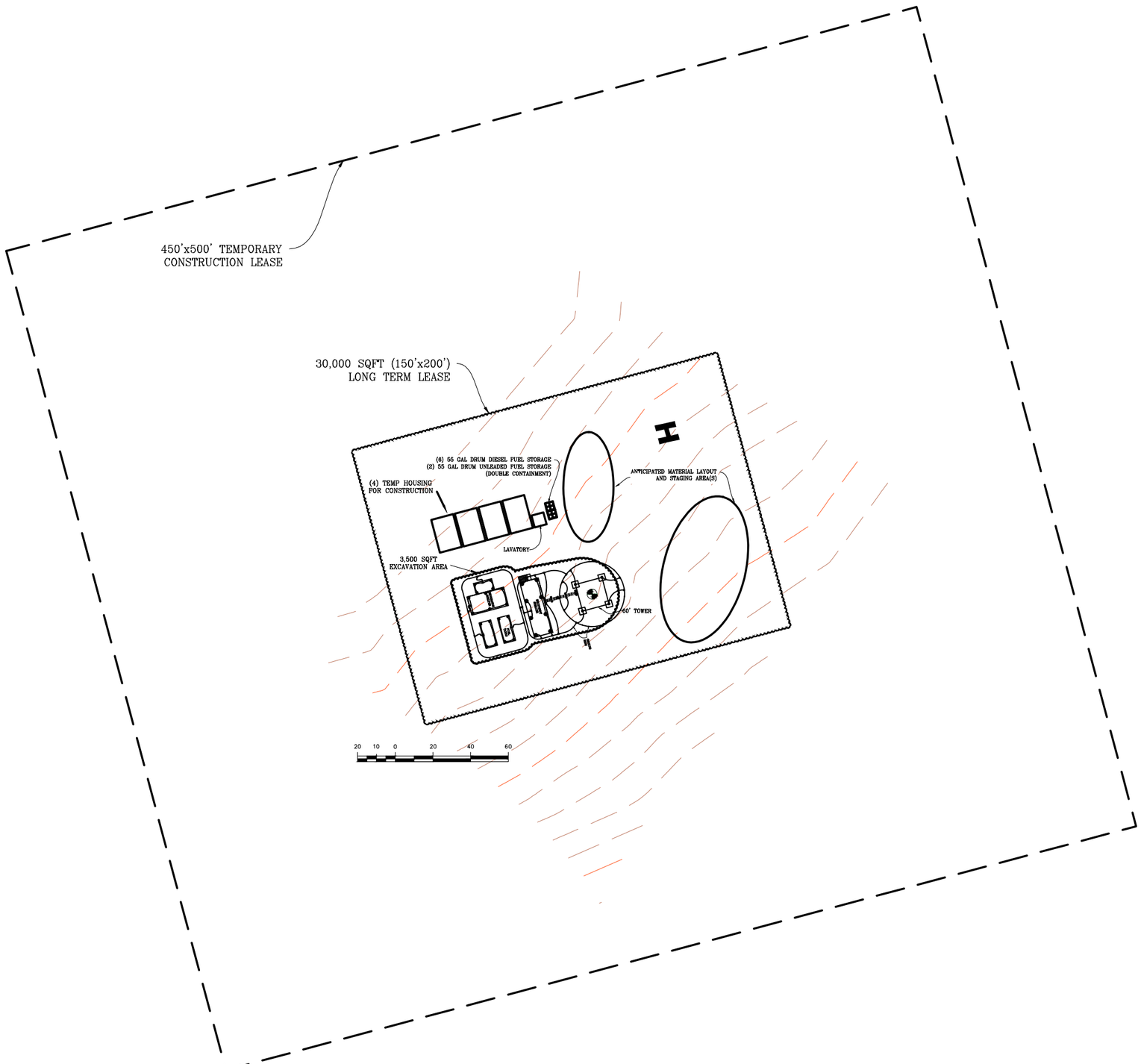


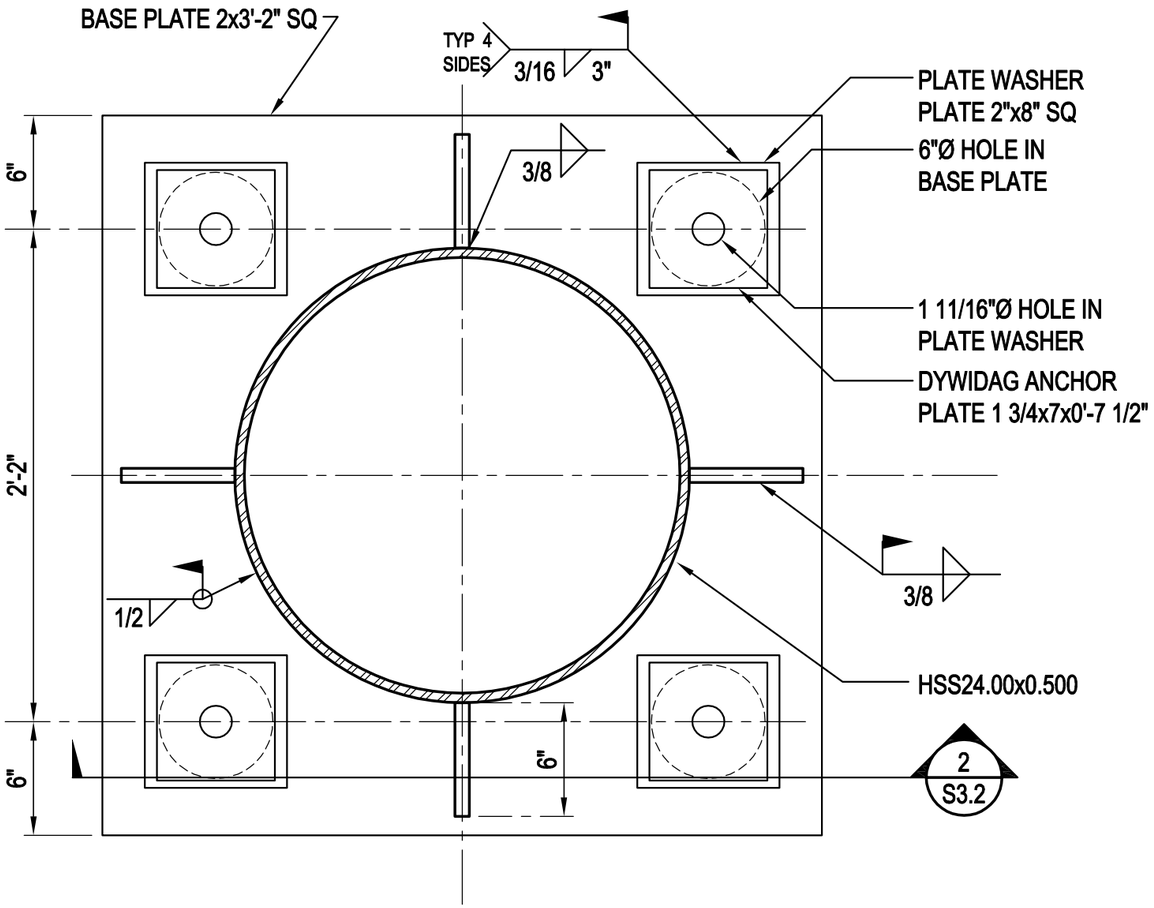
TERRA GCI UUI

OTTER CREEK REPEATER
GOLOVIN ALTERNATE REPEATER
REPRESENTATIVE SITE PLANS

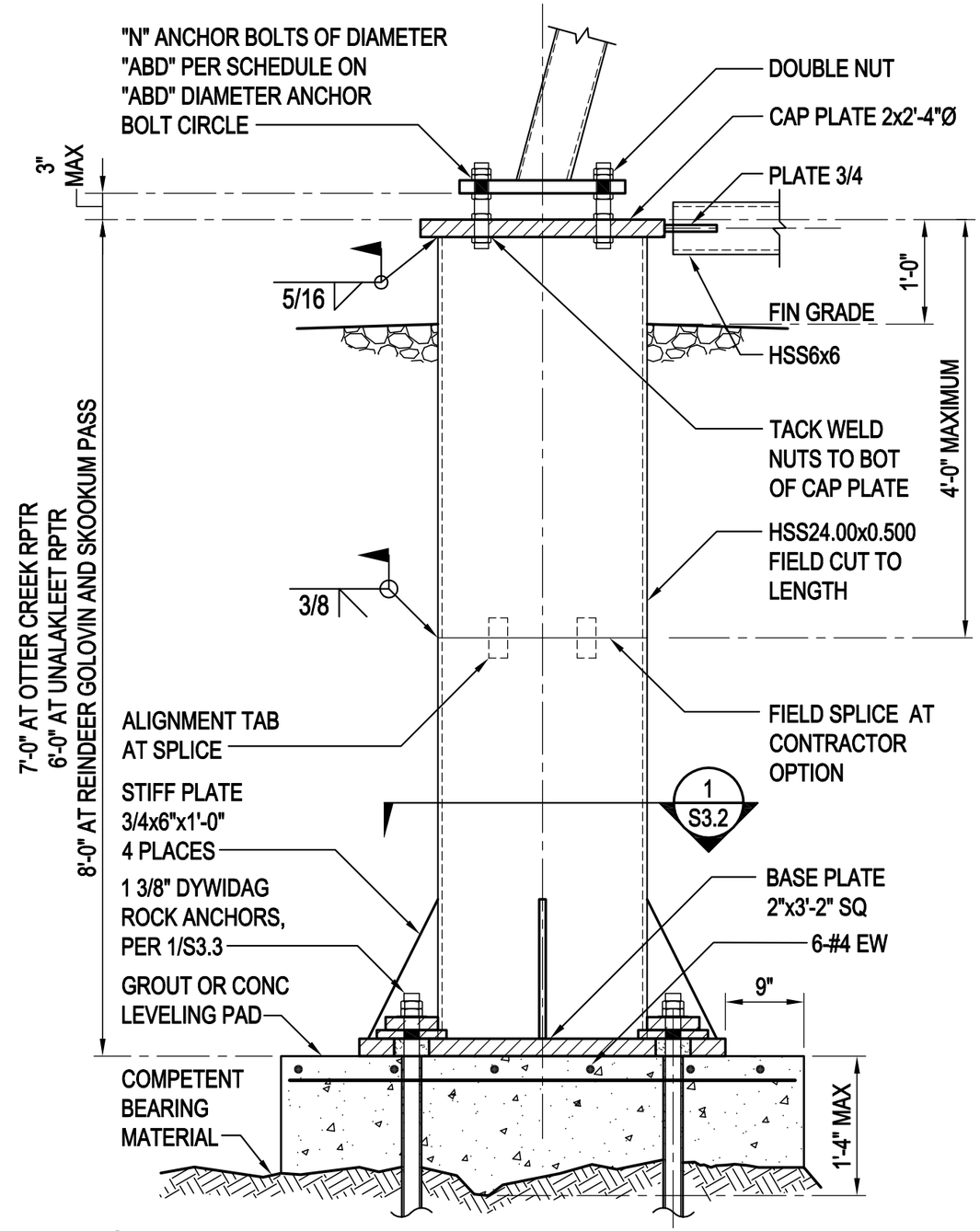
SCALE: 1"=30' FORMATTED: 11"x17"

DRAFTED BY: T.WEIST	DATE: 06/06/2011
DESIGNER/PROJECT ENGINEER: C. GILL	

REVISION	DATE
HEAVY LIFT	1-26-12
TEMP CONSTRUCTION LEASE	2-2-12



1 BASE PLATE PLAN
SCALE: 1 1/2" = 1'-0"



2 PIER ELEVATION
SCALE: 3/4" = 1'-0"

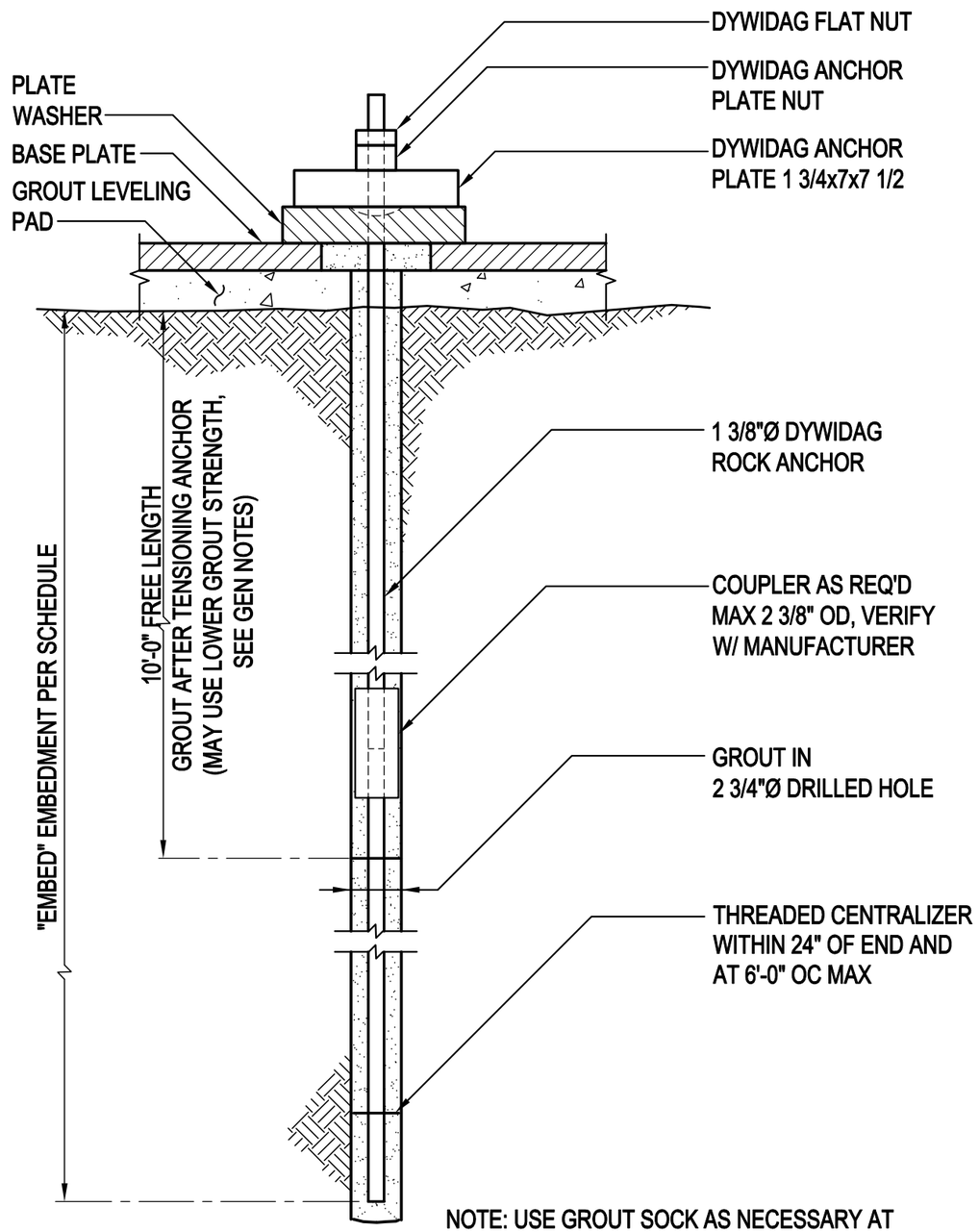
BBFM Engineers Inc.
510 L Street, Suite 200
Anchorage, AK 99501-1949
Phone: (907) 274-2236 Fax: 274-2520

TERRA NORTHWEST
ALASKA

Drawn	Date
JWC	10-31-11
Checked	Job No.
TJF	211128

Sheet Contents
TYPE 3 FOUNDATION
BASTE PLATE PLAN
PIER ELEVATION

Drawing No.
S3.2



NOTE: USE GROUT SOCK AS NECESSARY AT CONTRACTOR'S OPTION.

1 ROCK ANCHOR DETAIL
SCALE: 1 1/2" = 1'-0"

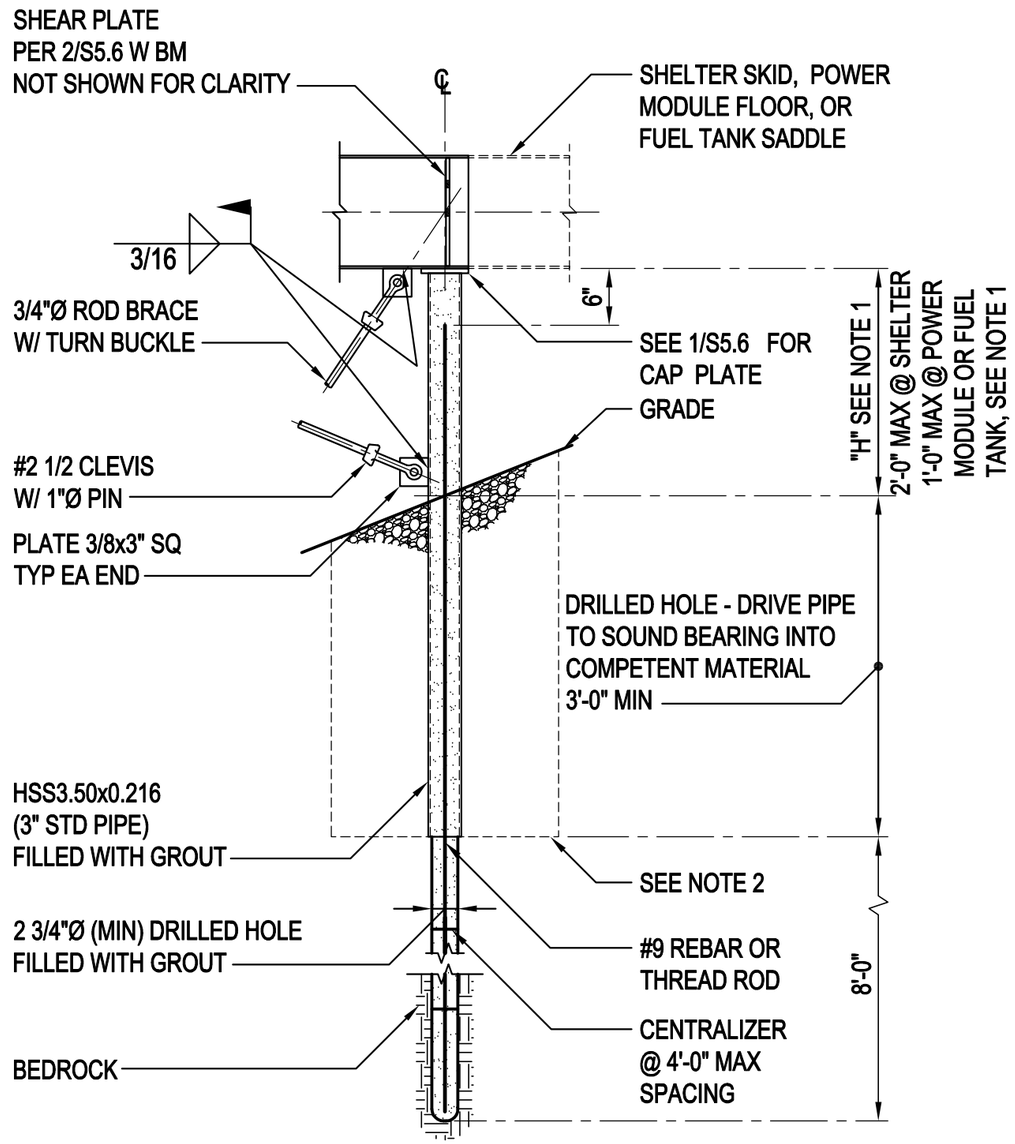
BBFM Engineers Inc.
510 L Street, Suite 200
Anchorage, AK 99501-1949
Phone: (907) 274-2236 Fax: 274-2520

TERRA NORTHWEST
ALASKA

Drawn	Date
JWC	10-31-11
Checked	Job No.
TJF	211128

Sheet Contents
TYP 3 FOUNDATION ROCK ANCHOR DETAIL

Drawing No.
S3.3



NOTES:

1. ROD BRACING AT MOUNTAINTOP SHELTER ONLY, NOT REQUIRED AT POWER MODULE AND FUEL TANK PLATFORM UNLESS "H" EXCEEDS 1'-0". IF "H" EXCEEDS 1'-0" FOR ANY TWO ADJACENT SUPPORTS THEN PROVIDE 3/4"Ø ROD CROSS BRACING BETWEEN THOSE TWO SUPPORTS.
2. IF EXISTING SURFACE IS NOT COMPETENT GRANULAR MATERIAL THEN EXCAVATE AND BACKFILL WITH COMPACTED GRANULAR MATERIAL.

1 MICROPILE AND ROCK ANCHOR

SCALE: 3/4" = 1'-0"

BBFM Engineers Inc.
510 L Street, Suite 200
Anchorage, AK 99501-1949
Phone: (907) 274-2236 Fax: 274-2520

TERRA NORTHWEST
ALASKA

Drawn	Date
JWC	10-31-11
Checked	Job No.
TJF	211128

Sheet Contents
SHELTER SCHEDULE
MICROPILE DETAIL

Drawing No.
S5.4

APPENDIX B

Seward Peninsula Bird Check List

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Seward Peninsula
Bird Checklist

Prepared by: Rich Harris
November, 2000

	June	July	August
Common Loon	r	r	r
Yellow-billed Loon	u	u	u
Arctic Loon	r	r	r
Pacific Loon	c	c	c
Red-throated Loon	a	a	a
Red-necked Grebe	u	u	u
Horned Grebe	r	r	*
Northern Fulmar	②	*	*
Short-tailed Shearwater	②	*	*
Fork-tailed Storm Petrel	②	*	*
Pelagic Cormorant	u	u	u
Sandhill Crane	a	a	a
Tundra Swan	a	a	a
Whooper Swan	②	*	*
Canada Goose	a	c	c
Black Brant	a	c	c
Emperor Goose	r	r	r
Bean Goose	②	*	*
White-fronted Goose	⓪	*	②
Snow Goose	r	r	r
Mallard	c	c	c
Northern Pintail	a	a	a
Green-winged Teal	a	a	a
Baikal Teal	②	*	*
Blue-winged Teal	②	*	*
Gadwall	②	*	*
Eurasian Wigeon	r	*	*
American Wigeon	c	c	c
Northern Shoveler	c	c	c
Canvasback	u	u	u
Common Pochard	②	*	*
Redhead	r	*	*
Tufted Duck	②	*	*
Greater Scaup	a	a	a
Lesser Scaup	②	*	*
Common Eider	c	u	u
King Eider	r	*	r
Spectacled Eider	r	*	r
Steller's Eider	②	*	②
Black Scoter	c	u	u
Surf Scoter	u	u	u
White-winged Scoter	u	u	u
Harlequin Duck	c	c	c
Oldsquaw	a	a	a
Common Goldeneye	r	r	*
Barrow's Goldeneye	*	*	*
Bufflehead	r	r	*
Common Merganser	r	*	*
Red-breasted Merganser	c	c	c
Semipalmated Plover	c	c	c
Mongolian Plover	②	*	*
Black-bellied Plover	u	u	u
American Golden Plover	c	c	c
Pacific Golden Plover	c	c	c
Hudsonian Godwit	u	*	*
Bar-tailed Godwit	a	c	c
Black-tailed Godwit	*	*	*
Bristle-thighed Curlew	r	r	r
Whimbrel	a	a	a
Common Greenshank	②	*	*
Lesser Yellowlegs	u	u	u
Solitary Sandpiper	②	*	*
Spotted Sandpiper	u	u	u
Terek Sandpiper	⓪	*	*
Wandering Tattler	c	c	c
Gray-tailed Tattler	②		
Green Sandpiper	⓪	*	*
Wood Sandpiper	⓪	*	*
Red-necked Phalarope	a	a	a
Red Phalarope	r	r	r
Long-billed Dowitcher	u	u	u
Common Snipe	c	c	c
Stilt Sandpiper	u	u	r
Ruddy Turnstone	c	c	c
Black Turnstone	u	u	u
Surfbird	r	r	r
Rock Sandpiper	r	r	r
Red Knot	c	u	c
Great Knot	⓪	*	*
Dunlin	c	u	c
Sanderling	r	*	*
Semipalmated Sandpiper	a	a	a
Western Sandpiper	a	a	a
White-rumped Sandpiper	u	r	r
Long-toed Stint	r	*	*
Little Stint	⓪	*	*
Temmink's Stint	⓪	*	*
Red-necked Stint	r	*	*
Sharp-tailed Sandpiper	⓪	*	*
Baird's Sandpiper	u	r	u
Pectoral Sandpiper	c	u	c
Buff-breasted Sandpiper	⓪	*	⓪
Pomarine Jaeger	u	u	u
Parasitic Jaeger	c	u	c
Long-tailed Jaeger	c	c	c
Black-headed Gull	r	*	*
Bonaparte's Gull	r	r	r
Ross' Gull	⓪	*	*
Mew Gull	c	c	c
Herring Gull	u	u	u
Thayer's Gull	r	r	r
Glaucous Gull	c	c	c
Slaty-backed Gull	u	u	u
Glaucous-winged Gull	a	a	a
Black-legged Kittiwake	c	c	c
Sabine's Gull	u	u	u
Ivory Gull	⓪	*	*
Arctic Tern	a	a	a
Aleutian Tern	u	u	u
Dovekie	②	*	*
Common Murre	c	c	c
Thick-billed Murre	c	c	c
Black Guillemot	u	*	*
Pigeon Guillemot	u	*	*
Marbled Murrelet	r	*	*
Kittlitz's Murrelet	r	*	*
Parakeet Murrelet	r	r	r
Least Auklet	r	*	*
Crested Auklet	r	*	*
Horned Puffin	u	u	u
Tufted Puffin	u	u	u
Golden Eagle	u	u	u
Turkey Vulture	*	*	②
Northern Harrier	u	u	u
Northern Goshawk	r	r	r
Rough-legged Hawk	c	c	c
Osprey	r	r	r
American Kestrel	r	r	r
Merlin	r	r	r
Peregrine Falcon	u	u	u
Gyrfalcon	u	u	u
Spruce Grouse	r	r	r
Rock Ptarmigan	u	u	u
Willow Ptarmigan	c	u	u
Short-eared Owl	c	u	c
Great Horned Owl	r	r	r
Snowy Owl	r	r	u
Northern Hawk-owl	r	r	r
Olive-sided Flycatcher	c	c	u
Alder Flycatcher	u	u	u
Northern Shrike	u	u	u
Say's Phoebe	u	u	u
Horned Lark	u	u	u
Tree Swallow	a	a	a
Violet-green Swallow	r	r	*
Bank Swallow	c	c	c
Cliff Swallow	c	c	c
Northern Rough-winged Swallow	r	r	r
Barn Swallow	②	*	*
Gray Jay	r	r	r
Common Raven	a	a	a
Arctic Warbler	u	u	u
Ruby-crowned Kinglet	u	u	u
Black-capped Chickadee	c	u	u
Boreal Chickadee	u	u	u
Gray-headed Chickadee (hypothetical)			
American Dipper	r	r	r
Gray-cheeked Thrush	a	a	a
Hermit Thrush	u	u	u
American Robin	c	c	c
Varied Thrush	u	u	u
Northern Wheatear	u	u	u
Bluethroat	u	u	u
Siberian Rubythroat	⓪	*	*
Northern Pipit	c	c	c
Red-throated Pipit	r	r	r
White Wagtail	r	r	r
Yellow Wagtail	a	a	a
Orange-crowned Warbler	u	u	u
Yellow Warbler	c	c	c
Blackpoll Warbler	u	u	u
Yellow-rumped Warbler	u	u	u
Wilson's Warbler	c	c	c
Northern Waterthrush	c	c	c
Savannah Sparrow	c	c	c
American Tree Sparrow	c	c	c
Dark-eyed Junco	r	r	r
White-crowned Sparrow	a	a	a
Golden-crowned Sparrow	c	c	c
Lincoln's sparrow	r	r	r
Fox Sparrow	a	a	a
Lapland Longspur	a	a	a
Snow Bunting [common in March]	r	*	*
McKay's Bunting [common in March]	r	*	*
Rusty Blackbird	u	r	r
Common Redpoll	a	a	a
Hoary Redpoll	a	a	a

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APPENDIX C

Section 810 Subsistence Evaluation and Findings

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United States Department of Interior
Bureau of Land Management
Anchorage Field Office

COMPLIANCE WITH ANILCA SECTION 810

EVALUATION AND FINDINGS

Case File No.: AA-93051(Hill 2211), AA-92971 (Otter Creek), AA-92969 (Golovin Alternative)

NEPA Document Number: AK-010-2012-0002-EA

URS project # 26220973

APPLICANT: Unicom Incorporated

PROPOSED ACTION: Right-of-Way Grant and Communication Site Lease

LOCATIONS:
Otter Creek - T. 25 S., R. 12 W., Secs. 16 & 21, Kateel River Meridian, approximately 45 miles south of Unalakleet, Alaska-
N 63 18' 50.73" W 160 57' 23.97"

Golovin Alternative - T. 11 S., R. 20 W., Sec 17, Kateel River Meridian, approximately 10 miles east of Golovin, Alaska-
N 64 32' 21.99" W 162 44' 12.11"

Hill 2211 - T.9 S., R. 21 W., Sec 24, Kateel River Meridian, approximately 12 miles NE of Golovin, Alaska-
N 64 41' 15" W 162 47' 03"

DESCRIPTION OF PROPOSED ACTION:
Under the Proposed Action reviewed in this EA, the TERRA-NW Project would construct two microwave towers and associated facilities on large blocks of remote, undeveloped BLM-managed lands. The Otter Creek tower site is located approximately 36 mi. northwest of Grayling within a large area of approximately 3.5 million acres of BLM-managed land in the Nulato Hills. The Golovin Alternate tower site is located approximately 10 mi. east of Golovin within an area of approximately 443,140 acres of BLM-managed land, running north of Cape Darby. See Figure 2-1 for project components and land status. Additional components of the TERRA-NW Project, not located on federal lands, are proposed for construction in 2012 and 2013. These eight towers, (five remote repeater towers and three community towers) are proposed for installation on private lands. They are classified as "connected actions," and reviewed as indirect effects of the proposed repeaters on federal land. In the future, Unicom intends to construct an additional five community towers, however, these are not yet proposed or funded.

Repeater Tower Site Construction
The location of the two towers proposed for federal lands and helicopter transit routes for construction are shown in Figures 2-2 and 2-3 of the EA. Under the leases for construction, activities would affect a temporary footprint of 225,000 square feet (sq. ft. or 5.15 acres) per site. Taken together, the two tower sites represent a total of 10.3 acres of land affected during the temporary (five-month) construction period in 2012 and 2013.

During the construction period, temporary areas would provide for component preparation and assembly, lodging, food preparation, and waste management. The project footprint at each tower site varies from 5.15 acres for the temporary construction lease to 0.69 acres for the 20 years of the long-term lease. The major project facilities at the each microwave repeater site include a 60 foot high lattice-type tower with microwave and cellular antennas, a 10 foot by 20 foot power module shelter, a 10 foot by 27 foot communication equipment shelter, and two 4500 gallon diesel fuel tanks (9000 gallons total fuel storage capacity). Power at the remote tower sites would be provided by two 9kW diesel generators, outfitted with hospital-grade silencers.

An Erickson Air Crane "heavy-lift" helicopter will be utilized to transport the pre-fabricated modules and fuel tanks. In the case of the Otter Creek tower site, four heavy-lift flights and approximately four light-lift flights would occur from the Klikitarik Bay staging area on Norton Sound. The remainder of the flights would originate out of Unalakleet. For the Golovin Alternate tower site, all helicopter flights would stage from Unalakleet as noted above. A Hughes 500-E or Robinson R-44 helicopter would be employed to move personnel and light equipment and supplies throughout the five-month construction period. A Bell UH-1H Huey would be used to ferry most of the equipment and building materials, primarily during June and July. The Erikson Air Crane would be used to lift the pre-fabricated power module shelter and communications equipment shelter during late June and early July.

During the operations period, the proposed maintenance and refueling flights would occur four to five days per site per year. Taking the two microwave repeater sites together, during the operations period, a total of 48 flights would take place over a period of 12 to 15 days each year. Maintenance and refueling flights would originate from Grayling for the Otter Creek tower site, and for Unalakleet for the Golovin Alternate tower site. Each trip would transport 500 gallons of diesel fuel, taking the safest direct route to the tower sites. The construction season schedule is summarized in Table 2-6.

No Action Alternative – Alternative 2

Under the No Action Alternative, BLM would not grant ROWs, and the existing telecommunications and satellite Internet service would continue or Unicom would have to seek other alternatives not involving federal public lands. Satellite-based service may continue for the foreseeable future, incurring higher delays in connectivity and lower reliability. The existing telecommunications infrastructure would not provide the means for proposed improvements in health care providers (telemedicine), more effective educational services (distance education), expanded access to governmental, tribal, and non-profit entities, or improved Internet speed for residential users and commerce.

Hill 2211 Repeater Site– Alternative 3

Under Alternative 3, the Golovin Alternative microwave tower site would be replaced by a tower on a summit approximately 12 mi. north and east of Golovin, termed Hill 2211 for its elevation. The site is located on BLM managed land and was identified as a potential alternative location in the Unicom initial review and again in internal agency scoping. A communications tower funded by the Norton

Sound Economic Development Corporation currently occupies this site, and this offers the potential to co-locate the new microwave repeater tower with an existing facility. Construction and maintenance activities associated with the Hill 2211 tower site would be similar to the Golovin Alternative and Otter Creek tower sites indicated in Alternative 1. Construction activities would affect a temporary footprint of 225,000 sq. ft. (5.15 acres) , however, following construction, and through the operational life of the project (20 years), the footprint would consist of the 0.69-acres area under long-term lease. This includes a helicopter landing area that would be used four to five days per year. The permanent facilities would occupy an excavated footprint of 0.08 acres.

EVALUATION: Effect of proposed action on subsistence uses and needs.

The proposed actions at the Hill 2211 and the Golovin Alternative site have been identified on State Selected lands. These lands do not meet the ANILCA sec 102 (3) definition of Federal Public Lands under the Federal Subsistence Program. Validly patented, conveyed, or tentatively approved lands fall under the authority of the State of Alaska for the management of fish and game.

The proposed action at the Otter Creek site occurs on unencumbered BLM managed lands which do fall under the Federal Subsistence Program. These Federal lands occur in an area that is remote from local villages and important subsistence use areas. The most intensive subsistence fishing activity is believed to be concentrated on lands conveyed or selected by the Native Village corporations. Subsistence activities are a key factor in the selection of lands by Native individuals and corporations, and Native Allotments are typically claimed based on a family's use of a site for subsistence activities.

Fisheries:
All of the proposed sites are at a higher elevation (Otter Creek 1705 feet, Golovin Alternative 1000 feet, Hill 2211, 2211 feet) and therefore not in close proximity to fish habitats. Due to the three sites elevation and distance from fish habitats, the construction, maintenance and operation of the sites would not significantly reduce harvestable fisheries resources that are available for subsistence use. All of the proposed sites would not alter the distribution, migration or location of harvestable fisheries resources. The proposed action will not create any legal or physical barriers that would limit access by subsistence users of the fisheries resource. The Otter Creek tower site, however is within the watershed of Anvik River, and a potential for fuel spills affecting fish habitats exists. However mitigation measures outlined in the Kobuk Seward RMP and stipulations in the EA would prevent degradation of adjacent water sources and fisheries habitat.

Wildlife:
The proposed sites include habitats potentially used by moose, caribou and muskox, three important subsistence wildlife populations. Moose are found at all three of the proposed sites, but typically inhabit lower elevation riparian areas and shrub habitats. The Western Arctic Caribou herd moves into the southern Seward Peninsula in winter and may potentially use habitats in the area of the Golovin Alternative and Hill 2211 sites in dispersed groups. Muskox may also use the elevated sites in this area, but are less likely to be found near the Otter Creek site. These sites are all potentially used by subsistence users in surrounding villages. Subsistence hunts for these species typically take place in fall and winter.

The proposed action of construction of the communication towers will occur during the summer months. As any disturbance from construction will be temporary in nature, it is reasonable to conclude that the construction of the towers will not reduce harvestable wildlife resources that are available for subsistence hunting on BLM administered lands. Maintenance and operation of the tower sites will also not restrict subsistence use of the wildlife resources. The proposed action would not likely alter the distribution, migration or location of harvestable wildlife resources. The proposed action would not create any legal or physical barriers that would limit subsistence harvest and access. The impacts to subsistence resources associated with this action will be negligible.

The proposed tower sites occur in areas that are fairly remote from local villages and important subsistence use areas. The most intensive subsistence activity is believed to be concentrated on lands conveyed or selected by the Native Village corporations. Subsistence activities are a key factor in the selection of lands by Native individuals and corporations, and Native Allotments are typically claimed based on a family's use of a site for subsistence activities. The BLM lands at these sites are at higher elevation, have fairly difficult access and receive little consistent use by qualified Federal Subsistence users.

The proposed action should not significantly alter the distribution, migration or location of harvestable wildlife resources. Temporary construction camps may displace animals in the immediate vicinity, but such impacts would occur only during the short time that camps are in use.

Other Resources: The proposed action would not appreciably impact any other harvestable renewable resources such as wood, berries, vegetation or water.

Availability of other lands for the purpose sought to be achieved:

The proposed action includes BLM managed lands. This site was chosen for its location and feasibility to receive microwave signals from other towers in the communications system. Other lands available for the purposes proposed would not be technically feasible. Therefore, no other lands are available for these intended purposes.

FINDING:

This proposed action will not significantly restrict subsistence uses. As a result of the proposed action there are no reasonably foreseeable significant decreases in the abundance or distributions of subsistence resources and no reasonably foreseeable limitations to subsistence access.

Prepared by: _/S/_ Signed copy available in the Administrative Record
Bruce E. Seppi, Wildlife Biologist

Date: March 12, 2012_____

APPENDIX D

BLM Lands with Wilderness Characteristics Inventories

1) Golovin/Darby Mountains Area

2) Otter Creek/Golsovia River Area

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Appendix D

BLM Lands with Wilderness Characteristics Inventories

The TERRA-NW Project would potentially impact two areas within BLM jurisdiction: Otter Creek/Golsovia River Area and Golovin/Darby Mountains Area.

Lands with Wilderness Characteristics (Otter Creek/Golsovia River area)

Introduction

Washington Office Instruction Memorandum No. 2011-154, directs offices to continue to conduct and maintain inventories regarding the presence or absence of wilderness characteristics, and to consider identified lands with wilderness characteristics in land use plans and when analyzing projects under the National Environmental Policy Act (NEPA). This instruction memorandum (IM) contains current Bureau of Land Management (BLM) guidance and general procedures for conducting wilderness characteristics inventories under Section 201 of the Federal Land Policy and Management Act of 1976 (FLPMA). Managing the wilderness resource is part of the BLM's multiple use mission. Lands with wilderness characteristics provide a range of uses and benefits in addition to their value as settings for solitude or primitive and unconfined recreation.

The first step in the Lands with Wilderness Characteristics (LWC) process is to inventory the lands to determine which areas have wilderness characteristics. This narrative outlines the methods used and the results of an inventories conducted for the Golovin/Darby Mountains Area, Otter Creek/Golsovia River Area, and the Safety Roadhouse/Safety Sound Area. The following are only relevant to inventory of public lands to assess their wilderness characteristics and should not be confused with managing of lands with wilderness characteristics.

Methodology

All public lands, including State-selected lands, addressed in the inventory area of the proposed action were inventoried for wilderness characteristics. The inventory evaluated wilderness characteristics as discussed in Section 2(c) of the Wilderness Act of 1964 (16 U.S.C. 1131) and incorporated into the Federal Land Policy and Management Act (43 U.S.C. 1701 *et seq*.).

The criteria for determining wilderness characteristics are established by the IM indicated above. To be identified during the inventory process as having wilderness characteristics, lands must:

- Be a roadless area with over 5,000 acres of contiguous BLM lands;
- Be roadless of less than 5,000 acres of contiguous BLM lands where any of the following apply:

  -They are contiguous with lands which have been formally determined to have wilderness or potential wilderness values, or any Federal lands managed for the protection of wilderness characteristics. Such lands include: designated Wilderness, BLM Wilderness Study Areas, U.S. Fish and Wildlife Service area

Proposed for Wilderness designation, U.S. Forest Service (FS) Wilderness Study Areas or areas of Recommended Wilderness, and National Park Service (NPS) areas Recommended or Proposed for Designation.

-It is demonstrated that the area is sufficient size as to make practicable its preservation and use in an unimproved condition.

-Any roadless island on the public lands.

- Generally appear to have been affected primarily by the forces of nature, and any work of human beings must be substantially unnoticeable, and;
- Have outstanding opportunities for solitude or a primitive and unconfined type of recreation.

Within this inventory boundary, lands were not buffered or setback from the physical edge of the imprint of man or any unnatural portions of the area. Land with wilderness characteristics may immediately abut land whose own character precludes wilderness characteristics. For example, land immediately adjacent to a road may be classified during inventory as possessing wilderness characteristics. The fact that the sight or sound of the road may detract from the wilderness experience on adjacent lands does not, in and of itself, render those lands as not possessing wilderness characteristics.

As long as the wilderness characteristics criteria listed above are met, the following facilities, activities and uses consistent with the Alaska National Interest Lands Conservation Act (ANILCA) may occur on lands having wilderness characteristics: public use cabins; administrative sites and visitor facilities; temporary facilities and equipment for hunting, fishing, and camping; airplane use and landings; and motorboat, snowmobile, and all-terrain motor vehicle use. The critical question to consider is not whether these facilities, activities or uses exist in the relevant tract, but whether they singly or in combination with other factors have altered the character of the land from one that "generally appears to have been affected primarily by the forces of nature" and precludes the land from having "outstanding opportunities for solitude and/or a primitive and unconfined type of recreation." In general, substantial active or remnant evidence of mining or oil and gas extraction facilities, above-ground pipelines or power lines, intensive recreational developments, and similar intrusions on the land may render such lands as inappropriate for identification in the inventory stage as having wilderness characteristics. The inventory process utilized in-house expertise from staff specialists as well as existing land use planning information (Southwest Management Framework Plan, 1981 and the Kobuk-Seward Peninsula Record of Decision and Approved Management Plan, 2008) to assess whether or not specific lands possess wilderness characteristics.

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: Otter Creek/Golsovia River area Acreage: 3.5 million+ acres

1) Is the area of sufficient size? Yes

Description: The area is significantly more than 5,000 contiguous roadless acres of BLM land (see following map). This inventory area is bounded on the east by the Yukon River and Innoko National Wildlife Refuge, to the north by the Unalakleet Wild & Scenic River and Bering Sea, and to the west and south by the Yukon Delta National Wildlife Refuge. The inventory area consist of over 3 million acres of BLM unencumbered and encumbered (State selected) lands within the Golsovia River drainage and adjacent areas. Current State selection priority rankings for this region are listed as 5 through 14, with no imminent land conveyance actions. Surrounding lands also consist of village owned lands and a few Native allotments. There are no recorded federal mining claims within or near the boundary of the inventory area. Even if all selected lands were to be conveyed, the remaining BLM lands, in total, will exceed 5,000 acres. There are no BLM-managed wilderness areas or wilderness study areas within this inventory area.

2) Does the area appear natural? Yes

Description: This inventory area is a contiguous/un-fragmented parcel of BLM land. The area is highly natural in appearance, having been primarily affected by the forces of nature, and contains no observed evidence of people's work. There are no roads or developed trails within or adjacent to the inventory area. Overall, this area retains its primitive character.

3) Does the area have outstanding opportunities for solitude? Yes

Description: The nearest established or active airstrip is located 39 miles away in the village of Unalakleet. There are no year-round road connected communities in the region. Nearly all travel into the area and among communities is by air. Fuel, food, and supplies are delivered by barge or airplane. An established winter trail used primarily by dog sledding activities runs from St. Michael to Unalakleet, bordering the northern edge of the inventory area. There are currently two BLM-authorized commercial recreation activities occurring within the inventory area: commercial dog sledding along the winter route identified above and a big game guide-outfitter operation near the Golsovia River. Both permitted activities do not have any permanent structures or facilities. One sport fishing/hunting lodge in the inventory area is located on private land, along the Anvik River. There are no other permitted activities or man-made developments on BLM lands within the inventory area.

4) Does the area have outstanding opportunities for primitive and unconfined recreation? Yes

Description: The landscape within the Otter Creek/Golsovia River area is very much remote and primitive, consisting of low lying hills with rivers occupying narrow and flat-bottom valleys. Adjacent to these lands are two nationally designated wildlife refuges and one wild and scenic river. Though seasonal weather patterns consist of short cool, wet summers and long cold winters, backcountry recreational and outdoor opportunities include: fishing, hunting, dog sledding, camping, hiking, wildlife viewing, and photography.

There are several species of animals in the region that are recreationally valuable and are sought after by visitors interested in sport fishing, sport hunting, bird watching, and hiking/camping. Even though the eco-tourism industry is very small, it is important for nearby community

economic development and provides some cash to local households. The interim Visual Resource Management objective for this area is Class III.

The overall size, remoteness and lack of any developments in the inventory area provide users with outstanding opportunities for primitive and unconfined recreation.

5) Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)? Yes

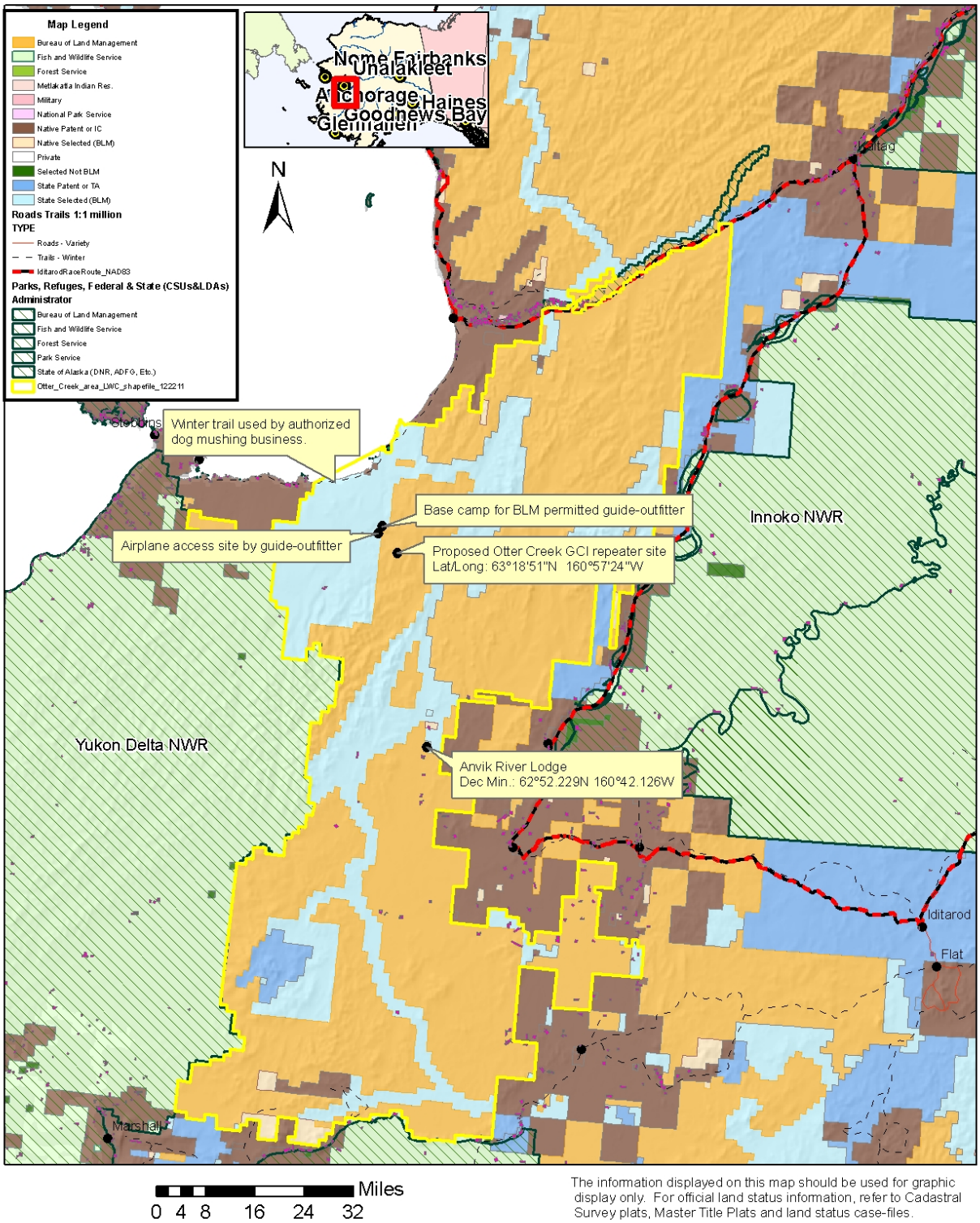
Description: Subsistence species are clearly recognized by natural resource managers in the area to be of major importance where hunting, gathering, and the general dependence on natural resources continues for most residents in the region.

CONCLUSION: The area has wilderness characteristics and is identified as Land with Wilderness Characteristics (LWC).

_____Jeff Kowalczyk_____ ___11/2/2011___
Name Date

_____/s/_____
Signature

Map 1 - Otter Creek area



The information displayed on this map should be used for graphic display only. For official land status information, refer to Cadastral Survey plats, Master Title Plats and land status case-files.

Lands with Wilderness Characteristics (Golovin/Darby Mountains Area)

Current Conditions: Presence or Absence of Wilderness Characteristics

Area Unique Identifier: Golovin/Darby Mountains. area Acreage: 443,140 acres

1) Is the area of sufficient size? Yes

Description: The inventory area is significantly more than 5,000 contiguous roadless acres of BLM land (see following map). This area is bounded on the east by State owned land and to the east, south, and west by Native owned lands. The inventory area consist of over 443,000 acres of BLM unencumbered and encumbered (State and Native selected) lands within the Golovin area. Current State selection priority rankings within the immediate area of the project site are listed as 14, with no imminent land conveyance actions. Even if all selected lands were to be conveyed, the remaining BLM lands, in total, will exceed 5,000 acres (134,383 acres). The inventory area contains a few Native allotments, located mostly along the Fish River. There are no recorded Federal mining claims and a few State mining claims located within the inventory area boundary. There are no BLM-managed wilderness areas or wilderness study areas within the inventory area.

2) Does the area appear natural? Yes

Description: The inventory area is a contiguous/un-fragmented parcel of BLM land. The area is highly natural in appearance, having been primarily affected by the forces of nature, and contains no observed substantially noticeable evidence of people's work. There are no roads or developed trails within or adjacent to the area. Three established winter trails pass through the southern stem end of the inventory area, consisting of the Iditarod National Historic Trail primary route, Iditarod Trail race route, and an Iditarod National Historic Trail connecting route. The three winter trails are not maintained or signed and are only traveled during winter months when there's adequate snow cover. Trail tripod markers, consisting of native spruce poles, can be observed occasionally along the Iditarod Trail race route. There are no other human-made features observed within the area. Overall, this inventory area retains its primitive character.

3) Does the area have outstanding opportunities for solitude? Yes

Description: The nearest active airstrip or airport that a visitor to the inventory area may be affected by is located 60 miles away in Nome. There are no year-round road connected communities in the region. Nearly all travel into the area and among communities is by air. Fuel, food, and supplies are delivered by barge or airplane. The previously mentioned winter routes are used primarily by individual or group dog sledding activities and snowmachine use. There are two BLM-authorized commercial big game guide-outfitters operating within the inventory area, neither of which has established base or spike camps with any permanent structures or facilities. Other short-term permitted use occurs briefly in the winter along the Iditarod Trail race route. There are no other permitted activities or man-made developments on BLM lands within the inventory area.

4) Does the area have outstanding opportunities for primitive and unconfined recreation? Yes

Description: The landscape within the area is very remote and primitive, consisting of low lying hills and the Darby Mountains ranging from 350 feet to almost 3,000 feet high, with several rivers containing a variety of fish. Though seasonal weather patterns consist of short cool, wet summers and long cold winters, backcountry recreational and outdoor opportunities include: hunting, fishing, dog sledding, snow machining, geologic features, and camping. There are several species of animals and fish in the region that are recreationally valuable and are sought after by visitors interested in sport hunting and fishing. The established Visual Resource Management objective for this area is Class III[1]. The overall size, remoteness and lack of any developments in the inventory area provide users with outstanding opportunities for primitive and unconfined recreation.

5) Does the area have supplemental values (ecological, geological, or other features of scientific, educational, scenic or historical value)? Yes

Description: Subsistence species are clearly recognized by natural resource managers in this area to be of major importance where hunting, gathering, and the general dependence on natural resources continues for most residents in the region.

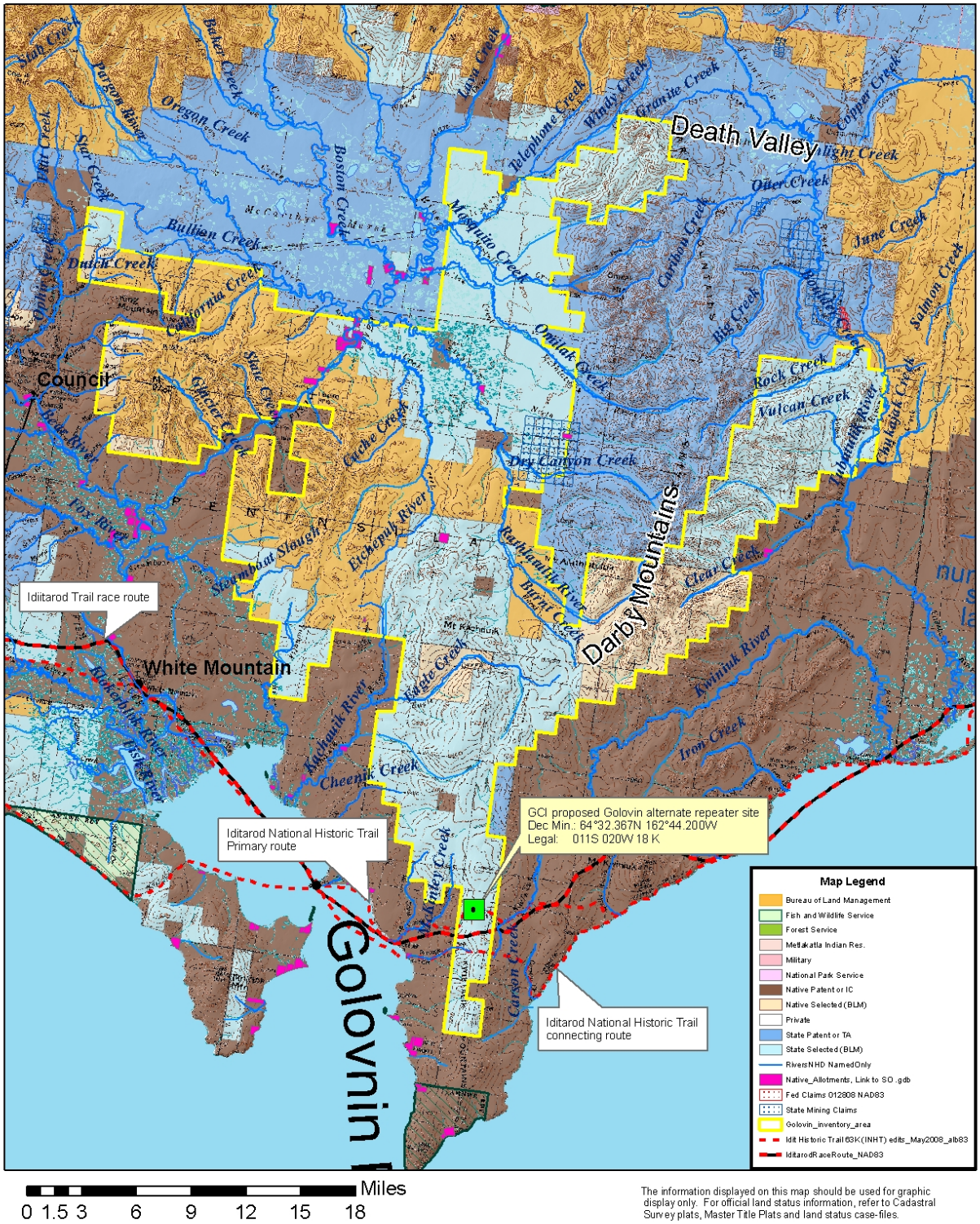
CONCLUSION: The area has wilderness characteristics and is identified as Land with Wilderness Characteristics (LWC).

_____Jeff Kowalczyk_____	___11/4/2011___
Name	Date

_____/s/_____
Signature

[1] Kobuk-Seward Peninsula Record of Decision and Approved Management Plan, September 2008.

Map 1 - Golovin area



The information displayed on this map should be used for graphic display only. For official land status information, refer to Cadastral Survey plats, Master Title Plats and land status case-files.

APPENDIX E

Background Information for the Analysis of Noise

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Background Information for the Analysis of Noise

Fundamentals of Acoustics

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by several variables, including frequency and amplitude. Frequency describes the sound's pitch (tone) and is measured in cycles per second (Hertz [Hz]), while amplitude describes the sound's pressure (loudness). Because the range of sound pressures that occur in the environment is extremely large, it is convenient to express these pressures on a logarithmic scale that compresses the wide range of pressures into a more useful range of numbers. The standard unit of sound measurement is the decibel (dB).

Hz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. When the drum skin vibrates 100 times per second it generates a sound pressure wave that is oscillating at 100 Hz, and this pressure oscillation is perceived by the ear/brain as a tonal pitch of 100 Hz. Sound frequencies between 20 and 20,000 Hz are within the range of sensitivity of the healthy human ear.

As mentioned above, sound level is expressed by reference to a specified national/international standard. The Sound Pressure Level (SPL) is used to describe sound at a specified distance or specific receptor location. In expressing sound pressure level on a logarithmic scale, sound pressure is compared to a reference value of 20 micropascals (µPa). SPL depends not only on the power of the source, but also on the distance from the source and on the acoustical characteristics of the space surrounding the source (absorption, reflection, etc.).

Outdoor sound levels decrease logarithmically as the distance from the source increases. This is due to wave divergence, atmospheric absorption, and ground attenuation. Sound radiating from a source in a homogeneous and undisturbed manner travels in spherical waves. As the sound waves travel away from the source, the sound energy is dispersed over a greater area decreasing the sound pressure of the wave. Spherical spreading of the sound wave from a point source reduces the noise level at a rate of 6 dB per doubling of distance.

Atmospheric absorption also influences the sound levels received by an observer; the greater the distance traveled, the greater the influence of the atmosphere and the resultant fluctuations. Atmospheric absorption becomes important at distances greater than 1,000 ft. The degree of absorption varies depending on the frequency of the sound as well as the humidity and temperature of the air. For example, atmospheric absorption is lowest (i.e., sound carries further) at high humidity and high temperatures and lower frequencies are less readily absorbed (i.e., sound carries further) than higher frequencies. Over long distances, lower frequencies become dominant as the higher frequencies are more rapidly attenuated. Turbulence, gradients of wind and other atmospheric phenomena also play a significant role in determining the degree of attenuation. For example, certain conditions, such as temperature inversions can channel or focus the sound waves resulting in higher noise levels than would result from simple spherical spreading.

Sound from a tuning fork contains a single frequency (a pure tone), but most sounds one hears in the environment do not consist of a single frequency but rather a broad band of many frequencies

differing in sound level. Because of the broad range of audible frequencies, methods have been developed to quantify these values into a single number. The most common method used to quantify environmental sounds consists of evaluating all frequencies of a sound according to a weighting system that is reflective of human hearing characteristics. Human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This process is termed “A weighting”, and the resulting dB level is termed the “A weighted” decibel (dBA). “A weighting" is widely used in local noise ordinances and state and federal guidelines. In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve. Unless specifically noted, the use of A-weighting is always assumed with respect to environmental sound and community noise even if the notation does not show the “A”. Sound levels underwater are not weighted and measure the entire frequency range of interest.

In terms of human perception, a sound level of 0 dBA is approximately the threshold of human hearing and is barely audible by a healthy ear under extremely quiet listening conditions. This threshold is the reference level against which the amplitude of other sounds is compared. Normal speech has a sound level of approximately 60 dBA. Sound levels above about 120 dBA begin to be felt inside the human ear as discomfort progressing to pain at still higher levels. Humans are much better at discerning relative sound levels than absolute sound levels. The minimum change in the sound level of individual events that an average human ear can detect is about 1 to 3 dBA. A 3 to 5 dBA change is readily perceived. An increase (or decrease) in sound level of about 10 dBA is usually perceived by the average person as a doubling (or halving) of the sound’s loudness.

Because of the logarithmic nature of the dB unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules are useful in dealing with sound levels. First, if a sound’s intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example: 60 dB + 60 dB = 63 dB, and 80 dB + 80 dB = 83 dB. Remember however, that it requires about a 10 dB increase to double the perceived intensity of a sound and it is interesting to note that a doubling of the acoustical energy (a 3 dB increase) is at the lower limit of readily perceived change.

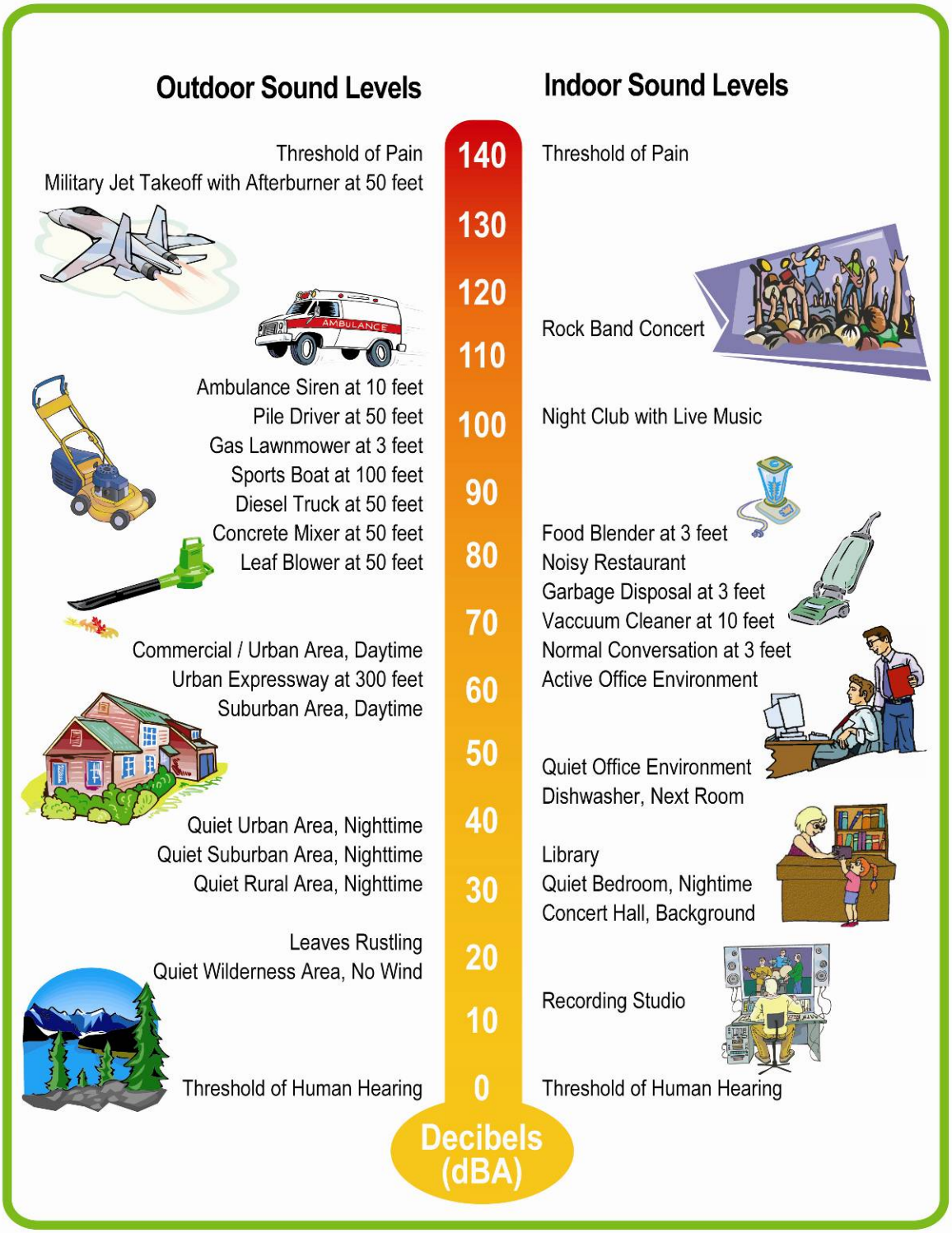
Although dBA may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most ambient environmental noise includes a mixture of noise from nearby and distant sources that creates an ebb and flow of sound including some identifiable sources plus a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) is used to describe sound that is constant or changing in level. L_{eq} is the energy-mean dBA during a measured time interval. It is the “equivalent” constant sound level that would have to be produced by a given constant source to equal the acoustic energy contained in the fluctuating sound level measured during the interval. In addition to the energy-average level, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum L_{eq} (L_{max}) and minimum L_{eq} (L_{min}) indicators that represent the root-mean-square (RMS) maximum and minimum noise levels measured during the monitoring interval. The L_{min} value obtained for a particular monitoring location is often called the acoustic floor for that location.

To describe the time-varying character of environmental noise, the statistical or percentile noise descriptors L_{10}, L_{50}, and L_{90} may be used. These are the noise levels equaled or exceeded during 10 percent, 50 percent, and 90 percent of the measured time interval. Sound levels associated

with L_{10} typically describe transient or short-term events, L_{50} represents the median sound level during the measurement interval, while L_{90} levels are typically used to describe background noise conditions.

The Day-Night Average Sound Level (L_{dn} or DNL) represents the average sound level for a 24-hour day and is calculated by adding a 10 dB penalty only to sound levels during the night period (10:00 p.m. to 7:00 a.m.). The L_{dn} is the descriptor of choice used by nearly all federal, state, and local agencies throughout the United States to define acceptable land use compatibility with respect to noise. Because of the time-of-day penalties associated with the L_{dn} descriptor, the L_{dn} dBA value for a continuously operating sound source during a 24-hour period will be numerically greater than the dBA value of the 24-hour L_{eq}. Thus, for a continuously operating noise source producing a constant noise level operating for periods of 24 hours or more, the L_{dn} will be 6 dB higher than the 24-hour L_{eq} value. To provide a frame of reference, common sound levels, in terms of L_{eq}, are presented in Figure1, "Sound Levels of Typical Noise Sources and Noise Environments".

Figure 1. Sound Levels of Typical Noise Sources and Noise Environments



Source: URS Corporation, 2008

Applicable Laws, Ordinances, Regulations, and Standards (LORS)

The following discussion addresses relevant LORS regarding noise emissions and exposure. The purpose of this section is to provide the reader with a greater understanding of the regulatory environment relating to environmental noise. Although the proposed project is not directly subject to these LORS, many activities that influence the existing noise environment are subject to various components of these LORS. Because of this influence, these LORS help to define the existing noise environment.

There are a number of laws and guidelines at the federal level that direct the consideration of a broad range of noise issues. Because the project does not fall within the purview of the Federal Energy Regulatory Commission, the proposed project is not directly subject to federal noise regulations other than the Occupational Safety and Health Administration (OSHA). For perspective, several of the more significant noise-related federal regulations and guidelines are provided below:

- Noise Control Act of 1972 (42 U.S.C 4910)

  This Act establishes a national policy to promote an environment for all Americans free from noise that jeopardizes their health and welfare. To accomplish this, the Act establishes a means for the coordination of Federal research and activities in noise control, authorizes the establishment of Federal noise emissions standards for products distributed in commerce, and provides information to the public respecting the noise emission and noise reduction characteristics of such products.

- Environmental Protection Agency (EPA) recommendations in "Information on Levels of Environmental Noise Requisite to Protect Health and Welfare with an Adequate Margin of Safety", NTIS 550\9-74-004, USEPA, Washington, D.C., March 1974.

  In response to a federal mandate, the U.S. EPA provided guidance in this document, commonly referenced as the, "Levels Document," that establishes an Ldn of 55 dBA as the requisite level, with an adequate margin of safety, for areas of outdoor uses including residences and recreation areas. This document does not constitute U.S. EPA regulations or standards, but identifies safe levels of environmental noise exposure without consideration for achieving these levels or other potentially relevant considerations. It is intended to "provide State and Local governments as well as the Federal Government and the private sector with an informational point of departure for the purpose of decision making." The agency is careful to stress that the recommendations contain a factor of safety and do not consider technical or economic feasibility issues, and therefore should not be construed as standards or regulations.

- Occupational Safety and Health Administration (OSHA) Occupational Noise Exposure; Hearing Conservation Amendment (FR 48 (46), 9738 – 9785 (1983).

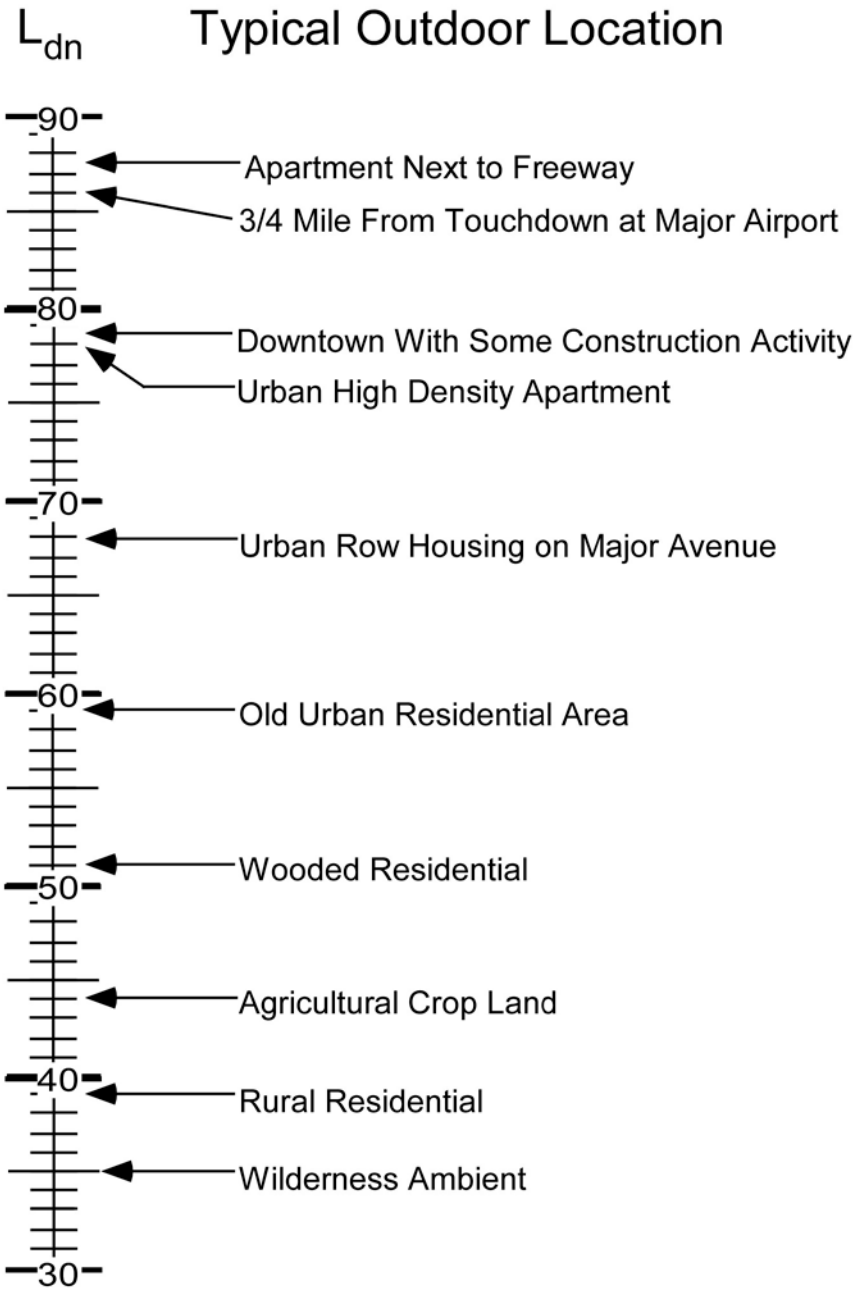
  The standard stipulates that protection against the effects of noise exposure shall be provided for employees when sound levels exceed 90 dBA over an 8-hour exposure period. Protection shall consist of feasible administrative or engineering controls. If such controls fail to reduce sound levels to within acceptable levels, personal protective equipment shall be provided and used to reduce exposure of the employee. Additionally, a Hearing Conservation Program must be instituted by the employers whenever employee noise exposure equals or exceeds the Action Level of an 8-hour time-weighted average

(TWA) sound level of 85 dBA. The Hearing Conservation Program requirements consist of periodic area and personal noise monitoring, performance and evaluation of audiograms, provision of hearing protection, annual employee training, and record keeping.

The State of Alaska does not have statewide noise regulations. Boroughs, counties and cities may adopt a general plan or noise ordinance that establishes noise standards. The proposed project sites will be Kulukak Mountain, Caribou Ridge and Cone Mountain. The staging areas for these three sites would be located in Kulukak Bay, the City of Togiak and Carter Bay, respectively. None of the local jurisdictions potentially impacted by the proposed project have adopted noise regulations applicable to the project.

In the absence of state or local guidelines, the most relevant guidelines are federal guidelines provided by the U.S. Environmental Protection Agency (EPA) in "Information of Levels on Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." (EPA 550/9-74-004). Although this document does not constitute EPA regulations or standards, it does identify safe levels of environmental noise exposure. These levels are provided without consideration for the technical or economic feasibility issues that may be associated with achieving these levels. In these guidelines, an L_{dn} of 55 dBA is recommended in order to maintain an "adequate margin of safety for areas of outdoor uses including residences and recreation areas" (EPA 1974). 55 dBA L_{dn} is equivalent to a constant, steady-state L_{eq} of 49 dBA. Typical community noise levels, in terms of L_{dn}, are presented in Figure 2, Typical Outdoor Noise Levels in Terms of L_{dn}. As shown in this figure, typical outdoor noise levels vary by human activity and population density.

Figure 2. Typical Outdoor Noise Levels in Terms of L_{dn}



Source: Adapted from "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety", EPA, 1974

References

42 United States Code (U.S.C.). The Noise Control Act of 1972, as amended, 42 U.S.C. § 4901 § 4918 *et seq.*

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Harris, Cyril M., ed. 1991. *Handbook of Acoustical Measurements and Noise Control*. Third Edition. McGraw-Hill, Inc. New York, NY.

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United States Code of Federal Regulations. Title 18 § 157.206. Federal Energy Regulatory Commission.

APPENDIX F

Visual Contrast Rating Report

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Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 4.5 miles from proposed project
2. Key Observation Point: 1	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills; flat valley bottom	Short; rough	historic shed
LINE	Bold, Diagonal, horizontal	Curvilinear; Bold	Weak; simple
COLOR		Brown; Maroon; Vivid	Grey/Tan
TEX-TURE	smooth	Directional; Coarse	Smooth; medium texture

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower; auxiliary buildings
LINE	No Change	No Change	Vertical; weak
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X			X	
	LINE				X				X			X	
	COLOR				X				X			X	
	TEXTURE				X				X			X	

2. Does project design meet visual resource management objectives? X Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
_X__Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

The proposed project is expected to achieve VRM Class III standards. The element contrast can be seen but does not attract attention due to the large scale of the landscape. The facility would not be equipped with night lighting and consequently would not create visual contrast during periods of darkness.

Additional Mitigating Measures (See item 3)

Paint facilities white, with a non-reflective matte finish.

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 3.0 miles from proposed project location
2. Key Observation Point: 2	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills; flat valley bottom	Short; rough	Tripods
LINE	Bold, Diagonal, horizontal	Curvilinear; Bold	Weak; simple
COLOR		Brown; Maroon; Vivid	Grey/Tan
TEX-TURE	smooth	Directional; Coarse	Smooth; medium texture

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower; auxiliary buildings
LINE	No Change	No Change	Vertical; weak
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X			X	
	LINE				X				X			X	
	COLOR				X				X			X	
	TEXTURE				X				X			X	

2. Does project design meet visual resource management objectives? X Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
_X__Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

The proposed project is expected to achieve VRM Class III standards. The element contrast can be seen but does not attract attention due to the large scale of the landscape. The facility would not be equipped with night lighting and consequently would not create visual contrast during periods of darkness.

Additional Mitigating Measures (See item 3)

Paint facilities, with non-reflective matte finish.

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 1.3 miles from proposed project location
2. Key Observation Point: 3	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills; flat valley bottom	Short; rough	N/A
LINE	Bold, Diagonal, horizontal	Curvilinear; Bold	N/A
COLOR		Brown; Maroon; Vivid	N/A
TEX-TURE	smooth	Directional; Coarse	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower; auxiliary buildings
LINE	No Change	No Change	Vertical; angular; weak
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM X_LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X			X	
	LINE				X				X		X		
	COLOR				X				X			X	
	TEXTURE				X				X		X		

2. Does project design meet visual resource management objectives? X Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended _X_Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

The proposed project is expected to achieve VRM Class III standards. The element contrast can be seen and may attract attention. However, views are expected to be intermittent due to topographic shielding. The facility would not be equipped with night lighting and consequently would not create visual contrast during periods of darkness.

Additional Mitigating Measures (See item 3)

Paint facilities off-white, matte finish.

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 2.2 miles from proposed project location
2. Key Observation Point: 4	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills; flat valley bottom	Short; rough	N/A
LINE	Bold, Diagonal, horizontal	Curvilinear; Bold	N/A
COLOR		Brown; Maroon; Vivid	N/A
TEX-TURE	smooth	Directional; Coarse	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower
LINE	No Change	No Change	weak
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM XLONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X			X	
	LINE				X				X			X	
	COLOR				X				X			X	
	TEXTURE				X				X			X	

2. Does project design meet visual resource management objectives? X Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended _X_Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

The proposed project is expected to achieve VRM Class III standards. The element contrast can be seen but does not attract attention. The facility would not be equipped with night lighting and consequently would not create visual contrast during periods of darkness.

Additional Mitigating Measures (See item 3)

Paint facilities off-white, non-reflective matte finish.

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 4.2 miles from proposed project location
2. Key Observation Point: 5	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills; flat valley bottom	Short; rough	N/A
LINE	Bold, Diagonal, horizontal	Curvilinear; Bold	N/A
COLOR		Brown; Maroon; Vivid	N/A
TEX-TURE	smooth	Directional; Coarse	N/A

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower; auxiliary buildings
LINE	No Change	No Change	Vertical; angular; weak
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM XLONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X			X	
	LINE				X				X			X	
	COLOR				X				X			X	
	TEXTURE				X				X			X	

2. Does project design meet visual resource management objectives? X Yes ___No
(Explain on reverses side)

3. Additional mitigating measures recommended
_X_Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

The proposed project is expected to achieve VRM Class III standards. The element contrast can be seen but does not attract attention. The facility would not be equipped with night lighting and consequently would not create visual contrast during periods of darkness.

Additional Mitigating Measures (See item 3)

Paint facilities off-white, non-reflective matte finish.

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 0.4 miles from proposed project location
2. Key Observation Point: 6	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Rolling hills; flat valley bottom	Short; rough	No structures visible.
LINE	Bold, Diagonal, horizontal	Curvilinear; Bold	
COLOR	White / brown	Brown; Maroon; Vivid	
TEX-TURE	smooth	Clumped; Directional; Coarse	

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower
LINE	No Change	No Change	rounded
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X	X			
	LINE				X				X	X			
	COLOR				X				X			X	
	TEXTURE				X				X	X			

2. Does project design meet visual resource management objectives? X Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended _X_Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

See Visual Resource Impact Technical Memo for analysis of conformance with VRM Class III objective.

Additional Mitigating Measures (See item 3)

Paint facilities off-white, with a non-reflective matte finish.

Form 8400-4

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
VISUAL CONTRAST RATING WORKSHEET

Date: December 9, 2011
District/ Field Office: Anchorage DO
Resource Area:
Activity (program): Lands and Realty

SECTION A. PROJECT INFORMATION

1. Project Name: Terra NW	4. Location Township_____11S____	5. Location Sketch 1.0 miles from proposed project location
2. Key Observation Point: 7	Range_____20W_____	
3. VRM Class: III	Section___17_____	

SECTION B. CHARACTERISTIC LANDSCAPE DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	Broad, flat hilltop	No vegetation visible	No structures visible.
LINE	Angular; blocky		
COLOR	White / brown		
TEX-TURE	Rough; coarse		

SECTION C. PROPOSED ACTIVITY DESCRIPTION

	1. LAND/WATER	2. VEGETATION	3. STRUCTURES
FORM	No Change	No Change	Communication tower
LINE	No Change	No Change	rounded
COLOR	No Change	No Change	White / grey
TEX-TURE	No Change	No Change	smooth

SECTION D. CONTRAST RATING __SHORT TERM X LONG TERM

1. DEGREE OF CONTRAST		FEATURES											
		LAND/WATER BODY (1)				VEGETATION (2)				STRUCTURES (3)			
		STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE	STRONG	MODERATE	WEAK	NONE
ELEMENTS	FORM				X				X			X	
	LINE				X				X			X	
	COLOR				X				X			X	
	TEXTURE				X				X			X	

2. Does project design meet visual resource management objectives? X Yes ___No (Explain on reverses side)

3. Additional mitigating measures recommended _X_Yes ___No (Explain on reverses side)

Evaluator's Names / Date
Louise Kling
December 09, 2011

SECTION D. (Continued)

Comments from item 2.

The proposed project is expected to achieve VRM Class III standards. The majority of the structure and all auxiliary facilities are eclipsed by topography. The element contrast can be seen but does not attract attention. The facility would not be equipped with night lighting and consequently would not create visual contrast during periods of darkness.

Additional Mitigating Measures (See item 3)

Paint facilities off-white, with a non-reflective matte finish.

APPENDIX G

Cultural Resources Survey of Sites Associated with the TERRA-NW Project

Report prepared for:
URS Corporation
700 G Street Suite 500
Anchorage AK, 99501

Report prepared by:
Morgan Blanchard, Ph.D., R.P.A.

BLM ARPA Permits AA-092968 and AA-093059

Northern Land Use Research, Inc.
Peter M. Bowers, M.A., R.P.A.
Principal Investigator
234 Front Street
Fairbanks, Alaska 99701

February 2012

RESTRICTED DATA NOTICE

The locations of cultural resources given in this report are provided to facilitate environmental and engineering planning efforts only. Under the provisions of the Archaeological Resources Protection Act and the National Historic Preservation Act, site location information is restricted in distribution; disclosure of such information is exempt from requests under Federal and State freedom of information laws. This report is not a public document. It is intended for release to URS Corporation, UNICOM, GCI, the Bureau of Land Management, the U.S. Fish and Wildlife Service, the Alaska State Historic Preservation Office, the Hee-Yea-Lingde Corporation, the Unalakleet Native Corporation, the Shaktoolik Native Corporation and any other appropriate Alaska Native corporations or entities.

This report contains confidential cultural resource site locations. It may be viewed by persons with authorized access by contacting the BLM Historical Archaeology Liaison Jenny H. Blanchard at (907) 267-1246.

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APPENDIX H

TERRA SW Alternative Power Sources Considered

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Appendix H

TERRA SW Alternative Power Sources Considered

Introduction

This appendix presents the analysis and discussion from the TERRA SW project on alternative power sources that were considered for remote microwave repeater sites but dismissed as a result of technical feasibility.

2.2.4.2 Alternative Power Sources

The use of alternative fuels and renewable energy as an alternative power source for the Mountaintop Power Module (module) was evaluated based upon the availability of resources to meet module power needs, as well as the feasibility and cost of implementation and maintenance. The following sections evaluate the potential for use of propane, solar, and wind energy. A concluding section examines the potential for a hybrid system, in which alternative, renewable energy sources might supplement a diesel generator system, with a reduction in diesel fuel requirements.

For each of the three microwave repeater sites the energy requirements (based upon 15 months) for the modules are estimated to be 68,492 kilowatt hours per year (Electric Power Systems Inc., 2010). The microwave repeater sites are expected to be un-manned with scheduled maintenance visits expected twice a year (in the spring and fall). Alternative power sources examined included propane fuel, and solar and wind power generation. Hydroelectric and geothermal renewable energy sources were not evaluated as they are highly site specific and are not practical within the vicinity of the three proposed microwave repeater sites.

Use of propane fuel would result in some environmental benefits, including a longer shelf life, cleaner emissions (particularly particulate matter and carbon monoxide), and quieter operation as compared to diesel fuel. Table 2-5 illustrates some of the key aspects in the comparison of the proposed use of diesel fuel with the alternate use of propane fuel. Based on the estimated yearly energy requirements (15 months), the total estimated cost of fuel and bulk storage related requirements were assessed. The number of trips is based on a helicopter lifting capacity of 8,500 lbs (Electric Power Systems Inc., 2010).

As demonstrated in Table 2-5, despite the lower cost of propane fuel, a nearly 3.5 greater volume of fuel would be required, more storage capacity would be necessary, and/or refueling trips would be more frequent. According to the UUI plan of development, for each month of operation, approximately 15 propane tanks of 200 pounds capacity would be required, with a storage foot print approximately equal to that of the tanks needed for an annual supply of diesel (UUI, 2011). Thus, either a larger storage footprint would be required, or monthly resupply trips would be necessary. Given seasonal weather conditions, and the logistics challenges of mobilizing a helicopter to the site on a frequent basis, monthly resupply is not feasible, and a larger storage capacity would be required on site. Based on these factors, propane as a fuel supply was dismissed from further analysis.

Table 2-5. Comparison of Fuel Types Considered (per site)

	Diesel	Propane
Energy Required (kWh/yr)	68,492	68,492
Required Volume (gal/yr)	6,534	23,376
Price per Gallon	$4.00	$2.62
Price per Year	$26,136	$61,246
Weight (lbs)	47,045	98,883
Fill Trips	5.53	11.63

Source: Electric Power Systems Inc., 2010
Notes:
kWh/yr: Kilowatt hour per year
gal/yr: Gallon per year
lbs: pounds

Solar power generation was also evaluated as an alternative to the proposed project. Solar insolation data generated by the National Renewable Energy Laboratory (NREL) was evaluated in the locations of the proposed towers. The annual insolation values (provided on grid cells of approximately 40 km by 40 km) represent watt hours (Wh). The insolation values represent the resource available to a flat plate collector, such as a photovoltaic (PV) panel, oriented due south at an angle from horizontal equal to the latitude of the collector location. This is typical practice for PV system installation, although other orientations are also used. The data was developed from the Climatological Solar Radiation Model. The Climatological Solar Radiation Model was developed by the National Renewable Energy Laboratory for the U.S. Department of Energy (NREL, 2010).

The values present on the tower sites range from 3,276 Wh to 3,517 Wh . These values are not suitable for sustained solar power generation and would not meet the module need of approximately 68,492 kWh/yr. Preliminary analysis indicates that comparatively large solar panels would be needed, on the order of 100 sq ft for a panel to produce 1200 watts of generated power. The panels would be required to be installed in an on-edge configuration, which poses a significant risk in regard to wind loads at the remote mountain top sites. Additionally, the values presented are annual averages and do not account for seasonal fluctuations in solar insolation. During winter months at module locations, the insolation values are expected to dramatically decrease. Therefore, solar power is not reliable as a sole energy source for the modules. Additional concerns include the ability of solar technology to withstand extreme weather and high icing, which may damage the equipment. Implementation of a solar power generation system may require additional maintenance trips for mirror washing and other trouble shooting, beyond the bi-yearly planned maintenance. Both the increased maintenance and added costs of the solar power infrastructure would increase project costs and logistics challenges. As such, solar energy would not be expected to provide reliable power to the tower sites. This alternative does not meet the stated purpose of delivering reliable and affordable broadband service and was dismissed from further analysis.

Wind power generation as an alternate power source was evaluated as part of this assessment. The availability of wind resources was evaluated at the locations of the proposed towers using data compiled by NREL. The national wind resource assessment of the United States was created for the U.S. Department of Energy in 1986 by the Pacific Northwest Laboratory and is

documented in the Wind Energy Resource Atlas of the United States, October 1986. The wind resource assessment was based on surface wind data, coastal marine area data, and upper-air data, where applicable. In data-sparse areas, three qualitative indicators of wind speed or power were used when applicable: topographic/meteorological indicators (e.g., gorges, mountain summits, sheltered valleys); wind deformed vegetation; and eolian landforms (e.g., playas, sand dunes). The data was evaluated at a regional level to produce 12 regional wind resource assessments; the regional assessments were then incorporated into the national wind resource assessment (NREL, 2010).

According to NREL, wind power density in the vicinity of the tower sites ranges from 173 watts per meter squared (W/m^2) to 1,901 W/m^2 (corresponding to wind speeds between 12.5 and 26.6 miles per hour [mph]) (Figure 2-11). The large range may be predominantly attributed to the topography of the area and the mountaintops, where the towers would be located, and would have wind power densities on the higher end of the spectrum. The degree of certainty with which the wind power class can be specified depends on three factors: the abundance and quality of wind data; the complexity of the terrain; and the geographical variability of the resource. Wind power densities as low as 400 W/m^2 are expected to be suitable for utility-scale wind generation, and rural applications of wind power generation are feasible at even lower wind power densities (NREL, 2010).

Based upon the NREL data, it is expected that the average availability of wind as a power generation source could provide the microwave repeater facility power supply a majority of the time. However, due to the modules highly reliable and continuous power and load requirements, at minimum, a backup diesel supply would be required in conjunction with wind power generation as wind power generation is not expected to have the same level of reliability as a fuel-driven power generation. Additionally, extreme weather conditions and high icing are anticipated to curtail output and damage equipment (Electric Power Systems Inc., 2010) and implementation of a wind power generation system may require additional maintenance trips for trouble shooting, beyond the bi-yearly planned maintenance. The increased cost of developing a wind power generation system in addition to a back-up diesel fuel system in concert with the anticipated increased maintenance, could impact the affordability of the proposed telecommunications. The implementation of wind generation could increase impacts from noise and avian collisions, and contribute to a larger degree of change to the aesthetic values of the viewshed around the towers. Therefore, this alternative was dismissed from further analysis.

While propane, solar, and wind energy are not feasible as standalone power sources for the remote microwave repeater facilities, hybrid or dual source systems were also considered. In this design, solar and wind energy might be considered as supplemental sources, producing a portion of the total energy required, with a commensurate reduction in the demand on the diesel generators and a reduction in the quantity of diesel fuel required each year. For both solar and wind energy, a hybrid system would introduce considerable technical complexity into synchronizing and switching the power source, through which the diesel generators would go to standby, while the alternative energy source provides power. At a remote, unstaffed site, with seasonally extreme weather, this technical complexity would result in a significant impact on stability and reliability of the power generation system. In addition, both alternative energy sources are intermittent, and therefore significant battery storage capacity would be required.

As with the use of solar power as the sole generation source, using solar power as a supplemental source poses significant risk in regards to wind loads at the remote mountain top sites. Wind energy systems may be feasible at the sites although wind, weather and icing conditions are not currently known for the mountain-top sites. UUI plans to install weather stations at the three sites to measure wind speed, barometric pressure, precipitation and air-water content. UUI proposes to reevaluate the potential for supplemental wind energy when sufficient site-specific data are available.

APPENDIX I

Required Operating Procedures

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TABLE OF CONTENTS

TABLE OF CONTENTS ..... I-i

Appendix I Required Operating Procedures I-1

Introduction I-1

1. Soils 1-1
   a) Objective Soils-1 1-1
2. Vegetation 1-2
   a) Objective Veg-1 1-2
   b) Objective Veg-2 1-3
3. Water, Riparian, and Wetlands 1-3
   a) Objective Water-1 1-3
   b) Objective Water-2 1-3
   e) Objective Water-5 1-3
4. Special Status Species 1-4
   a) Objective Special Status Species-1 1-4
5. Fish and Wildlife 1-5
   a) Objective Fish and Wildlife-1 1-5
   c) Objective Fish and Wildlife-3 1-5
6. Subsistence 1-5
   a) Objective Subsistence-1 1-5
7. Cultural and Paleontological 1-6
   a) Objective Cultural and Paleontological-1 1-6
   b) Objective Cultural and Paleontological-2 1-6
8. Visual Resource Management 1-6
   a) Objective Visual Resource Management-1 1-6
9. Fire Management 1-7
   a) Objective Fire Management-1 1-7

10. Hazardous Materials and Waste Management 1-8
a) Objective Hazardous Materials and Waste Management-1 1-8
b) Objective Hazardous Materials and Waste Management-2 1-8
c) Objective Hazardous Materials and Waste Management-3 1-9

Appendix I

Required Operating Procedures

Introduction

Required operating procedures (ROP) are requirements, procedures, management practices, or design features that BLM adopts as operational requirements. ROPs apply to all permitted activities as appropriate, including FLPMA leases and permits, Special Recreation Permits, oil and gas operations, coal exploration, mining Plans of Operation, and Right-of-Way authorizations. Obviously, not all ROPs will apply to all permitted activities. ROPs are selected during the site-specific analysis that occurs during activity level planning if they are needed to meet the stated resource objective. They are applied as conditions of approval to permits. ROPs are not selected as a condition of the permitted activities if the applicant has included them as part of the proposal or has identified an alternative method to meet the resources objective.

ROPs have been developed to ensure that the Alaska Statewide Land Health Standards (AK LHS) developed by the BLM Resource Advisory Council and signed by the State Director on March 2, 2004 (I.M. AK 2004-023) are met in carrying out permitted activities and management practices. Two land use plans, the Southwest Management Framework Plan (1987) and the Kobuk Seward Peninsula Resource Management Plan (Sept. 2008) are applicable to the alternatives in this EA. Only the Kobuk Seward Peninsula Resource Management Plan developed ROPs. The Southwest Management Framework Plan identified broad categories of land use and recommended management options. Given the realities of land management and changing land ownership patterns, the ROPs may be modified slightly during the NEPA and permitting process to fit site specific conditions.

The following ROPS have been identified as being applicable to the environmental consequences identified in this EA. They are categorized as found in the Kobuk Seward Peninsula Resource Management Plan (Sept. 2008) Record of Decision and have been modified slightly to meet site specific conditions.

1. Soils

a) Objective Soils-1

Minimize soil erosion by stabilizing disturbed areas as soon as possible. Where permitted operations result in surface disturbance, return land to its pre-disturbance condition to the extent possible.

ROP Soils-1a. All organic material will be saved in a separate area from overburden for future use.

ROP Soils-1b. All overburden will be stockpiled and saved for respreading over tailings.

ROP Soils-1c. All overburden piles will be shaped and stabilized to prevent erosion.

ROP Soils-1d. Final shape of respread tailing and overburden will approximate the shape of the surrounding terrain.

ROP Soils-1e. Disturbed stream banks will be recontoured, revegetated, or other protective measures will be taken to prevent soil erosion into adjacent waters.

ROP Soils 1-f. Disturbed areas will be recontoured and revegetated as per an approved reclamation plan. Revegetation will occur through seeding of native seed or by providing for soil conditions that allow the site to re-vegetate naturally, whichever provides the most effective means of reestablishing ground cover and minimizing erosion. Revegetation plans will be approved prior to implementation. The final land surface will be scarified to provide seed traps and erosion control.

ROP Soils 1-g. Surface disturbing proposals involving construction on slopes greater than 25 percent will include an approved erosion control strategy, topsoil segregation/restoration plan, be properly surveyed and designed by a certified engineer and approved by the BLM prior to construction and maintenance.

2. Vegetation

a) Objective Veg-1

Treatments to alter the vegetative composition of a site, such as prescribed burning, seeding, or planting will be based on the potential of the site and will: retain or promote infiltration, permeability, and soil moisture storage; contribute to nutrient cycling and energy flow; protect water quality; help prevent the introduction and spread of noxious weeds; contribute to the diversity of plant communities, and plant community composition and structure; and support the conservation of threatened and endangered species, other special status species, and species of local importance.

ROP Veg-1a. Vegetation treatments will be designed to achieve desired conditions clearly described in a reclamation plan which must be approved by BLM prior to implementation. Desired conditions will be based on the ecological capability of a given site and will be expressed as cover types or seral stages within cover types, based on management objectives.

ROP Veg-1b. Vegetation treatments will be designed to prevent introduction of noxious weeds. Project plans will contain a section on known occurrence of noxious weeds within project area and a mitigation strategy for prevention, monitoring and treatment.

ROP Veg-1c. Seeding and planting non-native vegetation may be used in those cases where native species are not available in sufficient quantities; where native species are incapable of maintaining or achieving the objective; or where non-native species are essential to the functional integrity of the site, with specific approval from the Administrative Officer.

ROP Veg-1d. In order to eliminate, minimize, or limit the spread of noxious weeds, only certified feed and mulch (hay cubes, hay pellets, straw, etc,) will be permitted on BLM lands.

ROP Veg-1e. Operators must prevent and control noxious weed infestations. Noxious weeds in Alaska are listed under Alaska Statute 11 AAC 34.020 or other statewide lists that may be developed in the future.

b) Objective Veg-2

Minimize disturbance to vegetative resources from permitted activities.

ROP Veg-2a. Where feasible, existing roads and trails will be utilized.

ROP Veg-2b. Bull-dozing of tundra mat and vegetation is prohibited unless there is no feasible alternative (e.g., lode mining), as approved by the AO. If trenching is required, use equipment that minimizes trench width. Clearing of drifted snow is allowed to the extent that the tundra mat is not disturbed.

ROP Veg-2f. When ground operations are required in snow-free months, routes that utilize naturally hardened sites will be selected to avoid the need for trail braiding. The permittee will work with the AO on specifying vehicle types and methods to minimize vegetation and soil disturbance, such as use of air or water craft, utilizing existing roads or trails, or use of low ground pressure vehicles.

ROP Veg-2g. Permanent facilities will be designed and located to minimize the development footprint.

ROP Veg-2h. Off-highway Vehicle use associated with permitted activities will comply with OHV designations in the area. The use of OHVs associated with permitted activities will be allowed under appropriate stipulations as approved by the AO.

3. Water, Riparian, and Wetlands

a) Objective Water-1

Manage human use to achieve and maintain water quality standards and avoid waste management problems and water quality impacts.

ROP Water-1a. Projects will be designed to protect water quality and comply with Federal and State water quality standards.

ROP Water-1b. Management practices will include public education and construction of toilet facilities where appropriate.

b) Objective Water-2

Land management practices will be directed to avoid or minimize adverse impacts upon the hydrological, habitat, subsistence, and recreational values of public wetlands.

ROP Water-2a. Activities in wetlands will comply with Federal and State permit requirements for alteration of wetlands.

e) Objective Water-5

Provide for maintenance of proper functioning condition in riparian areas and protection of water quality by minimizing impacts of other permitted activities and vegetation treatments.

ROP Water-5a. Structural and vegetative treatment in riparian and wetland areas will be compatible with the capability of the site, including the system's hydrologic regime, and will contribute to maintenance or restoration of proper functioning condition.

ROP Water 5b. Refueling of equipment will not be conducted in riparian areas or within 500 feet of the active floodplain of any fish-bearing waterbody or within 100 feet from non-fish bearing waterbodies. The AO may allow storage and operations at areas closer than the stated distance if properly designed to account for local hydrologic conditions.

ROP Water 5c. The design and location of permanent oil and gas facilities within 500 feet of fish-bearing waterbodies or within 100 feet of non fish-bearing waterbodies will only be approved on a case-by-case basis if the lessee can demonstrate that impacts to fish, water quality, and aquatic and riparian habitats are minimal.

ROP Water 5d. New structures will be located away from riparian or wetland areas if they conflict with achieving or maintaining riparian or wetland function. Existing structures will be used in a way that does not conflict with riparian or wetland functions or be relocated or modified when incompatible.

4. Special Status Species

a) Objective Special Status Species-1

Fish, wildlife, sensitive plants, and habitat will be managed to ensure compliance with the Endangered Species Act (ESA) and to ensure progress towards recovery of listed threatened or endangered species.

ROP SS-1a. The planning area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status. BLM may recommend modifications to proposals to further its policy of avoiding BLM-approved activity that will contribute to a need to list such a species. BLM may either require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed, threatened, or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the ESA as amended, 16 U.S.C. 1531 et seq., including completion of any required procedure for conference or consultation.

ROP SS-1b. Within the breeding range of Spectacled eiders, habitat in the project area will be assessed to determine if eiders are likely to use the area for nesting or brood rearing. The following activities will be prohibited within 650 feet (200 meters) of spectacled eider nest sites; 1).Ground level activity (by foot or vehicle) from May 20 through August 1., 2) Construction of permanent facilities, placement of fill, or alteration of habitat., 3) Introduction of high noise levels within 200 meters of nest sites (from activities at potentially greater distances), May 20 through August 1.

These may include but are not limited to: airports, blasting, and compressor stations.

ROP SS-1c. Within the breeding range of Kittlitz's murrelet, habitat in the project area will be assessed to determine if murrelet's are likely to use the area for nesting. If nests are found, minimize ground-level disturbance and activity within identified areas of suitable habitat during June–August.

ROP SS-1d. Where practical, use will be redirected, as necessary, to protect Federal and State listed and candidate Threatened and Endangered species habitat, to enhance indigenous animal population, and to otherwise maintain public land health through avoidance of sensitive habitat.

ROP SS-1e. Where populations or individual sensitive status plant species are located, take measures to protect these populations or individuals through site-specific buffers or management prescriptions.

5. Fish and Wildlife

a) Objective Fish and Wildlife-1

Avoid human-caused increases in populations of predators of ground nesting birds.

ROP FW-1a. The best available technology will be used to prevent permanent facilities from providing nesting, denning, or shelter sites for ravens, raptors, and foxes in areas where ground nesting populations are sensitive to increased predation.

c) Objective Fish and Wildlife-3

Avoid heavy concentration of activities in sensitive fish, wildlife, and plant habitats.

ROP FW-3b. Whenever possible, operations that require vegetation removal will avoid the migratory bird-nesting period of May 1 to July 15 (Area specific dates: May 20-July 20 for Seward Pen; June 1-July 31 for Northern region; and May 1-July 15 for interior). If no feasible alternatives exist, assessment will be conducted to determine bird species present, significance of potential impacts, and possible mitigation measures (FWS Advisory: Recommended Time Periods for Avoiding Vegetation Clearing in Alaska to Protect Migratory Birds. September 2005.).

6. Subsistence

a) Objective Subsistence-1

Prevent unreasonable conflicts between subsistence use and permitted activities on BLM managed lands.

ROP Sub-1a. BLM will consider using the following actions to eliminate, minimize, or limit the effects of permitted activities on subsistence use; 1) BLM may recommend modifications to proposed activity, 2) Permittees will be required to provide information to affected subsistence communities regarding the timing, siting, and scope of the proposed activity, 3) Permittees will be required to consult with affected subsistence communities to receive input regarding ways to minimize impacts to subsistence, and the permittee will be required to provide documentation of their consultation efforts to the BLM.

Also see *FW-4b.*

7. Cultural and Paleontological

a) Objective Cultural and Paleontological-1

Management practices will consider protection and conservation of known cultural resources, including historical sites and prehistoric sites.

ROP C-1a. For permitted activities, cultural resource protection and conservation will be consistent with 1) Sections 106, 110, and 101d of the Historic Preservation Act, 2) procedures under BLM's 1997 Programmatic Agreement for Section 106 compliance, and 3) the BLM's 1998 implementing Protocol in Alaska between BLM and the Alaska State Historic Preservation Officer.

ROP C-1b. If necessary, mitigation measures will be implemented according to a mitigation plan approved by the AO. Mitigation plans will be reviewed as part of Section 106 consultation for National Register eligible or listed properties. The extent and nature of recommended mitigation will be commensurate with the significance of the cultural resource involved and the anticipated extent of the damage. Reasonable costs for mitigation will be borne by the land use applicant. Mitigation must be cost effective and realistic.

b) Objective Cultural and Paleontological-2

Avoid damage to significant paleontological resources where possible, and mitigate unavoidable damage.

ROP C-2a. For all actions, the BLM will evaluate the impacts of proposed actions to known resources and avoid damage to already-identified significant paleontological resources by avoidance.

ROP C-2b. If avoidance is not possible, the applicant will perform scientific examination of the to-be-impacted significant resources followed by appropriate mitigation. This may include the professional collection and analysis of significant specimens by scientists.

8. Visual Resource Management

a) Objective Visual Resource Management-1

Manage permitted activities to meet Visual Resource Management Class Objectives described below.

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.

ROP VRM-1a. To the extent practicable, all permanent facilities will be located away from roadsides, rivers, or trails, thereby using distance to reduce the facility's visual impact.

ROP VRM-1b. Access roads and permanent facilities will be designed to meet the visual resource objective using such methods as minimizing vegetation clearing, and using landforms to screen roads and facilities.

ROP VRM-1c. Permanent facilities will be designed to be screened behind trees or landforms if feasible so they will blend with the natural surroundings.

ROP VRM-1d. The modification or disturbance of landforms and vegetative cover will be minimized.

ROP VRM-1e. Permanent facilities will be designed so their shapes, sizes, and colors harmonize with the scale and character of the surrounding landscape.

ROP VRM-1f. In open, exposed landscapes, development will be located in the opposite direction from the primary scenic views, if feasible.

9. Fire Management

a) Objective Fire Management-1

Reduce impacts to water quality, riparian habitat, vegetation, soils, and fish habitat from fire suppression activities.

ROP FM-1a. Permitees and casual users will be held financially responsible for any actions or activity that results in a wildland fire. Costs associated with wildland fires include but are not limited to damage to natural or cultural resources and costs associated with any suppression action taken on the fire.

ROP FM-1b. The Federal government will not be held responsible for protection of permitees' structures or their personal property. It is the responsibility of permitees and leasees to mitigate and minimize risk to their personal property and structures from wildland fire, if allowed by their permit.

ROP FM-1c. Gas powered equipment will be equipped with manufacturer approved and functional spark arrestors.

ROP FM-1d. To avoid the potential impacts to aquatic life the use of fire retardant is prohibited except when necessary to protect:

- Human life
- Permanent year-around residences
- National Historic land marks
- Structures on or eligible for the National Register of Historic Places
- Government Facilities, and
- Other designated sites or structures or if necessary to protect high value resources on adjacent lands under other than BLM administration or ownership

Even if one of the above listed resources is being threatened, water will be used instead of fire retardant whenever possible or appropriate. The use of fire suppressant foams is prohibited.

ROP FM-1e. Use of tracked or off-road vehicles in fire suppression or management activities will be conducted in a manner that does not cause erosion, damage to riparian areas, degradation of water quality or fish habitat, or contribution to stream channel sedimentation.

ROP FM-1f. Use of heavy equipment and other motorized vehicles off road requires approval of AO or designee.

ROP FM-1g. Rehabilitate areas burned by fires as needed, guided by the fire specific rehabilitation plan provided by the resource area to the suppression agency.

ROP FM-1h. Helicopters used for any activity during snow free conditions, which requires landing in wildland fuels, should have the exhaust/cooling system located high on the fuselage. Helicopters, which have exhaust/cooling systems that are located low on the fuselage and expels the exhaust straight back or downward, should only be landed in areas with no fuel such as areas of bare soil, gravel bars, or other areas of low combustability.

10. Hazardous Materials and Waste Management

a) Objective Hazardous Materials and Waste Management-1

Protect the health and safety of permittees, lessees, and the general public by avoiding the disposal of solid waste and garbage near areas of human activity.

ROP Hazmat-1a. Areas of operation will be left clean of all debris.

b) Objective Hazardous Materials and Waste Management-2

Minimize impacts on the environment from non-hazardous waste generation.

ROP Hazmat-2a. All feasible precautions will be taken to avoid attracting wildlife to food and garbage.

ROP Hazmat-2b. Current requirements prohibit the burial of garbage. All putrescible waste will be incinerated, backhauled, or composted in a manner approved by the AO. All unburnable solid waste will be backhauled and disposed of in an approved waste-disposal facility in accordance with U.S. Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC) regulations and procedures.

ROP Hazmat-2c. No disposal of domestic wastewater is allowed into bodies of fresh, estuarine, and marine water, including wetlands, unless authorized by the National Pollution Discharge Elimination System (NPDES) or State permit.

ROP Hazmat-2d. Wastewater must be managed in accordance with Title 18 Alaska Administrative Code, Chapter 72, (18 AAC 72) Wastewater Disposal. Wastewater is defined as Human Waste (sewage), and Gray Water (water which has been used for personal hygiene, washing clothing or equipment, or sanitizing cooking and eating materials). If the standards for Pit Privies found at 18 AAC 72.030 cannot be met, all wastewater must be collected and transported to a state approved disposal facility. Upon closure of the campsite the Pit Privy must be completely back-filled with the surface area covered and re-graded to approximate original appearance.

ROP Hazmat-2e. Pit privies will be located a minimum of at least 100 feet from the high-water mark of streams, rivers, or lakes. Pit privies will be sprinkled with lime and then backfilled with a minimum of two feet of over-material when the pit has reached capacity or the operation is terminated. All Pit privies must comply with ADEC Standards.

ROP Hazmat-2f. For oil and gas operations, all pumpable solid, liquid, and sludge waste will be disposed by injection in accordance with EPA, ADEC, and the Alaska Oil and Gas Conservation Commission regulations and procedures. The AO may permit alternate disposal if

the lessee demonstrates that subsurface disposal is not feasible or prudent and the alternative method will not result in adverse environmental effects.

ROP Hazmat-2g. For oil and gas operations, produced water will be disposed of into injection wells as approved by the AOGCC under EPA regulations and the UIC program. The AO may permit alternate disposal methods if the lessee demonstrates that subsurface disposal is not feasible or prudent and the alternative method will not result in adverse environmental effects.

c) Objective Hazardous Materials and Waste Management-3

Minimize the impacts to fish, wildlife, and the environment, from hazardous materials, oil spills, and other chemical spills.

ROP Hazmat-3e. For oil and gas operations, mining operations, and other leases and permits, sufficient oil-spill cleanup materials (absorbents, containment devices, etc.) will be stored at all fueling points and vehicle-maintenance areas and will be carried by field crews on all overland moves, seismic work trains, and similar overland moves by heavy equipment.

ROP Hazmat-3f. Fuel and other petroleum products will be stored at a location approved by the AO and within an impermeable lined and diked area capable of containing 110 percent of the stored volume or within approved alternate storage containers.

ROP Hazmat-3g. Fuel storage will not occur closer than 100 feet from any river, lake, stream, or wetland unless approved by the AO.

ROP Hazmat-3h. Liner material will be compatible with the stored product and capable of remaining impermeable during typical weather extremes expected throughout the storage period.

ROP Hazmat-3i. Fuel and other petroleum products and hazardous materials will be stored in containers designed to hold that product. All fuel containers, including barrels and propane tanks, will be marked with the responsible party's name, product type, and year filled and purchased.

ROP Hazmat-3j. Hazardous materials/toxic substances, as defined by EPA (i.e., used oils/petroleum products, batteries), will be handled and disposed of in accordance with EPA and ADEC guidelines.

ROP Hazmat-3k. All fuel spills will be cleaned up immediately, taking precedence over all other matters, except the health and safety of personnel. Spills will be cleaned up utilizing absorbent pads or other ADEC approved methods.

ROP Hazmat-3l. Notice of any reportable spill (as required by 40 CFR 300.125 and 18 AAC 75.300) will be given to the AO as soon as possible, but no later than 24 hours after occurrence and such other Federal and State officials as are required by law to be given such notice including ADEC at (907) 478-9300.

ROP Hazmat-3m. Surface discharge of reserve-pit fluids and produced water is prohibited unless authorized by applicable NPDES, ADEC, and Borough permits and is approved by the AO.

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APPENDIX J

Threatened and/or Endangered Species Evaluation

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United States Department of Interior
Bureau of Land Management
Anchorage Field Office

Threatened and/or Endangered Species Evaluation

Casefile Number: AA-93051(Hill 2211), AA-92971 (Otter Creek), AA-92969 (Golovin Alternative)

NEPA Document Number: AK-010-2012-0002-EA

URS project # 26220973

Proposed Action: Right-of-Way Grant and Communication Site Lease

Location of Proposed Action:
Otter Creek - T. 25 S., R. 12 W., Secs. 16 & 21, Kateel River Meridian, approximately 45 miles south of Unalakleet, Alaska-
N 63 18' 50.73" W 160 57' 23.97"

Golovin Alternative - T. 11 S., R. 20 W., Sec 17, Kateel River Meridian, approximately 10 miles east of Golovin, Alaska-
N 64 32' 21.99" W 162 44' 12.11"

Hill 2211 - T.9 S., R. 21 W., Sec 24, Kateel River Meridian, approximately 12 miles NE of Golovin, Alaska-
N 64 41' 15" W 162 47' 03"

Description of Proposed Action:
Under the Proposed Action reviewed in this EA, Unicom, Inc. proposes to construct two microwave towers and associated facilities on large blocks of remote, undeveloped BLM-managed lands. The Otter Creek tower site is located approximately 36 mi. northwest of Grayling within a large area of approximately 3.5 million acres of BLM-managed land in the Nulato Hills. The Golovin Alternate tower site is located approximately 10 mi. east of Golovin within an area of approximately 443,140 acres of BLM-managed land, running north of Cape Darby. See Figure 2-1 for project components and land status. Additional components of the TERRA-NW Project, not located on federal lands, are proposed for construction in 2012 and 2013. These eight towers, (five remote repeater towers and three community towers) are proposed for installation on private lands. They are classified as "connected actions," and reviewed as indirect effects of the proposed repeaters on federal land. In the future, Unicom intends to construct an additional five community towers, however, these are not yet proposed or funded.

Repeater Tower Site Construction
The location of the two towers proposed for federal lands and helicopter transit routes for construction are shown in Figures 2-2 and 2-3 of the EA. Under the leases for construction, activities would affect a temporary footprint of 225,000 square feet (sq. ft. or 5.15 acres) per site. Taken together, the two tower sites represent a total of 10.3 acres of land affected during the temporary (five-month) construction period in 2012 and 2013.

During the construction period, temporary areas would provide for component preparation and assembly, lodging, food preparation, and waste management. The project footprint at each tower site varies from 5.15 acres for the temporary construction lease to 0.69 acres for the 20 years of the long-term lease. The major project facilities at the each microwave repeater site include a 60 foot high lattice-type tower with microwave and cellular antennas, a 10 foot by 20 foot power module shelter, a 10 foot by 27 foot communication equipment shelter, and two 4500 gallon diesel fuel tanks (9000 gallons total fuel storage capacity). Power at the remote tower sites would be provided by two 9kW diesel generators, outfitted with hospital-grade silencers.

An Erickson Air Crane "heavy-lift" helicopter will be utilized to transport the pre-fabricated modules and fuel tanks. In the case of the Otter Creek tower site, four heavy-lift flights and approximately four light-lift flights would occur from the Klikitarik Bay staging area on Norton Sound. The remainder of the flights would originate out of Unalakleet. For the Golovin Alternate tower site, all helicopter flights would stage from Unalakleet as noted above. A Hughes 500-E or Robinson R-44 helicopter would be employed to move personnel and light equipment and supplies throughout the five-month construction period. A Bell UH-1H Huey would be used to ferry most of the equipment and building materials, primarily during June and July. The Erikson Air Crane would be used to lift the pre-fabricated power module shelter and communications equipment shelter during late June and early July.

During the operations period, the proposed maintenance and refueling flights would occur four to five days per site per year. Taking the two microwave repeater sites together, during the operations period, a total of 48 flights would take place over a period of 12 to 15 days each year. Maintenance and refueling flights would originate from Grayling for the Otter Creek tower site, and for Unalakleet for the Golovin Alternate tower site. Each trip would transport 500 gallons of diesel fuel, taking the safest direct route to the tower sites. The construction season schedule is summarized in Table 2-6.

No Action Alternative – Alternative 2
Under the No Action Alternative, BLM would not grant ROWs, and the existing telecommunications and satellite Internet service would continue or Unicom would have to seek other alternatives not involving federal public lands. Satellite-based service may continue for the foreseeable future, incurring higher delays in connectivity and lower reliability. The existing telecommunications infrastructure would not provide the means for proposed improvements in health care providers (telemedicine), more effective educational services (distance education), expanded access to governmental, tribal, and non-profit entities, or improved Internet speed for residential users and commerce.

Hill 2211 Repeater Site– Alternative 3

Under Alternative 3, the Golovin Alternative microwave tower site would be replaced by a tower on a summit approximately 12 mi. north and east of Golovin, termed Hill 2211 for its elevation. The site is located on BLM managed land and was identified as a potential alternative location in the Unicom initial review and again in internal agency scoping. A communications tower funded by the Norton Sound Economic Development Corporation currently occupies this site, and this offers the potential to co-locate the new microwave repeater tower with an existing facility. Construction and maintenance activities associated with the Hill 2211 tower site would be similar to the Golovin Alternative and Otter Creek tower sites indicated in Alternative 1. Construction activities would affect a temporary footprint of 225,000 sq. ft. (5.15 acres), however, following construction, and through the operational life of the project (20 years), the footprint would consist of the 0.69-acres area under long-term lease. This includes a helicopter landing area that would be used four to five days per year. The permanent facilities would occupy an excavated footprint of 0.08 acres.

The Endangered Species Act listed and candidate species potentially affected by this project are Kittlitz's murrelet, spectacled and Steller's eider, yellow-billed loon and polar bear.

Kittlitz's Murrelet

The Kittlitz's Murrelet nests in unvegetated scree (rock) fields, on coastal cliffs, barren ground, rock ledges, and talus slopes above timberline in coastal mountains. These birds feed in coastal waters and winter in offshore marine areas adjacent to the breeding areas. They are small-bodied birds that spend much of their time in the near shore marine environment diving for small fish. Kittlitz's murrelets are not common near the proposed project sites, but nest sites have been identified in coastal areas around Kotzebue Sound. Kittlitz's murrelets are not expected to be affected by this project.

Yellow-billed loon

Yellow-billed loons nest in coastal and inland low-lying tundra. They select nest sites associated with permanent fish-bearing lakes, and are known to nest in coastal areas of Norton Sound and Kotzebue Sound. Marine habitats are frequently used by non-breeding, migrating, and wintering birds. They are piscivorous (fish-eating) diving birds and are likely to be most susceptible to the effects of nest disturbance, habitat modifications, oil spills, contaminants, subsistence harvest, fisheries by catch, and disease. This project is not expected to affect yellow-billed loons.

Steller's eider

The North American breeding population of Steller's eiders is not known to use the proposed project areas, but birds may migrate past Stebbins and Kivalina while en route to the breeding grounds. These birds winter in south-central and southwestern Alaska, and breed in northern Alaska. A small population nests in the Yukon-Kuskokwim Delta. Birds congregate on exposed shoals, in protected lagoons and bays, and along rocky headlands and islets. Birds may fly over the uplands, but most are thought to follow the coastline or traverse open water during migration. Spectacled eiders and Steller's eiders are susceptible to collision with overhead power lines and guy wires. This project is not expected to affect Steller's eiders.

Spectacled eider
Eastern Norton Sound is a crucial molting area for female spectacled eiders nesting on the Yukon-Kuskokwim Delta, and was designated as critical habitat under the ESA in 2001. Spectacled eiders generally molt in this area between July and October and non-breeding birds may be there anytime between May and October. Non-nesting eiders spend most of their time in the marine environment and near the coast. A No Traverse Zone is in place in Norton Sound between August 1 and October 31 so as to minimize impacts of boat traffic on molting eiders. The breeding range of the spectacled eider includes the arctic coastal plain of the North Slope of Alaska. This project is not expected to affect spectacled eiders.

Polar bear
Offshore areas adjacent to Kivalina and Stebbins have been proposed for designation as critical habitat for the polar bear. Some coastal areas of Norton Sound and Kotzebue Sound have also been identified as having important barrier island habitat. The presence of polar bears in these areas is strongly associated with the presence and characteristics of seasonal sea ice. During the winter months, bears can be found as far south as the Yukon-Kuskokwim Delta. As the ice pack retreats during spring and summer, the bears move northward. Due to summer construction schedules and the higher elevation of the tower sites, this project is not expected to affect polar bears.

The impact of the proposed action and alternatives on threatened and endangered plants and animals and their habitats has been evaluated in accordance with the Endangered Species Act of 1973, as amended. Based on currently available information, the proposed action would not affect any threatened or endangered species or their habitats. Therefore, no consultation with the U. S. Fish and Wildlife Service is considered necessary pursuant to Section 7 of the Act and none will be undertaken.

/S/_Signed copy available in the Administrative Record_
Bruce E. Seppi, Examining Wildlife Biologist

March 14, 2012_____
Date