Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

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Volume 8 - Chapters 10-18 & Appendices

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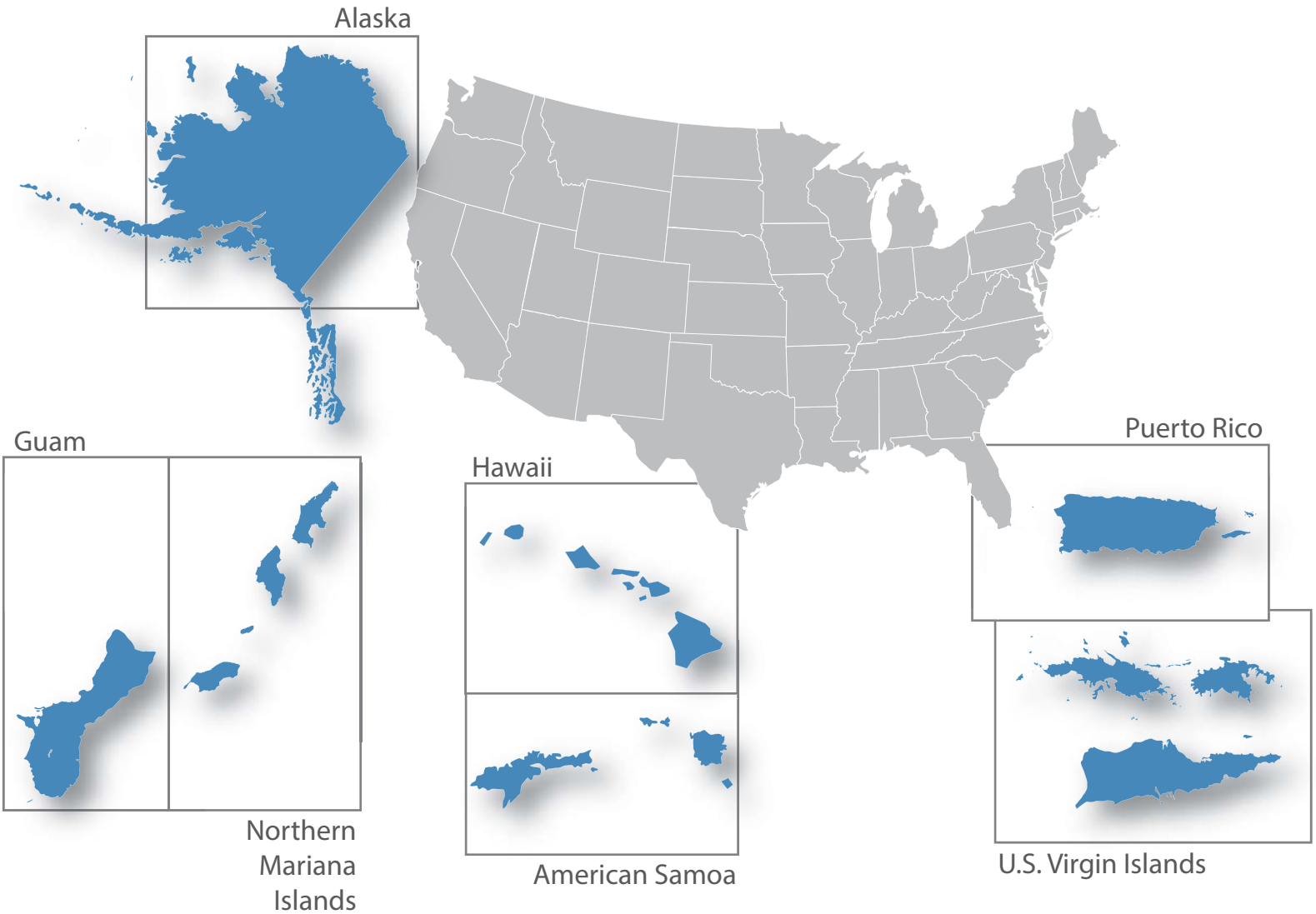

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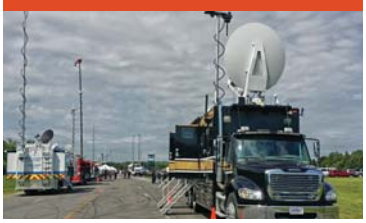

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First Responder Network Authority

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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Cooperating Agencies
Federal Communications Commission
General Services Administration
U.S. Department of Agriculture—Natural Resource Conservation Service
U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Commerce—National Telecommunications and Information Administration
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

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Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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10. CUMULATIVE EFFECTS

National Environmental Policy Act (NEPA) regulations (*40 CFR §§ 1500-1508*), as issued by the Council on Environmental Quality, require addressing the incremental impact of a federal agency's action (in this case, FirstNet's Proposed Action) when added to other past, present, and reasonably foreseeable future actions no matter which agency (federal or non-federal) or person undertakes such other actions. These incremental impacts are referred to as cumulative impacts. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time by various agencies or individuals (*40 CFR § 1508.7*).

The scope of the cumulative effects analysis involves both the geographic extent of the effects and the timeframe in which the effects could be expected to occur, as well as a description of what resources could potentially be cumulatively affected. When applying the concept of cumulative impacts to a programmatic analysis such as this Final Programmatic Environmental Impact Statement (Final PEIS), additional consideration must be given to existing uncertainty associated with specific project locations that will be selected in the future. The design, construction, and operation of the Nationwide Public Safety Broadband Network (NPSBN) would occur throughout the non-contiguous region of the United States, and specific project sites have not yet been identified. Furthermore, there is currently a wide range of technologies that FirstNet and/or their partners may use to implement and deploy the NPSBN, ranging from new and existing fixed assets to mobile, deployable infrastructure. The range of technologies to be implemented and/or deployed for the NPSBN would consist of individual components at specific locations that are relatively small in size, would likely result in being fairly dispersed in their distribution, and would cover large geographies to achieve the connectivity of the program. As such, it is not possible to quantify the cumulative effects of these projects when combined with other potential projects. Therefore, this Final PEIS addresses cumulative impacts qualitatively.

A cumulative impact results from the additive effect of all projects in the same geographical area. Generally, an impact can be considered cumulative if: 1) effects of several actions occur in the same location, 2) effects on a particular resource are the same in nature, and 3) effects are long-term in nature. The common key factor to cumulative assessment is identifying any potential temporally and/or spatially overlapping or successive effects that may significantly affect resources occurring in the analysis areas (*CEQ 1997; USEPA 1999*).

In evaluating the cumulative impacts of an action, an agency considers the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource, no matter what entity (federal, non-federal, or private) is taking the action. Cumulative impacts involve the combined, incremental effects of human activity (*USEPA 1999*). In accordance with NEPA and to the extent reasonable and practical, this Final PEIS considers the combined effects of the No Action Alternative, Preferred Alternative, and Deployable Technologies Alternative at the programmatic level with other past, present, and reasonably foreseeable actions that may affect the resources identified.

The geographic extent of the Proposed Action considered for the cumulative impact analysis includes the area under the jurisdiction of the FirstNet program, specifically the non-contiguous region that is the subject of this Final PEIS. The timeframe considered for this analysis is 50 years.

At the programmatic level, it is not practical to include a list of all possible infrastructure projects in the non-contiguous region. Instead, this cumulative impacts analysis describes projects similar to the Proposed Action with common potential impacts that could have additive effects. States and territories within the non-contiguous region have continued to develop their broadband infrastructure in recent years, with several having completed projects funded through the Broadband Technology Opportunities Program (*BroadbandUSA 2015*). Additional broadband infrastructure projects are underway or have been proposed. Examples of such projects are provided in Table 10-1 below.

Table 10-1: Additional Broadband Infrastructure Projects

Name	Location	Sponsor	Brief Description	Completion Year
Public Safety Interoperable Communications (PSIC) Grant Program	Nationwide	Department of Commerce (DOC) National Telecommunications and Information Agency (NTIA) and Department of Homeland Security (DHS) Federal Emergency Management Agency (FEMA)	$1 billion grant program to U.S. states and territories for the acquisition of, deployment of, or training for the use of interoperable communications systems that use (or enable interoperability with communications systems that use) reallocated public safety spectrum in the 764-776 megahertz (MHz) and 794-806 MHz bands. Grants were awarded for 6,750 projects, including the installation of 133 new freestanding and 11 new guyed towers, collocation of equipment at 2,710 existing towers and 2,710 existing facilities, 112.9 miles of fiber optic cable, more than 350 training events, and acquisition of over 75,000 radios. (*NITA 2016*)	Concluded in 2012
TERRA	Alaska	General Communication, Inc.	Development of a broadband communications network across the state, including remote regions. Projects have been completed in the Southwest and more recently in the Northwest Arctic with additional construction in 2014 in the Northwest and along the Yukon River (*CGI 2015*).	2011-2014
Broadband Linking the American Samoa Territory (BLAST) Project	American Samoa	American Samoa TeleCommunications Authority	The BLAST project includes build-out of a land-based fiber network combined with a 350 kilometers interisland submarine cable network connecting Fogagogo, Tu'tuila, Ofu, Luma, Ta'ū and Aunu'u Islands (*WFN Strategies 2016*).	Largely completed 2015
Gigabit Island Plan	Puerto Rico	Puerto Rico Broadband Taskforce (a public-private partnership)	Establishes strategic goals to further expand high speed broadband networks island-wide across Puerto Rico, involving new infrastructure as a component (*PRBT 2015*).	2020

Name	Location	Sponsor	Brief Description	Completion Year
Measuring Broadband Hawaii	Hawaii	State of Hawaii Department of Commerce and Consumer Affairs (DCCA)	In collaboration with the Federal Communications Commission's (FCC) Measuring Broadband America, the goal of this project is to "better inform Hawaii consumers about their Internet service performance and to collect broadband performance data that DCCA can use in its efforts to improve access to broadband service across the State." DCCA activities include supporting public-private efforts to develop broadband infrastructure. (*DCCA 2016*)	Ongoing

The analysis herein considered the alternatives discussed in Chapter 2, Description of the Proposed Action and Alternatives, and other programmatic-scale actions. Cumulative effects analysis of individual projects and other past, present, and reasonably foreseeable future actions relevant at the local level can be addressed as part of future project-specific NEPA reviews. Project-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work.

The potential impacts associated with the Proposed Action would result from the collocation on existing infrastructure; construction of new infrastructure and/or accessory components; use of existing fiber facilities; installation of new conduit; deployment of satellite phones and/or satellite technology; installation of microwave facilities; and utilization of deployable technologies. As described in Chapters 3 through 9, the effects as a result of the Proposed Action would not result in potentially significant impacts at the programmatic level based on the impact significance criteria and ratings presented in this Final PEIS. Impacts could occur as a result of other ongoing telecommunications infrastructure development, including those projects described above as well as others in the future; however, when combined with the potential impacts associated with the Proposed Action, incremental impacts to the natural and human environment[1] are not expected to be significant at the programmatic level. The project types that involve new construction and/or ground-disturbing activities would tend to be limited by their nature in the extent and duration of their effects, and these projects would typically implement appropriate best management practices and/or mitigation measures to further reduce the already limited potential impacts. Similarly, effects associated with project operations are not expected to be significant at the programmatic level. Taken together, these projects are not expected to result in significant incremental cumulative impacts to either human health or the environment.

[1] The human environment is the natural and physical (e.g., structures) environment, and the association of people and their activities to those environments.

REFERENCES

BroadbandUSA. 2015. *Grants Awarded: Broadband Infrastructure Projects*. Accessed: November 4, 2015. Retrieved from: http://www2.ntia.doc.gov/infrastructure

CEQ (Council on Environmental Quality). 1997. *Considering Cumulative Effects under the National Environmental Policy Act*. Executive Office of the President. Washington, D.C. January 1997. Accessed: September 29, 2015. Retrieved from: http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-ConsidCumulEffects.pdf

DCCA (Department of Commerce and Consumer Affairs). 2016. *Measuring Broadband Hawaii.* Accessed: February 3, 2016. Retrieved from: http://cca.hawaii.gov/broadband/mbh

GCI (General Communications Inc.). 2015. *Project: TERRA*. Accessed: November 4, 2015. Retrieved from: http://terra.gci.com/project

NTIA (National Telecommunications and Information Administration). 2016. *Public Safety Interoperable Communications (PSIC) Grant Program*. Accessed: February 3, 2016. Retrieved from: https://www.ntia.doc.gov/legacy/psic/index.html

PRBT (Puerto Rico Broadband Task Force). 2015. *Governor Garcia Padilla Announces a Gigabit Island Plan for Fast Broadband Across Puerto Rico by 2020*. February 17, 2015. Accessed: November 4, 2015. Retrieved from: http://www.prbroadband.org/news/governor-garcia-padilla-announces-a-gigabit-island-plan-for-fast-broadband-across-puerto-rico-by-2020

USEPA (U.S. Environmental Protection Agency). 1999. *Consideration of Cumulative Impacts in EPA Review of NEPA Documents*. Office of Federal Activities (2252A). EPA 315-R-99-002/May 1999. Accessed: September 29, 2015. Retrieved from: http://www.epa.gov/sites/production/files/2014-08/documents/cumulative.pdf

WFN Strategies. 2016. *BLAST.* Accessed: February 3, 2016. Retrieved from: http://wfnstrategies.com/portfolio/blast

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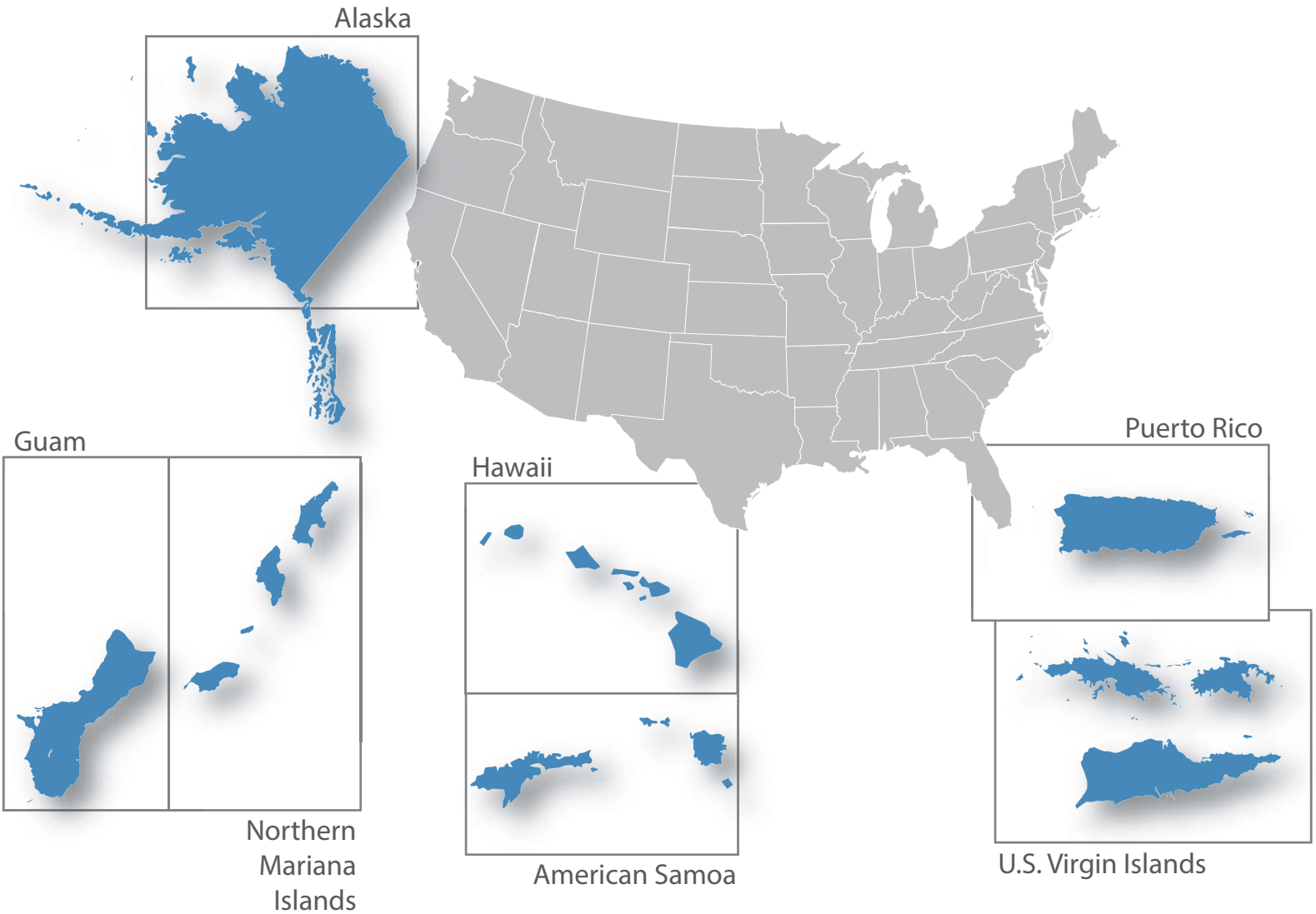

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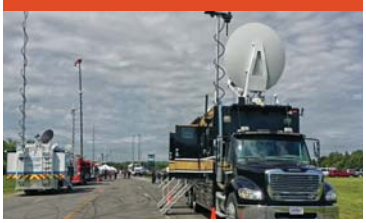

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Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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11. BMPS AND MITIGATION MEASURES

This chapter provides examples of best management practices (BMPs) and mitigation measures that FirstNet and/or their partners would recommend or require to be implemented during deployment and operation of the Proposed Action to help avoid or minimize potential impacts to various resources, or potential impacts to deployed infrastructure from various hazards. Specifically, FirstNet and/or their partners would be required to implement mitigation measures, as defined through permitting and/or consultation with appropriate resource agencies. Unlike mitigation measures, however, BMPs would not necessarily be required in every project activity but would be applied as practicable or feasible during deployment and operation of the Proposed Action. The BMPs and mitigation measures outlined in this chapter have been developed based on initial consultation with other agencies as well as through independent research conducted by FirstNet and their environmental contractors. It is possible that other or additional site-specific BMPs and mitigation measures not included in this chapter may be recommended or required to be implemented as a result of consultation with resource agencies, permits, and/or additional environmental reviews.[1] The example BMPs and mitigation measures in this chapter are organized by resource area and, where applicable, each of the following project types:[2]

- Wired Projects
  - New Build – Buried Fiber Optic Plant
  - Use of Existing Conduit – New Buried Fiber Optic Plant
  - New Build – Aerial Fiber Optic Plant
  - Collocation on Existing Aerial Fiber Optic Plant
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable
  - New Build – Submarine Fiber Optic Plant
  - Installation of Optical Transmission or Centralized Transmission Equipment
- Wireless Projects
  - New Wireless Communication Towers
  - Collocation on Existing Wireless Tower, Structure, or Building
- Deployable Technologies
  - Cell on Wheels; Cell on Light Truck; System on Wheels
  - Deployable Aerial Communications Architecture

[1] Site-specific analysis or environmental reviews may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work.

[2] The resource areas are ordered in this chapter consistent with how they appear in each of the state/territory-specific chapters (Chapters 3 through 9). Additional information and details regarding the Proposed Action infrastructure and project types can be found in Section 2.1.2, Proposed Action Infrastructure, and each respective section within the state/territory chapters.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment
  - Deployment of Satellites

11.1. INFRASTRUCTURE

11.1.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to infrastructure. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for construction on or near public roads.
- Follow all applicable federal, state/territory, and local laws concerning traffic speed and safety during the transport of equipment.
- Schedule deployment activities outside of peak traffic hours.
- Avoid roads with heavy traffic volumes and peak travel hours, to the extent possible, when scheduling the transport of heavy equipment or construction materials.
- Design staging areas to minimize unnecessary equipment and material mobilizations.
- Repave and restore disturbed roads and public road rights-of-way (ROWs), applicable to federal, state/territory, and local laws, as quickly as possible to avoid any traffic impediments that may potentially hinder access to local health, public safety, and emergency facilities, and so traffic capacity and safety conditions could return to their pre-construction condition.
- Design new deployment activities within existing ROWs to the extent possible and outside of roadways and thoroughfares to minimize potential impacts on traffic flow or safety.
- Coordinate with federal, state/territory, and local government agencies as appropriate, as well as with public safety officials, emergency and medical facilities, and existing telecommunications providers to the extent practicable to facilitate awareness of deployment activities and accompanying schedule.
- Schedule new construction outside of seasons known to cause more accidents (e.g., tsunami/ hurricane/tropical cyclone season or times of the year when wildfires are more likely to occur) so that potential service disruptions are less likely to coincide with times of increased demand.
- Confirm or otherwise install detection systems so that if and when a disruption to utility services or telecommunications systems occurs, it can be identified and repaired quickly.
- Implement a backup telecommunications system, as needed, which allows first responders to communicate with each other and the public during deployment activities until the new nationwide public safety broadband network (NPSBN) has been successfully implemented.

- Complete deployment activities as quickly and safely as possible to avoid any possible disruptions to utility services.
- Complete those deployment activities that could interrupt power during non-peak times for power or water.
- Follow all applicable state/territory and local one-call laws and procedures for buildouts.
- Follow all applicable federal, state/territory, or local requirements regarding utilities (water, sewer, power, and electricity) and construction within a utility ROW.

11.1.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.2. SOILS

11.2.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to soil resources. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for soil erosion and sedimentation control and permitting to avoid or minimize erosion and sedimentation and restore disturbed soil.
- Avoid construction in areas with steep or unstable slopes or with soils known to be particularly susceptible to soil erosion, (see Affected Environment Soils sections) and construct facilities in alternate locations to avoid these areas, if practical.
- Develop a soil erosion and sedimentation control plan for disturbed areas, and use silt fences,[3] erosion control blankets,[4] retention ponds, straw and sandbag barriers, and/or other controls as needed to reduce soil erosion, storm water runoff, and sedimentation.
- Schedule construction activities to avoid, to the extent possible, soil disturbance activities during periods or months with heavy rainfall and snowmelt.[5]
- Cover exposed areas with tarps or similar materials to prevent rainfall exposure to the extent possible.
- Minimize the area of bare soil exposed at any one time as much as possible by constructing in stages.

[3] Silt fences are designed to trap sediment in the area where construction or soil disturbance is taking place to minimize or avoid soil erosion and sedimentation. The fence is typically 2- to 3-feet tall, buried 8 to 12 inches into the soil, and secured with stakes.
[4] Erosion control blankets are biodegradable or synthetic sheet-like materials that are rolled out onto disturbed areas to protect soil from wind and water erosion.
[5] See Affected Environment Climate Change sections for an explanation of seasonal climate and weather patterns.

- Revegetate disturbed areas with native plants, to the extent practicable, as progressively and quickly as practicable to achieve stabilization.[6]
- Minimize soil disturbance to the extent practicable, especially in wetland and designated natural resource areas.
- Maintain topsoil by segregating topsoil or surface soil from subsurface layers and implementing temporary topsoil storage areas during construction.[7]
- Replace topsoil as soon as possible following construction.
- Remove and store topsoil with a woven weed barrier or similar material for post-construction site restoration for areas.
- Pay particular attention to areas identified as having soils that are vulnerable to compaction (see Affected Environment Soils sections) and select alternate locations to construct facilities if practical.
- Implement deep tillage procedures where practical to loosen compacted soils.
- Restore soil surface to original or improved contours.
- Use timber mats or similar infrastructure as deemed necessary to distribute vehicle and heavy equipment weight.
- Use existing roads or previously disturbed areas to the maximum extent practicable.

11.2.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures for soils beyond those listed above for all project types.

11.3. GEOLOGY

11.3.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to geologic resources or potential impacts to the Proposed Action as a result of geologic hazards. The following BMPs and mitigation measures would apply to all project types:

- Avoid, to the extent practicable, deployment in areas that undergo significant geomorphological changes, such as within active glacial valleys (in Alaska) or streams and rivers.

[6] Plant roots play a significant role in stabilizing soils. Seeding disturbed areas quickly after construction activities would allow for faster plant and root development and would therefore provide better erosion protection.

[7] Topsoil is segregated from subsoil layers by stripping the uppermost soil from the area being excavated and storing it separately from the subsurface soil. Once construction is completed, the topsoil is replaced as the uppermost soil unit.

- Avoid construction in seismically active areas, locations with karst topography or that have shown recent subsidence, or steep or unstable slopes that are susceptible to erosion; construct facilities in alternate locations if practical.
- Construct all infrastructure to standards that meet or exceed state/territory seismic requirements.
- Avoid rock ripping to the extent practicable to preserve bedrock resources, topography, and physiography.
- Minimize the area/volume of disturbed/removed terrain during deployment/construction.
- Restore topographic features and grades to pre-construction/deployment conditions.
- Limit construction to areas that are not actively mined or undergoing mineral or other material or petroleum extraction activities, or coordinate planning and deployment with mining and extraction plans and activities in active areas.
- Follow all relevant federal, state/territory, and local laws and regulations as they apply to paleontological, mineral, and fossil fuel resources.
- Develop a Paleontological Monitoring and Mitigation Plan outlining areas with high likelihood for encountering significant fossil resources and plans for avoidance and appropriate response if previously unknown resources are encountered.
- Avoid areas with significant fossil resources, if practicable.
- Suspend all work if paleontological resources are encountered on a project construction site until a certified paleontologist has been brought on-site to oversee project activities and ensure that fossil resources are handled properly.
- Locate construction/deployment activities outside of high risk seismic hazard zones, active faults, and away from low coastal areas that could potentially be impacted from tsunamis.
- Follow all applicable federal, state/territory, and local requirements for construction codes, seismic criteria, and geotechnical designs, and construct/deploy all infrastructure to standards that meet or exceed state/territory seismic requirements.
- Design and deploy resilient infrastructure to withstand earthquakes typical to the region.
- Locate construction/deployment activities outside of high-risk volcanic hazard zones.
- Locate construction/deployment activities away from steep slopes with unconsolidated material and other areas prone to landslides, to the extent practicable.
- Locate construction/deployment activities outside of areas identified as having karst topography, loosely compacted soils, and low density sediments prone to subsidence or compaction, to the extent practicable.
- Consider alternate methods to trenching for placement of fiber optic cable and transmission lines in sensitive areas.

11.3.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures for geology beyond those listed above for all project types.

11.4. WATER RESOURCES

11.4.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to water resources. The following BMPs and mitigation measures would apply to all project types:

- Minimize ground disturbance in or near waterbodies during construction, as practicable, particularly in areas prone to erosion.
- Follow all applicable federal, state/territory, and local requirements for soil erosion and sedimentation control and permitting to avoid or minimize inputs of eroded materials into waterbodies.
- Develop a storm water pollution prevention plan.
- Include engineered or site-designed methods to control storm water.
- Include any forested riparian areas along the stream in the length of the bore to minimize impacts to forested habitat when using directional bores to cross a stream.
- Ensure the cleared width through any forested area is the minimum needed to install the line; the width should be no more than 20 feet wide through the forested area to allow the canopy to close over the line.
- Restore disturbed stream banks using bioengineering bank stabilization methods and revegetate disturbed banks with native trees, shrubs, and herbaceous plants.
- Restore stream bank slopes after project completion to stable-slope steepness (not steeper than 2:1).
- Use graded stone or riprap to protect the section of trench below the normal water level from scour or erosion if using directional boring under a stream. Any stone or riprap fill in the streambed must not be placed above the existing streambed elevation to avoid creating a fish passage obstruction. As an alternative to using stone or riprap, allow sufficient separation distance between the directional boring and the stream bottom to minimize the potential for scour or erosion to affect the installed line.

- Implement storm water reduction methods for large-scale construction activities, including minimizing impervious surfaces, using porous materials, or collecting and reusing storm water (e.g., extended detention ponds, storm water wetlands, filtration structures,[8] and infiltration [or recharge] basins).[9]
- Direct water to storm water drains for large-scale construction activities or to constructed bioretention areas,[10] rain gardens, or other storage and retention areas designed to slow water and allow sediments to settle out.
- Stabilize and revegetate disturbed areas as progressively and quickly as practicable to achieve stabilization and minimize the potential for erosion.
- Avoid construction of roads and other impervious surfaces in floodplain areas to the extent practicable; where necessary in floodplains, construct roads and other impervious surfaces level with existing grades, as practicable, to not change or restrict water flow.
- Station all deployables and aboveground structures outside of floodplains, to the extent practicable; if deployables or aboveground structures must be placed in floodplains, station them such that they are not vulnerable to be damaged by flood flows and do not themselves impede or restrict flood flows, as practicable.
- Restore native vegetation/wetlands to stabilize stream banks and stop erosion.
- Minimize the use of riprap and the use of alternative erosion protection materials whenever possible.
- Place only enough riprap to provide stream bank toe protection, such as from the toe of the bank, where riprap must be used. Consider using bioengineered bank stabilization methods instead of riprap.
- Meet state/territory or local regulations for development proposed in a floodway or floodplain.
- Avoid construction, where feasible, in areas with steep or unstable slopes with soils known to be particularly susceptible to soil erosion and construct facilities in alternate locations if practical.
- Develop a soil erosion and sedimentation control plan for disturbed areas, and implement BMPs, as appropriate, including the use of silt fences, erosion control blankets, progressive revegetation, and other controls as needed to reduce soil erosion, storm water runoff, and sedimentation.

[8] Storm water filtration structures use a filtering media (sand, soil, gravel, peat, or compost) in storm water filtration structures to remove pollutants from storm water runoff.

[9] Infiltration basins (also known as recharge basins) are considered a treatment BMP because they can remove pollutants from surface discharges by capturing the storm water runoff volume (typically, larger volumes than an infiltration trench) and infiltrating it directly to the soil rather than discharging it to an aboveground drainage system.

[10] Bioretention is a structural storm water control measure that captures and temporarily stores storm water runoff using soils and vegetation in shallow basins or landscaped areas to provide enhanced removal of dissolved storm water pollutants, including nutrients, pesticides, organics, metals, and biological constituents.

- Seed and protect disturbed stream banks that are 3:1 or steeper with heavy-duty, net-free biodegradable erosion control blankets to minimize the entrapment and snaring of small wildlife such as snakes and turtles (follow manufacturer's recommendation for installation); seed and apply mulch on all other disturbed areas.
- Use weed-free erosion control mechanisms (such as straw wattles or straw or hay bales).
- Avoid construction activities (especially activities resulting in soil disturbance), to the extent possible, during rainy or snowmelt seasons when streamflow, rainfall, and runoff are highest.
- Minimize the total area of bare soil exposed at any one time as much as possible by constructing in stages.
- Minimize clearing of riparian and streamside vegetation, including trees, as practicable.
- Establish and clearly mark all waterbody buffers in the field with signs or highly visible flagging until construction-related ground disturbing activities are complete.
- Stabilize and revegetate disturbed areas as progressively and quickly as practicable to achieve stabilization.
- Monitor site restoration following ground disturbance activities, as required by law or permit; implement contingency measures if site restoration should fail and soil erosion occurs.
- Retain vegetative buffers, wherever possible, to prevent runoff into waterbodies.
- Revegetate all bare and disturbed areas along stream banks or shorelines with a mixture of grasses (excluding all varieties of tall fescue), legumes, and native shrub and hardwood tree species as soon as possible upon completion.
- Minimize in-stream work to the extent practicable, and when working in streams, restore streambeds and banks to original contours.
- Construct all stream crossings (roads and trenching) as close as perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.
- Use standard upland construction techniques when crossing waterbodies when they are dry or frozen and not flowing or as required by permit or law, provided that it is not likely for flow to resume during construction and prior to post-construction stabilization.
- Route the stream crossing to minimize the number of waterbody crossings where waterbodies meander or have multiple channels, as practicable.
- Prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan to prevent, contain, and report accidental spills.
- Inspect and maintain tanks and equipment containing oil, fuel, or chemicals for drips or leaks to prevent spills to the ground or directly into waterbodies.
- Maintain and repair all equipment and vehicles on impervious surfaces, as practicable, away from all sources of surface water.

- Park vehicles at least 50 feet from any stream or wetland unless authorized by a permit or on an existing roadway, as practicable.
- Deposit and stabilize all excavated material not reused in an upland area outside of floodplains and streams.
- Design any structures located in floodplains, as feasible, with structural hardening to withstand flooding and to not increase the risk of flooding for other areas of the floodplain.
- Space and size culverts properly.
- Stabilize approaches to streams and stream crossings with clean rock or steel plates during construction to minimize erosion and sedimentation, as practicable.
- Place materials storage and staging areas outside of waterways and floodplain.
- Maintain adequate waterbody flow rates to protect aquatic life and prevent the interruption of existing downstream users, as practicable, if conducting in-stream construction (trenching or roads if necessary) during times that streams have flow.

11.4.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply to Wired Projects in addition to those listed above for all project types:

- Wireless Projects
  - New Wireless Communication Towers
    - Do not permit underwater blasting and pile driving activities in any waterbody.

11.5. WETLANDS

11.5.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to wetlands. The following BMPs and mitigation measures would apply to all project types:

- Follow all BMPs and mitigation measures related to minimizing soil erosion, sedimentation, and soil compaction presented in Section 11.2, Soils.
- Develop management plans such as, but not limited to, wetland and vegetation management and restoration, water quality protection, and erosion and sediment control plans for the management of wetland habitat, vegetation, water quality, and soils/erosion control.
- Follow any BMPs and mitigation measures for work in or near wetlands developed by state/territory and local agencies, such as state/territory departments of transportation.
- Conduct a detailed baseline study of the wetland to be impacted to aid in restoration of pre-impact condition, including, as appropriate or required by law, a survey of wetland contours; soil texture and profile; plant species, structure, and cover; and hydrology.

- Develop a storm water pollution prevention plan.
- Time construction to outside the breeding and migratory seasons of wetland wildlife when construction is unavoidable.
- Preserve existing tree canopies and natural areas in and around wetlands as much as possible.
- Cut wetland vegetation by hand (chain or hand saw) instead of using large equipment when cutting is unavoidable.
- Use timber mats when working in or near wetlands.
- Use weed-free erosion control mechanisms (such as straw wattles or straw or hay bales).
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Avoid both above and belowground wetland crossings unless necessary.
- Take advantage of already disturbed areas such as easements, roads, roadway shoulders, bridges, or old railroad beds when crossing a wetland is unavoidable.
- Span a wetland by locating telecommunication poles on either side of the wetland instead of disturbing the interior, where practicable or feasible.
- Avoid diversion of surface water and groundwater sources, which could affect nearby wetlands.
- Include engineered or site-designed methods to control storm water.
- Create and maintain buffer zones around wetlands to protect their functions and values.
- Follow all applicable federal, state/territory, and local requirements related to potential wetland impacts and permitting to avoid or minimize potential wetland impacts, compensate for unavoidable impacts to wetlands, and restore impacted wetlands.
- Position deployment activities to avoid wetlands to the greatest extent practicable and to minimize the project footprint while safely and practically implementing the Proposed Action.
- Clearly mark the boundaries of wetland areas to be avoided during construction using flagging, and maintain markers until reclamation is complete (as applicable). Train equipment operators on the activities to avoid within or near wetlands.
- Segregate and salvage all topsoil up to a maximum of 12 inches of topsoil from the area disturbed in dry wetlands, where practicable, and restore topsoil to its approximate original stratum after backfilling is complete.
- Avoid temporarily storing or stockpiling materials in wetland areas or in areas that could alter wetland hydrology (causing damming and flooding) or impede or divert water (causing drying). When unavoidable, place temporary fill on geotextile fabric.
- Minimize vegetation clearing in or near wetlands. If vegetation clearing is required, minimize ground disturbance and maintain low groundcover vegetation, as well as the roots of taller vegetation.

- Install and maintain sediment barriers, as appropriate, at saturated wetlands or wetlands with standing water across the entire construction ROW upslope of the wetland boundary and where saturated wetlands or wetlands with standing water are adjacent to the construction ROW as necessary to prevent sediment flow into the wetland.
- Time construction using heavy equipment to avoid periods of heavy moisture, as appropriate, when construction within wetlands is unavoidable.
- Do not maintain, store, wash, or repair equipment in or near (within 100 feet of) wetland areas to avoid spills or contamination, where practicable. Do not use heavy equipment within wetlands, even temporarily, and do not travel through wetlands, where practicable. Use wide-tracked or low-ground pressure construction equipment and/or conventional equipment operating from the ROW, timber mats, or prefabricated equipment mats. Prohibit storage of hazardous materials, chemicals, fuels, and lubricating oils in wetlands. Use existing access roads whenever possible. Where construction is required, maintain natural drainage patterns to the extent practicable by installing culverts in sufficient number and size to prevent ponding, diversion, or concentrated runoff. Use gravel for road surfaces where possible to avoid an increase in permeable surfaces and use proper drainage structures to minimize sedimentation and erosion to adjacent wetlands.
- Consult local wetland restoration guidance, including communicating with the appropriate local agency, if one exists. Use suggested up-to-date published restoration manuals to ensure that appropriate wetland restoration measures are followed and to increase restoration success.
- Conduct a detailed baseline study of the wetland to be impacted to aid in restoration of pre impact condition, including, as appropriate or required by law, a survey of wetland contours; soil texture and profile; plant species, structure, and cover; and hydrology.
- Stockpile wetland topsoil and sod mats used during facility installation after initial use when working in areas where wetlands would be restored. Use standard reclamation protocol. Re-use the topsoil and sod mats in the post-construction wetland restoration.
- Revegetate, as applicable, bare areas as progressively and quickly as possible (preferably within the same growing season) to stabilize soils, reduce sedimentation, and avoid the spread of invasive species. Install erosion protection and leave in place until the area is revegetated and the soil is stabilized.
- Prohibit use of herbicides or pesticides within 100 feet of any wetland (unless allowed or required by the appropriate land management, tribal, or state/territory agency).
- Conduct post-construction monitoring inspections after the first growing season to determine success of revegetation, as applicable, unless otherwise required by a permit.
- Determine restoration to be successful if the surface condition is similar to adjacent undisturbed communities or found acceptable by the applicable regulatory body.

11.5.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply to Wired Projects in addition to those listed above for all project types:

- New Build –Buried Fiber Optic Plant
  - Avoid, as appropriate, stockpiling material from directional drilling in a wetland, or where the stockpile could cause sedimentation into a wetland or dam water, causing flooding of a wetland area; avoid, as appropriate, setting up drilling equipment in a wetland.
  - Conduct dewatering in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody if dewatering an excavation.
  - Replace topsoil and restore original contours to the greatest extent practicable.
  - Install buried cable along existing road ROWs wherever possible to minimize vegetation clearing and other potential impacts to wetlands.
  - Use structures or devices to prevent subdraining or groundwater movement along new trenched-in buried conduit such as anti-seepage collars, intermittent clay barriers, trench plugs, or clay saddles.
- New Build – Aerial Fiber Optic Plant
  - Coordinate with U.S. Fish and Wildlife Service (USFWS) during site-specific reviews as required to assess whether it may be preferable and less impactful to implement line burial instead of installing lines overhead. However, depending on site conditions, installation of overhead transmission lines along existing road ROWs may minimize vegetation clearing and other potential impacts to some (but not all) wetlands.
- New Build – Submarine Fiber Optic Plant
  - Avoid, as appropriate, stockpiling material from directional drilling in a wetland, or where the stockpile could cause sedimentation into a wetland or dam water, causing flooding of a wetland area; avoid, as appropriate, setting up drilling equipment in a wetland.
  - Conduct dewatering in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody if dewatering an excavation.
  - Replace topsoil and restore original contours to the greatest extent practicable.

11.6. BIOLOGICAL RESOURCES

11.6.1. Terrestrial Vegetation

11.6.1.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to terrestrial vegetation. The following BMPs and mitigation measures would apply to all project types:

- Engage in early consultation with appropriate agencies and stakeholders, including but not limited to the USFWS and state/territory agencies.
- Consolidate facilities as much as possible (collocation and use of existing ROWs) to reduce vegetation loss.
- Avoid high-quality habitat.[11]
- Minimize construction of all roads, fences, and other ancillary facilities to reduce overall vegetation loss and habitat fragmentation. Control fugitive dust generated by the use of unpaved roads and construction.
- Limit construction equipment and vehicles to approved roads or ROWs.
- Avoid construction/deployment in areas with sensitive vegetation (i.e., woodlots and wetlands), unique habitat (i.e., shorelines and stream banks), or designated natural resources, if practical.
- Close and revegetate any temporary and unnecessary roads after project completion.
- Segregate topsoil or surface soil from subsurface layers during construction for reuse during post-construction seeding.
- Restore disturbed areas as progressively and quickly as possible to pre-construction use; grade and apply vegetation cover using appropriate and certified seed mixes and seed dispersal, management, and maintenance processes, as applicable.
- Revegetate with native species that approximate pre-disturbance plant community composition.
- Use existing roads and regularly maintained areas when conducting routine maintenance and inspections to the extent feasible.
- Follow all applicable federal, state/territory, and local requirements for vegetation removal, disturbance, and restoration.

[11] High-quality habitats contain high plant diversity and low numbers of non-native or invasive plants; are left in a natural state; and have high-quality plants or ones that are very valuable to wildlife. Disturbed habitats generally contain non-native, invasive species and extremely low plant diversity; are under regular maintenance; and consist of low quality or unsuitable habitat. Professional biologists can typically provide a basic assessment of the quality of the site based on one or more site visits. Private consultants can also evaluate habitat quality through a standardized assessment tool, the Floristic Quality Assessment. This assessment provides a quantitative assessment score, rating sites on a scale from 0 to 10 (10 being the highest quality).

- Obtain all appropriate permits and comply with conditions to minimize or avoid impacts to vegetation.
- Minimize or avoid forest removal whenever possible.
- Identify all areas within the proposed construction footprint that contain noxious or invasive plants and use pre-construction treatments such as mowing or herbicide applications (in consultation with appropriate agencies and stakeholders) prior to ground disturbance activities.
- Store soil containing noxious or invasive plants in a location away from clean topsoil and subsoil.
- Inspect and clean all construction equipment and deployable vehicles with high-pressure washing equipment to remove soil and plant matter prior to moving to the next job site or staging location.
- Locate staging areas and construction sites in previously disturbed areas.

11.6.1.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.6.2. Wildlife

11.6.2.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to wildlife. The following BMPs and mitigation measures would apply to all project types:

- Engage in early consultation with appropriate agencies and stakeholders as necessary, including but not limited to USFWS, the National Marine Fisheries Service (NMFS), and relevant state/territory wildlife and natural resource agencies.
- Give preference to development options that involve use of existing physical infrastructure, and/or that do not involve new aboveground structures (e.g., collocation on existing structures, etc.).
- Minimize vehicular harm of animals migrating between seasonal habitats by locating activities, roads, and infrastructure away from these areas or installing barriers along roadsides.
- Locate project activities, facilities, and roads away from key habitats (e.g., wetlands, cays,[12] and stream sites) for amphibians and reptiles.

[12] Cays are small, low-elevation, sandy islands on the surface of a coral reef.

- Control the spread of invasive animals and plants by coordinating mowing schedules and assisting agencies and groups with ROW permits, washing mowers and equipment between sites, and educating staff.
- Consolidate facilities as much as possible (e.g., collocation and use of existing ROWs).
- Avoid known calving/lambing areas in Alaska during critical life stages when undertaking deployment and associated activities (these times vary greatly depending on region, species, and habitat).
- Assess locations of roost sites for bats and timing of critical life stages (e.g., maternity and weaning periods), hibernation for deployment and associated activities (these times vary greatly depending on region, species, and habitat).
- Minimize construction of all roads, fences, and other ancillary facilities to reduce overall habitat fragmentation.
- Instruct all construction employees to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship, lambing/calving, pupping and molting [haulout period], spring/fall migrations) seasons.
- Do not permit pets on site in order to avoid harassment and disturbance of wildlife.
- Report observations of potential wildlife interactions, including wildlife mortality, to the appropriate agency immediately.
- Avoid known marine mammal haulouts or concentration areas as locations for deployment and associated activities.
- Provide for passage of fish and wildlife in new crossings and avoid reducing the efficiency of a structure to allow passage.
- Avoid roads and ROWs that provide access to critical wildlife habitat and near known migration routes (especially terrestrial and semi-aquatic wildlife routes), stopover sites, and large blocks of habitat.
- Assess critical life stages of marine mammals hauled out near locations (1 mile) selected for deployment and associated activities.
- Avoid development in areas that contain high densities of breeding or wintering birds, in high wildlife use areas, migratory staging areas, woodlots, riparian corridors, Audubon Important Bird Areas, nature preserves, state and national parks, state forests, fish and wildlife areas, and other publicly owned properties.
- Reduce habitat fragmentation, minimize the number of new roads constructed, and maximize use of existing corridors, roads, disturbed or developed areas.
- Assess potential noise impacts to migrating whales and local pinnipeds if deployment and activities would occur over sea ice. Control the spread of invasive animals and plants by coordinating mowing schedules, assisting agencies and groups with ROW permits, washing mowers and equipment between sites, and educating staff.

- Develop "good housekeeping" procedures to ensure that sites are kept clean of debris, garbage, and/or waste.
- Follow food and waste management protocols to minimize attractants to proposed network deployment sites.
- Restore habitat in construction zones, staging areas, etc. once construction is complete.
- Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
- Install bat exclusions and/or deterrents on existing and new structures.
- Turn off all unnecessary lighting at night.
- Minimize or avoid the need for or use of specific types of illumination (e.g., sodium vapor lights) at site facilities to reduce attraction of migratory birds.
- Determine during site-specific reviews the feasibility and effectiveness of implementing construction timing windows to avoid or minimize adverse effects to bird nests, eggs, and young birds and implement if practicable or feasible.
- Monopole structures should be considered in place of lattice structures, to the extent practicable or feasible. If lattice structures are to be used, FirstNet and/or their partners would work with the USFWS to incorporate anti-nesting devices into project design, as practicable or feasible.
- Work with USFWS to choose appropriate markers when towers requiring guy wires are necessary. Markers should be regularly maintained for the life of the project.
- Use outdoor security or safety lights, as practicable or feasible, that are motion-triggered, downcast and/or down-shielded, and directed inward whenever possible to prevent "star" effects when viewed offsite during construction/deployment and operation, particularly in coastal areas.
- Use structures containing the fewest perching options in areas where raptors and raven predation of sensitive resources is a concern.
- Use structures and components compatible with the guidance in *APLIC 2006* where raptor electrocution is a concern.
- Follow, as practicable or feasible, the suggested practices by the APLIC to minimize impacts to migratory birds through collision and electrocution.

The following BMPs and mitigation measures are recommended by USFWS, including guidelines on communications tower siting (*2012a, 2013b*):

> "1. Collocation of the communications equipment on an existing communication tower or other structure (e.g., billboard, water and transmission tower, distribution pole, or building mount) is strongly recommended. Depending on tower load factors and communication needs, from 6 to 10 providers should collocate on an existing tower or structure provided that frequencies do not overlap/'bleed' or where frequency length or broadcast distance requires higher towers. New towers should be designed structurally and electronically to accommodate the applicant's antenna, and antennas of at least 2 additional users—ideally 6 to 10 additional users, if possible—unless the design would require the addition of lights and/or guy wires to an otherwise unlit and/or unguyed tower. This recommendation is intended to reduce the number of towers needed in the future.
>
> 2. If collocation is not feasible and a new tower or towers are to be constructed, it is strongly recommended that the new tower(s) should be not more than 199 feet above ground level (AGL), and that construction techniques should not require guy wires. Such towers should be unlighted if Federal Aviation Administration (FAA) regulations and lighting standards (*FAA 2007, Patterson 2012, FAA 2013 lighting circular anticipated update* [[13]]) permit. Additionally, the Federal Communications Commission (FCC) through recent rulemaking now requires that new towers > 450 ft AGL contain no red-steady lights. FCC also recommends that new towers 350-450 ft AGL also contain no red-steady lights, and they will eventually recommend that new towers < 350 ft AGL convert non-flashing lights to flash with existing flashing lights. LED lights are being suggested as replacements for all new construction and for retrofits, with the intent of future synchronizing the flashes. Given these dynamics, the Service recommends using lattice tower or monopole structures for all towers < 200 ft AGL and for taller towers where feasible. The Service considers the less than 200 ft AGL option the 'gold standard' and suggests that this is the environmentally preferred industry standard for tower placement, construction and operation—i.e., towers that are unlit, unguyed, monopole or lattice, and less than 200 ft AGL.
>
> 3. If constructing multiple towers, the cumulative impacts of all the towers to migratory birds—especially to Birds of Conservation Concern (*[US]FWS 2008*) and threatened and endangered species, as well as the impacts of each individual tower, should be considered during the development of a project.

[13] Current FAA guidance (*FAA 2016a*) requires lighting for towers greater than 200 feet.

4. The topography of the proposed tower site and surrounding habitat should be clearly noted, especially in regard to surrounding hills, mountains, mountain passes, ridge lines, rivers, lakes, wetlands, and other habitat types used by raptors, Birds of Conservation Concern, and state and federally listed species, and other birds of concern. Active raptor nests, especially those of Bald and Golden Eagles, should be noted, including known or suspected distances from proposed tower sites to nest locations. Nest site locations for Golden Eagles may vary between years, and unoccupied, inactive nests and nest sites may be re-occupied over multiple years. The Service's 2013 Eagle Conservation Plan Guidance, Module 1, Land-based Wind Energy, Version 2, available on our website, is a useful document (*USFWS 2013[a]*).

5. If at all possible, new towers should be sited within existing 'antenna farms' (i.e., clusters of towers), in degraded areas (e.g., strip mines or other heavily industrialized areas), in commercial agricultural lands, in Superfund sites, or other areas where bird habitat is poor or marginal. Towers should not be sited in or near wetlands, other known bird concentration areas (e.g., state of federal refuges, staging areas, rookeries, and Important Bird Areas), in known migratory, daily movement flyways, areas of breeding concentration, in habitat of threatened or endangered species, or key habitats for Birds of Conservation Concern (*[US]FWS 2008*). Disturbance can result in effects to bird populations which may cumulatively affect their survival. The Service has recommended some disturbance-free buffers, e.g., 0.5 mi around raptor nests during the nesting season, and 1-mi disturbance free buffers for Ferruginous Hawks and Bald Eagles during nesting season in Wyoming (*[US]FWS WY Ecological Services Field Office, referenced in Manville 2007:23*). The effects of towers on 'prairie grouse,' 'sage grouse,' and grassland and shrub-steppe bird species should also be considered since tall structures have been shown to result in abandonment of nest site areas and leks, especially for 'prairie grouse' (*Manville 2004*). The issue of buffers is currently under review, especially for Bald and Golden Eagles. Additionally, towers should not be sited in areas with a high incidence of fog, mist, and low cloud ceilings.

6. If taller (> 199 ft AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used.[14] Unless otherwise required by the FAA, only white strobe or red strobe lights (red preferable since it is generally less displeasing to the human eye at night), or red flashing incandescent lights should be used at night, and these should be the minimum number, minimum intensity (< 2,000 candela), and minimum number of flashes per minute (i.e., longest duration between flashes/'dark phase') allowable by the FAA. The use of solid (non-

[14] This guidance (*USFWS 2013b*) was based on earlier FAA guidance that has since been updated. Current FAA guidance (*FAA 2016a*) now requires lighting for towers greater than 200 feet.

flashing) warning lights at night should be avoided (*Patterson 2012, Gehring et al. 2009*)—see recommendation #2 above. Current research indicates that solid red lights attract night-migrating birds at a much higher rate than flashing lights (*Gehring et al. 2009, Manville 2007, 2009*). Recent research indicates that use of white strobe, red strobe, or red flashing lights alone provides significant reductions in bird fatalities (*Patterson 2012, Gehring et al. 2009*).

7. Tower designs using guy wires for support, which are proposed to be located in known raptor or waterbird concentrations areas, daily movement routes, major diurnal migratory bird movement routes, staging areas, or stopover sites, should have daytime visual markers or bird deterrent devices installed on the wires to prevent collisions by these diurnally moving species. The efficacy of bird deterrents on guy wires to alert night migrating species has yet to be scientifically validated. For guidance on markers, see *Avian Power Line Interaction Committee (APLIC). 2006*. Suggested Practices for Avian Protection on Power Lines -- State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA. 207 pp, and APLIC. 2012. Reducing Avian Collisions with Power Lines – the State of the Art in 2012. Edison Electric Institute and APLIC. Washington, DC. 159 pp. Also see www.aplic.org, www.energy.ca.gov, or call 202-508-5000.

8. Towers and appendant facilities should be designed, sited, and constructed so as to avoid or minimize habitat loss within and adjacent to the tower 'footprint.' However, a larger tower footprint is preferable to the use of guy wires in construction. Several shorter, un-guyed towers are preferable to one, tall guyed, lighted tower. Road access and fencing should be minimized to reduce or prevent habitat fragmentation, disturbance, and the creation of barriers, and to reduce above ground obstacles to birds in flight.

9. If, prior to tower design, siting and construction, if it has been determined that a significant number of breeding, feeding and roosting birds, especially of Birds of Conservation Concern (*[US]FWS 2008*), state or federally-listed bird species, and eagles are known to habitually use the proposed tower construction area, relocation to an alternate site is highly recommended. If this is not an option, seasonal restrictions on construction are advised in order to avoid disturbance, site and nest abandonment, especially during breeding, rearing and other periods of high bird activity.

10. Security lighting for on-ground facilities, equipment and infrastructure should be motion- or heat-sensitive, down-shielded, and of a minimum intensity to reduce nighttime bird attraction and eliminate constant nighttime illumination, but still allow safe nighttime access to the site (*USFWS 2012[b], Manville 2011*).

> 11. Representatives from the USFWS or researchers from the Research Subcommittee of the Communication Tower Working Group should be allowed access to the site to evaluate bird use; conduct dead-bird searches; place above ground net catchments below the towers (*Manville 2002*); and to perform studies using radar, Global Position System, infrared, thermal imagery, and acoustical monitoring, as necessary. This will allow for assessment and verification of bird movements, site use, avoidance, and mortality. The goal is to acquire information on the impacts of various tower types, sizes, configurations and lighting protocols.
>
> 12. Towers no longer in use, not re-licensed by the FCC for use, or determined to be obsolete should be removed from the site within 12 months of cessation of use, preferably sooner.
>
> 13. In order to obtain information on the usefulness of these guidelines in preventing bird strikes and better understanding impacts from habitat fragmentation, please advise USFWS personnel of the final location and specifications of the proposed tower, and which measures recommended in these guidelines were implemented. If any of these recommended measures cannot be implemented, please explain why they are not feasible. This will further advise USFWS in identifying any recurring problems with the implementation of the guidelines, which may necessitate future modifications."

Additional tower lighting BMPs are described in Section 11.6.2.2, Project-Type Specific BMPs and Mitigation Measures.

11.6.2.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Deployable Technologies
  - Avoid activities within migratory bird flyways and in the immediate vicinity of bat roosts to the extent practicable.
  - Site towers away from known communal bat use areas and high bird use areas to the extent practicable or feasible.
  - Do not operate aircraft at an altitude that could disturb known natural roosting sites of bats, with the exception only for severe weather conditions.
  - Do not operate aircraft at an altitude lower than 1,500 feet within 0.5 mile of known walrus observed on land or ice, with the exception only for severe weather conditions.

- Wired Projects
  - New Build – Aerial Fiber Optic Plant
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
    - Install bat exclusions and/or deterrents on existing and new structures.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
- Wireless Projects
  - New Wireless Communication Towers
    - Follow USFWS Guidelines For Recommendations On Communications Tower Siting, Construction, Operation, and Decommissioning (*USFWS 2012a*).
    - Insert anti-nesting devices on existing or new structures.
    - Site towers away from known communal bat use areas and high bird use areas to the extent practicable or feasible.
    - Construct new towers more than 3 miles from any ocean (or Great Lake shoreline), as practicable or feasible. If towers must be closer than 3 miles from the shoreline:
      - Conduct site-specific studies;
      - Ensure towers are self-standing (un-guyed); and
      - Ensure towers are short enough to not require lighting, as practicable or feasible. If towers do require lighting, install lighting that does not include steady-burning lights, as practicable or feasible.
    - Follow the FAA requirements to eliminate steady-burning flashing obstruction lights and use only flashing obstruction lights in accordance with FAA Advisory Circulars AC 70/7460-1L and AC 150/5345-43H (*FAA 2016a; FAA 2016b; FCC 2017*).
  - Collocation on Existing Wireless Tower, Structure, or Building
    - Follow the FAA requirements to eliminate steady-burning flashing obstruction lights and use only flashing obstruction lights in accordance with FAA Advisory Circulars AC 70/7460-1L and AC 150/5345-43H (*FAA 2016a; FAA 2016b; FCC 2017*).

11.6.3. Fisheries and Aquatic Habitats

11.6.3.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to fisheries and aquatic habitats. The following BMPs and mitigation measures would apply to all project types:

- Avoid construction, as practicable, during sensitive seasons for fish such as migration, spawning, egg development (including intra-gravel development) and larval fish (benthic[15] or pelagic[16]) development (sensitive seasons/time periods vary by species and location).
- Consolidate facilities as much as possible.
- Use site-appropriate native plants and invasive-free materials (e.g., seed mixes, rock, mulch, soil) for revegetation and restoration efforts.
- Revegetate and restore riparian areas and other vegetated areas around aquatic resources to the extent possible once construction activities are complete.
- Report spills or other observed pollutants to the appropriate agency immediately.
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Instruct all construction employees to avoid harassment and disturbance of fish and other aquatic species, and report any signs of mortality to the appropriate agency immediately.
- Avoid productive habitats to the extent practicable, such as coastal wetlands, inland waterways, essential fish habitats, spawning areas, and reefs.
- Minimize sedimentation and turbidity in fish habitats by implementing sediment and erosion control measures, as practicable; the use of such measures (e.g., silt fences, silt curtains,[17] and erosion control blankets) could reduce erosion and sedimentation.
- Minimize the amount of fill placed in wetlands and streams when constructing access roads by installing bridges and or culverts; work with the appropriate agency to use culverts and bridges that are appropriately designed and sized for fish passage.
- Use set-backs when clearing vegetation for construction, where appropriate, from riparian zones to avoid removal of important fish cover such as vegetation, boulders, and large woody debris.
- Perform regular maintenance checks of equipment near coastal areas, waterways, and other protected areas to minimize detachment of components reaching critical habitat.
- Consider tidal regimes when deploying near coastal areas to help prevent loss of equipment and marine debris in nearby coastal fish habitat.

[15] Benthic means anything associated with or occurring on the bottom of a body of water.

[16] Pelagic means anything that inhabits the water column as opposed to being associated with the sea floor, generally occurring anywhere from the surface to 1,000 meters (*NOAA 2006*).

[17] Silt curtains are floating barriers used in marine construction and remediation to control silt and sediment in a body of water.

- Utilize buffer zones, temporary or permanent native seeding on disturbed ground, ground cover, plastic sheeting, and/or matting to minimize sedimentation.
- Develop a storm water pollution prevention plan.
- Avoid construction/deployment, as practicable, in productive riparian zones, marine preserves, and wetlands since construction could potentially result in less refuge for fish, fundamental changes in channel structure (e.g., loss of pool habitats), instability of stream banks, and alteration of nutrient and prey sources within the shoreline aquatic community (*Hanson et al. 2003*).
- Implement an emergency response plan for fuel spills and environmental emergencies.
- Include secondary containment for hazardous materials such as fuels and use uplands, as feasible, away from streams and waterbodies for refueling of construction or operations equipment.
- Implement invasive species plans to minimize introduced aquatic plant and animal species into the Proposed Action areas (e.g., wash and inspect equipment and vehicles before moving from one drainage basin or watershed to the next).
- Minimize construction noise in and near fish habitats, as practicable.
- Avoid physical barriers in waterbodies, to the extent practicable, during installation and operation to allow for the migration of invertebrates and other aquatic fauna.
- Follow all applicable federal and state/territory requirements for construction activities near fish and fish habitat.

11.6.3.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply to Wired Projects in addition to those listed above for all project types:

- New Build – Buried Fiber Optic Plant
  - Use horizontal directional drilling where possible and appropriate, for stream crossings to avoid potential impacts to the streambed, banks, and associated fish habitat.

11.6.4. Threatened and Endangered Species and Species of Conservation Concern

11.6.4.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to threatened and endangered species and species of conservation concern. The following BMPs and mitigation measures would apply to all project types:

- Fully adhere to the compliance requirements of the Endangered Species Act.
- Engage in early consultation with appropriate agencies and stakeholders including, but not limited to, USFWS, NMFS, and state/territory wildlife and natural resources agencies.
- Avoid conducting deployment activities in areas with known locations or habitats for threatened and endangered plants.
- Instruct all construction employees to identify and report any sightings of listed species, to avoid harassment and disturbance of wildlife, and to not disturb or enter any nearby caves or mines.
- Follow food and waste management protocols to minimize attractants to the deployment site.
- Minimize construction of all roads, fences, and other ancillary facilities to reduce overall habitat fragmentation.
- Use site-appropriate native plants and invasive-free materials (e.g., seed mixes, rock, mulch, soil) for revegetation and restoration efforts.
- Prohibit any pets on site during construction or deployment.
- Report observations of sensitive species that are injured, dead, or entangled to the appropriate agency immediately.
- Consolidate Proposed Action facilities as much as possible (e.g., collocation and use of existing ROWs).
- Implement seasonal and spatial buffer zones for construction and other potentially disturbing activities during sensitive periods for listed species such as breeding, nesting, calving/pupping, haulout, migration, spawning, and egg development as identified by USFWS, the NMFS, and/or relevant state/territory agency.
- Avoid removal or disturbance of forest to the maximum extent practicable and ensure that any unavoidable forest impacts do not result in the loss of listed snails, butterflies, bird breeding habitat, or bat roost sites or hibernacula.[18]
- Avoid activities within seagrass beds and control turbidity to minimize potential indirect impacts on seagrass.
- Avoid potential impacts to known grouper spawning sites.
- Avoid potential impacts within coastal estuarine habitats.
- Train construction and deployment staff in the Proposed Action BMPs and mitigation measures and incentivize reporting of any lapses in BMP and mitigation measure implementation.
- Implement a strict policy prohibiting pets on site and prohibiting hunting or fishing or any other action that would result in any avoidable disturbance of listed species.

[18] Hibernacula are the habitats within which animals hibernate or otherwise seek refuge for extended periods.

- Use setbacks from riparian zones when clearing vegetation for construction to avoid removal of important fish cover such as vegetation boulders and large woody debris.
- Follow all applicable federal and state/territory requirements for construction activities near fish and fish habitat.
- Use appropriate sediment and erosion control measures to minimize sedimentation and turbidity in fish habitats.
- Minimize the use of coastal lighting, particularly in the vicinity of known turtle nesting areas. If the use of coastal lighting in sea turtle use areas is unavoidable, use turtle safe lighting instead of normal lights (low-pressure sodium-vapor lighting or red lights that emit a very narrow portion of the visible light spectrum) and consult with local sea turtle experts on the design of the coastal lighting plan.
- Implement an emergency response plan for fuel spills and environmental emergencies.
- Include secondary containment for hazardous materials and use non-wetland sites away from streams and waterbodies for refueling of construction or operations equipment.
- Implement invasive species plans to minimize introduced aquatic plant and animal species into the areas affected by the Proposed Action (e.g., wash and inspect equipment and vehicles before moving from one drainage basin or watershed to the next).
- Implement the same construction and deployment BMPs and mitigation measures for any operational activities that involve any major infrastructure replacement as part of ongoing system maintenance.
- Implement seasonal and spatial buffer zones for operational activities that involve potentially disturbing activities in listed species use areas.
- Implement “good housekeeping” procedures to ensure that during operation the sites would be kept clean of debris, garbage, and fugitive trash or waste.
- Turn off all unnecessary lighting at night.
- Avoid or minimize the use of sodium vapor lights at site facilities to reduce attraction of migratory birds.
- Develop and implement operational monitoring and adaptive management procedures.
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Post and enforce speed limits on access roads, particularly within areas where a listed animal may be struck by construction and/or maintenance vehicles.

11.6.4.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wired Projects
  - New Build – Aerial Fiber Optic Plant
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
  - Collocation on Existing Aerial Fiber Optic Plant
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
- Wired Projects
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable
    - Minimize underwater construction noise in all aquatic habitats by minimizing vessel speed, using quieter equipment or technologies, or deploying bubble curtains or other noise screens during underwater work.
    - Implement a marine observer program during construction and operation to avoid and minimize boat strikes to whales, sea turtles, seals, and dugongs.
- Deployable Technologies
  - Restrict aircraft operation at altitudes lower than 1,500 feet within 0.5 mile of known pupping or haulout areas during critical life stages, with the exception only for severe weather conditions.
  - Keep aircraft above altitudes higher than 1,500 feet within 0.5 mile of walruses and seals hauled out on land or ice, with the exception only for severe weather conditions.

11.7. LAND USE, AIRSPACE, AND RECREATION

11.7.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to land use, airspace, and recreation. The following BMPs and mitigation measures would apply to all project types:

- Give preference to development options that involve use of existing physical infrastructure, and/or that do not involve new aboveground structures (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.), especially near recreation lands.

- Give preference to development options that are compatible with existing zoning and applicable comprehensive plans.
- Select infrastructure locations that are screened from view by topography and/or vegetation, that do not require noticeable permanent changes in landforms (i.e., cut and fill) or vegetation, and that are as far from surrounding residences as possible.
- Retain existing vegetation wherever possible to provide visual screening of new infrastructure.
- Select infrastructure designs that minimize contrast with the surrounding landscape and land uses.
- Avoid infrastructure locations on easements established for wildlife habitat and other conservation purposes, to the extent practicable and feasible, and ensure compliance with applicable conditions and restrictions for locations on conservation lands.
- Select infrastructure locations that are as far from recreation lands as practicable and feasible.
- Select infrastructure designs that minimize construction footprints.
- Give preference to infrastructure locations that are compatible with existing park or recreation planning documents.
- Avoid or minimize, as practicable and feasible, construction activities in areas covered by existing incompatible easements.

11.7.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wireless Projects
  - New Wireless Communication Towers
    - Select the shortest possible structures necessary to meet the FirstNet system's needs, and only deploy towers less than 200 feet in height.
    - Place new infrastructure near existing similar infrastructure where possible, to minimize the total number of new aerial navigation hazards.
    - Avoid placing new infrastructure near airports or the areas regulated under the FAA's Part 77 regulations (*FAA 2016a*).
    - Avoid placing new infrastructure within Military Operations Areas or under Military Training Routes.
    - Work closely with the National Park Service (NPS) to address any concerns they might have if a tower needs to be placed in an area that might affect the nighttime sky at an NPS unit.

- Deployable Technologies
  - Limit the use of Deployable Airborne Communications Architecture to areas less likely to be used by commercial, military, or private aviation (to the degree feasible, and in consultation with the FAA and Department of Defense).

11.8. VISUAL RESOURCES

11.8.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to visual resources. The following BMPs and mitigation measures would apply to all project types:

- Take the scenic character of the surrounding area into account in the proposed design to reasonably minimize or avoid visual impacts to the surrounding area when viewed from existing roadways or shorelines (design structures to complement the natural landscape; for example, use paint that blends with the surrounding landscape).
- Utilize non-reflecting coatings on towers, antennas, buildings, and associated structures where possible.
- Implement sensitive grading techniques that blend grading with the natural terrain.
- Treat all disturbed slopes for erosion control.
- Minimize the area of bare soil at any one time as much as possible by constructing in stages.
- Revegetate disturbed areas as progressively and quickly as practicable to restore vegetative cover.
- Reduce or eliminate the need for lighting on poles or structures, or to restrict the duration and directionality of needed lighting.
- Give preference to development options that involve use of existing physical infrastructure (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.), and specifically avoid the construction of new aerial fiber optic plant and/or new wireless communication towers within, or in locations within sight of, federal or other lands where visual resources are regulated (e.g., units of the National Park System, or areas where local zoning regulations emphasize protection of views or aesthetic conditions), or where residents and visitors have come to expect high visual quality and the absence of human-built structures.
- Select infrastructure locations that are screened from view by topography and/or vegetation, that do not require noticeable permanent changes in landforms (i.e., cut and fill) or vegetation, and that are as far from surrounding residences as possible.
- Select infrastructure designs that minimize construction footprints.
- Retain existing vegetation wherever possible to provide visual screening of new infrastructure.

- Select infrastructure designs that minimize contrast with the surrounding landscape.
- Comply with all relevant and applicable federal regulations and guidance regarding visual and aesthetic conditions and impacts.

11.8.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wireless Projects
  - New Wireless Communication Towers
    - Work closely with the NPS to address any concerns they might have if a tower needs to be placed in an area that might affect the nighttime sky at an NPS unit.
- Deployable Technologies
  - Select parking locations for deployable technologies that are screened from view by topography or vegetation, that are as far away from as many observers as possible, and that are not in or near areas considered scenic, such as shorelines, ridgelines, or scenic roads.
  - Select deployable designs that minimize the use of nighttime lighting, that include shielded or directional nighttime lighting, and/or that use the minimum nighttime lighting required for safe operations.

11.9. SOCIOECONOMICS

11.9.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to socioeconomics. The following BMPs and mitigation measures would apply to all project types:

- Avoid development of new wireless communication towers in or near residential areas to reduce the potential that such activities could have adverse impacts on residential property values. Acceptable distances could vary, depending on the nature of the aesthetic impacts, the nature of other objectionable effects that influence property values, and other factors such as residential density, local concern over aesthetics, desire for improved wireless communications, local media response, and more. According to a recent literature review, measurable adverse impacts of wireless communication towers on property values are generally not observable beyond 300 meters (984 feet), and often are not observable beyond 100 meters (328 feet) (*Bond et al. 2013*).

- Avoid development or enlargement of storage, staging, and launch/landing areas for deployable technologies in or near residential areas to reduce the potential that such activities could have adverse impacts on residential property values. Acceptable distances could vary depending on the size of the facility, types of activities occurring there, the nature of the aesthetic impacts or other aspects that influence property values, and other factors such as residential density, local concern over aesthetics, desire for improved wireless communications, local media response, and more.
- Give preference to development options that involve use of existing physical infrastructure (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.).
- Select infrastructure locations that are screened from view by topography and/or vegetation, that do not require noticeable permanent changes in landforms (i.e., cut and fill) or vegetation and that are as far from surrounding residences as possible.
- Retain existing vegetation wherever possible to provide visual screening of new infrastructure.
- Select infrastructure designs that minimize contrast with the surrounding landscape.
- Give preference to hiring workers who are local residents, where practicable. In addition to reducing influx and associated social cohesion effects; this BMP would have the following effects on socioeconomic resources:
  - Reducing demand for public services, since employees would already be residents (i.e., existing public service users).
  - Increasing local employment and economic activity through wages and spending.
- Share deployment plans with public service providers, especially first responders, as early in the process as possible, and throughout the deployment process. This will provide advance notice to public service providers, and would particularly allow first responders to be better prepared for emergencies that could arise during deployment.
- Consult with subsistence users (including Indigenous Peoples and other individuals or groups for whom subsistence is a way of life) to understand the species and habitats used for subsistence activities, as well as the seasonal cycle of subsistence activity.
- Select infrastructure locations that minimize or avoid disturbance of subsistence species habitat.

11.9.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.10. ENVIRONMENTAL JUSTICE

11.10.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential environmental justice impacts. The following BMPs and mitigation measures would apply to all project types:

- Identify specific communities (i.e., neighborhoods or populations that may be contained within individual block groups), where possible, that are at risk of experiencing environmental justice impacts (this is important in Alaska given the size of block groups, particularly in rural areas). Conduct targeted outreach to these communities, tailored to the specific racial, ethnic, financial, and/or cultural background, as early in the development process as possible to explain the nature and extent of specific potential impacts, and to gain feedback on those impacts.
- Consult with subsistence users (including Indigenous Peoples and other individuals or groups for whom subsistence is a way of life) to understand the species and habitats used for subsistence activities, as well as the seasonal cycle of subsistence activity.
- Give preference to development options that involve use of existing physical infrastructure (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.).
- Select infrastructure locations, where possible, that are not within or near environmental justice communities, particularly new build options.
- Follow all BMPs identified throughout this chapter that reduce adverse impacts of construction activities, such as generation of noise, dust, and traffic.
- Avoid siting deployment activities and facilities requiring construction in proximity to environmental justice communities to reduce the potential that such activities would be seen as disproportionately affecting environmental justice communities. In general, proximity means within a distance at which noise and dust would be considered objectionable or where effects on traffic volume or patterns would be considered detrimental to local residents or businesses.
- Avoid development of new wireless communication towers in proximity to environmental justice communities because of their potential impacts on property values and to reduce the potential that such activities would be seen as disproportionately affecting environmental justice communities. Proximity could be defined variably depending on the nature of the aesthetic impacts, nature of other objectionable effects that influence property values, and other factors such as local concern over aesthetics, desire for improved wireless communications, local media response, and more. According to a recent literature review, measurable adverse impacts on property values are generally not observable beyond 300 meters (984 feet), and often are not observable beyond 100 meters (328 feet) (*Bond et al. 2013*).

11.10.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.11. CULTURAL RESOURCES

11.11.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to cultural resources. The following BMPs and mitigation measures would apply to all project types:

- Comply with the requirements of Section 106 of the National Historic Preservation Act.
- Follow all applicable federal and state requirements if inadvertent discoveries of human remains are made during deployment or operations.
- Ensure usage of an appropriate indirect effects Area of Potential Effects as part of pre-siting or pre-deployment surveys to sufficiently account for potential indirect effects to cultural resources.
- Establish procedures for pre-deployment monitoring if a project has the potential to adversely indirectly affect historic properties to collect baseline data, monitor potential indirect effects during deployment, and determine if effects have occurred post-deployment. Develop BMPs and mitigation measures as part of a Memorandum of Agreement or Programmatic Agreement to address any potential effects, if they were to occur.
- Use low-impact construction alternatives, when feasible. For instance, ripping could be used as an alternative to blasting near structures or archaeological sites identified as at risk of effects from vibration. Other techniques such as bored piling could be used to minimize the vibration generated, where possible.
- Restrict the timing of deployment activities so as not to disturb the use of historic properties, as applicable. Stop work at certain times when traditional and/or religious properties are in use, such as during significant events (e.g., religious festivals or ceremonies).
- Design projects to mitigate potentially negative visual and auditory impacts of facilities. The following visual and noise abatement techniques should be considered: noise-reducing barriers, low-profile constructions, proper siting to maximize the use of topography and vegetation, screening, blending with topographic forms and existing vegetation patterns, and use of environmental coloration or advanced camouflage techniques to limit visual effects.
- Consult with site users through a community liaison team to understand site usage and how the project could affect user access.
- Arrange alternative access using stakeholder input if access to an important cultural heritage site is restricted or blocked. Notify the public of the blockage and alternate means of access.

- Follow all applicable federal requirements for agency and tribal consultation on the identification of and assessment of effects to cultural resources.
- Avoid deployment in areas with known historic properties and deploy equipment and facilities in alternate locations if practical.

11.11.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures for cultural resources beyond those listed above for all project types.

11.12. AIR QUALITY

11.12.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to air quality. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for obtaining air pollution control permits for applicable emission sources.
- Use engines certified to the lowest emission standards and engines that burn alternative fuels (e.g., natural gas, biofuels), and/or install emission control devices (when practicable) for equipment with internal combustion engines.
- Use vehicles with hybrid or electric technology, when possible, to reduce or eliminate criteria pollutant emissions from fuel combustion.
- Use renewable energy, as practicable or feasible, for backup power at buildout locations (cell tower sites, for example).
- Control dust from construction or other land-disturbing activities by spraying water on roads/construction areas, limiting the area of uncovered soil to the minimum needed for each activity, siting staging areas to minimize fugitive dust, using a soil stabilizer (chemical dust suppressor), mulching areas or using a temporary gravel cover, limiting the number and speed of vehicles on the site, and covering trucks hauling dirt.
- Post and enforce speed limits on dirt/gravel roads to reduce airborne fugitive dust.
- Limit idling time of construction vehicle and equipment and conduct proper vehicle maintenance.
- Minimize the time of operation of drones or aircraft below the mixing height (i.e., typically estimated at 3,000 feet aboveground level).
- Use electric or alternate fueled ground support equipment for drones or other aircraft.

- Avoid placement of air emission sources within Class I Areas to the extent possible.[19]
- Ensure all activities are in compliance with general conformity requirements in nonattainment and maintenance areas.
- Ensure all activities conform to the State or Territory Implementation Plan.
- Follow all applicable federal, state/territory, and local air quality requirements, including standards for nuisance (where possible) and fossil fuel-powered generators.
- Ensure all diesel engines are compliant with USEPA emission standards for the corresponding engine class.
- Ensure all equipment is appropriately sized for the Proposed Action.
- Consider using hydrogen-fueled generators where practicable to reduce nitrous oxides emissions.
- Obtain permits, where required, to install and operate fossil fuel-powered generators.[20]
- Implement a dust control plan for construction activities and any travel over unpaved roads.
- Use only ultra-low sulfur fuel (where commercially available) for both on-road and off-road diesel engines.
- Ensure all fuel-burning equipment including, but not limited to, heavy construction equipment and power generator, is maintained in accordance with manufacturer's specifications.

11.12.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.13. NOISE AND VIBRATIONS

11.13.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential noise and vibration impacts. The following BMPs and mitigation measures would apply to all project types:

- Use noise mufflers on heavy equipment to limit noise and vibration exposure on noise and vibration-sensitive receptors during construction and grading activities near populated areas and other noise sensitive receptors, including parks or other protected areas; limit the use of such equipment to operation during daytime hours only.

[19] Class I areas are national parks and wilderness areas in attainment or unclassifiable areas that exceed 5,000 acres in size and were in existence on August 7, 1977.
[20] Permits for stationary sources (diesel generators) should be obtained in advance of future deployment.

- Avoid, as practicable, deployment in areas with highly sensitive receptors and construct facilities in alternate locations for those projects involving heavy equipment for deployment. Such sensitive areas include foraging or breeding areas for disturbance-sensitive congregatory species such as some species of bats, colonial waterbirds, and seabirds, particularly those species that are listed as threatened or endangered, as well as wilderness areas (where recreational activities such as hiking, bird watching, etc. occur).
- Follow all applicable federal, state/territory, county/borough, and local requirements for construction and operation noise and vibration control to avoid or minimize increased noise and vibration.
- Follow all state/territory and federal guidelines for limiting aircraft noise and vibration on populated areas and over national parks.
- Include mitigation measures during the design and implementation phases of the project for equipment that is expected to generate significant noise or vibration (e.g., use of noise barriers such as walls, shrubbery).
- Ensure, as practicable, all heavy equipment, power generators, and boats are maintained in accordance with manufacturer's specifications.
- Limit construction activities to daytime hours (7 a.m. to 7 p.m.) to the extent possible when increased noise levels are more tolerable and avoid construction on Sundays and legal holidays.
- Implement BMPs and mitigation measures as directed by the local jurisdiction such as avoiding unnecessary revving of engines, switching off equipment when not in use, changing location of stationary construction equipment, minimizing drop height of materials, replacing conventional audible reversing alarms with more quiet alternative reversing warning systems, siting equipment away from noise sensitive areas (if practicable), notifying adjacent residents in advance of construction work, installing temporary acoustic barriers around stationary construction noise sources, and other controls as needed to reduce increased noise levels.

11.13.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wired Projects
  - New Build – Aerial Fiber Optic Plant
    - Do not permit underwater blasting and pile driving activities in any waterbody.
  - New Build – Submarine Fiber Optic Plant
    - Do not permit underwater blasting and pile driving activities in any waterbody.

11.14. CLIMATE CHANGE

11.14.1. BMPs and Mitigation Measures for All Project Types

To minimize the GHG emissions of the Proposed Action, FirstNet and/or their partners would require, as practicable or feasible, implementation of the following BMPs and mitigation measures:

- Ensure that equipment used is the most energy efficient, or use state-of-the-art equipment to increase energy efficiency.
- Use more fuel-efficient diesel-power generation units or low-emission units such as gasoline- or hydrogen-fueled power generators.
- Ensure that construction vehicles are running only when required for construction and reduce or limit unnecessary idling.
- Ensure all operators and drivers have received adequate training to efficiently use equipment.
- Conduct regular maintenance and inspection on equipment to ensure that it is running at the maximum energy efficiency.
- Use renewable energy, as practicable or feasible, for backup power at buildout locations (cell tower sites, for example).
- Minimize disturbed land area and soil disturbance by co-locating where it is feasible.
- Revegetate disturbed land areas after construction where it is feasible.
- Use access roads previously used during deployment activities for maintenance and operational activities.

To minimize climate change effects on the Proposed Action, FirstNet and/or their partners would require, as practicable or feasible, implementation of the following BMPs and mitigation measures to provide for adaptation to climate change effects:

- Ensure design of aboveground structures and equipment has included allowances for maximum temperature and precipitation changes.
- Continuously monitor and reinforce structures build on permafrost.
- Assess sea-level rise prior to installation of infrastructure near coastal areas.
- To allow for extreme weather events and flooding, monitor risk-prone areas and reinforce structures or relocate structures such as deployables outside of high-risk areas as needed.
- Work jointly with public authorities in the implementation of monitoring plans and action plans related to potential impacts that could affect the Proposed Action.

11.14.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.15. HUMAN HEALTH AND SAFETY

11.15.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to human health and safety. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for hazardous materials and hazardous waste management.
- Utilize trained and licensed heavy equipment operators, when available or required.
- Develop a site-specific Health and Safety Plan that identifies all potential physical and chemical hazards present at the site, including historic contamination.
- Develop and utilize Standard Operating Procedures for site preparation activities and include descriptions of work practice controls and administrative controls.
- Ensure workers wear proper safety equipment as appropriate to the potential hazards present, such as high visibility safety vests, hard hats, steel-toe boots, gloves, eye protection, and hearing protection.
- Provide daily safety meetings to review activities, potential hazards, and safety objectives.
- Avoid site preparation work in areas with high vehicle traffic volume, such as road ROWs.
- Avoid site preparation work in areas known to contain environmental contamination.
- Incorporate all BMPs and mitigation measures listed in Section 11.1, Infrastructure, on potential impacts to transportation system capacity and safety.
- Incorporate all BMPs and mitigation measures listed in Section 11.2, Soils, for potential impacts from soil erosion.
- Incorporate all BMPs and mitigation measures listed in Section 11.4, Water Resources, for potential impacts to water quality – sedimentation, pollutants, nutrients or water temperature, and changes to groundwater or aquifer characteristics.
- Incorporate all BMPs and mitigation measures listed in Section 11.12, Air Quality.
- Incorporate all BMPs and mitigation measures listed in Section 11.13, Noise and Vibrations.
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Conduct air and noise monitoring to ensure levels stay within health-protective levels for communities and workers and, as required, that workers are trained and comply with personal protective equipment requirements as established by the Occupational Safety and Health Administration (OSHA).
- Search for the location of known contaminated sites prior to site selection in the area where the Proposed Action site is being considered, for new or existing infrastructure projects.

- Ensure that appropriate measures are taken in compliance with applicable regulations (including Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act)[21] if construction occurs in an area where there is the potential for legacy contamination, to protect workers and the public from unacceptable levels of exposure to contaminants as a result of deployment activities.
- Establish an emergency response plan (including emergency preparedness and response activities, resources, and responsibilities) to attend to specific emergencies (e.g., accidental spills) that could arise during deployment.
- Ensure that reporting requirements are followed in the event that Emergency Planning and Community Right-to-Know Act reporting thresholds are reached for the shipping, handling or storage of gasoline or diesel used for equipment and generators.[22]
- Establish a grievance mechanism or other stakeholder engagement tool that is accessible and culturally appropriate for use by the community to express concerns regarding the Proposed Action.
- Implement community education and public awareness, as needed, about the Proposed Action's traffic, routes used, road signage, and safety which are particularly critical in high-risk areas.
- Use signage to clearly mark construction sites, and establish boundaries and barricades to keep people out of dangerous areas.
- Make sure an incident investigation procedure is in place that can be specifically used for any near misses or incidents involving workers and community members.
- Ensure all workers are appropriately trained in wildlife identification and hazard management to minimize the likelihood of wildlife attacks.
- Ensure all workers are appropriately trained in weather hazard management and equipped with all necessary personal protective equipment.
- Inform community members of dates and times of construction activities that are likely to generate noise at levels above 55 A-weighted decibels at the residences or workplaces of those individuals.
- Monitor land clearing and construction sites for areas of standing water, including ditches and holes in the ground, as well open receptacles (e.g., empty barrels) and fill or eliminate these hazards to prevent mosquito breeding.

[21] The main objective of the Resource Conservation and Recovery Act of 1976 is to "protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner" (*USEPA 2015a*). The Comprehensive Environmental Response, Compensation, and Liability Act or Superfund law was designed to help clean up hazardous waste sites and releases of pollutants or contaminants that may negatively affect public health (*USEPA 2011*).

[22] The Emergency Planning and Community Right-to-Know Act of 1986 was designed to assist communities in planning for emergencies related to hazardous waste. The law also requires industry to inform federal, state, and local governments on the storage, use, and releases of hazardous chemicals: 75,000 gallons for gasoline; 100,000 gallons for diesel; and 10,000 pounds for all other hazardous chemicals (*USEPA 2015b*).

- Given that no filariasis-, chikungunya-, or dengue-specific OSHA recommendations are available, follow OSHA recommended Workplace Precautions against West Nile Virus, another mosquito-borne illness for which, like chikungunya and dengue, the only preventative measure is avoidance of bites by infected mosquitoes.
- Ensure that the appropriate medication is available for treatment of any filariasis infections that may arise in the workforce for projects located in areas where filariasis is known to occur.

11.15.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.16. REFERENCES

11.16.1. Wildlife

APLIC (Avian Power Line Interaction Committee). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA. Accessed: November 21, 2016. Retrieved from: http://www.dodpif.org/downloads/APLIC_2006_SuggestedPractices.pdf

_____. 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* Washington, D.C.: Edison Electric Institute and APLIC.

APLIC and USFWS (Avian Power Line Interaction Committee and the U.S. Fish and Wildlife Service). 2005. *Avian Protection Plan Guidelines.* April 2005.

FAA (Federal Aviation Administration). 2016a. *Obstruction Marking and Lighting, Advisory Circular 70/7460-1L, Change 1*. October 8, 2016. U.S. Department of Transportation. Accessed: October 8, 2016. Retrieved from: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/70_7460-1

_____. 2016b. Specification for Obstruction Lighting Equipment. Advisory Circular 150/5345-43H. September 28, 2016. Accessed: March 2017. Retrieved from: https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5345-43GH.pdf

FCC (Federal Communications Commission). 2017. *Opportunities to Reduce Bird Collisions with Communication Towers while Reducing Tower Lighting Costs*. Washington, D.C. January 6, 2017. Accessed: March 2017. Retrieved from: http://wireless.fcc.gov/migratory-birds/Light_Changes_Information_Update_120415.pdf

Gehring, J., P. Kerlinger, and A.M. Manville, II. 2009. *Communication Towers, Lights and Birds: Successful Methods of Reducing the Frequency of Avian Collisions*. Ecological Applications, 19(2): 505-514.

_____. 2011. *The Role of Tower Height and Guy Wires on Avian Collisions with Communication Towers*. The Wildlife Society. Journal of Wildlife Management, 75(4): 848-855.

Manville, A.M., II. 2002. *Protocol for Monitoring the Impact of Cellular Telecommunication Towers on Migratory Birds Within the Coconino, Prescott, and Kaibab National Forests, Arizona*. Prepared for U.S. Forest Service. 9 pp.

_____. 2004. *Prairie Grouse Leks and Wind Turbines: U.S. Fish and Wildlife Service Justification for a 5-mile Buffer from Leks: Additional Grassland Songbird Recommendations.* Peer-reviewed briefing paper. Arlington, VA: U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. 17 pp.

_____. 2007. *Comments of the U.S. Fish and Wildlife Service Submitted Electronically to the FCC on 47 CFR Parts 1 and 17, WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, "Effects of Communication Towers on Migratory Birds."* February 2, 2007. 32 pp.

_____. 2009. "Towers, Turbines, Power Lines, and Buildings—Steps Being Taken by the U.S. Fish and Wildlife Service to Avoid or Minimize Take of Migratory Birds at these Structures." In T.D. Rich, C. Arizmendi, D. Demarest, and C. Thompson (eds.). *Tundra to Tropics: Connecting Habitats and People*. McAllen, TX: Proceedings 4th International Partners in Flight Conference. Pp. 262-272.

_____. 2011. *Comments of the U.S. Fish and Wildlife Service's Division of Migratory Bird Management Filed Electronically on WT Docket No. 08-61 and WT Docket No. 03-187, Regarding the Environmental Effects of the Federal Communication's Antenna Structure Registration Program*. January 14, 2011. 12 pp.

Patterson, J.T., Jr. 2012. *Evaluation of New Obstruction Lighting Techniques to Reduce Avian Fatalities*. DOT/FAA/TC-TN12/9, Federal Aviation Administration, U.S. Department of Transportation. 28 pp, plus appendices.

USFWS (U.S. Fish and Wildlife Service). 2000. *Service Guidance on the Siting, Construction, Operation, and Decommissioning of Communication Towers*. FWSIFHC/DHCIBFA. September 14, 2000. Accessed: July 2015. Retrieved from: http://www.fws.gov/habitatconservation/com_tow_guidelines.pdf (updated January 2016)

_____. 2008. *Birds of Conservation Concern 2008*. Arlington, VA: U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. 85 pp. Accessed: July 2015. Retrieved from: http://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf (updated January 2016)

_____. 2012a. *Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning*. The Migratory Bird Program – Conserving America's Birds. Accessed: July 2015. Retrieved from: http://www.fws.gov/policy/m0084.html (updated January 2016)

_____. 2012b. *U.S. Fish and Wildlife Service Land-based Wind Energy Guidelin*es. March, 82 pp.

_____. 2013a. *Eagle Conservation Plan Guidance, Module 1, Land-based Wind Energy, Version 2*. Division of Migratory Bird Management. April, 103 pp.

_____. 2013b. *2013 U.S. Fish and Wildlife Service USFWS Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning -- Suggestions Based on Previous USFWS Recommendations to FCC Regarding WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, "Effects of Communication Towers on Migratory Birds," Docket No. 08-61, FCC's Antenna Structure Registration Program, and Service 2012 Wind Energy Guidelines*. Prepared by Albert M. Manville. September 27, 2013.

11.16.2. Fisheries and Aquatic Habitats

Hanson, Jeanne, Mark Helvey, and Russ Strach (eds.). 2003. *Non-fishing Impacts to Essential Fish Habitat and Recommended Conservation Measures*. Version 1, August 2013. NOAA Fisheries. Accessed: July 13, 2015. Retrieved from: http://www.fpir.noaa.gov/Library/HCD/EFH%20Non-fishing%20NW-SW%202003.pdf

NOAA (National Oceanic and Atmospheric and Atmospheric Administration). 2006. *NOAA Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/SPO-69. October 2005. Revised Edition, June 2006.

11.16.3. Threatened and Endangered Species and Species of Conservation Concern

APLIC (Avian Power Line Interaction Committee). 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* Washington, D.C.: Edison Electric Institute and APLIC.

11.16.4. Land Use, Airspace, and Recreation

FAA (Federal Aviation Administration). 2016. *Obstruction Marking and Lighting, Advisory Circular 70/7460-1L, Change 1*. October 8, 2016. U.S. Department of Transportation. Accessed: October 8, 2016. Retrieved from: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/70_7460-1

11.16.5. Socioeconomics

Bond, Sandy, Sally Sims, and Peter Dent. 2013. *Towers, Turbines and Transmission Lines: Impacts on Property Values*. Chichester, West Sussex, U.K.: Wiley-Blackwell.

11.16.6. Environmental Justice

Bond, Sandy, Sally Sims, and Peter Dent. 2013. *Towers, Turbines and Transmission Lines: Impacts on Property Values*. Chichester, West Sussex, U.K.: Wiley-Blackwell.

11.16.7. Human Health and Safety

USEPA (U.S. Environmental Protection Agency). 2011. *CERCLA Overview*. EPA Superfund, Laws, Policy and Guidance.

_____. 2015a. *Resource Conservation and Recovery Act (RCRA)*. Accessed: July 2015. Retrieved from: http://www.epa.gov/agriculture/agriculture-laws-and-regulations-apply-your-agricultural-operation-statute#RCRA (updated January 2016)

_____. 2015b. *Summary of the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)*. Accessed: July 2015. Retrieved from: http://www2.epa.gov/laws-regulations/summary-comprehensive-environmental-response-compensation-and-liability-act

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

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Volume 8 - Chapters 10-18 & Appendices

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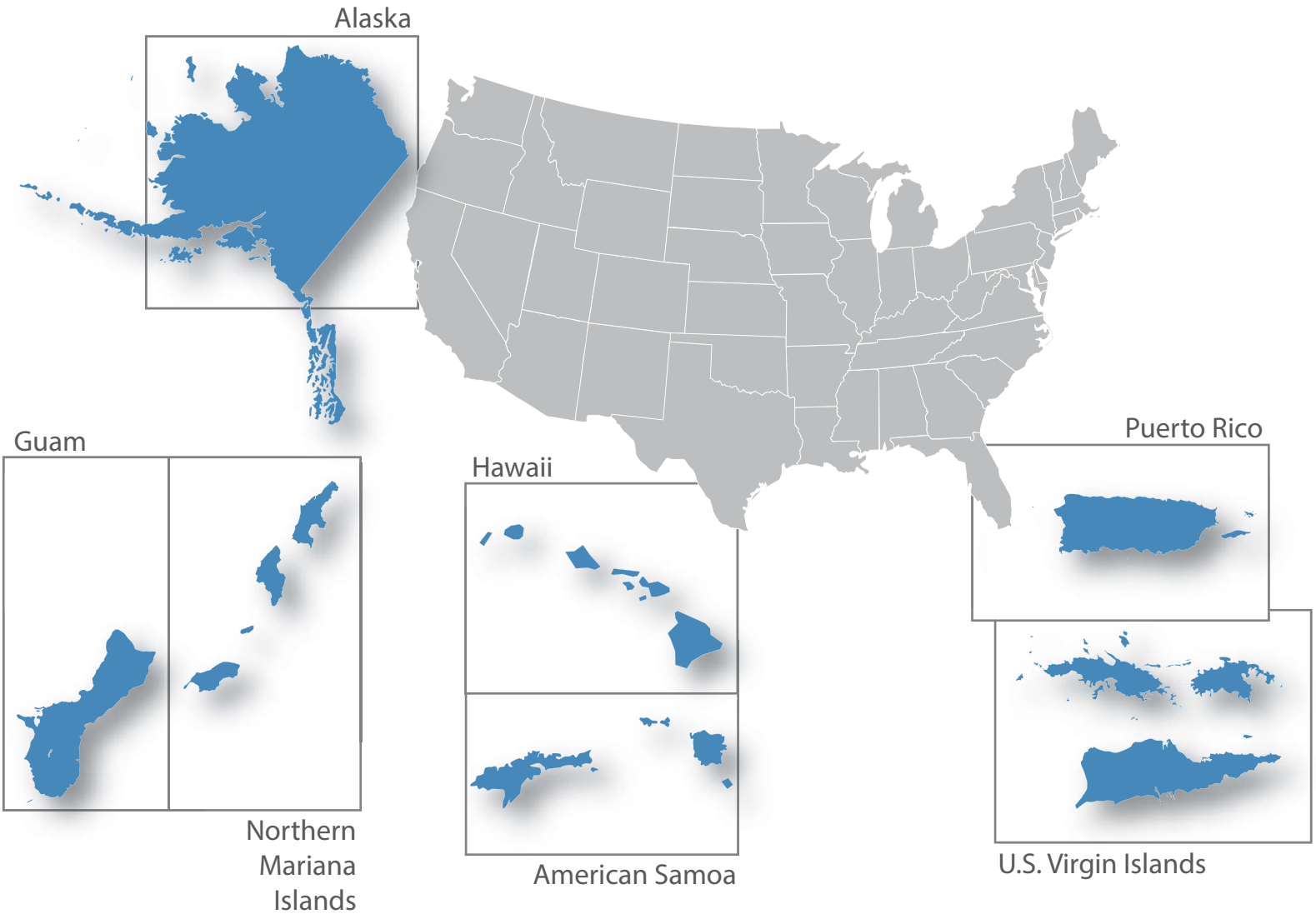

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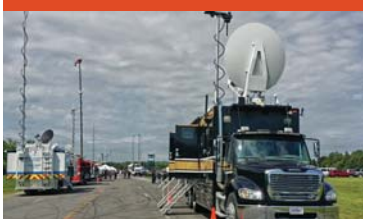

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First Responder Network Authority

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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General Services Administration
U.S. Department of Agriculture—Natural Resource Conservation Service
U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Commerce—National Telecommunications and Information Administration
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

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Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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11. BMPS AND MITIGATION MEASURES

This chapter provides examples of best management practices (BMPs) and mitigation measures that FirstNet and/or their partners would recommend or require to be implemented during deployment and operation of the Proposed Action to help avoid or minimize potential impacts to various resources, or potential impacts to deployed infrastructure from various hazards. Specifically, FirstNet and/or their partners would be required to implement mitigation measures, as defined through permitting and/or consultation with appropriate resource agencies. Unlike mitigation measures, however, BMPs would not necessarily be required in every project activity but would be applied as practicable or feasible during deployment and operation of the Proposed Action. The BMPs and mitigation measures outlined in this chapter have been developed based on initial consultation with other agencies as well as through independent research conducted by FirstNet and their environmental contractors. It is possible that other or additional site-specific BMPs and mitigation measures not included in this chapter may be recommended or required to be implemented as a result of consultation with resource agencies, permits, and/or additional environmental reviews.[1] The example BMPs and mitigation measures in this chapter are organized by resource area and, where applicable, each of the following project types:[2]

- Wired Projects
  - New Build – Buried Fiber Optic Plant
  - Use of Existing Conduit – New Buried Fiber Optic Plant
  - New Build – Aerial Fiber Optic Plant
  - Collocation on Existing Aerial Fiber Optic Plant
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable
  - New Build – Submarine Fiber Optic Plant
  - Installation of Optical Transmission or Centralized Transmission Equipment
- Wireless Projects
  - New Wireless Communication Towers
  - Collocation on Existing Wireless Tower, Structure, or Building
- Deployable Technologies
  - Cell on Wheels; Cell on Light Truck; System on Wheels
  - Deployable Aerial Communications Architecture

[1] Site-specific analysis or environmental reviews may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work.

[2] The resource areas are ordered in this chapter consistent with how they appear in each of the state/territory-specific chapters (Chapters 3 through 9). Additional information and details regarding the Proposed Action infrastructure and project types can be found in Section 2.1.2, Proposed Action Infrastructure, and each respective section within the state/territory chapters.

- Satellites and Other Technologies
  - Satellite-Enabled Devices and Equipment
  - Deployment of Satellites

11.1. INFRASTRUCTURE

11.1.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to infrastructure. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for construction on or near public roads.
- Follow all applicable federal, state/territory, and local laws concerning traffic speed and safety during the transport of equipment.
- Schedule deployment activities outside of peak traffic hours.
- Avoid roads with heavy traffic volumes and peak travel hours, to the extent possible, when scheduling the transport of heavy equipment or construction materials.
- Design staging areas to minimize unnecessary equipment and material mobilizations.
- Repave and restore disturbed roads and public road rights-of-way (ROWs), applicable to federal, state/territory, and local laws, as quickly as possible to avoid any traffic impediments that may potentially hinder access to local health, public safety, and emergency facilities, and so traffic capacity and safety conditions could return to their pre-construction condition.
- Design new deployment activities within existing ROWs to the extent possible and outside of roadways and thoroughfares to minimize potential impacts on traffic flow or safety.
- Coordinate with federal, state/territory, and local government agencies as appropriate, as well as with public safety officials, emergency and medical facilities, and existing telecommunications providers to the extent practicable to facilitate awareness of deployment activities and accompanying schedule.
- Schedule new construction outside of seasons known to cause more accidents (e.g., tsunami/ hurricane/tropical cyclone season or times of the year when wildfires are more likely to occur) so that potential service disruptions are less likely to coincide with times of increased demand.
- Confirm or otherwise install detection systems so that if and when a disruption to utility services or telecommunications systems occurs, it can be identified and repaired quickly.
- Implement a backup telecommunications system, as needed, which allows first responders to communicate with each other and the public during deployment activities until the new nationwide public safety broadband network (NPSBN) has been successfully implemented.

- Complete deployment activities as quickly and safely as possible to avoid any possible disruptions to utility services.
- Complete those deployment activities that could interrupt power during non-peak times for power or water.
- Follow all applicable state/territory and local one-call laws and procedures for buildouts.
- Follow all applicable federal, state/territory, or local requirements regarding utilities (water, sewer, power, and electricity) and construction within a utility ROW.

11.1.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.2. SOILS

11.2.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to soil resources. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for soil erosion and sedimentation control and permitting to avoid or minimize erosion and sedimentation and restore disturbed soil.
- Avoid construction in areas with steep or unstable slopes or with soils known to be particularly susceptible to soil erosion, (see Affected Environment Soils sections) and construct facilities in alternate locations to avoid these areas, if practical.
- Develop a soil erosion and sedimentation control plan for disturbed areas, and use silt fences,[3] erosion control blankets,[4] retention ponds, straw and sandbag barriers, and/or other controls as needed to reduce soil erosion, storm water runoff, and sedimentation.
- Schedule construction activities to avoid, to the extent possible, soil disturbance activities during periods or months with heavy rainfall and snowmelt.[5]
- Cover exposed areas with tarps or similar materials to prevent rainfall exposure to the extent possible.
- Minimize the area of bare soil exposed at any one time as much as possible by constructing in stages.

[3] Silt fences are designed to trap sediment in the area where construction or soil disturbance is taking place to minimize or avoid soil erosion and sedimentation. The fence is typically 2- to 3-feet tall, buried 8 to 12 inches into the soil, and secured with stakes.
[4] Erosion control blankets are biodegradable or synthetic sheet-like materials that are rolled out onto disturbed areas to protect soil from wind and water erosion.
[5] See Affected Environment Climate Change sections for an explanation of seasonal climate and weather patterns.

- Revegetate disturbed areas with native plants, to the extent practicable, as progressively and quickly as practicable to achieve stabilization.[6]
- Minimize soil disturbance to the extent practicable, especially in wetland and designated natural resource areas.
- Maintain topsoil by segregating topsoil or surface soil from subsurface layers and implementing temporary topsoil storage areas during construction.[7]
- Replace topsoil as soon as possible following construction.
- Remove and store topsoil with a woven weed barrier or similar material for post-construction site restoration for areas.
- Pay particular attention to areas identified as having soils that are vulnerable to compaction (see Affected Environment Soils sections) and select alternate locations to construct facilities if practical.
- Implement deep tillage procedures where practical to loosen compacted soils.
- Restore soil surface to original or improved contours.
- Use timber mats or similar infrastructure as deemed necessary to distribute vehicle and heavy equipment weight.
- Use existing roads or previously disturbed areas to the maximum extent practicable.

11.2.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures for soils beyond those listed above for all project types.

11.3. GEOLOGY

11.3.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to geologic resources or potential impacts to the Proposed Action as a result of geologic hazards. The following BMPs and mitigation measures would apply to all project types:

- Avoid, to the extent practicable, deployment in areas that undergo significant geomorphological changes, such as within active glacial valleys (in Alaska) or streams and rivers.

[6] Plant roots play a significant role in stabilizing soils. Seeding disturbed areas quickly after construction activities would allow for faster plant and root development and would therefore provide better erosion protection.

[7] Topsoil is segregated from subsoil layers by stripping the uppermost soil from the area being excavated and storing it separately from the subsurface soil. Once construction is completed, the topsoil is replaced as the uppermost soil unit.

- Avoid construction in seismically active areas, locations with karst topography or that have shown recent subsidence, or steep or unstable slopes that are susceptible to erosion; construct facilities in alternate locations if practical.
- Construct all infrastructure to standards that meet or exceed state/territory seismic requirements.
- Avoid rock ripping to the extent practicable to preserve bedrock resources, topography, and physiography.
- Minimize the area/volume of disturbed/removed terrain during deployment/construction.
- Restore topographic features and grades to pre-construction/deployment conditions.
- Limit construction to areas that are not actively mined or undergoing mineral or other material or petroleum extraction activities, or coordinate planning and deployment with mining and extraction plans and activities in active areas.
- Follow all relevant federal, state/territory, and local laws and regulations as they apply to paleontological, mineral, and fossil fuel resources.
- Develop a Paleontological Monitoring and Mitigation Plan outlining areas with high likelihood for encountering significant fossil resources and plans for avoidance and appropriate response if previously unknown resources are encountered.
- Avoid areas with significant fossil resources, if practicable.
- Suspend all work if paleontological resources are encountered on a project construction site until a certified paleontologist has been brought on-site to oversee project activities and ensure that fossil resources are handled properly.
- Locate construction/deployment activities outside of high risk seismic hazard zones, active faults, and away from low coastal areas that could potentially be impacted from tsunamis.
- Follow all applicable federal, state/territory, and local requirements for construction codes, seismic criteria, and geotechnical designs, and construct/deploy all infrastructure to standards that meet or exceed state/territory seismic requirements.
- Design and deploy resilient infrastructure to withstand earthquakes typical to the region.
- Locate construction/deployment activities outside of high-risk volcanic hazard zones.
- Locate construction/deployment activities away from steep slopes with unconsolidated material and other areas prone to landslides, to the extent practicable.
- Locate construction/deployment activities outside of areas identified as having karst topography, loosely compacted soils, and low density sediments prone to subsidence or compaction, to the extent practicable.
- Consider alternate methods to trenching for placement of fiber optic cable and transmission lines in sensitive areas.

11.3.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures for geology beyond those listed above for all project types.

11.4. WATER RESOURCES

11.4.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to water resources. The following BMPs and mitigation measures would apply to all project types:

- Minimize ground disturbance in or near waterbodies during construction, as practicable, particularly in areas prone to erosion.
- Follow all applicable federal, state/territory, and local requirements for soil erosion and sedimentation control and permitting to avoid or minimize inputs of eroded materials into waterbodies.
- Develop a storm water pollution prevention plan.
- Include engineered or site-designed methods to control storm water.
- Include any forested riparian areas along the stream in the length of the bore to minimize impacts to forested habitat when using directional bores to cross a stream.
- Ensure the cleared width through any forested area is the minimum needed to install the line; the width should be no more than 20 feet wide through the forested area to allow the canopy to close over the line.
- Restore disturbed stream banks using bioengineering bank stabilization methods and revegetate disturbed banks with native trees, shrubs, and herbaceous plants.
- Restore stream bank slopes after project completion to stable-slope steepness (not steeper than 2:1).
- Use graded stone or riprap to protect the section of trench below the normal water level from scour or erosion if using directional boring under a stream. Any stone or riprap fill in the streambed must not be placed above the existing streambed elevation to avoid creating a fish passage obstruction. As an alternative to using stone or riprap, allow sufficient separation distance between the directional boring and the stream bottom to minimize the potential for scour or erosion to affect the installed line.

- Implement storm water reduction methods for large-scale construction activities, including minimizing impervious surfaces, using porous materials, or collecting and reusing storm water (e.g., extended detention ponds, storm water wetlands, filtration structures,[8] and infiltration [or recharge] basins).[9]
- Direct water to storm water drains for large-scale construction activities or to constructed bioretention areas,[10] rain gardens, or other storage and retention areas designed to slow water and allow sediments to settle out.
- Stabilize and revegetate disturbed areas as progressively and quickly as practicable to achieve stabilization and minimize the potential for erosion.
- Avoid construction of roads and other impervious surfaces in floodplain areas to the extent practicable; where necessary in floodplains, construct roads and other impervious surfaces level with existing grades, as practicable, to not change or restrict water flow.
- Station all deployables and aboveground structures outside of floodplains, to the extent practicable; if deployables or aboveground structures must be placed in floodplains, station them such that they are not vulnerable to be damaged by flood flows and do not themselves impede or restrict flood flows, as practicable.
- Restore native vegetation/wetlands to stabilize stream banks and stop erosion.
- Minimize the use of riprap and the use of alternative erosion protection materials whenever possible.
- Place only enough riprap to provide stream bank toe protection, such as from the toe of the bank, where riprap must be used. Consider using bioengineered bank stabilization methods instead of riprap.
- Meet state/territory or local regulations for development proposed in a floodway or floodplain.
- Avoid construction, where feasible, in areas with steep or unstable slopes with soils known to be particularly susceptible to soil erosion and construct facilities in alternate locations if practical.
- Develop a soil erosion and sedimentation control plan for disturbed areas, and implement BMPs, as appropriate, including the use of silt fences, erosion control blankets, progressive revegetation, and other controls as needed to reduce soil erosion, storm water runoff, and sedimentation.

[8] Storm water filtration structures use a filtering media (sand, soil, gravel, peat, or compost) in storm water filtration structures to remove pollutants from storm water runoff.

[9] Infiltration basins (also known as recharge basins) are considered a treatment BMP because they can remove pollutants from surface discharges by capturing the storm water runoff volume (typically, larger volumes than an infiltration trench) and infiltrating it directly to the soil rather than discharging it to an aboveground drainage system.

[10] Bioretention is a structural storm water control measure that captures and temporarily stores storm water runoff using soils and vegetation in shallow basins or landscaped areas to provide enhanced removal of dissolved storm water pollutants, including nutrients, pesticides, organics, metals, and biological constituents.

- Seed and protect disturbed stream banks that are 3:1 or steeper with heavy-duty, net-free biodegradable erosion control blankets to minimize the entrapment and snaring of small wildlife such as snakes and turtles (follow manufacturer's recommendation for installation); seed and apply mulch on all other disturbed areas.
- Use weed-free erosion control mechanisms (such as straw wattles or straw or hay bales).
- Avoid construction activities (especially activities resulting in soil disturbance), to the extent possible, during rainy or snowmelt seasons when streamflow, rainfall, and runoff are highest.
- Minimize the total area of bare soil exposed at any one time as much as possible by constructing in stages.
- Minimize clearing of riparian and streamside vegetation, including trees, as practicable.
- Establish and clearly mark all waterbody buffers in the field with signs or highly visible flagging until construction-related ground disturbing activities are complete.
- Stabilize and revegetate disturbed areas as progressively and quickly as practicable to achieve stabilization.
- Monitor site restoration following ground disturbance activities, as required by law or permit; implement contingency measures if site restoration should fail and soil erosion occurs.
- Retain vegetative buffers, wherever possible, to prevent runoff into waterbodies.
- Revegetate all bare and disturbed areas along stream banks or shorelines with a mixture of grasses (excluding all varieties of tall fescue), legumes, and native shrub and hardwood tree species as soon as possible upon completion.
- Minimize in-stream work to the extent practicable, and when working in streams, restore streambeds and banks to original contours.
- Construct all stream crossings (roads and trenching) as close as perpendicular to the axis of the waterbody channel as engineering and routing conditions permit.
- Use standard upland construction techniques when crossing waterbodies when they are dry or frozen and not flowing or as required by permit or law, provided that it is not likely for flow to resume during construction and prior to post-construction stabilization.
- Route the stream crossing to minimize the number of waterbody crossings where waterbodies meander or have multiple channels, as practicable.
- Prepare a Spill Prevention, Control, and Countermeasure (SPCC) Plan to prevent, contain, and report accidental spills.
- Inspect and maintain tanks and equipment containing oil, fuel, or chemicals for drips or leaks to prevent spills to the ground or directly into waterbodies.
- Maintain and repair all equipment and vehicles on impervious surfaces, as practicable, away from all sources of surface water.

- Park vehicles at least 50 feet from any stream or wetland unless authorized by a permit or on an existing roadway, as practicable.
- Deposit and stabilize all excavated material not reused in an upland area outside of floodplains and streams.
- Design any structures located in floodplains, as feasible, with structural hardening to withstand flooding and to not increase the risk of flooding for other areas of the floodplain.
- Space and size culverts properly.
- Stabilize approaches to streams and stream crossings with clean rock or steel plates during construction to minimize erosion and sedimentation, as practicable.
- Place materials storage and staging areas outside of waterways and floodplain.
- Maintain adequate waterbody flow rates to protect aquatic life and prevent the interruption of existing downstream users, as practicable, if conducting in-stream construction (trenching or roads if necessary) during times that streams have flow.

11.4.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply to Wired Projects in addition to those listed above for all project types:

- Wireless Projects
  - New Wireless Communication Towers
    - Do not permit underwater blasting and pile driving activities in any waterbody.

11.5. WETLANDS

11.5.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to wetlands. The following BMPs and mitigation measures would apply to all project types:

- Follow all BMPs and mitigation measures related to minimizing soil erosion, sedimentation, and soil compaction presented in Section 11.2, Soils.
- Develop management plans such as, but not limited to, wetland and vegetation management and restoration, water quality protection, and erosion and sediment control plans for the management of wetland habitat, vegetation, water quality, and soils/erosion control.
- Follow any BMPs and mitigation measures for work in or near wetlands developed by state/territory and local agencies, such as state/territory departments of transportation.
- Conduct a detailed baseline study of the wetland to be impacted to aid in restoration of pre-impact condition, including, as appropriate or required by law, a survey of wetland contours; soil texture and profile; plant species, structure, and cover; and hydrology.

- Develop a storm water pollution prevention plan.
- Time construction to outside the breeding and migratory seasons of wetland wildlife when construction is unavoidable.
- Preserve existing tree canopies and natural areas in and around wetlands as much as possible.
- Cut wetland vegetation by hand (chain or hand saw) instead of using large equipment when cutting is unavoidable.
- Use timber mats when working in or near wetlands.
- Use weed-free erosion control mechanisms (such as straw wattles or straw or hay bales).
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Avoid both above and belowground wetland crossings unless necessary.
- Take advantage of already disturbed areas such as easements, roads, roadway shoulders, bridges, or old railroad beds when crossing a wetland is unavoidable.
- Span a wetland by locating telecommunication poles on either side of the wetland instead of disturbing the interior, where practicable or feasible.
- Avoid diversion of surface water and groundwater sources, which could affect nearby wetlands.
- Include engineered or site-designed methods to control storm water.
- Create and maintain buffer zones around wetlands to protect their functions and values.
- Follow all applicable federal, state/territory, and local requirements related to potential wetland impacts and permitting to avoid or minimize potential wetland impacts, compensate for unavoidable impacts to wetlands, and restore impacted wetlands.
- Position deployment activities to avoid wetlands to the greatest extent practicable and to minimize the project footprint while safely and practically implementing the Proposed Action.
- Clearly mark the boundaries of wetland areas to be avoided during construction using flagging, and maintain markers until reclamation is complete (as applicable). Train equipment operators on the activities to avoid within or near wetlands.
- Segregate and salvage all topsoil up to a maximum of 12 inches of topsoil from the area disturbed in dry wetlands, where practicable, and restore topsoil to its approximate original stratum after backfilling is complete.
- Avoid temporarily storing or stockpiling materials in wetland areas or in areas that could alter wetland hydrology (causing damming and flooding) or impede or divert water (causing drying). When unavoidable, place temporary fill on geotextile fabric.
- Minimize vegetation clearing in or near wetlands. If vegetation clearing is required, minimize ground disturbance and maintain low groundcover vegetation, as well as the roots of taller vegetation.

- Install and maintain sediment barriers, as appropriate, at saturated wetlands or wetlands with standing water across the entire construction ROW upslope of the wetland boundary and where saturated wetlands or wetlands with standing water are adjacent to the construction ROW as necessary to prevent sediment flow into the wetland.
- Time construction using heavy equipment to avoid periods of heavy moisture, as appropriate, when construction within wetlands is unavoidable.
- Do not maintain, store, wash, or repair equipment in or near (within 100 feet of) wetland areas to avoid spills or contamination, where practicable. Do not use heavy equipment within wetlands, even temporarily, and do not travel through wetlands, where practicable. Use wide-tracked or low-ground pressure construction equipment and/or conventional equipment operating from the ROW, timber mats, or prefabricated equipment mats. Prohibit storage of hazardous materials, chemicals, fuels, and lubricating oils in wetlands. Use existing access roads whenever possible. Where construction is required, maintain natural drainage patterns to the extent practicable by installing culverts in sufficient number and size to prevent ponding, diversion, or concentrated runoff. Use gravel for road surfaces where possible to avoid an increase in permeable surfaces and use proper drainage structures to minimize sedimentation and erosion to adjacent wetlands.
- Consult local wetland restoration guidance, including communicating with the appropriate local agency, if one exists. Use suggested up-to-date published restoration manuals to ensure that appropriate wetland restoration measures are followed and to increase restoration success.
- Conduct a detailed baseline study of the wetland to be impacted to aid in restoration of pre impact condition, including, as appropriate or required by law, a survey of wetland contours; soil texture and profile; plant species, structure, and cover; and hydrology.
- Stockpile wetland topsoil and sod mats used during facility installation after initial use when working in areas where wetlands would be restored. Use standard reclamation protocol. Re-use the topsoil and sod mats in the post-construction wetland restoration.
- Revegetate, as applicable, bare areas as progressively and quickly as possible (preferably within the same growing season) to stabilize soils, reduce sedimentation, and avoid the spread of invasive species. Install erosion protection and leave in place until the area is revegetated and the soil is stabilized.
- Prohibit use of herbicides or pesticides within 100 feet of any wetland (unless allowed or required by the appropriate land management, tribal, or state/territory agency).
- Conduct post-construction monitoring inspections after the first growing season to determine success of revegetation, as applicable, unless otherwise required by a permit.
- Determine restoration to be successful if the surface condition is similar to adjacent undisturbed communities or found acceptable by the applicable regulatory body.

11.5.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply to Wired Projects in addition to those listed above for all project types:

- New Build –Buried Fiber Optic Plant
  - Avoid, as appropriate, stockpiling material from directional drilling in a wetland, or where the stockpile could cause sedimentation into a wetland or dam water, causing flooding of a wetland area; avoid, as appropriate, setting up drilling equipment in a wetland.
  - Conduct dewatering in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody if dewatering an excavation.
  - Replace topsoil and restore original contours to the greatest extent practicable.
  - Install buried cable along existing road ROWs wherever possible to minimize vegetation clearing and other potential impacts to wetlands.
  - Use structures or devices to prevent subdraining or groundwater movement along new trenched-in buried conduit such as anti-seepage collars, intermittent clay barriers, trench plugs, or clay saddles.
- New Build – Aerial Fiber Optic Plant
  - Coordinate with U.S. Fish and Wildlife Service (USFWS) during site-specific reviews as required to assess whether it may be preferable and less impactful to implement line burial instead of installing lines overhead. However, depending on site conditions, installation of overhead transmission lines along existing road ROWs may minimize vegetation clearing and other potential impacts to some (but not all) wetlands.
- New Build – Submarine Fiber Optic Plant
  - Avoid, as appropriate, stockpiling material from directional drilling in a wetland, or where the stockpile could cause sedimentation into a wetland or dam water, causing flooding of a wetland area; avoid, as appropriate, setting up drilling equipment in a wetland.
  - Conduct dewatering in a manner to prevent erosion and to prevent heavily silt-laden water from flowing directly into any wetland or waterbody if dewatering an excavation.
  - Replace topsoil and restore original contours to the greatest extent practicable.

11.6. BIOLOGICAL RESOURCES

11.6.1. Terrestrial Vegetation

11.6.1.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to terrestrial vegetation. The following BMPs and mitigation measures would apply to all project types:

- Engage in early consultation with appropriate agencies and stakeholders, including but not limited to the USFWS and state/territory agencies.
- Consolidate facilities as much as possible (collocation and use of existing ROWs) to reduce vegetation loss.
- Avoid high-quality habitat.[11]
- Minimize construction of all roads, fences, and other ancillary facilities to reduce overall vegetation loss and habitat fragmentation. Control fugitive dust generated by the use of unpaved roads and construction.
- Limit construction equipment and vehicles to approved roads or ROWs.
- Avoid construction/deployment in areas with sensitive vegetation (i.e., woodlots and wetlands), unique habitat (i.e., shorelines and stream banks), or designated natural resources, if practical.
- Close and revegetate any temporary and unnecessary roads after project completion.
- Segregate topsoil or surface soil from subsurface layers during construction for reuse during post-construction seeding.
- Restore disturbed areas as progressively and quickly as possible to pre-construction use; grade and apply vegetation cover using appropriate and certified seed mixes and seed dispersal, management, and maintenance processes, as applicable.
- Revegetate with native species that approximate pre-disturbance plant community composition.
- Use existing roads and regularly maintained areas when conducting routine maintenance and inspections to the extent feasible.
- Follow all applicable federal, state/territory, and local requirements for vegetation removal, disturbance, and restoration.

[11] High-quality habitats contain high plant diversity and low numbers of non-native or invasive plants; are left in a natural state; and have high-quality plants or ones that are very valuable to wildlife. Disturbed habitats generally contain non-native, invasive species and extremely low plant diversity; are under regular maintenance; and consist of low quality or unsuitable habitat. Professional biologists can typically provide a basic assessment of the quality of the site based on one or more site visits. Private consultants can also evaluate habitat quality through a standardized assessment tool, the Floristic Quality Assessment. This assessment provides a quantitative assessment score, rating sites on a scale from 0 to 10 (10 being the highest quality).

- Obtain all appropriate permits and comply with conditions to minimize or avoid impacts to vegetation.
- Minimize or avoid forest removal whenever possible.
- Identify all areas within the proposed construction footprint that contain noxious or invasive plants and use pre-construction treatments such as mowing or herbicide applications (in consultation with appropriate agencies and stakeholders) prior to ground disturbance activities.
- Store soil containing noxious or invasive plants in a location away from clean topsoil and subsoil.
- Inspect and clean all construction equipment and deployable vehicles with high-pressure washing equipment to remove soil and plant matter prior to moving to the next job site or staging location.
- Locate staging areas and construction sites in previously disturbed areas.

11.6.1.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.6.2. Wildlife

11.6.2.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to wildlife. The following BMPs and mitigation measures would apply to all project types:

- Engage in early consultation with appropriate agencies and stakeholders as necessary, including but not limited to USFWS, the National Marine Fisheries Service (NMFS), and relevant state/territory wildlife and natural resource agencies.
- Give preference to development options that involve use of existing physical infrastructure, and/or that do not involve new aboveground structures (e.g., collocation on existing structures, etc.).
- Minimize vehicular harm of animals migrating between seasonal habitats by locating activities, roads, and infrastructure away from these areas or installing barriers along roadsides.
- Locate project activities, facilities, and roads away from key habitats (e.g., wetlands, cays,[12] and stream sites) for amphibians and reptiles.

[12] Cays are small, low-elevation, sandy islands on the surface of a coral reef.

- Control the spread of invasive animals and plants by coordinating mowing schedules and assisting agencies and groups with ROW permits, washing mowers and equipment between sites, and educating staff.
- Consolidate facilities as much as possible (e.g., collocation and use of existing ROWs).
- Avoid known calving/lambing areas in Alaska during critical life stages when undertaking deployment and associated activities (these times vary greatly depending on region, species, and habitat).
- Assess locations of roost sites for bats and timing of critical life stages (e.g., maternity and weaning periods), hibernation for deployment and associated activities (these times vary greatly depending on region, species, and habitat).
- Minimize construction of all roads, fences, and other ancillary facilities to reduce overall habitat fragmentation.
- Instruct all construction employees to avoid harassment and disturbance of wildlife, especially during reproductive (e.g., courtship, lambing/calving, pupping and molting [haulout period], spring/fall migrations) seasons.
- Do not permit pets on site in order to avoid harassment and disturbance of wildlife.
- Report observations of potential wildlife interactions, including wildlife mortality, to the appropriate agency immediately.
- Avoid known marine mammal haulouts or concentration areas as locations for deployment and associated activities.
- Provide for passage of fish and wildlife in new crossings and avoid reducing the efficiency of a structure to allow passage.
- Avoid roads and ROWs that provide access to critical wildlife habitat and near known migration routes (especially terrestrial and semi-aquatic wildlife routes), stopover sites, and large blocks of habitat.
- Assess critical life stages of marine mammals hauled out near locations (1 mile) selected for deployment and associated activities.
- Avoid development in areas that contain high densities of breeding or wintering birds, in high wildlife use areas, migratory staging areas, woodlots, riparian corridors, Audubon Important Bird Areas, nature preserves, state and national parks, state forests, fish and wildlife areas, and other publicly owned properties.
- Reduce habitat fragmentation, minimize the number of new roads constructed, and maximize use of existing corridors, roads, disturbed or developed areas.
- Assess potential noise impacts to migrating whales and local pinnipeds if deployment and activities would occur over sea ice. Control the spread of invasive animals and plants by coordinating mowing schedules, assisting agencies and groups with ROW permits, washing mowers and equipment between sites, and educating staff.

- Develop "good housekeeping" procedures to ensure that sites are kept clean of debris, garbage, and/or waste.
- Follow food and waste management protocols to minimize attractants to proposed network deployment sites.
- Restore habitat in construction zones, staging areas, etc. once construction is complete.
- Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
- Install bat exclusions and/or deterrents on existing and new structures.
- Turn off all unnecessary lighting at night.
- Minimize or avoid the need for or use of specific types of illumination (e.g., sodium vapor lights) at site facilities to reduce attraction of migratory birds.
- Determine during site-specific reviews the feasibility and effectiveness of implementing construction timing windows to avoid or minimize adverse effects to bird nests, eggs, and young birds and implement if practicable or feasible.
- Monopole structures should be considered in place of lattice structures, to the extent practicable or feasible. If lattice structures are to be used, FirstNet and/or their partners would work with the USFWS to incorporate anti-nesting devices into project design, as practicable or feasible.
- Work with USFWS to choose appropriate markers when towers requiring guy wires are necessary. Markers should be regularly maintained for the life of the project.
- Use outdoor security or safety lights, as practicable or feasible, that are motion-triggered, downcast and/or down-shielded, and directed inward whenever possible to prevent "star" effects when viewed offsite during construction/deployment and operation, particularly in coastal areas.
- Use structures containing the fewest perching options in areas where raptors and raven predation of sensitive resources is a concern.
- Use structures and components compatible with the guidance in *APLIC 2006* where raptor electrocution is a concern.
- Follow, as practicable or feasible, the suggested practices by the APLIC to minimize impacts to migratory birds through collision and electrocution.

The following BMPs and mitigation measures are recommended by USFWS, including guidelines on communications tower siting (*2012a, 2013b*):

> "1. Collocation of the communications equipment on an existing communication tower or other structure (e.g., billboard, water and transmission tower, distribution pole, or building mount) is strongly recommended. Depending on tower load factors and communication needs, from 6 to 10 providers should collocate on an existing tower or structure provided that frequencies do not overlap/'bleed' or where frequency length or broadcast distance requires higher towers. New towers should be designed structurally and electronically to accommodate the applicant's antenna, and antennas of at least 2 additional users—ideally 6 to 10 additional users, if possible—unless the design would require the addition of lights and/or guy wires to an otherwise unlit and/or unguyed tower. This recommendation is intended to reduce the number of towers needed in the future.
>
> 2. If collocation is not feasible and a new tower or towers are to be constructed, it is strongly recommended that the new tower(s) should be not more than 199 feet above ground level (AGL), and that construction techniques should not require guy wires. Such towers should be unlighted if Federal Aviation Administration (FAA) regulations and lighting standards (*FAA 2007, Patterson 2012, FAA 2013 lighting circular anticipated update* [[13]]) permit. Additionally, the Federal Communications Commission (FCC) through recent rulemaking now requires that new towers > 450 ft AGL contain no red-steady lights. FCC also recommends that new towers 350-450 ft AGL also contain no red-steady lights, and they will eventually recommend that new towers < 350 ft AGL convert non-flashing lights to flash with existing flashing lights. LED lights are being suggested as replacements for all new construction and for retrofits, with the intent of future synchronizing the flashes. Given these dynamics, the Service recommends using lattice tower or monopole structures for all towers < 200 ft AGL and for taller towers where feasible. The Service considers the less than 200 ft AGL option the 'gold standard' and suggests that this is the environmentally preferred industry standard for tower placement, construction and operation—i.e., towers that are unlit, unguyed, monopole or lattice, and less than 200 ft AGL.
>
> 3. If constructing multiple towers, the cumulative impacts of all the towers to migratory birds—especially to Birds of Conservation Concern (*[US]FWS 2008*) and threatened and endangered species, as well as the impacts of each individual tower, should be considered during the development of a project.

[13] Current FAA guidance (*FAA 2016a*) requires lighting for towers greater than 200 feet.

4. The topography of the proposed tower site and surrounding habitat should be clearly noted, especially in regard to surrounding hills, mountains, mountain passes, ridge lines, rivers, lakes, wetlands, and other habitat types used by raptors, Birds of Conservation Concern, and state and federally listed species, and other birds of concern. Active raptor nests, especially those of Bald and Golden Eagles, should be noted, including known or suspected distances from proposed tower sites to nest locations. Nest site locations for Golden Eagles may vary between years, and unoccupied, inactive nests and nest sites may be re-occupied over multiple years. The Service's 2013 Eagle Conservation Plan Guidance, Module 1, Land-based Wind Energy, Version 2, available on our website, is a useful document (*USFWS 2013[a]*).

5. If at all possible, new towers should be sited within existing 'antenna farms' (i.e., clusters of towers), in degraded areas (e.g., strip mines or other heavily industrialized areas), in commercial agricultural lands, in Superfund sites, or other areas where bird habitat is poor or marginal. Towers should not be sited in or near wetlands, other known bird concentration areas (e.g., state of federal refuges, staging areas, rookeries, and Important Bird Areas), in known migratory, daily movement flyways, areas of breeding concentration, in habitat of threatened or endangered species, or key habitats for Birds of Conservation Concern (*[US]FWS 2008*). Disturbance can result in effects to bird populations which may cumulatively affect their survival. The Service has recommended some disturbance-free buffers, e.g., 0.5 mi around raptor nests during the nesting season, and 1-mi disturbance free buffers for Ferruginous Hawks and Bald Eagles during nesting season in Wyoming (*[US]FWS WY Ecological Services Field Office, referenced in Manville 2007:23*). The effects of towers on 'prairie grouse,' 'sage grouse,' and grassland and shrub-steppe bird species should also be considered since tall structures have been shown to result in abandonment of nest site areas and leks, especially for 'prairie grouse' (*Manville 2004*). The issue of buffers is currently under review, especially for Bald and Golden Eagles. Additionally, towers should not be sited in areas with a high incidence of fog, mist, and low cloud ceilings.

6. If taller (> 199 ft AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used.[14] Unless otherwise required by the FAA, only white strobe or red strobe lights (red preferable since it is generally less displeasing to the human eye at night), or red flashing incandescent lights should be used at night, and these should be the minimum number, minimum intensity (< 2,000 candela), and minimum number of flashes per minute (i.e., longest duration between flashes/'dark phase') allowable by the FAA. The use of solid (non-

[14] This guidance (*USFWS 2013b*) was based on earlier FAA guidance that has since been updated. Current FAA guidance (*FAA 2016a*) now requires lighting for towers greater than 200 feet.

flashing) warning lights at night should be avoided (*Patterson 2012, Gehring et al. 2009*)—see recommendation #2 above. Current research indicates that solid red lights attract night-migrating birds at a much higher rate than flashing lights (*Gehring et al. 2009, Manville 2007, 2009*). Recent research indicates that use of white strobe, red strobe, or red flashing lights alone provides significant reductions in bird fatalities (*Patterson 2012, Gehring et al. 2009*).

7. Tower designs using guy wires for support, which are proposed to be located in known raptor or waterbird concentrations areas, daily movement routes, major diurnal migratory bird movement routes, staging areas, or stopover sites, should have daytime visual markers or bird deterrent devices installed on the wires to prevent collisions by these diurnally moving species. The efficacy of bird deterrents on guy wires to alert night migrating species has yet to be scientifically validated. For guidance on markers, see *Avian Power Line Interaction Committee (APLIC). 2006*. Suggested Practices for Avian Protection on Power Lines -- State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, DC, and Sacramento, CA. 207 pp, and APLIC. 2012. Reducing Avian Collisions with Power Lines – the State of the Art in 2012. Edison Electric Institute and APLIC. Washington, DC. 159 pp. Also see www.aplic.org, www.energy.ca.gov, or call 202-508-5000.

8. Towers and appendant facilities should be designed, sited, and constructed so as to avoid or minimize habitat loss within and adjacent to the tower 'footprint.' However, a larger tower footprint is preferable to the use of guy wires in construction. Several shorter, un-guyed towers are preferable to one, tall guyed, lighted tower. Road access and fencing should be minimized to reduce or prevent habitat fragmentation, disturbance, and the creation of barriers, and to reduce above ground obstacles to birds in flight.

9. If, prior to tower design, siting and construction, if it has been determined that a significant number of breeding, feeding and roosting birds, especially of Birds of Conservation Concern (*[US]FWS 2008*), state or federally-listed bird species, and eagles are known to habitually use the proposed tower construction area, relocation to an alternate site is highly recommended. If this is not an option, seasonal restrictions on construction are advised in order to avoid disturbance, site and nest abandonment, especially during breeding, rearing and other periods of high bird activity.

10. Security lighting for on-ground facilities, equipment and infrastructure should be motion- or heat-sensitive, down-shielded, and of a minimum intensity to reduce nighttime bird attraction and eliminate constant nighttime illumination, but still allow safe nighttime access to the site (*USFWS 2012[b], Manville 2011*).

> 11. Representatives from the USFWS or researchers from the Research Subcommittee of the Communication Tower Working Group should be allowed access to the site to evaluate bird use; conduct dead-bird searches; place above ground net catchments below the towers (*Manville 2002*); and to perform studies using radar, Global Position System, infrared, thermal imagery, and acoustical monitoring, as necessary. This will allow for assessment and verification of bird movements, site use, avoidance, and mortality. The goal is to acquire information on the impacts of various tower types, sizes, configurations and lighting protocols.
>
> 12. Towers no longer in use, not re-licensed by the FCC for use, or determined to be obsolete should be removed from the site within 12 months of cessation of use, preferably sooner.
>
> 13. In order to obtain information on the usefulness of these guidelines in preventing bird strikes and better understanding impacts from habitat fragmentation, please advise USFWS personnel of the final location and specifications of the proposed tower, and which measures recommended in these guidelines were implemented. If any of these recommended measures cannot be implemented, please explain why they are not feasible. This will further advise USFWS in identifying any recurring problems with the implementation of the guidelines, which may necessitate future modifications."

Additional tower lighting BMPs are described in Section 11.6.2.2, Project-Type Specific BMPs and Mitigation Measures.

11.6.2.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Deployable Technologies
  - Avoid activities within migratory bird flyways and in the immediate vicinity of bat roosts to the extent practicable.
  - Site towers away from known communal bat use areas and high bird use areas to the extent practicable or feasible.
  - Do not operate aircraft at an altitude that could disturb known natural roosting sites of bats, with the exception only for severe weather conditions.
  - Do not operate aircraft at an altitude lower than 1,500 feet within 0.5 mile of known walrus observed on land or ice, with the exception only for severe weather conditions.

- Wired Projects
  - New Build – Aerial Fiber Optic Plant
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
    - Install bat exclusions and/or deterrents on existing and new structures.
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
- Wireless Projects
  - New Wireless Communication Towers
    - Follow USFWS Guidelines For Recommendations On Communications Tower Siting, Construction, Operation, and Decommissioning (*USFWS 2012a*).
    - Insert anti-nesting devices on existing or new structures.
    - Site towers away from known communal bat use areas and high bird use areas to the extent practicable or feasible.
    - Construct new towers more than 3 miles from any ocean (or Great Lake shoreline), as practicable or feasible. If towers must be closer than 3 miles from the shoreline:
      - Conduct site-specific studies;
      - Ensure towers are self-standing (un-guyed); and
      - Ensure towers are short enough to not require lighting, as practicable or feasible. If towers do require lighting, install lighting that does not include steady-burning lights, as practicable or feasible.
    - Follow the FAA requirements to eliminate steady-burning flashing obstruction lights and use only flashing obstruction lights in accordance with FAA Advisory Circulars AC 70/7460-1L and AC 150/5345-43H (*FAA 2016a; FAA 2016b; FCC 2017*).
  - Collocation on Existing Wireless Tower, Structure, or Building
    - Follow the FAA requirements to eliminate steady-burning flashing obstruction lights and use only flashing obstruction lights in accordance with FAA Advisory Circulars AC 70/7460-1L and AC 150/5345-43H (*FAA 2016a; FAA 2016b; FCC 2017*).

11.6.3. Fisheries and Aquatic Habitats

11.6.3.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to fisheries and aquatic habitats. The following BMPs and mitigation measures would apply to all project types:

- Avoid construction, as practicable, during sensitive seasons for fish such as migration, spawning, egg development (including intra-gravel development) and larval fish (benthic[15] or pelagic[16]) development (sensitive seasons/time periods vary by species and location).
- Consolidate facilities as much as possible.
- Use site-appropriate native plants and invasive-free materials (e.g., seed mixes, rock, mulch, soil) for revegetation and restoration efforts.
- Revegetate and restore riparian areas and other vegetated areas around aquatic resources to the extent possible once construction activities are complete.
- Report spills or other observed pollutants to the appropriate agency immediately.
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Instruct all construction employees to avoid harassment and disturbance of fish and other aquatic species, and report any signs of mortality to the appropriate agency immediately.
- Avoid productive habitats to the extent practicable, such as coastal wetlands, inland waterways, essential fish habitats, spawning areas, and reefs.
- Minimize sedimentation and turbidity in fish habitats by implementing sediment and erosion control measures, as practicable; the use of such measures (e.g., silt fences, silt curtains,[17] and erosion control blankets) could reduce erosion and sedimentation.
- Minimize the amount of fill placed in wetlands and streams when constructing access roads by installing bridges and or culverts; work with the appropriate agency to use culverts and bridges that are appropriately designed and sized for fish passage.
- Use set-backs when clearing vegetation for construction, where appropriate, from riparian zones to avoid removal of important fish cover such as vegetation, boulders, and large woody debris.
- Perform regular maintenance checks of equipment near coastal areas, waterways, and other protected areas to minimize detachment of components reaching critical habitat.
- Consider tidal regimes when deploying near coastal areas to help prevent loss of equipment and marine debris in nearby coastal fish habitat.

[15] Benthic means anything associated with or occurring on the bottom of a body of water.

[16] Pelagic means anything that inhabits the water column as opposed to being associated with the sea floor, generally occurring anywhere from the surface to 1,000 meters (*NOAA 2006*).

[17] Silt curtains are floating barriers used in marine construction and remediation to control silt and sediment in a body of water.

- Utilize buffer zones, temporary or permanent native seeding on disturbed ground, ground cover, plastic sheeting, and/or matting to minimize sedimentation.
- Develop a storm water pollution prevention plan.
- Avoid construction/deployment, as practicable, in productive riparian zones, marine preserves, and wetlands since construction could potentially result in less refuge for fish, fundamental changes in channel structure (e.g., loss of pool habitats), instability of stream banks, and alteration of nutrient and prey sources within the shoreline aquatic community (*Hanson et al. 2003*).
- Implement an emergency response plan for fuel spills and environmental emergencies.
- Include secondary containment for hazardous materials such as fuels and use uplands, as feasible, away from streams and waterbodies for refueling of construction or operations equipment.
- Implement invasive species plans to minimize introduced aquatic plant and animal species into the Proposed Action areas (e.g., wash and inspect equipment and vehicles before moving from one drainage basin or watershed to the next).
- Minimize construction noise in and near fish habitats, as practicable.
- Avoid physical barriers in waterbodies, to the extent practicable, during installation and operation to allow for the migration of invertebrates and other aquatic fauna.
- Follow all applicable federal and state/territory requirements for construction activities near fish and fish habitat.

11.6.3.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply to Wired Projects in addition to those listed above for all project types:

- New Build – Buried Fiber Optic Plant
  - Use horizontal directional drilling where possible and appropriate, for stream crossings to avoid potential impacts to the streambed, banks, and associated fish habitat.

11.6.4. Threatened and Endangered Species and Species of Conservation Concern

11.6.4.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to threatened and endangered species and species of conservation concern. The following BMPs and mitigation measures would apply to all project types:

- Fully adhere to the compliance requirements of the Endangered Species Act.
- Engage in early consultation with appropriate agencies and stakeholders including, but not limited to, USFWS, NMFS, and state/territory wildlife and natural resources agencies.
- Avoid conducting deployment activities in areas with known locations or habitats for threatened and endangered plants.
- Instruct all construction employees to identify and report any sightings of listed species, to avoid harassment and disturbance of wildlife, and to not disturb or enter any nearby caves or mines.
- Follow food and waste management protocols to minimize attractants to the deployment site.
- Minimize construction of all roads, fences, and other ancillary facilities to reduce overall habitat fragmentation.
- Use site-appropriate native plants and invasive-free materials (e.g., seed mixes, rock, mulch, soil) for revegetation and restoration efforts.
- Prohibit any pets on site during construction or deployment.
- Report observations of sensitive species that are injured, dead, or entangled to the appropriate agency immediately.
- Consolidate Proposed Action facilities as much as possible (e.g., collocation and use of existing ROWs).
- Implement seasonal and spatial buffer zones for construction and other potentially disturbing activities during sensitive periods for listed species such as breeding, nesting, calving/pupping, haulout, migration, spawning, and egg development as identified by USFWS, the NMFS, and/or relevant state/territory agency.
- Avoid removal or disturbance of forest to the maximum extent practicable and ensure that any unavoidable forest impacts do not result in the loss of listed snails, butterflies, bird breeding habitat, or bat roost sites or hibernacula.[18]
- Avoid activities within seagrass beds and control turbidity to minimize potential indirect impacts on seagrass.
- Avoid potential impacts to known grouper spawning sites.
- Avoid potential impacts within coastal estuarine habitats.
- Train construction and deployment staff in the Proposed Action BMPs and mitigation measures and incentivize reporting of any lapses in BMP and mitigation measure implementation.
- Implement a strict policy prohibiting pets on site and prohibiting hunting or fishing or any other action that would result in any avoidable disturbance of listed species.

[18] Hibernacula are the habitats within which animals hibernate or otherwise seek refuge for extended periods.

- Use setbacks from riparian zones when clearing vegetation for construction to avoid removal of important fish cover such as vegetation boulders and large woody debris.
- Follow all applicable federal and state/territory requirements for construction activities near fish and fish habitat.
- Use appropriate sediment and erosion control measures to minimize sedimentation and turbidity in fish habitats.
- Minimize the use of coastal lighting, particularly in the vicinity of known turtle nesting areas. If the use of coastal lighting in sea turtle use areas is unavoidable, use turtle safe lighting instead of normal lights (low-pressure sodium-vapor lighting or red lights that emit a very narrow portion of the visible light spectrum) and consult with local sea turtle experts on the design of the coastal lighting plan.
- Implement an emergency response plan for fuel spills and environmental emergencies.
- Include secondary containment for hazardous materials and use non-wetland sites away from streams and waterbodies for refueling of construction or operations equipment.
- Implement invasive species plans to minimize introduced aquatic plant and animal species into the areas affected by the Proposed Action (e.g., wash and inspect equipment and vehicles before moving from one drainage basin or watershed to the next).
- Implement the same construction and deployment BMPs and mitigation measures for any operational activities that involve any major infrastructure replacement as part of ongoing system maintenance.
- Implement seasonal and spatial buffer zones for operational activities that involve potentially disturbing activities in listed species use areas.
- Implement “good housekeeping” procedures to ensure that during operation the sites would be kept clean of debris, garbage, and fugitive trash or waste.
- Turn off all unnecessary lighting at night.
- Avoid or minimize the use of sodium vapor lights at site facilities to reduce attraction of migratory birds.
- Develop and implement operational monitoring and adaptive management procedures.
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Post and enforce speed limits on access roads, particularly within areas where a listed animal may be struck by construction and/or maintenance vehicles.

11.6.4.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wired Projects
  - New Build – Aerial Fiber Optic Plant
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
  - Collocation on Existing Aerial Fiber Optic Plant
    - Follow recommendations outlined by the Avian Power Line Interaction Committee and USFWS (*APLIC 2006; APLIC and USFWS 2005; APLIC 2012*) for any aboveground lines or cables (e.g., use of diverters and anti-nesting devices).
- Wired Projects
  - Use of Existing Buried or Aerial Fiber Optic Plant or Existing Submarine Cable
    - Minimize underwater construction noise in all aquatic habitats by minimizing vessel speed, using quieter equipment or technologies, or deploying bubble curtains or other noise screens during underwater work.
    - Implement a marine observer program during construction and operation to avoid and minimize boat strikes to whales, sea turtles, seals, and dugongs.
- Deployable Technologies
  - Restrict aircraft operation at altitudes lower than 1,500 feet within 0.5 mile of known pupping or haulout areas during critical life stages, with the exception only for severe weather conditions.
  - Keep aircraft above altitudes higher than 1,500 feet within 0.5 mile of walruses and seals hauled out on land or ice, with the exception only for severe weather conditions.

11.7. LAND USE, AIRSPACE, AND RECREATION

11.7.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to land use, airspace, and recreation. The following BMPs and mitigation measures would apply to all project types:

- Give preference to development options that involve use of existing physical infrastructure, and/or that do not involve new aboveground structures (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.), especially near recreation lands.

- Give preference to development options that are compatible with existing zoning and applicable comprehensive plans.
- Select infrastructure locations that are screened from view by topography and/or vegetation, that do not require noticeable permanent changes in landforms (i.e., cut and fill) or vegetation, and that are as far from surrounding residences as possible.
- Retain existing vegetation wherever possible to provide visual screening of new infrastructure.
- Select infrastructure designs that minimize contrast with the surrounding landscape and land uses.
- Avoid infrastructure locations on easements established for wildlife habitat and other conservation purposes, to the extent practicable and feasible, and ensure compliance with applicable conditions and restrictions for locations on conservation lands.
- Select infrastructure locations that are as far from recreation lands as practicable and feasible.
- Select infrastructure designs that minimize construction footprints.
- Give preference to infrastructure locations that are compatible with existing park or recreation planning documents.
- Avoid or minimize, as practicable and feasible, construction activities in areas covered by existing incompatible easements.

11.7.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wireless Projects
  - New Wireless Communication Towers
    - Select the shortest possible structures necessary to meet the FirstNet system's needs, and only deploy towers less than 200 feet in height.
    - Place new infrastructure near existing similar infrastructure where possible, to minimize the total number of new aerial navigation hazards.
    - Avoid placing new infrastructure near airports or the areas regulated under the FAA's Part 77 regulations (*FAA 2016a*).
    - Avoid placing new infrastructure within Military Operations Areas or under Military Training Routes.
    - Work closely with the National Park Service (NPS) to address any concerns they might have if a tower needs to be placed in an area that might affect the nighttime sky at an NPS unit.

- Deployable Technologies
  - Limit the use of Deployable Airborne Communications Architecture to areas less likely to be used by commercial, military, or private aviation (to the degree feasible, and in consultation with the FAA and Department of Defense).

11.8. VISUAL RESOURCES

11.8.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to visual resources. The following BMPs and mitigation measures would apply to all project types:

- Take the scenic character of the surrounding area into account in the proposed design to reasonably minimize or avoid visual impacts to the surrounding area when viewed from existing roadways or shorelines (design structures to complement the natural landscape; for example, use paint that blends with the surrounding landscape).
- Utilize non-reflecting coatings on towers, antennas, buildings, and associated structures where possible.
- Implement sensitive grading techniques that blend grading with the natural terrain.
- Treat all disturbed slopes for erosion control.
- Minimize the area of bare soil at any one time as much as possible by constructing in stages.
- Revegetate disturbed areas as progressively and quickly as practicable to restore vegetative cover.
- Reduce or eliminate the need for lighting on poles or structures, or to restrict the duration and directionality of needed lighting.
- Give preference to development options that involve use of existing physical infrastructure (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.), and specifically avoid the construction of new aerial fiber optic plant and/or new wireless communication towers within, or in locations within sight of, federal or other lands where visual resources are regulated (e.g., units of the National Park System, or areas where local zoning regulations emphasize protection of views or aesthetic conditions), or where residents and visitors have come to expect high visual quality and the absence of human-built structures.
- Select infrastructure locations that are screened from view by topography and/or vegetation, that do not require noticeable permanent changes in landforms (i.e., cut and fill) or vegetation, and that are as far from surrounding residences as possible.
- Select infrastructure designs that minimize construction footprints.
- Retain existing vegetation wherever possible to provide visual screening of new infrastructure.

- Select infrastructure designs that minimize contrast with the surrounding landscape.
- Comply with all relevant and applicable federal regulations and guidance regarding visual and aesthetic conditions and impacts.

11.8.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wireless Projects
  - New Wireless Communication Towers
    - Work closely with the NPS to address any concerns they might have if a tower needs to be placed in an area that might affect the nighttime sky at an NPS unit.
- Deployable Technologies
  - Select parking locations for deployable technologies that are screened from view by topography or vegetation, that are as far away from as many observers as possible, and that are not in or near areas considered scenic, such as shorelines, ridgelines, or scenic roads.
  - Select deployable designs that minimize the use of nighttime lighting, that include shielded or directional nighttime lighting, and/or that use the minimum nighttime lighting required for safe operations.

11.9. SOCIOECONOMICS

11.9.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to socioeconomics. The following BMPs and mitigation measures would apply to all project types:

- Avoid development of new wireless communication towers in or near residential areas to reduce the potential that such activities could have adverse impacts on residential property values. Acceptable distances could vary, depending on the nature of the aesthetic impacts, the nature of other objectionable effects that influence property values, and other factors such as residential density, local concern over aesthetics, desire for improved wireless communications, local media response, and more. According to a recent literature review, measurable adverse impacts of wireless communication towers on property values are generally not observable beyond 300 meters (984 feet), and often are not observable beyond 100 meters (328 feet) (*Bond et al. 2013*).

- Avoid development or enlargement of storage, staging, and launch/landing areas for deployable technologies in or near residential areas to reduce the potential that such activities could have adverse impacts on residential property values. Acceptable distances could vary depending on the size of the facility, types of activities occurring there, the nature of the aesthetic impacts or other aspects that influence property values, and other factors such as residential density, local concern over aesthetics, desire for improved wireless communications, local media response, and more.
- Give preference to development options that involve use of existing physical infrastructure (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.).
- Select infrastructure locations that are screened from view by topography and/or vegetation, that do not require noticeable permanent changes in landforms (i.e., cut and fill) or vegetation and that are as far from surrounding residences as possible.
- Retain existing vegetation wherever possible to provide visual screening of new infrastructure.
- Select infrastructure designs that minimize contrast with the surrounding landscape.
- Give preference to hiring workers who are local residents, where practicable. In addition to reducing influx and associated social cohesion effects; this BMP would have the following effects on socioeconomic resources:
  - Reducing demand for public services, since employees would already be residents (i.e., existing public service users).
  - Increasing local employment and economic activity through wages and spending.
- Share deployment plans with public service providers, especially first responders, as early in the process as possible, and throughout the deployment process. This will provide advance notice to public service providers, and would particularly allow first responders to be better prepared for emergencies that could arise during deployment.
- Consult with subsistence users (including Indigenous Peoples and other individuals or groups for whom subsistence is a way of life) to understand the species and habitats used for subsistence activities, as well as the seasonal cycle of subsistence activity.
- Select infrastructure locations that minimize or avoid disturbance of subsistence species habitat.

11.9.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.10. ENVIRONMENTAL JUSTICE

11.10.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential environmental justice impacts. The following BMPs and mitigation measures would apply to all project types:

- Identify specific communities (i.e., neighborhoods or populations that may be contained within individual block groups), where possible, that are at risk of experiencing environmental justice impacts (this is important in Alaska given the size of block groups, particularly in rural areas). Conduct targeted outreach to these communities, tailored to the specific racial, ethnic, financial, and/or cultural background, as early in the development process as possible to explain the nature and extent of specific potential impacts, and to gain feedback on those impacts.
- Consult with subsistence users (including Indigenous Peoples and other individuals or groups for whom subsistence is a way of life) to understand the species and habitats used for subsistence activities, as well as the seasonal cycle of subsistence activity.
- Give preference to development options that involve use of existing physical infrastructure (e.g., collocation on existing structures, new buried or undersea infrastructure, etc.).
- Select infrastructure locations, where possible, that are not within or near environmental justice communities, particularly new build options.
- Follow all BMPs identified throughout this chapter that reduce adverse impacts of construction activities, such as generation of noise, dust, and traffic.
- Avoid siting deployment activities and facilities requiring construction in proximity to environmental justice communities to reduce the potential that such activities would be seen as disproportionately affecting environmental justice communities. In general, proximity means within a distance at which noise and dust would be considered objectionable or where effects on traffic volume or patterns would be considered detrimental to local residents or businesses.
- Avoid development of new wireless communication towers in proximity to environmental justice communities because of their potential impacts on property values and to reduce the potential that such activities would be seen as disproportionately affecting environmental justice communities. Proximity could be defined variably depending on the nature of the aesthetic impacts, nature of other objectionable effects that influence property values, and other factors such as local concern over aesthetics, desire for improved wireless communications, local media response, and more. According to a recent literature review, measurable adverse impacts on property values are generally not observable beyond 300 meters (984 feet), and often are not observable beyond 100 meters (328 feet) (*Bond et al. 2013*).

11.10.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.11. CULTURAL RESOURCES

11.11.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to cultural resources. The following BMPs and mitigation measures would apply to all project types:

- Comply with the requirements of Section 106 of the National Historic Preservation Act.
- Follow all applicable federal and state requirements if inadvertent discoveries of human remains are made during deployment or operations.
- Ensure usage of an appropriate indirect effects Area of Potential Effects as part of pre-siting or pre-deployment surveys to sufficiently account for potential indirect effects to cultural resources.
- Establish procedures for pre-deployment monitoring if a project has the potential to adversely indirectly affect historic properties to collect baseline data, monitor potential indirect effects during deployment, and determine if effects have occurred post-deployment. Develop BMPs and mitigation measures as part of a Memorandum of Agreement or Programmatic Agreement to address any potential effects, if they were to occur.
- Use low-impact construction alternatives, when feasible. For instance, ripping could be used as an alternative to blasting near structures or archaeological sites identified as at risk of effects from vibration. Other techniques such as bored piling could be used to minimize the vibration generated, where possible.
- Restrict the timing of deployment activities so as not to disturb the use of historic properties, as applicable. Stop work at certain times when traditional and/or religious properties are in use, such as during significant events (e.g., religious festivals or ceremonies).
- Design projects to mitigate potentially negative visual and auditory impacts of facilities. The following visual and noise abatement techniques should be considered: noise-reducing barriers, low-profile constructions, proper siting to maximize the use of topography and vegetation, screening, blending with topographic forms and existing vegetation patterns, and use of environmental coloration or advanced camouflage techniques to limit visual effects.
- Consult with site users through a community liaison team to understand site usage and how the project could affect user access.
- Arrange alternative access using stakeholder input if access to an important cultural heritage site is restricted or blocked. Notify the public of the blockage and alternate means of access.

- Follow all applicable federal requirements for agency and tribal consultation on the identification of and assessment of effects to cultural resources.
- Avoid deployment in areas with known historic properties and deploy equipment and facilities in alternate locations if practical.

11.11.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures for cultural resources beyond those listed above for all project types.

11.12. AIR QUALITY

11.12.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to air quality. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for obtaining air pollution control permits for applicable emission sources.
- Use engines certified to the lowest emission standards and engines that burn alternative fuels (e.g., natural gas, biofuels), and/or install emission control devices (when practicable) for equipment with internal combustion engines.
- Use vehicles with hybrid or electric technology, when possible, to reduce or eliminate criteria pollutant emissions from fuel combustion.
- Use renewable energy, as practicable or feasible, for backup power at buildout locations (cell tower sites, for example).
- Control dust from construction or other land-disturbing activities by spraying water on roads/construction areas, limiting the area of uncovered soil to the minimum needed for each activity, siting staging areas to minimize fugitive dust, using a soil stabilizer (chemical dust suppressor), mulching areas or using a temporary gravel cover, limiting the number and speed of vehicles on the site, and covering trucks hauling dirt.
- Post and enforce speed limits on dirt/gravel roads to reduce airborne fugitive dust.
- Limit idling time of construction vehicle and equipment and conduct proper vehicle maintenance.
- Minimize the time of operation of drones or aircraft below the mixing height (i.e., typically estimated at 3,000 feet aboveground level).
- Use electric or alternate fueled ground support equipment for drones or other aircraft.

- Avoid placement of air emission sources within Class I Areas to the extent possible.[19]
- Ensure all activities are in compliance with general conformity requirements in nonattainment and maintenance areas.
- Ensure all activities conform to the State or Territory Implementation Plan.
- Follow all applicable federal, state/territory, and local air quality requirements, including standards for nuisance (where possible) and fossil fuel-powered generators.
- Ensure all diesel engines are compliant with USEPA emission standards for the corresponding engine class.
- Ensure all equipment is appropriately sized for the Proposed Action.
- Consider using hydrogen-fueled generators where practicable to reduce nitrous oxides emissions.
- Obtain permits, where required, to install and operate fossil fuel-powered generators.[20]
- Implement a dust control plan for construction activities and any travel over unpaved roads.
- Use only ultra-low sulfur fuel (where commercially available) for both on-road and off-road diesel engines.
- Ensure all fuel-burning equipment including, but not limited to, heavy construction equipment and power generator, is maintained in accordance with manufacturer's specifications.

11.12.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.13. NOISE AND VIBRATIONS

11.13.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential noise and vibration impacts. The following BMPs and mitigation measures would apply to all project types:

- Use noise mufflers on heavy equipment to limit noise and vibration exposure on noise and vibration-sensitive receptors during construction and grading activities near populated areas and other noise sensitive receptors, including parks or other protected areas; limit the use of such equipment to operation during daytime hours only.

[19] Class I areas are national parks and wilderness areas in attainment or unclassifiable areas that exceed 5,000 acres in size and were in existence on August 7, 1977.
[20] Permits for stationary sources (diesel generators) should be obtained in advance of future deployment.

- Avoid, as practicable, deployment in areas with highly sensitive receptors and construct facilities in alternate locations for those projects involving heavy equipment for deployment. Such sensitive areas include foraging or breeding areas for disturbance-sensitive congregatory species such as some species of bats, colonial waterbirds, and seabirds, particularly those species that are listed as threatened or endangered, as well as wilderness areas (where recreational activities such as hiking, bird watching, etc. occur).
- Follow all applicable federal, state/territory, county/borough, and local requirements for construction and operation noise and vibration control to avoid or minimize increased noise and vibration.
- Follow all state/territory and federal guidelines for limiting aircraft noise and vibration on populated areas and over national parks.
- Include mitigation measures during the design and implementation phases of the project for equipment that is expected to generate significant noise or vibration (e.g., use of noise barriers such as walls, shrubbery).
- Ensure, as practicable, all heavy equipment, power generators, and boats are maintained in accordance with manufacturer's specifications.
- Limit construction activities to daytime hours (7 a.m. to 7 p.m.) to the extent possible when increased noise levels are more tolerable and avoid construction on Sundays and legal holidays.
- Implement BMPs and mitigation measures as directed by the local jurisdiction such as avoiding unnecessary revving of engines, switching off equipment when not in use, changing location of stationary construction equipment, minimizing drop height of materials, replacing conventional audible reversing alarms with more quiet alternative reversing warning systems, siting equipment away from noise sensitive areas (if practicable), notifying adjacent residents in advance of construction work, installing temporary acoustic barriers around stationary construction noise sources, and other controls as needed to reduce increased noise levels.

11.13.2. Project-Type Specific BMPs and Mitigation Measures

The following project-specific BMPs and mitigation measures apply in addition to those listed above for all project types:

- Wired Projects
  - New Build – Aerial Fiber Optic Plant
    - Do not permit underwater blasting and pile driving activities in any waterbody.
  - New Build – Submarine Fiber Optic Plant
    - Do not permit underwater blasting and pile driving activities in any waterbody.

11.14. CLIMATE CHANGE

11.14.1. BMPs and Mitigation Measures for All Project Types

To minimize the GHG emissions of the Proposed Action, FirstNet and/or their partners would require, as practicable or feasible, implementation of the following BMPs and mitigation measures:

- Ensure that equipment used is the most energy efficient, or use state-of-the-art equipment to increase energy efficiency.
- Use more fuel-efficient diesel-power generation units or low-emission units such as gasoline- or hydrogen-fueled power generators.
- Ensure that construction vehicles are running only when required for construction and reduce or limit unnecessary idling.
- Ensure all operators and drivers have received adequate training to efficiently use equipment.
- Conduct regular maintenance and inspection on equipment to ensure that it is running at the maximum energy efficiency.
- Use renewable energy, as practicable or feasible, for backup power at buildout locations (cell tower sites, for example).
- Minimize disturbed land area and soil disturbance by co-locating where it is feasible.
- Revegetate disturbed land areas after construction where it is feasible.
- Use access roads previously used during deployment activities for maintenance and operational activities.

To minimize climate change effects on the Proposed Action, FirstNet and/or their partners would require, as practicable or feasible, implementation of the following BMPs and mitigation measures to provide for adaptation to climate change effects:

- Ensure design of aboveground structures and equipment has included allowances for maximum temperature and precipitation changes.
- Continuously monitor and reinforce structures build on permafrost.
- Assess sea-level rise prior to installation of infrastructure near coastal areas.
- To allow for extreme weather events and flooding, monitor risk-prone areas and reinforce structures or relocate structures such as deployables outside of high-risk areas as needed.
- Work jointly with public authorities in the implementation of monitoring plans and action plans related to potential impacts that could affect the Proposed Action.

11.14.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.15. HUMAN HEALTH AND SAFETY

11.15.1. BMPs and Mitigation Measures for All Project Types

FirstNet and/or their partners would require, as practicable or feasible, the BMPs and mitigation measures listed below to help avoid or minimize potential impacts to human health and safety. The following BMPs and mitigation measures would apply to all project types:

- Follow all applicable federal, state/territory, and local requirements for hazardous materials and hazardous waste management.
- Utilize trained and licensed heavy equipment operators, when available or required.
- Develop a site-specific Health and Safety Plan that identifies all potential physical and chemical hazards present at the site, including historic contamination.
- Develop and utilize Standard Operating Procedures for site preparation activities and include descriptions of work practice controls and administrative controls.
- Ensure workers wear proper safety equipment as appropriate to the potential hazards present, such as high visibility safety vests, hard hats, steel-toe boots, gloves, eye protection, and hearing protection.
- Provide daily safety meetings to review activities, potential hazards, and safety objectives.
- Avoid site preparation work in areas with high vehicle traffic volume, such as road ROWs.
- Avoid site preparation work in areas known to contain environmental contamination.
- Incorporate all BMPs and mitigation measures listed in Section 11.1, Infrastructure, on potential impacts to transportation system capacity and safety.
- Incorporate all BMPs and mitigation measures listed in Section 11.2, Soils, for potential impacts from soil erosion.
- Incorporate all BMPs and mitigation measures listed in Section 11.4, Water Resources, for potential impacts to water quality – sedimentation, pollutants, nutrients or water temperature, and changes to groundwater or aquifer characteristics.
- Incorporate all BMPs and mitigation measures listed in Section 11.12, Air Quality.
- Incorporate all BMPs and mitigation measures listed in Section 11.13, Noise and Vibrations.
- Prepare an SPCC Plan to prevent, contain, and report accidental spills.
- Conduct air and noise monitoring to ensure levels stay within health-protective levels for communities and workers and, as required, that workers are trained and comply with personal protective equipment requirements as established by the Occupational Safety and Health Administration (OSHA).
- Search for the location of known contaminated sites prior to site selection in the area where the Proposed Action site is being considered, for new or existing infrastructure projects.

- Ensure that appropriate measures are taken in compliance with applicable regulations (including Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act)[21] if construction occurs in an area where there is the potential for legacy contamination, to protect workers and the public from unacceptable levels of exposure to contaminants as a result of deployment activities.
- Establish an emergency response plan (including emergency preparedness and response activities, resources, and responsibilities) to attend to specific emergencies (e.g., accidental spills) that could arise during deployment.
- Ensure that reporting requirements are followed in the event that Emergency Planning and Community Right-to-Know Act reporting thresholds are reached for the shipping, handling or storage of gasoline or diesel used for equipment and generators.[22]
- Establish a grievance mechanism or other stakeholder engagement tool that is accessible and culturally appropriate for use by the community to express concerns regarding the Proposed Action.
- Implement community education and public awareness, as needed, about the Proposed Action's traffic, routes used, road signage, and safety which are particularly critical in high-risk areas.
- Use signage to clearly mark construction sites, and establish boundaries and barricades to keep people out of dangerous areas.
- Make sure an incident investigation procedure is in place that can be specifically used for any near misses or incidents involving workers and community members.
- Ensure all workers are appropriately trained in wildlife identification and hazard management to minimize the likelihood of wildlife attacks.
- Ensure all workers are appropriately trained in weather hazard management and equipped with all necessary personal protective equipment.
- Inform community members of dates and times of construction activities that are likely to generate noise at levels above 55 A-weighted decibels at the residences or workplaces of those individuals.
- Monitor land clearing and construction sites for areas of standing water, including ditches and holes in the ground, as well open receptacles (e.g., empty barrels) and fill or eliminate these hazards to prevent mosquito breeding.

[21] The main objective of the Resource Conservation and Recovery Act of 1976 is to "protect human health and the environment from the potential hazards of waste disposal, to conserve energy and natural resources, to reduce the amount of waste generated, and to ensure that wastes are managed in an environmentally sound manner" (*USEPA 2015a*). The Comprehensive Environmental Response, Compensation, and Liability Act or Superfund law was designed to help clean up hazardous waste sites and releases of pollutants or contaminants that may negatively affect public health (*USEPA 2011*).

[22] The Emergency Planning and Community Right-to-Know Act of 1986 was designed to assist communities in planning for emergencies related to hazardous waste. The law also requires industry to inform federal, state, and local governments on the storage, use, and releases of hazardous chemicals: 75,000 gallons for gasoline; 100,000 gallons for diesel; and 10,000 pounds for all other hazardous chemicals (*USEPA 2015b*).

- Given that no filariasis-, chikungunya-, or dengue-specific OSHA recommendations are available, follow OSHA recommended Workplace Precautions against West Nile Virus, another mosquito-borne illness for which, like chikungunya and dengue, the only preventative measure is avoidance of bites by infected mosquitoes.
- Ensure that the appropriate medication is available for treatment of any filariasis infections that may arise in the workforce for projects located in areas where filariasis is known to occur.

11.15.2. Project-Type Specific BMPs and Mitigation Measures

There are no project-specific BMPs and mitigation measures beyond those listed above for all project types.

11.16. REFERENCES

11.16.1. Wildlife

APLIC (Avian Power Line Interaction Committee). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. Edison Electric Institute, APLIC, and the California Energy Commission. Washington, D.C. and Sacramento, CA. Accessed: November 21, 2016. Retrieved from: http://www.dodpif.org/downloads/APLIC_2006_SuggestedPractices.pdf

_____. 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* Washington, D.C.: Edison Electric Institute and APLIC.

APLIC and USFWS (Avian Power Line Interaction Committee and the U.S. Fish and Wildlife Service). 2005. *Avian Protection Plan Guidelines.* April 2005.

FAA (Federal Aviation Administration). 2016a. *Obstruction Marking and Lighting, Advisory Circular 70/7460-1L, Change 1*. October 8, 2016. U.S. Department of Transportation. Accessed: October 8, 2016. Retrieved from: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/70_7460-1

_____. 2016b. Specification for Obstruction Lighting Equipment. Advisory Circular 150/5345-43H. September 28, 2016. Accessed: March 2017. Retrieved from: https://www.faa.gov/documentLibrary/media/Advisory_Circular/150-5345-43GH.pdf

FCC (Federal Communications Commission). 2017. *Opportunities to Reduce Bird Collisions with Communication Towers while Reducing Tower Lighting Costs*. Washington, D.C. January 6, 2017. Accessed: March 2017. Retrieved from: http://wireless.fcc.gov/migratory-birds/Light_Changes_Information_Update_120415.pdf

Gehring, J., P. Kerlinger, and A.M. Manville, II. 2009. *Communication Towers, Lights and Birds: Successful Methods of Reducing the Frequency of Avian Collisions*. Ecological Applications, 19(2): 505-514.

_____. 2011. *The Role of Tower Height and Guy Wires on Avian Collisions with Communication Towers*. The Wildlife Society. Journal of Wildlife Management, 75(4): 848-855.

Manville, A.M., II. 2002. *Protocol for Monitoring the Impact of Cellular Telecommunication Towers on Migratory Birds Within the Coconino, Prescott, and Kaibab National Forests, Arizona*. Prepared for U.S. Forest Service. 9 pp.

_____. 2004. *Prairie Grouse Leks and Wind Turbines: U.S. Fish and Wildlife Service Justification for a 5-mile Buffer from Leks: Additional Grassland Songbird Recommendations.* Peer-reviewed briefing paper. Arlington, VA: U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. 17 pp.

_____. 2007. *Comments of the U.S. Fish and Wildlife Service Submitted Electronically to the FCC on 47 CFR Parts 1 and 17, WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, "Effects of Communication Towers on Migratory Birds."* February 2, 2007. 32 pp.

_____. 2009. "Towers, Turbines, Power Lines, and Buildings—Steps Being Taken by the U.S. Fish and Wildlife Service to Avoid or Minimize Take of Migratory Birds at these Structures." In T.D. Rich, C. Arizmendi, D. Demarest, and C. Thompson (eds.). *Tundra to Tropics: Connecting Habitats and People*. McAllen, TX: Proceedings 4th International Partners in Flight Conference. Pp. 262-272.

_____. 2011. *Comments of the U.S. Fish and Wildlife Service's Division of Migratory Bird Management Filed Electronically on WT Docket No. 08-61 and WT Docket No. 03-187, Regarding the Environmental Effects of the Federal Communication's Antenna Structure Registration Program*. January 14, 2011. 12 pp.

Patterson, J.T., Jr. 2012. *Evaluation of New Obstruction Lighting Techniques to Reduce Avian Fatalities*. DOT/FAA/TC-TN12/9, Federal Aviation Administration, U.S. Department of Transportation. 28 pp, plus appendices.

USFWS (U.S. Fish and Wildlife Service). 2000. *Service Guidance on the Siting, Construction, Operation, and Decommissioning of Communication Towers*. FWSIFHC/DHCIBFA. September 14, 2000. Accessed: July 2015. Retrieved from: http://www.fws.gov/habitatconservation/com_tow_guidelines.pdf (updated January 2016)

_____. 2008. *Birds of Conservation Concern 2008*. Arlington, VA: U.S. Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management. 85 pp. Accessed: July 2015. Retrieved from: http://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf (updated January 2016)

_____. 2012a. *Service Interim Guidelines for Recommendations on Communications Tower Siting, Construction, Operation, and Decommissioning*. The Migratory Bird Program – Conserving America's Birds. Accessed: July 2015. Retrieved from: http://www.fws.gov/policy/m0084.html (updated January 2016)

_____. 2012b. *U.S. Fish and Wildlife Service Land-based Wind Energy Guidelin*es. March, 82 pp.

_____. 2013a. *Eagle Conservation Plan Guidance, Module 1, Land-based Wind Energy, Version 2*. Division of Migratory Bird Management. April, 103 pp.

_____. 2013b. *2013 U.S. Fish and Wildlife Service USFWS Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning -- Suggestions Based on Previous USFWS Recommendations to FCC Regarding WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, "Effects of Communication Towers on Migratory Birds," Docket No. 08-61, FCC's Antenna Structure Registration Program, and Service 2012 Wind Energy Guidelines*. Prepared by Albert M. Manville. September 27, 2013.

11.16.2. Fisheries and Aquatic Habitats

Hanson, Jeanne, Mark Helvey, and Russ Strach (eds.). 2003. *Non-fishing Impacts to Essential Fish Habitat and Recommended Conservation Measures*. Version 1, August 2013. NOAA Fisheries. Accessed: July 13, 2015. Retrieved from: http://www.fpir.noaa.gov/Library/HCD/EFH%20Non-fishing%20NW-SW%202003.pdf

NOAA (National Oceanic and Atmospheric and Atmospheric Administration). 2006. *NOAA Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/SPO-69. October 2005. Revised Edition, June 2006.

11.16.3. Threatened and Endangered Species and Species of Conservation Concern

APLIC (Avian Power Line Interaction Committee). 2012. *Reducing Avian Collisions with Power Lines: The State of the Art in 2012.* Washington, D.C.: Edison Electric Institute and APLIC.

11.16.4. Land Use, Airspace, and Recreation

FAA (Federal Aviation Administration). 2016. *Obstruction Marking and Lighting, Advisory Circular 70/7460-1L, Change 1*. October 8, 2016. U.S. Department of Transportation. Accessed: October 8, 2016. Retrieved from: https://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.current/documentNumber/70_7460-1

11.16.5. Socioeconomics

Bond, Sandy, Sally Sims, and Peter Dent. 2013. *Towers, Turbines and Transmission Lines: Impacts on Property Values*. Chichester, West Sussex, U.K.: Wiley-Blackwell.

11.16.6. Environmental Justice

Bond, Sandy, Sally Sims, and Peter Dent. 2013. *Towers, Turbines and Transmission Lines: Impacts on Property Values*. Chichester, West Sussex, U.K.: Wiley-Blackwell.

11.16.7. Human Health and Safety

USEPA (U.S. Environmental Protection Agency). 2011. *CERCLA Overview*. EPA Superfund, Laws, Policy and Guidance.

_____. 2015a. *Resource Conservation and Recovery Act (RCRA)*. Accessed: July 2015. Retrieved from: http://www.epa.gov/agriculture/agriculture-laws-and-regulations-apply-your-agricultural-operation-statute#RCRA (updated January 2016)

_____. 2015b. *Summary of the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)*. Accessed: July 2015. Retrieved from: http://www2.epa.gov/laws-regulations/summary-comprehensive-environmental-response-compensation-and-liability-act

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

FirstNet®

First Responder Network Authority

Volume 8 - Chapters 10-18 & Appendices

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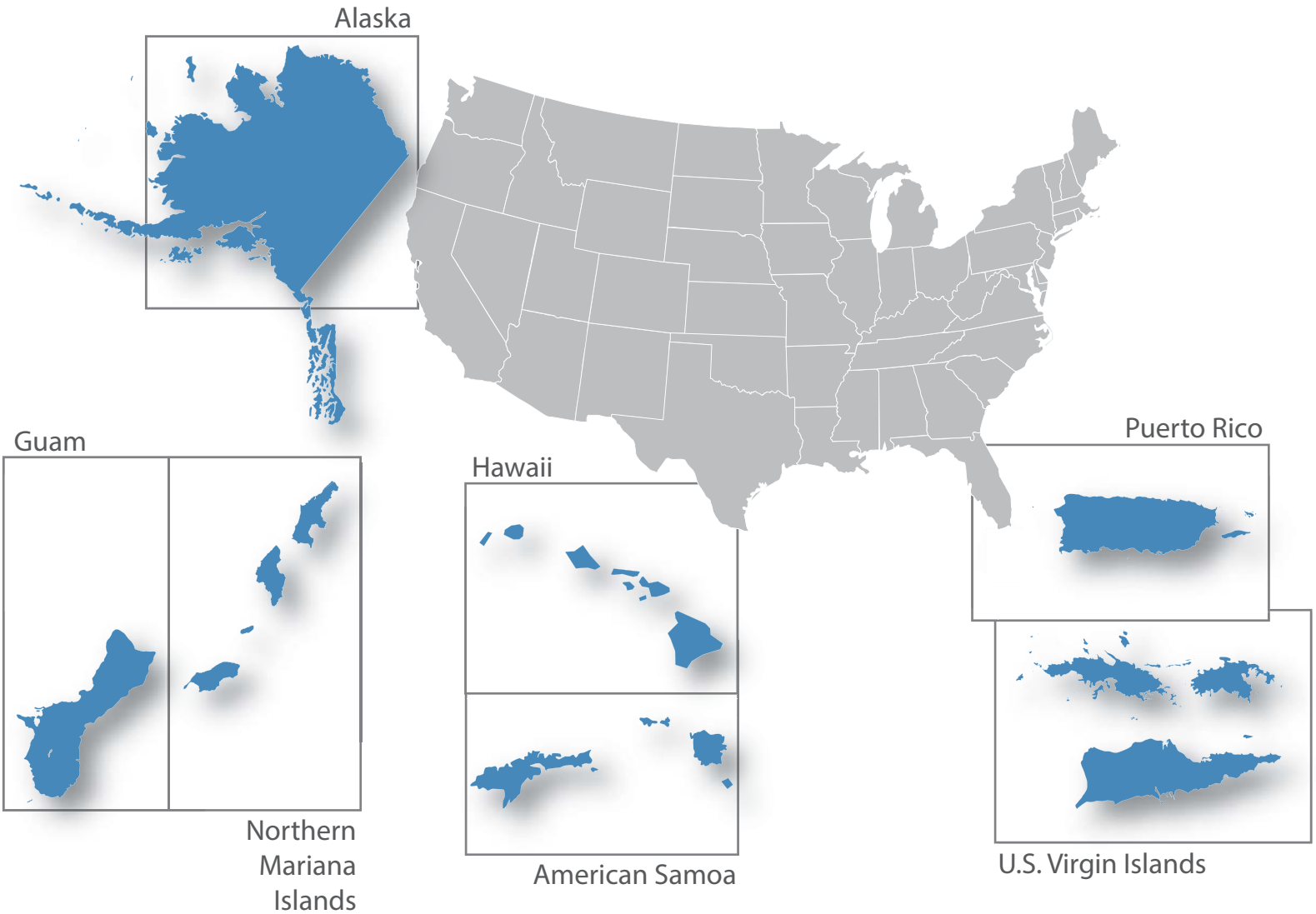

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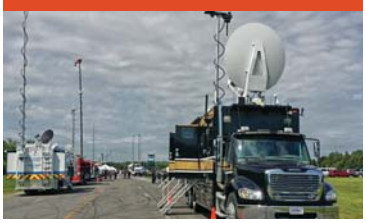

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First Responder Network Authority

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
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ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
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HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
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HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
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MW	megawatt
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N	north; not attained
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ND	no data
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NMOG	non-methane organic compounds
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NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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13. OTHER REQUIRED ANALYSES

In addition to the analyses discussed in the previous state/territory chapters, the National Environmental Policy Act (NEPA) requires an additional evaluation of the potential impacts from the Proposed Action related to unavoidable adverse impacts, any irreversible or irretrievable commitment of resources, and the relationship between local short-term and long-term productivity.

13.1. UNAVOIDABLE ADVERSE IMPACTS

The Council on Environmental Quality's (CEQ) NEPA implementing regulations (*40 CFR § 1502.16*) require that an Environmental Impact Statement (EIS) evaluate the unavoidable adverse impacts from implementation of the Proposed Action. For this Proposed Action, the analysis indicates that no significant or unavoidable adverse impacts are anticipated at the programmatic level. Once site-specific project information is known, the potential for adverse impacts would be analyzed, as appropriate, in NEPA documentation tiered from this Final Programmatic EIS (PEIS). Site-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work.

13.2. IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

CEQ's NEPA implementing regulations (*40 CFR § 1502.16*) require that an EIS review the potential impacts to irreversible or irretrievable commitments of resources resulting from implementation of the Proposed Action. An irreversible commitment of resources refers to the loss of resource use in the future, whereas irretrievable refers to the loss of a natural resource for harvest,[1] production, or use. These resources are irretrievable in that they would be used for a single project instead of being used for multiple purposes. An irretrievable commitment of resources is the loss of resources that cannot be replaced, recovered, or reversed. An example of irreversible commitments of resources could be the loss of a protected species or a cultural resource that would be considered permanent losses. An example of irretrievable commitment of resources could include the use of local contractors during deployment construction activities, during which the contractors supporting FirstNet deployment would be unable to work on other projects, and may cause temporary increases in the cost of local labor, equipment, or materials.

The potential impacts at the programmatic level addressed in each Environmental Consequences section of the preceding chapters were determined based on the resource-specific impact significance criteria developed by FirstNet. As a result, the impact significance ratings[2] of the specific types of effects analyzed in this Final PEIS cannot be directly related to the generalized discussion of irreversible or irretrievable commitments of resources in this section. However, any potential impacts that could create perceptible resource commitments that would be

[1] Harvesting is the act or process to take or kill wildlife for food, sport, or population control; to gather crops for consumption.

[2] As discussed in the Environmental Consequences sections, types of effects were rated as *potentially significant*, *less than significant with BMPs and mitigation measures incorporated*, *less than significant*, and *no impact* at the programmatic level based on the characteristics of the potential effects. BMPs are best management practices.

irreversible or irretrievable are assumed to result in some level of impact to a particular resource. Potential resource commitments are shown on Table 13.2-1.

Table 13.2-1: Summary of Irreversible and Irretrievable Commitment of Resources by Resource Area

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Infrastructure	No	No	Short-term obstruction or temporary disruption to local infrastructure could occur during construction of deployment activities. There would be no long-term impacts to infrastructure.
Soils	Yes	Yes	If an undisturbed land area is selected for deployment and operation activities, there could be an irreversible resources commitment. Irretrievable impacts could occur if, for example, deployment/construction activities affect a planting or harvesting schedule or crop yields.
Geology	Yes	Yes	Removal or disturbance of paleontological resources (fossils) could potentially create irreversible and irretrievable impacts.
Water Resources and Wetlands	No	No	Deployment activities are not expected to cause irretrievable loss of existing waterbodies or wetlands, or exceed water quality standards.
Biological Resources	Yes	Yes	Removal or disturbance of habitat could potentially create minor irreversible and irretrievable impacts.
Land Use and Recreation	Yes	Yes	Land use required for the deployment activities could potentially be a minor irreversible impact. Deployment of buried fiber, for example, could result in minor irretrievable impacts due to temporary loss of land use for other purposes.
Visual Resources	Yes	Yes	Irreversible and irretrievable impacts associated with obstruction of scenic areas could occur from some angles, and new light sources associated with project activities could impact enjoyment of the night sky.
Socioeconomic Resources	No	Yes	There could be a temporary increase in use of local contractors during construction activities, representing increased employment and an irretrievable loss of workers for other projects during construction.
Environmental Justice	No	No	In general, Environmental Justice impacts across each state or territory would not include irreversible or irretrievable effects. Analyses of individual proposed projects should assess whether potential impacts to specific environmental justice com munities include irreversible and/or irretrievable effects. Site-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work.
Cultural Resources	Yes	Yes	Removal or disturbance of previously unidentified cultural resources could potentially result in irretrievable and irreversible impacts.
Air Quality	No	No	Project emissions are not expected to exceed federal or state air quality standards. Air quality would return to existing conditions after completion of deployment activities.
Noise and Vibrations	No	Yes	Potential short-term, temporary noise impacts may result during construction activities for deployment. There would be no long-term impacts from noise and vibrations.

Resource Area	Irreversible Impacts	Irretrievable Impacts	Explanation
Climate Change	No	No	Greenhouse gas emissions are not expected to be significant at the programmatic level.
Human Health and Safety	No	Yes	Construction activities during deployment may present relatively minor human health and safety concerns. Any hazardous wastes would be disposed of properly. Conditions would return to normal after completion of deployment activities.

Where any potential irreversible or irretrievable commitments of resources are identified, they would be addressed in project-specific environmental compliance documentation. Project- or site-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work. BMPs and mitigation measures would be implemented where practicable and feasible to help reduce irreversible and irretrievable impacts.

13.3. RELATIONSHIP BETWEEN SHORT-TERM AND LONG-TERM PRODUCTIVITY

CEQ's NEPA implementing regulations (*40 CFR § 1502.16*) require that an EIS address the relationship between short-term use of the environment and the potential impacts of such use on the maintenance and enhancement of long-term productivity, particularly for beneficial uses. Such impacts can arise from choosing one action that could reduce the flexibility of pursuing other options in the future, or from selecting a specific parcel of land or other resource to a certain use that would not allow other uses to occur at the site. At the programmatic level, it is anticipated that implementation of the Proposed Action would not result in any impacts that would narrow the range of future beneficial uses of the environment because it would not pose any long-term risks to the health, safety, or the general welfare of public communities and would, in fact, provide significant public welfare benefits in terms of increased public safety and security. Deployment activities would follow, as practicable and feasible, the BMPs and mitigation measures outlined in this Final PEIS, as appropriate.

FirstNet does not intend to alter the current uses of the environment. Project- or site-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work. During those analyses, each project element and activity would be evaluated, and the potential long-term effects on productivity of each environmental resource area would be evaluated relative to potential trade-offs.

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Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

FirstNet®

First Responder Network Authority

Volume 8 - Chapters 10-18 & Appendices

Alaska
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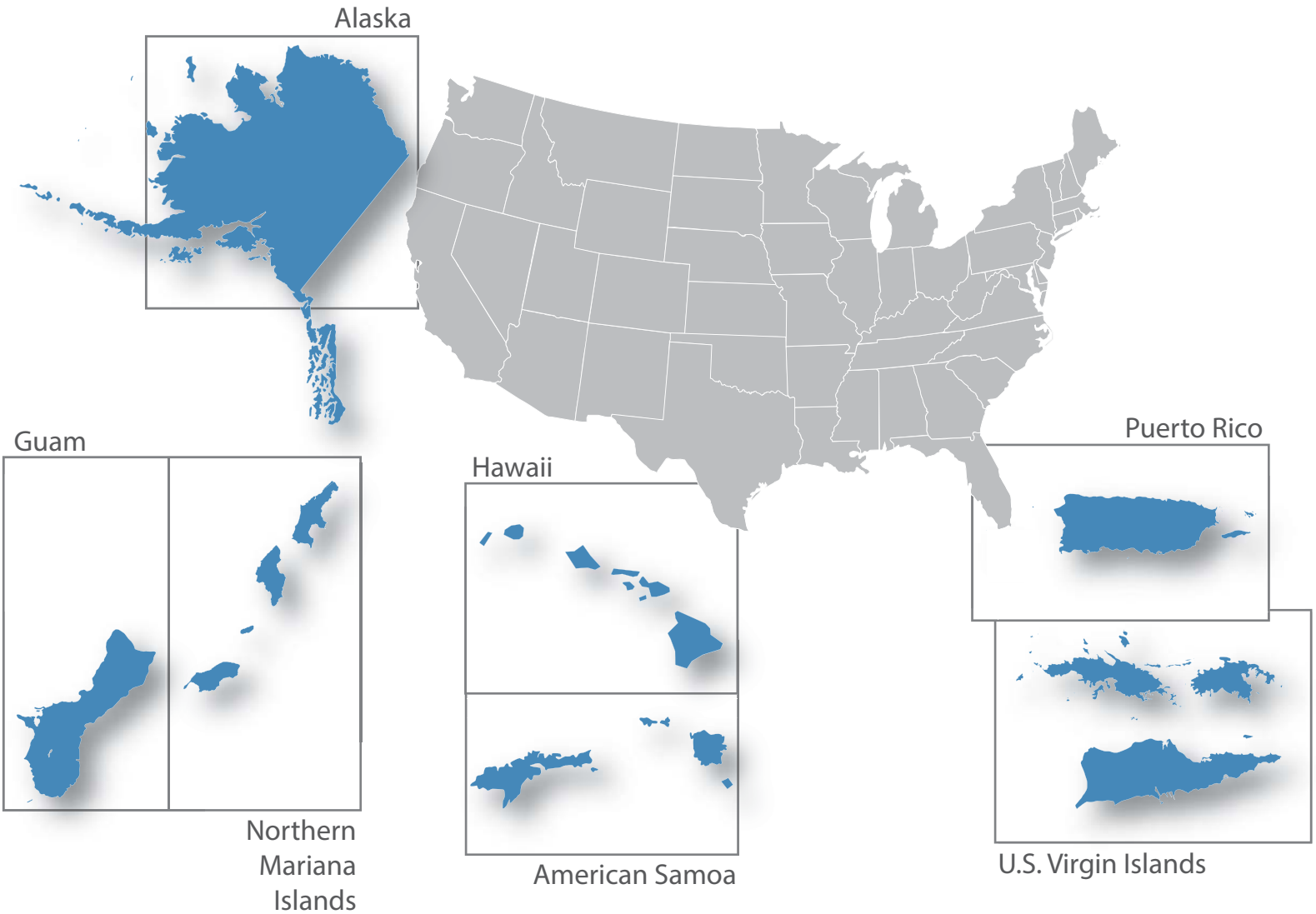
American Samoa
Guam
Northern Mariana Islands
Puerto Rico
U.S. Virgin Islands



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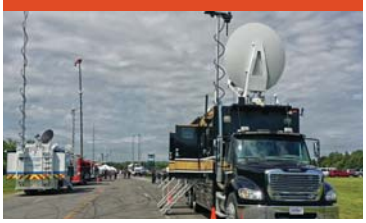

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First Responder Network Authority

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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Cooperating Agencies
Federal Communications Commission
General Services Administration
U.S. Department of Agriculture—Natural Resource Conservation Service
U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Commerce—National Telecommunications and Information Administration
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

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Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
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ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
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IEEE	Institute of Electrical and Electronics Engineers
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in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
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LAER	lowest achievable emission rate
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LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
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$\mu g/m^3$	microgram(s) per cubic meter
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mg/m^3	Milligram(s) per cubic meter
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NCDC	National Climatic Data Center
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NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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14. DRAFT PEIS PUBLIC COMMENTS

FirstNet has developed a series of five Programmatic Environmental Impact Statements (PEISs) for the Proposed Action, one for each of five geographic regions across the United States (U.S.). This Final PEIS helps fulfill some of FirstNet's responsibilities under the National Environmental Policy Act (NEPA) for the non-contiguous region, which includes the states of Alaska and Hawaii, as well as the Commonwealths of the Northern Mariana Islands and Puerto Rico and the territories of American Samoa, Guam, and the U.S. Virgin Islands. Under the Council on Environmental Quality guidance for public involvement in the NEPA process, agencies shall seek to involve the public in preparing environmental documents such as this PEIS (*40 CFR § 1506.6*). These efforts include providing notice to potentially interested parties, holding public meetings, soliciting comments, and making both the Draft and Final PEIS available to the public.

This chapter provides a full listing of public and agency comments received on the Draft PEIS for the non-contiguous region as well as FirstNet's responses to those comments (see Table 14-1). In addition, some of the comments received on the other four Draft PEISs for the contiguous U.S. were applicable to the non-contiguous region as well; those comments that were received during the preparation of this document are captured in Table 14-2.[1]

The Draft PEIS for the non-contiguous region was published on March 4, 2016, which initiated a 60-day public comment period (*81 FR § 11511 [March 4, 2016]*). Notices were also provided directly to cooperating agencies, state/territory Single Points of Contact, elected officials, American Indian tribes and Native Hawaiian Organizations, media organizations, and other interested parties.

Over the course of the comment period, agencies and members of the public were invited to submit comments to FirstNet via traditional mail, e-mail, and the regulations.gov website.[2] In addition, public meetings were held in each of the seven non-contiguous states and territories where participants had the opportunity to talk directly with FirstNet environmental staff and its contractors to learn about the Proposed Action and the preliminary findings of the Draft PEIS. Individuals in attendance could provide input on those findings both verbally and on comment cards. The public meetings were held as follows:

- Anchorage, Alaska, on March 15, 2016
- Juneau, Alaska, on March 17, 2016
- Honolulu, Hawaii, on March 21, 2016
- Tumon Bay, Guam, on April 5, 2016
- Saipan, Northern Mariana Islands, on April 7, 2016
- Tafuna, American Samoa, on April 11, 2016

[1] A summary of comments provided during the scoping period can be found in Appendix B, *First Responder Network Authority Nationwide Public Safety Broadband Network Programmatic Environmental Impact Statement Scoping Summary Report.*
[2] Docket ID: FIRSTNET-2016-0001 (https://www.regulations.gov/docket?D=FIRSTNET-2016-0001)

- Christiansted, St. Croix, U.S. Virgin Islands, on April 22, 2016
- San Juan, Puerto Rico, on April 26, 2016

Although the official comment period lasted 60 days, FirstNet also considered comments provided after the closing of that period. There were a total of 20 submissions received on the non-contiguous Draft PEIS, which included 5 comment cards and 5 verbal comments. From those 20 submissions, 171 comments were extracted as identified in Table 14-1 (166 comments from agencies or individuals who identified themselves with agency affiliation and 5 public comments). Agency comments were received from the U.S. Department of Agriculture Natural Resources Conservation Service, U.S. Department of the Interior, U.S. Department of Energy, U.S. Department of Homeland Security, U.S. Environmental Protection Agency, U.S. Coast Guard, American Samoa Department of Homeland Security, State of Hawaii Department of Land and Natural Resources, Puerto Rico Emergency Management Agency, Port Authority of Guam, Guam Department of Homeland Security, and U.S. Virgin Islands Bureau of Information Technology.

Content-related comments received on the non-contiguous region Draft PEIS ranged from simple word changes and reference updates to suggestions for additional analysis. Several comments were site-specific in nature, such as installation methods on the Arctic Coastal Plain in Alaska and the identification of eagle habitats within their known ranges. In addition, numerous commenters on the Draft PEIS indicated that the Final PEIS should describe the environmental review process to be followed after the Final PEIS is published and prior to construction and implementation of the Proposed Action. As indicated throughout this Final PEIS, site-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis, but will be issuing a Supplemental Environmental Impact Statement with that information as soon as it is determined.

During the preparation of this document, comments were also received on the other four Draft PEISs for the contiguous U.S. Comments from 13 of these submissions were also applicable to the non-contiguous region (see Table 14-2). These comments included reference and guidance updates, such as the need to remove the 25,000 metric tons of carbon dioxide equivalent reference point from the greenhouse gas and climate change analysis; concerns regarding vibration impacts to natural and cultural resources; suggestions for mitigating potential impacts to migratory birds, such as conducting vegetation clearing outside of breeding periods; and ensuring a detailed review of the best management practices that could avoid or minimize potential impacts of RF emissions to wildlife and humans.

All comments from both Tables 14-1 and 14-2 were used to prepare this Final PEIS.

Table 14-1: Draft PEIS Comment Response Matrix

Submission ID	Comment Number	Date(s) Received	Sender Name(s)	Sender Organization(s)	Comment Text	Response	Chapter/Section/Page Number Reference in the Draft PEIS as Identified by Commenter	Section(s) where changes were made in Final PEIS
FN-NC-0001	1	2/26/2016	Michael Robotham	NRCS	Based on my preliminary review of the document, I do not see any issues with the finding of "less that significant" impact related to soil resources, including the protection of prime and important farmlands (FPPA), in all the jurisdictions covered by this assessment.	Thank you for your comment.	General	NA
FN-NC-0001	2	2/26/2016	Michael Robotham	NRCS	I am somewhat concerned about the decision to use STATSGO2 as the basis for the soils assessments instead of using the more detailed SSURGO data. This may be an issue of consistency since SSURGO is not available for significant portions of Alaska, but, this does result in the use of a less detailed and comprehensive data source in areas where more detailed and comprehensive data (SSURGO) is easily available (Hawaii, Guam, Am Samoa, CNMI, Puerto Rico and USVI) and, at a minimum, this decision should be document and justified in the introductory section. In my opinion, given the scope and effect of the proposed activities, the use of STATSGO2 vs the more detailed SSURGO data does not change the overall conclusions of the assessment at the broad scale. However, it should be explicitly stated (if it is not already and I just missed it) that specific decisions on the selection of alternative and, more specifically on the selection of sites for those alternatives will be based on best available soils information (SSURGO where it exists – STATSGO2 where it doesn't). In addition, it should be clearly stated that all BMPs to ameliorate potential impacts (e.g. soil erosion during construction activities) will be based on best available soils data and information.	FirstNet used the STATSGO2 database to obtain soils information at the programmatic level to ensure consistency across all the states and territories and the District of Columbia. This regional information provides a sufficient level of detail for a programmatic analysis. Where appropriate, the best available soils data and information, including the use of the SSURGO database, will be used during any subsequent site-specific assessments. This explanation has been provided in the Final PEIS.	General	All Soils Affected Environment sections
FN-NC-0001	3	2/26/2016	Michael Robotham	NRCS	There also are some typos/inconsistencies which I assume will be caught in the editorial process including the following in Volume 3 (American Samoa): Soil Conservation Service. 1982. Soil Survey of the United States Virgin Islands. U.S. Department of Agriculture in cooperation with the Government of American Samoa.	This error has been corrected in the Final PEIS.	General	Various
FN-NC-0002	4	4/18/2016	William Ostrum	DOE	"(See NEPA 1502.20)" - This seems to be referencing the CEQ NEPA regulations, not NEPA. Suggest replacing "NEPA" with "CEQ" for similar references throughout.	The proper reference for this CEQ regulation is *40 CFR § 1502.20*. References have been corrected throughout the Final PEIS document as appropriate.	ES1.1, page 1	ES1.1
FN-NC-0002	5	4/18/2016	William Ostrum	DOE	"Partner organization(s)" - this is the first time this term is used. Suggest providing some explanation of the role of these organizations.	The following explanation has been included in the Final PEIS: "FirstNet's partner organization(s) would assist in providing resources as necessary to deploy and operate the NPSBN." This text has been added as a footnote in the Executive Summary and in the text body of Section 2.1.	ES3, page 6; 2.1, page 2-1	ES3

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FN-NC-0002	6	4/18/2016	William Ostrum	DOE	Recommend including the title of the preferred alternative in the header.	The Final PEIS has been updated to make clean distinctions between the Proposed Action and the Preferred Alternative. The Proposed Action is the nationwide broadband network and the Preferred Alternative refers to the specific way the network would be implemented using a combination of technologies.	ES3.1, page 7	Throughout document
FN-NC-0002	7	4/18/2016	William Ostrum	DOE	Add a brief explanation of the source of the BMPs in general (e.g., BMPs have been developed based on independent research by FirstNet and consultation with other agencies.)	A footnote has been added to the Executive Summary and the main body text in the Final PEIS stating: "BMPs and mitigation measures have been developed based on consultation with other agencies as well as independent research by FirstNet and their environmental contractors."	ES4, page 10	ES4; Chapter 11, BMPS and Mitigation Measures
FN-NC-0002	8	4/18/2016	William Ostrum	DOE	Bullet 8 - Also coordinate with federal, state, and local government agencies as appropriate.	Bullet 8 referenced in Table ES4-1 has been updated in the Final PEIS to read: "Coordinate with federal, state/territory, and local government agencies as appropriate, as well as with public safety officials, emergency and medical facilities, and existing telecommunications providers to the extent practicable to facilitate awareness of deployment activities and accompanying schedule."	Table ES4-1, page 12	Table ES4-1; Chapter 11, BMPS and Mitigation Measures
FN-NC-0002	9	4/18/2016	William Ostrum	DOE	Explain "notification and redundancy."	A footnote has been added to this text of the Final PEIS stating the following: "In this context, notification refers to the ability of health care providers to be alerted in the event of a disaster. Redundancy refers to the duplication of equipment or processes to help maintain continuity of operations." This has also been explained in the Infrastructure sections of each state/territory-specific chapters.	ES4.1.6, page 15	Infrastructure Affected Environment sections and Environmental Consequences sections; Chapter 1, Introduction; ES4.1.6
FN-NC-0002	10	4/18/2016	William Ostrum	DOE	Global - unclear when "less than significant with BMPs and mitigation measures" should be used. It seems like impacts could be significant without BMPs in most cases.	Section ES4 explains that the methodology used to determine the various impact levels in the programmatic analysis is provided for each resource within each state or territory section. The methodology includes developing and applying specific programmatic criteria to determine impact levels. The descriptions of potential impacts to various resources presented in the Executive Summary are summarized. Specific impacts will be evaluated at the site-specific level in subsequent environmental reviews. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined.	ES4.2, page 16	ES4
FN-NC-0002	11	4/18/2016	William Ostrum	DOE	Since prime farmlands are discussed for each other area, add "Alaska has no prime farmlands."	The Executive Summary of the Final PEIS has been updated to indicate that prime farmland soils are not present in Alaska since soil temperatures do not meet the required threshold established by Congress.	ES4.2.1, page 19	ES4.2.1
FN-NC-0002	12	4/18/2016	William Ostrum	DOE	"It is recommended that…" Recommend removing this phrase throughout the impacts discussion. It is better to say that "FirstNet will, as appropriate and practical, avoid…"	The text in the Final PEIS has been revised to state "As practicable or feasible, FirstNet and/or their partners would work to avoid…"	ES4.3.2, page 25	Throughout document

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FN-NC-0002	13	4/18/2016	William Ostrum	DOE	Global - The phrase "in general" could be seen to imply that there are specific effects that could be considered significant. Recommend removing.	At the programmatic level and using the impact criteria developed for the PEIS, these effects would be considered less than significant. The phrase "in general" has been removed for clarity.	ES4.4.2, page 33	Throughout the Executive Summary
FN-NC-0002	14	4/18/2016	William Ostrum	DOE	"Consider spanning…" -recommend removing "Consider."	This sentence has been updated in the Final PEIS to read: "Where practicable, span a wetland by locating telecommunication poles on either side of the wetland instead of disturbing the interior."	Table ES4-5, page 36	Table ES4-5; Chapter 11, BMPS and Mitigation Measures
FN-NC-0002	15	4/18/2016	William Ostrum	DOE	In final sentence, insert "impacts" between "and" and "further." The BMPs wouldn't reduce deployment (the first half of the sentence) but would reduce impacts.	This text has been updated in the Final PEIS to read: "To the extent practicable or feasible, FirstNet and/or their partners would work to avoid or minimize deployment in wetland areas. Where deployment in wetlands cannot be avoided, mitigation measures, as defined through permitting and/or consultation with the appropriate resource agency, would be implemented to help avoid or reduce potential impacts. Implementation of BMPs, as practicable or feasible, could further reduce the potential for impacts."	ES4.5.1, page 39	ES4.5.1; ES4.5.2; ES4.5.3; ES4.5.4; ES4.5.5; ES4.5.6; ES4.5.7
FN-NC-0002	16	4/18/2016	William Ostrum	DOE	Remove "likely" from last sentence.	The word "likely" has been removed from this section in the Final PEIS. The sentence now reads: "To the extent practicable or feasible, FirstNet and/or their partners would work to avoid or minimize deployment in wetland areas. Where deployment in wetlands cannot be avoided, mitigation measures, as defined through permitting and/or consultation with the appropriate resource agency, would be implemented to help avoid or reduce potential impacts. Implementation of BMPs, as practicable or feasible, could further reduce the potential for impacts."	ES4.5.2, page 39	ES4.5.2
FN-NC-0002	17	4/18/2016	William Ostrum	DOE	Text claims that "activities that involve collocation or shared use of existing facilities or do not require new ground disturbance…would have no effect on biological resources." Things like lighting and noise could still have an effect. Suggest rewriting to say it is a less than significant effect.	The text in ES4.6 has been updated to better explain the potential development scenarios that could/could not result in potential impacts to biological resources. As described in the Biological Resources sections within each state/territory-specific chapter, collocation or shared use of existing facilities could result in the addition of power units, structural hardening, and physical security measures such as lighting. These activities could impact biological resources, and the text of ES4.6 has been updated to make these distinctions clear, consistent with the text in the state/territory chapters.	ES4.6, page 41	ES4.6
FN-NC-0002	18	4/18/2016	William Ostrum	DOE	Last sentence before bullets - unclear why it claims impacts to "biological resources (including wildlife…" are assessed separately. Isn't that the focus of this section?	Within the Biological Resources sections (as well as other resource sections) of each state/territory-specific chapter, potential impacts as a result of deployment are assessed separately from operations impacts. This text in ES4.6 has been revised as needed to more clearly convey this point.	ES4.6, page 41	ES4.6

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FN-NC-0002	19	4/18/2016	William Ostrum	DOE	Include statement that FirstNet "has and will continue to coordinate with appropriate state, local, federal, and tribal agencies." p 1-7 says FirstNet has already initiated contact with USFWS, but doesn't mention NOAA/NMFS. Suggest including NOAA if applicable.	Specific planned and on-going consultation efforts are discussed in Section ES1.3 as well as in Chapter 1, Introduction (Section 1.5). Appendix A, *Invited Cooperating Agencies*, lists those agencies that were invited to become cooperating agencies including NOAA and NMFS. NOAA and NMFS declined to be cooperating agencies for the Programmatic EIS. Within Table ES4-6, there is a BMP/Mitigation Measure related to consultation with USFWS and NMFS.	ES1.2, page 1	NA
FN-NC-0002	20	4/18/2016	William Ostrum	DOE	Remove extra "s" in third to last bullet.	The extra "s" has been removed in the third to last bullet.	Table ES4-6, page 44	Table ES4-6
FN-NC-0002	21	4/18/2016	William Ostrum	DOE	"May affect, but is not likely to adversely affect" is the conclusion of a Biological assessment. Has one been completed for this project? If not recommend using different language.	As indicated in footnote b of Table ES4-6, the impact ratings used for Threatened and Endangered Species and Species of Conservation Concern are based on those in the Endangered Species Consultation Handbook (USFWS and NMFS 1998) in order to facilitate impact evaluation under Section 7 of the Endangered Species Act. A Programmatic Biological Assessment has not been completed for the project. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined; however, consultation under Section 7 of the ESA will occur as required.	ES4.6.1, page 51	NA
FN-NC-0002	22	4/18/2016	William Ostrum	DOE	Appendix D contains a species list, but it uses older references from secondary sources. Replace with USFWS and NMFS species lists.	As explained in Section 3.1.6.6, Table 1 of Appendix D, *Threatened and Endangered Species*, is a list of Forest Service and BLM sensitive species only. Table 3.1.6.6-1 lists the federal and state-listed species in Alaska using USFWS and NMFS species lists.	ES4.6.1, page 51	NA
FN-NC-0002	23	4/18/2016	William Ostrum	DOE	Recommend removing reference to aurora borealis. It seems out of place given the level of detail provided for dark skies in other locations.	Aurora borealis is a unique natural phenomenon found in Alaska more so than other places in the United States, and is therefore an important part of the existing environment. As such, it is appropriate to include it in this discussion.	ES4.8.1, page 62	NA
FN-NC-0002	24	4/18/2016	William Ostrum	DOE	Recommend replacing reference (Puerto Rico Tourism Company 2015). Is there a government or academic source for this information?	The reference has been updated using a government or academic source. This change has also made in Section 8.1.8 (others).	ES4.8.6, page 63	ES4.8.6; 8.1.8.3; accompanying reference sections
FN-NC-0002	25	4/18/2016	William Ostrum	DOE	Add reference for "studies have shown a minimal impact on property prices."	This text has been updated in the Final PEIS to be consistent with the text of the state/territory-specific socioeconomic impacts sections. The Bond et al. 2013 reference that is included in the resource section has been added to the Executive Summary.	ES4.9, page 64	ES4.9

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FN-NC-0002	26	4/18/2016	William Ostrum	DOE	Also reference the previously discussed impacts and BMPs resulting less than significant effects on tourism which is important in many of these areas.	This text has been updated in the Final PEIS to mention tourism.	ES4.9, page 64	ES4.9
FN-NC-0002	27	4/18/2016	William Ostrum	DOE	Bullet referring to "subsistence species habitat" may be more appropriate in EJ discussion than socioeconomics.	Impacts and related BMPs associated with subsistence practices/resources are addressed in the socioeconomics sections.	Table ES4-9, page 65	NA
FN-NC-0002	28	4/18/2016	William Ostrum	DOE	See previous comment regarding discussion of subsistence practices.	Impacts and related BMPs associated with subsistence practices/resources are addressed in both the socioeconomics and environmental justice sections.	ES4.9.1, page 65	NA
FN-NC-0002	29	4/18/2016	William Ostrum	DOE	The individual state/territory summaries don't mention low-income groups, just minority groups. This should be considered in the ratings and discussion.	This section of the text has been modified to include the low-income information that is presented in the environmental justice sections of the state/territory-specific chapters.	ES4.10, page 68	ES4.10.1; ES4.10.2; ES4.10.3; ES4.10.4; ES4.10.5; ES4.10.6; ES4.10.7
FN-NC-0002	30	4/18/2016	William Ostrum	DOE	Add ", a racial minority for purposes of this analysis" to the first sentence.	This text has been updated in the Final PEIS to indicate that the majority of American Samoa's population is considered a racial minority.	ES4.10.3, page 71	ES4.10.3
FN-NC-0002	31	4/18/2016	William Ostrum	DOE	Does the rating (3) imply that is effect is expected but that it won't be an adverse effect? Unclear how "physical damage to and/or destruction of historic properties" can be not adverse.	As explained in the text, the evaluation of potential impacts to cultural resources uses a distinct set of impact categories. A rating of 3, "effect, but not adverse," is comparable to a rating of "less than significant" at the programmatic level for other resource areas. As discussed in each Cultural Resources section of the Final PEIS, the criterion of "effect, but not adverse" applies for effects to a non-contributing portion of a single or many historic properties. Also, the first effect type in Table ES4-11 has been changed to "Direct effects to historic properties" to be consistent with the main text of the cultural resources sections in the Final PEIS.	Table ES4-11, page 75	Table ES4-11
FN-NC-0002	32	4/18/2016	William Ostrum	DOE	In the first sentence, replace "flat areas" with "easily accessible areas."	This sentence has been updated in the various sections of Final PEIS to read: "…cultural resources can be found in coastal areas or inland environments, in relatively flat or easily accessible areas, or in more remote locations, such as those that could be used for ceremonial purposes."	ES4.11.1, page 77	5.1.11.3; 6.1.11.3; 7.1.11.3; ES4.11.1; ES4.11.2
FN-NC-0002	33	4/18/2016	William Ostrum	DOE	Should the second bullet also include Class 1 areas?	The second bullet in Table ES4-12 has been updated to include Class I areas.	Table ES4-12, page 80	Table ES4-12; Chapter 11, BMPS and Mitigation Measures

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FN-NC-0002	34	4/18/2016	William Ostrum	DOE	According to the CEQ guidance, the analysis should use "GHG emissions as a proxy for assessing…proposed climate change impacts." This is a little different than just "GHG emissions" as stated in the text.	The Final PEIS has been updated (both in the Executive Summary and in the main body text) to state that GHG emissions are used as a proxy for assessing climate change impacts from the Proposed Action.	ES4.14, page 86	All Climate Change sections; Affected Environment sections and Environmental Consequences sections
FN-NC-0002	35	4/18/2016	William Ostrum	DOE	When discussing the Revised guidance, use "recommends" not "requires."	The word "requires" has been replaced with "recommends" in this text of the Final PEIS.	ES4.14, page 86	All Climate Change sections; Environmental Consequences sections; ES4.14
FN-NC-0002	36	4/18/2016	William Ostrum	DOE	Replace "any project type" with "the FirstNet program" in the last sentence.	This section has been modified in the Final PEIS to reflect the final CEQ guidance on GHG emissions.	ES4.14, page 86	ES4.14
FN-NC-0002	37	4/18/2016	William Ostrum	DOE	25,000 metric tons is a "reference point" not a "threshold" in the Revised guidance. Make text change in ES4.14 and the accompanying table.	Section ES4.14, Table ES4-14, and elsewhere in the document that referenced the 25,000 metric ton reference point originally included in the CEQ draft guidance on GHG emissions has been updated to reflect the final guidance and no longer cites the reference point in accordance with the final guidance.	ES4.14, page 86	All Climate Change sections; Environmental Consequences sections; ES4.14, Table ES4-14
FN-NC-0002	38	4/18/2016	William Ostrum	DOE	Add "-" between "El Nino" and "like."	A hyphen has been added between "El Nino" and "like" in this section of the Final PEIS.	ES4.14.5, page 90	ES4.14.5
FN-NC-0002	39	4/18/2016	William Ostrum	DOE	"Increasing mean sea levels would likely increase the frequency of extreme events such as hurricanes." Sea level rise isn't usually associated with hurricane frequency. It could be associated with inundation frequency caused by hurricanes. Alternately, the previous sentence is talking about ocean temperature, which may be linked to hurricane frequency. Clarify this sentence.	This section has been re-written in the Final PEIS to make the requested clarifications regarding the correlation between sea level rise and extreme events.	ES4.14.5, page 90	ES4.14.5
FN-NC-0002	40	4/18/2016	William Ostrum	DOE	Recommend highlighting impacts that differ from the preferred alternative.	Chapter 12, Comparison of Alternatives, provides a side-by-side comparison of impact ratings associated with the preferred alternative and each of the other alternatives. Section ES5.3 summarizes key differences.	Table ES5-1, page 100	ES5.3
FN-NC-0002	41	4/18/2016	William Ostrum	DOE	If possible, provide links to remaining references.	Not all references cited are available via web links. Links have been provided where available.	General	All Reference sections
FN-NC-0002	42	4/18/2016	William Ostrum	DOE	Unclear what "physical layer" means. Can the document just use "physical"?	This text has been updated in the Final PEIS to just use the word "physical".	1.4, page 1-5	1.4; all Geology Environmental Consequences sections

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FN-NC-0002	43	4/18/2016	William Ostrum	DOE	Insert period after "(Hurricane Sandy Rebuilding Taskforce)."	A period has been added after the second Hurricane Sandy Rebuilding Taskforce reference.	1.4, page 1-7	1.4
FN-NC-0002	44	4/18/2016	William Ostrum	DOE	Recommend removing "under NEPA." This isn't a comprehensive list of the "primary objectives" of PEISs under NEPA. See 40 CFR § 1502.1 for primary purpose of an EIS.	The discussion in this section has been revised to summarize CEQ guidance for public participation under *40 CFR § 1506.6*. The discussion of PEIS objectives has been moved to Section 1.2.	1.7, page 1-8	1.7
FN-NC-0002	45	4/18/2016	William Ostrum	DOE	Insert "further" between "warranted" and "analysis."	At the time of scoping, an initial formal/published analysis had not yet been performed related to identifying alternatives to the Proposed Action. Therefore, the scoping phase would not have identified areas for further analysis, but rather for initial analysis. No change made.	1.7.1, page 1-9	NA
FN-NC-0002	46	4/18/2016	William Ostrum	DOE	Add a brief statement on how scoping comments were incorporated into the PEIS (e.g., are all of these impacts now discussed in the PEIS).	A statement has been added to this text in the Final PEIS to indicate that scoping comments were taken into consideration during the analysis and drafting phase of the Draft PEIS.	1.7.2, page 1-10	1.7.2
FN-NC-0002	47	4/18/2016	William Ostrum	DOE	Recommend including the full ESA definition of take: harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.	The text has been revised to include the full definition of take rather than a summary.	1.8.3, page 1-11	1.8.3; 1.8.6; all Biology Affected Environment sections; Glossary
FN-NC-0002	48	4/18/2016	William Ostrum	DOE	Federal agencies must use the best *available* scientific and commercial data. This is an important distinction.	For clarity, the word "available" has been moved from after the words "commercial data" to before the word "scientific". The sentence now reads: "…use the best available scientific and commercial data when making an effect determination…"	1.8.3, page 1-12	1.8.3
FN-NC-0002	49	4/18/2016	William Ostrum	DOE	May want to change title to Executive Order 11988 (as amended by 13690) - Floodplain Management" and combine with EO 13690. I don't think it's appropriate to consider these separately - see comment below on new guidelines.	Sections 1.8.10 and 1.8.14 have been combined in the Final PEIS to explain EOs 11988 and 13690 in the same section. Appendix C, *Environmental Laws and Regulations*, has also been updated per this comment.	1.8.10, page 1-14	1.8.10; 1.8.14
FN-NC-0002	50	4/18/2016	William Ostrum	DOE	The guidelines are unclear in first sentence after the bullets. Also, the guidelines were updated in 2015 to reflect EO 13690. Suggest moving the first two sentences of this paragraph to the end and adding "for implementing this EO" after "The guidelines."	See response to comment 51. The text has been updated in the Final PEIS and the suggested sentence structure change has been made.	1.8.10, page 1-14	1.8.10; 1.8.14
FN-NC-0002	51	4/18/2016	William Ostrum	DOE	Add some discussion of how actions associated with the network will be "federal actions" or "federally funded actions" under EO 13693.	A summary description of EO 13693 has been added to Chapter 1, Introduction.	1.8.10, page 1-15	New Section 1.8.14

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FN-NC-0002	52	4/18/2016	William Ostrum	DOE	Add links to remaining references.	Not all references cited are available via web links. Links have been provided where available.	1.10, page 1-17	1.1
FN-NC-0002	53	4/18/2016	William Ostrum	DOE	Recommend removing quotes around “include the alternative of no action.”	The quotes have been removed in the Final PEIS.	2, page 2-1	Chapter 2, Description of the Proposed Action and Alternatives
FN-NC-0002	54	4/18/2016	William Ostrum	DOE	Remove “utility corridor” in the first sentence. It’s mentioned in the next sentence as something that could be included in ROW.	The Final PEIS has been updated to read: “…plowing or trenching cable alongside the road usually within a utility corridor or within public road right-of-way (ROW), where possible. Utility ROWs could also include other easements and may be public or private.	2.1.2.1, page 2-2	2.1.2.1
FN-NC-0002	55	4/18/2016	William Ostrum	DOE	Under “Cell on Wheels” replace “to” with “and” - “15 feet *and* 40 feet.”	The sentence has been revised in the Final PEIS to read “…typically between 15 feet and 40 feet…”	2.1.2.3, page 2-4	2.1.2.3
FN-NC-0002	56	4/18/2016	William Ostrum	DOE	Remove comma in “the No Action Alternative, forward for analysis.”	The comma has been removed in the Final PEIS.	2.2, page 2-5	2.2
FN-NC-0002	57	4/18/2016	William Ostrum	DOE	Legislative mandate can’t be the only reason it’s dismissed. The combination of the reasons listed here is why it can be dismissed. Suggest rewording last two sentences - e.g., “This alternative has been dismissed from further consideration because new construction of the entire...Furthermore, it is counter to FirstNet’s legislative mandate to leverage existing infrastructure.” 40 most commonly asked questions concerning NEPA 2b - “A potential conflict with local or federal law does not necessarily render an alternative unreasonable, although such conflicts must be considered.”	The New Construction Only Alternative would present a clear violation of federal law, which is sufficient to dismiss this alternative from further consideration. As stated in this section, other factors further support eliminating this alternative. No change made.	2.3.1, page 2-7	NA
FN-NC-0002	58	4/18/2016	William Ostrum	DOE	See previous comment on dismissing alternatives due to legislative mandate.	The New Satellite Alternative would present a clear violation of federal law, which is sufficient to dismiss this alternative from further consideration. As stated in this section, other factors further support eliminating this alternative. No change made.	2.3.2, page 2-7	NA
FN-NC-0002	59	4/18/2016	William Ostrum	DOE	Insert “during the scoping period” after “comments received.”	The suggested text has been added to the Final PEIS.	2.4.1, page 2-7	2.4.1

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FN-NC-0002	60	4/18/2016	William Ostrum	DOE	In last paragraph before bullets, insert an m-dash between “space” and “others.”	An em dash has been added as suggested in the Final PEIS.	2.4.1, page 2-8	2.4.1
FN-NC-0002	61	4/18/2016	William Ostrum	DOE	At the end of the first bullet, insert “in the microwave spectrum.	The text has been updated in the Final PEIS to reflect the type of non-ionizing radiation that would be emitted, which is within the microwave spectrum. The text now also states that portions of 700 MHz band are already being used for both commercial wireless and public safety communications.	2.4.1, page 2-8	2.4.1
FN-NC-0002	62	4/18/2016	William Ostrum	DOE	Highlight the frequency ranges where FirstNet would operate.	Table 2.4.1-1 has been updated in the Final PEIS to indicate the frequency where FirstNet would operate.	Table 2.4.1-1, page 2-10	Table 2.4.1-1
FN-NC-0002	63	4/18/2016	William Ostrum	DOE	If possible, provide the exposure range of “typical ground-level exposures.”	Text related to “typical ground-level exposures” has been included in the Final PEIS.	2-4-2, page 2-11	2.4.2
FN-NC-0002	64	4/18/2016	William Ostrum	DOE	In the paragraph after the bullets, verify that this is really a positive correlation. A negative correlation makes more sense.	The text has been updated in the Final PEIS to explain that the correlation is negative between distance from transmitters and risk of cancer.	2.4.2.2, page 2-17	2.4.2.2
FN-NC-0002	65	4/18/2016	William Ostrum	DOE	Remove “conversely” from the last sentence.	The word conversely has been removed in the Final PEIS.	2.4.2.3, page 2-18	2.4.2.3
FN-NC-0002	66	4/18/2016	William Ostrum	DOE	Remove second sentence of first paragraph. Federal regulatory levels aren’t set based on how they are used in NEPA.	The first paragraph in Section 2.4.3 has been revised in the Final PEIS to clarify the relationship between the lack of exposure levels for non-human species and the treatment of that impact in a NEPA analysis.	2.4.3, page 2-18	2.4.3
FN-NC-0002	67	4/18/2016	William Ostrum	DOE	In the second paragraph, second sentence, replace the “and” between “project” and “make” with a comma.	The sentence has been restructured in the Final PEIS to improve flow by adding commas.	2.4.3, page 2-18	2.4.3
FN-NC-0002	68	4/18/2016	William Ostrum	DOE	In the second paragraph, second sentence, Depending on the specifics, environmental effects don’t necessarily have “parity.” It may be more accurate to say they have to be considered along with engineering and economic decisions.	The sentence has been modified in the Final PEIS to indicate that environmental effects would be considered along with engineering and economic decisions.	2.4.3, page 2-18	2.4.3

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FN-NC-0002	69	4/18/2016	William Ostrum	DOE	In the third paragraph, first sentence, suggest deleting "equally-if not-more."	It is FirstNet's opinion that there is greater complexity associated with evaluating impacts to non-human species.	2.4.3, page 2-18	NA
FN-NC-0002	70	4/18/2016	William Ostrum	DOE	Footnote 11: Clarify if this is referring to general effects on migratory bird species or effects specific to bird migration.	Footnote 11 has been updated in the Final PEIS to indicate that the research and environmental community have focused on migratory bird species.	2.4.3.1, page 2-19	2.4.3.1
FN-NC-0002	71	4/18/2016	William Ostrum	DOE	In the next to last paragraph, the first sentence (there are no available studies…) seems to contradict the previous paragraph, unless that study referred to high-level RF emissions. Clarify in text.	This sentence has been removed in the Final PEIS.	2.4.3.1, page 2-20	2.4.3.1
FN-NC-0002	72	4/18/2016	William Ostrum	DOE	In the last paragraph, explain or remove "predatory journals."	A footnote has been added to the text to explain the term "predatory open access journals."	2.4.3.1, page 2-20	2.4.3.1
FN-NC-0002	73	4/18/2016	William Ostrum	DOE	In reference Dolk 1997, add a space after the PMID number.	A space has been added after the after the PMID number.	References, page 2-22	Chapter 2, Description of the Proposed Action and Alternatives (References)
FN-NC-0002	74	4/18/2016	William Ostrum	DOE	Is 2011 the most recent data available? Suggest updating if possible. Likewise with the energy information below.	The most recent data from the USGS Mineral Commodity Summary and EIA have been used in the Final PEIS.	3.1.3.3, page 3.1.3-2	3.1.3.3; all Geology Environmental Consequences sections
FN-NC-0002	75	4/18/2016	William Ostrum	DOE	In the last paragraph (The University of Alaska Museum…), next to last sentence, is this referring to something different than the "location" in the previous sentence. If not, recommend deleting this sentence.	The second to the last sentence has been modified in the Final PEIS to avoid redundancy. The sentence now reads: "Specifically, the database has a spatial query function that may be used to generate maps showing locations of fossil specimens..."	3.1.3.3, page 3.1.3-4	3.1.3.3
FN-NC-0002	76	4/18/2016	William Ostrum	DOE	At the end of the next to last paragraph, insert "mainland" before "United States."	The sentence has been revised in the Final PEIS by adding "mainland". The sentence reads: "…caused destruction along the west coast of the United States mainland, Hawaii, and Canada…"	3.1.3.4, page 3.1.3-5	3.1.3.4
FN-NC-0002	77	4/18/2016	William Ostrum	DOE	Regarding the USGS landslide hazard map, is there no source of landslide hazard data for Alaska? If that's the case, it should be stated clearly rather than just mentioning one source that excludes Alaska.	This text has been updated in the Final PEIS to indicate that a state-wide landslide hazard dataset does not exist for Alaska. In addition, an example USGS map showing seismic landslide hazards in Anchorage has been referenced for that geographic area.	3.1.3.4, page 3.1.3-8	3.1.3.4

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FN-NC-0002	78	4/18/2016	William Ostrum	DOE	1st paragraph - Federally funded actions in the 500 year floodplain do fall under EO 13690. It provides a number of options for determining the floodplain for federally funded actions, one of which is the 500-year floodplain. This would likely include FirstNet's activities.	This text in the Final PEIS has been updated and no longer states that the 500-year floodplain is not generally regulated.	3.1.4.3, page 3.1.4-7	All Water Resources Affected Environment sections
FN-NC-0002	79	4/18/2016	William Ostrum	DOE	In the last paragraph, delete "among other species" from "Although not threatened or endangered in Alaska, among other species, …"	This text has been revised in the Final PEIS for clarity, now reading "Although not threatened or endangered in Alaska, moose and salmon (among other species) are important…"	3.1.5.4, page 3.1.5-10	3.1.5.4
FN-NC-0002	80	4/18/2016	William Ostrum	DOE	In the Terrestrial Invertebrates section, the last two sentences in this section are a little awkward and don't flow correctly. Would rewrite as: "Many plants of the tundra are reliant on flies and bumblebees for pollination. For example,…"	These sentences have been revised for improved flow in the Final PEIS.	3.1.6.4, page 3.1.6-17	3.1.6.4
FN-NC-0002	81	4/18/2016	William Ostrum	DOE	In the final sentence in the bison section, clarify if "Bison herds" refers to the number of bison or the number of herds.	This sentence has been updated in the Final PEIS to specify that "bison herds" refers to the number of bison within the herds discussed.	3.1.6.4, page 3.1.6-21	3.1.6.4
FN-NC-0002	82	4/18/2016	William Ostrum	DOE	In the "Non-game (furbearers)" section, clarify how sealing records are relevant.	This sentence has been simplified in the Final PEIS to indicate the ADFG estimates 2,500 to 3,500 trappers in the state.	3.1.6.4, page 3.1.6-22	3.1.6.4
FN-NC-0002	83	4/18/2016	William Ostrum	DOE	Recommend removing footnote 1. The concept is covered in the following sentence.	Footnote 1 has been left in the Final PEIS and the redundant sentence has been removed.	3.1.6.5, page 3.1.6-33	3.1.6.5
FN-NC-0002	84	4/18/2016	William Ostrum	DOE	Since FirstNet is a federal agency, this discussion of HCPs and Section 10 permits may not be necessary.	Footnote 5 indicates that an incidental take permit is issued under Section 10 of the ESA to private parties undertaking otherwise lawful projects that might result in the *take* of an endangered or threatened species. This information remains in the Final PEIS for completeness. No change made.	3.1.6.6, page 3.1.6-43	NA
FN-NC-0002	85	4/18/2016	William Ostrum	DOE	Under Federally and State-listed and Candidate Species - Does FirstNet plan to treat the candidate species as if they are listed for purposes of this project? If so, state that here.	The response to this question has been addressed in the Environmental Consequences section (3.2.6.6). The text of the Final PEIS has been updated to clarify that while FirstNet does not plan to treat candidate species as listed species, they would be managed in accordance with applicable laws as well as the BMPs presented in the Final PEIS.	3.1.6.6, page 3.1.6-45	3.2.6.6
FN-NC-0002	86	4/18/2016	William Ostrum	DOE	In the first full sentence, note that the reference point is metric tons of CO2-e, not just CO2, and that CO2 is recommended as a "proxy" for a project's effect on climate change.	The text of the Final PEIS has been updated to reflect CO2-e and that CO2 is recommended as a proxy.	Page 3.1.14-4	All Climate Change sections; Affected Environment sections

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FN-NC-0002	87	4/18/2016	William Ostrum	DOE	In the last sentence in the smoking paragraph, replace "compared with" with "than."	The sentence has been updated in the Final PEIS to read: "In 2013, Alaska had a higher percentage of current smokers (an estimated 22.6 percent, according to the Center for Disease Control's Behavioral Risk Factor Survey) than the U.S. (19.0 percent, CDC 2013a)."	Page 3.1.15-4	3.1.15; 4.1.15; 5.1.15; 6.1.15; 7.1.15; 8.1.15; 9.1.15
FN-NC-0003	88	4/21/2016	Susan Hathaway	DHS	Thank you for this advanced read of the FirstNet PEIS. The additional time that you allowed us has greatly benefitted our review and ability to reach out to our components who have extensive and detailed experience in the field.	Thank you for your comment.	NA	NA
FN-NC-0003	89	4/21/2016	Susan Hathaway	DHS	Impact Assessments- The impact assessment sections for all resource areas assume adverse impact with or without BMPs or no impacts. Please specify as such since in some cases increased public safety communication could be perceived as a beneficial positive effect. Particularly in light of the fact that your document makes statements such as "Over the years, numerous lives have been lost as a result of the lack of interoperability in public safety telecommunications in America." The ultimate outcome of the program is beneficial to human health and safety.	The Comparison of Alternatives chapter has been updated in the Final PEIS to include a subsection on likely substantial beneficial impacts, particularly related to infrastructure, health and safety, and socioeconomic resources. The Executive Summary also highlights the likely beneficial aspects of the Proposed Action.	Executive Summary, Chapter 12 Comparison of Alternatives	Executive Summary; Chapter 12, Comparison of Alternatives
FN-NC-0003	90	4/21/2016	Susan Hathaway	DHS	FirstNet also makes the assumption that you will mitigate all significant adverse impacts to a level of not significant but without capturing the details of how or what criteria would be used. FirstNet may be able to provide regional examples or show that you have queried or communicated with agencies that have dealt with site specific tower colocations or mobile units and so on. Though this is programmatic because of the nature of the regional PEIS this information could be gleaned on such a level. In cases that you truly do not know it is difficult for the reader to agree that everything will be mitigated or minimized when you have no specificity to every scenario with corresponding BMP for a situation that is unknown similar to how you stated it in the cumulative effects section. FirstNet would need to wait for a site specific analysis.	The Final PEIS indicates that at the regional, programmatic level, potentially significant impacts are not expected based on the specific impact significance rating criteria developed for each individual resource (which uses a rating system based on magnitude/intensity, geographic extent, and duration/frequency).[3] However, significant impacts could potentially occur at the site-specific level. Site-specific BMPs may be needed in addition to those outlined in the PEIS, and those would be determined during site-specific environmental assessments in coordination with local environmental agencies. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. The text in the Final PEIS has been revised to indicate that impact determinations are at the programmatic level per the impact significance criteria.	General	All Environmental Consequences Introduction sections; ES4

[3] Impacts of climate change on the Preferred Alternative could range from potentially significant to less than significant with BMPs and mitigation measures incorporated at the programmatic level.

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FN-NC-0003	91	4/21/2016	Susan Hathaway	DHS	**Protocols for working with agencies to make siting and collocation decisions:** While we recognize that planning and decisions regarding siting and collocations will need to be made on a case by case/site by site basis, the EIS does not address the general protocol or role for the cooperating agencies to participate in the FirstNet program. This includes describing, in general, how the program expects their applicants and other agencies to work with FirstNet to ensure that environmental reviews and consultations are conducted for site-level projects. This is a concern because CBP has had at least one Commerce Department grant (a Broadband Technology Opportunity Program- BTOP grant) to a state agency (NM) come across our desks. In that case, they wish to collocate on a BPFTI tower located at the Santa Teresa Land Port of Entry. However, the Commerce grantee is doing all Environmental compliance on their own without anyone signing off at Commerce from what we were able to discover back when the project came to us in Summer 2015. As a result, CBP has been compelled to enter into discussions with Commerce with respect to taking on the consultation burden with some of the resource agencies to cover our NEPA obligations (per Chris Shaw at CBP OCC). Furthermore, CBP needs to ensure that the collocation would not interfere with existing CBP conditions on construction and use of that tower site. To date, that project remains unapproved by CBP and we have not heard back about what role Commerce will be taking or received any of the requested documentation that would allow us to proceed. (Please recall that we mentioned this project issue to you in January 2016.) Without protocols for us to review and comment upon, we can anticipate these same issues of who is responsible for what and how to ensure that FirstNet actions comply with any pre-existing environmental conditions on a DHS or DHS component tower or facility will persist.	The Introduction chapter (Chapter 1) has been updated in the Final PEIS to outline cooperating agency roles, how the program will be coordinated, and a description of the environmental review process going forward, including continued agency and public outreach efforts. For those FirstNet projects that have the potential to affect federal property or facilities, FirstNet or their partner(s), as appropriate, will conduct outreach to the relevant federal agency to help ensure compliance requirements are addressed.	Chapter 1	Chapter 1, Introduction

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FN-NC-0003	92	4/21/2016	Susan Hathaway	DHS	**Significance determinations:** As written, the document assumes that in all cases every approach for each type of activity will have minimal (mitigated or unmitigated) impacts. It is a concern that this PEIS may actually need to address more remote areas where impacts may approach significance depending on the site-specific case. For instance, what if some FirstNet resources potentially need to consider sites in or adjacent to pristine, protected areas? Or what if a best option in one area could potentially have adverse effects to historic properties? It seems that there should be some discussion of those possibilities. CBP's towers are not 100% minimal to no impact. If we were to be approached by FirstNet about collocating on a site with restrictions, we would assume that our restrictions would stand for their activities or that they would end up with adverse impacts. So for a CBP helicopter access only site intended to avoid damage to historic properties, a FirstNet access road could not be minimal to no impact. Other towers located in coastal areas have strict requirements about access and maintenance which may elevate collocation on these towers to the level of significance. The document's failure to better acknowledge the potential circumstances where impacts could arguably approach significance limits its potential usefulness to agencies that would cooperate with the FirstNet program in collocation and co-siting situations in areas with sensitive environmental resources.	The Final PEIS explains that at the programmatic level and based on the impact significance ratings developed, there would be no potentially significant impacts as a result of the Proposed Action as a whole.[4] However, the same impact significance criteria used at the programmatic level may not apply to site-specific build-out activities/actions. The Final PEIS acknowledges that site-specific impacts do have the potential to be more significant on a localized basis and may require site-specific assessments and mitigation. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. The text of the document has been updated to provide examples of circumstances where certain impacts may approach significance. In doing so, the Final PEIS makes clear distinctions between the purpose and usefulness of the PEIS and subsequent analyses (such as Environmental Assessments). For example, while potential impacts from specific FirstNet projects taking place in a wetland may not rise to the level of significance at the programmatic level, such impacts could be considered potentially significant at the site-specific level.	General	Throughout Final PEIS, to include all Environmental Consequences Introduction sections
FN-NC-0003	93	4/21/2016	Susan Hathaway	DHS	References/citations that refer to A. Manville most likely belong under US FWS and not his name, similar to what you have done with US DOE, USDA and FCC. Please check this and correct as necessary.	Where government source documents list a specific author(s), the author name is used in the in-text citation and references section. The Manville references refer to a congressional staff briefing presentation (2007), a journal article in the Proceedings of the Fourth International Partners in Flight Conference (2009), and talking points released to the public from a communication tower webinar (2014). Dr. Manville is no longer with the USFWS. No change made.	Section 2-5; page 2-24	NA
FN-NC-0003	94	4/21/2016	Susan Hathaway	DHS	Acronyms are used as references section that don't the citation that you are referring to. So, despite the fact that you have divided the reference sections to each chapter it may actually be easier to combine all the references. This affects the references and other sections - For example- Under Acronyms you only specify APLIC as the Avian Power Line Interaction Committee and fail to define Alaska Public Lands Information Centers – which is in the references sections therefore it might be easier to combine all references and citations then provide the two uses- e.g. APLIC as APLIC[1] and APLIC[2].	The Final PEIS has been updated to ensure there are no conflicts between acronyms used in the text and reference citation acronyms. Where there is a conflict, the citation will use the full name. Where identical acronyms are used in the text, "1" and "2" designations are provided. The Final PEIS text has been updated to use "Alaska Public Lands Information Centers" in the references and citations and not "APLIC".	TOC - Acronyms 3.3 and References	3.3; 3.1.3

[4] Impacts of climate change on the Preferred Alternative could range from potentially significant to less than significant with BMPs and mitigation measures incorporated at the programmatic level.

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FN-NC-0003	95	4/21/2016	Susan Hathaway	DHS	Incorrect citation – Please see https://www.whitehouse.gov/omb/fedreg_1997standards Change the citation for this simply to include the US Census Bureau or OMB definition – I think this section got confused with a prior section and you intended to reference OMB 1997 not CEQ 1997. CEQ 1997 does not expressly make these definitions. Nonetheless, the reader doesn't need the basis for the definition they just need the proper definition Suggest "Since publication of the Environmental Justice: Guidance under the National Environmental Policy Act (CEQ 1997), The U.S. Census Bureau has changed how it defines race and ethnicity. Ethnicity (Hispanic or not Hispanic) is now counted defined separate differently from race (US Census, Definitions of Subject Characteristics, 2010; OMB 1997). As a result, this Draft Programmatic Environmental Impact Statement (PEIS) considers both race and ethnicity separately for the purpose of evaluating minority status." Get the census definition and present it.	The suggested edits have been made in the Final PEIS.	Section 3.1.10.2, page 3.1.10-2	All Environmental Justice Affected Environment sections
FN-NC-0003	96	4/21/2016	Susan Hathaway	DHS	**BMPs:** As a cooperating agency who at some time may have to work with FirstNet on deployment of technologies on our structures (or otherwise), DHS and its components should do a thorough and detailed review of the FirstNet BMPs to make sure that they do not conflict with existing DHS and component BMPs and MOUs which are specifically designed to prevent constraints to DHS and component technologies and missions. For example: There is a BMP for building new FirstNet towers that says: "Select the shortest possible structures necessary to meet the FirstNet system's needs, and only deploy towers less than 200 feet in height." It is fine as a goal, but (1) is it efficacious in every situation and (2) might it limit opportunities for collocations in certain circumstances (i.e. If one over 200' tower may be able to service a remote area as opposed to using multiple less than 200' towers to cover the same area, it should be an option for consideration)? Due to the volume of BMPs in the document and the apparent conflicting nature of some of the proposed BMPs, this will require a significant amount of time and agency resources.	Unlike mitigation measures, BMPs are not required in every case and will be applied as practicable and feasible. FirstNet will continue to coordinate with DHS as a cooperating agency. Application of BMPs will be determined on a case-by-case basis. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. Additionally, some of FirstNet's BMPs were developed through consultation with resource managing agencies.	Chapter 11 BMPs and Mitigation Measures	Chapter 11, BMPS and Mitigation Measures
FN-NC-0003	97	4/21/2016	Susan Hathaway	DHS	DHS appreciates the thorough discussion and analysis of RF given the public concerns on the matter**.**	Thank you for your comment.	Section 2.4	NA

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FN-NC-0003	98	4/21/2016	Susan Hathaway	DHS	How would the installation of the system be documented and reference the PEIS criteria that apply? For instance, is there some kind of numbering scale (numbering or color coding) that could be associated with the potential impacts? That way, when the tiered analysis is being completed for the site-specific project, the appropriate reference could be made in the PEIS to address the type.	The Draft and Final PEIS use four categories of potential impacts to rank the types of effects that may be anticipated at the programmatic level: 1) Potentially significant; 2) Less than significant with BMPs and mitigation measures incorporated; 3) Less than significant; and 4) No impact. As explained in the response to comment 92 above, the same impact significance criteria used at the programmatic level may not apply to all site-specific actions, and site-specific environmental analysis may be performed that describe potential impacts and mitigation measures at the local level. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. To the extent practicable, however, site-specific analyses will refer to and tier off of the appropriate discussions in the Final PEIS and will incorporate the applicable impact ratings and BMPs/mitigation measures from the Final PEIS. However, since the geographic extent, magnitude/intensity, and duration/frequency of some impacts may be different at the local level than at the programmatic level, site-specific impact rankings and additional BMPs/mitigation measures may be developed during these subsequent analyses.	Potential Impacts	Throughout Final PEIS, to include all Environmental Consequences Introduction sections
FN-NC-0003	99	4/21/2016	Susan Hathaway	DHS	The cumulative impacts section specifically states that a cumulative impact results from the additive effect of all projects in the same geographical area; however, no linkage is then made as to why you have singled-out examples of Broadband projects. Please provide rationale or re-word what you have so that reader can make sense of providing only one subset of potential cumulative impacts.	As explained in the Final PEIS, at the programmatic level it is not practical to include a list of all possible infrastructure projects in the cumulative impacts section. Instead, the cumulative impacts section describes projects similar to the Proposed Action with common impacts that would likely have additive effects. The text points out that specific project sites have not yet been identified by FirstNet, and that there is currently a wide range of potential technologies that could be implemented.	Table 10-1	NA

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FN-NC-0003	100	4/21/2016	Susan Hathaway	DHS	Given DHS above comments on impacts and BMPs it is difficult to see the analysis behind such broad statements as – "The potential impacts associated with the Proposed Action would result from the collocation on existing infrastructure; construction of new infrastructure and/or accessory components; use of existing fiber facilities; installation of new conduit; deployment of satellite phones and/or satellite technology; installation of microwave facilities; and utilization of deployable technologies. As described in Chapters 3 through 9, the effects as a result of the Proposed Action would not result in significant potential impacts." And "Impacts would occur as a result of other ongoing telecommunications infrastructure development, including those projects described above; however, when combined with the potential impacts associated with the Proposed Action, significant impacts to the natural or human environment are not expected." Cumulative impacts would include projects that FirstNet has no control over so these statements seem over-generalized and lack a reasonable written logic train to guide the reader to come to such a conclusion. DHS is familiar with situations along the border and in remote locations where this seems difficult to be certain and even more difficult to ensure/enforce.	See the responses to comments 92 and 99. The FEIS recognizes that impacts could occur as a result of other ongoing telecommunications infrastructure development. However, when combined with the potential impacts associated with the Proposed Action, incremental significant impacts to the natural or human environment are not expected to be significant at the programmatic level.	Section 10 Cumulative, page 10-3	Throughout Final PEIS, to include all Environmental Consequences Introduction sections
FN-NC-0004	101	3/14/2016	Anonymous	Not specified	The document refers to State Civil Defense which is a division of the State of Hawaii Dept. of Defense. The name was changed to Hawaii Emergency Management Agency (HI-EMA) in 2014; HI-EMA is now the accepted name for that entity	The Final PEIS includes the correct reference to HI-EMA.	Section 4	Hawaii Introduction; 4.1.1.2; 4.1.1.4
FN-NC-0005	102	4/26/2016	Mihai Leta	USCG	Please notify me if any FirstNet representatives visit CNMI in the future. I can provide visitors with information regarding potential tower sites.	FirstNet has provided notification of this request to the User Advocacy Team.	NA	NA
FN-NC-0006	103	3/21/2016	John C.	-	Will this network include coordination with transit agencies such as HART or HI DOT?	At this stage in the project, coordination between FirstNet and state and local transportation agencies has not occurred. However, as individual state/territory plans are developed, opportunities for coordination will occur. The Introduction chapter (Chapter 1) has been updated in the Final PEIS to outline cooperating agency roles, how the program will be coordinated, and a description of the environmental review process going forward, including continued agency and public outreach efforts.	NA	Chapter 1, Introduction
FN-NC-0007	104	4/5/2016	Mike Gawel	NPS	Land needed for facilities can be bought and owned on Guam. But in Saipan and all the Commonwealth of the Northern Mariana Islands, land cannot be alienated and can only be owned by traditional residents. But land can be leased for use in these islands.	The land use sections within the applicable state/territory chapters acknowledge this landownership issue.	General	NA

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FN-NC-0008	105	4/11/2016	Carl Prendergast	ASDHS	I am concerned that FirstNet will have negative impacts to existing local broadband companies like ASTLA (American Samoa Telecommunications Authority) or BlueSky Communications. The surplus bandwidth from FirstNet could cause loss of local jobs since these two companies employ many local people.	The Final PEIS addresses this comment related to competition and potential job loss or dislocations in the socioeconomics impact sections within each state/territory chapter.	General	All Socioeconomics Environmental Consequences sections
FN-NC-0009	106	4/22/2016	Kenneth Duinkerk	-	FirstNet should use renewable energy for backup power in the Virgin Islands (cell towers, for example).	The Final PEIS addresses the potential use of renewable energy in the Climate Change sections of each state/territory chapter, as well as in the BMPs and Mitigation Measures chapter (Chapter 11). A BMP in Chapter 11 states that FirstNet and/or their partners would use, as practicable or feasible, engines certified to the lowest emission standards and engines that burn alternative fuels (e.g., natural gas, biofuels). A BMP also states that FirstNet and/or their partners would use vehicles with hybrid or electric technology, as practicable or feasible, to reduce or eliminate criteria pollutant emissions from fuel combustion.	General	All Climate Change sections; Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures
FN-NC-0010	107	4/26/2016	Ruth E. Silva	PREMA	It's important to take into consideration that there are three important species that are very loved by the island: the Puerto Rican parrot, manatees, and the coqui.	The Final PEIS addresses potential impacts to wildlife and threatened and endangered species in Puerto Rico in sections 8.2.6.4, 8.2.6.6, and 8.1.6.4. Each of these species is specifically included in the Final PEIS.	General	NA
FN-NC-0011	108	3/21/2016	Victoria Garcia	HI-DOD	(verbal comment) FirstNet should focus more effort on coordinating with other agencies in Hawaii, including Native Hawaiian Organizations, to educate them about the project in general, as well as to inform them about the environmental review process and potential environmental impacts. She suggested that FirstNet could better integrate the environmental review process into overall outreach plans.	Thank you for your comment. A Supplemental Programmatic Environmental Impact Statement will be developed that outlines the site-specific process. As discussed in the Final PEIS, FirstNet has initiated consultation with Native Hawaiian Organizations.	NA	NA
FN-NC-0012	109	4/5/2016	Leigh Pereda	Guam DHS	(verbal comment) FirstNet should make sure that the report is double-checked for typos. A typo was found in the Executive Summary where the text incorrectly referred to the people from Guam as Native Hawaiians.	The Final PEIS has been checked for typos and inconsistencies through a rigorous review and editing process.	General	Various
FN-NC-0013	110	4/5/2016	Chris Roberto	Port Authority of Guam	(verbal comment) Regarding infrastructure resiliency in Guam, the FirstNet project should be structurally resilient and should take into account the potential for insect damage (such as from termites).	The Description of the Proposed Action and Alternatives chapter (Chapter 2) addresses resiliency issues related to the NPSBN. The Infrastructure section within each state/territory chapter discusses infrastructure resiliency as well. Resiliency is discussed as a broad category of natural and man-made disasters and does not go into specifics at the programmatic level.	Section 6.1.1; Section 6.2.1	NA
FN-NC-0014	111	4/11/2016	Unknown	Unknown	(verbal comment) The PEIS should take into account emissions associated with generator use both during construction and during operation, for example, if back-up generators would be used to supply power to cell tower sites.	The PEIS discusses potential impacts related to air emissions and generator use in the air quality section within each state/territory-specific chapter. Additionally, BMPs and Mitigation measures are included in Chapter 11 to help avoid or minimize potential impacts to air quality. For example, FirstNet will use, as practicable or feasible, engines certified to the lowest emission standards and engines that burn alternative fuels (e.g., natural gas, biofuels).	General	Chapter 11, BMPS and Mitigation Measures

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FN-NC-0015	112	4/11/2016	Unknown	Unknown	(verbal comment) Not all historic places are included in the National Register of Historic Places, and that this should be taken into account during the planning and development stages of the project	The cultural resources sections within each state/territory-specific chapter address historic places. The Final PEIS indicates that cultural resources surveys might need to be conducted to identify specific cultural resources of an individual project; however, through previous surveys and a general understanding of the cultural context, archaeological sites and historic resources are more typically found in certain locations given their size, type, and function.	General	All Cultural Environmental Consequences sections
FN-NC-0016	113	4/22/2016	Reuben D. Molloy	U.S. Virgin Islands Bureau of Information Technology	(verbal comment) Some of the challenges in St. Croix related to the telecommunications infrastructure for first responders include: • Coverage - 20% of St. Croix is a "dead-spot." Even the radios of first responders are not useable in these areas. • Congestion on the network is a major issue – too many users with not enough bandwidth. • Redundancy – there are redundant 911 call centers in St. Thomas and St. Croix, but the LMR radios in the two locations are not interoperable so they cannot communicate after a call is made. • Training – not all users of the system and radios are properly trained. Also, cell tower "fall-zones" are an issue of concern on St. Croix. A moratorium for building tall towers near existing structures has been recently lifted, but the new regulations make constructing tall towers difficult. Collapsible towers should be explored. The importance of resilient infrastructure to withstand hurricanes is stressed.	Technical information related to the deployment has been communicated to the relevant FirstNet personnel.	General	NA
FN-NC-0017	114	4/25/2016	Mary Josie Blanchard	US DOI	First paragraph, last sentence: The reference to sparse feeding opportunities is an incorrect categorization of habitats in Alaska. Birds migrate to breed in Arctic and sub-Arctic habitats in part because of the abundance of food resources (especially invertebrates) during the short summer season at these latitudes. However, habitat fragmentation is a source of impact to birds through the direct loss of habitat important to critical life stages, including nesting, brood rearing, and refueling (after and before long migratory flights and/or reproduction, which has high energy demands). Activities during construction can also result in indirect impacts to birds (through disturbance) during sensitive life stages. Recommend correcting as appropriate. Second paragraph: Activities onshore can in some circumstances disturb or displace Alaskan marine mammals as well (e.g. near terrestrial haulout locations, near polar bear dens).	The Final PEIS has been updated and no longer indicates relatively sparse feeding opportunities for birds. The final sentence of section 4.6.1 now reads: "Habitat fragmentation could also potentially affect birds through the loss of nesting, brood rearing, and feeding after and before long migratory flights and/or reproduction." A sentence has been added to the second paragraph of section ES4.6.1 that reads: "Marine mammals could also be affected by project activities onshore if done near terrestrial haulout locations or near polar bear dens."	Executive Summary ES4.6.1, page ES-51	ES4.6.1

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FN-NC-0017	115	4/25/2016	Mary Josie Blanchard	US DOI	Alaska presents unique challenges to certain ground-disturbing activities proposed under the Project's preferred alternative, due to the presence of permafrost-rich soils across much of the landscape. On the Arctic Coastal Plain (ACP) especially, trenching in frozen saturated soils characteristic of this region of continuous permafrost often results in thermokarsting. This can in turn lead to trench subsidence. Subsidence of linear features has been known to drain adjacent wetlands, altering local hydrology and habitat and creating long-term maintenance issues. For example, subsidence and subsequent flooding of power cables buried in the tundra in a Prudhoe Bay oil field in the 1990s continued to be a problem well into the late 2000s, in spite of the routine placement of fill, which is expensive and not widely available in this region. We strongly recommend the Project consider alternatives to trenching for placement of fiber optic cable and other transmission lines on the ACP, include hanging wires on existing pipeline vertical support members, burial in existing roadways, and co-location with other transmission lines or other existing infrastructure (e.g., oil and gas pipelines).	Section 3.1.3 of the Draft PEIS indicated that thawing permafrost in Alaska can lead to land subsidence. The Final PEIS has been updated to elaborate on thermokarst and specifically calls out the Arctic Coastal Plain. Specific installation methods will be determined at the site-specific level or during project design phase.	General	3.1.3; 3.2.3; 3.2.5 Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	116	4/25/2016	Mary Josie Blanchard	US DOI	Volume 6, Chapter 8 covers Puerto Rico and Volume 7, Chapter 9 covers the U.S. Virgin Islands. Alternatives include the use of existing or the construction of new wireless communication towers. Based on the information in the DPEIS, the use of towers to maintain a communications infrastructure in Puerto Rico and the U.S. Virgin Islands after a natural disaster such as a hurricane would be difficult. Hurricane force winds can knock down towers or misalign or dislocate antennae. Electrical power is usually cut to preserve the existing grid prior to a Hurricane or Tropical Storm, and power might not be re-established until downed lines are corrected. Under these circumstances, tower facilities would depend exclusively on their existing generators and fuel supplies. This makes tower communications after a tropical weather emergency difficult at best.	No change made. The Draft and Final PEIS indicate that the FirstNet network would be "hardened" from the physical, user access, and cyber security perspectives to be more resilient to impacts from natural and manmade disasters. Hardening refers to a variety of methods that may be used to make a structure more resistant to failure, whether through physical reinforcement of a structure, redundant sources of emergency power, or additional firewalls and cybersecurity. These efforts would be designed not only to ensure that the network has greater resistance to system failure than what is currently available, but also that it can recover more rapidly should failure occur at any point in the system. The goal would be to provide not only interoperability, but also improved operability in the event of a natural or manmade disaster.	General	NA
FN-NC-0017	117	4/25/2016	Mary Josie Blanchard	US DOI	Chapter 3 Alaska, page 3.1.6-11 to -13: The Endangered Species Act (ESA) should also be listed here.	In both the Draft and Final PEIS, the Endangered Species Act (ESA) is discussed in Section 1.8, Overview or Relevant Federal Laws and Executive Orders, as well as in the "Specific Regulatory Considerations" sub-section within each state/territory-specific "Threatened and Endangered Species and Species of Conservation Concern" section. A footnote has been added to the "Specific Regulatory Considerations" subsection within each state/territory "Wildlife" section indicating this.	Chapter 3 - Alaska 3.1.6.4 Wildlife, pages 3.1.6-11 to -13	All Wildlife Affected Environment sections
FN-NC-0017	118	4/25/2016	Mary Josie Blanchard	US DOI	Third paragraph: Recommend clarifying that this is non-federal critical habitat, since there is also critical habitat as defined under the ESA. Be careful with the statement that critical habitat is managed by the State of Alaska.	This sentence has been changed in the Final PEIS to say: "The ADFG Habitat Division manages land use activities within Alaska's 'Special Areas' (state game refuges, state game sanctuaries, and non-federal critical habitat areas)."	Chapter 3 - Alaska 3.1.6.4 Wildlife, page 3.1.6-11	3.1.6.4

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FN-NC-0017	119	4/25/2016	Mary Josie Blanchard	US DOI	Bald and Golden Eagle Protection Act: Suggest acknowledging somewhere in this section that both Bald and Golden Eagles are federally managed through the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Also important to note, for projects taking place within eagles' preferred habitat within their known ranges, the project proponent should contact the FWS to ensure compliance with BGEPA. Please add language that legal take must be authorized through a FWS permitting process.	This section of the Final PEIS has been updated to reflect that both Bald and Golden Eagles are also federally managed under the MBTA (in addition to the BGEPA). FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. Language has also been added indicating that legal take must be authorized through a USFWS permitting process. Site-specific reviews will be performed and consultation with USFWS where required will be conducted.	Chapter 3 - Alaska 3.1.6.4 Wildlife, page 3.1.6-12	All Wildlife Affected Environment sections
FN-NC-0017	120	4/25/2016	Mary Josie Blanchard	US DOI	In the paragraph that continues from page 3.1.6-13, marine mammals should not be discussed. This text all falls under the header Terrestrial Habitats and Wildlife. Recommend making it clear in this paragraph that this section applies to species that are generally state-managed (according to the regions shown on Figure 3.1.6.4-1).	The mention of marine mammals in the introductory paragraph of this section has been removed in the Final PEIS. Text has been modified to indicate that the section discusses state-managed terrestrial habitats and wildlife.	Chapter 3 - Alaska 3.1.6.4 Terrestrial Habitats and Wildlife, page 3.1.6-14	3.1.6.4
FN-NC-0017	121	4/25/2016	Mary Josie Blanchard	US DOI	Recommend making it clear in the introductory paragraph; this section applies to species that are generally federally-managed, through either NMFS or the FWS. Beaufort and Chukchi Seas: There are Pacific walrus haulouts in the Chukchi Sea, in addition to those mentioned farther south. Gulf of Alaska and Southeast: Please state the listed species that will be discussed in section 3.1.6.6, as you have for previous sections.	The introductory paragraph of this section has been updated to indicate that the section applies to species that are generally federal-managed. In addition, the text notes that there are Pacific walrus haulouts in the Chukchi Sea. The text indicates that the North Pacific right whale is discussed in Section 3.1.6.6.	Chapter 3 - Alaska 3.1.6.4 Habitats and Marine Mammals 3.1.6-22	3.1.6.4
FN-NC-0017	122	4/25/2016	Mary Josie Blanchard	US DOI	Pacific Walrus: The Pacific walrus is a candidate species under the ESA, so it should be discussed in Section 3.1.6.6. (Same comment applies to NMFS candidate species, such as the bearded seal). Walrus are known to stampede from terrestrial haulouts as well as ice floes; and this should be discussed, as it might be a more relevant concern to the FirstNet project, which has more of an onshore or nearshore footprint than an offshore component.	The Pacific walrus and bearded seal discussion were left in Section 3.1.6.4 as the wildlife chapter goes into more detail regarding haulouts as they relate to specific species. A cross reference was added for Section 3.1.6.6 where these species are already included in a briefer discussion, within Table 3.1.6.6-1. Detail was also added to walrus discussion regarding stampeding.	Chapter 3 - Alaska 3.1.6.4 Habitats and Marine Mammals, page 3.1.6-23	3.1.6.4
FN-NC-0017	123	4/25/2016	Mary Josie Blanchard	US DOI	Recommend using the FWS's Birds of Conservation Concern list (http://www.fws.gov/migratorybirds/pdf/grants/BirdsofConservationConcern2008.pdf) to help identify which birds in this category fall within which Bird Conservation Regions (BCR). Because the list is older than some of your references, those should not be replaced; however, this one should be added because it is the most recent, official list from the FWS.	Information from the referenced 2008 USFWS Birds of Conservation Concern document has been added to the Final PEIS to supplement information provided in the Draft PEIS.	Chapter 3 - Alaska 3.1.6.4 Habitats and Birds, page 3.1.6-26	All Wildlife Affected Environment sections
FN-NC-0017	124	4/25/2016	Mary Josie Blanchard	US DOI	Aleutian and Bering Sea Islands: Short-tailed albatross could range into this BCR, as well as both listed eiders. Even if these are discussed in a later section, recommend including that fact here (where the BCRs are the focus). Same comment applies to other BCRs, as appropriate.	A mention of the short-tailed albatross and eiders has been included in this section of the Final PEIS.	Chapter 3 - Alaska 3.1.6.4 Habitats and Birds, page 3.1.6-26	3.1.6.4

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FN-NC-0017	125	4/25/2016	Mary Josie Blanchard	US DOI	Arctic Plains and Mountains: Some seabirds are also found in this BCR, but they are missing from the discussion. Recommend including seabirds as part of this section.	Seabirds have been added to this discussion of the Final PEIS.	Chapter 3 - Alaska 3.1.6.4 Habitats and Birds, page 3.1.6-27	3.1.6.4
FN-NC-0017	126	4/25/2016	Mary Josie Blanchard	US DOI	Northwest Pacific Rainforest: Missing raptors or other birds of prey in the discussion, including eagles. Recommend including these species. In the first full sentence on page 28, place an "and/or" between wintering and migration habitat, so that it is clearer not all of the species listed do all of these things (e.g. Western Sandpipers are not breeding in the Copper and Stikine River Deltas).	Raptors, including the northern goshawk, bald eagle, and northern saw-whet owl were included in Section 3.1.6.4 of the Draft PEIS. No Change needed for the Final PEIS. The suggested "and/or" edit has been made in the Final PEIS.	Chapter 3 - Alaska 3.1.6.4 Habitats and Birds, pages 3.1.6-27 to 28	3.1.6.4
FN-NC-0017	127	4/25/2016	Mary Josie Blanchard	US DOI	Northwestern Interior Forest: Missing raptors or other birds of prey in the discussion, including eagles. Recommend including these species.	Raptors and eagles have been added to this section of the Final PEIS.	Chapter 3 - Alaska 3.1.6.4 Habitats and Birds, page 3.1.6-28	3.1.6.4
FN-NC-0017	128	4/25/2016	Mary Josie Blanchard	US DOI	The sentence referring to Figure 3.1.6.4-7 should be modified to reflect that federally- managed areas are also shown on this figure.	This sentence has been updated in the Final PEIS as suggested to reflect that federally-managed areas are also shown on the figure.	Chapter 3 - Alaska 3.1.6.4 Important Habitat Areas, page 3.1.6-29	3.1.6.4
FN-NC-0017	129	4/25/2016	Mary Josie Blanchard	US DOI	Recommend choosing representative IBAs from each of the types represented on Figure 3.1.6.4-8 (coastal, nearshore, marine, and colony) as examples for the discussion on this page. Currently, only IBAs important to nesting waterfowl are discussed.	This text in the Final PEIS has been updated to include a discussion of the various representative IBAs, not just nesting waterfowl.	Chapter 3 - Alaska 3.1.6.4 Important Bird Areas, page 3.1.6-30	3.1.6.4
FN-NC-0017	130	4/25/2016	Mary Josie Blanchard	US DOI	Species Overview: Refer to Table 3.1.6.6-1 here in the text. Federal land State-listed and Candidate Species: It is incorrect to state that there are no federally listed Species of Concern. There are birds of conservation concern, as well as fish stocks/populations of conservation and management concern. If you are referring to a more specific definition of Species of Concern, then please provide a footnote for that definition under the introductory paragraph on page 3.1.6.43.	Table 3.1.6.6-1 was referenced in the Species Overview text of the Draft PEIS. No change made. The sentence about Species of Concern has been removed from the text.	Chapter 3 - Alaska 3.1.6.6 Threatened and Endangered Species, page 3.1.6-45	3.1.6.6

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FN-NC-0017	131	4/25/2016	Mary Josie Blanchard	US DOI	Short-tailed Albatross: Please fix the description under geographic range (some missing words make this hard to follow). Also, this species has been found as far north as the Chukchi Sea in recent years. Their range might be expanding. Eskimo Curlew: Species status can be changed to "probably extinct". Eiders: Please include non-breeding habitats for both eiders under general habitat description. Yellow-billed Loon: Can be removed from this table. It was found not warranted for listing. Polar bear: This section needs some substantial edits. Polar bears are not migratory; they are found in Alaska year-round (including denning bears, which are increasingly using the terrestrial environment). Their habitat and geographic range both need to be updated to reflect their use of the terrestrial environment. Pacific Walrus: Please update this table to reflect walrus use of terrestrial haulouts.	The applicable sections have been revised as appropriate.	Chapter 3 - Alaska 3.1.6.6 Threatened and Endangered Species, Table 3.1.6.6-1	3.1.6.6
FN-NC-0017	132	4/25/2016	Mary Josie Blanchard	US DOI	The descriptions of Critical Habitat for Spectacled and Steller's Eiders as described in the text on this page are not accurate. Please go back to the listing and correct.	These descriptions have been modified in the Final PEIS.	Chapter 3 - Alaska 3.1.6.6 Threatened and Endangered Species, page 3.1.6-57	3.1.6.6
FN-NC-0017	133	4/25/2016	Mary Josie Blanchard	US DOI	It is hard to see the terrestrial eider habitat delineated on this map. Please check for accuracy and consider renaming the yellow polygons CH for Steller's AND spectacled eiders, and add the little sliver of spectacled eider-only CH south of Toksook Bay in another color. (See attached Figure 1: "Listed Critical Eider Habitat in YKD in FWS's comment letter).	This map in the Final PEIS has been updated to make the distinctions clear.	Chapter 3 - Alaska 3.1.6.6 Threatened and Endangered Species, Figure 3.1.6.6-1	Figure 3.1.6.6-1
FN-NC-0017	134	4/25/2016	Mary Josie Blanchard	US DOI	In the sentence, "If a disturbance such as noise... excluded marine mammals from a preferred sea ice haulout," please change this just to "haulout." Walrus are using terrestrial haulouts more and more. Even if they are not preferred, these haulouts are important to their life history with loss of sea ice; additionally, walrus using terrestrial haulouts might be more likely than those using sea ice haulouts to be impacted by the FirstNet project.	In addition to sea ice haulouts, terrestrial haulouts were added to the document.	Chapter 3 - Alaska 3.1.6.6 Threatened and Endangered Species, page 3.1.6-59	3.1.6.6; 3.2.6.6
FN-NC-0017	135	4/25/2016	Mary Josie Blanchard	US DOI	It is not clear whether Section 3.2.6.4 applies to only non-listed species, or whether it includes listed species. Assuming the former, the information about Pacific Walrus (pages 3.2.6-17, 3.2.6-20, 3.2.6-22 through 23) should be removed from this section and placed in Section 3.2.6.6.	Section numbers have been added to the descriptions of the sections listed in Section 3.2.6.1 to make it clear where the various biological resources are covered within the larger section 3.2.6. The discussion of the Pacific Walrus was left in Section 3.2.6.4, where detailed species discussions are presented, and a cross reference to the threatened and endangered species section was added.	Chapter 3 - Alaska 3.2.6.4 Wildlife, page 3.2.6-16	All Biology Environmental Consequences Introduction sections

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FN-NC-0017	136	4/25/2016	Mary Josie Blanchard	US DOI	Direct Injury/Mortality: Collision events can occur to many species that do not necessarily fall in these categories, caused by weather events or poor visibility. Consider adding the bird family of alcids to the list of poor fliers and loons to the list of heavy birds. Note the mitigation measures and BMPs presented in Chapter 11 are general and not project-specific. The FWS would like the opportunity to collaborate early in the development of specific projects to help ensure impacts to migratory birds and ESA-listed species are avoided and minimized throughout the project siting, design, and operation stages.	Alcids and loons have been added as additional examples as suggested. Additionally, FirstNet intends to fully adhere to its compliance requirements under Section 7 of the ESA, and site-specific reviews will be performed and consultation where required will be conducted.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-18	All Wildlife Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	137	4/25/2016	Mary Josie Blanchard	US DOI	Vegetation and Habitat Loss Alteration, or Fragmentation: For a discussion about impacts from vegetation clearing, snow geese are not the best example to use. Snow geese are increasing in the western Arctic. In the eastern Arctic, they have displaced other birds through over grazing on grass and sedge tundra habitats. The statement that feeding habitats are limited is misleading. Not all feeding habitats are limited, although some (lagoons, mudflats) might be. Vegetation clearing in molting areas would be a concern because flightless birds do need access to high quality forage within their immediate vicinity. Brant molting and feeding at Teshekpuk Lake are a good example of this. In the last paragraph, recommend listing what factors would influence the degree to which habitat exclusion affects birds (e.g., life history and behavior of the species, stage of the annual cycle being affected, habitat type limited or not). Here, passerines are listed as one bird group for which construction activities might only have minor, short-term effects. Loons would be a good example of the other end of the spectrum (solitary nesters), as would seabirds (colony nesters). The shorebird example used here is also good.	The examples provided in the Final PEIS have been updated as suggested. Additionally, the last paragraph of this section has been updated to describe the factors that would influence the degree to which habitat exclusion affects various bird groups.	Chapter 3 - Alaska 3.2.6.4 Birds, pages 3.2.6-20 to 21	3.2.6.4
FN-NC-0017	138	4/25/2016	Mary Josie Blanchard	US DOI	The Alaska region of the FWS is in the process of updating recommendations for time periods to avoid vegetation clearing/land disturbing activities. The Project should refer to the most recent version of this document available prior to commencing construction.	The text of this section has been updated to refer to the most recent versions of published materials related to avoidance periods for vegetation clearing.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-20	3.2.6.4
FN-NC-0017	139	4/25/2016	Mary Josie Blanchard	US DOI	Indirect Injury/Mortality: What are the lowland and upland waders species referred to in the first paragraph under birds? This category of bird sometimes means shorebirds, or it might mean marsh birds (herons, egrets). Recommend clarification. FWS doesn't have any of the latter here, and the former were already listed in this sentence. Please also add some discussion here about increased predation on birds and/or their nests, with citations.	This text has been revised in the Final PEIS to provide necessary clarification. The text regarding increased predation has been removed.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-23	3.2.6.4

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FN-NC-0017	140	4/25/2016	Mary Josie Blanchard	US DOI	Effects to Migration or Migratory Patterns: Shorebirds migrating long distances are not just using Australian non-breeding areas. These birds are flying to Australia, Asia, and to North, Central, and South America non-breeding locations. Additionally, some seabirds are making these long-distance movements (terns may fly all the way to Antarctica), and so are some passerines (e.g. the Northern Wheatear, which winters in Africa). If one of the important, discrete stopover areas is impacted by construction permanently, there might be important consequences to a species or even a population. Temporary impacts could result in displacement from preferred stopover habitat, affecting quality and quantity of food resources, refueling rates, and possibly fitness of individual birds (with the potential to impact survival and therefore have population level consequences).	The examples provided in the Draft PEIS were not intended to be inclusive of all migrating birds. Text has been added in the Final PEIS to provide more information related to the range and distances of migrating bird groups. In addition, project BMPs (see Chapter 11, BMPS and Mitigation Measures) incorporate USFWS BMPs and mitigation measures, including the avoidance of sensitive areas such as known bird concentration areas and known migratory flyways.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-25	All Wildlife Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	141	4/25/2016	Mary Josie Blanchard	US DOI	Reproductive Effects: In addition to disturbance or displacement, young birds and eggs could be susceptible to direct impacts from construction activities (e.g. crushing of nests during construction of gravel pads). This could be mitigated by using appropriate construction timing windows (e.g. winter construction).	Direct impacts to nests during construction have been added under the Direct Injury/Mortality subsection. The use of construction timing windows can be an effective mitigation measure for avoiding and minimizing adverse reproductive effects. At the programmatic level the project covers a wide geographic range and currently lacks project-specific detail. As such, determining the feasibility and effectiveness of this BMP will be done as part of subsequent site-specific reviews. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-27	All Wildlife Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	142	4/25/2016	Mary Josie Blanchard	US DOI	Invasive Species Effects: Would any of the equipment or supplies for the proposed action be delivered via waterways? If so, there is potential to bring invasive species along on boat hulls and/or in ballast water. This would be one way of having large impacts to the marine ecosystem. Recommend clarification.	No change made. The Draft and Final PEIS indicate that such invasive species effects to marine ecosystems are possible but not likely to be significant given the short duration of construction activities in limited near-shore locations. The project would not involve significant marine deployment activities.	Chapter 3 - Alaska 3.2.6.4 Marine Mammals, page 3.2.6-29	NA
FN-NC-0017	143	4/25/2016	Mary Josie Blanchard	US DOI	Invasive Species Effects: In addition to seabirds, rats could impact any ground-nesting birds (waterfowl, cranes, shorebirds, tundra-nesting passerines). However there are laws against transporting rats in the State of Alaska, so activities for the Proposed Action should not increase risk to birds (as long as mitigation measures and BMPs are followed).	No change made.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-29	NA

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FN-NC-0017	144	4/25/2016	Mary Josie Blanchard	US DOI	If "deployment" (as described on 3.2.6-31) means construction, then is this section dealing with both temporary and permanent impacts? This is somewhat unclear, but the following comment assumes that is the case. Where potential impacts to birds are described, it is not correct to say that impacts to Alaska's birds are anticipated to be less than significant. Impacts from infrastructure built under the Proposed Action could range from less than significant to significant at the population or species level, depending on placement, design, operation, and maintenance of the infrastructure. The FWS would like to be involved in site-specific placement, design, and operation as early as possible in the planning stages of individual projects, in order to help avoid and minimize impacts to birds. Also, as a side note, these international migrants should probably not be called "Alaska's birds."	The Final PEIS indicates that at the regional, programmatic level, potentially significant impacts are not expected based on the specific impact significance rating criteria developed for each individual resource (which uses a rating system based on magnitude/intensity, geographic extent, and duration/frequency).[5] However, significant impacts could potentially occur at the site-specific level, although with BMPs and mitigation measures this is expected to be rare. Site-specific BMPs may be needed in addition to those outlined in the PEIS, and those would be determined during site-specific environmental assessments in coordination with local environmental agencies. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. The text in the Final PEIS has been revised to indicate that impact determinations are at the programmatic level per the impact significance criteria.	Chapter 3 - Alaska 3.2.6.4 Birds, page 3.2.6-34	All Wildlife Environmental Consequences sections
FN-NC-0017	145	4/25/2016	Mary Josie Blanchard	US DOI	There are no birds considered to be candidates for listing at this time in Alaska. Please correct here and throughout text in this section.	The candidate bird species listing has been revised in the Final PEIS.	Chapter 3 - Alaska 3.2.6.6 Threatened and Endangered Species, Table 3.2.6.6-2	3.1.6.6; 3.2.6.6
FN-NC-0017	146	4/25/2016	Mary Josie Blanchard	US DOI	Both direct injury or mortality and indirect effects from disturbance would be considered a take of listed species. Regardless of level of impact, this would be considered a violation of the ESA, unless authorized. Consider adding language stating such to this section.	Language has been added to this section in the Final PEIS to add clarification as suggested.	Chapter 3 - Alaska Threatened and Endangered Species, page 3.2.6-57	All Threatened and Endangered Environmental Consequences sections
FN-NC-0017	147	4/25/2016	Mary Josie Blanchard	US DOI	First sentence in the first full paragraph of this page, please modify to say, "listed or candidate marine mammal species." Add polar bears to this discussion, as they are also a listed marine mammal. In the sentence about walrus that starts with, "If a disturbance such as noise, human activity...," please also add language stating this can happen on terrestrial haulouts (in addition to sea ice). Although terrestrial haulouts might not be "preferred," they are becoming more and more important with reduced sea ice. Walrus displacement from haulouts could (extreme case) result in death through starvation or drowning, if the disturbance is chronic or severe enough to prevent walrus from returning, and if other, accessible haulouts are not available.	Thank you for your comments. These changes have been made in the final PEIS as suggested.	Chapter 3 - Alaska Threatened and Endangered Species/Marine Mammals, page 3.2.6-59	3.2.6.6

[5] Impacts of climate change on the Preferred Alternative could range from potentially significant to less than significant with BMPs and mitigation measures incorporated at the programmatic level.

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FN-NC-0017	148	4/25/2016	Mary Josie Blanchard	US DOI	Recommend including timing windows as one way to avoid impacts to nests, eggs, and young birds. In the first paragraph, it is not accurate to say that injury or death from deployment of equipment is unlikely. Young birds and nests might be most susceptible to ground disturbing-activities (e.g. gravel pad construction during nesting season), but adult birds are susceptible to collision (as discussed in the next paragraph). Make the collision paragraph listed-species specific, as other species are discussed earlier in this document. It is not appropriate to talk about swans, cranes, eagles, hawks, osprey, or owls here. We also don't have herons or egrets in Alaska. All of this language (excluding the discussion on herons and egrets) can be moved into the earlier section, where non-listed birds are discussed. It is not necessary to single the Eskimo Curlew out in this discussion. First, that species is likely extinct; but perhaps more pertinent to this discussion, it (just like any other bird) could be at risk of collision under certain conditions.	Regarding timing windows, see response to Comment 141 above. The text has been modified in the Final PEIS to indicate that potential impacts to adult birds are unlikely from equipment deployment. Additional revisions have been made to the text to clarify the types of species potentially affected by collision impacts, such as large wing-span birds, heavy birds, and those that fly in flocks. Non-listed species are discussed in the Wildlife section.	Chapter 3 - Alaska Threatened and Endangered Species/Birds, page 3.2.6-60	All Threatened and Endangered Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	149	4/25/2016	Mary Josie Blanchard	US DOI	Under wired projects, please correct text to say "defending breeding sites or young" and "denning or pupping mammals or nesting birds" as mammals don't nest.	The suggested edits have been made in the Final PEIS.	Chapter 3 - Alaska Threatened and Endangered Species, page 3.2.6-65	3.2.6.6
FN-NC-0017	150	4/25/2016	Mary Josie Blanchard	US DOI	Under birds, please correct text to say the listed species have limited distribution in marine, coastal, and tundra habitats. Also, the correct number of listed birds is four (not five). Impacts to breeding birds are not the only possibility that should be listed here. There is collision risk if projects are not appropriately sited, designed, operated, and maintained. FWS would still consider the impact to be "may affect, not likely to adversely affect" IF the FWS is consulted early in the planning stages of a project, which will allow impacts to be avoided and minimized to the maximum extent.	Suggested edits have been made.	Chapter 3 - Alaska Threatened and Endangered Species, Table 3.2.6.6-3	All Threatened and Endangered Environmental Consequences sections
FN-NC-0017	151	4/25/2016	Mary Josie Blanchard	US DOI	Page 5-2 and Page 5.1.7-5 (Land Use) discusses lands owned by the federal government in the Pacific area, and mentions NPSA. Although the NPS manages these lands, this is accomplished through a lease agreement with the territorial Government (we have no ownership interests).	This distinction has been made in the Final PEIS.	Chapter 5 - American Samoa Affected Environment, page 5-2	5.1.7.3
FN-NC-0017	152	4/25/2016	Mary Josie Blanchard	US DOI	Text indicates that no General Management Plan (GMP) is available. NPSA does have a GMP, which was approved in 1997; printed or electronic versions are available through Superintendent Scott Burch (see attached contact list at end of comments).	The Final PEIS has been revised to mention the GMP.	Chapter 5 - American Samoa Affected Environment Visual Resources, page 5.1.8-3	5.1.8.3

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FN-NC-0017	153	4/25/2016	Mary Josie Blanchard	US DOI	Recommend including language prohibiting the use of straw or hay bales for erosion control as they can harbor invasive weed seeds, even if locally sourced.	The relevant BMP in the Final PEIS has been updated to indicate that straw or hay bales used for erosion control will be designated as weed free.	Chapter 11 11.4.1 4th Bullet Page 11-7	Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	154	4/25/2016	Mary Josie Blanchard	US DOI	Project proponent should work with Alaska Department of Fish and Game to ensure culverts are properly sized to pass fish in any fish-bearing streams.	The relevant BMP in the Final FPEIS has been revised to indicate fish passage should be accommodated working with the appropriate state/territory natural resource agencies.	Chapter 11 11.4.1 7th Bullet Page 11-8	Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	155	4/25/2016	Mary Josie Blanchard	US DOI	New Build - Aerial Fiber Optic Plant: "Install overhead transmission lines along existing road ROWs wherever possible to minimize vegetation clearing and other potential impacts to wetlands." In certain locations (e.g., on the North Slope in high fog areas; in areas of critical eider habitat), it might be preferable to clear wetland vegetation outside of the breeding season for line burial as opposed to hanging new transmission wire/cables. For scenarios or deployment activities which require new work such as new Build Scenarios (Buried Fiber Optic Plant, Aerial Fiber Optic Plant, or Submarine Fiber Optic Plant); New Wireless Communication Towers; Deployable Technologies; and Deployable Aerial Communications Architecture, we cannot concur with your determination of not likely to adversely affect because of the many variables involved in the different options, habitats and species. New work should have ESA consultation on a case by case basis with the species of concern and appropriate BMPs.	The text in this section has been modified to indicate that in certain circumstances it may be preferable and less impactful to implement line burial instead of installing lines overhead. Such determinations would be made at the site-specific level. Additionally, the Final PEIS indicates that at the regional, programmatic level, potentially significant impacts are not expected based on the specific impact significance rating criteria developed for each individual resource (which uses a rating system based on magnitude/intensity, geographic extent, and duration/frequency).[6] However, significant impacts could potentially occur at the site-specific level, although with BMPs and mitigation measures this is expected to be rare. Site-specific BMPs may be needed in addition to those outlined in the PEIS, and those would be determined during site-specific environmental assessments in coordination with local environmental agencies. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. The text in the Final PEIS has been revised to indicate that impact determinations are at the programmatic level per the impact significance criteria.	Chapter 11 11.5.2 11-11	Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	156	4/25/2016	Mary Josie Blanchard	US DOI	Recommend including this additional information: Prior to selecting individual project locations in areas known to have habitat suitable for nesting Bald and Golden Eagles, work with the FWS to design and carry out surveys to locate active and inactive raptor nests. Early collaboration with the FWS will help to incorporate site-specific considerations, thereby minimizing the risk of unauthorized take of eagles.	Site-specific BMPs may be needed in addition to those outlined in the PEIS, and those would be determined during site-specific environmental assessments in coordination with environmental agencies. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. Site-specific reviews will be performed and consultation where required will be conducted.	Chapter 11 11.6.2.1 Item 4 and 5 Page 11-15	Chapter 11, BMPS and Mitigation Measures

[6] Impacts of climate change on the Preferred Alternative could range from potentially significant to less than significant with BMPs and mitigation measures incorporated at the programmatic level.

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FN-NC-0017	157	4/25/2016	Mary Josie Blanchard	US DOI	The Department believes that early consultation with appropriate agencies and stakeholders including, but not limited to, USFWS, NMFS, and state/territory wildlife and natural resources agencies, is critical since all the other BMPs are not detailed enough to properly make a not likely to adversely affect determination. The BMPs outlined in chapter 11.6.4 can be incorporated into the early consultation to reach a not likely to adversely affect determination, through informal consultation.	As mentioned above, the Final PEIS indicates that at the regional, programmatic level, potentially significant impacts are not expected based on the specific impact significance rating criteria developed for each individual resource (which uses a rating system based on magnitude/intensity, geographic extent, and duration/frequency).[7] However, significant impacts could potentially occur at the site-specific level, although with BMPs and mitigation measures this is expected to be rare. Site-specific BMPs may be needed in addition to those outlined in the PEIS, and those would be determined during site-specific environmental assessments in coordination with local environmental agencies. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. Where the possibility exists for a significant adverse impact at the project specific level, consultation with the appropriate agency may be required.	Chapter 11 11.6.4	Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	158	4/25/2016	Mary Josie Blanchard	US DOI	Recommend including this additional information in the BMP section: Ground-disturbing work should take place outside the nesting season, so as to avoid direct and indirect impacts to breeding birds and their reproductive success. The FWS can provide project- specific timing window guidance for ground-clearing activities. As Region 7 is in the process of updating published timing windows, we recommend contacting the FWS for current guidance.	Please see the response to comment 141.	Chapter 11 General	Chapter 11, BMPS and Mitigation Measures

[7] Impacts of climate change on the Preferred Alternative could range from potentially significant to less than significant with BMPs and mitigation measures incorporated at the programmatic level.

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FN-NC-0017	159	4/25/2016	Mary Josie Blanchard	US DOI	NPS Pacific Area Parks & Superintendents World War II Valor in the Pacific National Monument 1845 Wasp Blvd. Bldg# 176 Honolulu HI 96818 Jacqueline Ashwell, Superintendent Jacqueline_ashwell@nps.gov Honouliuli National Monument 1845 Wasp Blvd. Bldg # 176 Honolulu HI 96818 Jacqueline Ashwell, Superintendent Jacqueline_ashwell@nps.gov Kalaupapa National Historical Park PO Box 2222 Kalaupapa HI 96742 Erika Stein Espaniola, Superintendent Erika_stein@nps.gov Haleakala National Park P.O. Box 369 Makawao, HI 96768 Natalie Gates, Superintendent Natalie_gates@nps.gov	Thank you for your comment.	Potentially Impacted NPS Resources	Chapter 16, Distribution List
FN-NC-0017	159 (cont.)	4/25/2016	Mary Josie Blanchard	US DOI	Ala Kahakai National Historic Trail 73-4786 Kanalani Street, #14 Kailua-Kona HI 96740 Aric Arakaki, Superintendent Aric_arakaki@nps.gov Puukohola Heiau National Historic Site 62-3601 Kawaihae Road Kawaihae HI 96743 Daniel Kawaiaea, Superintendent Daniel_kawaiaea@nps.gov Kaloko-Honokohau National Historical Park 73-4786 Kanalani St. Suite #14 Kailua-Kona HI 96740 Tammy Duchesne, Superintendent Tammy_duchesne@nps.gov Pu'uhonua O Honaunau National Historical Park Tammy Duchesne, Superintendent Tammy_duchesne@nps.gov	Thank you for your comment.	Potentially Impacted NPS Resources	Chapter 16, Distribution List

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FN-NC-0017	159 (cont.)	4/25/2016	Mary Josie Blanchard	US DOI	Hawai'i Volcanoes National Park P.O. Box 52 Hawai'i National Park, HI 96718-0052 Cindy Orlando, Superintendent Cindy_orlando@nps.gov National Park of American Samoa Pago Pago, AS 96799 Scott Burch, Superintendent Scott_burch@nps.gov War in the Pacific National Historic Park 135 Murray Boulevard, Suite 100 Hagatna, GU 96910 James Richardson, Superintendent Jim_richardson@nps.gov American Memorial Park P.O. Box 5198-CHRB Saipan MP 96950 James Richardson, Superintendent Jim_richardson@nps.gov	Thank you for your comment.	Potentially Impacted NPS Resources	Chapter 16, Distribution List
FN-NC-0017	160	4/25/2016	Mary Josie Blanchard	US DOI	The DPEIS is generally well-written, with thorough consideration of biological resources and includes a good discussion of potential impacts to these resources. Most activities discussed in the preferred alternative are identified to have "less than significant" impacts. Given the limited footprint associated with Project infrastructure, we generally agree with the assessment.	Thank you for your comment.	General	NA
FN-NC-0017	161	4/25/2016	Mary Josie Blanchard	US DOI	We believe the BMPs listed in Chapter 11 of the PEIS are sufficient to avoid and minimize risk to most species, in most areas. We recommend including the following, additional BMPs: • Ground-disturbing work will take place outside the bird nesting season to avoid direct and indirect impacts to breeding birds and their reproductive success. The dates for the timing of the nesting seasons are currently being revised in Alaska, so we recommend you work directly with FWS staff in Region 7 to obtain avoidance periods. • In areas known to have habitat suitable for nesting eagles (bald and golden), work with the FWS to design and implement surveys to locate active and inactive eagle nests prior to selecting individual Project locations. Early collaboration with the FWS will help to incorporate site-specific considerations, thereby minimizing the risk of unauthorized take of eagles.	Regarding the first suggested BMP, please see the response to comment 141. Site-specific BMPs may be needed in addition to those outlined in the PEIS, and those would be determined during site-specific environmental assessments in coordination with environmental agencies. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. Site-specific reviews will be performed and consultation where required will be conducted.	Chapter 11	Chapter 11, BMPS and Mitigation Measures

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FN-NC-0017	162	4/25/2016	Mary Josie Blanchard	US DOI	On the Alaskan Coastal Plain (ACP) especially, aerial infrastructure might pose risks to birds during the breeding and migration seasons due to: (1) the density of birds migrating to the Arctic to breed; (2) frequent low lighting and poor weather conditions that lead to many low visibility days; and (3) a landscape that otherwise has few tall vertical structures. At risk are a wide variety of migratory bird species, including Alaska-breeding Steller's (*Polysticta stelleri*) and spectacled eiders (*Somateria fischeri*), both of which are listed as threatened under the Endangered Species Act. For these coastal areas, the Department suggests the following additional BMPs should be implemented: • Self-supporting towers will be used instead of guyed towers wherever possible. • When guy wires are necessary, each wire will be marked for its full length, using daytime markers that stand out against the wire and the environment. Not all markers are designed for use in extreme conditions such as those encountered in the Arctic. The Project should work with the FWS to choose appropriate markers. Markers should be regularly maintained for the life of the project. • On the ACP, monopole structures will be considered in place of lattice structures to discourage perching and nesting by ravens and raptors/birds of prey, unless use of a monopole structure would require addition of any guy wires. In these cases, projects should work with the FWS to incorporate anti-perching and anti-nesting devices into project design.	The Draft and Final PEIS indicate that the use of non-guyed towers is preferable to guyed towers, and that when guy wires are used they will have daytime markers. FirstNet will consult with USFWS at the site-specific level as required, regarding the use of guyed towers. The text in the Final PEIS has been modified to indicate that, to the extent practicable and feasible, monopole structures may be considered in place of lattice structures on the ACP. If lattice towers are to be used on the ACP, FirstNet and/or their partners would work with the USFWS to incorporate anti-perching and anti-nesting devices into project design, as practicable and feasible.	Chapter 11	Chapter 11, BMPS and Mitigation Measures
FN-NC-0017	162 (cont.)	4/25/2016	Mary Josie Blanchard	US DOI	• Outdoor security or safety lights will be motion-triggered, downcast and/or down-shielded, and directed inward whenever possible to prevent "star" effects when viewed offsite. This recommendation applies to both permanent and temporary lighting used during construction and operation. • Lights inside buildings will be motion-triggered. Blackout shades will be installed and used on outward-facing windows at night, when migratory birds are present (e.g., May through October on the ACP). • The FWS has concerns about the risks overhead power lines pose to migratory birds on the ACP. Except in special cases, we generally discourage their use. If telecommunications facilities will require use of overhead wires, the FWS would like to provide input on design and placement to minimize potential impacts to migratory birds.	Text has been added Chapter 11, BMPS and Mitigation Measures, of the Final PEIS related to the suggestions made in the first and third bullets. In certain circumstances it may be preferable and less impactful to implement line burial instead of installing lines overhead. Such determinations would be made at the site-specific level. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. Although project-specific details have not yet been developed, buildings are not anticipated to be tall enough to pose a significant risk for bird collisions as a result of indoor lighting.	Chapter 11	Chapter 11, BMPS and Mitigation Measures

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FN-NC-0017	163	4/25/2016	Mary Josie Blanchard	US DOI	For communication towers constructed in forested habitats without ESA compliance, the Department cannot concur with your no effect determination. The consultation process is a forward looking process that works to anticipate impacts and avoid or minimize them. This cannot be done for towers that were constructed without consultation. The Department recommends that towers show proof of existing ESA compliance prior to FirstNet using them.	The Federal Communications Commission (FCC) is responsible for addressing environmental and historic preservation requirements for existing towers. FirstNet will address ESA compliance requirements for any new towers and modifications made to existing towers for the Nationwide Public Safety Broadband Network (NPSBN) at the site-specific level. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined.	General	NA
FN-NC-0118	164	7/27/2016	Kealana Phillips	State of Hawaii Department of Land and Natural Resources, State Historic Preservation Division	On behalf of the Maui Lana'I Island Burial Council, I would like to thank you for contacting the council regarding the First Responder Network Authority (FirstNet) release of the Draft Programmatic Environmental Impact Statement (PEIS) for the Nationwide Public Safety Broadband Network (NPSBN) in the non-contiguous region of the United States (Alaska, Hawai'i, American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and U.S. Virgin Islands). Unfortunately, with the sporadic meeting schedule of our schedule, we were not able to convene to discuss the PEIS prior to the 60-day comment period ending May 3. However, we would greatly appreciate it if we can remain informed as the project progresses so that we may provide comments in the future as we see fit. Should you have any questions or concerns, please feel free to contact me.	FirstNet will continue to keep the State Historic Preservation Division informed as the project progresses.	General	NA
FN-NC-0019	165	5/3/2016	Shari Wilson	US EPA	The draft PEIS analyzed three alternatives: 1) No Action; 2) Deployable Technologies Only and; 3) Mixed Technologies. FirstNet selected alternative three (Mixed Technologies) as the preferred alternative. This alternative incorporates a combination of methods including collocation of network equipment, construction of new communication towers, installation of new conduit and fiber technology and deployable technologies (portable satellite phones, cell-on-wheels, cell-on-light trucks and system-on-wheels). Based on our review, EPA finds no objection with the preferred alternative in the draft PEIS. EPA has rated the draft PEIS as LO ("Lack of Objections"). The "LO" rating signifies the draft PEIS did not identify an environmental impacts requiring substantive changes. A summary of EPA's Rating System Criteria is located at http:/www.epa.gov/compliance/nepa/comments/ratings.html	Thank you for your comment.	General	NA
FN-NC-0020	166	12/21/2016	Jacinta Brown	American Samoa Department of Homeland Security	Police Services – line 5 – There is one central police station and four sub-stations: Tafuna, Leone, Faga'itua and the Manu'a Islands Group, as well as the Department of Public Safety Uniform Crime Reporting Record Office, located in Fagatogo.	Thank you for your comment. This text has been updated in the Final PEIS.	Page 5.1.1-4	5.1.1.4

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FN-NC-0020	167	12/21/2016	Jacinta Brown	American Samoa Department of Homeland Security	Second bullet: American Samoa TEMCO: should read American Samoa Department of Homeland Security (ASDHS), Territorial Emergency Management Coordinating Office (TEMCO) as the territorial emergency management mechanism is the lead office responsible for coordinating resource management, emergency response and recovery efforts……	Thank you for your comment. This text has been updated in the Final PEIS.	Page 5.1.1-6	5.1.1.5
FN-NC-0020	168	12/21/2016	Jacinta Brown	American Samoa Department of Homeland Security	Third bullet: Emergency Alert System (EAS): The American Samoa EAS was developed by National Weather Services an ASDHS/TEMCO….	Thank you for your comment. This text has been updated in the Final PEIS.	Page 5.1.1-6	5.1.1.5
FN-NC-0020	169	12/21/2016	Jacinta Brown	American Samoa Department of Homeland Security	Fourth bullet: Federal Emergency Management Agency Integrated Public Alert and Warning System (IPAWS):….FEMA has partnered with the ASDHS/TEMCO and NOAA/NWS with the KKHJ-FM radio station in American Samoa as the EAS Primary Entry Point Station or LP1 and the radio station KULA-FM as the LP2.	Thank you for your comment. This text has been updated in the Final PEIS.	Page 5.1.1-6	5.1.1.5
FN-NC-0020	170	12/21/2016	Jacinta Brown	American Samoa Department of Homeland Security	Section on Fire Services: Fifth sentence in the para should read: There is one main fire station located in Fagatogo and four sub-stations which are co-located with the four police substations at Tafuna, Leone, Faga'itua and the Manu'a islands group. The Fire Bureau or Division of the Department of Public Safety is made up of ____ 48 ??? people, including firefighters and administrative staff.	Thank you for your comment. This text has been updated in the Final PEIS.	Page 5.1.1-5	5.1.1.4
FN-NC-0020	171	12/21/2016	Jacinta Brown	American Samoa Department of Homeland Security	Section on Emergency Medical and Hospital Services: Emergency medical services are provided under the Lyndon B. Johnson (LBJ) Tropical Medical Center. The emergency medical staff is made of 34 people……???	This text has been updated in the Final PEIS.	Page 5.1.1-5	5.1.1.4

ASDHS = American Samoa Department of Defense; DHS = U.S. Department of Homeland Security; DOE = U.S. Department of Energy; DOI = Department of the Interior; EPA = Environmental Protection Agency; ES = Executive Summary; HI-DOD = Hawaii Department of Defense; NA = not applicable; NPS = National Park Service; NPSBN = Nationwide Public Safety Broadband Network; NRCS = U.S. Department of Agriculture Natural Resources Conservation Service; PEIS = Programmatic Environmental Impact Statement; PREMA = Puerto Rico Emergency Management TOC = Table of Contents; USCG = U.S. Coast Guard

Table 14-2: Comments on Other Reports Applicable to this Final PEIS

Submission ID	Comment Number	Date(s) Received	Sender Name(s)	Sender Organization(s)	Comment Text	Response	Chapter/Section/Page Number Reference in the Draft PEIS as Identified by Commenter	Section(s) where changes were made in Final PEIS
FN-NC-0021	172	10/11/2016	Michaela E. Noble	US DOI	USFWS recommends conducting vegetation clearing and removal and tree cutting outside of the breeding period for migratory birds. The USFWS Field Offices can provide state-specific date ranges when clearing should be avoided.	Direct impacts to nests during construction have been added under the Direct Injury/Mortality subsection. The use of construction timing windows can be an effective mitigation measure for avoiding and minimizing adverse reproductive effects. At the programmatic level the project covers a wide geographic range and currently lacks project-specific detail. As such, determining the feasibility and effectiveness of this BMP will be done as part of subsequent site-specific reviews. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined.	General	Chapter 11, BMPS and Mitigation Measures
FN-NC-0021	173	10/11/2016	Michaela E. Noble	US DOI	We recommend that structures containing the fewest perching options be used in areas where raptor and raven predation of sensitive resources is a concern. Where raptor electrocution is a concern, use of structures and components compatible with the guidance in the Avian Power Line Interaction Committee's (APLIC) 2006 "Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006" electrocution manual should be implemented. Where collision is a hazard, we recommend the APLIC's 2012 "Reducing Avian Collisions with Power Lines: The State of the Art in 2012" manual be implemented.	The suggested BMPs have been added to Chapter 11, BMPs and Mitigation Measures	General	Chapter 11, BMPS and Mitigation Measures
FN-NC-0021	174	10/11/2016	Michaela E. Noble	US DOI	The USFWS recommends that the suggested practices by the Avian Power Line Interaction Committee be followed to minimize impacts to migratory birds through collision and electrocution (see www.aplic.org for the 2006 electrocution and 2012 collision manuals) for all overhead lines.	A reference to the APLIC practices is included in Chapter 11, BMPs and Mitigation Measures, to be implemented as practicable or feasible during deployment and operation activities.	General	Chapter 11, BMPS and Mitigation Measures

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FN-NC-0021	175	10/11/2016	Michaela E. Noble	US DOI	Communication towers are currently estimated to kill between four and five million birds per year. A great deal of the mortality is the result of collisions with supporting guy wires. Additionally, the type of safety lighting on these towers appears to influence their attractiveness to birds. In order to minimize the potential for impacts to migratory birds, the USFWS urges consideration of the following siting and construction recommendations. 1. If possible, new communication equipment should be co-located on an existing tower or similar structure (e.g. billboard, water tower, or building mount). Depending on tower load factors, from 6 to 10 providers may co-locate on an existing tower. 2. Where co-location is not feasible and a new tower must be constructed, all efforts should be taken to construct towers no more than 199 feet above ground level (AGL), that do not require guys wires (e.g. use a lattice, monopole structure, etc.). Such towers should be unlighted if Federal Aviation Administration (FAA) regulations permit. 3. If constructing multiple towers, providers should consider the cumulative effects of all of those towers to endangered, threatened, proposed, and candidate species and migratory birds as well as effects of each individual tower. 4. If at all possible, new towers should be sited within existing antenna farms Avoid siting towers near (within 3 to 5 miles of) wetlands, other known bird concentration areas (e.g., state or Federal refuges, staging areas, rookeries), in known migratory or daily movement flyways, or in habitat of threatened or endangered species. Towers should not be sited in areas with a high incidence of fog, mist, or low ceilings. 5. If taller (greater that n 199 feet AGL) towers requiring lights for aviation safety must be constituted, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. Unless required by the FAA, only white strobe lights should be used at night, preferably with the minimum number, minimum intensity, and minimum number of flashes per minute (longest duration between flashes) allowable by the FAA. Current research indicates that solid or pulsating (beacon) red lights attract night-migrating birds at a much higher rate than white strobe lights.	Elements of many of these recommendations are included in Chapter 11, BMPs and Mitigation Measures. Most of these suggestions are also duplicates of the recommendations in USFWS 2013b which are cited in Chapter 11. Site-specific analysis may be required depending on the site conditions, the type of deployment, or any other permits or permissions necessary to perform the work, and the feasibility of implementing these recommendations could be determined during subsequent analysis and consultation. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined.	General	Chapter 11, BMPS and Mitigation Measures

Submission ID	Comment Number	Date(s) Received	Sender Name(s)	Sender Organization(s)	Comment Text	Response	Chapter/Section/Page Number Reference in the Draft PEIS as Identified by Commenter	Section(s) where changes were made in Final PEIS
FN-NC-0021	176	10/11/2016	Michaela E. Noble	US DOI	6. Towers designed using guy wires for support that are proposed to be located in known raptor or waterbird concentration areas or daily movement routes, or in major diurnal migratory bird movement routes or stopover sites, should have daytime visual markers (e.g., bird diverter devices) on the wires to prevent collisions by these diurnal moving species. For guidance on markers, the Avian Power Line Interaction Committee has published guidance (Reducing Avian Collisions with Power Lines: The State of the Art in 2012 and Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006). Copies can be obtained at http://www.aplic.org/. 7. Towers and attendant facilities should be sited, designed, and constructed to avoid or minimize habitat loss within and adjacent to the tower footprint. Road access and fencing should be minimized to reduce or prevent habitat fragmentation and disturbance, and to reduce above-ground obstacles to birds in flight. 8. If significant numbers of breeding, feeding, or roosting birds are known to occur within the tower construction area, relocation to an alternate site is recommended. If this is not possible, seasonal restrictions on construction may be advisable in order to avoid disturbance during periods of high bird activity. 9. New towers should be designed structurally and electrically to accommodate the applicant/licensee's antennas and comparable antennas for at least two additional users (minimum of 3 users for each tower structure), unless this design would require the addition of lights or guy wires to an otherwise unlighted and/or non-guyed tower. 10. Security lighting for on-ground facilities and equipment should be down-shielded to keep light within the boundaries of the site. 11. USFWS personnel and/or researchers from the Communication Tower Working Group or its designees should be allowed access to the site to evaluate bird use, conduct dead bird searches, and to conduct various research. 12. Towers no longer in use or determined to be obsolete should be removed within 12 months of cessation of use.	(Included with response above.)	General	Chapter 11, BMPS and Mitigation Measures

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FN-NC-0021	177	10/11/2016	Michaela E. Noble	US DOI	Although these measures will provide significant protection for migratory birds, implementation of these measures alone will not remove any liability should violations of the MBTA or the Eagle Act occur. The U.S. Fish and Wildlife Service Division of Law Enforcement and the U.S. Department of Justice have used enforcement and prosecutorial discretion in the past regarding individuals or companies who have made good faith efforts to avoid the take of migratory birds. We acknowledge that you intend to avoid construction during sensitive time periods and within specific spatial buffers for listed species. We recommend that nesting migratory birds also be avoided during the nesting season within species-specific buffers. As a part of the Project, we recommend monitoring of avian use of Project facilities as well as reporting avian mortality events.	(Included with response above.)	General	Chapter 11, BMPS and Mitigation Measures
FN-NC-0021	178	10/11/2016	Michaela E. Noble	US DOI	The reproductive success of federally listed plants may be impacted by the Project, particularly through use of insecticides or pesticides as well as dust generated from construction and use of access roads.	The Draft and Final PEIS acknowledge this potential impact to listed plants.	General	NA
FN-NC-0021	179	10/11/2016	Michaela E. Noble	US DOI	A spill prevention, control, and countermeasure plan (SPCCP) should be developed for the Project. This would apply to Water Resources, Wetlands, Fisheries and Aquatic Habitats, T&E Species, and Human Health and Safety.	The development of an SPCC Plan, as practicable or feasible, has been added to Chapter 11, BMPs and Mitigation Measures, to avoid, reduce, or minimize impacts to the resources mentioned.	General	Chapter 11, BMPS and Mitigation Measures
FN-NC-0021	180	10/11/2016	Michaela E. Noble	US DOI	Recommend adding a measure about control of fugitive dust generated by the Project's use of unpaved roads and construction. Dust can settle on plants and block their ability to photosynthesize, and can disrupt pollination success.	Chapter 11, BMPS and Mitigation Measures, of the Draft PEIS included a BMP to implement a dust control plan for construction activities and any travel over unpaved roads. In the Final PEIS, a BMP has been added to this chapter in the Biological Resources section to avoid, reduce, or minimize dust impacts to those resources.	Chapter 11	Chapter 11, BMPS and Mitigation Measures
FN-NC-0021	181	10/11/2016	Michaela E. Noble	US DOI	Recommend adding a measure on controlling speed limits on access roads, particularly within areas where a federally listed animal may be struck by construction and/or maintenance vehicles.	Chapter 11, BMPS and Mitigation Measures, of the Draft PEIS included a BMP to post and enforce speed limits on dirt/gravel roads as related to reducing airborne fugitive dust impacts. In the Final PEIS, a BMP has been added to this chapter in the Biological Resources section to avoid, reduce, or minimize potential collision impacts to Wildlife and T&E species.	Chapter 11	Chapter 11, BMPS and Mitigation Measures

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FN-NC-0021	182	10/11/2016	Michaela E. Noble	US DOI	Additionally, communication towers might have an impact on migratory birds due to non-ionizing electromagnetic radiation emitted by the tower. Please review the February 7, 2014, letter from the Department to Mr. Eli Veenendaal (National Telecommunications and Information Administrator) for additional information regarding electromagnetic radiation impacts from the Proposed Action (Enclosure 1).	The full US DOI comment submission, including the February 7, 2014, letter to Mr. Veenendaal, can be found in Appendix H, *Radio Frequency Emissions Comments Received—All Regions,* of the Final PEIS. The letter references radiation studies conducted at communication towers and discusses the potential impacts to birds from non-ionizing electromagnetic radiation. The Wildlife sections of the Final PEIS have been updated to include additional information related to potential radio frequency exposure and its associated potential impacts to wildlife, specifically birds and bats. Potential radio frequency exposure impacts to humans are discussed in Section 2.4, Radio Frequency Emissions.	General	All Wildlife Environmental Consequences sections
FN-NC-0022	183	10/11/2016	Brian Shepherd	FirstNet Colorado	The environmental regulations, guidelines, exclusions, etc. that apply to states that choose to 'opt-in' to the national plan (and the national partner) should apply to states that choose to develop an alternative Radio Access Network (RAN) through their statutory right. States and their partners that choose to opt-out should in no way be treated any differently than states that opt-in. The fundamental environmental impacts for each scenario are the same.	Thank you for your comments; however, the issues raised are beyond the scope of this Final PEIS.	General	NA
FN-NC-0022	184	10/11/2016	Brian Shepherd	FirstNet Colorado	Categorical exclusions: Any categorical exclusions requested by FirstNet and/or the national partner should set a precedent/template for any categorical exclusions required by an alternative plan state. As the national plan is developed, implemented, and categorical exclusions are granted, the parameters that enable those categorical exclusions should apply to any opt-out states. This will primarily impact the use of existing towers and/or structures for the RAN. A process and reasons for granting any exclusion for a specific tower or structures should be the same for any other towers or structures.	Thank you for your comments; however, the issues raised are beyond the scope of this Final PEIS.	General	NA
FN-NC-0022	185	10/11/2016	Brian Shepherd	FirstNet Colorado	Use of existing assets: We would encourage the PEIS to include a more detailed discussion of the impact of using existing towers and/or structures. Currently, the PEIS states that the use of existing assets 'may' have an environmental impact. It would be helpful to include in the final PEIS a set of specific parameters that would guide the decision on whether an existing asset will have an actual impact. We understand that the final impact would be a case-by-case review, but providing some examples of how specific uses of towers/structures may or may not create an impact would be helpful.	The impacts of using existing assets would vary depending on the specific asset and its unique environment, therefore it is not possible to provide greater specificity on impacts at the programmatic level beyond the discussion of impacts of each project type on the various resource areas included in the Environmental Consequences sections of the document. The impacts of use of existing assets would be subject to further evaluation at the site-specific level. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined.	General	NA

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FN-NC-0023	186	10/21/2016	Michael Robotham	NRCS	Another issue that has come up in our internal agency discussions is the need for FirstNet to be aware of land use easements that are held by NRCS (and I believe by other agencies – but we are focused on ours). NRCS holds some very large acreage easements, primarily focused on wildlife habitat. These are mainly located in the Western US, but easements have been purchased nationwide. Easement conditions often severely restrict potential management activities including, but not limited to, construction activities. Easements can be amended, but this is typically a very long process and, depending on the particular species of concern, proposed FirstNet activities may not be compatible with the goals of the particular easement. To address this issue, we suggest that language be included in the Draft PEIS recognizing that FirstNet is aware of this as a potential issue, and that all reasonable efforts will be taken to avoid construction activities in areas covered by existing easements.	Information related to NRCS easements has been included in the Final PEIS within the Land Use, Airspace, and Recreation sections of each state/territory chapter. In addition, a BMP has been added to Chapter 11, BMPs and Mitigation Measures, indicating that reasonable efforts would be taken to avoid or minimize construction activities in areas covered by existing incompatible easements.	General	All Land Use Affected Environment sections; all Land Use Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures
FN-NC-0024	187	10/6/2016	Nick Antonio	Antonio Acoustics	Construction vibration can have a direct effect on natural and cultural resources, including disturbance to humans, impacts on sensitive activities and processes, damage to property and structures, and effects on fauna in both land and marine habitats… I therefore suggest that the PEIS address vibration impacts from construction activities.	Thank you for your comment. Vibration impacts have been added to the noise and vibrations sections within each state/territory chapter.	General	All Noise and Vibrations Affected Environment sections; all Noise and Vibrations Environmental Consequences sections
FN-NC-0024	188	10/6/2016	Nick Antonio	Antonio Acoustics	The construction work proposed encompasses a wide variety of processes including (but not limited to) piling, trenching, concrete placement and road construction. Many of these processes are noisy. The exact location of these has not been established but some working is anticipated to be in urban and suburban areas. Therefore, some work will be close to noise sensitive receivers. It is not possible to carry out many construction work processes close to noise sensitive receivers without disturbance, sometimes even after mitigation. The PEIS identifies that noise from "the Proposed Action is expected to result in impacts that are not potentially significant regardless of whether BMPs and mitigation measures are incorporated." Clearly this is wrongly categorized. As it is not possible to carry out noisy construction and work close to noise sensitive receivers without disturbance, Best Management Practices and mitigation measures should be incorporated. The Assessed Impact should therefore be either "Potentially Significant", or "Less than significant with best management practices (BMPs) and mitigation measures incorporated."	Thank you for your comment. See response to comment number 92. The Final PEIS explains that at the programmatic level and based on the impact significance ratings developed, there would be no potentially significant impacts as a result of the Proposed Action as a whole.[8] However, the same impact significance criteria used at the programmatic level may not apply to site-specific build-out activities/actions. The Final PEIS acknowledges that site-specific impacts do have the potential to be greater on a localized basis and may require site-specific assessments and mitigation. FirstNet has not yet determined the methodology that will be employed to address site-specific analysis but will be issuing a Supplemental Programmatic Environmental Impact Statement with that information as soon as it is determined. At the programmatic level, noise impacts are anticipated to be less than significant using the significance criteria established for the analyses.	General	Throughout Final PEIS, to include all Noise and Vibrations Environmental Consequences sections

[8] Impacts of climate change on the Preferred Alternative could range from potentially significant to less than significant with BMPs and mitigation measures incorporated at the programmatic level.

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FN-NC-0025	189	11/15/2016	Rob Tomiak	US EPA	We recommend revising the GHG and climate change analysis to remove the 25,000 metric tons of CO2-e reference point and ensure overall consistency with the 2016 Final GHG Guidance.	The climate change analyses in the Final PEIS no longer include the 25,000 metric ton reference point and have been revised in accordance with the 2016 Final Guidance.	Climate Change Environmental Consequences sections	All Climate Change Environmental Consequences sections; ES4.14, Table ES4-14
FN-NC-0026	190	11/8/2016	Richard Fristik	USDA-RUS	Section 1.2 - Suggest deleting “of actions and associated levels” from this sentence: “Finally, and as discussed in the introduction of each of the Environmental Consequences sections, the programmatic approach allows FirstNet to identify and define four categories of actions and associated levels of potential impact as described below:”	This phrase has been deleted from the sentence in the Final PEIS.	Section 1.2	1.2
FN-NC-0026	191	11/8/2016	Richard Fristik	USDA-RUS	Sections 2.1.2 and 2.2 - realizing that this is a programmatic assessment, and as stated in Section 2.1, that the network “…must use existing infrastructure to the maximum extent economically desirable”, is it at all possible to at least generally describe the magnitude of parameters of the proposed project for this region in terms of miles of buried and aerial fiber, number of antennas/towers, etc.? If nothing else, this provides some point of reference for the impact assessment and may also inform the assessment of cumulative impacts.	Project design plans have not been developed and therefore this information is not available to be included in the Final PEIS.	Sections 2.1 and 2.2	NA
FN-NC-0026	192	11/8/2016	Richard Fristik	USDA-RUS	Section 2.4 - This seems oddly placed in this chapter.	Radio frequency emission concerns were expressed by the public during the scoping and public comment periods. The discussion of emissions effects to human and non-human species is important to include in Chapter 2, Description of the Proposed Action and Alternatives, as it applies to all states and territories.	Section 2.4	NA
FN-NC-0026	193	11/8/2016	Richard Fristik	USDA-RUS	Concerned that the impact descriptions seem not to match established criteria of USFWS, e.g., for may affect, not likely to adversely affect, the effects are expected to be “discountable, insignificant, or completely beneficial” (FWS S. 7 Consultation Handbook)...	As explained in the Draft and Final PEIS, the impact levels (or effect determinations) used in the analysis of threatened and endangered species and species of conservation concern are based on those in the Endangered Species Consultation Handbook (USFWS and NMFS 1998). The text under the “Impact Assessment Methodology and Significant Criteria” heading in each of these sections describes the three impact levels (no effect; may affect, not likely to adversely affect; may affect, likely to adversely affect). Within these descriptions, the “may affect, not likely to adversely affect” determination indicates that these effects are beneficial, insignificant, or discountable. The text also describes the other two effect determinations. Following these descriptions, the impact significance rating criteria tables provide examples of various effect characteristics based on magnitude/intensity, geographic extent, and duration/frequency.	NA	NA
FN-NC-0026	194	11/8/2016	Richard Fristik	USDA-RUS	…references to CEQ 2014 guidance on climate change/GHG; CEQ issued final guidance Aug. 1, 2016. Not only do the references need to be changed, but text needs to be modified to reflect the final guidance, e.g., it no longer uses the 25,000 MT threshold.	The Final PEIS uses the August 1, 2016 final guidance. The climate change analyses in the Final PEIS no longer include the 25,000 metric ton reference point and have been revised in accordance with the 2016 Final Guidance.	General	All Climate Change Environmental Consequences sections; ES4.14, Table ES4-14

Submission ID	Comment Number	Date(s) Received	Sender Name(s)	Sender Organization(s)	Comment Text	Response	Chapter/Section/Page Number Reference in the Draft PEIS as Identified by Commenter	Section(s) where changes were made in Final PEIS
FN-NC-0026	195	11/8/2016	Richard Fristik	USDA-RUS	BMPs/Mitigation… there is considerable overlap and redundancy in the BMPs and mitigation measures. Also, some appear to be neither BMP nor mitigation measure…	Where appropriate and applicable, the suggestions made by RUS on the West Region BMPs and Mitigation Measures chapter were made in the non-contiguous region chapter.	Chapter 11	Chapter 11, BMPS and Mitigation Measures
FN-NC-0026	196	11/8/2016	Richard Fristik	USDA-RUS	Appendix A: The appendix possibly should be re-titled, and at a minimum the table annotated to indicate that these agencies were invited to be cooperating agencies (according to section 1.5.2), and then highlight or otherwise indicate those that accepted.	The title of Appendix A has been changed to *Invited Cooperating Agencies* in the Final PEIS to reflect the fact that the list represents the agencies that were invited to become cooperating agencies. The text of the appendix was also updated to indicate which agencies accepted the invitation.	Appendix A	Appendix A, *Invited Cooperating Agencies*
FN-NC-0027	197	1/20/2017	Dr. Andrea A. Hunder and Jackie Rodgers	Osage Nation Tribal Historic Preservation Office	First, it came to our attention that inadvertant discoveries and the Native American Graves Protection and Repatriation Act, also known as NAGPRA (Public Lawy 101-601; 25 U.S.C. 3001-3013) were not mentioned throughout the document. As the avoidance of disturbing burials is a top priority for the Osage Nation, this omission needs to be addressed. We suggest adding a BMP to follow all state and national laws and regulations if inadvertent discoveries of human remains are made during construction. Additionally, we suggest that state burial laws be included in the cultural resources sections' lists of state laws as well.	Thank you for your comment. NAGPRA is addressed in Appendix C, *Environmental Laws and Regulations,* as well as in the applicable Cultural Resources Affected Environment and Environmental Consequences sections. Relevant burial laws are included in the "Specific Regulatory Considerations" under Section X.1.11. For clarity, the suggested BMP has been added to Chapter 11, BMPs and Mitigation Measures.	General	All Cultural Affected Environment sections; all Cultural Environmental Consequences sections; Chapter 11, BMPS and Mitigation Measures; Appendix C, *Environmental Laws and Regulations*
FN-NC-0027	198	1/20/2017	Dr. Andrea A. Hunder and Jackie Rodgers	Osage Nation Tribal Historic Preservation Office	One of the BMPs states "Follow all applicable federal requirements for consultation on the identification and assessment of effects to cultural resources." While it is important to consult with all invested parties on potential impacts to cultural resources, it is especially important to consult with Tribes before work begins. Tribes have special knowledge of their significant sites and often still utilize these sites in ceremonies or for other cultural purposes. Additionally, several peices of legislation and executive orders require tribal consultation including NAGPRA, the American Indian Religious Freedome Act (AIRFA) (16 U.S.C. 1996), the Archeological Resources Protection Act of 1979. (ARPA) (16 U.S.C. 470aa-mm), the National Historic Preservation Act (NHPA) (16 U.S.C. 470 et seq.), the National Environmental Policy Act (NEPA) Implementing Regulations (40 CFR Part 1500, and Executive Order 13175: Consultation and Coordination with Indian Tribal Governments (Nov. 6, 2000). This office recommends that tribal consultation be emphasized either within the wording of this BMP or in an additional BMP.	Thank you for your comment. When site-specific information is known, American Indian tribes will be notified of the deployment locations using FCC's Tower Construction Notification System (TCNS). At that time, the federally recognized tribes with an interest in a given geographic area will be able to review the project location(s) within that given geographic area and provide feedback, comments, or requests to FirstNet regarding the project(s) and its location in relation to cultural resources. Additionally for clarity, the suggested BMP has been revised in Chapter 11, BMPs and Mitigation Measures.	Chapter 11	Chapter 11, BMPS and Mitigation Measures
FN-NC-0028	NA	9/29/2016	Dr. Albert M. Manville	Wildlife and Habitat Conservation Solutions, LLC;	Comments from this submittal express concerns about the potential impacts of radio frequency radiation to wildlife and humans. This submittal also expresses concerns related to birds colliding with communication towers. This full comment submission can be found in Appendix H of the Final PEIS.	The Wildlife sections of the Final PEIS have been updated to include additional information related to potential radio frequency exposure and its associated potential impacts to wildlife, specifically birds and bats. The Wildlife sections also address potential collision impacts. Potential radio frequency exposure impacts to humans are discussed in Section 2.4, Radio Frequency Emissions.	General	All Wildlife Environmental Consequences sections

Submission ID	Comment Number	Date(s) Received	Sender Name(s)	Sender Organization(s)	Comment Text	Response	Chapter/Section/Page Number Reference in the Draft PEIS as Identified by Commenter	Section(s) where changes were made in Final PEIS
FN-NC-0029 through FN-NC-0033	NA	12/15/2016; 12/16/2016; 12/21/2016; 1/28/2017	Catherine Kleiber; Rebecca Smith; Naveen Albert; Michelle Illiatovitch; Tara Schell	Various	See Appendix H of the Final PEIS. Comments from these submissions express concerns about potential impacts to humans, wildlife, and vegetation as a result of radio frequency emissions.	The Wildlife sections of the Final PEIS have been updated to include additional information related to potential radio frequency exposure and its associated potential impacts to wildlife, specifically birds and bats. Potential radio frequency exposure impacts to humans are discussed in Section 2.4, Radio Frequency Emissions. The terrestrial vegetation sections have also been updated to acknowledge potential impacts from radio frequency emissions.	Various	All Wildlife Environmental Consequences sections; All Vegetation Environmental Consequences sections

DOI = Department of the Interior; EPA = Environmental Protection Agency; ES = Executive Summary; NA = not applicable; NPSBN = Nationwide Public Safety Broadband Network; NRCS = U.S. Department of Agriculture Natural Resources Conservation Service; PEIS = Programmatic Environmental Impact Statement; T&E = Threatened and Endangered; USDA-RUS = U.S. Department of Agriculture Rural Utilities Service

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Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

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First Responder Network Authority

Volume 8 - Chapters 10-18 & Appendices

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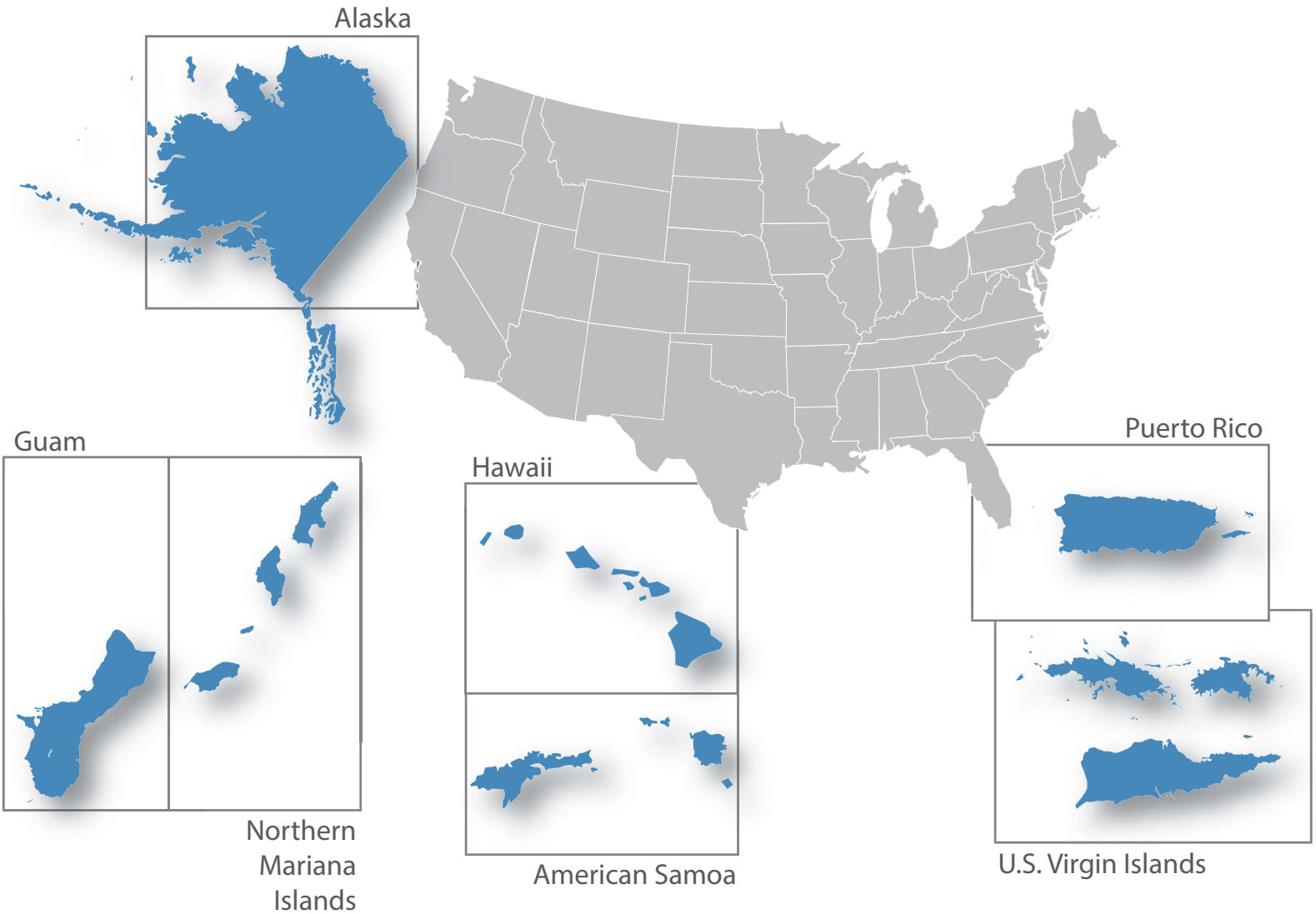
U.S. Virgin Islands



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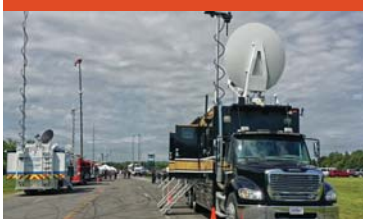

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First Responder Network Authority

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

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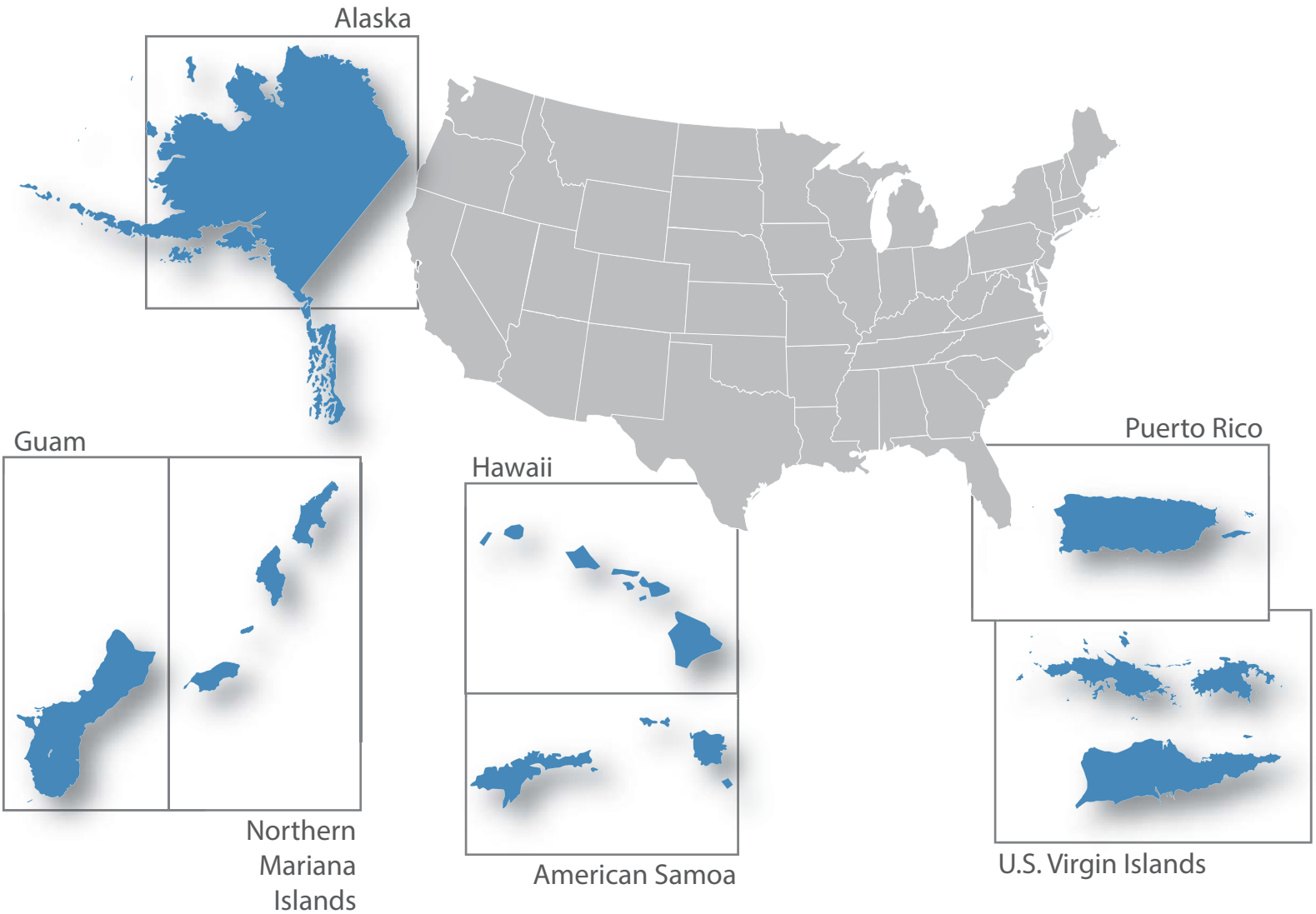

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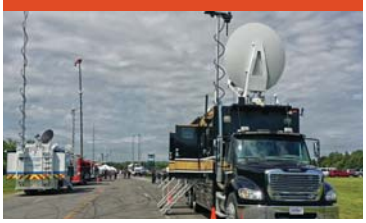

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Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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U.S. Department of Commerce—National Telecommunications and Information Administration
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

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Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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APPENDICES

LIST OF TABLES

LIST OF FIGURES

ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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American Samoa Government, Department of Homeland Security, Pago Pago, AS

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Guam Homeland Security, Department of Civil Defense, Agana Heights, Guam

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U.S. Virgin Islands Department of Planning and Natural Resources, St. Thomas, VI, and Frederiksted, VI
U.S. Virgin Islands State Historic Preservation Office, Kongens Quarter, Charlotte Amalie, St. Thomas, VI

TRIBES AND NATIVE ORGANIZATIONS

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Agdaagux Tribe of King Cove
Akiachak Native Community
Akiak Native Community
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Algaaciq Native Village, St. Mary's, AK
Allakaket Village
Angoon Community Association
Anvik Village
Arctic Village
Asa'carsarmiut Tribe, Mountain Village, AK
Atqasuk Village (Atkasook)
Beaver Village, Beaver, AK
Birch Creek Tribe, Fort Yukon, AK
Central Council of the Tlingit & Haida Indian Tribes, Juneau, AK
Chalkyitsik Village
Cheesh-Na Tribe, Chistochina, AK
Chevak Native Village
Chickaloon Native Village
Chignik Bay Tribal Council
Chignik Lake Village
Chilkat Indian Village (Klukwan), Haines, AK
Chilkoot Indian Association, Haines, AK
Chinik Eskimo Community, Golovin, AK
Chuloonawick Native Village, Emmonak, AK
Circle Native Community
Craig Tribal Association
Curyung Tribal Council, Dillingham, AK
Douglas Indian Association, Juneau, AK
Egegik Village
Eklutna Native Village, Chugiak, AK
Emmonak Village
Evansville Village, Bettles Field, AK
Galena Village (a.k.a. Louden Village)
Gulkana Village
Healy Lake Village, Fairbanks, AK
Holy Cross Village
Hoonah Indian Association
Hughes Village, Hughes, AK
Huslia Village
Hydaburg Cooperative Association
Igiugig Village
Inupiat Community of the Arctic Slope, Barrow, AK
Iqurmiut Traditional Council, Russian Mission, AK
Ivanoff Bay Village, Anchorage, AK
Kaguyak Village, Akhiok, AK
Kaktovik Village (a.k.a. Barter Island)
Kasigluk Traditional Elders Council
Kenaitze Indian Tribe, Kenai, AK
Ketchikan Indian Corporation
King Island Native Community, Nome, AK
King Salmon Tribe
Klawock Cooperative Association
Knik Tribe, Wasilla, AK
Kokhanok Village
Koyukuk Native Village
Levelock Village
Lime Village, McGrath, AK
Manley Hot Springs Village
Manokotak Village
McGrath Native Village
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Native Village of Kiana
Native Village of Kipnuk
Native Village of Kivalina
Native Village of Kluti Kaah, Copper Center, AK
Native Village of Kobuk
Native Village of Kongiganak
Native Village of Kotzebue
Native Village of Koyuk
Native Village of Kwigillingok
Native Village of Kwinhagak, Quinhagak, AK
Native Village of Larsen Bay
Native Village of Marshall (a.k.a. Fortuna Ledge), Marshall, AK
Native Village of Mary's Igloo, Teller, AK
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Native Village of Minto
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Native Village of Napaimute, Anchorage, AK
Native Village of Napakiak
Native Village of Napaskiak
Native Village of Nelson Lagoon
Native Village of Nightmute
Native Village of Nikolski
Native Village of Noatak
Native Village of Nuiqsut (a.k.a. Nooiksut)
Native Village of Nunam Iqua, Sheldon's Point, AK
Native Village of Nunapitchuk
Native Village of Old Harbor
Native Village of Ouzinkie
Native Village of Paimiut, Hooper Bay, AK
Native Village of Perryville
Native Village of Pilot Point
Native Village of Pitka's Point, St. Mary's, AK
Native Village of Point Hope
Native Village of Point Lay
Native Village of Port Graham
Native Village of Port Heiden
Native Village of Port Lions
Native Village of Ruby
Native Village of Saint Michael
Native Village of Savoonga
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Saint Paul Island (See Pribilof Islands Aleut Communities of St. Paul and St. George Island)
Seldovia Village Tribe
Shageluk Native Village
Sitka Tribe of Alaska, Sitka, AK
Skagway Village
South Naknek Village
Stebbins Community Association
Sun'aq Tribe of Kodiak
Takotna Village
Tangirnaq Native Village (a.k.a. Woody Island), Kodiak, AK
Telida Village, Nikolai, AK
Traditional Village of Togiak
Tuluksak Native Community
Twin Hills Village
Ugashik Village, Anchorage, AK
Umkumiut Native Village, Nightmute, AK
Village of Alakanuk
Village of Anaktuvuk Pass
Village of Aniak
Village of Atmautluak
Village of Bill Moore's Slough, Kotlik, AK
Village of Chefornak
Village of Clarks Point
Village of Crooked Creek
Village of Dot Lake
Village of Illiamna
Village of Kalskag
Village of Kaltag
Village of Kotlik
Village of Lower Kalskag
Village of Ohogamiut, Marshall, AK
Village of Red Devil
Village of Salamatoff, Kenai, AK
Village of Sleetmute
Village of Solomon, Nome, AK
Village of Stony River
Village of Venetie
Village of Wainwright
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Yakutat Tlingit Tribe
Yupiit of Andreafski, Saint Mary's, AK

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- History and Culture Branch Chief
- Kaua'i/Ni'ihau Islands Burial Council
- Maui/Lana'i Islands Burial Council
- Molokai Island Burial Council
- Oahu Island Burial Council

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Enid M. Baa Public Library, St. Thomas, VI
Florence Williams Public Library, Christiansted, VI

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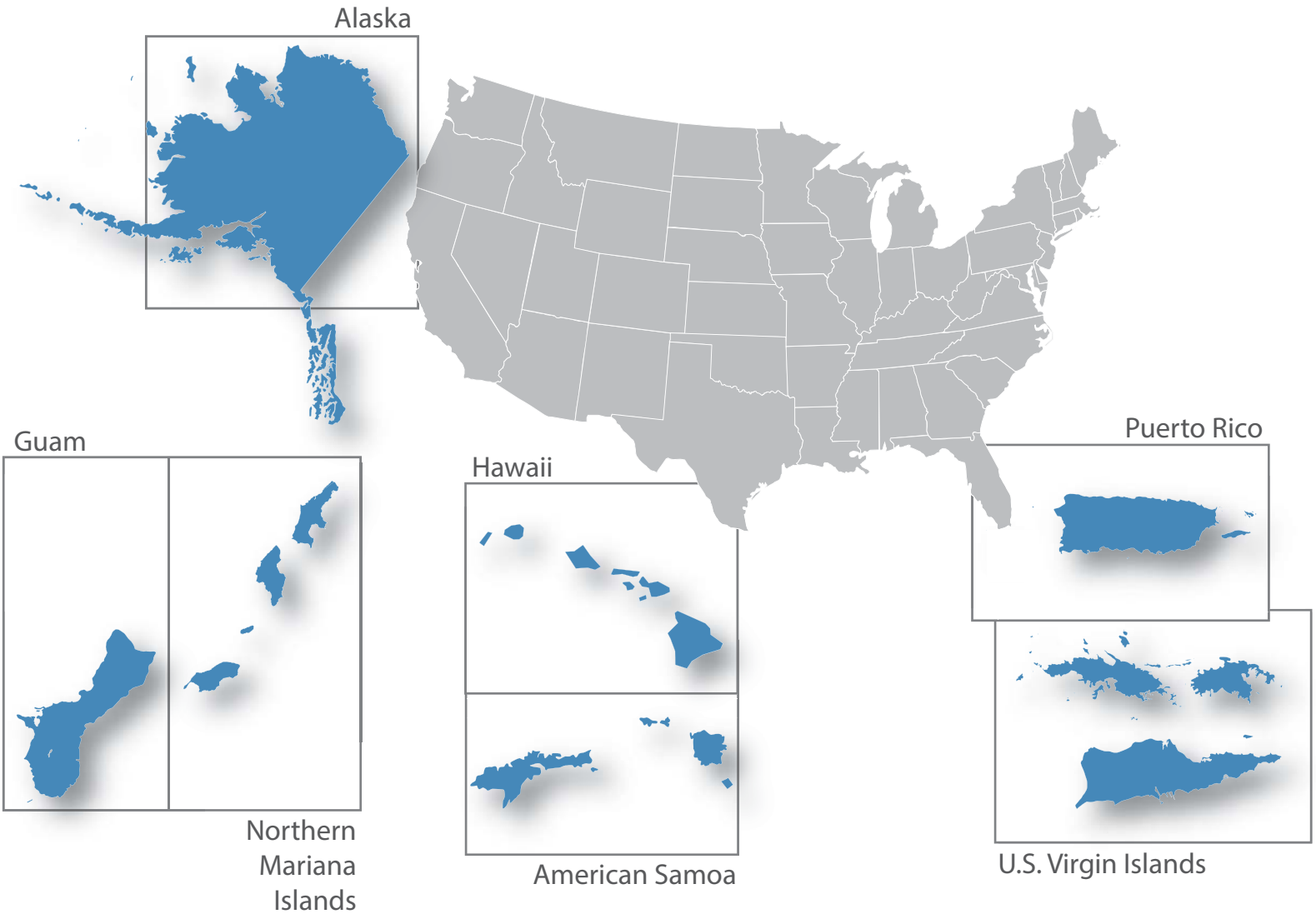

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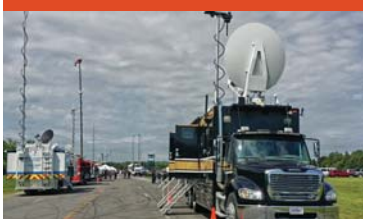

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Volume 8

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U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Commerce—National Telecommunications and Information Administration
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

May 2017

Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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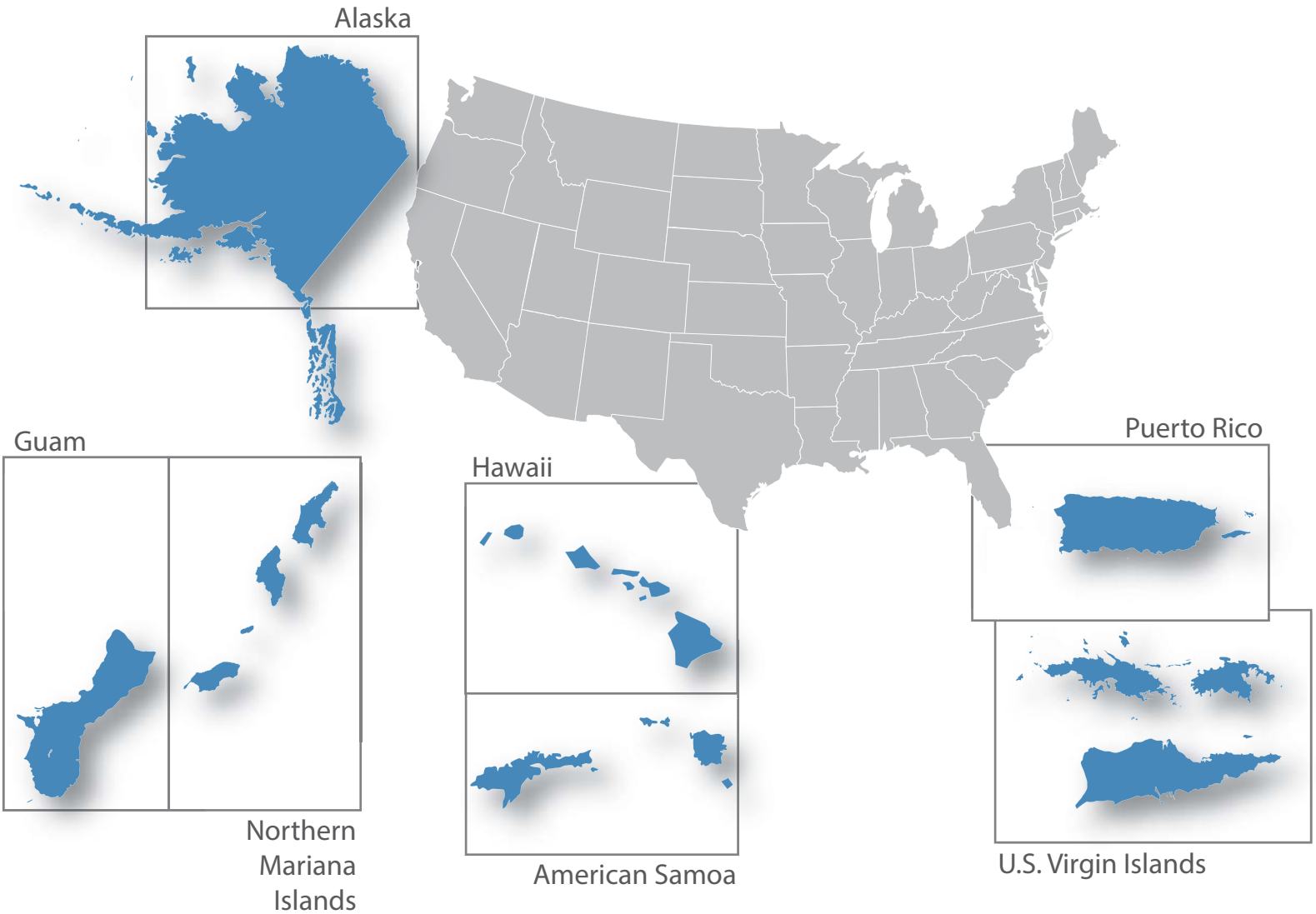

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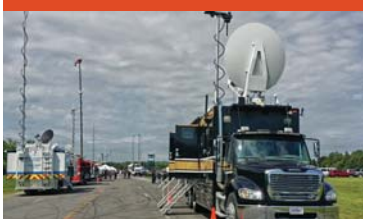

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First Responder Network Authority

Nationwide Public Safety Broadband Network
Final Programmatic Environmental Impact Statement for the Non-Contiguous United States

Volume 8

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Cooperating Agencies
Federal Communications Commission
General Services Administration
U.S. Department of Agriculture—Natural Resource Conservation Service
U.S. Department of Agriculture—Rural Utilities Service
U.S. Department of Agriculture—U.S. Forest Service
U.S. Department of Commerce—National Telecommunications and Information Administration
U.S. Department of Defense—Department of the Air Force
U.S. Department of Energy
U.S. Department of Homeland Security

May 2017

Cover Art Sources:

DVM (Digital Vector Maps). 2007. Blank Puerto Rico Outline. Digital Map. Accessed: April 2017. Retrieved from: http://digital-vector-maps.com/state-maps-detail/2194/Blank-Puerto-Rico-Outline-Adobe-Illustrator.htm

Environmental Resources Management, Inc. 2017. Map artwork: contiguous United States and states of Alaska and Hawaii.

Getty Images. Undated. Maps of Guam, U.S. Virgin Islands, and American Samoa. Accessed: April 2017. Retrieved from: http://www.gettyimages.com/

Marine Mammal Commission. Undated. *Polar bear (Ursus maritimus)*. Uncredited Marine Mammal Commission Photograph. Accessed: February 2017. Retrieved from: https://www.mmc.gov/priority-topics/species-of-concern/polar-bear/

Nakano, Hajime. 2006. *Latte Stones in Latte Stone Park, Hagnata, Guam*. Photograph. Wikimedia Commons. Accessed: March 2017. Retrieved from: https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg <https://upload.wikimedia.org/wikipedia/commons/a/ad/Latte_stones_in_Hagatna.jpg>

NPS (National Park Service). 2016. *Fruit Bat [White-necked Flying Fox (Pteropus tonganus)]*. Uncredited NPS Photograph. Accessed: January 2016. Retrieved from: http://www.nps.gov/npsa/learn/education/fruit-bats-are-our-friends.htm

Tapilatu, R. 2016. *Leatherback Turtle*. Photograph. National Marine Fisheries Service. Accessed: March 2017. Retrieved from: http://www.nmfs.noaa.gov/pr/species/turtles/images/leatherback_r.tapilatu.jpg

U.S. Census Bureau, Department of Commerce. 2012. TIGER/Line Shapefile, Commonwealth of the Northern Mariana Islands. Metadata updated May 17, 2013. Accessed: April 2017. Retrieved from: https://catalog.data.gov/dataset/tiger-line-shapefile-2012-state-commonwealth-of-the-northern-mariana-islands-current-census-tra

USFWS (U.S. Fish and Wildlife Service). 2013a. *Mariana Fruit Bat Pteropus mariannus / Fanihi*. Uncredited USFWS Photograph. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/guam/wildlife_and_habitat/mariana_fruit_bat.html

_____. 2013b. *Nēnē Branta sandvicensis / Hawaiian Goose*. Photograph by Laura Beauregard, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/refuge/Hakalau_Forest/wildlife_and_habitat/nene.html

_____. 2015. *Rota blue damselfly (Ischura luta)*. Photograph by A. Asquith, USFWS. Accessed: January 2016. Retrieved from: https://www.fws.gov/news/ShowNews.cfm?ID=4DA36523-E516-A820-414BB2B0165E7461

_____. 2016. *West Indian Manatee.* Photograph by Keith Ramos, USFWS. Accessed: January 2016. Retrieved from: http://www.fws.gov/southeast/wildlife/mammal/manatee/

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ACRONYMS AND ABBREVIATIONS

°F	degree Fahrenheit
°N	degrees north
µg/m^3	microgram(s) per cubic meter
µPa	micro Pascal
%	percent
A	attained
AAC	Alaska Administrative Code
AAFIS	Alaska Public Safety Identification System
AAQS	Ambient Air Quality Standards
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey (U.S. Census Bureau)
ADEC	Alaska Department of Environmental Conservation
ADFG	Alaska Department of Fish and Game
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AJRCCM	American Journal of Respiratory and Critical Care Medicine
AKNHP	Alaska National Heritage Program
AKOSH	Alaska Occupational Safety and Health
AKWAS	Alaska Warning System
ALMR	Alaska Land Mobile Radio
ANCSA	Alaska Native Claims Settlement Act
ANFIRS	Alaska Fire Incident Reporting System
ANSI	American National Standards Institute
APE	Area of Potential Effect
APLIC	Avian Power Line Interaction Committee
APSIN	Alaska Public Safety Information Network
AQCR	air quality control region
ARFF	Aircraft Rescue and Firefighting
ARMS	Alaska Records Management System
ARPA	Archaeological Resources Protection Act of 1979
AS	Alaska Statute
ASAC	American Samoa Administrative Code
ASCA	American Samoa Code Annotated
ASCMP	American Samoa Coastal Management Program
ASDHS	American Samoa Department of Homeland Security
ASDMWR	American Samoa Department of Marine and Wildlife Resources
ASEPA	American Samoa Environmental Protection Agency
ASHPO	American Samoa Historic Preservation Office
ASPA	American Samoa Power Authority
ATO	Air Traffic Organization
ATWC	Alaska Tsunami Warning Center
AURORA	Alaska Uniform Response Online Reporting Access
BACT	best available control technology
BCE	before Common Era
BCR	Bird Conservation Regions
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLS	U.S. Bureau of Labor Statistics
BMP	best management practice
BRFSS	Behavioral Risk Factor Surveillance System
BSAI	Bering Sea/Aleutian Island
BWG	BioInitiative Working Group
CAA	Clean Air Act
CAB	Clean Air Branch
CARB	California Air Resources Board
CBIA	Coastal Barrier Improvement Act of 1990
CBRA	Coastal Barrier Resources Act of 1982
CCP	Comprehensive Conservation Plan
CDC	Center for Disease Control
CDLNR	Commonwealth Department of Lands and Natural Resources
CE	Common Era
CELCP	Coastal and Estuarine Land Conservation Program
CEPD	Caribbean Environmental Protection Division
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMC	Caribbean Fisheries Management Council
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CHC	Commonwealth Health Center
CIA	Central Intelligence Agency
CMIP3	Coupled Model Intercomparison Project phase 3
CNMI	Commonwealth of Northern Mariana Islands
CNMIAC	Commonwealth of Northern Mariana Islands Administrative Code
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
COMAR	Committee on Man and Radiation

CPA	Commonwealth Ports Authority
CRMP	Coastal Resources Management Program
CSP	Central South Pacific
CUC	Commonwealth Utilities Corporation
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DACA	Deployable Airborne Communications Architecture
DAR	Division of Aquatic Resources (Hawaii)
DAWR	Division of Aquatic and Wildlife Resources (Guam)
dB	decibel(s)
dBA	A-weighted decibel(s)
DBCP	1,2-dibromo-3-chloropropane
dBZ	Z-weighted decibel(s)
DCP	1,2-dichloropropane
DEC	Department of Environmental Conservation
DHHL	Department of Hawaiian Homelands
DLNR	Department of Land and Natural Resources (Hawaii)
DMA	Disaster Mitigation Act of 2000
DNER	Department of Natural and Environmental Resources of Puerto Rico
DOA	Department of Agriculture
DOD	Department of Defense
DOE	U.S. Department of Energy
DOH	Department of Health
DOH-CAB	Hawaii Department of Health, Clean Air Branch
DOT	U.S. Department of Transportation
DPNR	Department of Planning and Natural Resources (U.S. Virgin Islands)
DPS	Department of Public Safety
EA	Environmental Assessment
EAS	Emergency Alert System
EBS	Emergency Broadcast System
EDB	ethylene dibromide
EFH	essential fish habitat
EMS	emergency medical services
ENSO	El Niño/Southern Oscillation
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	effective radiated power
ESA	Endangered Species Act
ESI	Environmental Sensitivity Index
FAA	Federal Aviation Administration
FAD	Fish Aggregating Device
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FirstNet	First Responder Network Authority
FMP	Fishery Management Plan
FPPA	Farmland Protection Policy Act of 1981
FR	Federal Register
ft	feet
g/hp-hr	grams per horsepower-hour
g/mi	grams per mile
GAP	Gap Analysis Program
GCA	Guam Code Annotated
GDA	Guam Department of Agriculture
GEPA	Guam Environmental Protection Agency
GHG	greenhouse gas
GIS	geographic information system
GMP	General Management Plan
GOA	Gulf of Alaska
GRHP	Guam Register of Historic Places
GWP	global warming potential
H_2S	hydrogen sulfide
HDOH	Hawaii Department of Health
HEI	Health Effects Institute
HHCA	Hawaiian Homes Commission Act of 1920
HI-EMA	Hawaii Emergency Management Agency
HIANG	Hawaii Air National Guard
HIARNG	Hawaii Army National Guard
HIHWNMS	Hawaiian Islands Humpback Whale National Marine Sanctuary
HIOSH	Hawaii Occupational Safety and Health Division
hp	horsepower
HRD	(Guam) Historic Resources Division
HRHP	Hawaii Register of Historic Places
HRS	Hawaii Administrative Rules, Revised Statute
HTA	Hawai'i Tourism Authority
HUC	hydrologic unit code
I/M	Inspection/Maintenance
IARC	International Agency for Research on Cancer
IBA	Important Bird Area
IEEE	Institute of Electrical and Electronics Engineers
IFC	International Finance Corporation
in	inches
IPCC	Intergovernmental Panel on Climate Change
IR	ionizing radiation
ITCZ	Intertropical Convergence Zone
IUCN	International Union for Conservation of Nature
kg/gal	kilograms per gallon
KIRC	Kaho'olawe Island Reserve Commission

LAER	lowest achievable emission rate
lb/day	pounds per day
lb/hp-hr	pounds per horsepower-hour
LBJ	Lyndon B. Johnson
Ldn	day-night average sound level
Leq	equivalent noise levels
LNG	liquefied natural gas
LTE	Long Term Evolution
$\mu g/m^3$	microgram(s) per cubic meter
µPa	micro Pascal
m/s	meter per second
MBTA	Migratory Bird Treaty Act
mg/m^3	Milligram(s) per cubic meter
mgd	million gallons per day
MHz	megahertz
MLRA	Major Land Resource Area
mm/s	millimeters per second
MMPA	Marine Mammal Protection Act
MOA	Memorandum of Agreement
MPA	Marine Protected Area
mph	miles per hour
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MTR	Military Training Route
MUID	Map Unit Identification Data
MW	megawatt
mW/cm^2	milliwatts per centimeter squared
N	north; not attained
N_2O	nitrous oxide
NA	not applicable; not assessed
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NANSR	Nonattainment New Source Review
NAWAS	National Warning System
NCA	National Climate Assessment
NCD	non-communicable disease
NCDC	National Climatic Data Center
NCN	no common name
NCRP	National Council on Radiation Protection and Measurements
ND	no data
NE	northeast
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFIP	National Flood Insurance Program
NFIRS	National Fire Incident Reporting System
NHPA	National Historic Preservation Act
NIR	non-ionizing radiation
NMFS	National Marine Fisheries Service
NMHC	non-methane hydrocarbon compounds
NMOG	non-methane organic compounds
NNE	north-northeast
NOAA	National Oceanic and Atmospheric Administration
NOx	nitrogen oxides
NP	National Park
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NPSBN	nationwide public safety broadband network
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NTIA	National Telecommunications and Information Administration
NVSR	National Vital Statistics Report
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
NWWS	National Weather Wire Satellite System
OHA	Office of History and Archaeology
OIA	Office of Insular Affairs (USDI)
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAG	Port Authority of Guam
PAHO	Pan American Health Organization
PCB	polychlorinated biphenyl
PCP	pentachlorophenol
PCS	Personal Communications Service
PDO	Pacific Decadal Oscillation
PEIS	Programmatic Environmental Impact Statement
PL	Public Law
PM	particulate matter
PM_{10}	particulate matter up to 10 micrometers in diameter
$PM_{2.5}$	particulate matter up to 2.5 micrometers in diameter
POPs	points of presence
ppm	parts per million
PRDNER	Puerto Rico Department of Natural and Environmental Resources
PREQB	Puerto Rico Environmental Quality Board
PR OSHA	The Puerto Rico Occupational Safety and Health Administration
PRASA	Puerto Rico Aqueduct and Sew Authority
PREPA	Puerto Rico Electric Power Authority
PRSHPO	Puerto Rico State Historic Preservation Office
PSD	Prevention of Significant Deterioration
PUAG	Public Utility Agency of Guam
Pub. L.	Public Law

PV	photovoltaic
RAN	radio access network
RCP	Representative Concentration Pathway
RCRA	Resource Conservation and Recovery Act
RF	radio frequency
RIN	Regulation Identification Number
rms	root mean square
ROW	right-of-way
SAAQS	State Air Quality Standards
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act:A Legacy for Users
SARA	Superfund Amendments and Reauthorization Act of 1986
SE	Standard of Error
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	sea level rise
SMA	Special Management Area
SMS	Scenery Management System
SO_2	sulfur dioxide
SOx	sulfur oxides
SPCC	Spill Prevention, Control, and Countermeasure
SPCZ	South Pacific Convergence Zone
SPOC	State Single Point of Contact
SRES	Special Report on Emission Scenarios
SSA	sole source aquifer
STATSGO2	State Soil Geographic [Database]
SW	southwest
TAAQS	Territory Ambient Air Quality Standards
TCP	traditional cultural property
TEMCO	Territorial Emergency Management Coordinating Office
TMDL	Total Maximum Daily Load
TOC	total organic compound
tpy	tons per year
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
U.S.	United States
UAMES	University of Alaska Museum Earth Sciences
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGCRP	U.S. Global Climate Change Research Program
USGS	U.S. Geological Survey
USVIDOH	U.S. Virgin Islands Department of Health
USVIPD	U.S. Virgin Islands Police Department
UVA	University of Virginia
VdB	vibration decibel(s)
VIC	Virgin Islands Code
VIPA	Virgin Islands Port Authority
VISHPO	Virgin Islands State Historic Preservation Office
VOC	volatile organic compound
vog	volcanic smog
VRM	Visual Resource Management
W	watt(s)
W/m^2	watts per meters squared
WAPA	Water and Power Authority
WHO	World Health Organization
WIMARCS	West Indies Marine Animal Research and Conservation Science
WNP	Western North Pacific
WNW	west-northwest
WPC	watts per channel
WPRFMC	Western Pacific Regional Fishery Management Council

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18. GLOSSARY

Terms are defined within the context of this Programmatic Environmental Impact Statement.

aeolian: An environment where wind is the major agent of sediment deposition.

agroecosystems or agroforestry: Land use management system in which trees or shrubs are grown around or among crops or pastureland.

alluvial fan: Sediment or debris in a fan shape deposited by streams and rivers.

alluvial valleys: Valleys formed by rivers.

alluvium: Sediment (clay, silt, sand, and/or gravel) deposited by flowing streams in a river valley.

alvar: A biological environment of naturally open areas of thin soil over limestone or marble bedrock, distinguished by a vegetation community that includes a number of rare plants.

ammonia slip: An industry term for ammonia passing through the Selective Catalytic Reduction system un-reacted. This occurs when ammonia is over-injected into a gas stream, temperatures are too low for ammonia to react, or the catalyst has degraded.

anadromous fish: Fish born in freshwater that migrate to the ocean to grow as adults, and then return to freshwater to spawn.[1]

anchialine pools: Enclosed, landlocked waterbodies or ponds with an underground connection to both fresh and salt water.[2]

anthropogenic: Changes caused by humans.

aquatic: Of or related to water.

aquifer: An underground layer of water-bearing permeable rock, rock fractures, or unconsolidated sediments from which groundwater can be extracted using a water well.

arthropod: Arthropods are invertebrate animals that have segmented bodies and jointed appendages, such as insects, spiders, and crustaceans.

attainment area: Any area that meets the national primary or secondary ambient air quality standard for the pollutant.

avifauna: The birds of a particular region, habitat, or geological period.

backhaul capacity: The ability of a network to transfer data from a radio base station or cell site to a larger core network. These connections are typically made via fiber optic cable and microwave technology.

benthic: Anything associated with or occurring on the bottom of a body of water.

[1] NOAA (National Oceanic and Atmospheric Administration). 2006. *Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

[2] NOAA (National Oceanic and Atmospheric Administration). 2006. *Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

binge drinking: More than five drinks on one occasion for adult men and more than four drinks on one occasion for adult women.[3] See also heavy alcohol consumption.

biology (soils): The presence/absence of vegetation in soils that affects the soil's organic content quantity.

biophysical settings: Settings that represent the areas of vegetation that dominates a landscape without human disturbance.

bioretention: Bioretention is a structural storm water control measure that captures and temporarily stores storm water runoff using soils and vegetation in shallow basins or landscaped areas to provide enhanced removal of dissolved storm water pollutants, including nutrients, pesticides, organics, metals, and biological constituents.

bivalve: An aquatic mollusk with a hinged shell that encloses an invertebrate body.

bog: Wet, spongy ground with soil composed mainly of decayed vegetable matter.

boreal forest: Forest that consists primarily of spruces, pines, and larches.

breeding area: The area used by an organism to reproduce and to rear its offspring.

bycatch: Unintentional capture/injury/entanglement of unwanted species during commercial fishing (e.g., a shark captured in a seine net targeting salmon).

calcareous: Of or containing calcium carbonate, calcium, or limestone, or occurring on limestone.

candidate species: A species officially nominated for listing as threatened or endangered, according to the Endangered Species Act.

carbon sink: Carbon sinks occur when natural processes absorb more carbon dioxide than they release. Examples of natural processes that serve as carbon sinks include forests, soils, oceans, and vegetation.

catadromous: An organism that lives in fresh water and travels to the sea to spawn.

cays: Small, low-elevation, sandy islands on the surface of a coral reef.

cetacean: An order of marine mammals commonly known as whales, dolphins, and porpoises.

Chamorro: Indigenous people of the Mariana Islands, including Guam and the Northern Mariana Islands.

chikungunya: A mosquito-borne disease.

cistern: An artificial reservoir, usually underground used to store water.

Class I Areas: National parks and wilderness areas in attainment or unclassifiable areas that exceed 5,000 acres in size and were in existence on August 7, 1977.

climate (soils): Chemical changes in parent material occur slowly in low temperatures. Hot temperatures evaporate moisture, which facilitates chemical reactions within soils. The highest degree of reaction within soils occurs in temperate, moist climates.

[3] Centers for Disease Control. 2016. *Excessive Alcohol Use: Preventing a Leading Risk for Death, Disease, and Injury*. Accessed: November 11, 2016. Retrieved from: https://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2015/alcohol-aag.pdf

commercial fishery: The whole process of catching and marketing fish and shellfish for sale.

confined aquifers: Layers of groundwater that are generally bound above and below with impermeable layers of rock or sediment. Unconfined aquifers are not bound by such layers.

congregatory: The behavior of gathering in groups.

coral bleaching: The stress response of corals releasing the photosynthetic plankton, known as Zooxanthellae, leading to coral bleaching.[4]

county equivalent: The U.S. Census Bureau terminology for a geographic area that functions as a unit of state government, even if it is not formally known as a county.

covered haul system: A covered haul system involves water "piped into the carrier vehicle, withdrawn by similar mechanism into the user's cistern, and in most cases, piped again from cistern to faucet."[5]

critical habitat: An area essential to the conservation of an endangered or threatened species that is designated by a governmental entity and that may require special management considerations or protection.

crustaceans: A group of freshwater and saltwater invertebrates with jointed legs and a hard shell of chitin (e.g., shrimps, crabs, lobsters, and crayfish).[6]

decapods: Types of crustaceans. Common crustacean examples include crayfish, crabs, and lobsters.

deciduous: Plants that shed certain structures such as leaves seasonally or at a given stage in development.

degradation: A reduced capacity of the environment to meet social or ecological objectives or needs.

demersal: Species that live and/or feed on or near the sea floor.

dengue: A mosquito-borne disease.

depredating bird: A bird that causes resource damage, economic loss, or a threat to health or human safety.

dimension stone: Natural rock material quarried for the purpose of obtaining blocks or slabs that meet specifications as to size and shape.

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[4] National Oceanic and Atmospheric Administration. 2006. *NOAA Fisheries Glossary.* NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

[5] U.S. Environmental Protection Agency. 1998. *Applicability of the Safe Drinking Water Act to Water Haulers*. Accessed September 17, 2015. Retrieved from: http://nepis.epa.gov/Exe/ZyNET.exe/P100NBCV.TXT?ZyActionD=ZyDocument&Client=EPA&Index=1995+Thru+1999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C95thru99%5CTxt%5C00000036%5CP100NBCV.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL (updated January 2016)

[6] National Oceanic and Atmospheric Administration. 2006. *NOAA Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/SPO-69. October 2005. Revised Edition, June 2006.

direct effect: Effects that physically alter a historic property in some way.

ecoregion: An ecological area that is relatively homogeneous in climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.

ecosystem: A biological community of interacting organisms together with their physical environment.

endangered species: According to the Endangered Species Act, the term *endangered species* means any species in danger of extinction throughout all or a significant portion of its range. This does not include species of the Class Insecta determined by the Secretary of the Interior to constitute a pest whose protection under the provisions of the Endangered Species Act would present an overwhelming and overriding risk to humans.

endemic: Species that are only found in one area or region. Also, (of a disease or condition) regularly found among particular people or in a certain area.

energetic (climate change): Refers to strength and amplification in oscillations.

ephemeral stream: Ephemeral streams carry water only as a result of precipitation (any time of year).

epiphytic: Plants living on, or attached to, another plant.

ermine: A small carnivorous short-tailed weasel.

erosion control blanket: Biodegradable or synthetic sheet-like materials that are rolled out onto disturbed areas to protect soil from wind and water erosion.

estuarine: See estuary.

estuarine emergent wetlands: Coastal wetlands dominated by herbaceous vegetation where salt water from the sea mixes with rivers and streams.

estuarine intertidal: Coastal areas usually semi-enclosed by land but have open partially obstructed access to open ocean. Water is partially diluted by freshwater runoff.

estuary: Coastal areas where salt water from the sea mixes with rivers and streams, and may also be called bays, harbors, inlets, or lagoons.

ethnographic: The systematic study of people and cultures, generally designed to explore culture from the point of view of the subject of the study.

eutrophication: A process where waterbodies receive excess nutrients that stimulate excessive plant growth.

evapotranspiration: The sum of evaporation and plant transpiration from the Earth's land and ocean surface to the atmosphere

exotic species: A plant or animal species introduced from another geographic area that is not native to the area.

expansive soils: Soils that include clay materials that swell when they absorb water and shrink when dry, leaving voids in the soil.

extant: A species still in existence.

extinction: The state or process of a species' disappearance from part or all of its range.

extirpated: Cease to exist in the geographic area of study.

fern allies: Plants similar to true ferns but have different leaf structures, if they have leaves at all.

forams (Foraminifera): Single-celled organisms with shells.

freshwater-lens systems: Systems where freshwater floats on saltwater separated by a transition zone of brackish water found in areas where groundwater is not held up by impermeable barriers.

frugivorous: Animals that eat primarily fruit.

furbearers: Mammal species traditionally trapped or hunted for their fur, such as marten, lynx, wolverine, and beaver.

geology: An interdisciplinary science with a focus on the following aspects of earth sciences: geologic hazards and disasters, climate variability and change, energy and mineral resources, ecosystem and human health, and groundwater availability.

germanium: A mining byproduct associated with zinc production.

gestation: The period of development from conception to birth.

glacial: Relating to, or resulting from, the presence or effects of glaciers and ice sheets.

Guamanians: The native peoples of Guam.

guts: Narrow coastal water channels usually subject to strong tidal currents flowing back and forth.[7]

habitat: The natural environment where an organism lives, including its biological and physical surroundings.

hard ground conditions: A hard site exists where noise travels away from the source over a generally flat, hard surface such as water, concrete, hard-packed soil, or other ground surfaces having a low porosity. These are examples of reflective ground, where the ground does not provide any attenuation. The standard attenuation rate for hard site conditions is 6 A-weighted decibels (dBA) per doubling of distance for point source noise (e.g., power generators, most construction activities, etc.) and 3 dBA per doubling of distance for line sources (e.g., highway traffic, conveyor belt, etc.).[8]

harvesting: The act or process to take or kill wildlife for food, sport, or population control; to gather crops for consumption or sale.

haulouts: Areas of land or ice where seals and walrus come ashore to rest, molt, or breed.

[7] University of Virgin Islands. 2009. *Waves of Change: A Resource for Environmental Issues in the U.S. Virgin Islands*. University of the Virgin Islands Center for Marine and Environmental Studies, Virgin Islands Marine Advisory Service. Accessed: May 2015. Retrieved from: ftp://ftp.nodc.noaa.gov/pub/data.nodc/coris/library/NOAA/other/waves_change_envir_resource_usvi.pdf

[8] Washington State Department of Transportation. 2015. *Biological Assessment Preparation for Transportation Projects - Advanced Training Manual*. Version 02-2015. February 2015. Accessed: June 2015. Retrieved from: http://www.wsdot.wa.gov/Environment/Biology/BA/BAguidance.htm#manual

haze: A condition caused when sunlight encounters tiny pollution particles in the air. Some light is absorbed by particles; other light is scattered away before it reaches an observer. More pollutants mean more absorption and scattering of light, which reduce the clarity and color of what we see. Some types of particles, such as sulfates, scatter more light, particularly during humid conditions.

heavy alcohol consumption: Drinking five or more drinks on the same occasion on each of five or more days in the past 30 days. See also binge drinking.

heavy drinking: More than two drinks per day for adult men and more than one drink per day for adult women.[9]

herbaceous: Plants that do not have woody stems.

herbivorous: Animals that eat primarily plants.

hibernacula: Habitats within which animals hibernate or otherwise seek refuge for extended periods.

highly migratory: Pelagic, or open-water, species that have a wide geographic distribution, both inside and outside countries' 200-mile zones, and that undertake migrations of significant but variable distances across oceans for feeding or reproduction.

historic property: An historic property is defined as any "prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register [of Historic Places] including artifacts, records, and material remains related to such a property or resource" (*16 USC § 470(w)(5)*).

hookah: A basic form of surface-supplied diving in which the air supply is via a single hose.

hotspot (geology): A location where plumes of hot rock rise from within the Earth toward the surface. Lower pressures toward the surface allow rock to melt, which can result in molten rock, volcanism, and lava flows.

human environment: The natural and the physical (e.g., structures) environment, and the association of people and their activities to those environments.

human health and safety: The existing environment for health and safety is defined by occupational and environmental hazards likely to be encountered during the construction, operation, and maintenance of towers, antennas, cables, utilities, and other equipment and infrastructure at existing and potential FirstNet telecommunication sites.

hydrology: The properties of water movement and distribution via precipitation, runoff, storage, and evaporation, especially in relation to land.

ice floe: A sheet of floating ice where walrus calves are typically born.

[9] Centers for Disease Control. 2016. *Excessive Alcohol Use: Preventing a Leading Risk for Death, Disease, and Injury*. Accessed: November 11, 2016. Retrieved from: https://www.cdc.gov/chronicdisease/resources/publications/aag/pdf/2015/alcohol-aag.pdf

Indian tribe: The National Historic Preservation Act of 1966 defines and Indian tribe as "an Indian tribe, band, nation, or other organized group or community, including a Native village, Regional Corporation or Village Corporation, as those terms are defined in section 3 of the Alaska Native Claims Settlement Act (*43 USC § 1602*), which is recognized as eligible for the special programs and services provided by the United States to Indians because of their status as Indians" (*16 USC § 470(w)*).

indirect effect: Effects that are further removed in time or space and diminish some aspect of the historic property, but may not physically alter it.

inferred properties (soils): Soil properties that are inferred from the combined data of soil science and other disciplines such as meteorology.

infiltration basins: Infiltration basins (also known as recharge basins) are considered a treatment BMP because they can remove pollutants from surface discharges by capturing the storm water runoff volume (typically, larger volumes than an infiltration trench) and infiltrating it directly to the soil rather than discharging it to an aboveground drainage system.

informed siting of Proposed Action features: Refers to the act of locating activities or features in areas that do not support listed species or their known habitats.

infrastructure: Consists of the systems and physical structures that enable a population in a specified area to function. Infrastructure includes a broad array of facilities such as utility systems, streets and highways, railroads, airports, buildings and structures, ports, harbors, and other manmade facilities.

injurious wildlife: Any animal species or subspecies (except game birds or game mammals) known to be harmful to agriculture, aquaculture, indigenous wildlife or plants, or constituting a nuisance or health hazard, as listed in the *List of Species of Injurious Wildlife in Hawaii, Exhibit 5, Chapter 13-124,* State of Hawaii, Division of Forestry and Wildlife.

insectivorous: To feed on insects, worms, and other invertebrates.

intermittent stream: Streams that carry water for part of the year (generally winter and spring).

invasive species: Introduced species that out-compete native species for space and resources.[10]

island arc: A type of archipelago with an arc-shaped alignment. Island arcs are typically of volcanic origin.

jurisdictional wetlands: Jurisdictional wetlands are wetlands that are found to be "waters of the U.S." per definitions presented in the Clean Water Act, and are thus under the jurisdiction of the U.S. Army Corps of Engineers.

juvenile: An organism that has not reached sexual maturity.

karst: Terrain with distinctive landforms and hydrology created from soluble rock dissolution and characterized by springs, caves, sinkholes, and unique hydrogeology.[11]

[10] National Oceanic and Atmospheric Administration. 2006. *NOAA Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/SPO-69. October 2005. Revised Edition, June 2006.

[11] U.S. Geological Survey. Undated. *USGS Groundwater Information–What is Karst?* Accessed: August 28, 2015. Retrieved from: http://water.usgs.gov/ogw/karst/pages/whatiskarst

Kona winds: Kona winds are stormy, rain-bearing winds that blow over the Hawaiian Islands from the southwest or south-southwest in the opposite direction of trade winds. Kona winds occur when a low-pressure center is within 500 miles northwest of the islands. Although strong, Kona winds usually do not last for more than a day or so.

lagomorphs: Gnawing mammals that feed on plants and have fully furred feet and two pairs of incisors in the upper jaw.

land subsidence: The downward settling or sudden sinking of the Earth's surface.

land use/land cover: Refers to the use of land, as visible from the air (or satellites).

landslide: Refers to processes that lead to the downhill movement of earth materials due to gravity and other forces.

lane miles: Refers to the length of a roadway multiplied by the number of traffic lanes.[12]

latte: Large limestone or basalt pillars topped with a capstone.

lava tubes: Lava tubes are natural conduits through which lava travels beneath the surface of a lava flow.[13]

leeward: On the side sheltered from the wind (downwind).

life cycle: The continuous sequence of an organism's development.

limestone: A sedimentary rock consisting of calcium carbonate that can be deposited either by direct precipitation out of sea water or by biochemical processes such as coral reefs that secrete calcium carbonate as part of their structure.

limiting distance: Distances beyond which an adverse effect would not occur.

listed wildlife: Any animal listed as threatened or endangered by federal or state agencies.

littoral: Refers to shore or near-shore areas.

maintenance area: An area that was previously in nonattainment, but has met the national primary or secondary ambient air quality standards for the pollutant, and has been designated as in attainment.

mammal: A warm-blooded vertebrate that gives birth to, and nurses, live young; has highly evolved skeletal structures; is covered with hair at some stage of development; and has two pairs of limbs (except some aquatic mammals).

manganese nodules: Nodular concretions of manganese and iron oxides that occur on the ocean floor as a result of direct precipitation of minerals from seawater.

manholes: A small covered opening in a street or other surface that allows a person access, usually to utilities. Manholes may be used for telecommunications activities, especially in cities and urban areas, depending on the location of other utilities; in cities, utility lines are often co-located.

[12] Rulebase Foundation. 2015. *Lane Miles Definition*. Accessed: September 2, 2015. Retrieved: from: https://definedterm.com/lane_miles

[13] U.S. Geological Survey. 2015e. *Volcano Hazards Program. Glossary–Lava Tube*. Accessed August 28, 2015. Retrieved from: http://volcanoes.usgs.gov/vsc/glossary/lava_tube.html

marine: Of, or relating to, the sea.

marine debris: Any manmade object discarded, disposed of, or abandoned that enters the marine environment.

marine intertidal: Areas of open ocean associated with high energy coastline where the substrate is exposed and flooded by tides.[14]

masonry cement: A mix, typically of Portland cement, hydrated lime, and other materials used to improve the water retention and workability of cement in masonry work.

maternity roosts: Locations where bats congregate to birth and rear young. Maternity roosts are often located in trees, under manmade structures (e.g., bridges, rooftops, etc.), or in caves.

mesic soil: A medium-wet soil condition.

metamorphic processes: A process that involves profound physical and or chemical change in rocks due to heat and pressure.

montane: Mountainous areas.

montane bogs: bogs occurring in mountainous regions.

moraine: Unstratified and unsorted sediment deposits formed through direct action of, or contact with, glacier ice. Many different varieties are recognized depending on their position with respect to a glacier.

muskeg: North American swamp or bog consisting of a mixture of water and partly dead vegetation, frequently covered by a layer of sphagnum or other mosses.

Native Hawaiian: The National Historic Preservation Act of 1966 defines Native Hawaiian as "any individual who is a descendant of the aboriginal people who, prior to 1778, occupied and exercised sovereignty in the area that now constitutes the State of Hawaii" (*16 USC § 470(w)(17)*).

Native Hawaiian Organization: The National Historic Preservation Act of 1966 defines a Native Hawaiian organization as "any organization which serves and represents the interests of Native Hawaiians; has as a primary and stated purpose the provision of services to Native Hawaiians; and has demonstrated expertise in aspects of historic preservation that are significant to Native Hawaiians. The term includes, but is not limited to, the Office of Hawaiian Affairs of the State of Hawaii and Hui Malama I Na Kupuna O Hawai'i Nei, an organization incorporated under the laws of the State of Hawaii" (*16 USC § 470 (w)(18)*).

noise: A form of sound caused by pressure variations that the ear can detect; often defined as unwanted sound.

nonattainment area: Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant.

[14] Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service Report No. FWS/OBS/-79/31*. Washington, D.C.

nonpoint source pollution: Any source of water pollution that does not meet the legal definition of "point source", and includes runoff from rain or snowmelt that picks up natural and manmade pollutants, such as fertilizers, oils, salt, bacteria, and others that are eventually deposited into lakes, rivers, streams, wetlands, coastal water, and groundwater (*33 USC § 1251 et seq.*).

noxious plant: As defined in the Federal Noxious Weed Act of 1974, a noxious plant is any living stage (e.g., seeds and reproductive parts) of any parasitic or other plant of a kind, or subdivision of a kind, which is of foreign origin, is new to, or not widely prevalent in, the U.S., and can directly or indirectly injure crops, other useful plants, livestock, poultry, other interests of agriculture including irrigation, navigation, U.S. fish and wildlife resources, or public health.

obligate: Means "by necessity"; restricted to one particularly characteristic life mode.

ocean convergence zone: The relatively horizontal flow of ocean water toward a common destination from different directions. When ocean waters come together at a point or along a line (convergence line), the denser water coming from one direction sinks under the lighter water coming from the other direction. The ocean convergence lines include the polar, subtropical, tropical, and equatorial.

orographic effect: A change in atmospheric conditions caused by a change in elevation, primarily due to mountains.

outwash: The deposit of sand, silt, and gravel formed below a glacier by meltwater streams and rivers. An outwash plain is an extensive, relatively flat area of these glacial deposits.

Pacific plate: A tectonic plate located within portions of the Pacific Ocean.

paleontological resources: Fossils that are the physical remains of plants and animals that have mineralized into or left impressions in solid rock or sediment.

palustrine emergent wetland: All nontidal wetlands dominated by persistent herbaceous plants, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand.

palustrine wetlands: Wetlands that include all nontidal wetlands dominated by trees, shrubs, persistent emergent, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 parts per thousand.

parent material: The original geologic source material from which a soil has formed; parent material influences soil properties, including color, texture, and ability to hold water.

passerines: An order of "perching" birds that have four toes, three facing forward and one backward, which allows the bird to easily cling to both horizontal and nearly vertical perches.

pelagic: Anything that inhabits the water column as opposed to being associated with the sea floor, generally occurring anywhere from the surface to 1,000 meters.[15]

peneaeid shrimp: A family of marine crustacean that includes some of the most commercially valuable species (e.g., tiger prawn).

[15] NOAA (National Oceanic and Atmospheric Administration). 2006. *NOAA Fisheries Glossary.* NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

perched groundwater: An aquifer that occurs above the regional water table, separated by an impermeable or relatively impermeable layer of rock or sediment.

perennial stream: Streams that normally have surface flow year-round in all or part of their course. Non-perennial streams are normally dry during part of the year.

permeability: A property of a material that allows liquids or gases to pass through it.

phenology: The seasonal changes in plant and animal life cycles, such as emergence of insects or migration of birds.

photic zone: Zone within which light penetrates below the ocean surface.

physiography: Refers to the description of the Earth's landforms and surface features.

piggery: Pig farms.

pinniped: Widely distributed and diverse group of fin-footed, semiaquatic marine mammals; commonly known as seals.

plant associations: Plant communities of a specific type (or types) and geography (or geographies).

plateau: A large area of elevated plain, tableland, or flat-topped region.

plutonic rocks: Rocks formed from cooling magma below the Earth's surface.

point source pollution: Section 502 (14) of the Clean Water Act defines point source pollution as pollution that comes from "any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged."

points of presence: Connections or access points between two different networks, or different components of one network.

population: Interbreeding organisms occupying a certain space; the number of people or other living creatures in a designated area.

Portland cement: Cement that is made from limestone and clay that turns to a paste and hardens with water.

predation: The relationship between two organisms of different species in which one of them acts as predator that captures and feeds on the other organism that serves as the prey.

predatory open-access journal: Predatory journals are issued by publishers that "are characterized by various levels of deception and lack of transparency in their operations…they may claim a stringent peer-review where none really exists".[16] Open access journals are available online and require no fee or membership; they are accessible to anyone who has access to the internet.

prehistoric sites: The physical evidence of human activity that occurred prior to European contact.

[16] Elliott, Carl. 2012. *On Predatory Publishers: a Q&A with Jeffrey Beall*. Brainstorm Blog--The Chronicle of Higher Education. June 5, 2012. Accessed: June 2016. Retrieved from: http://www.chronicle.com/blogs/brainstorm/on-predatory-publishers-a-qa-with-jeffrey-beall/47667

Prevention of Significant Deterioration increment: The maximum allowable increase in pollutant concentration that is allowed to occur above a baseline concentration for a pollutant.

prime farmland: Land that possesses the required characteristics for producing food, feed, fiber, and oilseed crops.

procellariiform: An order of seabirds that includes albatrosses and petrels.

proposed species: Species that have been proposed for listing as threatened or endangered in the *Federal Register* after the completion of a status review and consideration of other protective conservation measures.

public safety answering points: Call centers responsible for answering calls to an emergency telephone number for police, fire, and emergency medical services.

public safety entity: An entity that provides public safety services (*47 USC § 1401(26)*).

public safety infrastructure: Any infrastructure used by a public safety entity as defined in the Middle Class Tax Relief and Job Creation Act of 2012, including infrastructure associated with police, EMS, and fire services.

pupping grounds: Sites where marine mammals birth and rear their young.

radiant flux: The amount of energy per unit time radiated from a source.

radiative forcing index: Radiative forcing is the difference between the radiation absorbed by Earth and the energy reflected back to space.

radio frequency emissions: Refers to radio frequency radiation emitted by devices.

radio frequency radiation: "Electromagnetic radiation in the frequency ranges 3 kilohertz (kHz) - 300 Megahertz (MHz), and 300 MHz - 300 gigahertz (GHz), respectively."[17]

recovery: A population or community's partial or full return to a previous condition before a stressor was introduced.

recreational fishery: Fishing when the catch is for personal use, pleasure, or competition.

recruitment: The number of new individuals reaching reproductive age in a given population over a given time interval (typically measured over a year).

redundancy: The duplication of equipment or processes to help maintain continuity of operations.

refugia: An area of stable environmental conditions that protects wildlife and organisms from environmental change.

Rhus: A specific genus of vines, shrubs, or small trees native to temperate and warm regions.

riparian zone: Areas near wetlands, rivers, or streams.

rock ripping: The breakup and removal of rock material with heavy equipment such as an excavator.

runup: The height the wave reaches above sea level before washing to shore.

[17] Occupational Health and Safety Administration. Undated. *Radiofrequency and Microwave Radiation*. Retrieved from: https://www.osha.gov/SLTC/radiofrequencyradiation/

rutting (soil): Soil indentations caused by equipment operation in moist conditions or in soils with lower bearing strength. See soil rut.

sedimentary rocks: Rocks formed by the deposition of material at the Earth's surface and within bodies of water.

Selective Catalytic Reduction: Add-on nitrogen dioxides control placed in the exhaust stream following the engine and involves injecting ammonia into the flue gas. The ammonia reacts with the nitrogen dioxides in the presence of a catalyst to form water and nitrogen.

sessile: Unable to move; attached to the substrate.[18]

shield volcano: A volcano that is above the ocean surface, has broad and gentle slopes, and is composed of fluid basalt.

short ton: One short ton is equal to 2,000 pounds.

silt curtain: Floating barrier used in marine construction, dredging, and remediation to control silt and sediment in a body of water.

silt fence: Designed to trap sediment in the area where construction or soil disturbance is taking place to minimize or avoid soil erosion and sedimentation. The fence is typically 2- to 3-feet tall, buried 8 to 12 inches into the soil, and secured with stakes.

Sirenian: An order of fully aquatic, herbivorous mammals that inhabit swamps, rivers, estuaries, marine wetlands, and coastal marine waters.

site fidelity: The tendency of an animal to return to a previously occupied location.

sky glow: The overall diffusion of artificial light into the sky.

smolt: A young fish undergoing its first migration from freshwater to the ocean.

soarer: A bird that flies to a considerable altitude and maintains elevation without moving its wings by using ascending air currents.

soft ground conditions: A soft site exists where noise travels away from the source over porous ground or normal unpacked earth capable of absorbing noise energy such as grass, trees, or other ground surfaces suitable for the growth of vegetation, such as farmland.

soil rut: A sunken track or groove made by vehicle or equipment activity. See rutting.

sole-source aquifer: An aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer.

species diversity: An ecological measure of the variety of organisms present in an ecological community including the richness (number of species) and abundance (number of individuals of each species).

storm water filtration: Use of a filtering media (sand, soil, gravel, peat, or compost) in storm water filtration structures to remove pollutants from storm water runoff.

stratovolcanoes: Also called composite volcanoes, are cone-shaped and consist of alternate layers of lava and other volcanic material such as ash.

[18] National Oceanic and Atmospheric Administration. 2006. *NOAA Fisheries Glossary*. NOAA Technical Memorandum NMFS-F/SPO-69. October 2005. Revised Edition, June 2006.

stream reach: Any specified length of a stream.

submarine volcano: Volcanoes that occur beneath the ocean surface.

subsistence fishery: Fishing when the catch is shared and consumed directly by the families and kin of the fishermen, rather than being sold.

substrate: Material such as sand and cobble that is associated with or occurs on the bottom of a body of water.[19]

subwatershed: USGS subwatershed refers to the USGS 12-digit hydrologic unit code (HUC12), which averages approximately 40 square miles, depending on the region.

succession: A gradual process of a plant or animal community successively giving way to another until a stable state is reached.

suicide contagion: Direct or indirect exposure to suicide or suicidal behaviors within one's family, peer group, or media reports that can result in an increase in suicide or suicidal behaviors, especially in adolescents and young adults.[20]

symbiont: Two organisms that live in symbiosis (mutually beneficial relationship) with one another. Algae species are symbionts with corals.

take: *Take* is defined differently by various federal and state regulations, but the most commonly accepted definition is that of the U.S. Endangered Species Act that defines take as "to harass, harm, pursue, hunt, shoot, wound, trap, capture, collect or attempt to engage in any such conduct."

taxonomic group: A group of biological organisms that have shared characteristics.

taxonomy: Science of naming and classifying organisms or specimens.

tectonic plate: The solid pieces of rock (or earth) that collide, move apart, or slide past each other over geologic time.

tectonism: Forces affecting the structural deformation, uplift, and movement of the earth's crust.

temperate forest: Forests found in regions with mild climates that receive heavy rainfall.

terrestrial: Of, or related to, the land.

thermokarst: The process by which landforms result from the thawing of ice-rich permafrost or the melting of ice.[21]

threatened species: According to the Endangered Species Act, a *threatened* species is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

[19] National Oceanic and Atmospheric Administration. 2006. *NOAA Fisheries Glossary.* NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

[20] U.S. Department of Health and Human Services. 2015. *Mental Health and Substance Abuse: Suicide*. Accessed: August 2015. Retrieved from: http://www.hhs.gov/answers/mental-health-substance-abuse/suicide/suicide-contagion.html

[21] Van Everdingen. 1998 (revised 2005). *Multi-Language Glossary of Permafrost and Related Ground-Ice Terms; In: Chinese, English, French, German, Icelandic, Italian, Norwegian, Polish, Romanian, Russian, Spanish, and Swedish*. The Arctic Institute of North America. The University of Calgary. Accessed: September 12, 2016. Retrieved from: http://globalcryospherewatch.org/reference/glossary_docs/Glossary_of_Permafrost_and_Ground-Ice_IPA_2005.pdf

time (soils): Soil properties are dependent on the period over which other processes act on them.

tonne: One tonne is a unit of measure in the International System of Units that is equivalent to 1 metric ton and equivalent to 1.1023 U.S. tons, which are also known as short tons.

topography: The unique features and shapes of the land (e.g., valleys and mountains).

Total Maximum Daily Load: Maximum pollutant amount a waterbody can receive while still meeting water quality standards.

total radiative forcing: The difference between the visible light absorbed by Earth and the energy reflected back to space.

trachyte: A type of fine-grained volcanic rock.

traditional cultural property: A place "eligible for inclusion in the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community."[22]

translocation: The capture, transport, and release (or introduction) from one location to another.

trophic: The feeding habits or relationships of different organisms in a food chain or food web.[23]

trophic structure: The way organisms utilize food resources leading to energy transfer within an ecosystem.[24]

tsunami: Large ocean waves that form as a result of water displacement.

tundra: A vast, flat, treeless Arctic region of Europe, Asia, and North America in which the subsoil is permanently frozen.

turbidity: A measure of the clarity of a liquid. When many fine particles are suspended in water, the turbidity is high.

U.S. Exclusive Economic Zone: The U.S. Exclusive Economic Zone is a 200-mile ocean boundary around the coastline of U.S. states and territories in which the U.S. asserts exclusive commercial fishing rights.

ultra-high frequency: The UHF band covers frequencies ranging from 300 MHz to 3000 MHz.

unclassified area: Any area that cannot be classified on the basis of available information as meeting the national primary or secondary air quality standard for a pollutant.

understory: The forest layer of smaller trees and shrubs that grows under the taller tree canopy, replacing the older trees as they die.

ungulate: The classification of mammals having hooves.

[22] National Park Service. 1998. *National Register Bulletin: Guidelines for Evaluating and Documenting Traditional Cultural Properties*. Accessed: September 24, 2015. Retrieved from: http://www.nps.gov/nr/publications/bulletins/nrb38/

[23] NOAA (National Oceanic and Atmospheric Administration). 2006. *NOAA Fisheries Glossary.* NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

[24] NOAA (National Oceanic and Atmospheric Administration). 2006. *NOAA Fisheries Glossary.* NOAA Technical Memorandum NMFS-F/Spo-69. U.S. Department of Commerce. Accessed: August 8, 2015. Retrieved from: https://www.st.nmfs.noaa.gov/st4/documents/FishGlossary.pdf

unicameral legislature: A legislature consisting of one chamber (a single house, for example).

unincorporated territory: In U.S. law, an unincorporated territory is an area controlled by the U.S. government "where fundamental rights apply as a matter of law, but other constitutional rights are not available."[25]

urban: Densely developed residential, commercial, and other non-residential areas.

urban electronic noise: An area with a concentration of cell phone towers and users, which by sheer volume and level of use, creates a zone of electromagnetic noise.

vascular plants: Plants that possess conducting tissues to transport nutrients and water throughout the plant.

vector: An organism that carries and transmits an infectious pathogen to another living organism.

vernal pools: Formed in basin depressions and are ponded only during the wetter part of the year; also known as ephemeral pools.[26]

very high frequency: The VHF band covers frequencies ranging from 30 MHz to 300 MHz.

visual landscape: What observers can readily see from a given vantage point.

water resources: Surface waterbodies and groundwater systems, including streams, rivers, lakes, canals, ditches, estuarine waters, floodplains, aquifers, wetlands, and other aquatic habitats.

watershed: USGS watershed refers to the USGS 10-digit hydrologic unit code (HUC10), which averages approximately 230 square miles, depending on the region.

wetland alternation: Any changes where the area remains a wetland and is not lost or converted, but the impacts cause a change in the type of wetland or a decrease in wetland function.

wetland loss or conversion: The actual loss of wetland habitat due to fill or conversion to a non-wetland habitat.

wetlands: Wetlands generally include swamps, marshes, bogs and similar areas. The USEPA defines wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

[25] U.S. General Accounting Office. 1997. *U.S. Insular Areas, Application of the U.S. Constitution*. November 1997. Accessed: June 22, 2015. Retrieved from: http://www.gao.gov/archive/1998/og98005.pdf

[26] U.S. Environmental Protection Agency. 2015. *Vernal Pools*. Accessed: October 2015. Retrieved from: http://water.epa.gov/type/wetlands/vernal.cfm